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Tyco Electronics Corporation
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Products for
Aerospace & Defense

Catalog 1308940
Issued 08-06

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Tyco Electronics brings design and problem-solving experience to your aerospace application:

Space
As more and more satellites are launched, space applications represent a fast-growing market as NASA, the European Space Agency, and a growing number of commercial satellite consortia are using satellite technology to bring new capabilities to Earth. Tyco Electronics is there in launch vehicles, ground stations and of course, satellites.

Commercial Aircraft
Safety, performance, and passenger convenience in commercial systems benefit from Tyco Electronics' capabilities. Our experience in electronics, interconnections and packaging brings new levels of value and technology.

Aerospace and Defense Electronics
We serve almost every defense and government agency program, with emphasis on electronic warfare, smart weapons, navigation and communications, radar and all aircraft platforms.

In-Flight Networking
We are helping to deliver reliable, in-seat entertainment systems using a fiber optic and copper network backbone. We offer a wide choice of interconnect solutions to enable in-flight networking via ARINC 628, 664 and 763 specifications.

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Products for Aerospace and Defense Applications

Introduction

For over 60 years, we have been helping the aerospace and defense industry reach new levels of performance with specific product solutions. Built on the foundation of AMP Incorporated, which originated in 1941 as Aircraft Marine Products, Tyco Electronics is now the home of an unmatched array of quality components for the MIL-Aero market, including such well-known and respected brands as AMP, Raychem, CII, NANONICS, M/A-COM, HARTMAN, KILOVAC, MICRODOT, LDI, Elcon, Elo TouchSystems, TDI Batteries and many more.

In just three years, Tyco Electronics has grown to become the world's largest manufacturer of passive electronic components, as well as a world leader in cutting-edge wireless technologies and fiber optic active components. We are also one of the largest RF component and subsystem manufacturers in the industry. In addition to our broad offering of interconnection solutions for copper and fiber, cable and harness assemblies, wireless components and antennas, Tyco Electronics' portfolio also includes printed circuits, touch screens, relays, high-reliability lasers, aircraft sensors, plus nano- and micro-lens connectors for free space optical interconnect applications. In short, we have the products to meet your MIL-Spec, QPL, space-qualified and COTS requirements.

We're committed to working with you to design the next generation of aerospace and defense products — and delivering cost-effective performance and innovative solutions through capabilities such as:

- Design and development engineering and analysis
- Reliability, quality assurance, testing and agency approvals
- Materials engineering expertise in metals, polymers and plating
- Technology leadership in electromagnetic and shielding analysis and high-speed circuit design
- Program management

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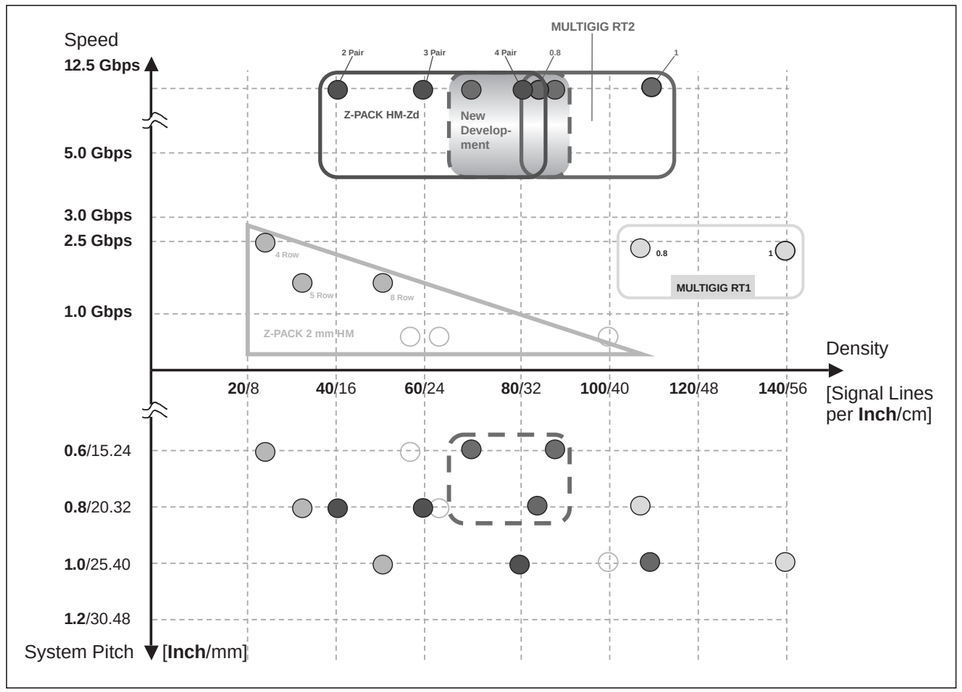
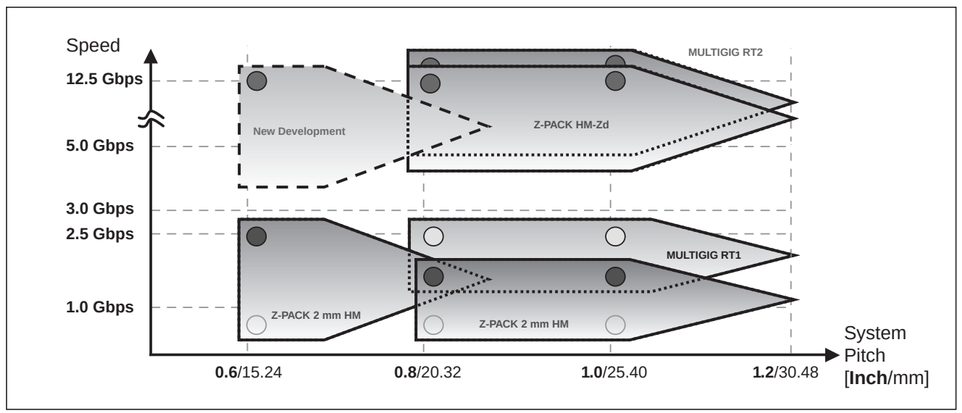


High Speed Backplane Connectors Ranked by:
- **Speed Versus Signal Density**
- **System Slot-Pitch Versus Signal Density**



High Speed Backplane Connectors Ranked by:
- **Speed Versus System Slot-Pitch**

Catalog 1308940
Revised 8-06

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
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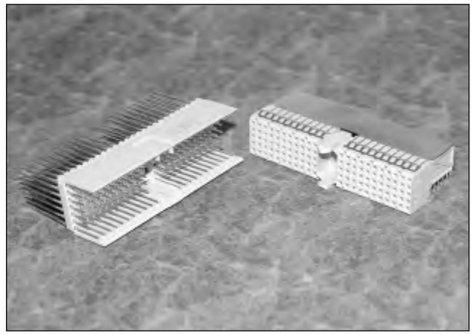
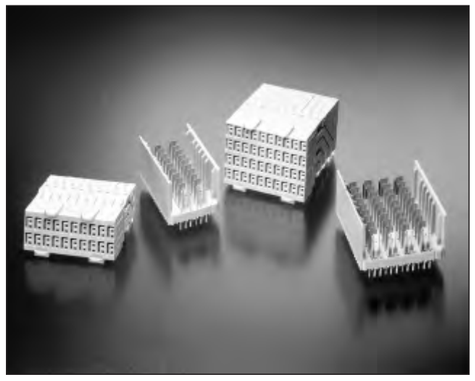
Introduction (Continued)



Z-PACK 2 mm HM Product

- Hard Metric 2 mm pitch in accordance to IEC 917 and IEC 61076-4-101.
- Open pin field connector capable of supporting data rates of 2.5 Gb/s depending on the S/G ratio.
- Modular units give flexible configurations.
- Extensive range of signal, power, coaxial and fibre board-to-board and cable-to-board connections.
- Available in four, five, eight (and twelve-row) configurations, respectively fitting .600 [15.25], .800 [20.32], 1.000 [25.40] slot-pitches.
- Four row configuration is specially designed to fit IEC 917-2-2.
- Available shielded and unshielded for board and cable versions.
- Order Catalog 65911, “Z-PACK 2 mm HM Interconnection Catalog”.



Z-PACK HM-Zd Product

- Designed specifically for high speed differential applications.
- Capable of supporting data rates up to 12.5 Gb/s.
- Modular connector system designed as Z-PACK 2 mm HM family extension.
- Available in two, three and four pairs/column, fitting .800 [20.32] slot-pitch for two and three pair version and 1.000 [25.40] slot-pitch for the four pair version.
- Standard four pair right-angle board-to-board connector specified in the PICMG 3.X Advanced TCA specifications.
- Density up to 32 signal lines (16 diff. Pairs) per cm board space, in 1.000 [25.40] slot-pitch.
- Product family includes right-angle board-to-board, mid-plane board, co-planar board, mezzanine board and cable-to-board connectors.
- Future plans to increase product density based on similar connector design in SMT & Press-Fit: Z-PACK HM-Zd HD.
- Connector footprint optimized for improved electrical performance and ease of trace routing (including Quad-routing to improve electrical performance and reduce PCB cost).
- Order Catalog 1773095, “High Speed Board-to-Board Products”.
- Website: http://hmzd.tycoelectronics.com

Catalog 1308940
Revised 8-06

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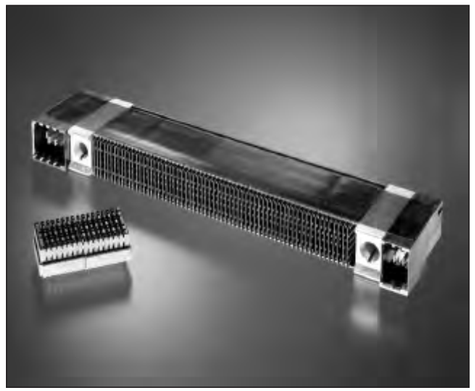
Introduction (Continued)



MULTIGIG RT Product

- Pinless backplane connector capable of supporting data rates up to 12.5 Gb/s.
- Available in two tiers; third tier in development.
- Available in 2 versions per tier: 0.8″ and 1″, respectively fitting .800 [20.32] and 1.000 [25.4] slot-pitches.
- Up to 56 high speed lines per cm board space, in 1.000 [25.40] slot-pitch.
- Connector system specified in VME standards: VITA 41 & VITA 46.
- Daughtercard connector utilizes a PCB construction, which allows the connector system to have extreme flexibility. 100 Ohm differential, 50 Ohm single ended, open pin field and power wafers can be mixed within one connector module.
- Future plans to include components, active and passive, within the daughtercard connector.
- Order Catalog 1773095, “High Speed Board-to-Board Products”.
- Website: http://www.multigigrt.com

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Revised 8-06

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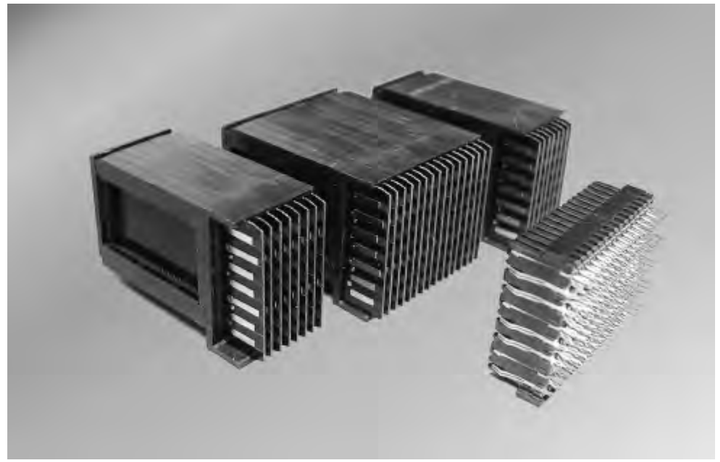
MULTIGIG RT Tier 1 Connector System

Target Applications

- High speed telecommunications equipment
- Midrange and high-end servers
- Networking equipment
- Blindmate design
- High speed custom platforms
- Mass data storage
- Rugged, mission-critical applications

Product Features

- Excellent performance to 3.125 Gb/s
- High density: 140 contacts per inch provides 70 contact pairs per inch for differential signaling
- Options include .800 [20.32] and 1.000 [25.40] pitch card spacing
- Modular options for signal, power, keying and guidance
- Optimized footprints
- Robust design
- Low noise levels
- Supports differential pair widths of 6 mils with 9 mil spacings
- Single-ended option available; contact Tyco Electronics for performance data



The MULTIGIG RT Tier 1 connector meets customer requirements for high-density and high-performance two-piece interconnects. In Tyco Electronics and independent lab tests, the MULTIGIG RT Tier 1 connector has performed in excess of 3 Gb/s using standard FR-4 board material and routing techniques.

The MULTIGIG RT Tier 1 connector is a differential connector with a contact density of 70 pairs per inch. The robust connector uses daughtercard plugs with a printed circuit board (PCB) wafer design and backplane receptacles with a completely enclosed dual-beam design. All signal lines use redundant points of contact for high reliability.

The MULTIGIG RT Tier 1 connector is available for both .800 [20.32] and 1.000 [25.40] pitch card spacing. The totally modular system allows flexibility in choosing signal and power modules as well as guidance, keying, and electrostatic discharge (ESD) modules to meet the most demanding applications. Signal modules can be customized for specific electrical requirements—such as sequencing—that are critical in high speed applications.

Power modules are available with two- and four-voltage options, each circuit capable of carrying 15 amps. The robust metal guide pin provides eight keying options and a unique ESD contact to discharge static when daughtercards are hot-plugged.

Availability

Fully validated SPICE models: E-mail requests to modeling@tycoelectronics.com

Pro/E models and IGES models: E-mail requests to TycoCAD@tycoelectronics.com

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Revised 8-06

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MULTIGIG RT Tier 1 Connector System (Continued)

Mechanical Design Summary

Mechanical Features

- **Extremely rugged connector for mission-critical applications**
- **Three signal sequencing levels plus an additional three power sequencing levels**
- **Keyed guide modules standard: cannot mate connector incorrectly, and provide ± 3 mm of gather**
- **Options available include:**
  - **Power modules**
  - **Electrostatic discharge guide pins**
  - **Multiple guide pin keying options**
- **High signal density: 70 pairs for differential signals**

METRIC

Dimensions on this page are millimeters over inches. All other pages are inches over millimeters.

20.30 [.800] Pitch Connector

Type	Style	No. of Cols.	Signal Pattern	Part Number
(Backplane) Receptacle	Center	16	N/A	1410200-1
	Stand Alone	16	N/A	1410420-1
	Half Left	8	N/A	1410226-1
	Half Right	8	N/A	1410227-1
	Full Left	16	N/A	1410201-1
	Full Right	16	N/A	1410202-1
(Daughtercard) Plug	Center	16	S.E.	1410205-1
		16	Diff.	1410205-2
	Stand Alone	16	S.E.	1410421-1
		16	Diff.	1410421-2
	Half Left	8	S.E.	1410228-1
		8	Diff.	1410228-2
	Half Right	8	S.E.	1410229-1
		8	Diff.	1410229-2
	Full Left	16	S.E.	1410206-1
		16	Diff.	1410206-2
	Full Right	16	S.E.	1410207-1
		16	Diff.	1410207-2

25.40 [1.000] Pitch Connector

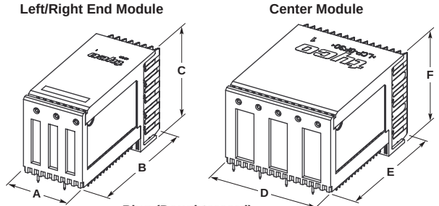
Type	Style	No. of Cols.	Signal Pattern	Part Number
(Backplane) Receptacle	Center	16	N/A	1410210-1
	Stand Alone	16	N/A	1410412-1
	Half Left	8	N/A	1410231-1
	Half Right	8	N/A	1410230-1
	Full Left	16	N/A	1410211-1
	Full Right	16	N/A	1410212-1
(Daughtercard) Plug	Center	16	S.E.	1410215-1
		16	Diff.	1410215-2
	Stand Alone	16	S.E.	1410413-1
		16	Diff.	1410413-2
	Half Left	8	S.E.	1410232-1
		8	Diff.	1410232-2
	Half Right	8	S.E.	1410233-1
		8	Diff.	1410233-2
	Full Left	16	S.E.	1410216-1
		16	Diff.	1410216-2
	Full Right	16	S.E.	1410217-1
		16	Diff.	1410217-2

The drawings below show the nominal dimensions for the MULTIGIG RT 1 connector modules

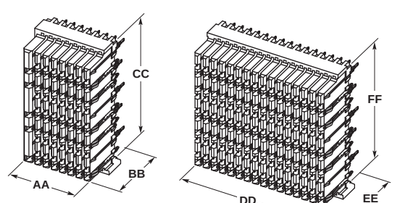
Dim.	20.32 [.800] Connector	25.40 [1.000] Connector
A	**16.10** .630	**16.10** .630
B	**21.60** .850	**27.40** 1.080
C	**18.40** .720	**24.20** .950
D	**28.70** 1.130	**28.70** 1.130
E	**21.60** .850	**27.40** 1.080
F	**18.40** .720	**24.20** .950

Dim.	20.32 [.800] Connector	25.40 [1.000] Connector
AA	R = **17.00** .067 L = **15.20** .600	R = **17.00** .067 L = **15.20** .600
BB	**10.50** .410	**10.50** .410
CC	**18.60** .730	**24.40** .960
DD	**28.70** 1.130	**28.70** 1.130
EE	**10.50** .410	**10.50** .410
FF	**18.60** .730	**24.40** .960

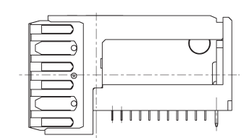
Left/Right End Module | **Center Module** | **Left Full End Module** | **Right Full End Module**

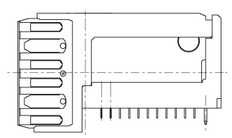


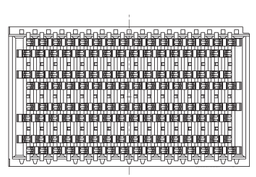
Plug (Daughtercard)



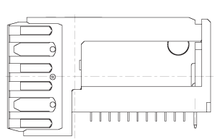
Receptacle (Backplane)







Stand Alone Backplane



Stand Alone Daughtercard

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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UK: 44-208-420-8341

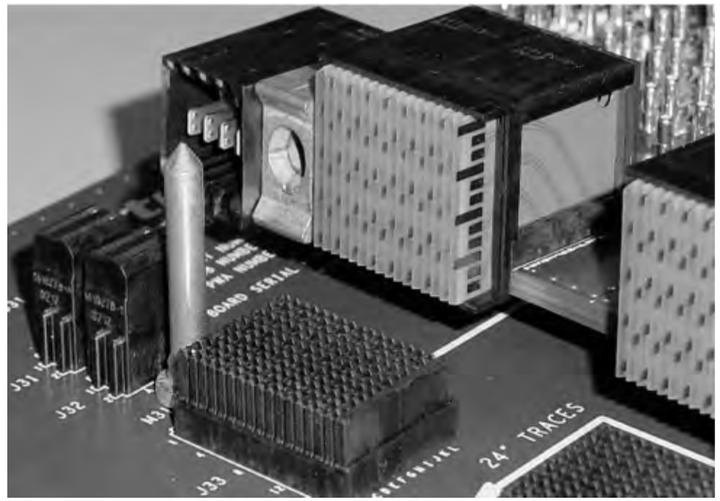
MULTIGIG RT Tier 2 Connector System

Target Applications

- High speed telecommunications equipment
- Midrange and high-end servers
- Networking equipment
- Blindmate design
- High speed custom platforms
- Mass data storage
- Rugged, mission-critical applications

Product Features

- Excellent performance to 6.25+ Gb/s
- High density: 113 contacts per inch provides 56 contact pairs per inch for differential signaling
- Options include .800 [20.32] and 1.000 [25.40] pitch card spacing
- Modular options for signal, power, keying and guidance
- Optimized footprints
- Robust design
- Low noise levels
- Supports differential pair widths of 6 mils with 9 mil spacings
- Single-ended, open pin field and power wafers available



The MULTIGIG RT Tier 2 connector is the latest product release to meet customer requirements for high-density and high-performance two-piece interconnects. In Tyco Electronics and independent lab tests, the MULTIGIG RT Tier 2 connector has performed in excess of 6 Gb/s using standard FR-4 board material and routing techniques, and has **been demonstrated to 10 Gb/s**.

The MULTIGIG RT Tier 2 connector system provides the flexibility to configure the daughtercard for Differential, Single-ended, Open Pin Field, or Power within a single connector module. All of these options then mate into a common Backplane Receptacle. The robust connector uses daughtercard plugs with a printed circuit board (PCB) wafer design and backplane receptacles with a completely enclosed dual-beam design. All signal lines use redundant points of contact for high reliability.

The MULTIGIG RT Tier 2 connector is available for both .800 [20.32] and 1.000 [25.40] pitch card spacing. The totally modular system allows flexibility in choosing signal and power modules as well as guidance, keying, and electrostatic discharge (ESD) modules to meet the most demanding applications. Signal modules can be customized for specific electrical requirements—such as sequencing—that are critical in high speed applications.

Power modules are available with two- and four-voltage options, each circuit capable of carrying 15 amps. The robust metal guide pin provides eight keying options and a unique ESD contact to discharge static when daughtercards are hot-plugged.

Availability

Fully validated SPICE models: E-mail requests to modeling@tycoelectronics.com

Pro/E models and IGES models: E-mail requests to TycoCAD@tycoelectronics.com

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MULTIGIG RT Tier 2 Connector System (Continued)

Mechanical Design Summary

20.30 [.800] Pitch Connector

Type	Style	No. of Cols.	Signal Pattern	Part Number
(Backplane) Receptacle	Center	16	N/A	1410140-1
	Stand Alone	16	N/A	1410133-1
	Half Left	8	N/A	1410186-1
	Half Right	8	N/A	*
	Full Left	16	N/A	1410141-1
	Full Right	16	N/A	1410142-1
	Right End	18	N/A	1410456-1
(Daughtercard) Plug	Center	16	S.E.	*
		16	Diff.	1410137-1
	Stand Alone	16	S.E.	*
		16	Diff.	1410134-1
	Half Left	8	S.E.	*
		8	Diff.	*
	Half Right	8	S.E.	*
		8	Diff.	*
	Full Left	16	S.E.	*
		16	Diff.	1410138-1
	Full Right	16	S.E.	*
		16	Diff.	1410139-1

* Contact Tyco Electronics.

25.40 [1.000] Pitch Connector

Type	Style	No. of Cols.	Signal Pattern	Part Number
(Backplane) Receptacle	Center	16	N/A	1410127-1
	Stand Alone	16	N/A	1410131-1
	Half Left	8	N/A	*
	Half Right	8	N/A	*
	Full Left	16	N/A	1410129-1
	Full Right	16	N/A	1410128-1
(Daughtercard) Plug	Center	16	S.E.	*
		16	Diff.	1410123-1
	Stand Alone	16	S.E.	*
		16	Diff.	1410132-1
	Half Left	8	S.E.	*
		8	Diff.	*
	Half Right	8	S.E.	*
		8	Diff.	*
	Full Left	16	S.E.	*
		16	Diff.	1410124-1
	Full Right	16	S.E.	*
		16	Diff.	1410125-1

* Contact Tyco Electronics.

METRIC
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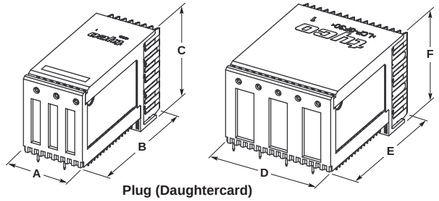
The drawings below show the nominal dimensions for the MULTIGIG RT 2 connector modules

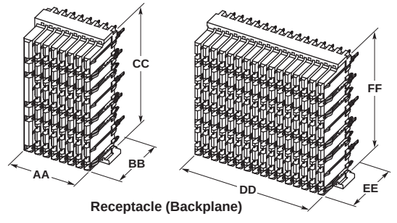
Dim.	20.32 [.800] Connector	25.40 [1.000] Connector
A	**16.10** .630	**16.10** .630
B	**21.60** .850	**27.40** 1.080
C	**18.40** .720	**24.20** .950
D	**28.70** 1.130	**28.70** 1.130
E	**21.60** .850	**27.40** 1.080
F	**18.40** .720	**24.20** .950

Dim.	20.32 [.800] Connector	25.40 [1.000] Connector
AA	R = **17.00** .067 L = **15.20** .600	R = **17.00** .067 L = **15.20** .600
BB	**10.50** .410	**10.50** .410
CC	**18.60** .730	**24.40** .960
DD	**28.70** 1.130	**28.70** 1.130
EE	**10.50** .410	**10.50** .410
FF	**18.60** .730	**24.40** .960

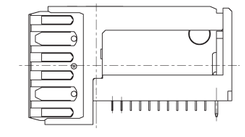
Left/Right End Module **Center Module** **Left Full End Module** **Right Full End Module**

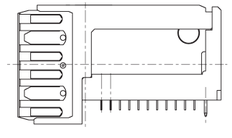


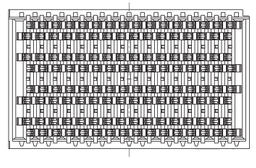
Plug (Daughtercard)



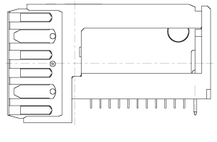
Receptacle (Backplane)







Stand Alone Backplane



Stand Alone Daughtercard

1

Printed Circuit Board Connectors

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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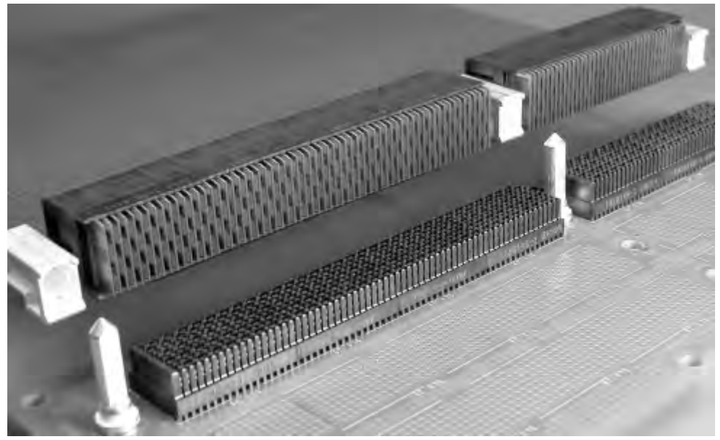
MULTIGIG RT Connector Products for VITA 46 (VPX)

Product Facts

- 10 Gbps performance
- Differential, Single-ended and Power
- Customizable impedance matched printed circuit wafer interface
- Backplane connector system with “pinless” interface
- Superior crosstalk performance
- Optimized footprints for signal integrity and ease of board design
- Utilizes a .022 [0.56] diameter via for backplane connector for lower cost board fabrication
- Three levels of signal contact sequencing
- Modular connector system
- Available for .800 [20.30] or 1.00 [25.40] card pitch systems
- Complete connector family includes…
  - Power Modules
  - Guidance Modules
  - Cable Assemblies planned
- Provides ESD protection



The MULTIGIG RT product line is a backplane interconnect family that offers levels of flexibility and customization never before seen in the industry. This printed circuit based, pinless, interconnect family is comprised of modular components which can be used in a variety of combinations.

Applications

- Military
- Aerospace and Defense
- Rugged, mission critical applications
- Mass data storage
- High-end and mid-range servers
- Telecommunications equipment

Catalog 1308940
Revised 8-06

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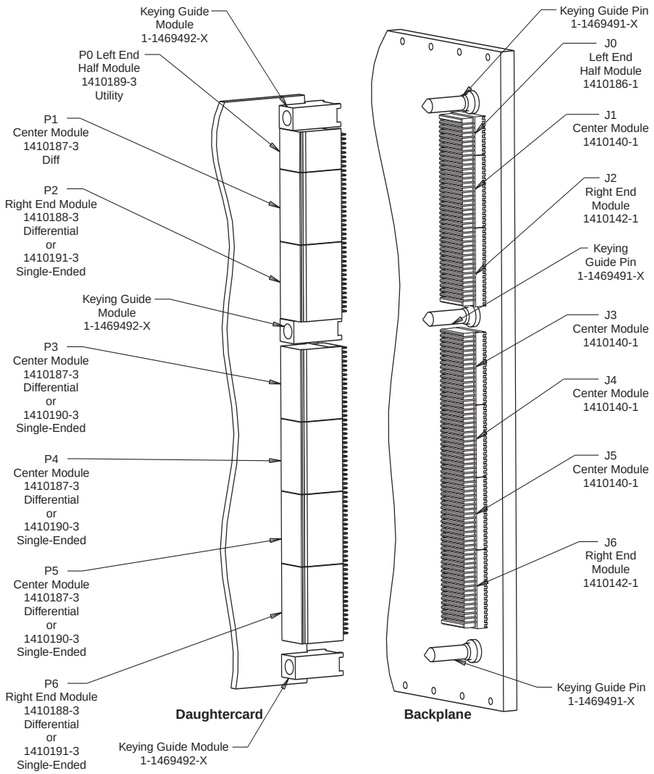
MULTIGIG RT Connector Products for VITA 46 (VPX) (Continued)

Product Offering

For additional information on the complete MultiGig product family, visit: www.multigigrt.com



VITA 46 (VPX) Connectors and Guide Hardware

	Location	Used On	Part Number	Description
Backplane	J0	3U & 6U	1410186-1	RT-2, BP, Left End, 8 Columns
	J1	3U & 6U	1410140-1	RT-2, BP, Center, 16 Columns
	J2	3U & 6U	1410142-1	RT-2, BP, Right End, 16 Columns
	J3	6U only	1410140-1	RT-2, BP, Center, 16 Columns
	J4	6U only	1410140-1	RT-2, BP, Center, 16 Columns
	J5 (or J6) *	6U only	1410140-1	RT-2, BP, Center, 16 Columns
	J6	6U only	1410142-1	RT-2, BP, Right End, 16 Columns
Daughtercard	P0	3U & 6U	1410189-3	RT-2, 7 Row, DC, Left End, 8 Columns, Mixed S-E, Diff, Power
	P1	3U & 6U	1410187-3	RT-2, 7 Row, DC, Center, 16 Columns, Diff
	P2	3U & 6U	1410188-3	RT-2, 7 Row, DC, Right End, 16 Columns, Diff (or 1410191-3 S-E)
	P3	6U only	1410187-3	RT-2, 7 Row, DC, Center, 16 Columns, Diff (or 1410190-3 S-E)
	P4	6U only	1410187-3	RT-2, 7 Row, DC, Center, 16 Columns, Diff (or 1410190-3 S-E)
	P5 (or P6) *	6U only	1410187-3	RT-2, 7 Row, DC, Center, 16 Columns, Diff (or 1410190-3 S-E)
	P6	6U only	1410188-3	RT-2, 7 Row, DC, Right End, 16 Columns, Diff (or 1410191-3 S-E)
Guidance				
Backplane	N/A	3U & 6U	1-1469491-x**	Guide Pin, BP, for 9mm wide module
Daughtercard	N/A	3U & 6U	1-1469492-x**	Guide Module, DC, 9mm wide
		3U & 6U	1410946-1	Screw, Low Profile with Nylox, for Guide Module

* Connectors J5 and P5 will use connectors J6 and P6 respectively when the physical position of J6 and P6 is either not being used, or a connector other than MULTIGIG RT is in this position, such as a fiber optic connector.
** See product drawing for dash number options.

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Introduction

Mini-Box .050 [1.27] Centerline Connectors

Mini-Box Contact Connectors, per MIL-C-55302 are available in 2-row configurations with pin counts from 20 to 200 positions and uses the reliable 4-beam box contact and 4-row configurations up to 320 positions. The tighter centerline spacing, .050 x .150 [1.27 x 3.81] in 2-row, .050 x .100 [1.27 x 2.54] in 4-row, provides more pins within a specified distance and the staggered footprint allows for easier manufacturing of the pc boards.

Standard receptacles are thru-hole flow solder, surface mount, press fit tail and straddle mount. Standard pin headers are available in a choice of surface mount, straddle mount or right-angle configurations.

Extended receptacles are vertical thru-hole and pin headers are available in straddle mount or right-angle thru-hole versions.

In addition, Mini-Box 2-row connectors are available with 4 or 6 hybrid cavities which accept micro-miniature coax contacts or a choice of high voltage pin and socket contacts.

Tyco Electronics Mini-Box connectors are also available in 4-row connector configurations. Vertical mount receptacle assemblies and pin headers with flexible circuit tails.

(See pages 1-31 to 1-32)

AMP-HDI .050 [1.27] and .075 [1.91] Centerline Connectors

This family includes .050 [1.27] stacking connectors and 6 & 8 Row LRM (Line Replaceable Module) Connectors

Designed specifically to be the next generation, high density electronic packaging system, the AMP-HDI 6 Row, .075 [1.91] centerlines and 8 Row, .080 [2.03] centerlines, LRM Interconnection System meets applicable DSCC 89065 LRM specifications. This advanced system features high temperature plastic housings compatible with IR reflow solder techniques. Added advantage of the AMP-HDI LRM System is its capability of accepting MIL SPEC fiber optic contacts per MIL-T29504/5. Six-row configurations available in 306 contact positions. Eight-row configurations feature two 214 position plug halves which mate with one 428-position receptacle. This technological leader is offered with standard tin-lead plated solder tails and for those applications where maintaining a light weight system is a factor. The 8-row configuration is made available with weight saving, flexible film tails.

Equally important are Application Costs. The AMP-HDI LRM interconnection system offers advanced tooling that simplifies contact alignment to the pc board, substantially reducing overall applied labor costs. (See pages 1-35 to 1-42)

.075 [1.91] & .100 [2.54] Centerline Box Contact Connectors

Box Contact Connectors with contacts on .075 [1.91] & .100 [2.54] centerline spacing are available in 2, 3 and 4-row configurations with pin counts up to 300 contact positions. Box contact connectors use this unique, reliable four-beam design which offers low applied cost while maintaining high reliability and performance. (See pages 1-43 to 1-83)

Commercial military versions are available for both pin headers and receptacles.

Box II vertical receptacles with ACTION PIN Posts and Solder Post Contacts are also available. When mated with AMP-HDI pin assemblies, these permit horizontal stacking of motherboards. 2, 3, and 4-row connector versions are available.

.100 [2.54] Centerline Connectors

AMPMODU Board-Mount Receptacle Assemblies are qualified to MIL-C-55302, and provide a compact and versatile means of interconnecting today's complex electronic modules. Right-angle receptacle connectors mate with .025[2] [0.64[2]] posts, have dual cantilever spring contact design and built-in anti-overstress, duplex gold-over-nickel plating, and wide misalignment tolerances. Contacts are on .100 [2.54] centerlines, and are available in single or double row, blue diallyl phthalate housings. Assemblies will accommodate pcb .062 [1.57] or .093 [2.36] thick. (See pages 1-96 to 1-103)

AMP-BLADE Two-Piece PC Edge Connectors provide high levels of conductivity and reliability to meet the performance specifications of MIL-C-21097, and the design requirements of MIL-E-5400. Blade and receptacle contacts, on .100 [2.54] centerlines provide multiple areas of contact for maximum conductivity. Blade contacts are gold plated in the contact mating area, with tin-lead on the solder tails all over nickel underplate.

PC board housings are available with or without mounting hole while cable-mount connectors are designed for maximum versatility, and will accept a variety of receptacle contact designs. (See pages 1-104 to 1-111).

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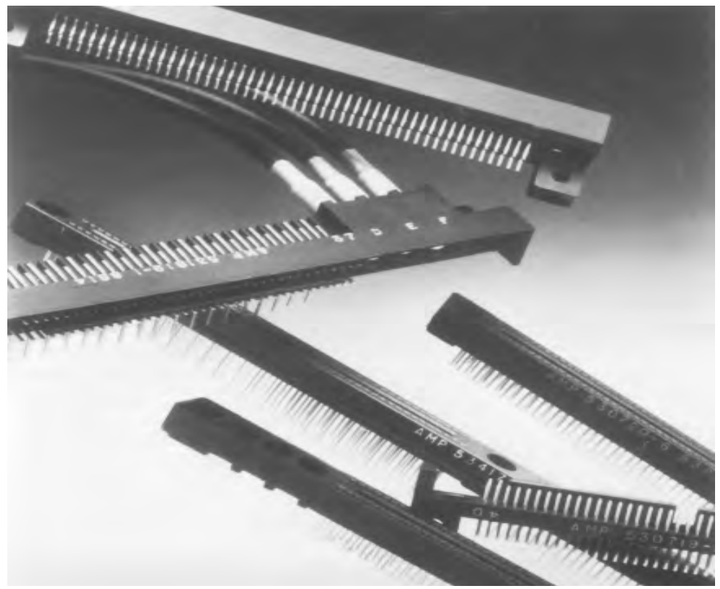
Introduction



Product Facts

- Contacts are on .050 x .150 [1.27 x 3.81] centers
- Four-beam box-type receptacle contact design provides four areas of contact per connection
- Quad-beam contact redundancy makes it an excellent choice in high-vibration environments
- 2-row standard versions: 2 to 120 contact positions
- 2-row extended versions: 132 to 200 contact positions
- 4-row versions: 120 to 320 contact positions
- Sealed versions available
- Pin headers are available in straddle mount (with or without pin protectors) and right-angle versions (with pin protectors)
- Solder tails on receptacles and right-angle pin headers are staggered for easy access
- Hybrid connectors with coaxial and signal contacts available
- Qualified to MIL-C-55302/117, /118, /119
- 2 row and 4 row versions available

Tyco Electronics Mini-Box .050 [1.27] centerline connectors are available in 2-row connector configurations having 20 to 128 contact positions in the standard version, and 132 to 200 contact positions in the extended version.

Standard Mini-Box receptacle assemblies are available with a choice of thru-hole, surface-mount or straddle mount solder tails. Standard Mini-Box pin headers are designed with surface-mount, straddle mount, and thru-hole right-angle solder tails.

Extended receptacle assemblies are vertical-mount thru-hole configurations, and pin headers are in a choice of straddle mount or thru-hole versions.

A 4-row version for compact high count connections* is offered in thru-hole receptacle and straddle mount pin header configurations.

Mini-Box connectors are also available in four or six cavity hybrid configurations with 26 to 74-Mini-Box contacts.

Coaxial Cavities in the hybrid Mini-Box connectors will also accept high voltage pin or socket contacts with operating voltage up to 5KVDC.

External keying is an added feature of the Tyco Electronics Mini-Box connector family. External keys are used with receptacle assemblies and pin headers. Keys used in one end of each mated pair will yield eight keying combinations. If used in both ends sixty-four keying combinations are possible.

*up to 360 positions

Performance Characteristics

Rated Current — 1.5 amps per contact

Operating Temperature Range — -85° to 257°F [-65° to 125° C]

Maximum Mating Force — .3 lb. [.08N] per contact

Durability — 500 cycles of mating and unmating

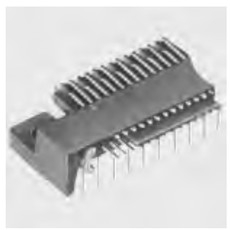
Dielectric Withstanding Voltage — 600 VAC at sea level, 150 VAC at 70,000 feet

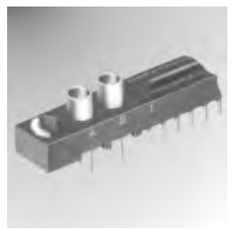
Technical Documents

Product Specifications

108-9046 Connector Mini-Box Contact

108-1663 Connector Mini-Box Contact with Compliant Printed Wiring Board Termination





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Mini-Box Receptacle Assemblies for Flow Soldering — MIL-C-55302 Qualified

Housing Material — In accordance with MIL-M-24519 per MIL-C-55302. GLCP-30F, liquid crystal polymer

[1] Contact Material and Finish — Commercial receptacle — Beryllium copper per QQ-C-533 or ASTM B768, or phosphor bronze per ASTM B103 plated .000030 [0.00076] min. gold in the mating area, .000100 [0.00254] min. tin-lead in the terminating area over .000030 [0.00076] min. nickel on the entire contact; Military receptacle — Beryllium copper per QQ-C-533 or ASTM B768, or phosphor bronze per ASTM B103 plated .000050 [0.00127] min. gold in the mating area, .000100 [0.00254] min. tin-lead in the terminating area over .000030 [0.00076] min. nickel on the entire contact

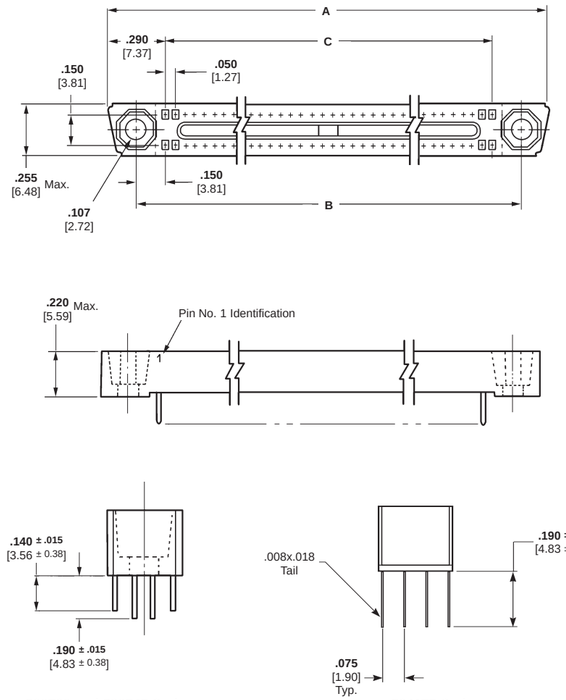
[2] Contact Material and Finish — Same as above except for tin in the terminating area

Related Product Data

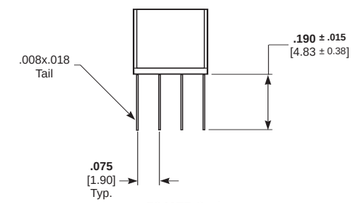
Mates with — Pin headers, pages 1-17 to 1-19

External Keying — page 1-30

Recommended PC Board Layout — page 1-28



530720 and 530745 Series



534175 Series

No. of Pos.	Dimensions			Assembly Part Nos.				Military Assembly Part Nos.		
	A	B	C	Commercial[1]	Commercial[2]	Epoxy Sealed*[1]	Epoxy Sealed*[2]	M55302/	Unsealed[1]	Sealed[1]
128	**3.740** 95.00	**3.450** 87.63	**3.150** 80.01	530720-9	—	534175-1	5-534175-1	119-11	1-530745-1	2-530745-2
110	**3.290** 83.57	**3.000** 76.2	**2.700** 68.58	530720-8	—	534175-2	—	119-10	1-530745-0	2-530745-1
100	**3.040** 77.22	**2.750** 69.85	**2.450** 62.23	530720-7	5-530720-7	534175-3	—	119-09	530745-9	2-530745-0
90	**2.790** 70.87	**2.500** 63.5	**2.200** 55.88	530720-6	—	534175-4	—	119-08	530745-8	1-530745-9
80	**2.540** 64.52	**2.250** 57.15	**1.950** 49.53	530720-5	—	534175-5	—	119-07	530745-7	1-530745-8
70	**2.290** 58.17	**2.000** 50.8	**1.700** 43.18	530720-4	—	534175-6	—	119-06	530745-6	1-530745-7
60	**2.040** 51.82	**1.750** 44.45	**1.450** 36.83	530720-3	—	534175-7	—	119-05	530745-5	1-530745-6
50	**1.790** 45.47	**1.500** 38.1	**1.200** 30.48	530720-2	—	534175-8	—	119-04	530745-4	1-530745-5
40	**1.540** 39.12	**1.250** 31.75	**.950** 24.13	530720-1	5-530720-1	534175-9	—	119-03	530745-3	1-530745-4
30	**1.290** 32.77	**1.000** 25.4	**.700** 17.78	1-530720-0	6-530720-0	1-534175-0	—	119-02	530745-2	1-530745-3
20	**1.040** 26.42	**.750** 19.05	**.450** 11.43	1-530720-1	—	1-534175-1	—	119-01	530745-1	1-530745-2

Note: Contact Alignment Tool—Part Number 58107-1
*Same contact material and finish per military receptacle

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Mini-Box Receptacle Assemblies for Flow Soldering — MIL-C-55302 Qualified (Continued)

Vertical, Surface-Mount

Material and Finish

Housing — In accordance with MIL-M-24519 per MIL-C-55302. GLCP-30F, liquid crystal polymer, grey

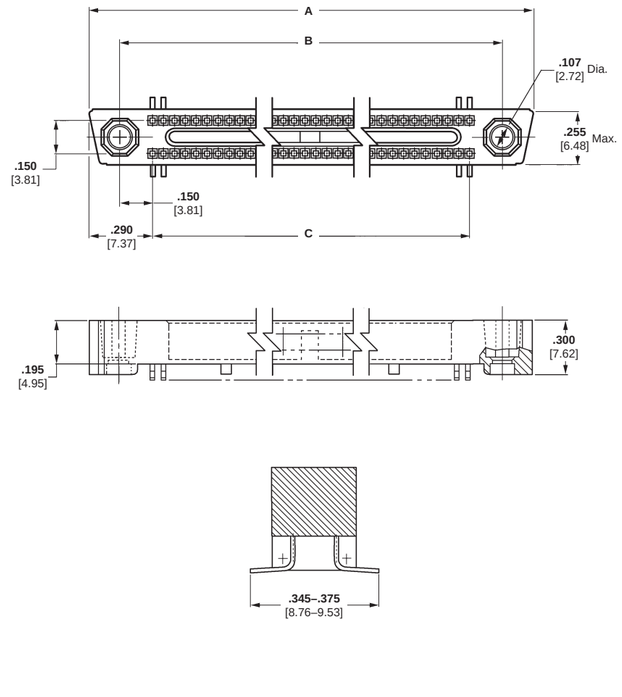
Contacts — Beryllium copper per QQ-C-533 or ASTM B768, or phosphor bronze per ASTM B103 plated .000050 [0.00127] min. gold in themating area, .000100 [0.00254] min. tin-lead in the terminating area, over .000030 [0.00076] min. nickel on the entire contact

Related Product Data

Mates with — Pin headers, pages 1-17 to 1-19

External Keying — page 1-30

Recommended PC Board Layout — page 1-29



No. of Pos.	Dimensions			Assembly Part No.
	A	B	C	
128	**3.740** 95.00	**3.450** 87.63	**3.150** 80.01	1-449599-1
110	**3.290** 83.57	**3.000** 76.20	**2.700** 68.58	1-449599-0
100	**3.040** 77.22	**2.750** 69.85	**2.450** 62.23	449599-9
90	**2.790** 70.87	**2.500** 63.50	**2.200** 55.88	449599-8
80	**2.540** 64.52	**2.250** 57.15	**1.950** 49.53	449599-7
70	**2.290** 58.17	**2.000** 50.80	**1.700** 43.18	449599-6
60	**2.040** 51.82	**1.750** 44.45	**1.450** 36.83	449599-5
50	**1.790** 45.47	**1.500** 38.10	**1.200** 30.48	449599-4
40	**1.540** 39.12	**1.250** 31.75	**.950** 24.13	449599-3
30	**1.290** 32.77	**1.000** 25.40	**.700** 17.78	449599-2
20	**1.040** 26.42	**.750** 19.05	**.450** 11.43	449599-1

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Mini-Box Straddle Mount Receptacle Assemblies

Housing Material — Liquid crystal polymer

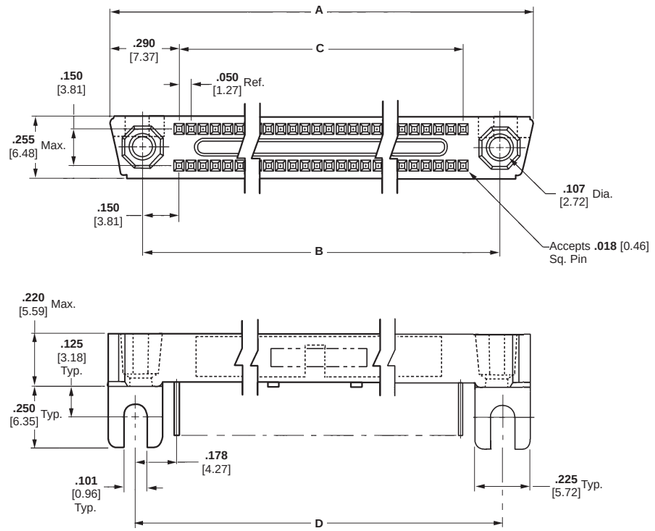
Contact Material and Finish — Beryllium copper per QQ-C-533 or ASTM B768, or phosphor bronze per ASTM B103 plated .000050 [0.00127] min. gold in the mating area, .000100 [0.00254] min. tin-lead in the terminating area over .000030 [0.00076] min. nickel on the entire contact

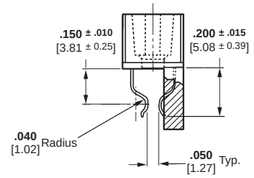
Related Product Data

Mates with — Pin headers, pages 1-17 to 1-19

External Keying — page 1-30

Recommended PC Board Layout — page 1-28





No. of Pos.	Dimensions				Assembly Part No.
	A	B	C	D	
128	**3.740** 95.00	**3.450** 87.63	**3.150** 80.01	**3.505** 89.03	445185-1
110	**3.290** 83.57	**3.000** 76.2	**2.700** 68.58	**3.055** 77.60	445185-2
100	**3.040** 77.22	**2.750** 69.85	**2.450** 62.23	**2.805** 71.25	445185-3
90	**2.790** 70.87	**2.500** 63.5	**2.200** 55.88	**2.555** 64.90	445185-4
80	**2.540** 64.52	**2.250** 57.15	**1.950** 49.53	**2.305** 58.55	445185-5
70	**2.290** 58.17	**2.000** 50.8	**1.700** 43.18	**2.055** 52.20	445185-6
60	**2.040** 51.82	**1.750** 44.45	**1.450** 36.83	**1.805** 45.85	445185-7
50	**1.790** 45.47	**1.500** 38.1	**1.200** 30.48	**1.555** 39.50	445185-8
40	**1.540** 39.12	**1.250** 31.75	**.950** 24.13	**1.305** 33.15	445185-9
30	**1.290** 32.77	**1.000** 25.4	**.700** 17.78	**1.055** 26.80	1-445185-0
20	**1.040** 26.42	**.750** 19.05	**.450** 11.43	**.805** 20.45	1-445185-1

Mini-Box Pin Header Assemblies

Vertical, Surface Mount

Material and Finish

Housing — In accordance with MIL-M-24519 per MIL-C-55302. GLCP-30F, liquid crystal polymer, grey

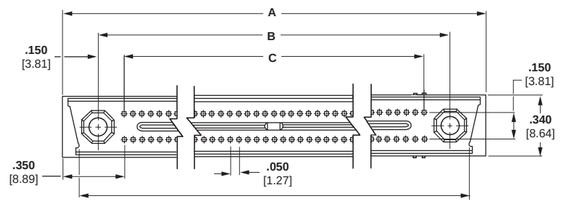
Contacts — Brass per QQ-B-626, plated .000050 [0.00127] min. gold in the mating area, .000100 [0.00254] min. tin-lead in the terminating area, over .000030 [0.00076] min. nickel on the entire contact

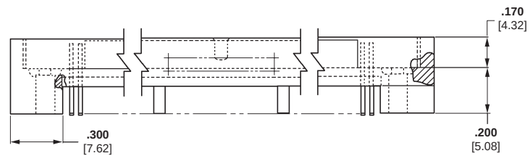
Related Product Data

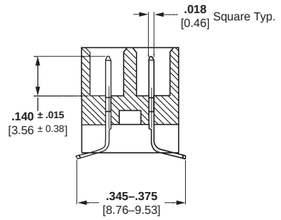
Mates with — Receptacle assemblies, pages 1-14 to 1-16

External Keying — page 1-30

Recommended PC Board Layout — page 1-29







No. of Pos.	Dimensions			Assembly Part No.
	A	B	C	
128	**3.850** 97.79	**3.450** 87.63	**3.150** 80.01	447441-3
110	**3.400** 86.36	**3.000** 76.20	**2.700** 68.58	447441-1
100	**3.150** 80.01	**2.750** 69.85	**2.450** 62.23	447441-4
90	**2.900** 73.66	**2.500** 63.50	**2.200** 55.88	447441-5
80	**2.650** 67.31	**2.250** 57.15	**1.950** 49.53	447441-6
70	**2.400** 60.96	**2.000** 50.80	**1.700** 43.18	447441-2
60	**2.150** 54.61	**1.750** 44.45	**1.450** 36.83	447441-7
50	**1.900** 48.26	**1.500** 38.10	**1.200** 30.48	447441-8
40	**1.650** 41.91	**1.250** 31.75	**.950** 24.13	447441-9
30	**1.400** 35.56	**1.000** 25.40	**.700** 17.78	1-447441-0
20	**1.150** 29.21	**.750** 19.05	**.450** 11.43	1-447441-1

Catalog 1308940
Revised 8-06

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Mini-Box Pin Header Assemblies (Continued)

Related Product Data

Mates with — Receptacles, pages 1-14 to 1-16

External Keying — Page 1-30

Recommended PC Board Layout — Page 1-28

Style I

Style II

Style III

Commercial Pin Header Assemblies

Housing Material — In accordance with MIL-M-24519 per MIL-C-55302 GLCP-30F, liquid crystal polymer

[1] Contact Material and Finish — Brass per QQ-B-626 plated .000030 [0.00076] min. gold in the contact area, .000100 [0.00254] min. tin-lead on the tail over .000050 [0.00127] min. nickel on the entire contact

[2] Contact Material and Finish — Same as above except for tin in the terminating area

No. of Pos.	Dimensions A	Dimensions B	Dimensions C	Style I Straddle Mount Part No.[1]	Style II Straddle Mt. w/Pin Protect. Part No.[1]	Style III Right-Angle Mount Part No.[1]	Style III Right-Angle Mount RoHS Part No.[2]
128	**3.850** 97.79	**3.600** 91.44	**3.150** 80.01	530719-9	1-531122-1	530733-9	—
110	**3.400** 86.36	**3.150** 80.01	**2.700** 68.58	—	—	530733-8	—
100	**3.150** 80.01	**2.900** 73.66	**2.450** 62.23	530719-7	—	530733-7	5-530733-7
90	**2.900** 73.66	**2.650** 67.31	**2.200** 55.88	530719-6	—	530733-6	—
80	**2.650** 67.31	**2.400** 60.96	**1.950** 49.53	530719-5	—	530733-5	—
70	**2.400** 60.96	**2.150** 54.61	**1.700** 43.18	530719-4	531122-6	530733-4	5-530733-4
60	**2.150** 54.61	**1.900** 48.26	**1.450** 36.83	530719-3	531122-5	530733-3	—
50	**1.900** 48.26	**1.650** 41.91	**1.200** 30.48	530719-2	—	530733-2	—
40	**1.650** 41.91	**1.400** 35.56	**.950** 24.13	530719-1	—	530733-1	5-530733-1
30	**1.400** 35.56	**1.150** 29.21	**.700** 17.78	—	—	1-530733-0	6-530733-0
20	**1.150** 29.21	**.900** 22.86	**.450** 11.43	—	—	1-530733-1	—

Military Pin Header Assemblies — Qualified to MIL-C-55302

Housing Material — In accordance with MIL-C-55302

Contact Material and Finish — Brass per QQ-B-626 plated .000050 [0.00127] min. gold in the contact area, .000100 [0.00254] min. tin-lead on the tail over .000050 [0.00127] min. nickel on the entire contact.

No. of Pos.	Dimensions A	Dimensions B	Dimensions C	Style I - Straddle Mount MIL-C-55302/	Style I - Straddle Mount Part No.	Style II - Straddle Mt. w/ Pin Protect. MIL-C-55302/	Style II - Straddle Mt. w/ Pin Protect. Part No.	Style III - Right-Angle MIL-C-55302/	Style III - Right-Angle Part No.
128	**3.850** 97.79	**3.600** 91.44	**3.150** 80.01	118-11	2-530744-2	118-22	2-531803-2	117-11	2-530743-2
110	**3.400** 86.36	**3.150** 80.01	**2.700** 68.58	118-10	2-530744-1	118-21	2-531803-1	117-10	2-530743-1
100	**3.150** 80.01	**2.900** 73.66	**2.450** 62.23	118-09	2-530744-0	118-20	2-531803-0	117-09	2-530743-0
90	**2.900** 73.66	**2.650** 67.31	**2.200** 55.88	118-08	1-530744-9	118-19	1-531803-9	117-08	1-530743-9
80	**2.650** 67.31	**2.400** 60.96	**1.950** 49.53	118-07	1-530744-8	118-18	1-531803-8	117-07	1-530743-8
70	**2.400** 60.96	**2.150** 54.61	**1.700** 43.18	118-06	1-530744-7	118-17	1-531803-7	117-06	1-530743-7
60	**2.150** 54.61	**1.900** 48.26	**1.450** 36.83	118-05	1-530744-6	118-16	1-531803-6	117-05	1-530743-6
50	**1.900** 48.26	**1.650** 41.91	**1.200** 30.48	118-04	1-530744-5	118-15	1-531803-5	117-04	1-530743-5
40	**1.650** 41.91	**1.400** 35.56	**.950** 24.13	118-03	1-530744-4	118-14	1-531803-4	117-03	1-530743-4
30	**1.400** 35.56	**1.150** 29.21	**.700** 17.78	118-02	1-530744-3	118-13	1-531803-3	117-02	1-530743-3
20	**1.150** 29.21	**.900** 22.86	**.450** 11.43	118-01	1-530744-2	118-12	1-531803-2	117-01	1-530743-2

Catalog 1308940
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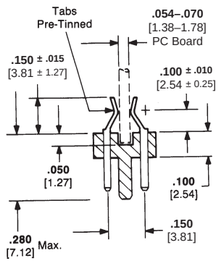
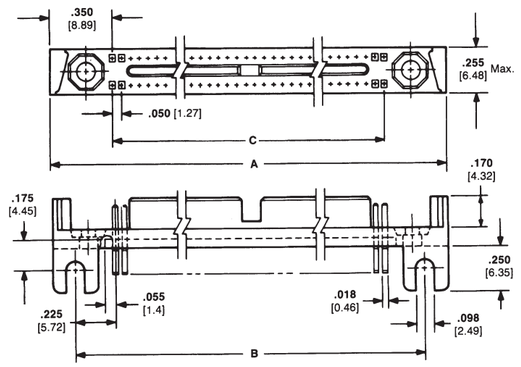
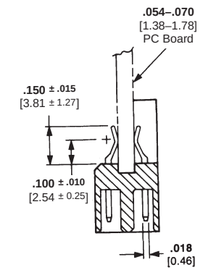
Mini-Box Pin Header Assemblies (Continued)

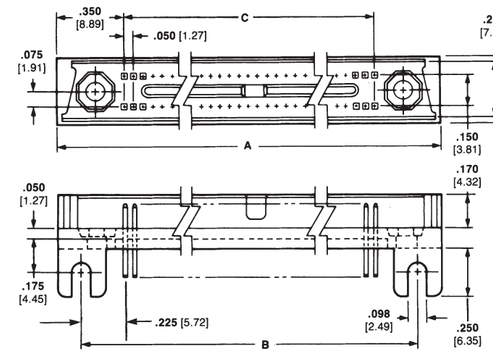
Style I
Straddle Mount without Pin Protectors



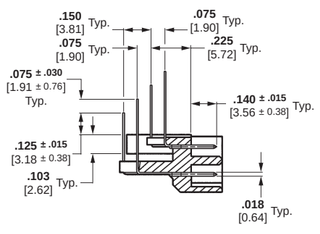


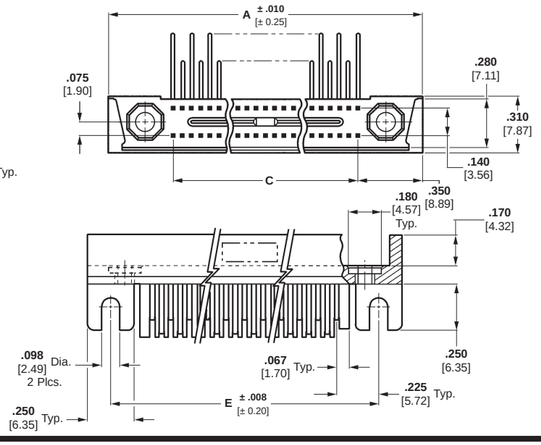
Style II
Straddle Mount with Pin Protectors





Style III
Right-Angle Mount





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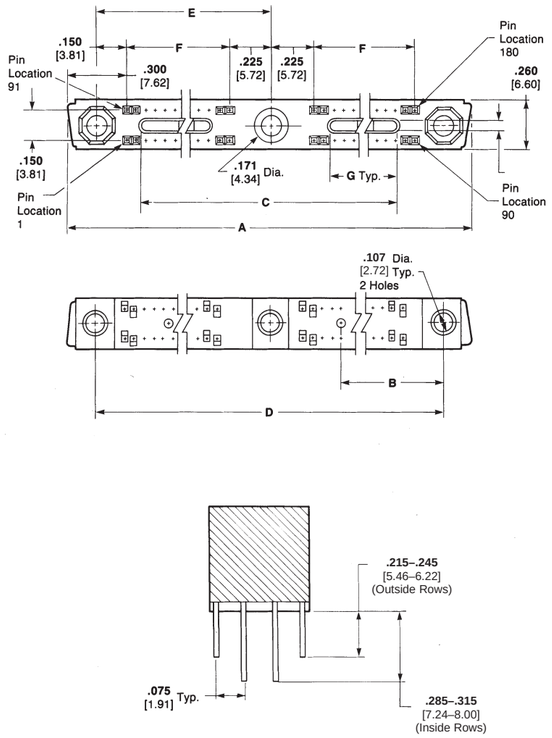
Extended Mini-Box Receptacle Assemblies



No. of Pos.	Dimensions							Assembly Part No.[1]	RoHS Part No.[2]
	A	B	C	D	E	F	G		
200	**5.950** 151.13	**1.413** 35.89	**5.200** 132.08	**5.650** 143.51	**2.825** 71.76	**2.450** 62.23	**2.300** 58.42	534179-8	5-534179-8
192	**5.750** 146.05	**1.362** 34.60	**5.000** 127.00	**5.450** 138.43	**2.725** 69.22	**2.350** 59.69	**2.200** 55.88	534179-7	5-534179-7
180	**5.450** 138.43	**1.287** 32.69	**4.700** 119.38	**5.150** 130.81	**2.575** 65.41	**2.200** 55.88	**2.050** 52.07	534179-6	—
172	**5.250** 133.35	**1.237** 31.42	**4.500** 114.30	**4.950** 125.73	**2.475** 62.87	**2.100** 53.34	**1.950** 49.53	534179-5	—
160	**4.950** 125.73	**1.162** 29.52	**4.200** 106.68	**4.650** 118.11	**2.325** 59.06	**1.950** 49.53	**1.800** 45.72	534179-4	—
152	**4.750** 120.65	**1.062** 26.98	**4.000** 101.60	**4.450** 113.03	**2.225** 56.52	**1.850** 46.99	**1.700** 43.18	534179-3	—
140	**4.450** 113.03	**1.037** 26.34	**3.700** 93.98	**4.150** 105.41	**2.075** 52.71	**1.700** 43.18	**1.550** 39.37	534179-2	5-534179-2
132	**4.250** 107.95	**.987** 25.07	**3.500** 88.90	**3.950** 100.33	**1.975** 50.17	**1.600** 40.64	**1.450** 36.83	534179-1	—

Housing Material — Liquid crystal polymer

[1] Contact Material and Finish — Beryllium copper per QQ-C-533 or ASTM B768, or phosphor bronze per ASTM B103 plated .000050 [0.00127] min. gold in the mating area, .000100 [0.00254] min. tin-lead in the terminating area over .000030 [0.00076] min. nickel on the entire contact

[2] Contact Material and Finish — Same as above except for tin in the terminating area

Related Product Data

Mates with — Straddle mount pin header assembly, page 1-22, and right-angle pin header, page 1-24

External Keying — page 1-30

Recommended PC Board Layout — page 1-29

Catalog 1308940
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Special Extended Mini-Box Receptacle Assemblies with Low Force Contacts

Housing Material — Liquid crystal polymer per MIL-M-24519, GLCP-30F, Color gray

Contact Material and Finish — Beryllium copper per QQ-C-533, or phosphor bronze per ASTM B103 plated .000050 [0.00127] gold per MIL-G-45204 over nickel per QQ-N-290 in contact area; remainder of contact tin-lead over nickel

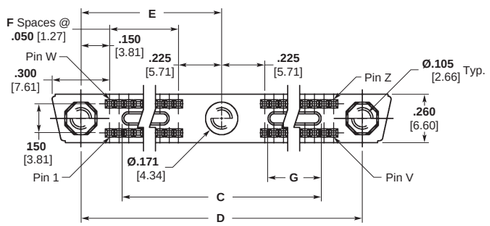
Jackscrew — Part Number 447697-4 assembled to housing with E-Spring Part Number 531361-2 in 3 places

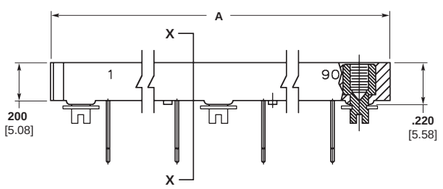
Related Product Data

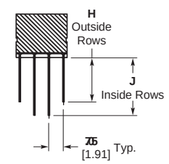
Mates with — page 1-23

External Keying — page 1-30

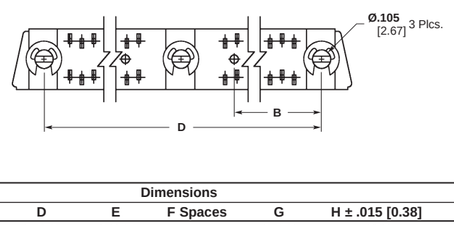
Recommended PC Board Layout — page 1-29







Section X-X



No. of Pos.	Dimensions									Assembly Part No.
	A	B	C	D	E	F Spaces	G	H ± .015 [0.38]	J ± .015 [0.38]	
132	**4.250** 107.95	**.987** 25.07	**3.500** 88.90	**3.950** 100.33	**1.975** 50.17	32	**1.450** 36.83	**.230** 5.84	**.300** 7.62	1757621-1
140	**4.450** 113.03	**1.037** 26.34	**3.700** 93.98	**4.150** 105.41	**2.075** 52.71	34	**1.550** 39.37	**.230** 5.84	**.300** 7.62	1757621-2
152	**4.750** 120.65	**1.062** 26.97	**4.000** 101.60	**4.450** 113.03	**2.225** 56.52	37	**1.700** 43.18	**.230** 5.84	**.300** 7.62	1757621-3
160	**4.950** 125.73	**1.162** 29.51	**4.200** 106.68	**4.650** 118.11	**2.325** 59.06	39	**1.800** 45.72	**.230** 5.84	**.300** 7.62	1757621-4
172	**5.250** 133.35	**1.237** 31.42	**4.500** 114.30	**4.950** 125.73	**2.475** 62.87	42	**1.950** 49.53	**.230** 5.84	**.300** 7.62	1757621-5
180	**5.450** 133.43	**1.287** 32.69	**4.700** 119.38	**5.150** 130.81	**2.575** 656.41	44	**2.050** 52.07	**.230** 5.84	**.300** 7.62	1757621-6
192	**5.750** 146.05	**1.362** 34.59	**5.000** 127.00	**5.450** 138.43	**2.725** 69.22	47	**2.200** 55.88	**.230** 5.84	**.300** 7.62	1757621-7
200	**5.950** 151.13	**1.413** 35.89	**5.200** 132.08	**5.650** 143.51	**2.825** 71.76	49	**2.300** 58.42	**.230** 5.84	**.300** 7.62	1757621-8
160	**4.950** 125.73	**1.162** 29.51	**4.200** 106.68	**4.650** 118.11	**2.325** 59.06	39	**1.800** 45.72	**.140** 3.56	**.190** 4.83	1757621-9

PC Layout	Pin Locations							Contact Ident. Numbers
	T	U	V	W	X	Y	Z	
I	33	34	66	67	99	100	132	1 & 66
I	35	36	70	71	105	106	140	1 & 70
II	38	39	76	77	114	115	152	1 & 76
II	40	41	80	81	120	121	160	1 & 80
I	43	44	86	87	129	130	172	1 & 86

PC Layout	Pin Locations							Contact Ident. Numbers
	T	U	V	W	X	Y	Z	
I	45	46	90	91	135	136	180	1 & 90
II	48	49	96	97	144	145	192	1 & 96
II	50	51	100	101	150	151	200	1 & 100
II	40	41	80	81	120	121	160	1 & 80

See page 1-29 for PC Layout I and II.

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UK: 44-208-420-8341

Extended Mini-Box Pin Header Assemblies

Housing Material — Liquid crystal polymer

Contact Material and Finish — Brass per QQ-B-626 plated .000050 [0.00127] min. gold in the contact area, .000100 [0.00254] min. tin-lead on the tails over .000050 [0.00127] min. nickel on the entire contact

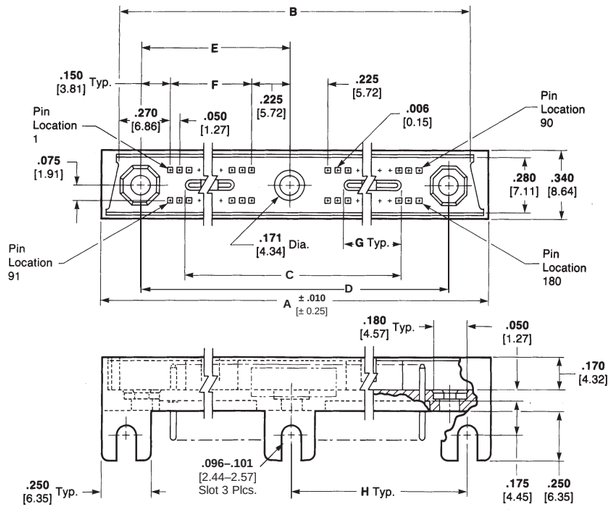
Related Product Data

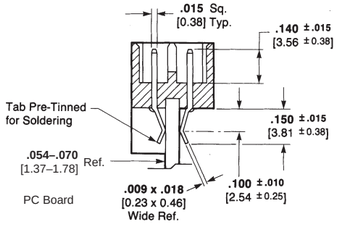
Mates with — Receptacle, page 1-20

External Keying— page 1-30

Recommended PC Board Layout — page 1-29

Style I





No. of Pos.	Dimensions								Assembly Part No.
	A	B	C	D	E	F	G	H	
200	**6.050** 153.67	**5.890** 149.61	**5.190** 131.83	**5.650** 143.51	**2.825** 71.76	**2.450** 62.23	**2.290** 58.17	**2.900** 73.66	534180-8
192	**5.850** 148.6	**5.690** 144.53	**4.990** 126.75	**5.450** 138.43	**2.725** 69.22	**2.350** 59.69	**2.190** 55.63	**2.800** 71.12	534180-7
180	**5.550** 140.97	**5.390** 136.91	**4.690** 119.13	**5.150** 130.81	**2.575** 65.41	**2.200** 55.88	**2.040** 51.82	**2.650** 67.31	534180-6
172	**5.350** 135.89	**5.190** 131.83	**4.490** 114.00	**4.950** 125.73	**2.475** 62.87	**2.100** 53.34	**1.940** 49.28	**2.550** 64.77	534180-5
160	**5.050** 128.27	**4.890** 124.21	**4.190** 106.43	**4.650** 118.11	**2.325** 59.06	**1.950** 49.53	**1.790** 45.47	**2.400** 60.96	534180-4
152	**4.850** 123.19	**4.690** 119.13	**3.990** 101.35	**4.450** 113.03	**2.225** 56.52	**1.850** 46.99	**1.690** 42.93	**2.300** 58.42	534180-3
140	**4.550** 115.57	**4.390** 111.51	**3.690** 93.73	**4.150** 105.41	**2.075** 52.71	**1.700** 43.18	**1.540** 38.12	**2.150** 54.60	534180-2
132	**4.350** 110.49	**4.190** 106.43	**3.490** 88.65	**3.950** 100.33	**1.975** 50.17	**1.600** 40.64	**1.440** 36.58	**2.050** 52.07	534180-1

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UK: 44-208-420-8341

Mini-Box Pin Header Assembly, Card Extender, with Jackscrews Installed

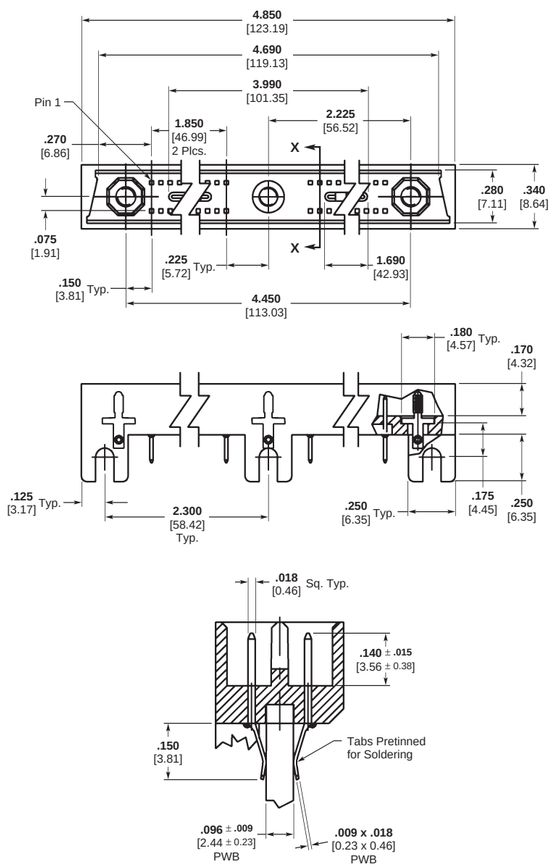
Housing Material — Liquid crystal polymer per MIL-M-24519, GLCP-30F, Color gray

Contact Finish — Plated .000050 [0.00127] gold in contact area, tin-lead on contact tails, all over nickel underplate

Jackscrews — Installed in the housing using roll pins in 3 places

Related Product Data

Mates with — page 1-21



Section X-X

No. of Pos.	Contact Ident. Numbers	Assembly Part No.
152	1 & 76	1757568-3

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Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Extended Mini-Box Right-Angle Pin Header Assemblies

Style II

Housing Material — Liquid crystal polymer

1 Contact Material and Finish — Brass per QQ-B-626 plated .000050 [0.00127] min. gold in the contact area, .000100 [0.00254] min. tin-lead on the tail over .000050 [0.00127] min. nickel on the entire contact

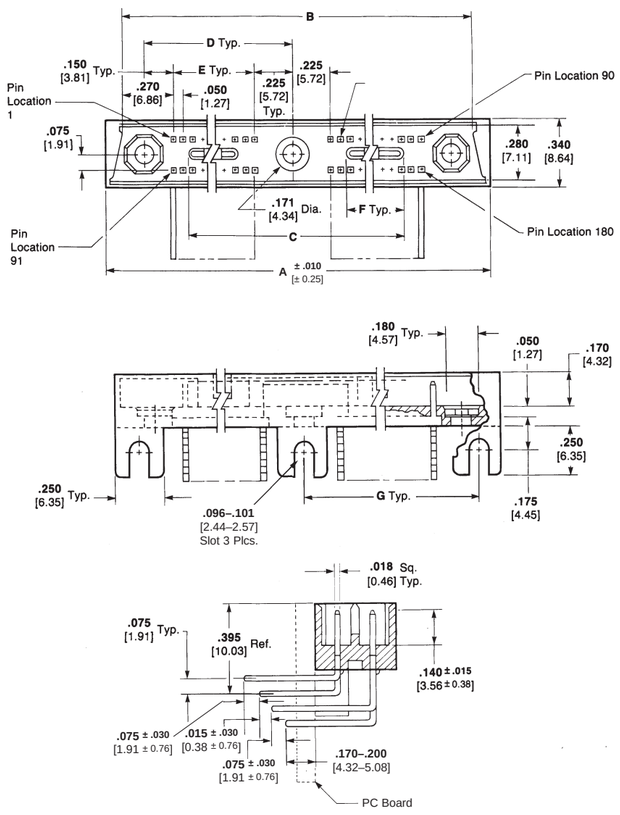
2 Contact Material and Finish — Same as above except for tin on the tail

Related Product Data

Mates with — Receptacle assemblies, page 1-20

External Keying — page 1-30

Recommended PC Board Layout — page 1-26



No. of Pos.	Dimensions							Assembly Part No.[1]	RoHS Part No.[2]
	A	B	C	D	E	F	G		
200	**6.050** 153.67	**5.890** 149.61	**5.190** 131.83	**2.825** 71.76	**2.450** 62.23	**2.290** 58.17	**2.900** 73.66	534688-8	—
192	**5.850** 148.60	**5.690** 144.53	**4.990** 126.75	**2.725** 69.22	**2.350** 59.69	**2.190** 55.63	**2.800** 71.12	534688-7	—
180	**5.550** 140.97	**5.390** 136.91	**4.690** 119.13	**2.575** 65.41	**2.200** 55.88	**2.040** 51.82	**2.650** 67.31	534688-1	—
172	**5.350** 135.89	**5.190** 131.83	**4.490** 114.00	**2.475** 62.87	**2.100** 53.34	**1.940** 49.28	**2.550** 64.77	534688-6	—
160	**5.050** 128.27	**4.890** 124.21	**4.190** 106.43	**2.325** 59.06	**1.950** 49.53	**1.790** 45.47	**2.400** 60.96	534688-5	5-534688-5
152	**4.850** 123.19	**4.690** 119.13	**3.990** 101.35	**2.225** 56.52	**1.850** 46.99	**1.690** 42.93	**2.300** 58.42	534688-4	—
140	**4.550** 115.57	**4.390** 111.51	**3.690** 93.73	**2.075** 52.71	**1.700** 43.18	**1.540** 38.12	**2.150** 54.60	534688-3	—
132	**4.350** 110.49	**4.190** 106.43	**3.490** 88.65	**1.975** 50.17	**1.600** 40.64	**1.440** 36.58	**2.050** 52.07	534688-2	—

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Mini-Box Receptacle Assemblies with 4 or 6 Hybrid Cavities

Housing Material — In accordance with MIL-C-55302

[1] Contact Material and Finish — Beryllium copper per QQ-C-533 or ASTM B768, or phosphor bronze per ASTM B103 plated .000030 [0.00076] min. gold in the contact area, .000100 [0.00254] min. tin-lead in the termination area over .000030 [0.00076] min. nickel on the entire contact

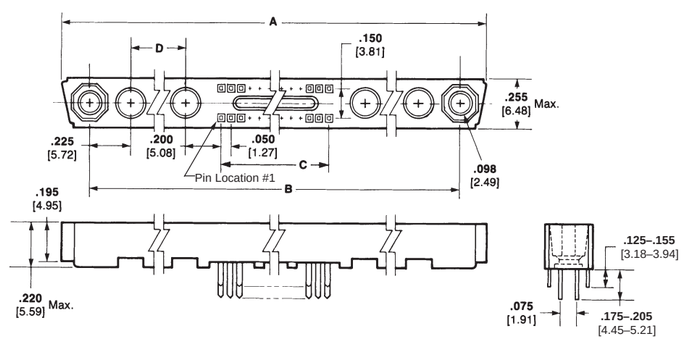
[2] Contact Material and Finish — Same as above except for tin in the termination area

Related Product Data

Mates with — Pin headers, page 1-26

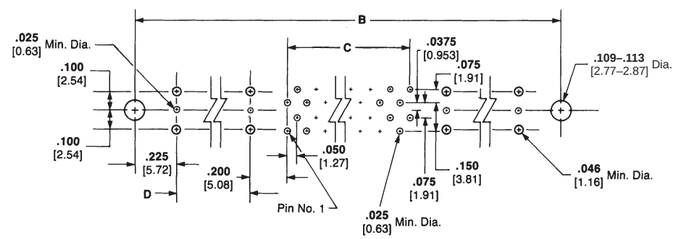
External Keying — page 1-30

Other sizes and configurations available. Consult Tyco Electronics.



No. of Box Contact Pos.	No. of Coaxial Cavities	Dimensions A	B	C	D	Assembly Part No.[1]	RoHS Part No.[2]
90	4	**3.740** 95.00	**3.450** 87.63	**2.200** 55.88	**.200** 5.08	532797-1	5-532797-1
74	6	**3.740** 95.00	**3.450** 87.63	**1.800** 45.72	**.400** 10.16	531820-1	5-531820-1
36	6	**2.790** 70.87	**2.500** 63.5	**.850** 21.59	**.400** 10.16	531820-3	5-531820-3
26	6	**2.540** 65.52	**2.250** 57.15	**.600** 15.24	**.400** 10.16	531820-2	—

Note: These receptacle assemblies accept coaxial contact—Vertical PC Board Mount Socket 227603-1



Recommended PC Board Layout

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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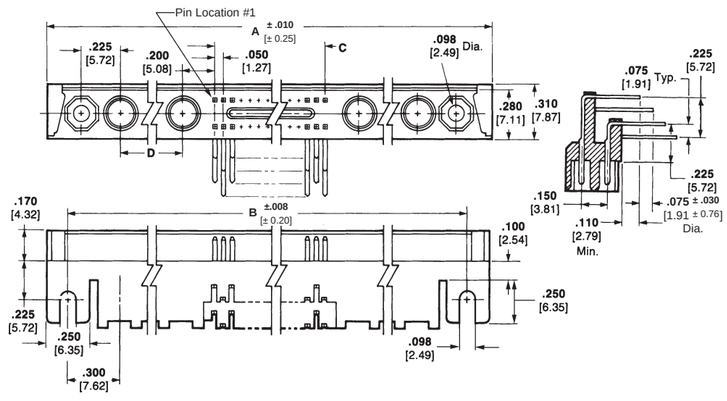
Japan: 81-44-844-8013
UK: 44-208-420-8341

Mini-Box Right-Angle Pin Header Assemblies with 4 or 6 Hybrid Cavities



Housing Material — In accordance with MIL-C-55302

[1] Contact Material and Finish — Brass per QQ-B-626 plated .000030 [0.00076] min. gold in the contact area, .000100 [0.00254] min. tin-lead on the post over .000030 [0.00076] min. nickel on the entire contact

[2] Contact Material and Finish — Same as above except for tin on the post

Related Product Data

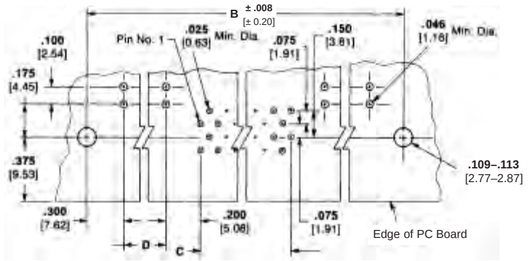
Mates with — Receptacles, page 1-25

External Keying — page 1-30

Other sizes and configurations available. Consult Tyco Electronics.

No. of Box Contact Pos.	No. of Coaxial Cavities	Dimensions A	B	C	D	Assembly Part No.[1]	RoHS Part No.[2]
90	4	**3.850** 97.79	**3.600** 91.44	**2.200** 55.88	**.200** 5.08	532796-1	5-532796-1
74	6	**3.850** 97.79	**3.600** 91.44	**1.800** 45.72	**.400** 10.16	531819-1	5-531819-1
36	6	**2.900** 73.66	**2.650** 67.31	**.850** 21.59	**.400** 10.16	531819-3	5-531819-3
26	6	**2.650** 67.31	**2.400** 60.96	**.600** 15.24	**.400** 10.16	531819-2	5-531819-2

Note: These pin header assemblies accept coaxial contacts—Vertical Cable Pin 227604-1 and Right-Angle PC Board Mount Pin 227602-1.



Recommended PC Board Layout

Catalog 1308940
Revised 8-06

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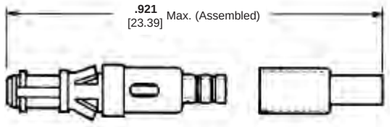
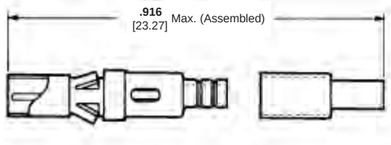
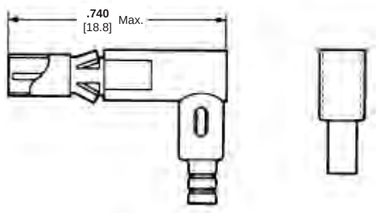
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341



Cable Pin



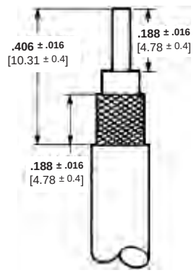
Cable Socket



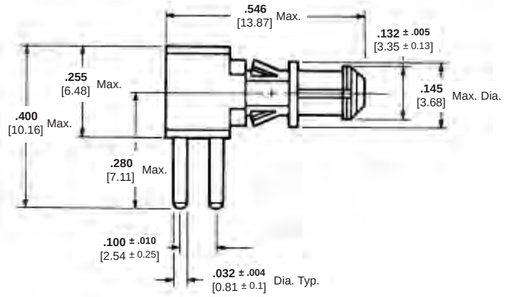
Right-Angle Cable Socket

Cable Size	Contact Style	Part No.	Application Tool Part No.
RG 178/U Double Braid RG 196/U	Cable Pin	227604-1	220215-1
	Cable Socket	227605-1	
	Right-Angle Cable Socket	227606-1	

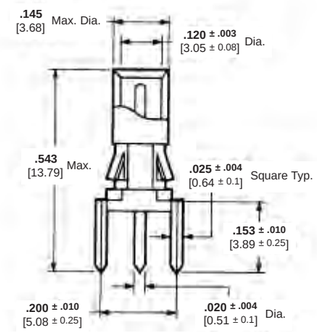
Extraction Tool Part Number 220216-1



Recommended Strip Length



Right-Angle Pin
for PC Board Application
Part Number 227602-1
Plated .000030 [0.00076] gold



Vertical Socket
for PC Board Application
Part Number 227603-1

Notes:
1. Center contacts are plated with .000030 [0.00076] gold.
2. For .125 [3.18] maximum thick pc boards.

Electrical Characteristics

Nominal Impedance — 50 ohms

Frequency Range — 0-2 GHz

Maximum Operating Voltage (Sea Level) — 150 VAC RMS

Mechanical Characteristics

Operating Temperature Range — -67°C to +257°F [-55°C to +125°C]

Cable Retention — 15 lb. [66.7N] min. (RG 178 type double braid)

Contact Materials

Stainless Steel — QQ-S-766

Gold Plate — MIL-G-45204

Nickel Plate — QQ-N-290

Beryllium Copper — QQ-C-530

TEFLON TFE — MIL-P-19468A

Brass — QQ-B-626

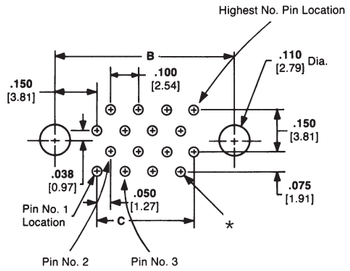
Ferrule Material

Brass — MIL-C-50, tin plate per MIL-T-10727

TEFLON — Trademark of E. I. DuPont de Nemours and Company

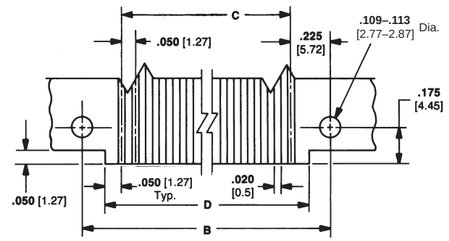
Mini-Box Connectors Recommended Printed Circuit Board Layouts

Receptacle Assemblies



(Connector Side)

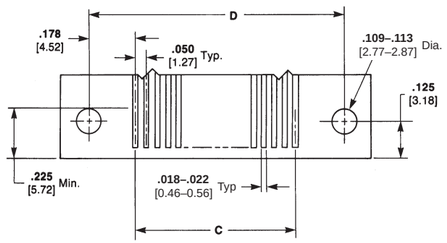
Pin Header Assemblies



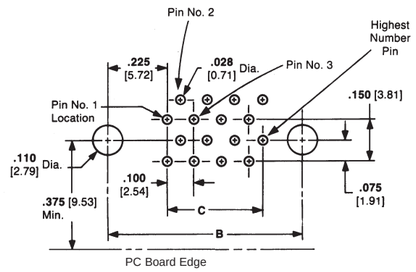
Style I & II

*Holes for solder type receptacle connectors should be .025 to .032 [0.64 to 0.81] dia. Holes for compliant tails should be manufactured as follows: .0320$^{\pm.0010}$ [0.813$^{\pm0.025}$] drilled hole dia. (no. 67 drill), .0003 [0.008] min. tin-lead plating over .001 to .002 [0.025 to 0.051] thick copper on wall. Finished hole diameter to be .026 to .030 [0.66 to 0.76] after plating, .025 to .030 [0.64 to 0.76] after reflow.

Straddle Mount Receptacle Assemblies



Right-Angle Pin Header Assemblies



Style III (Connector Side)

No. of Pos.	Dimensions		
	B	C	D
128	**3.450** 87.63	**3.150** 80.01	**3.505** 89.03
110	**3.000** 76.2	**2.700** 68.58	**3.055** 77.60
100	**2.750** 69.85	**2.450** 62.23	**2.805** 71.25
90	**2.500** 63.5	**2.200** 55.88	**2.555** 64.90
80	**2.250** 57.15	**1.950** 49.53	**2.305** 58.55
70	**2.000** 50.8	**1.700** 43.18	**2.055** 52.20
60	**1.750** 44.45	**1.450** 36.83	**1.805** 45.85
50	**1.500** 38.1	**1.200** 30.48	**1.555** 39.50
40	**1.250** 31.75	**.950** 24.13	**1.305** 33.15
30	**1.000** 25.4	**.700** 17.78	**1.055** 26.80
20	**.750** 19.05	**.450** 11.43	**.805** 20.45

No. of Pos.	Dimensions		
	B	C	D
128	**3.600** 91.44	**3.150** 80.01	**3.250** 82.55
110	**3.150** 80.01	**2.700** 68.58	**2.800** 71.12
100	**2.900** 73.66	**2.450** 62.23	**2.550** 64.77
90	**2.650** 67.31	**2.200** 55.88	**2.300** 58.42
80	**2.400** 60.96	**1.950** 49.53	**2.050** 52.07
70	**2.150** 54.61	**1.700** 43.18	**1.800** 45.72
60	**1.900** 48.26	**1.450** 36.83	**1.550** 39.37
50	**1.650** 41.91	**1.200** 30.48	**1.300** 33.02
40	**1.400** 35.56	**.950** 24.13	**1.050** 26.67
30	**1.150** 29.21	**.700** 17.78	**.800** 20.32
20	**.900** 22.86	**.450** 11.43	**.550** 13.97

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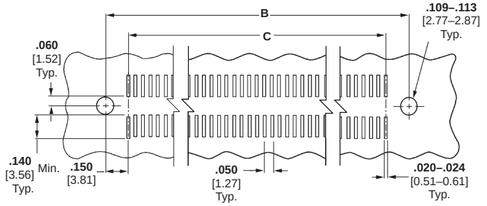
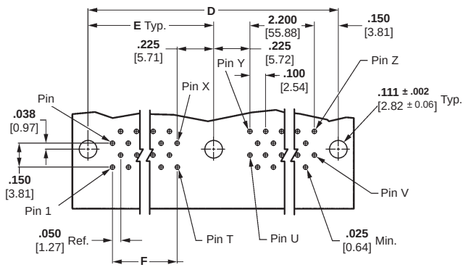
Mini-Box Connectors Recommended Printed Circuit Board Layouts (Continued)

Vertical Surface Mount Receptacle and Pin Header Assemblies

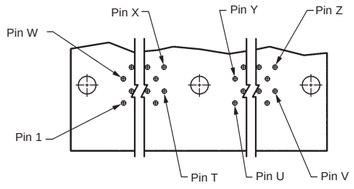


Extended Mini-Box Connectors Recommended Printed Circuit Board Layouts (Connector Side of Board)

Receptacle Assemblies

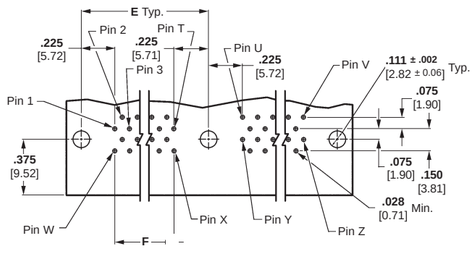


PC Layout I

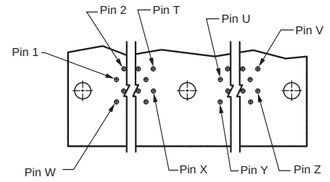


PC Layout II

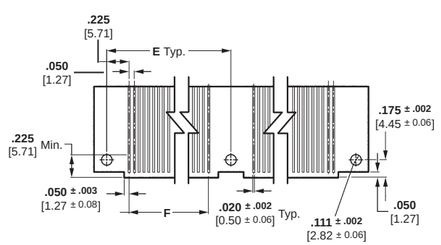
Pin Header Assemblies



Right-Angle—PC Layout I



Right-Angle—PC Layout II



Straddle Mount

Catalog 1308940
Revised 8-06

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Extended Mini-Box Connectors Recommended Printed Circuit Board Layouts (Connector Side of Board) (Continued)

Receptacles

PC Layout	Pin Locations						
	T	U	V	W	X	Y	Z
II	50	51	100	101	150	151	200
II	48	49	96	97	144	145	192
I	45	46	90	91	135	136	180
I	43	44	86	87	129	130	172
II	40	41	80	81	120	121	160
II	38	39	76	77	114	115	152
I	35	36	70	71	105	106	140
I	33	34	66	67	99	100	132

No. of Pos.	Dimensions		
	D	E	F
200	**5.650** 143.51	**2.825** 71.76	**2.450** 62.23
192	**5.450** 138.43	**2.725** 69.22	**2.350** 59.69
180	**5.150** 130.81	**2.575** 65.41	**2.200** 55.88
172	**4.950** 125.73	**2.475** 62.87	**2.100** 53.34
160	**4.650** 118.11	**2.325** 59.06	**1.950** 49.53
152	**4.450** 113.03	**2.225** 56.52	**1.850** 46.99
140	**4.150** 105.41	**2.075** 52.71	**1.700** 43.18
132	**3.950** 100.33	**1.975** 50.17	**1.600** 40.64

Pin Headers

PC Layout	Pin Locations						
	T	U	V	W	X	Y	Z
II	50	51	100	101	150	151	200
II	48	49	96	97	144	145	192
I	45	46	90	91	135	136	180
I	43	44	86	87	129	130	172
II	40	41	80	81	120	121	160
II	38	39	76	77	114	115	152
I	35	36	70	71	105	106	140
I	33	34	66	67	99	100	132

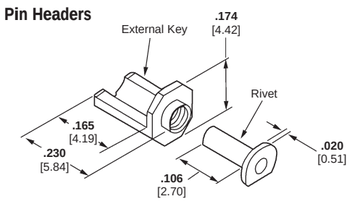
No. of Pos.	Dimensions	
	F	E
200	**2.450** 62.23	**2.900** 73.66
192	**2.350** 59.69	**2.800** 71.12
180	**2.200** 55.88	**2.650** 67.31
172	**2.100** 53.34	**2.550** 64.77
160	**1.950** 49.53	**2.400** 60.96
152	**1.850** 46.99	**2.300** 60.96
140	**1.700** 43.18	**2.150** 54.61
132	**1.600** 40.64	**2.050** 52.07

Mini-Box and Extended Mini-Box Connector Keying Hardware

External Keys

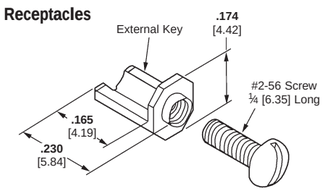
These external keys can be used with all the receptacle assemblies and with all the pin header assemblies. They are press fitted into position using tool number 91117-2. Keys used in one end of each mated pair will yield 8 keying combinations, and when used in both ends of the mated pairs will yield 64 keying combinations. The No. 2-56 screws are used to mount keyed receptacles to a printed circuit board. See instruction sheet 408-7894 for details. Rivets can be used to retain keys in pin header assemblies. See instruction sheet 408-9240.

Pin Headers



External Key Kit Number 530721-4
Kit includes 2 each of the following:
Keys — Part Number 530721-1
Military Part Number M55302/31-06
Rivets — Part Number 534164-2
Material — Passivated Stainless Steel

Receptacles



External Key Kit Number 530721-3
Kit includes 2 each of the following:
Keys — Part Number 530721-1
Military Part Number M55302/31-06
#2-56 Screws, **.250** [6.35] Long
Material — Passivated Stainless Steel

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

4-Row Mini-Box Connectors

Receptacle Assemblies, Vertical

Material and Finish

Housing — In accordance with MIL-M-24519 per MIL-C-55302. GLCP-30F, liquid crystal polymer, grey

Contacts — Beryllium copper per QQ-C-533 or ASTM B760, or phosphor bronze per ASTM B103 plated .000050 [0.00127] min. gold in the mating area, .000100 [0.00254] min. tin-lead in the terminating area, over .000030 [0.00076] min. nickel on the entire contact

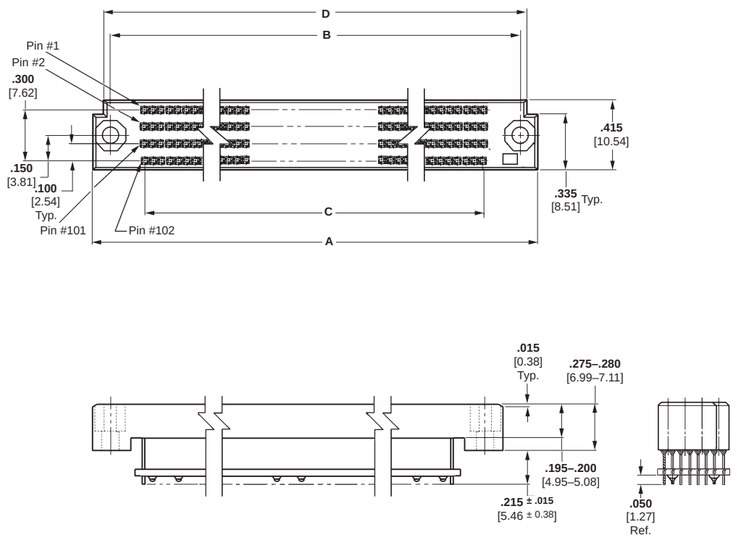
Related Product Data

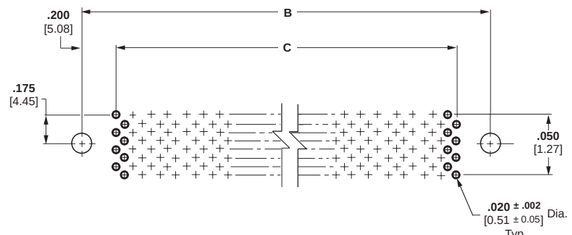
Mates with — Pin headers, page 1-32

External Keying — page 1-30

Technical Documents

Product Specifications — 108-1551





Recommended PC Board Layout (Connector Side)

No. of Pos.	Dimensions				Connector w/ Hardware*	Part No.
	A	B	C	D		
120	**2.095** 53.21	**1.850** 46.99	**1.450** 36.83	**1.950** 49.53	—	448445-1
152	**2.495** 63.37	**2.250** 57.15	**1.850** 46.99	**2.350** 59.69	449650-2	448445-4
200	**3.095** 78.61	**2.850** 72.39	**2.450** 62.23	**2.950** 74.93	—	448445-2
300	**4.345** 110.36	**4.100** 104.14	**3.700** 93.98	**4.200** 106.68	449650-1	448445-5
320	**4.595** 116.71	**4.350** 110.49	**3.950** 100.33	**4.450** 113.03	—	448445-3

* Hardware includes 2 each 531721-3 External Key Kit (See page 1-30)

4-Row Mini-Box Connectors (Continued)

Pin Headers, with Flexible Circuit Terminations

Material and Finish

Housing — In accordance with MIL-M-24519 per MIL-C-55302. GLCP-30F, liquid crystal polymer, grey

Contacts — Brass per ASTM B36 plated .000050 [0.00127] min. gold in the mating area, .000100 [0.00254] min. tin-lead in the terminating area, over .000030 [0.00076] min. nickel on the entire contact with flexible circuits, 3.5 oz [99.23 g] beryllium copper per QQ-C-530 conductors with polymide dielectric and acrylic adhesive

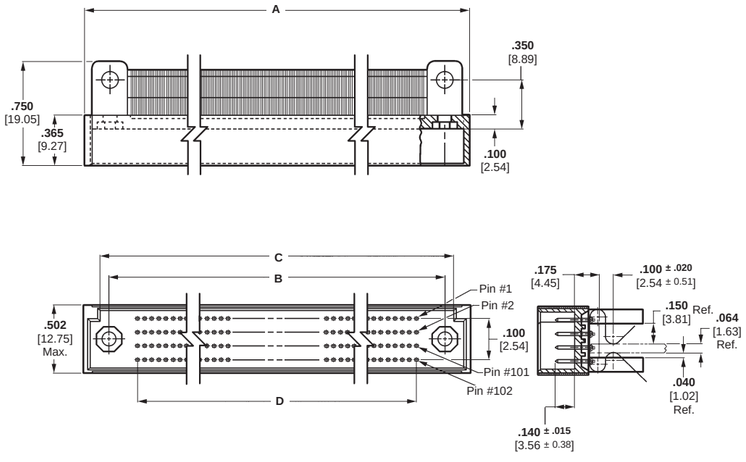
Related Product Data

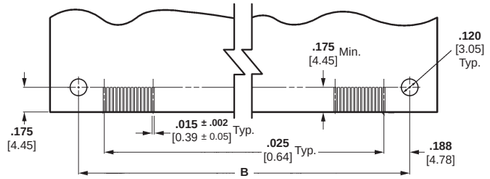
Mates with — Receptacle assemblies, page 1-31

External Keying — page 1-30

Technical Documents

Product Specifications — 108-1551





Recommended PC Board Layout

No. of Pos.	Dimensions				Connector w/ Hardware*	Part No.
	A	B	C	D		
120	**2.210** 56.13	**1.850** 46.99	**1.975** 50.17	**1.450** 36.83	—	448446-1
152	**2.610** 63.37	**2.250** 57.15	**2.375** 46.99	**1.850** 59.69	449619-2	448446-4
200	**3.210** 78.61	**2.850** 72.39	**2.975** 62.23	**2.450** 74.93	—	448446-2
300	**4.460** 110.36	**4.100** 104.14	**4.225** 93.98	**3.700** 106.68	449619-1	448446-5
320	**4.710** 116.71	**4.350** 110.49	**4.475** 100.33	**3.950** 113.03	—	448446-3

* Connector includes 2 each of 449601-1 Hardware Kit. Hardware Kit can also be purchased separately. Hardware Kit includes: external key, screw, spacers, e-ring and threaded spacer.

Surface Mount Receptacle Assembly, 4 Row, One Center Mount

Material and Finish

[1] **Plating** — .000050 [0.001127] min. nickel underplate all over with .000030 [.00076] min. gold in contact area & .000150 [.00381] min. tin-lead plated solder leads

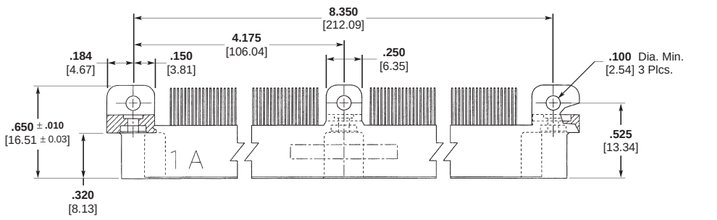
[2] **Plating** — Same as above except for tin plated solder leads

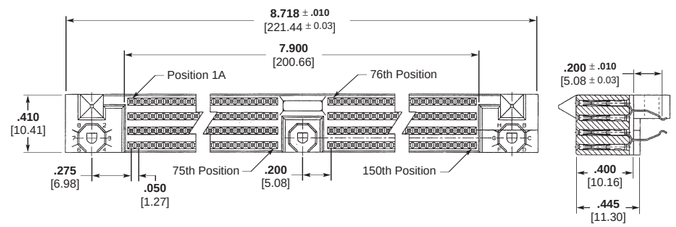
Spacing — .050 [1.27] x 1.00 [2.54] centerline. .025 [.635] centerline solder leads

PC Board — .094 ± .010 [2.4 ±.24] PC Board thickness

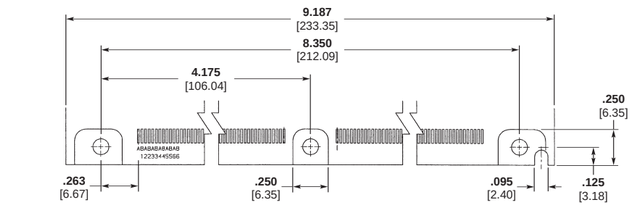
■ **Four-beam box-type contact design provides four areas of contact per connection**

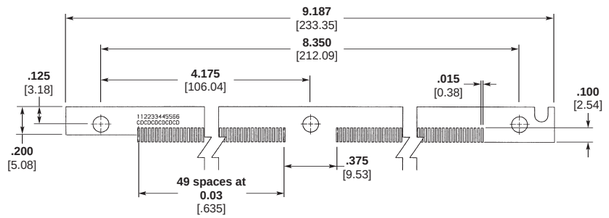
Product Specification — 108-9071





Part Number 650352-1[1]
RoHS Part Number 5-650352-1[2]





Recommended PC Board Layout

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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UK: 44-208-420-8341

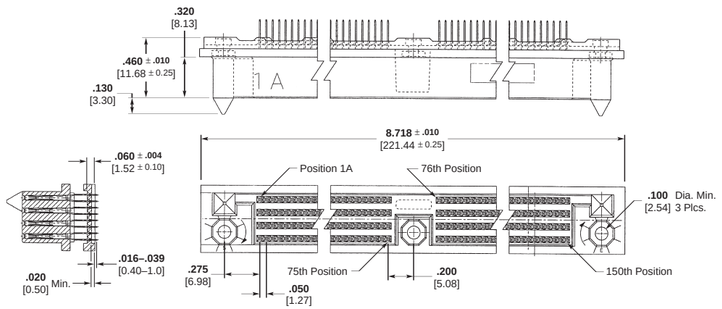
Stacking Receptacle Assembly, 4 Row, One Center Mount

Material and Finish

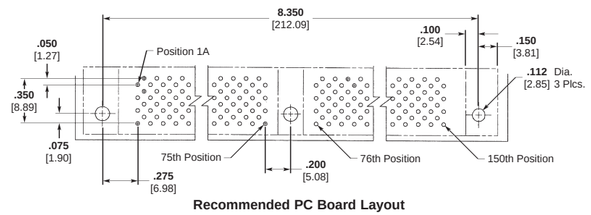
Plating — .000050 [0.001127] min. nickel underplate all over with .000030 [.00076] min. gold in contact area & .000150 [.00381] min. tin-lead plated solder leads

Spacing — .050 [1.27] x 1.00 [2.54] centerline

PC Board — .094 ± .010 [2.4 ±.24] PC Board thickness



Part Number 650354-1



Recommended PC Board Layout

ACTION PIN Connector Assembly, 4 Row, One Center Mount

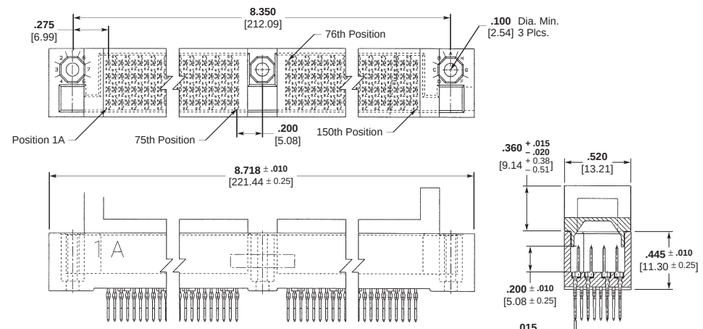
Material and Finish

Plating — .000050 [0.001127] min. nickel underplate all over with .000030 [.00076] min. gold in contact area & .000150 [.00381] min. tin-lead plated solder leads

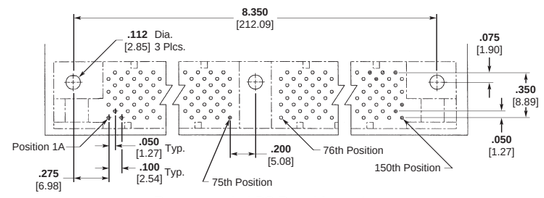
Spacing — .050 [1.27] x 1.00 [2.54] centerline

PC Board — .094 to .143 [2.4 to 3.65] PC Board thickness

Lead Length — .240 [6.10] Leads



Part Number 650508-1



Recommended PC Board Layout

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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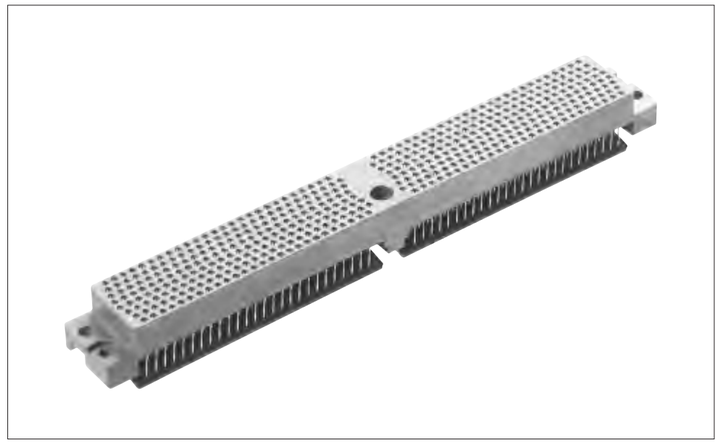
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMP-HDI .075 [1.91] Staggered Centerline LRM Connectors

Introduction

Product Facts

- Two-piece high density, high performance connectors for printed circuit board use
- Four-beam box-type contact design provides four areas of contact per connection
- Available in 6-Row 306 position and 8-Row 428 position
- Receptacles designed for through-hole soldering
- Pins designed for surface mount card edge applications
- Guide posts provide proper alignment during mating
- Octagonal shape keys ensure proper mating
- Meets DSCC 89065 performance requirements



AMP-HDI 6 and 8 Row LRM (Line Replaceable Module) Connectors

Designed specifically to be the next generation, high density electronic packaging system, the AMP-HDI 6 Row, .075 [1.91] centerlines and 8 Row, .080 [2.03] centerlines, LRM Interconnection System meets all DSCC 89065 LRM specifications. This advanced system features high temperature plastic housings compatible with IR reflow solder techniques. Added advantage of the AMP-HDI LRM Connector System is its capability of accepting MIL SPEC fiber optic contacts per MIL-T29504/5. Six-row configurations available in 306 contact positions. Eight-row configurations feature two 214 position plug halves which mate with one 428-position receptacle. This technological leader is offered with standard tin-lead plated solder tails and for those applications where maintaining a light weight system is a factor. The 8-row configuration is made available with weight saving, flexible film tails.

Equally important are Application Costs. The AMP-HDI LRM Connector interconnection system offers advanced tooling that simplifies contact alignment to the pc board, substantially reducing overall applied labor costs.

Guide posts provide alignment for the connectors when mating. Shell accessories protect the pin assemblies from physical damage. Octagonal shape keys permit eight rotational positions assuring only the proper mating assembly can be inserted.

The connectors offer 6 row and 306 positions with 4 fiber optic ports capability or 8 rows with 428 positions.

Housings are made from Polyphenylene sulfide with duplex plated .000050 [.00127] min. gold beryllium copper contacts. The contact tails are tin-lead coated for easy soldering.

Technical Features

Available Number of Positions — 306 and 428

Center Spacing — .075 [1.91] and .080 [2.03]

Housing Material — Polyphenylene Sulfide per MIL-M-24519

Contact Material — Beryllium copper

Contact Finish — 50 µ in gold per MIL-G-45204

Contact Dimension — .008 [0.20] wide

Current Rating — 1 ampere

Termination Resistance (Max.) — 20 milliohms

Connector Mating Force — Less than 130 pounds

Performance Characteristics

Dielectric Withstanding Voltage — 600 VRMS

Insulation Resistance — 100 VDC, 1000 Megaohms

Connector Mating/Unmating — Less than 3 oz. per contact

Durability — 500 cycles

Vibration — MIL-STD-1344 per Method 2005 Condition V

Physical Shock — MIL-STD-1344 per Method 2004 Condition H (15G)

Thermal Shock — MIL-STD-1344 method 1003 cond A

Temperature Humidity — MIL-STD-1344 method 1002 Type II

Technical Documents
Instruction Sheet 408-4008

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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AMP-HDI 6-Row, 306-Position Connector

LRM Receptacle Connectors with Additional, 4-Position, Fiber Optic Contact Ports

Part Number 445270-1

Material and Finish:

Housing — Polyphenylene sulfide, (PPS) per MIL-M-24519

Contacts — Beryllium copper, duplex plated .000050 [0.00127] min. gold in the mating area,.000100 [0.00254] min. tin-lead in the termination area per 5N60 or 5N63

Sealant — Epoxy, all 306 positions

Insert Key — Stainless steel, passivated

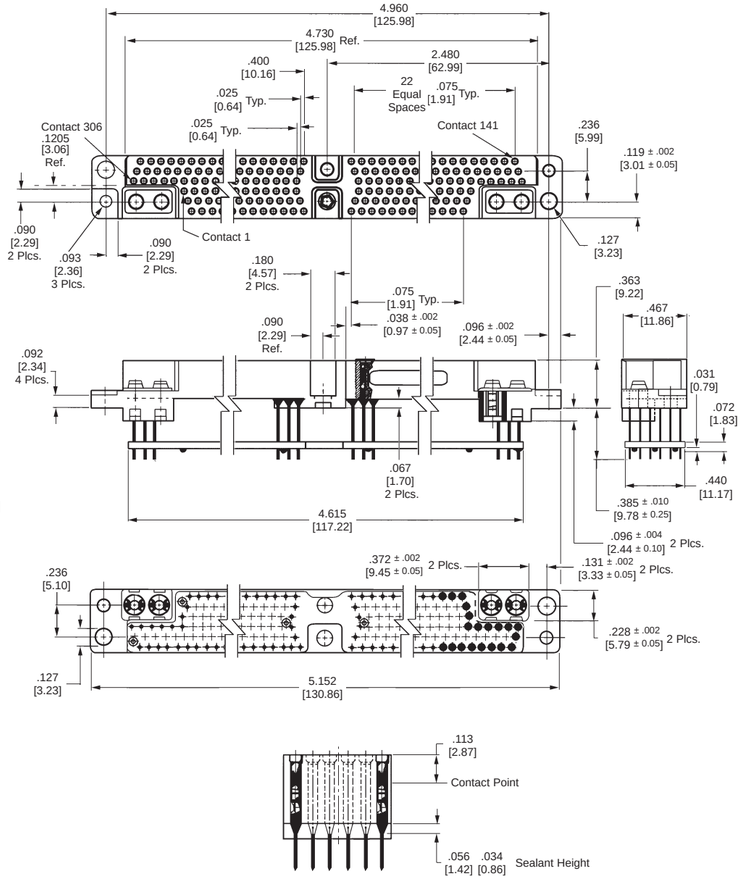
Fiber Optic Seats — Fluorosilicone rubber compound, blue

Fiber Optic Clip — Beryllium copper per QQ-C-533

Interfacial Seal — Fluorosilicone rubber compound, blue

Guide Post and Ground — Stainless steel, passivated

Shell — Aluminum per ASTM B 221-alloy 6061-T6, plated chromate per MIL-C-5541, Class 3 with **Captive Screws** — MS 246903-C7 modified



Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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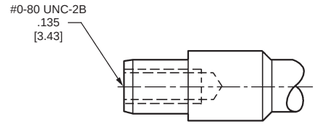
UK: 44-208-420-8341

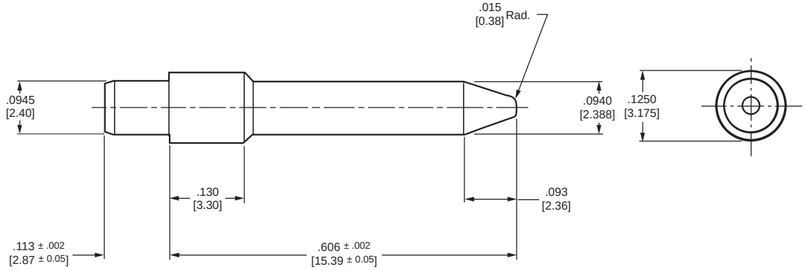
AMP-HDI 6-Row, 306-Position Connector (Continued)

LRM Receptacle Connectors with Additional, 4-Position, Fiber Optic Contact Ports (Continued)



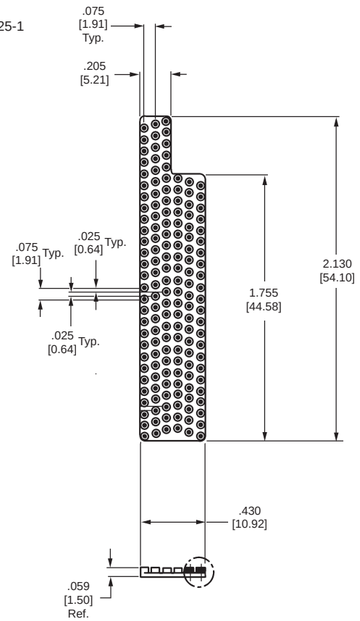
Part Number 445287-2

Part Number 445287-1

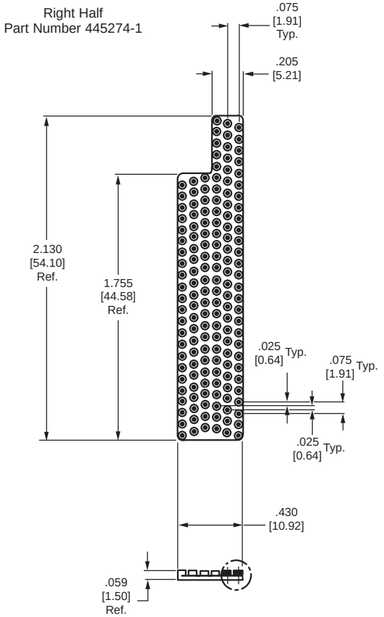


Guide Post

Left Half
Part Number 445525-1



Right Half
Part Number 445274-1



Interfacial Sealing Gaskets

Catalog 1308940
Revised 8-06

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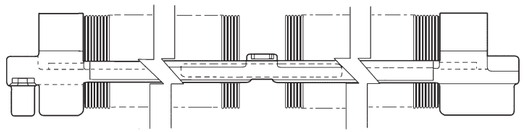
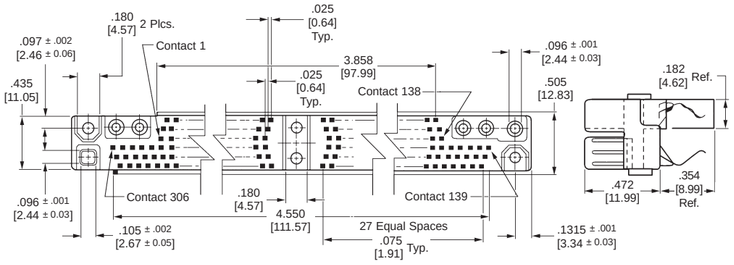
UK: 44-208-420-8341

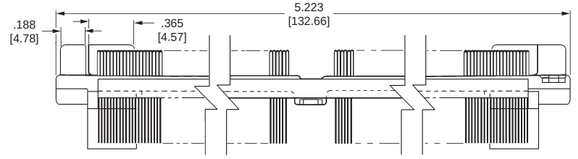
AMP-HDI 6-Row, 306-Position Connector (Continued)

LRM Plug Assembly with Additional, 4-Position, Fiber Optic Contacts

Part Number 445269-1







Material and Finish

Housing — Polyphenylene sulfide (PPS) per MIL-M-24519

Contacts — Beryllium copper, duplex .000050 [0.00127] min. gold in the mating area, .000100 [0.00254] min. tin-lead in the termination area per 5N60 or 5N63

Fiber Optic Contacts — Per MIL-T-29504/5 (are customer supplied)

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

AMP-HDI 8-Row, 428-Position Connector

LRM Motherboard Connector

Part Number 447447-1

Material and Finish

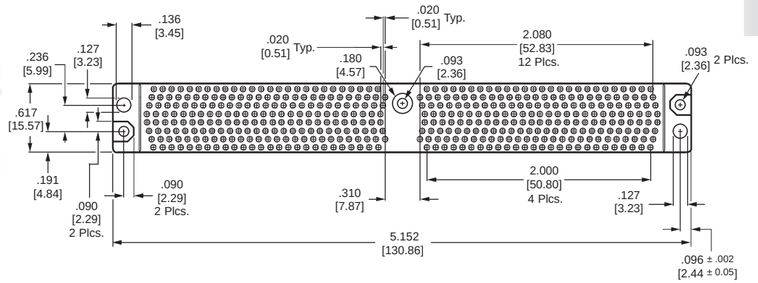
Housing — Polyphenylene sulfide per MIL-M-24519

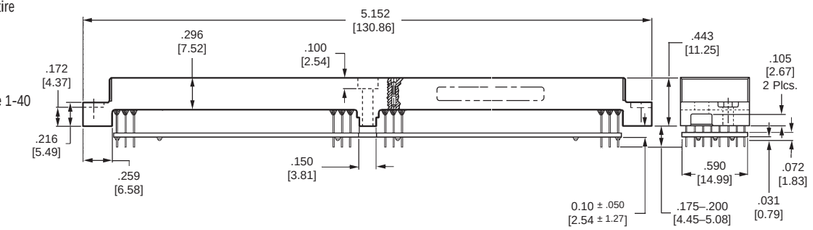
Contacts — Beryllium copper, plated .000050 [0.00127] min. gold per MIL-G-45204 in the contact area, over .000050 [0.00127] min. on the entire contact per QQ-N-290

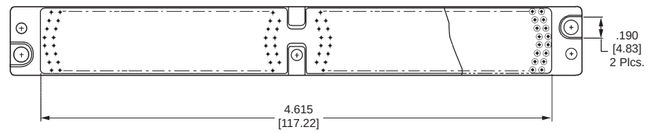
Related Product Data

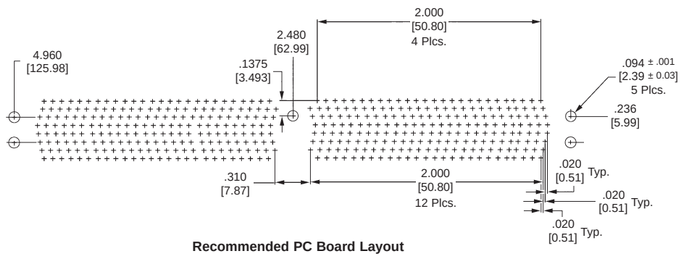
Mates with — Pin headers, page 1-40

Available Hardware — External Keys, Guide Pins









Recommended PC Board Layout

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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Japan: 81-44-844-8013
UK: 44-208-420-8341

AMP-HDI 8-Row, 428-Position Connector (Continued)

LRM Daughterboard Connector

Part Number 447444

Material and Finish

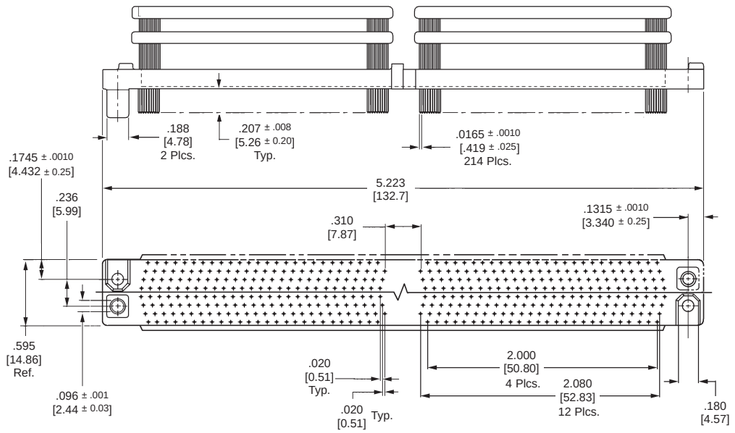
Housing — Polyphenylene sulfide per MIL-M-24519

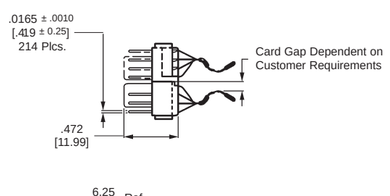
Contacts — Beryllium copper, plated .000050 [0.00127] min. gold per MIL-G-45204 in the contact area, over .000050 [0.00127] min. on the entire contact per QQ-N-290

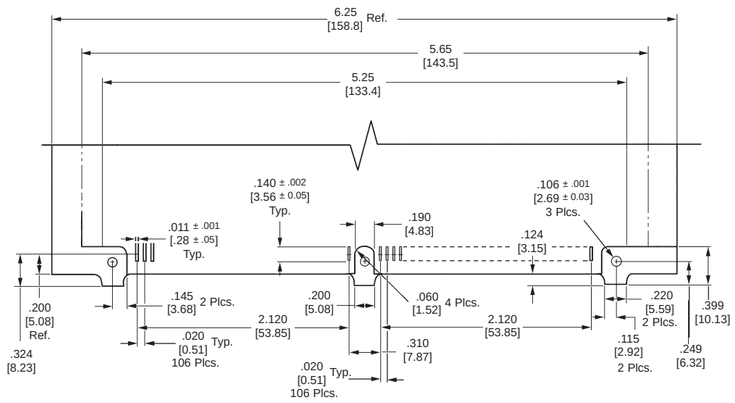
Related Product Data

Mates with — Receptacle, page 1-39

Available Hardware — Shell Assembly, Polarizing Keys







Recommended PC Board Layout

Plug Housing Assembly		Part Number
Plug Half (214 Pos.)	B Side	447444-4
		447444-2
	A Side	447444-3
		447444-1

Note: 8-Row Housing Dim. (Typ.) — Plug, 5.223 [132.66] L x .585 [14.86] W x .472 [11.99] H.

Catalog 1308940
Revised 8-06

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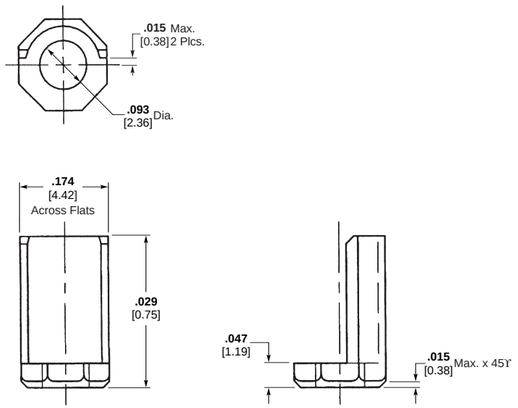
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMP-HDI Connector Accessories

External Key for Part Number 445270 and Part Number 447447

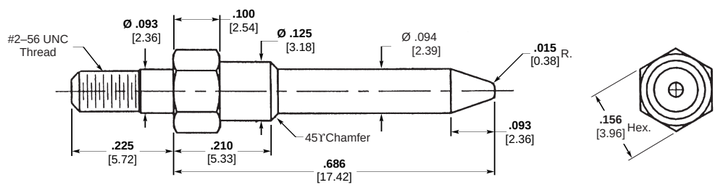
Material — Passivated stainless steel. Fasten with 2-56 cap screw x .50" long not included.



Part Number 445282-1

Threaded Post Guide for Part Number 445270 and Part Number 447447

Material — Passivated stainless steel. Fasten with 2-56 nut not included.



Part Number 447448-1

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UK: 44-208-420-8341

AMP-HDI Connector Shell Accessories

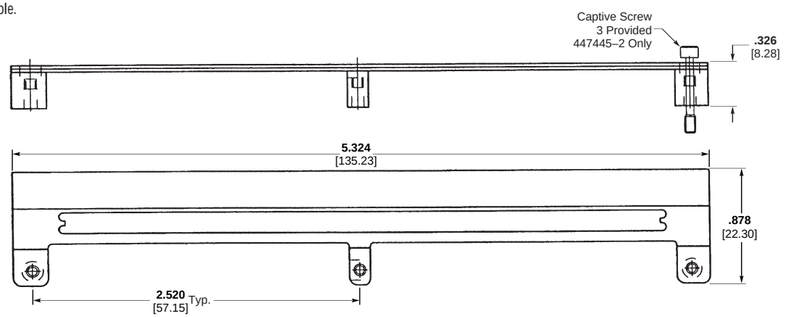
Protective Shell for Part Number 447444

Part Number 447445-2
Side “A” Shell With Captive Screws

Part Number 447446-2
Side “B” Shell Without Captive Screws

Material — Aluminum

Finish — Chromate conversion. Special shell markings available.



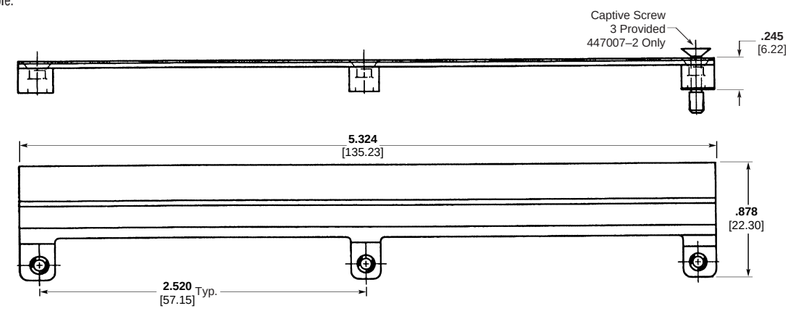
Protective Shell for Part Number 445269

Part Number 447007-2
Side “A” Shell With Captive Screws

Part Number 447006-2
Side “B” Shell Without Captive Screws

Material — Aluminum

Finish — Chromate conversion. Special shell markings available.



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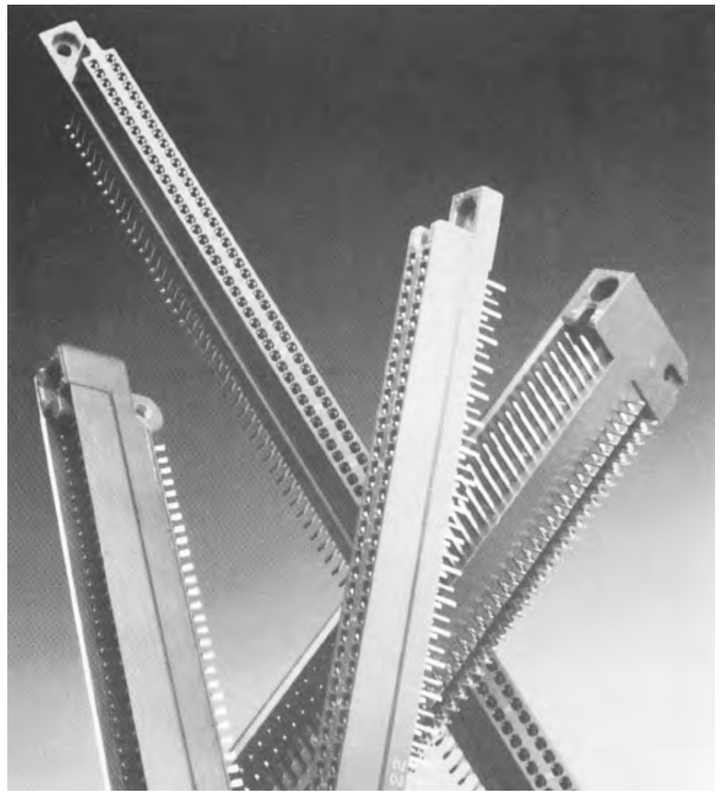
UK: 44-208-420-8341

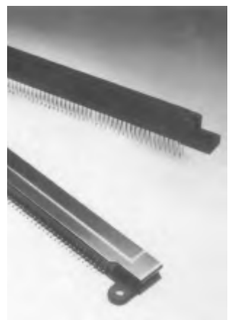
Introduction

Product Facts

- Contacts are on .075 x .125 [1.91 x 3.18] centers
- Pin headers are provided with pin protectors
- Box receptacles contacts are available in flow solder, solder eyelet and straddle mount styles
- Qualified to MIL-C-55302/24, /25, /23, /156
- Four-beam box-type receptacle contact design provides four areas of contact per connection



The .075 [1.91] centerline Box Connector series is available in a 2-row configuration with pin counts from 10 to 180 positions and uses the reliable four-beam box contact. The tighter centerline spacing provides more pins within a specified distance and the staggered footprint allows for easier manufacturing of the printed circuit board.



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Receptacle Assemblies for Flow Soldering — MIL-C-55302 Qualified

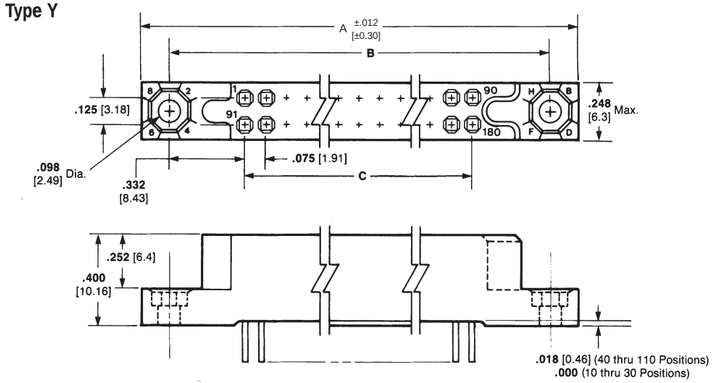
Related Product Data

Mates with — Pin Headers, pages 1-46 and 1-47

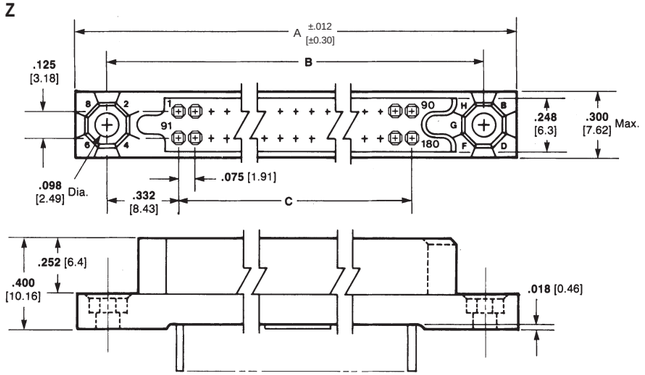
External Keying — page 1-82

Recommended PC Board Layout — page 1-49

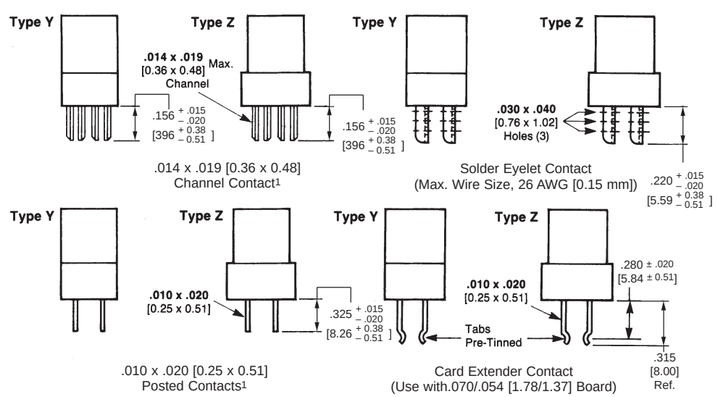
Type Y



Type Z



Contact Styles



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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Commercial Receptacle Assemblies

Housing Material—In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

Contact Material and Finish—Beryllium copper per QQ-C-533 or copper nickel silicon per ASTM B422 and ASTM B888
Channel Contact, Posted Contact and Card Extender Contact—Plated .000030 [0.00076] gold in contact area, .000100 [0.00254] tin-lead on the tails over .00030 [0.00076] nickel on the entire contact.
Solder Eyelet Contact—Plated .000030 [0.00076] gold in the contact area, .000100 [0.00254] tin-lead on the tails over .000030 [0.00076] nickel on the entire contact.

No. of Pos.	Housing Type	Dimensions A	Dimensions B	Dimensions C	.014 x .019 [0.36 x 0.48] Channel Contacts AMP Part No.	Solder Eyelet Contacts AMP Part No.	.010 x .020 [0.25 x 0.51] Posted Contacts AMP Part No.	Card Extender Contacts AMP Part No.
180	Z	7.630 193.8	7.340 186.44	6.675 169.55	531813-4	531811-4	531815-4	531817-4
160	Z	6.880 174.75	6.590 167.39	5.925 150.5	531813-3	—	—	531817-3
150	Z	6.505 165.23	6.215 157.86	5.550 140.97	531813-2	—	—	531817-2
120	Z	5.380 136.65	5.090 129.29	4.425 112.4	—	531811-1	531815-1	531817-1
100	Y	4.630 117.6	4.340 110.24	3.675 93.35	—	1-531810-0	—	1-531816-0
80	Y	3.880 98.55	3.590 91.19	2.925 74.3	531812-8	531810-8	—	—
50	Y	2.755 69.98	2.465 62.61	1.800 45.72	531812-5	531810-5	—	531816-5
40	Y	2.380 60.45	2.090 53.09	1.425 36.2	531812-4	531810-4	—	531816-4
30	Y	2.005 50.93	1.715 43.56	1.050 26.67	531812-3	—	—	531816-3
10	Y	1.255 31.88	.965 24.51	.300 7.62	—	—	531814-1	—

Military Receptacle Assemblies

Housing Material—In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

Contact Material and Finish—Beryllium copper per QQ-C-533
Channel Contact, Posted Contact and Card Extender Contact—Plated .000050 [0.00127] gold in the contact area, .000100 [0.00254] tin-lead on the tails over .000030 [0.00076] nickel on the entire contact.
Solder Eyelet Contact—Plated .000050 [0.00127] gold in the contact area, .000100 [0.00254] tin-lead on the tails over .000050 [0.00127] nickel on the entire contact.

No. of Pos.	Housing Type	Dimensions A	Dimensions B	Dimensions C	.014 x .019 [0.36 x 0.48] Channel Contacts MIL-Part No. M55302/	.014 x .019 [0.36 x 0.48] Channel Contacts AMP Part No.	Solder Eyelet Contacts MIL-Part No. M55302/	Solder Eyelet Contacts AMP Part No.	.010 x .020 [0.25 x 0.51] Posted Contacts MIL-Part No. M55302/	.010 x .020 [0.25 x 0.51] Posted Contacts AMP Part No.	Card Extender Contacts MIL-Part No. M55302/	Card Extender Contacts AMP Part No.
180	Z	7.630 193.8	7.340 186.44	6.675 169.55	25-29	531145-4	25-30	531146-4	25-31	531147-4	25-32	531148-4
160	Z	6.880 174.75	6.590 167.39	5.925 150.5	25-25	531145-3	25-26	531146-3	25-27	531147-3	25-28	531148-3
150	Z	6.505 165.23	6.215 157.86	5.550 140.97	25-21	531145-2	25-22	531146-2	25-23	531147-2	25-24	531148-2
120	Z	5.380 136.65	5.090 129.92	4.425 112.4	25-17	531145-1	25-18	531146-1	25-19	531147-1	25-20	531148-1
110	Y	5.005 127.13	4.715 119.76	4.050 102.87	24-85	1-531142-1	24-86	1-531129-1	24-87	1-531143-1	24-88	1-531144-1
100	Y	4.630 117.6	4.340 110.24	3.675 93.35	24-81	1-531142-0	24-82	1-531129-0	24-83	1-531143-0	24-84	1-531144-0
90	Y	4.255 108.08	3.965 100.71	3.300 83.82	24-77	531142-9	24-78	1-531129-2	24-79	531143-9	24-80	531144-9
80	Y	3.880 98.55	3.590 91.19	2.925 74.3	24-73	531142-8	24-74	531129-9	24-75	531143-8	24-76	531144-8
70	Y	3.505 89.03	3.215 81.66	2.550 64.77	24-69	531142-7	24-70	531129-8	24-71	531143-7	24-72	531144-7
60	Y	3.130 79.5	2.840 72.14	2.175 55.25	24-65	531142-6	24-66	531129-7	24-67	531143-6	24-68	531144-6
50	Y	2.755 69.98	2.465 62.61	1.800 45.72	24-61	531142-5	24-62	531129-6	24-63	531143-5	24-64	531144-5
40	Y	2.380 60.45	2.090 53.09	1.425 36.2	24-57	531142-4	24-58	531129-5	24-59	531143-4	24-60	531144-4
30	Y	2.005 50.93	1.715 43.56	1.050 26.67	24-53	531142-3	24-54	531129-4	24-55	531143-3	24-56	531144-3
20	Y	1.630 41.4	1.340 34.04	.675 17.15	24-49	531142-2	24-50	531129-3	24-51	531143-2	24-52	531144-2
10	Y	1.255 31.88	.965 24.51	.300 7.62	24-45	531142-1	24-46	531129-2	24-47	531143-1	24-48	531144-1

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Straddle Mount Pin Header Assemblies with Anodized Pin Protectors — MIL-C-55302 Qualified

Related Product Data

Mates with — Receptacles, pages 1-44 and 1-45

External Keying — page 1-82

Recommended PC Board Layout — page 1-49

Commercial Pin Header Assemblies

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 Type GLCP-30F

Pin Protector Material — Anodized aluminum per QQ-A-250/1

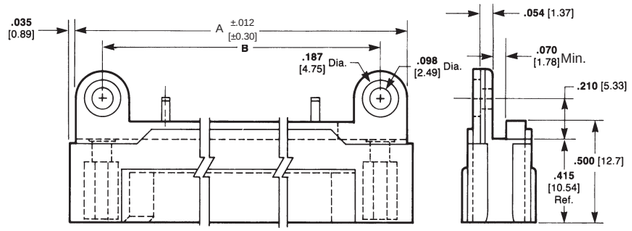
Contact Material and Finish — Brass per QQ-B-626 plated .000030 [0.00076] gold in the contact area, .000100 [0.00254] tin-lead on the tabs over .000050 [0.00127] nickel on the entire contact.

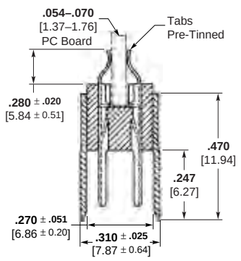
Military Pin Header Assemblies

Housing Material—In accordance with MIL-C-55302 or MIL-M-24519 Type GLCP-30F

Pin Protector Material—Anodized aluminum per QQ-A-250/1

Contact Material and Finish—Brass per QQ-B-626 plated .000050 [0.000127] gold in the contact area, .000100 [0.00254] tin-lead on the tabs over .000050 [0.00127] nickel on the entire contact.





No. of Pos.	Dimensions			Military Pin Header	
	A	B	C	M55302/	AMP Part No.
180	7.630 193.8	7.340 186.44	6.675 169.55	23-30	530785-4
160	6.880 174.75	6.590 167.39	5.925 150.5	23-29	530785-5
150	6.505 165.23	6.215 157.86	5.550 140.97	23-28	530785-2
120	5.380 136.65	5.090 129.29	4.425 112.4	23-27	530785-6
110	5.005 127.13	4.715 119.76	4.050 102.87	23-26	530785-7
100	4.630 117.6	4.340 110.24	3.675 93.35	23-25	530785-8
90	4.255 108.08	3.965 100.71	3.300 83.82	23-24	1-530785-7
80	3.880 98.55	3.590 91.19	2.925 74.3	23-23	530785-9
70	3.505 89.03	3.215 81.66	2.550 64.77	23-22	1-530785-0
60	3.130 79.5	2.840 72.14	2.175 55.25	23-21	1-530785-1
50	2.755 69.98	2.465 62.61	1.800 45.72	23-20	1-530785-2
40	2.380 60.45	2.090 53.09	1.425 36.2	23-19	1-530785-3
30	2.005 50.93	1.715 43.56	1.050 26.67	23-18	1-530785-4
20	1.630 41.4	1.340 34.04	.675 17.15	23-17	1-530785-5
10	1.255 31.88	.965 24.51	.300 7.62	23-16	1-530785-6

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UK: 44-208-420-8341

Right-Angle Pin Header Assemblies for Flow Soldering — MIL-C-55302 Qualified

Related Product Data

Mates with — Receptacles, pages 1-44 and 1-45

External Keying—page 1-82

Recommended PC Board Layout — page 1-49

Commercial Pin Header Assemblies

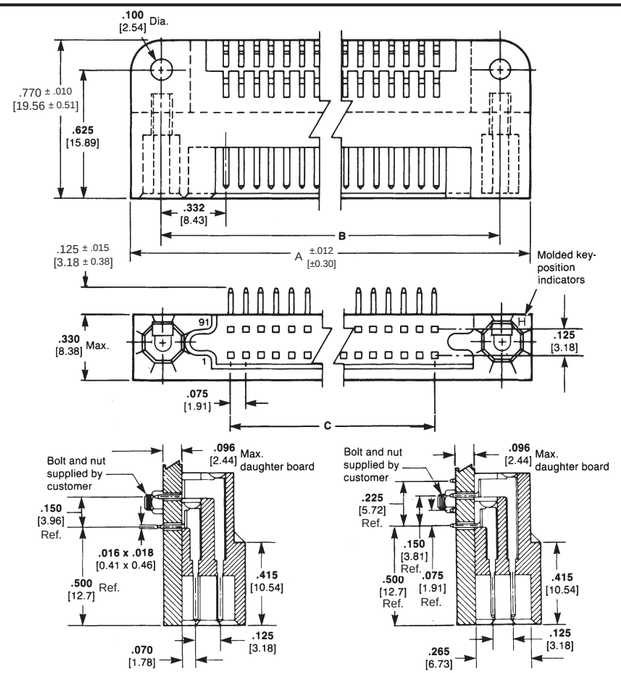
Housing Material — In accordance with MIL-C-55302

Contact Material and Finish — Brass per QQ-B-626 plated .000030 [0.00076] gold in the contact area, .000100 [0.00254] tin-lead on the tails over .000050 [0.00127] nickel on the entire contact

Military Pin Header Assemblies

Housing Material — In accordance with MIL-C-55302

Contact Material and Finish — Brass per QQ-B-626 plated .000050 [0.00127] gold in the contact area, .000100 [0.00254] tin-lead on the tails over .000050 [0.00127] nickel on the entire contact



In-Line Tails — Type I (2-row circuit board layout)

Staggered Tails — Type II (4-row circuit board layout)

No. of Positions	Dimensions			In-line, Type I			Staggered, Type II		
	A	B	C	Commercial Part No.	MIL-Part No. M55302/	AMP MIL Part No.	Commercial Part No.	MIL-Part No. M55302/	AMP MIL Part No.
180	7.630 193.8	7.340 186.44	6.675 169.55	—	156-15	1-531719-5	1-531124-5	156-30	1-531720-5
160	6.880 174.75	6.590 167.39	5.925 150.5	1-531127-4	156-14	1-531719-4	—	156-29	1-531720-4
150	6.505 165.23	6.215 157.86	5.550 140.97	—	156-13	1-531719-3	1-531124-3	156-28	1-531720-3
120	5.380 136.65	5.090 129.29	4.425 112.4	—	156-12	1-531719-2	—	156-27	1-531720-2
110	5.005 127.13	4.715 119.76	4.050 102.87	—	156-11	1-531719-1	—	156-26	1-531720-1
100	4.630 117.6	4.340 110.24	3.675 93.35	—	156-10	1-531719-0	—	156-25	1-531720-0
90	4.255 108.08	3.965 100.71	3.300 83.82	—	156-09	531719-9	—	156-24	531720-9
80	3.880 98.55	3.590 91.19	2.925 74.3	—	156-08	531719-8	—	156-23	531720-8
70	3.505 89.03	3.215 81.66	2.550 64.77	—	156-07	531719-7	—	156-22	531720-7
60	3.130 79.5	2.840 72.14	2.175 55.25	—	156-06	531719-6	531124-6	156-21	531720-6
50	2.755 69.98	2.465 62.61	1.800 45.72	—	156-05	531719-5	531124-5	156-20	531720-5
40	2.380 60.45	2.090 53.09	1.425 36.2	—	156-04	531719-4	531124-4	156-19	531720-4
30	2.005 50.93	1.715 43.56	1.050 26.67	—	156-03	531719-3	531124-3	156-18	531720-3
20	1.630 41.4	1.340 34.04	.675 17.15	—	156-02	531719-2	—	156-17	531720-2
10	1.255 31.88	.965 24.51	.300 7.62	—	156-01	531719-1	—	156-16	531720-1

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UK: 44-208-420-8341

Stacking Connectors

Receptacle Assembly

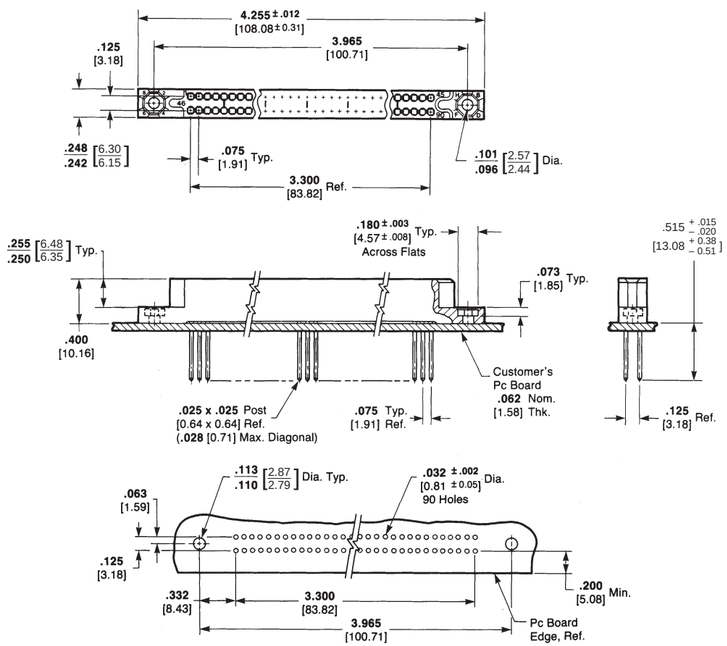
Housing Material — Blue Diallyl Phthalate or MIL-M-24519 Type GLCP-30F

Contact Material and Finish — Beryllium copper or copper nickel silicon per ASTM B422 and ASTM B888, plated gold .000050 [0.00127] thick all over nickel .000030 [0.00076] thick

Related Product Data

Mates with — Pin Shroud Housing

External Keying — page 1-82



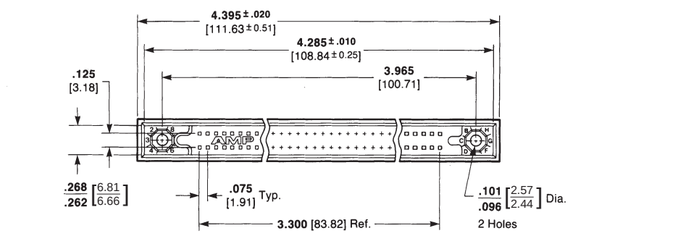
Recommended PC Board Layout

Pin Shroud Housing

Housing Material — Blue Polyester

Related Product Data

Mates with — Receptacle Assembly



Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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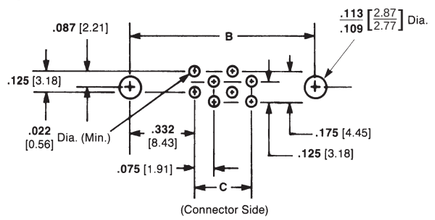
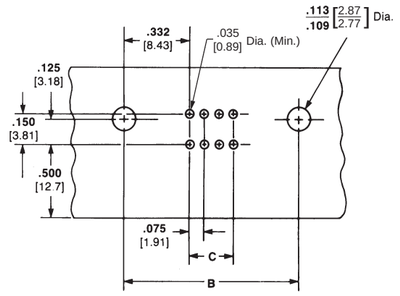
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Recommended Printed Circuit Board Layouts

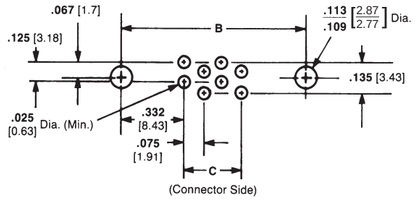
Receptacle Assemblies



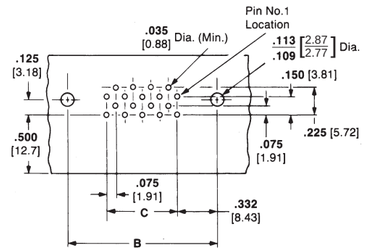
.014 x .019 [0.36 x 0.48]
Channel Contacts



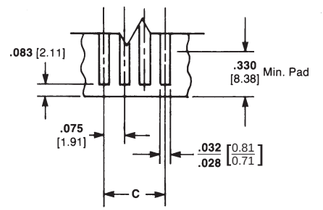
In-Line, Right-Angle



.010 x .020 [0.25 x 0.51]
Posted Contacts



Staggered, Right-Angle
(Connector Side)

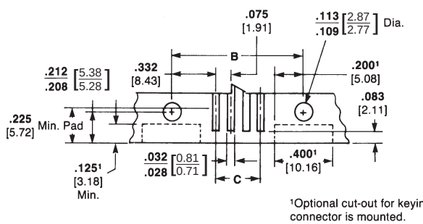


Card Extender Contacts

No. of Pos.	Dimensions	
	B	C
180	7.340 186.44	6.675 169.55
160	6.590 167.39	5.925 150.5
150	6.215 157.86	5.550 140.97
120	5.090 129.29	4.425 112.4
110	4.715 119.76	4.050 102.87
100	4.340 110.24	3.675 93.35
90	3.965 100.71	3.300 83.82
80	3.590 91.19	2.925 74.3
70	3.215 81.66	2.550 64.77
60	2.840 72.14	2.175 55.25
50	2.465 62.61	1.800 45.72
40	2.090 53.09	1.425 36.2
30	1.715 43.56	1.050 26.67
20	1.340 34.04	.675 17.15
10	.965 24.51	.300 7.62

Note: These drawings are for reference only. Consult Tyco Electronics for board layout details.

Pin Header Assemblies



¹Optional cut-out for keying after connector is mounted.

Straddle Mount Assembly

Catalog 1308940
Revised 8-06

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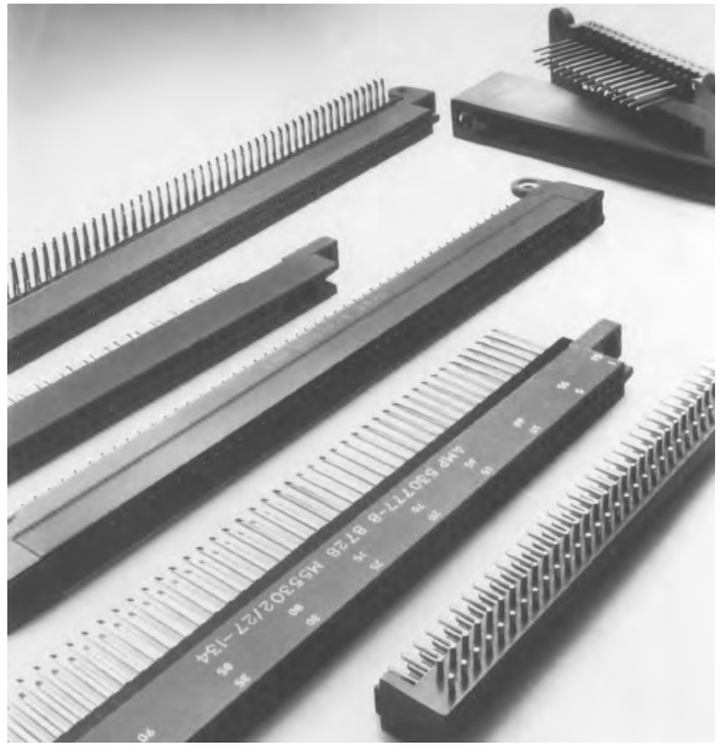
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

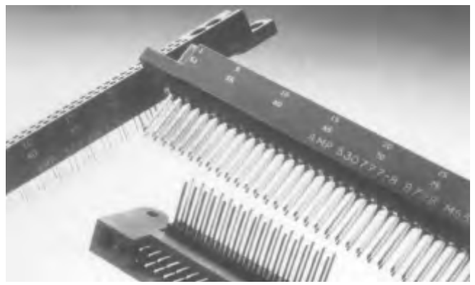
Introduction

Product Facts

- Contacts are on .100 x .100 [2.54 x 2.54] centers
- Four-beam box-type contact design provides four areas of contact per connection
- Quad-beam redundancy offers high performance and reliability
- Sealed versions available
- Straddle mount pin headers have pretinned tabs for connection to daughter boards
- Pin headers are provided with pin protectors
- Straddle mount pin headers have replaceable contacts
- Box receptacle contacts are available in flow solder, solder eyelet, straddle mount, wrap-type and crimp styles
- Pin header assemblies are available in right-angle, straddle mount and crimp styles
- Solder tails are tin-lead plated for solderability
- Signal-coax mix connectors available
- Qualified to MIL-C-55302/26, /27, /110, /113, /129, /130



The .100 [2.54] Box Contact Connector series is available in 2, 3 and 4-row configurations with pin counts up to 300 positions. Each configuration uses the unique, very reliable four-beam box design which offers low applied cost while maintaining high performance and reliability. The ability to choose different sizes; housing materials; terminations; sealed versions; hybrids; etc. provides one with needed versatility in designing a system.



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UK: 44-208-420-8341

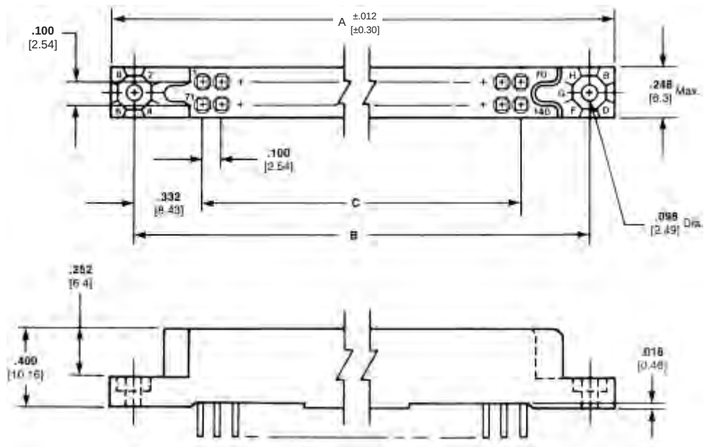
2-Row Receptacle Assemblies — MIL-C-55302 Qualified

Related Product Data

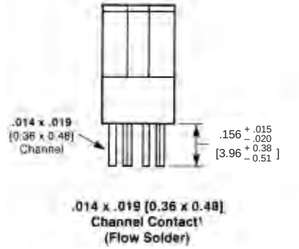
Mates with — Pin Headers and Assemblies, pages 1-58 to 1-62

External Keying — page 1-82

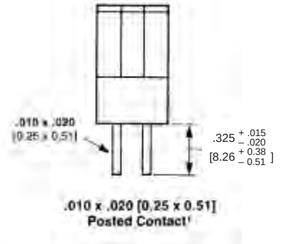
Recommended PC Board Layout — page 1-76



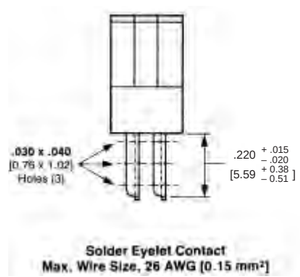
Contact Styles



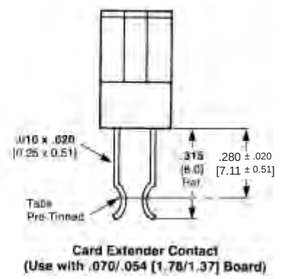
.014 x .019 [0.36 x 0.48] Channel Contact[1] (Flow Solder)



.010 x .020 [0,25 x 0.51] Posted Contact[1]



Solder Eyelet Contact Max. Wire Size, 26 AWG [0.15 mm²]



Card Extender Contact (Use with .070/.054 [1.78/1.37] Board)

[1] For flow solder application

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

2-Row Receptacle Assemblies — MIL-C-55302 Qualified (Continued)

Commercial Receptacle Assemblies

Housing Material — In accordance with MIL-C-55302

Contact Material and Finish — Beryllium copper or copper nickel silicon per ASTM B422 and ASTM B888
Channel Contact, Posted Contact and Card Extender Contact — Plated .000030 [0.00076] gold in contact area. .000100 [0.00254] tin-lead on the tails over .000030 [0.00076] nickel on the entire contact.

Solder Eyelet Contact — Plated .000030 [0.00076] gold in contact area, .000100 [0.00254] tin-lead on tails over .000030 [0.00076] nickel on the entire contact.

No. of Pos.	Dimensions A	Dimensions B	Dimensions C	.014 x .019 [0.36 x 0.48] Channel Contacts AMP Part No.	.010 x .020 [0.25 x 0.51] Posted Contacts AMP Part No.	Solder Eyelet Contacts AMP Part No.	Card Extender Contacts AMP Part No.
140	**7.855** 199.52	**7.565** 192.15	**6.900** 175.26	1-531832-3	—*	—*	—*
134	**7.555** 191.90	**7.265** 184.53	**6.600** 167.64	—*	—*	1-531833-2	—*
130	**7.355** 186.82	**7.065** 179.45	**6.400** 162.56	—*	—*	—*	—*
120	**6.855** 174.12	**6.565** 166.75	**5.900** 149.86	—*	—*	—*	—*
110	**6.355** 161.42	**6.065** 154.05	**5.400** 137.16	531832-9	—*	—*	531835-9
100	**5.855** 148.72	**5.565** 141.35	**4.900** 124.46	531832-8	—*	—*	—*
90	**5.355** 136.02	**5.065** 128.65	**4.400** 111.76	—*	—*	—*	—*
80	**4.855** 123.32	**4.565** 115.95	**3.900** 99.06	—*	531834-6	—*	—*
70	**4.355** 110.62	**4.065** 103.25	**3.400** 83.36	—*	—*	—*	—*
60	**3.855** 97.92	**3.565** 90.55	**2.900** 73.66	—*	—*	531833-4	—*
50	**3.355** 85.22	**3.065** 77.85	**2.400** 60.96	—*	—*	—*	531835-3
40	**2.855** 72.52	**2.565** 65.15	**1.900** 48.26	—*	—*	—*	—*
30	**2.355** 59.82	**2.065** 52.4 5	**1.400** 35.56	—*	—*	—*	—*

* Part Numbers available upon request, contact Tyco Electronics.

Military Receptacle Assemblies

Housing Material — In accordance with MIL-C-55302

Contact Material and Finish — Beryllium copper or copper nickel silicon per ASTM B422 and ASTM B888
Channel Contact, Posted Contact and Card Extender Contact — Plated .000050 [0.00127] gold in contact area, .000100 [0.00254] tin-lead on the tails over .000030 [0.00076] nickel on the entire contact.

Solder Eyelet Contact — Plated .000050 [0.00127] gold in contact area, in accordance with MIL-C-55302 .000100 [0.00254] tin-lead on tails over .000050 [0.00127] nickel on the entire contact.

No. of Pos.	Dimensions A	Dimensions B	Dimensions C	.014 x .019 [0.36 x 0.48] Channel Contacts MIL-Part No. M55302/	.014 x .019 [0.36 x 0.48] Channel Contacts AMP Part No.	Solder Eyelet Contacts MIL-Part No. M55302/	Solder Eyelet Contacts AMP Part No.	.010 x .020 [0.25 x 0.51] Posted Contacts MIL-Part No. M55302/	.010 x .020 [0.25 x 0.51] Posted Contacts AMP Part No.	Card Extender Contacts MIL-Part No. M55302/	Card Extender Contacts AMP Part No.
140	**7.855** 199.52	**7.565** 192.15	**6.900** 175.26	27-193	2-530340-2	27-197	1-530758-3	27-201	1-530776-3	27-229	1-530782-3
134	**7.555** 191.90	**7.265** 184.53	**6.600** 167.64	27-192	2-530340-1	27-196	1-530758-2	27-200	1-530776-2	27-228	1-530782-2
130	**7.355** 186.82	**7.065** 179.45	**6.400** 162.56	27-191	2-530340-0	27-195	1-530758-1	27-199	1-530776-1	27-227	1-530782-1
120	**6.855** 174.12	**6.565** 166.75	**5.900** 149.86	27-190	1-530340-9	27-194	1-530758-0	27-198	1-530776-0	27-226	1-530782-0
110	**6.355** 161.42	**6.065** 154.05	**5.400** 137.16	27-99	530340-9	27-108	530758-9	27-117	530776-9	27-180	530782-9
100	**5.855** 148.72	**5.565** 141.35	**4.900** 124.46	27-98	530340-8	27-107	530758-8	27-116	530776-8	27-179	530782-8
90	**5.355** 136.02	**5.065** 128.65	**4.400** 111.76	27-97	530340-7	27-106	530758-7	27-115	530776-7	27-178	530782-7
80	**4.855** 123.32	**4.565** 115.95	**3.900** 99.06	27-96	530340-6	27-105	530758-6	27-114	530776-6	27-177	530782-6
70	**4.355** 110.62	**4.065** 103.25	**3.400** 83.36	27-95	530340-5	27-104	530758-5	27-113	530776-5	27-176	530782-5
60	**3.855** 97.92	**3.565** 90.55	**2.900** 73.66	27-94	530340-4	27-103	530758-4	27-112	530776-4	27-175	530782-4
50	**3.355** 85.22	**3.065** 77.85	**2.400** 60.96	27-93	530340-3	27-102	530758-3	27-111	530776-3	27-174	530782-3
40	**2.855** 72.52	**2.565** 65.15	**1.900** 48.26	27-92	530340-2	27-101	530758-2	27-110	530776-2	27-173	530782-2
30	**2.355** 59.82	**2.065** 52.45	**1.400** 35.56	27-91	530340-1	27-100	530758-1	27-109	530776-1	27-172	530782-1

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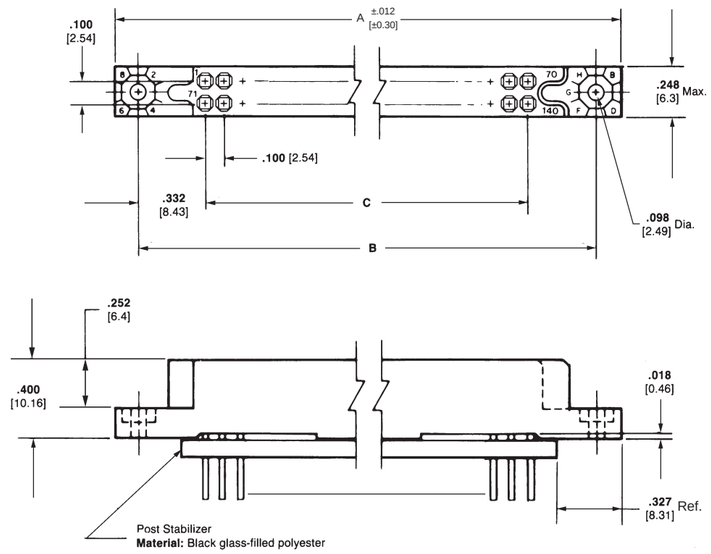
2-Row Receptacle Assemblies for Rack Mounting with Posted Contacts (Wrap-Type) — MIL-C-55302 Qualified

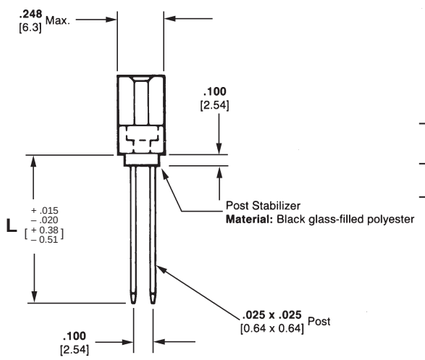
Related Product Data

Mates with — Pin Headers Assemblies, pages 1-58 to 1-62

External Keying — page 1-82

Recommended PC Board Layout — page 1-76





Post Length	No. of Terminals per Post		
	1 High	2 High	3 High
L	.405 10.29	.565 14.35	.725 18.42

Post Wrapping Information

Maximum wire size for wrapping a posted box terminal is 30 AWG [0.05mm²] (maximum insulated wire diameter, .019 [0.49mm]).

The following data can be used to determine bit and sleeve size:

- Maximum Terminal Diagonal: .034 [0.87]
- Minimum Terminal Diagonal: .031 [0.78]
- Maximum Effective Radius: .067 [1.71]

Recommended Sleeve:
No. 507100[1]
Recommended Bits:
No. 511208[1]
No. 507063[1]

[1]Available from Gardner-Denver Co.,

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Japan: 81-44-844-8013
UK: 44-208-420-8341

2-Row Receptacle Assemblies for Rack Mounting with Posted Contacts (Wrap-Type) — MIL-C-55302 Qualified (Continued)

Commercial Receptacle Assemblies

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 Type GLCP-30F

[1] **Contact Material and Finish** — Beryllium copper or copper nickel silicon per ASTM B422 and ASTM B888 plated .000030 [0.00076] gold in the contact area, .000100 [0.00254] tin-lead on the tails over .000030 [0.00076] nickel on the entire contact

[2] **Contact Material and Finish** — Same as above except for tin on the tails

No. of Pos.	Dimensions			No. of Terminations Per Post			
	A	B	C	1 High Part No.[1]	2 High Part No.[1]	3 High Part No.[1]	3 High RoHS Part No.[2]
140	**7.855** 199.52	**7.565** 192.15	**6.900** 175.26	—*	—*	—*	—
134	**7.555** 191.50	**7.265** 184.53	**6.600** 167.64	—*	—*	—*	—
130	**7.355** 186.82	**7.065** 179.45	**6.400** 162.56	—*	—*	—*	—
120	**6.855** 174.12	**6.565** 166.75	**5.900** 149.86	—*	—*	—*	—
110	**6.355** 161.42	**6.065** 154.05	**5.400** 137.16	—*	—*	531838-9	—
100	**5.855** 148.72	**5.565** 141.35	**4.900** 124.46	—*	531837-8	531838-8	5-531838-8
90	**5.355** 136.02	**5.065** 128.65	**4.400** 111.76	531836-7	—*	—*	—
80	**4.855** 123.32	**4.565** 115.95	**3.900** 99.06	—*	—*	531838-6	5-531838-6
70	**4.355** 110.62	**4.065** 103.25	**3.400** 86.36	—*	—*	—*	—
60	**3.855** 97.92	**3.565** 90.55	**2.900** 73.66	—*	—*	—*	—
50	**3.355** 85.22	**3.065** 77.85	**2.400** 60.96	531836-3	—*	531838-3	5-531838-3
40	**2.855** 72.52	**2.565** 65.15	**1.900** 48.26	—*	—*	—*	—
30	**2.355** 59.82	**2.065** 52.45	**1.400** 35.56	—*	—*	—*	—

* Part Numbers available upon request, contact Tyco Electronics.

Military Receptacle Assemblies

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 Type GLCP-30F

Contact Material and Finish — Beryllium copper or copper nickel silicon per ASTM B422 and ASTM B888 plated .000050 [0.00127] gold over .000030 [0.00076] nickel on the entire contact

No. of Pos.	Dimensions			No. of Terminations Per Post					
				1 High		2 High		3 High	
	A	B	C	MIL-Part No.	AMP Part No.	MIL-Part No.	AMP Part No.	MIL-Part No.	AMP Part No.
140	**7.855** 199.52	**7.565** 192.15	**6.900** 175.26	M55302/27-213	—	M55302/27-209	1-530777-3	M55302/27-205	1-530763-3
134	**7.555** 191.50	**7.265** 184.53	**6.600** 167.64	M55302/27-212	1-530778-2	M55302/27-208	1-530777-2	M55302/27-204	1-530763-2
130	**7.355** 186.82	**7.065** 179.45	**6.400** 162.56	M55302/27-211	1-530778-1	M55302/27-207	1-530777-1	M55302/27-203	1-530763-1
120	**6.855** 174.12	**6.565** 166.75	**5.900** 149.86	M55302/27-210	1-530778-0	M55302/27-206	1-530777-0	M55302/27-202	1-530763-0
110	**6.355** 161.42	**6.065** 154.05	**5.400** 137.16	M55302/27-144	530778-9	M55302/27-135	530777-9	M55302/27-126	530763-9
100	**5.855** 148.72	**5.565** 141.35	**4.900** 124.46	M55302/27-143	530778-8	M55302/27-134	530777-8	M55302/27-125	530763-8
90	**5.355** 136.02	**5.065** 128.65	**4.400** 111.76	M55302/27-142	530778-7	M55302/27-133	530777-7	M55302/27-124	530763-7
80	**4.855** 123.32	**4.565** 115.95	**3.900** 99.06	M55302/27-141	530778-6	M55302/27-132	530777-6	M55302/27-123	530763-6
70	**4.355** 110.62	**4.065** 103.25	**3.400** 86.36	M55302/27-140	530778-5	M55302/27-131	530777-5	M55302/27-122	530763-5
60	**3.855** 97.92	**3.565** 90.55	**2.900** 73.66	M55302/27-139	530778-4	M55302/27-130	530777-4	M55302/27-121	530763-4
50	**3.355** 85.22	**3.065** 77.85	**2.400** 60.96	M55302/27-138	530778-3	M55302/27-129	530777-3	M55302/27-120	530763-3
40	**2.855** 72.52	**2.565** 65.15	**1.900** 48.26	M55302/27-137	530778-2	M55302/27-128	530777-2	M55302/27-119	530763-2
30	**2.355** 59.82	**2.065** 52.45	**1.400** 35.56	M55302/27-136	530778-1	M55302/27-127	530777-1	M55302/27-118	530763-1

Catalog 1308940
Revised 8-06

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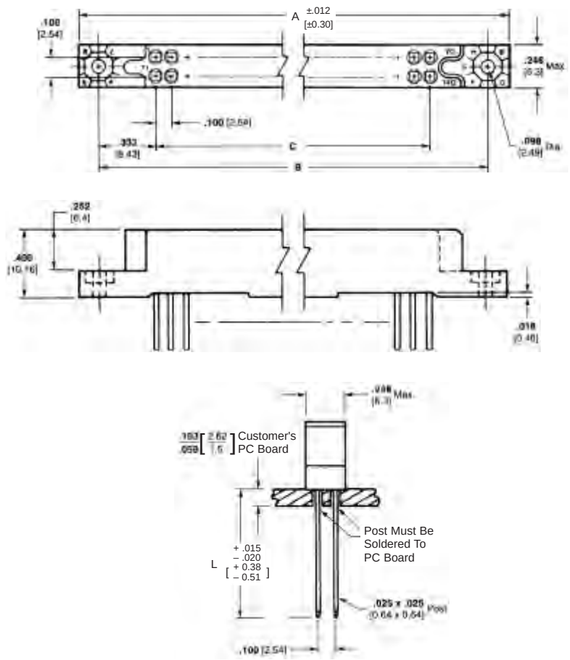
Japan: 81-44-844-8013
UK: 44-208-420-8341

2-Row Receptacle Assemblies for PC Solder Mount with Posted Contacts (Wrap-Type) — MIL-C-55302 Qualified



Related Product Data

Mates with — Pin Header Assemblies, pages 1-58 to 1-62

External Keying — page 1-82

Post Wrapping Information — page 1-53

Recommended PC Board Layout — page 1-76

Military Receptacle Assemblies

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 Type GLCP-30F

Contact Material and Finish — Beryllium copper or copper nickel silicon per ASTM B422 and ASTM B888 plated .000050 [0.00127] gold over .000030 [0.00076] nickel on the entire contact.

No. of Pos.	Dimensions			No. of Terminations Per Post					
				1 High		2 High		3 High	
	A	B	C	MIL-Part No.	AMP Part No.	MIL-Part No.	AMP Part No.	MIL-Part No.	AMP Part No.
140	**7.855** 199.52	**7.565** 192.15	**6.900** 175.26	M55302/27-225	—	M55302/27-221	1-530780-3	M55302/27-217	1-530779-3
134	**7.555** 191.90	**7.265** 184.53	**6.600** 167.64	M55302/27-224	—	M55302/27-220	1-530780-2	M55302/27-216	1-530779-2
130	**7.355** 186.82	**7.065** 179.45	**6.400** 162.56	M55302/27-223	1-530781-1	M55302/27-219	1-530780-1	M55302/27-215	1-530779-1
120	**6.855** 174.12	**6.565** 166.75	**5.900** 149.86	M55302/27-222	—	M55302/27-218	1-530780-0	M55302/27-214	1-530779-0
110	**6.355** 161.42	**6.065** 154.05	**5.400** 137.16	M55302/27-171	530781-9	M55302/27-162	530780-9	M55302/27-153	530779-9
100	**5.855** 148.72	**5.565** 141.35	**4.900** 124.46	M55302/27-170	530781-8	M55302/27-161	530780-8	M55302/27-152	530779-8
90	**5.355** 136.02	**5.065** 128.65	**4.400** 111.76	M55302/27-169	530781-7	M55302/27-160	530780-7	M55302/27-151	530779-7
80	**4.855** 123.32	**4.565** 115.95	**3.900** 99.06	M55302/27-168	530781-6	M55302/27-159	530780-6	M55302/27-150	530779-6
70	**4.355** 110.62	**4.065** 103.25	**3.400** 86.36	M55302/27-167	530781-5	M55302/27-158	530780-5	M55302/27-149	530779-5
60	**3.855** 97.92	**3.565** 90.55	**2.900** 73.66	M55302/27-166	—	M55302/27-157	530780-4	M55302/27-148	530779-4
50	**3.355** 85.22	**3.065** 77.85	**2.400** 60.96	M55302/27-165	530781-3	M55302/27-156	530780-3	M55302/27-147	530779-3
40	**2.855** 72.52	**2.565** 65.15	**1.900** 48.26	M55302/27-164	530781-2	M55302/27-155	530780-2	M55302/27-146	530779-2
30	**2.355** 59.82	**2.065** 52.45	**1.400** 35.56	M55302/27-163	530781-1	M55302/27-154	530780-1	M55302/27-145	530779-1

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Japan: 81-44-844-8013
UK: 44-208-420-8341

2-Row Right-Angle Receptacle Assemblies with Posted Contacts (Wrap-Type)

Related Product Data

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 Type GLCP-30F

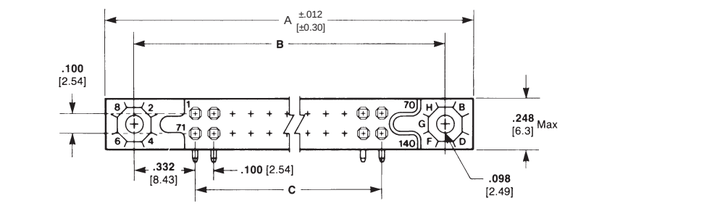
[1] Contact Material and Finish — Beryllium copper or copper nickel silicon per ASTM B422 and ASTM B888 plated .000030 [0.00076] gold in the contact area, .000100 [0.00254] tin-lead on posts over .000030 [0.00076] nickel on the entire contact

[2] Contact Material and Finish — Same as above except for tin on posts

Mates with — Pin Header Assemblies, pages 1-58 to 1-62

External Keying — page 1-82

Recommended PC Board Layout — page 1-76



[1]The rows of posts will not be of equal length.

No. of Pos.	Dimensions A	Dimensions B	Dimensions C	Part No.[1]	RoHS Part No.[2]
140	**7.855** 199.52	**7.565** 192.15	**6.900** 175.26	—	—
134	**7.555** 191.50	**7.265** 184.53	**6.600** 167.64	—	—
130	**7.355** 186.82	**7.065** 179.45	**6.400** 162.56	—	—
120	**6.855** 174.12	**6.565** 166.75	**5.900** 149.86	532469-4	—
110	**6.355** 161.42	**6.065** 154.05	**5.400** 137.16	1-532469-0	—
100	**5.855** 148.72	**5.565** 141.35	**4.900** 124.46	532469-9	5-532469-9
90	**5.355** 136.02	**5.065** 128.65	**4.400** 111.76	532469-3	5-532469-3
80	**4.855** 123.32	**4.565** 115.95	**3.900** 99.06	—	—
70	**4.355** 110.62	**4.065** 103.25	**3.400** 86.36	—	—
60	**3.855** 97.92	**3.565** 90.55	**2.900** 73.66	532469-2	—
50	**3.355** 85.22	**3.065** 77.85	**2.400** 60.96	—	—
40	**2.855** 72.52	**2.565** 65.15	**1.900** 48.26	532469-6	—
30	**2.355** 59.82	**2.065** 52.45	**1.400** 35.56	532469-5	—

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

2-Row Sealed Receptacle Connector

Housing Material — Per MIL-C-55302 or MIL-M-24519 type GLCP-30F

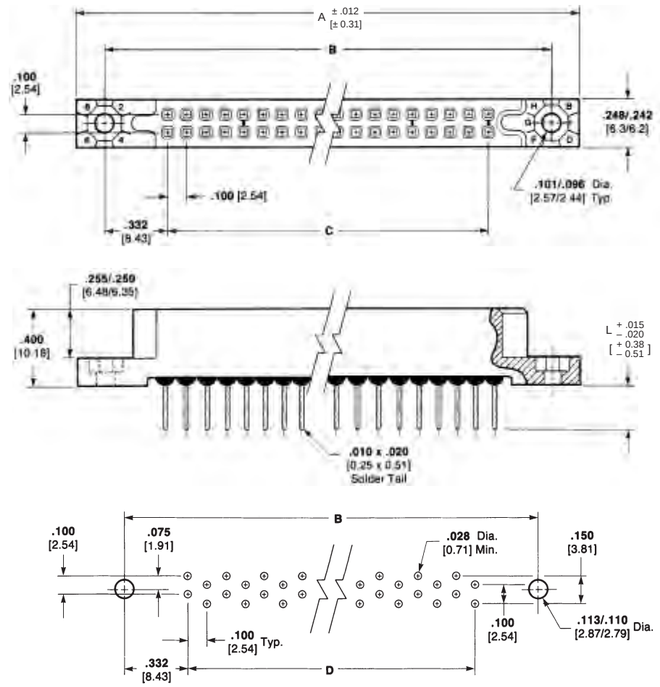
Contact Material and Finish — Beryllium copper or copper nickel silicon per ASTM B422 and ASTM B888 plated .000050 [0.00127] gold in the contact area, .000100 [0.00254] tin-lead on the solder tails over .000030 [0.00076] nickel on the entire contact

Related Product Data

Mates with — Pin Header Assemblies, pages 1-58 to 1-62

External Keying — page 1-82

Mating Sealed Pin Header Assembly — Part Number 532795



Recommended PC Board Layout

No. of Pos.	Dimensions				Part Nos. Dim. L	
	A	B	C	D	.156 [3.96]	.235 [5.97]
140	**7.855** 199.52	**7.565** 192.15	**7.165** 181.99	**6.900** 175.26	—*	—*
134	**7.555** 191.90	**7.265** 184.53	**6.865** 174.37	**6.600** 167.64	—*	—*
130	**7.355** 186.82	**7.065** 179.45	**6.555** 166.50	**6.400** 162.56	—*	—*
120	**6.855** 174.12	**6.565** 166.75	**6.165** 156.59	**5.906** 149.86	—*	—*
110	**6.355** 161.42	**6.065** 154.05	**5.655** 143.64	**5.400** 137.16	534195-9	534650-9
100	**5.855** 148.72	**5.565** 141.35	**5.165** 131.19	**4.900** 124.46	—*	—*
90	**5.355** 136.02	**5.065** 128.65	**4.655** 118.24	**4.400** 111.76	534195-7	—*
80	**4.855** 123.32	**4.565** 115.95	**4.165** 105.79	**3.900** 99.06	534195-6	—*
70	**4.355** 110.62	**4.065** 103.25	**3.655** 92.84	**3.400** 86.36	534195-5	—*
60	**3.855** 97.92	**3.565** 90.55	**3.165** 80.39	**2.900** 73.66	534195-4	—*
50	**3.355** 85.22	**3.065** 77.85	**2.655** 67.44	**2.400** 60.96	534195-3	—*
40	**2.855** 72.52	**2.565** 65.15	**2.165** 54.99	**1.900** 48.26	534195-2	—*
30	**2.355** 59.82	**2.065** 52.45	**1.665** 42.29	**1.400** 35.56	534195-1	—*

* Part Numbers available upon request, contact Tyco Electronics.

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

2-Row Straddle Mount Pin Header Assemblies with Anodized Pin Protectors — MIL-C-55302 Qualified

Commercial Pin Header Assembly

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

Pin Protector Material — Anodized aluminum per QQ-A-250/1

Contact Material and Finish — Brass per QQ-B-626 plated .000030 [0.00076] gold in the contact area, .000100 [0.00254] tin-lead on the tabs over .000050 [0.00127] nickel on the entire contact

Military Pin Header Assembly

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

Pin Protector Material — Anodized aluminum per QQ-A-250/1

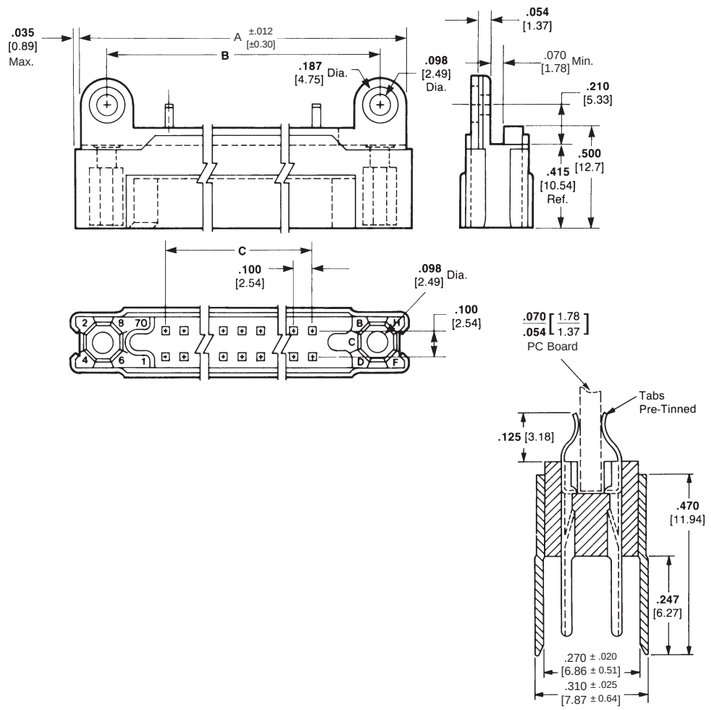
Contact Material and Finish — Brass per QQ-B-626 plated .000050 [0.00127] gold in the contact area, .000100 [0.00254] tin-lead on the tabs over .000050 [0.00127] nickel on the entire contact

Related Product Data

Mates with — Receptacles, pages 1-51 to 1-56, 1-63 and 1-64

External Keying — page 1-82

Recommended PC Board Layout — page 1-77



Edge Mount

No. of Pos.	Dimensions A	B	C	Commercial Part No.	Military MIL Part No.	AMP Part No.
140	**7.855** 199.52	**7.565** 192.15	**6.900** 175.26	—	M55302/26-22	1-530761-5
134	**7.555** 191.50	**7.265** 184.53	**6.600** 167.64	—	M55302/26-21	530761-3
130	**7.355** 186.82	**7.065** 179.45	**6.400** 162.56	—	M55302/26-20	1-530761-4
120	**6.855** 174.12	**6.565** 166.75	**5.900** 149.86	—	M55302/26-19	1-530761-3
110	**6.355** 161.42	**6.065** 154.05	**5.400** 137.16	—	M55302/26-18	530761-5
100	**5.855** 148.72	**5.565** 141.35	**4.900** 124.46	531842-8	M55302/26-17	530761-6
90	**5.355** 136.02	**5.065** 128.65	**4.400** 111.76	531842-7	M55302/26-16	530761-7
80	**4.855** 123.32	**4.565** 115.95	**3.900** 99.06	531842-6	M55302/26-15	530761-4
70	**4.355** 110.62	**4.065** 103.25	**3.400** 86.36	—	M55302/26-14	530761-8
60	**3.855** 97.92	**3.565** 90.55	**2.900** 73.66	531842-4	M55302/26-13	530761-9
50	**3.355** 85.22	**3.065** 77.85	**2.400** 60.96	531842-3	M55302/26-12	1-530761-0
40	**2.855** 72.52	**2.565** 65.15	**1.900** 48.26	—	M55302/26-11	1-530761-1
30	**2.355** 59.82	**2.065** 52.45	**1.400** 35.56	—	M55302/26-10	1-530761-2

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UK: 44-208-420-8341

2-Row Right-Angle Pin Header Assemblies for Flow Soldering — MIL-C-55302 Qualified

Commercial Pin Header

[1] Contact Material and Finish — Brass per QQ-B-626 plated .000030 [0.00076] gold in the contact area, .000100 [0.00254] tin-lead on the tails over .000050 [0.00127] nickel on the entire contact

[2] Contact Material and Finish — Same as above except for tin on the tails

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

Military Pin Header

Contact Material and Finish — Brass per QQ-B-626 plated .000050 [0.00127] gold in the contact area, .000100 [0.00254] tin-lead on the tails over .000050 [0.00127] nickel on the entire contact

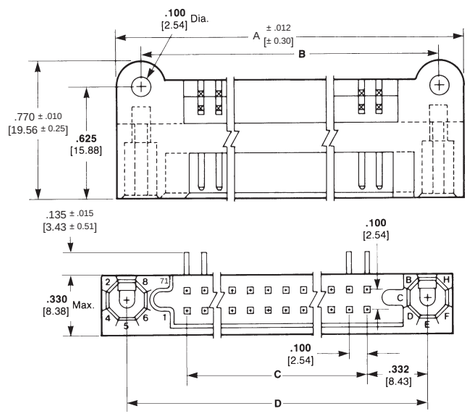
Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

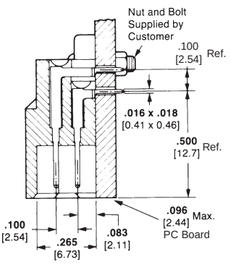
Related Product Data

Mates with — Receptacles, pages 1-51 to 1-56, 1-63 and 1-64

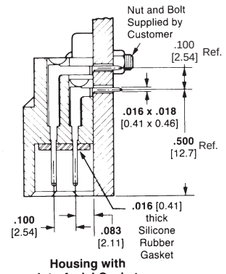
External Keying — page 1-82

Recommended PC Board Layout — page 1-77





Standard Housing



Housing with Interfacial Gasket

No. of Pos.	Dimensions				Standard Housing			Housing with Interfacial Gasket	
	A	B	C	D	Commercial Part No.	MIL Part No. M55302/	AMP Part No.	MIL Part No. M55302/	AMP Part No.
140	**7.855** 199.52	**7.565** 192.15	**6.900** 175.26	**7.565** 192.15	—	110-31	1-531721-3	110-35	1-531722-3
134	**7.555** 191.50	**7.265** 184.53	**6.600** 167.64	**7.265** 184.53	1-530942-2[1] 6-530942-2[2]	110-30	1-531721-2	110-34	1-531722-2
130	**7.355** 186.82	**7.065** 179.45	**6.400** 162.56	**7.065** 179.45	—	110-29	1-531721-1	110-33	1-531722-1
120	**6.855** 174.12	**6.565** 166.75	**5.900** 149.86	**6.565** 166.75	—	110-28	1-531721-0	110-32	1-531722-0
110	**6.355** 161.42	**6.065** 154.05	**5.400** 137.16	**6.065** 154.05	530942-9[1]	110-18	531721-9	110-27	531722-9
100	**5.855** 148.72	**5.565** 141.35	**4.900** 124.46	**5.565** 141.35	530942-8[1] 5-530942-8[2]	110-17	531721-8	110-26	531722-8
90	**5.355** 136.02	**5.065** 128.65	**4.400** 111.76	**5.065** 128.65	530942-7[1]	110-16	531721-7	110-25	531722-7
80	**4.855** 123.32	**4.565** 115.95	**3.900** 99.06	**4.565** 115.95	—	110-15	531721-6	110-24	531722-6
70	**4.355** 110.62	**4.065** 103.25	**3.400** 86.36	**4.065** 103.25	530942-5[1] 5-530942-5[2]	110-14	531721-5	110-23	531722-5
60	**3.855** 97.92	**3.565** 90.55	**2.900** 73.66	**3.565** 90.55	530942-4[1] 5-530942-4[2]	110-13	531721-4	110-22	531722-4
50	**3.355** 85.22	**3.065** 77.85	**2.400** 60.96	**3.065** 77.85	530942-3[1]	110-12	531721-3	110-21	531722-3
40	**2.855** 72.52	**2.565** 65.15	**1.900** 48.26	**2.565** 65.15	530942-2[1]	110-11	531721-2	110-20	531722-2
30	**2.355** 59.82	**2.065** 52.45	**1.400** 35.56	**2.065** 52.45	—	110-10	531721-1	110-19	531722-1

[1]See Material and Finish above. [2]See Material and Finish for RoHS Part Numbers above.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

2-Row Right-Angle Pin Header Assemblies with Posted Contacts (Wrap-Type)

Related Product Data

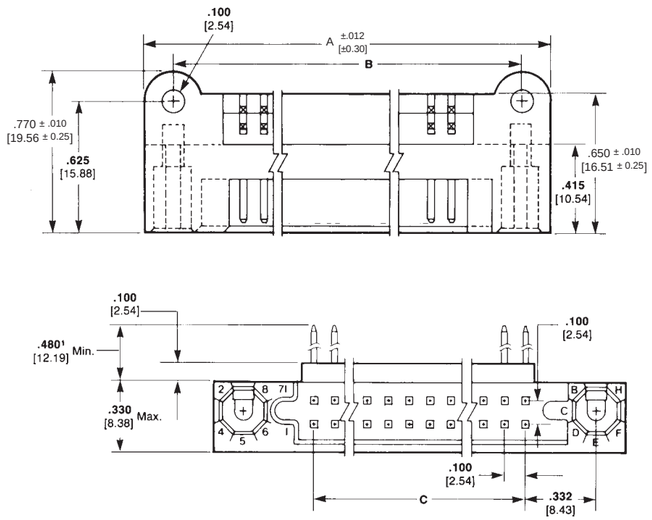
Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

Contact Material and Finish — Phosphor bronze plated .000050 [0.00127] gold over .000030 [0.00076] nickel on the entire contact

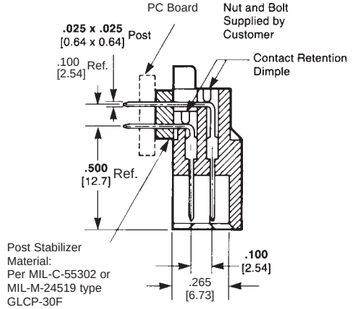
Mates with — Receptacles, pages 1-51 to 1-56, 1-63 and 1-64

External Keying — page 1-82

Recommended PC Board Layout — page 1-77



¹The two rows of posts will not be of equal length.



No. of Pos.	Dimensions A	Dimensions B	Dimensions C	AMP Part No.
110	**6.355** 161.42	**6.065** 154.05	**5.400** 137.16	532488-9
90	**5.355** 136.02	**5.065** 128.65	**4.400** 111.76	532488-7
80	**4.855** 123.32	**4.565** 115.95	**3.900** 99.06	—
70	**4.355** 110.62	**4.065** 103.25	**3.400** 86.36	—
30	**2.355** 59.82	**2.065** 52.45	**1.400** 35.56	532488-1

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

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Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

2-Row Pin Housing and Assemblies for Crimp Contacts — MIL-C-55302 Qualified

Housing Assembly
(includes turnable jackscrews)

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

Jackscrew Material — Passivated stainless steel

Related Product Data

Mates with — Receptacle assemblies, pages 1-51 to 1-56, and receptacle housings, pages 1-63 and 1-64

Crimp Type Pin Contact

Material — Brass

Finish — .000050 [0.00127] gold over .000050 [0.00127] nickel

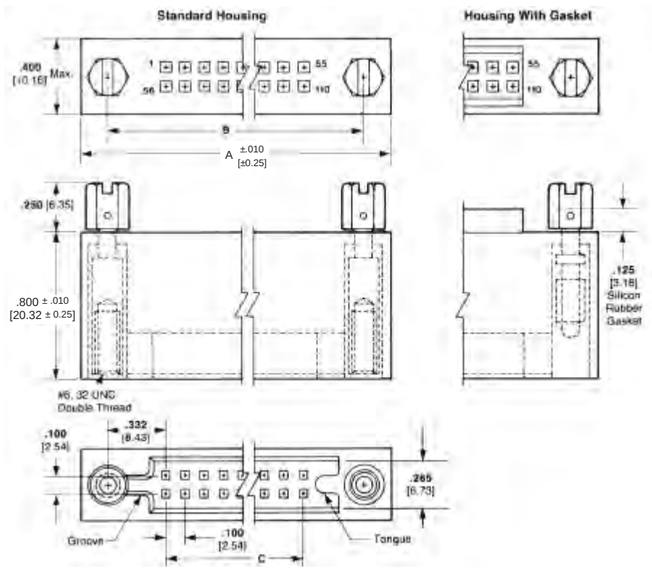
Wire Range — 26-22 AWG [0.12-0.4mm²]

Ins. Dia. Range — .036-.054 [0.91-1.37]

Extraction Tool —
Part Number 91156-1
Loose Piece
Military Part Number M55302/113-05
AMP Part Number 530750-5
Strip Form
Military Part Number M55302/113-06
AMP Part Number 530750-4

Tooling

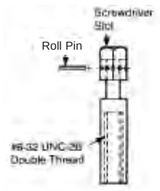
Hand Tool No. 90346-1 is used to apply the loose piece contacts (Hand tool instruction sheet 408-7820). For the application of strip contacts use the AMP-O-LECTRIC Machine with the applicator No. 466625-3. Other automated machines are available, consult Tyco Electronics for specifications.



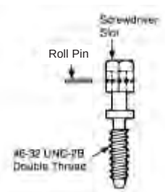
Turnable Jackscrews

Material — Passivated stainless steel

Note: To be used as replacement jackscrew for the pin housing assemblies shown above. They are not compatible with any other pin header assemblies.



Female
Military Part No. M55302/113-11
AMP Part No. 530754-2

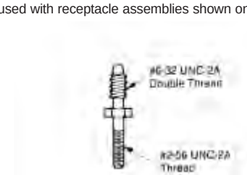


Male
Military Part No. M55302/113-12
AMP Part No. 530754-1

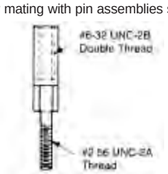
Fixed Jackscrews

Material — Passivated stainless steel

Note: To be used with receptacle assemblies shown on pages 1-51 to 1-56 for mating with pin assemblies shown above.



Male
Military Part No. M55302/113-14
AMP Part No. 531141-3
(Nut supplied by customer)



Female
Military Part No. M55302/113-13
AMP Part No. 531141-4
(Nut supplied by customer)

Catalog 1308940
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Japan: 81-44-844-8013
UK: 44-208-420-8341

2-Row Pin Housing and Assemblies for Crimp Contacts — MIL-C-55302 Qualified (Continued)

Standard Housing

No. of Pos.	Dimensions A	Dimensions B	Dimensions C	Housing Part Nos. Military Part No. M55302/	Housing Part Nos. AMP Part No.	Turnable Jackscrew Combinations Tongue End	Turnable Jackscrew Combinations Groove End	Housing Assembly Part Nos.[1] Military Part No. M55302/	Housing Assembly Part Nos.[1] AMP Part No.	Kit Part Nos.[2] Military Part No. M55302/	Kit Part Nos.[2] AMP Part No.
110	**6.355** 161.42	**6.065** 154.05	**5.400** 137.16	113-23	1-530753-8	Female	Female	113-84	3-530752-3	113-80	530755-5
						Male	Female	113-85	3-530752-4	113-81	530755-6
						Female	Male	113-86	3-530752-5	113-82	530755-7
						Male	Male	113-87	3-530752-6	113-83	530755-8
100	**5.855** 148.72	**5.565** 141.35	**4.900** 124.46	113-22	1-530753-6	Female	Female	113-76	2-530752-9	113-72	3-530755-3
						Male	Female	113-77	3-530752-0	113-73	3-530755-4
						Female	Male	113-78	3-530752-1	113-74	3-530755-5
						Male	Male	113-79	3-530752-2	113-75	3-530755-6
90	**5.355** 136.02	**5.065** 128.65	**4.400** 111.76	113-21	1-530753-4	Female	Female	113-68	2-530752-5	113-64	2-530755-9
						Male	Female	113-69	2-530752-6	113-65	3-530755-0
						Female	Male	113-70	2-530752-7	113-66	3-530755-1
						Male	Male	113-71	2-530752-8	113-67	3-530755-2
80	**4.855** 123.32	**4.565** 115.95	**3.900** 99.06	113-20	1-530753-2	Female	Female	113-60	2-530752-1	113-56	2-530755-5
						Male	Female	113-61	2-530752-2	113-57	2-530755-6
						Female	Male	113-62	2-530752-3	113-58	2-530755-7
						Male	Male	113-63	2-530752-4	113-59	2-530755-8
70	**4.355** 110.62	**4.065** 103.25	**3.400** 86.36	113-19	530753-2	Female	Female	113-07	530752-1	113-01	530755-1
						Male	Female	113-08	530752-2	113-02	530755-2
						Female	Male	113-09	530752-3	113-03	530755-3
						Male	Male	113-10	530752-4	113-04	530755-4
60	**3.855** 97.92	**3.565** 90.55	**2.900** 73.66	113-18	1-530753-0	Female	Female	113-52	1-530752-7	113-48	2-530755-1
						Male	Female	113-53	1-530752-8	113-49	2-530755-2
						Female	Male	113-54	1-530752-9	113-50	2-530755-3
						Male	Male	113-55	2-530752-0	113-51	2-530755-4
50	**3.355** 85.22	**3.065** 77.85	**2.400** 60.06	113-17	530753-8	Female	Female	113-44	1-530752-3	113-40	1-530755-7
						Male	Female	113-45	1-530752-4	113-41	1-530755-8
						Female	Male	113-46	1-530752-5	113-42	1-530755-9
						Male	Male	113-47	1-530752-6	113-43	2-530755-0
40	**2.855** 72.52	**2.565** 65.15	**1.900** 48.26	113-16	530753-6	Female	Female	113-36	530752-9	113-32	1-530755-3
						Male	Female	113-37	1-530752-0	113-33	1-530755-4
						Female	Male	113-38	1-530752-1	113-34	1-530755-5
						Male	Male	113-39	1-530752-2	113-35	1-530755-6
30	**2.355** 59.82	**2.065** 52.45	**1.400** 35.56	113-15	530753-4	Female	Female	113-28	530752-5	113-24	530755-9
						Male	Female	113-29	530752-6	113-25	1-530755-0
						Female	Male	113-30	530752-7	113-26	1-530755-1
						Male	Male	113-31	530752-8	113-27	1-530755-2

Housing with Gasket

No. of Pos.	Dimensions A	Dimensions B	Dimensions C	Housing Part Nos. Military Part No. M55302/	Housing Part Nos. AMP Part No.	Turnable Jackscrew Combinations Tongue End	Turnable Jackscrew Combinations Groove End	Housing Assembly Part Nos.[1] Military Part No. M55302/	Housing Assembly Part Nos.[1] AMP Part No.	Kit Part Nos.[2] Military Part No. M55302/	Kit Part Nos.[2] AMP Part No.
110	**6.355** 161.42	**6.065** 154.05	**5.400** 137.16	113-89	530884-2	Female	Female	113-94	530885-5	113-102	530886-5
						Male	Female	113-95	530885-6	113-103	530886-6
						Female	Male	113-96	530885-7	113-104	530886-7
						Male	Male	113-97	530885-8	113-105	530886-8
70	**4.355** 110.62	**4.065** 103.25	**3.400** 86.36	113-88	530884-1	Female	Female	113-90	530885-1	113-98	530886-1
						Male	Female	113-91	530885-2	113-99	530886-2
						Female	Male	113-92	530885-3	113-100	530886-3
						Male	Male	113-93	530885-4	113-101	530886-4

[1]Each Housing Assembly contains: A. 1 Housing. B. 2 Turnable Jackscrews installed (four combinations available, see table).
[2]Each Kit contains: A. 1 Housing Assembly with 2 Turnable Jackscrews installed (four combinations are available, see table). B. 2 Fixed Jackscrews to mate with Turnable Jackscrews (nuts included). These jackscrews are for installation on the mating receptacle housing. C. Loose Piece Contacts. Quantity is number of positions plus 5 extra.

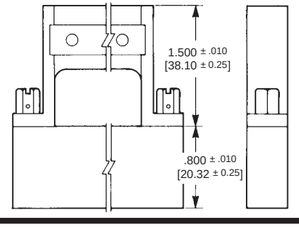
Pin Housing Assembly with Strain Relief

Material

Strain Relief — Black glass-filled nylon

Jackscrews — Passivated stainless steel

Housing — Blue glass-filled polyester



110 Position Housing and Strain Relief Kits

Tongue End	Groove End	Part No.
Female	Female	533194-1
Male	Female	—
Female	Male	—
Male	Male	533194-4

Other sizes can be made available, consult Tyco Electronics.

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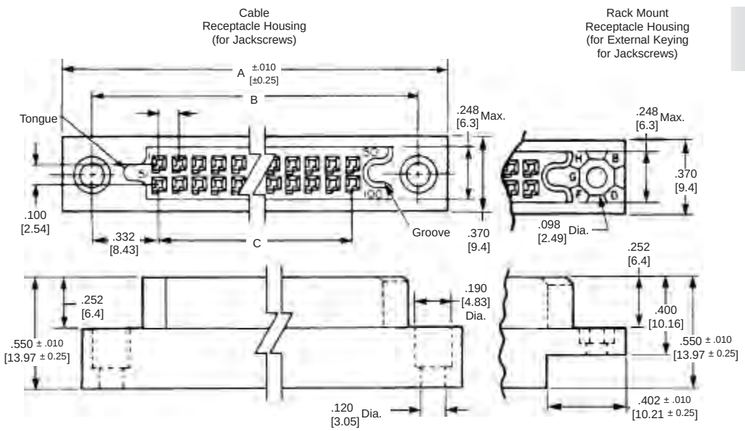
UK: 44-208-420-8341

2-Row Receptacle Housing and Assemblies for Crimp Contacts

Cable Receptacle with Jackscrews

Rack Mount Receptacle with External Keying



Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

Related Product Data

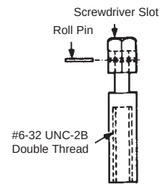
Mates with — Cable Receptacle Housings mate with Pin Housings on pages 1-58 to 1-62. Rack Mount Receptacle Housings mate with Pin Header Assemblies pages 1-58 to 1-62

External Keying — page 1-82

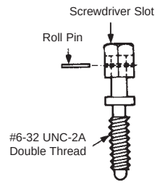
Turnable Jackscrews

Material — Passivated stainless steel

Note: To be used with the cable receptacle housings shown above. They are not compatible with other receptacle assemblies.



Female
Part Number 530754-4

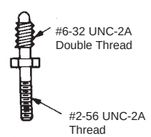


Male
Part Number 530754-3

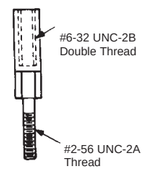
Fixed Jackscrews

Material — Passivated stainless steel

Note: For use with rack mount receptacles shown above.



Male
Part Number 532484-1
(Includes nut)

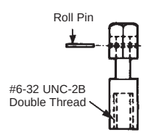


Female
Part Number 532483-2
(Includes nut)

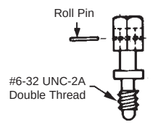
Turnable Jackscrews

Material — Passivated stainless steel

Note: For use with rack mount receptacles shown above.



Male
Part Number 531993-2

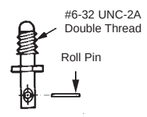


Male
Part Number 531993-1

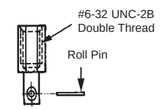
Fixed Jackscrews

Material — Passivated stainless steel

Note: For use with external key type Right-Angle pin headers when mating with rack mount receptacle housings with turnable jackscrews shown to the



Male
Part Number 531985-2



Female
Part Number 531985-1

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

2-Row Receptacle Housing and Assemblies for Crimp Contacts (Continued)

No. of Pos.	Dimensions A	Dimensions B	Dimensions C	Rack Mount Housing Part No.	Cable Housing Part No.	Jackscrews Combinations[1] Groove End	Jackscrews Combinations[1] Tongue End	Cable Housing with Jackscrews Part No.
110	**6.355** 161.42	**6.065** 154.05	**5.400** 137.16	1-531802-7	1-531840-7	Male	Male	—
						Female	Female	3-531841-3
100	**5.855** 148.72	**5.565** 141.35	**4.900** 124.46	1-531802-5	1-531840-5	Male	Male	—
						Male	Female	—
						Female	Male	3-531841-0
						Female	Female	—
80	**4.855** 123.32	**4.565** 115.95	**3.900** 99.06	—	1-531840-1	Male	Male	—
						Female	Female	2-531841-1
70	**4.355** 110.62	**4.065** 103.25	**3.400** 86.36	531802-9	531840-9	Male	Male	—
						Female	Female	—
60	**3.855** 97.92	**3.565** 90.55	**2.900** 73.66	531802-7	531840-7	Male	Male	—
						Male	Female	—
						Female	Female	—
50	**3.355** 85.22	**3.065** 77.85	**2.400** 60.96	531802-5	531840-5	Male	Male	1-531841-2
						Male	Female	—
						Female	Male	—
						Female	Female	—
40	**2.855** 72.52	**2.565** 65.15	**1.900** 48.26	531802-3	531840-3	Male	Male	—
						Female	Male	—
						Female	Female	—
30	**2.355** 59.82	**2.065** 52.45	**1.400** 35.56	531802-1	531840-1	Male	Male	531841-4
						Male	Female	531841-3
						Female	Male	—

[1]Jackscrews supplied with assemblies 531841 are 530754-4, female, and 530754-3, male, shown on page 1-63.

Crimp Type Receptacle Contacts

Material — Phosphor bronze

Finish — Gold over nickel
(See chart for gold thickness)

Wire Range	Insulation Range	Loose Piece .000030 [0.00076] Gold	Loose Piece .000050 [0.00127] Gold	Strip .000030 [0.00076] Gold	Strip .000050 [0.00127] Gold	Hand Tool	Applicator for AMP-O-LECTRIC Machine	Applicator for Stripper Crimper Machine
26-22 AWG 0.15-0.3mm²	.036-.054 0.91-1.37	531216-2	531216-4	531216-1	531216-3	91540-1	466819-2[2]	466943-1

[2]Use Applicator 466819-1 for the AMPOMATOR Machine.

Note: Instruction sheet for Hand Tool 90301-2 is 408-7909.

Extraction Tool Part Number 91156-2

Catalog 1308940
Revised 8-06

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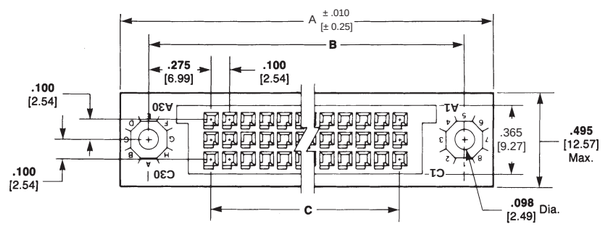
UK: 44-208-420-8341

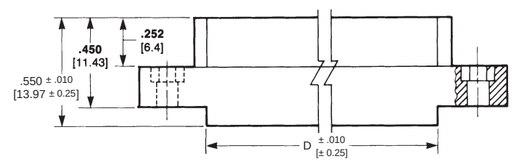
3-Row Receptacle Housings for Crimp Contacts

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

Related Product Data

Mates with — Pin Headers, page 1-68
External Keying — page 1-82





No. of Pos.	Dimensions A	B	C	D	Part No.
165	**6.250** 158.75	**5.950** 151.13	**5.400** 137.16	**5.550** 140.97	1-531984-4
150	**5.750** 146.05	**5.450** 138.43	**4.900** 124.46	**5.050** 128.27	1-531984-3
135	**5.250** 133.35	**4.950** 125.73	**4.400** 111.76	**4.550** 115.57	1-531984-1
126	**4.950** 125.73	**4.650** 118.11	**4.100** 104.14	**4.250** 107.95	531984-8
120	**4.750** 120.65	**4.450** 113.03	**3.900** 99.06	**4.050** 102.87	531984-6
105	**4.250** 107.95	**3.950** 100.33	**3.400** 86.36	**3.550** 90.17	531984-4
90	**3.750** 95.25	**3.450** 87.63	**2.900** 73.66	**3.050** 77.47	531984-1

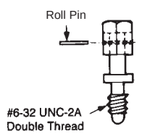
Crimp Type Receptacle Contact

(Refer to page 1-64 for specifications and part numbers)

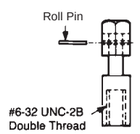
Turnable Jackscrews

Material — Passivated stainless steel

Note: For use with receptacle housings shown above when mating with Right-Angle pin headers having fixed jackscrews (531985-1 and 531985-2) shown on page 1-63.



Male
AMP Part Number 532021-1



Female
AMP Part Number 532021-2

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

3-Row Receptacle Assemblies — MIL-C-55302 Qualified

Commercial Receptacle Assemblies

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

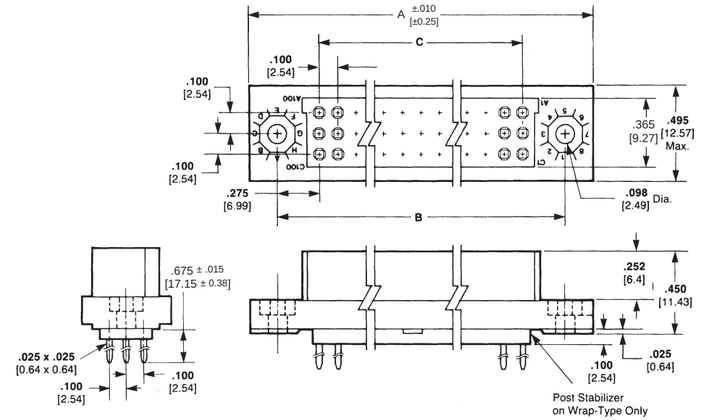
[1] Contact Material and Finish — Beryllium copper or copper nickel silicon per ASTM B422 and ASTM B888 Channel Contact and Wrap-Type Posted Contact — Plated .000030 [0.00076] gold in the contact area, .000100 [0.00254] tin-lead on the tails over .000030 [0.00076] nickel on the entire contact; Solder Eyelet — Plated .000030 [0.00076] gold in the contact area, in accordance with MIL-C-55302 tin-lead on the tails over .000030 [0.00076] nickel on the entire contact

[2] Contact Material and Finish — Same as above except for tin on the tails

Military Receptacle Assemblies

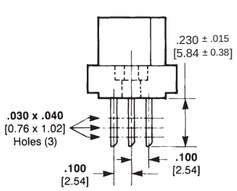
Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

Contact Material and Finish — Beryllium copper or copper nickel silicon per ASTM B422 and ASTM B888 Channel Contact — Plated .000050 [0.00127] gold in the contact area, .000100 [0.00254] tin-lead on the tails over .000030 [0.00076] nickel on the entire contact; Wrap-Type Posted Contact — Plated .000050 [0.00127] gold over .000030 [0.00076] nickel on the entire contact; Solder Eyelet — Plated .000050 [0.00127] gold in the contact area, in accordance with MIL-C-55302 .000100 [0.00254] tin-lead on the tails over .000050 [0.00127] nickel on the entire contact

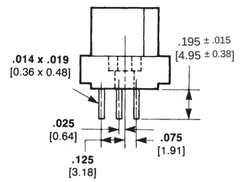


Wrap-Type Posted Contact

Material: In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F



Solder Eyelet Contact



Flow Solder
.014 x .019 [0.36 x 0.48]
Channel Contact—Unsealed
.010 x .020 [0.25 x 0.50]
Posted Contact—Sealed

Related Product Data

Mates with — Pin Headers, page 1-68

External Keying — page 1-82

Recommended PC Board Layout — page 1-78

No. of Pos.	Dimensions A	Dimensions B	Dimensions C	Flow Solder Contacts: Commercial Part No. Sealed	Flow Solder Contacts: Commercial Part No. Unsealed	Flow Solder Contacts: Military M55302/130	Flow Solder Contacts: AMP Part No. Sealed	Flow Solder Contacts: AMP Part No. Unsealed	Solder Eyelet: Commercial Part No.	Solder Eyelet: Military M55302/130	Solder Eyelet: AMP Part No.	Wrap-Type Posted Contact: Commercial Part No.	Wrap-Type Posted Contact: Military M55302/130	Wrap-Type Posted Contact: AMP Part No.
300[3]	**10.750** 273.05	**10.450** 265.43	**9.900** 251.46	—	—	—	—	—	—	—	—	—	—	—
270[3]	**9.750** 247.65	**9.450** 240.03	**8.900** 226.06	—	—	—	—	—	—	—	—	—	—	—
240	**8.750** 222.25	**8.450** 214.63	**7.900** 200.66	—	531138-8[1]	-44	446853-8	531134-8	—	-46	447192-8	—	-45	447193-8
210	**7.750** 196.85	**7.450** 189.23	**6.900** 175.26	—	531138-7[1]	-41	446853-7	531134-7	—	-43	447192-7	—	-42	447193-7
195	**7.250** 184.15	**6.950** 176.53	**6.400** 162.56	—	1-531138-3[1]	-38	1-446853-0	1-531134-3	1-531140-3[1]	-40	1-447192-0	—	-39	1-447193-0
180	**6.750** 171.45	**6.450** 163.83	**5.900** 149.86	—	531138-6[1]	-35	446853-6	531134-6	—	-37	447192-6	531139-6[1]	-36	447193-6
165	**6.250** 158.75	**5.950** 151.13	**5.400** 137.16	—	531138-5[1]	-32	446853-5	531134-5	—	-34	447192-5	—	-33	447193-5
150	**5.750** 146.05	**5.450** 138.43	**4.900** 124.46	—	531138-4[1] 5-531138-4[2]	-29	446853-4	531134-4	—	-31	447192-4	—	-30	447193-4
135	**5.250** 133.35	**4.950** 125.73	**4.400** 111.76	—	1-531138-2[1]	-26	446853-9	1-531134-2	—	-28	447192-9	1-531139-2[1]	-27	447193-9
126[3]	**4.950** 125.73	**4.650** 118.11	**4.100** 104.14	—	—	—	—	—	—	—	—	—	—	—
120	**4.750** 120.65	**4.450** 113.03	**3.900** 99.06	—	531138-3[1]	-23	446853-3	531134-3	—	-25	447192-3	—	-24	447193-3
105	**4.250** 107.95	**3.950** 100.33	**3.400** 86.36	—	531138-2[1] 5-531138-2[2]	-20	446853-2	531134-2	—	-22	447192-2	—	-21	447193-2
90	**3.750** 95.25	**3.450** 87.63	**2.900** 73.66	—	531138-1[1] 5-531138-1[2]	-17	446853-1	531134-1	—	-19	447192-1	531139-1[1]	-18	447193-1

[1]See Material and Finish above. [2]See Material and Finish for RoHS Part Numbers above. [3]Part Numbers available upon request.

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

3-Row Right-Angle Receptacle Assemblies with Posted Contacts (Wrap-Type)

Housing Material — In accordance with MIL-C-55302

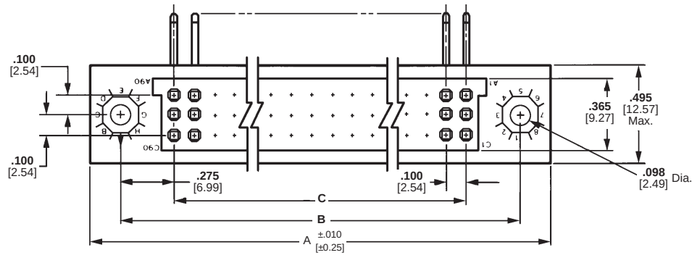
Contact Material and Finish — Beryllium copper or copper nickel silicon per ASTM B422 and ASTM B888 plated .000050 [0.00127] gold over .000030 [0.00076] nickel on the entire contact

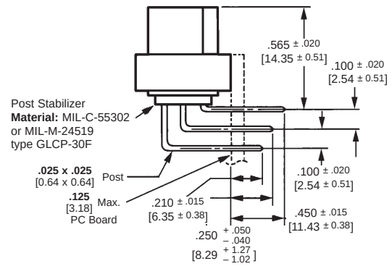
Related Product Data

Mates with — Pin Headers, page 1-68

External Keying — page 1-82

Recommended PC Board Layout — page 1-78





Right-Angle Wrap-Type Posts

No. of Pos.	Dimensions			Part No.
	A	B	C	
270[1]	**9.750** 247.65	**9.450** 240.03	**8.900** 226.06	—
240[1]	**8.750** 222.25	**8.450** 214.63	**7.900** 200.66	—
210	**7.750** 196.85	**7.450** 189.23	**6.900** 175.26	447255-2
195	**7.250** 184.15	**6.950** 176.53	**6.400** 162.58	447255-3
180	**6.750** 171.45	**6.450** 163.83	**5.900** 149.86	447255-4
165[1]	**6.250** 158.75	**5.950** 151.13	**5.400** 137.16	—
150	**5.750** 146.05	**5.450** 138.43	**4.900** 124.46	447255-6
135[1]	**5.250** 133.35	**4.950** 125.73	**4.400** 111.76	—
126[1]	**4.950** 125.73	**4.650** 118.11	**4.100** 104.14	—
123[1]	**4.850** 123.19	**4.550** 115.57	**4.000** 101.6	—
120	**4.750** 120.65	**4.450** 113.03	**3.900** 86.36	447255-8
105	**4.250** 107.95	**3.950** 100.33	**3.400** 86.36	447255-9
90	**3.750** 95.25	**3.450** 87.63	**2.900** 73.66	1-447255-0

[1]Part numbers available upon request.

3-Row Right-Angle Pin Header Assemblies — MIL-C-55302 Qualified

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

[1] Contact Material and Finish — Commercial Flow Solder Contact — Brass per QQ-B-626 plated .000030 [0.00076] gold in the contact area, .000100 [0.00254] tin-lead on the tails over .000050 [0.00127] nickel on the entire contact; Military Flow Solder Contact — Brass per QQ-B-626 plated .000050 [0.00127] gold in the contact area, .000100 [0.00254] tin-lead on the tails over .000050 [0.00127] nickel on the entire contact; Wrap-Type Contact — Phosphor bronze plate .000050 [0.00127] gold over .000030 [0.00076] nickel on the entire contact

[2] Contact Material and Finish — Same as above except for tin on the tails

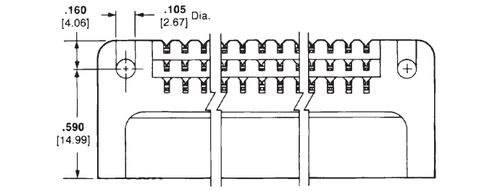
Related Product Data

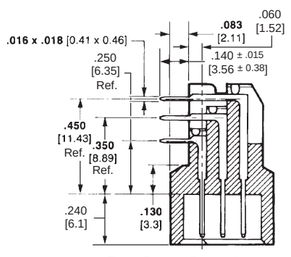
Mates with — 3-Row Receptacles, pages 1-65 to 1-67

External Keying — page 1-82

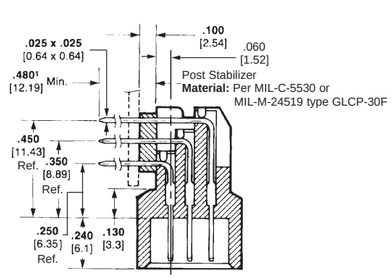
Recommended PC Board Layout — page 1-78

Fixed Jackscrew — page 1-63





Flow Solder Contacts (for use with .096 [2.44] Max. thick PC board)



Wrap-Type Posted Contacts

[1]The three rows of posts will not be of equal length.

No. of Pos.	Dimensions A	Dimensions B	Dimensions C	Flow Solder Contacts: Commercial Part No. Sealed	Flow Solder Contacts: Commercial Part No. Unsealed	Flow Solder Contacts: MIL-Part No. M55302/129	Flow Solder Contacts: AMP Part No. Sealed	Flow Solder Contacts: AMP Part No. Unsealed	Wrap-Type Posted Contacts (2 High): AMP Part No. Without Stabilizer	Wrap-Type Posted Contacts (2 High): AMP Part No. With Stabilizer
300[3]	**10.750** 273.05	**10.450** 265.43	**9.900** 251.46	1-447373-1[1]	—	—	—	—	—	—
270[3]	**9.750** 247.65	**9.450** 240.03	**8.900** 226.06	—	—	—	—	—	—	—
240	**8.750** 222.25	**8.450** 214.63	**7.900** 200.66	—	531137-8[1]	-18	446852-8[1]	531133-8[1]	—	—
210	**7.750** 196.85	**7.450** 189.23	**6.900** 175.26	—	531137-7[1]	-17	446852-7[1]	531133-7[1]	—	—
195	**7.250** 184.15	**6.950** 176.53	**6.400** 162.56	—	1-531137-3[1]	-16	1-446852-0[1]	1-531133-3[1]	—	—
180	**6.750** 171.45	**6.450** 163.83	**5.900** 149.86	—	—	-15	446852-6[1]	531133-6[1]	—	—
165	**6.250** 158.75	**5.950** 151.13	**5.400** 137.16	—	531137-5[1]	-14	446852-5[1]	531133-5[1]	532775-3[1]	—
150	**5.750** 146.05	**5.450** 138.43	**4.900** 124.46	—	531137-4[1] 5-531137-4[2]	-13	446852-4[1]	531133-4[1]	1-532775-2[1]	—
135	**5.250** 133.35	**4.950** 125.73	**4.400** 111.76	—	—	-12	446852-9[1]	1-531133-2[1]	—	—
126	**4.950** 125.73	**4.650** 118.11	**4.100** 104.14	—	—	—	—	1-531133-0[1]	1-532775-0[1]	—
120	**4.750** 120.65	**4.450** 113.03	**3.900** 99.06	—	531137-3[1]	-11	446852-3[1]	531133-3[1]	532775-8[1]	447380-7[1]
105	**4.250** 107.95	**3.950** 100.33	**3.400** 86.36	—	531137-2[1] 5-531137-2[2]	-10	446852-2[1]	531133-2[1]	—	—
90	**3.750** 95.25	**3.450** 87.63	**2.900** 73.66	—	531137-1[1] 5-531137-1[2]	-09	446852-1[1]	531133-1[1]	—	447380-5[1]

[1]See Material and Finish above. [2]See Material and Finish for RoHS Part Numbers. [3]Part Numbers available upon request.

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Revised 8-06

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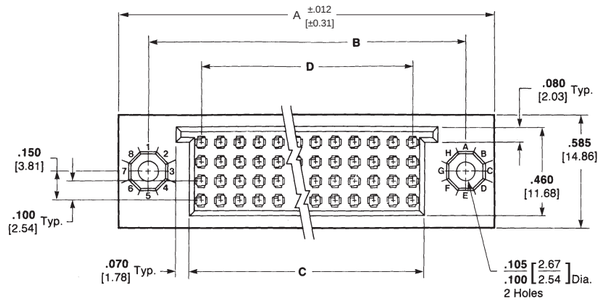
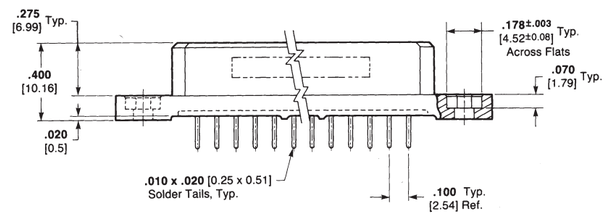
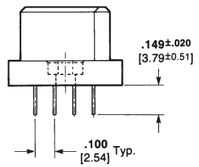
4-Row Receptacle Assemblies







No. of Pos.	Dimensions A	B	C	D	Part No.[1]	RoHS Part No.[2]
300	**8.250** 209.60	**7.950** 201.93	**7.524** 191.11	**7.400** 187.96	—*	—
292	**8.050** 204.47	**7.750** 196.85	**7.324** 186.03	**7.200** 182.88	—*	—
280	**7.750** 196.85	**7.450** 189.23	**7.024** 178.41	**6.900** 175.26	—*	—
268	**7.450** 189.23	**7.150** 181.61	**6.724** 170.79	**6.600** 167.64	—*	—
260	**7.250** 184.15	**6.950** 176.53	**6.524** 165.71	**6.400** 162.56	—*	—
240	**6.750** 171.45	**6.450** 163.83	**6.024** 153.01	**5.900** 149.86	—*	—
232	**6.550** 166.37	**6.250** 158.75	**5.824** 147.93	**5.700** 144.78	—*	—
220	**6.250** 158.75	**5.950** 151.13	**5.524** 140.31	**5.400** 137.16	446081-8	—
216	**6.150** 156.21	**5.850** 148.59	**5.424** 137.77	**5.300** 134.62	—*	—
200	**5.750** 146.05	**5.450** 138.43	**5.024** 127.61	**4.900** 124.46	1-446081-0	6-446081-0
192	**5.550** 140.97	**5.250** 133.35	**4.824** 122.53	**4.700** 119.38	—*	—
180	**5.250** 133.35	**4.950** 125.73	**4.524** 114.91	**4.400** 111.76	—*	—
168	**4.950** 125.73	**4.650** 118.11	**4.224** 107.29	**4.100** 104.14	—*	—
160	**4.750** 120.65	**4.450** 113.03	**4.024** 102.21	**3.900** 99.06	—*	—
152	**4.550** 115.57	**4.250** 107.95	**3.824** 97.13	**3.700** 93.98	—*	—
140	**4.250** 107.95	**3.950** 100.33	**3.524** 89.51	**3.400** 86.36	—*	—
128	**3.950** 100.33	**3.650** 92.71	**3.224** 81.89	**3.100** 78.74	1-446081-7	6-446081-7
120	**3.750** 95.25	**3.450** 87.63	**3.024** 76.81	**2.900** 73.66	—*	—
100	**3.250** 82.55	**2.950** 74.93	**2.524** 64.11	**2.400** 60.96	1-446081-9	—
68	**2.450** 62.23	**2.150** 54.60	**1.727** 43.87	**1.600** 40.64	—*	—
40	**1.750** 44.45	**1.450** 36.83	**1.024** 26.01	**.900** 22.86	—*	—

* Part Numbers available upon request, contact Tyco Electronics.

Housing Material — Polyphenylene sulfide per MIL-M-24519 or type GLCP-30F

[1] **Contact Material and Finish** — Beryllium copper or copper nickel silicon per ASTM B422 and ASTM B888 plated gold .000050 [0.00127] thick per MIL-G-45204 in contact area, tails plated tin-lead all over nickel per QQ-N-290

[2] **Contact Material and Finish** — Same as above except for tin on tails

Related Product Data

Mates with — Pin Header assembly, page 1-70

External Keying — page 1-82

Recommended PC Board Layout — page 1-79

Catalog 1308940
Revised 8-06

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

4-Row Right-Angle Pin Header Assemblies

Housing Material — Polyphenylene sulfide per MIL-M-24519 or type GLCP-30F

[1] **Contact Material and Finish** — Phosphor bronze per QQ-B-750, plated gold .000050 [0.00127] thick per MIL-G-45204 on mating end for a length of .120 [3.05] min., tails plated tin-lead over nickel per QQ-N-290

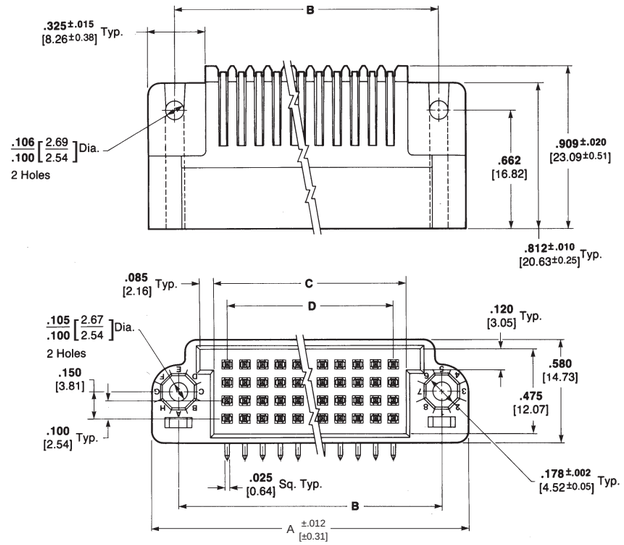
[2] **Contact Material and Finish** — Same as above except for tin on tails

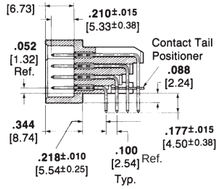
Related Product Data

Mates with — Receptacle assembly, page 1-69

External Keying — page 1-82

Recommended PC Board Layout — page 1-79





No. of Pos.	Dimensions A	B	C	D	Part No.[1]	RoHS Part No.[2]
300	**8.250** 209.60	**7.950** 201.93	**7.550** 191.77	**7.400** 187.96	—*	—
292	**8.050** 204.47	**7.750** 196.85	**7.350** 186.69	**7.200** 182.88	—*	—
280	**7.750** 196.85	**7.450** 189.23	**7.050** 179.07	**6.900** 175.26	—*	—
268	**7.450** 189.23	**7.150** 181.61	**6.750** 171.45	**6.600** 167.64	—*	—
260	**7.250** 184.15	**6.950** 176.53	**6.550** 166.37	**6.400** 162.56	—*	—
240	**6.750** 171.45	**6.450** 163.83	**6.050** 153.67	**5.900** 149.86	—*	—
232	**6.550** 166.37	**6.250** 158.75	**5.850** 148.59	**5.700** 144.78	—*	—
220	**6.250** 158.75	**5.950** 151.13	**5.550** 140.97	**5.400** 137.16	—*	—
216	**6.150** 156.21	**5.850** 148.59	**5.450** 138.43	**5.300** 134.62	—*	—
200	**5.750** 146.05	**5.450** 138.43	**5.050** 128.27	**4.900** 124.46	1-446080-0	6-446080-0
192	**5.550** 140.97	**5.250** 133.35	**4.850** 123.19	**4.700** 119.38	—*	—
180	**5.250** 133.35	**4.950** 125.73	**4.550** 115.57	**4.400** 111.76	1-446080-2	—
168	**4.950** 125.73	**4.650** 118.11	**4.250** 107.95	**4.100** 104.14	—*	—
160	**4.750** 120.65	**4.450** 113.03	**4.050** 102.87	**3.900** 99.06	—*	—
152	**4.550** 115.57	**4.250** 107.95	**3.850** 97.79	**3.700** 93.98	—*	—
140	**4.250** 107.95	**3.950** 100.33	**3.550** 90.17	**3.400** 86.36	—*	—
128	**3.950** 100.33	**3.650** 92.71	**3.250** 82.55	**3.100** 78.74	1-446080-7	6-446080-7
120	**3.750** 95.25	**3.450** 87.63	**3.050** 77.47	**2.900** 73.66	—*	—
100	**3.250** 82.55	**2.950** 74.93	**2.550** 64.77	**2.400** 60.96	—*	—
68	**2.450** 62.23	**2.150** 54.60	**1.750** 44.45	**1.600** 40.64	—*	—
40	**1.750** 44.45	**1.450** 36.83	**1.050** 26.67	**.900** 22.86	—*	—

* Part Numbers available upon request, contact Tyco Electronics.

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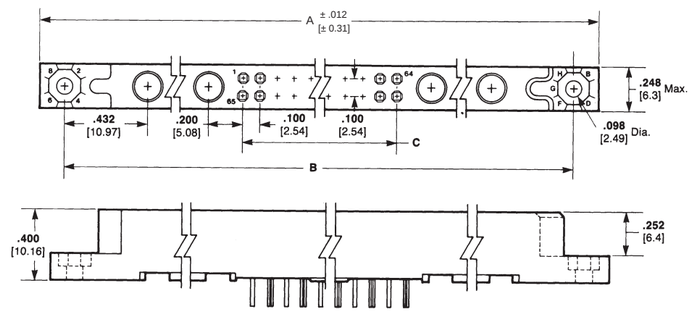
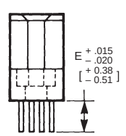
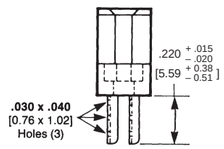
Receptacle Assemblies with Hybrid Cavities

8 Hybrid Cavity Shown

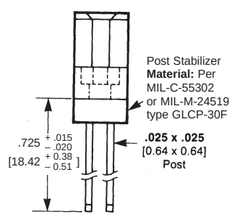




.014 x .019 [0.36 x 0.48] Channel Contact



Solder Eyelet Contact (Max. Wire Size, #26 AWG [0.15 mm])



Wrap-Type Posted Contact (3 terminations per post)

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

Contact Material and Finish — Beryllium copper per QQ-C-533 or copper nickel silicon per ASTM B422 and ASTM B888 Channel Contact and Posted Contact — Plated .000050 [0.00127] gold in contact area, .000100 [0.00254] tin-lead on the tails over .00030 [0.0076] nickel on the entire contact; Solder Eyelet Contact — Plated .000050 [0.00127] gold in the contact area, in accordance with MIL-C-55302 .000100 [0.00254] tin-lead on the tails over .000050 [0.00127] nickel on the entire contact

Related Product Data

Mates with — Right-Angle Pin Headers, pages 1-73 and 1-74

External Keying — page 1-82

Recommended PC Board Layout — page 1-80

E = .235 [5.97] - 2 Hybrid cavity connector
.154 [3.91] - 4 and 6 Hybrid cavity connector

2 Hybrid Cavity Connectors[1]

No. of Box Contact Pos.	Dimensions A	Dimensions B	Dimensions C	.014 x .019 [0.36 x 0.48] Channel Contacts Part No.
128	**7.885** 199.52	**7.565** 192.15	**6.300** 160.02	—*
122	**7.555** 191.90	**7.265** 184.53	**6.000** 152.4	—*
118	**7.355** 186.82	**7.065** 179.45	**5.800** 147.32	—*
108	**6.855** 174.12	**6.565** 166.75	**5.300** 134.62	—*
98	**6.335** 161.42	**6.065** 154.05	**4.800** 121.92	—*
88	**5.855** 148.72	**5.565** 141.35	**4.300** 109.22	—*
78	**5.355** 136.02	**5.065** 128.65	**3.800** 96.52	533606-7
68	**4.855** 123.32	**4.565** 115.95	**3.300** 83.82	—*
58	**4.355** 110.62	**4.065** 103.25	**2.800** 71.12	533606-5
48	**3.855** 97.92	**3.565** 90.55	**2.300** 58.42	—*
38	**3.355** 85.22	**3.065** 77.85	**1.800** 45.72	—*
28	**2.855** 72.52	**2.565** 65.15	**1.300** 33.02	533606-2
18	**2.355** 58.82	**2.065** 52.45	**.800** 20.32	533606-1

[1]These receptacle assemblies accept coaxial contacts—Vertical Cable Socket 227605-1, Right-Angle Cable Socket 227606-1 and Vertical Printed Circuit Board Mount Socket 227603-1.
* Part Numbers available upon request, contact Tyco Electronics.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Receptacle Assemblies with Hybrid Cavities (Continued)

4 Hybrid Cavity Connectors[1]

No. of Box Contact Pos.	Dimensions A	B	C	D	.014 x .019 [0.36 x 0.48] Channel Contacts Part No.	Solder Eyelet Contacts Part No.	Wrap-Type Posted Contacts Part No.
120	**7.855** 199.52	**7.565** 192.15	**5.900** 149.86	**.200** 5.08	—*	—*	—*
110	**7.355** 186.82	**7.065** 179.45	**5.400** 137.16	**.200** 5.08	—*	—*	—*
100	**6.855** 174.12	**6.565** 166.75	**4.900** 124.46	**.200** 5.08	533189-8	—*	533181-3
90	**6.355** 161.42	**6.065** 154.05	**4.400** 111.76	**.200** 5.08	—*	—*	—*
80	**5.855** 148.72	**5.565** 141.35	**3.900** 99.06	**.200** 5.08	—*	—*	—*
70	**5.355** 136.02	**5.065** 128.65	**3.400** 86.36	**.200** 5.08	—*	—*	—*
60	**4.855** 123.32	**4.565** 115.95	**2.900** 73.66	**.200** 5.08	—*	—*	—*
50	**4.355** 110.62	**4.065** 103.25	**2.400** 60.96	**.200** 5.08	—*	—*	—*
40	**3.855** 97.92	**3.565** 90.55	**1.900** 48.26	**.200** 5.08	533189-3	—*	—*
30	**3.355** 85.22	**3.065** 77.85	**1.400** 35.56	**.200** 5.08	533189-2	—*	—*

6 Hybrid Cavity Connectors[1]

No. of Box Contact Pos.	Dimensions A	B	C	D	.014 x .019 [0.36 x 0.48] Channel Contacts Part No.
112	**7.855** 199.52	**7.565** 192.15	**5.500** 139.7	**.400** 10.16	—*
102	**7.355** 186.82	**7.065** 179.45	**5.000** 127.0	**.400** 10.16	—*
92	**6.855** 174.12	**6.565** 166.75	**4.500** 114.3	**.400** 10.16	—*
82	**6.355** 161.42	**6.065** 154.05	**4.000** 101.6	**.400** 10.16	—*
72	**5.855** 148.72	**5.565** 141.35	**3.500** 88.9	**.400** 10.16	—*
62	**5.355** 136.02	**5.065** 128.65	**3.000** 76.2	**.400** 10.16	533639-5
52	**4.855** 123.32	**4.565** 115.95	**2.500** 63.5	**.400** 10.16	—*
42	**4.355** 110.62	**4.065** 103.25	**2.000** 50.8	**.400** 10.16	—*
32	**3.855** 97.92	**3.565** 90.55	**1.500** 38.1	**.400** 10.16	—*
22	**3.355** 85.22	**3.065** 77.85	**1.000** 25.4	**.400** 10.16	533639-1

8 Hybrid Cavity Connectors[1]

No. of Box Contact Positions	Dimensions A	B	C	D	Wrap-Type Contacts Part No.
104	**7.855** 199.52	**7.565** 192.15	**5.100** 129.54	**.600** 15.24	—*
94	**7.355** 186.82	**7.065** 179.45	**4.600** 116.84	**.600** 15.24	—*
84	**6.855** 174.12	**6.565** 166.75	**4.100** 104.14	**.600** 15.24	—*
74	**6.355** 161.42	**6.065** 154.05	**3.600** 91.44	**.600** 15.24	—*
64	**5.855** 148.72	**5.565** 141.35	**3.100** 78.74	**.600** 15.24	—*
54	**5.355** 136.02	**5.065** 128.65	**2.600** 66.04	**.600** 15.24	—*
44	**4.855** 123.32	**4.565** 115.95	**2.100** 53.34	**.600** 15.24	—*
34	**4.355** 110.62	**4.065** 103.25	**1.600** 40.64	**.600** 15.24	533170-8
24	**3.855** 97.92	**3.565** 90.55	**1.100** 27.94	**.600** 15.24	—*
14	**3.355** 85.22	**3.065** 77.85	**.600** 15.24	**.600** 15.24	1-533170-0

[1]These receptacle assemblies accept coaxial contacts — Vertical Cable Sockets 227605-1, Right-Angle Cable Socket 227606-1 and Vertical PC Board Mount Socket 227603-1.
* Part Numbers available upon request, contact Tyco Electronics.

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Right-Angle Pin Header Assemblies with Hybrid Contact Cavities

8 Hybrid Cavity Shown

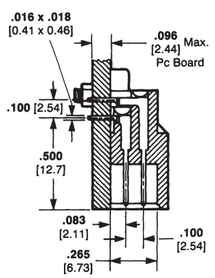
Related Product Data

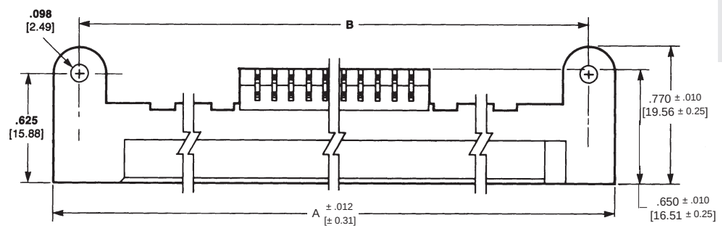
Mates with — Receptacles, pages 1-71 and 1-72

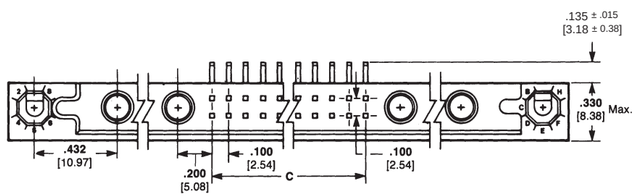
External Keying — page 1-82

Recommended PC Board Layout — page 1-81

Fixed Jackscrews — page 1-63







2 Hybrid Cavity Connectors[1]

No. of Box Contact Pos.	Dimensions A	Dimensions B	Dimensions C	Part No.[2]	RoHS Part No.[3]
128	**7.885** 199.52	**7.565** 192.15	**6.300** 160.02	—*	—
122	**7.555** 191.90	**7.265** 184.53	**6.000** 152.4	—*	—
118	**7.355** 186.82	**7.065** 179.45	**5.800** 147.32	—*	—
108	**6.855** 174.12	**6.565** 166.75	**5.300** 134.62	—*	—
98	**6.335** 161.42	**6.065** 154.05	**4.800** 121.92	—*	—
88	**5.855** 148.72	**5.565** 141.35	**4.300** 109.22	—*	—
78	**5.355** 136.02	**5.065** 128.65	**3.800** 96.52	—*	—
68	**4.855** 123.32	**4.565** 115.95	**3.300** 83.82	—*	—
58	**4.355** 110.62	**4.065** 103.25	**2.800** 71.12	—*	—
48	**3.855** 97.92	**3.565** 90.55	**2.300** 58.42	—*	—
38	**3.355** 85.22	**3.065** 77.85	**1.800** 45.72	—*	—
28	**2.855** 72.52	**2.565** 65.15	**1.300** 33.02	533607-3	—
18	**2.355** 59.82	**2.065** 52.45	**.800** 20.32	533607-1	5-533607-1

[1]These pin header assemblies accept coaxial contacts—Vertical Cable Pin 227604-1 and Right-Angle Printed Circuit Board Mount Pin 227602-1.

* Part Numbers available upon request, contact Tyco Electronics.

Housing Material — In accordance with MIL-C-55302 or MIL-M-24519 type GLCP-30F

[2] Contact Material and Finish — Brass per QQ-B-626 plated .000050 [0.00127] gold in the contact area, .000100 [0.00254] tin-lead on the tail over .000050 [0.00127] nickel on the entire contact

[3] Contact Material and Finish — Same as above except for tin on the tail

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Right-Angle Pin Header Assemblies with Hybrid Contact Cavities (Continued)

4 Hybrid Cavity Connectors[1]

No. of Box Contact Pos.	Dimensions A	B	C	D	Part No.[2]	RoHS Part No.[3]
120	**7.855** 199.52	**7.565** 192.15	**5.900** 149.86	**.200** 5.08	1-533182-0	—
80	**5.855** 148.72	**5.565** 141.35	**3.900** 99.06	**.200** 5.08	—*	—
70	**5.355** 136.02	**5.065** 128.65	**3.400** 86.36	**.200** 5.08	—*	—
40	**3.855** 97.92	**3.565** 90.55	**1.900** 48.26	**.200** 5.08	533182-3	5-533182-3
30	**3.355** 85.22	**3.065** 77.85	**1.400** 35.56	**.200** 5.08	—*	—

6 Hybrid Cavity Connectors[1]

No. of Box Contact Pos.	Dimensions A	B	C	D	Part No.
112	**7.855** 199.52	**7.565** 192.15	**5.500** 139.7	**.400** 10.16	—*
102	**7.355** 186.82	**7.065** 179.45	**5.000** 127.0	**.400** 10.16	—*
92	**6.855** 174.12	**6.565** 166.75	**4.500** 114.3	**.400** 10.16	—*
82	**6.355** 161.42	**6.065** 154.05	**4.000** 101.6	**.400** 10.16	—*
72	**5.855** 148.72	**5.565** 141.35	**3.500** 88.9	**.400** 10.16	—*
62	**5.355** 136.02	**5.065** 128.65	**3.000** 76.2	**.400** 10.16	533637-5
52	**4.855** 123.32	**4.565** 115.95	**2.500** 63.5	**.400** 10.16	—*
42	**4.355** 110.62	**4.065** 103.25	**2.000** 50.8	**.400** 10.16	—*
32	**3.855** 97.92	**3.565** 90.55	**1.500** 38.1	**.400** 10.16	—*
22	**3.355** 85.22	**3.065** 77.85	**1.000** 25.4	**.400** 10.16	—*

8 Hybrid Cavity Connectors[1]

No. of Box Contact Pos.	Dimensions A	B	C	D	Part No.
104	**7.855** 199.52	**7.565** 192.15	**5.100** 129.54	**.600** 15.24	—*
94	**7.355** 186.82	**7.065** 179.45	**4.600** 116.84	**.600** 15.24	533171-2
84	**6.855** 174.12	**6.565** 166.75	**4.100** 104.14	**.600** 15.24	—*
74	**6.355** 161.42	**6.065** 154.05	**3.600** 91.44	**.600** 15.24	—*
64	**5.855** 148.72	**5.565** 141.35	**3.100** 78.74	**.600** 15.24	533171-5
54	**5.355** 136.02	**5.065** 128.65	**2.600** 66.04	**.600** 15.24	—*
44	**4.855** 123.32	**4.565** 115.95	**2.100** 53.34	**.600** 15.24	—*
34	**4.355** 110.62	**4.065** 103.25	**1.600** 40.64	**.600** 15.24	533171-8
24	**3.855** 97.92	**3.565** 90.55	**1.100** 27.94	**.600** 15.24	—*
14	**3.355** 85.22	**3.065** 77.85	**.600** 15.24	**.600** 15.24	1-533171-0

[1]These pin header assemblies accept coaxial contacts—Vertical Cable Pin 227604-1 and Right-Angle Printed Circuit Board Mount Pin 227602-1.
[2]See Material and Finish on previous page.
[3]See Material and Finish for RoHS Part Numbers on previous page.
* Part Numbers available upon request, contact Tyco Electronics.

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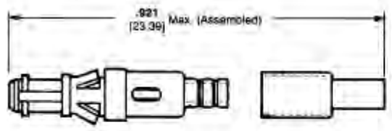
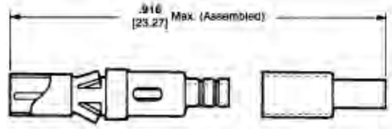
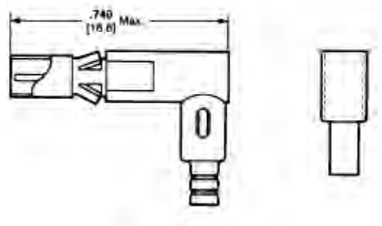


Cable Pin



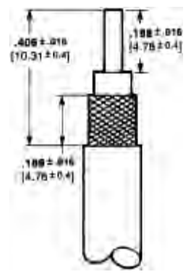
Cable Socket



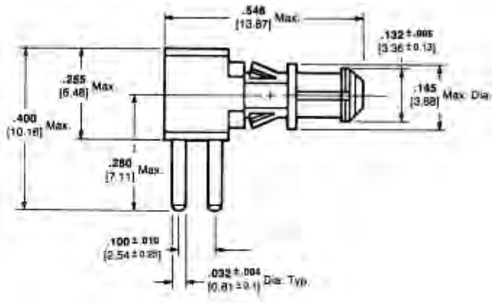
Right-Angle Cable Socket

Cable Size	Contact Style	Part No.	Application Tool Part No.
RG 178/U Double Braid RG 196/U	Cable Pin	227604-1	220215-1
	Cable Socket	227605-1	
	Right-Angle Cable Socket	227606-1	

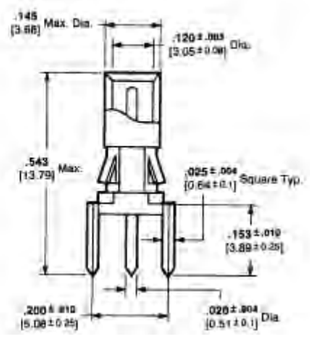
Extraction Tool Part Number 220216-1



Recommended Strip Length



Right-Angle Pin
for PC Board Application
Part Number 227602-1
Plated .000030 [0.00076] gold



Vertical Socket
for PC Board Application
Part Number 227603-1

Notes:
1. Center contacts are plated with .000030 [0.00076] gold.
2. For .125 [3.18] maximum thick PC boards.

Electrical Characteristics

Nominal Impedance — 50 ohms

Frequency Range — 0-2 GHz

Maximum Operating Voltage (Sea Level) — 150 VAC RMS

Mechanical Characteristics

Operating Temperature Range — –55°C to +125°C

Cable Retention — 15 lb. [66.7N] min. (RG 178 type double braid)

Contact Materials

Stainless Steel — QQ-S-766

Gold Plate — MIL-G-45204

Nickel Plate — QQ-N-290

Beryllium Copper — QQ-C-530

TEFLON TFE — MIL-P-19468A

Brass — QQ-B-626

Ferrule Material

Brass — MIL-C-50, tin plate per MIL-T-10727

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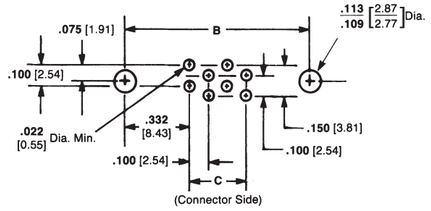
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

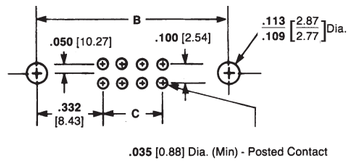
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Recommended Printed Circuit Board Layouts

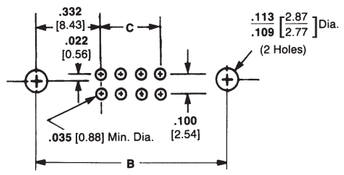
Receptacle Assemblies



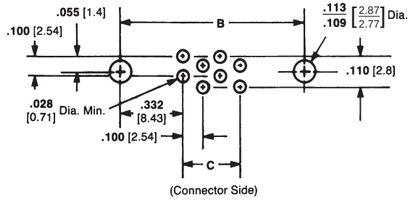
.014 x .019 [0.36 x 0.48] Channel Contacts



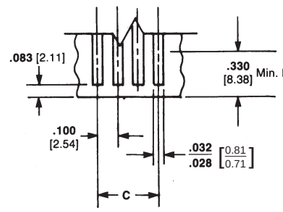
.025 x .025 [0.64 x 0.64] Posted Contacts



Right-Angle .025 x .025 [0.64 x 0.64] Posted Contacts



.010 x .020 [0.25 x 0.51] Posted Contacts



Card Extender Contacts

No. of Pos.	Dimensions	
	B	C
140	**7.565** 192.15	**6.900** 175.26
134	**7.265** 184.53	**6.600** 167.64
130	**7.065** 179.45	**6.400** 162.56
120	**6.565** 166.75	**5.906** 149.86
110	**6.065** 154.05	**5.400** 137.16
100	**5.565** 141.35	**4.900** 124.46
90	**5.065** 128.65	**4.400** 111.76
80	**4.565** 115.95	**3.900** 99.06
70	**4.065** 103.25	**3.400** 86.36
60	**3.565** 90.55	**2.900** 73.66
50	**3.065** 77.85	**2.400** 60.96
40	**2.565** 65.15	**1.900** 48.26
30	**2.065** 52.45	**1.400** 35.56

Catalog 1308940
Revised 8-06

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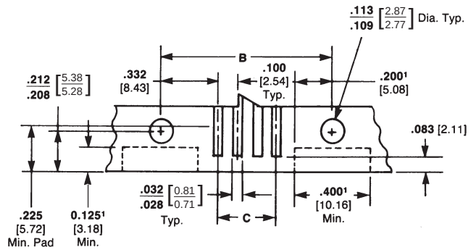
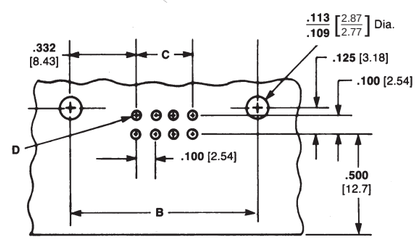
Recommended Printed Circuit Board Layouts (Continued)

Pin Header Assemblies



¹Optional cut-out for keying after connector is mounted.

Straddle Mount Assembly



D = Right-Angle Flow Solder - .035 [0.88] Dia. (Min.)
Wrap-Type Posts - .045 [1.14] Dia. (Min.)

Right-Angle Flow Solder and Wrap-Type Posted Contacts

Note: These drawings are for reference only. Consult Tyco Electronics for board layout details.

No. of Pos.	Dimensions	
	B	C
140	**7.565** 192.15	**6.900** 175.26
134	**7.265** 184.53	**6.600** 167.64
130	**7.065** 179.45	**6.400** 162.56
120	**6.565** 166.75	**5.906** 149.86
110	**6.065** 154.05	**5.400** 137.16
100	**5.565** 141.35	**4.900** 124.46
90	**5.065** 128.65	**4.400** 111.76
80	**4.565** 115.95	**3.900** 99.06
70	**4.065** 103.25	**3.400** 86.36
60	**3.565** 90.55	**2.900** 73.66
50	**3.065** 77.85	**2.400** 60.96
40	**2.565** 65.15	**1.900** 48.26
30	**2.065** 52.45	**1.400** 35.56

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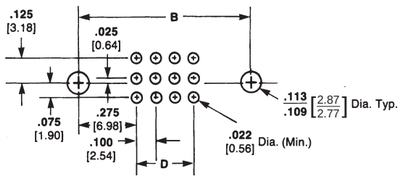
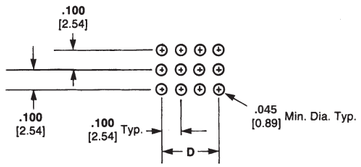
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

3-Row Assembly Recommended Printed Circuit Board Layouts

Receptacle Assemblies

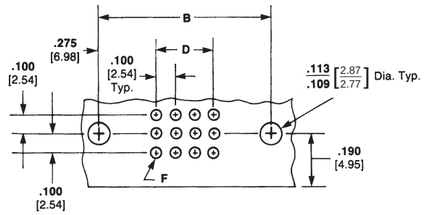


.014 x .019 [0.36 x 0.48] Channel Contacts



Right-Angle Wrap-Type Posted Contacts

Pin Header Assemblies



F = Right-Angle Flow Solder — **.035** [0.88] Dia. Min.
Wrap-Type Posts — .045 [1.14] Dia. Min.

Right-Angle Flow Solder and Wrap-Type Posted Contacts

Note: These drawings are for reference only. Consult Tyco Electronics for board layout details.

No. of Pos.	Dimensions	
	B	D
300	10.450 265.43	9.900 251.46
270	9.450 240.03	8.900 226.06
240	8.450 214.63	7.900 200.66
210	7.450 189.23	6.900 175.26
180	6.450 163.83	5.900 149.86
165	5.950 151.13	5.400 137.16
150	5.450 138.43	4.900 124.46
126	4.650 118.11	4.100 104.14
123	4.550 115.57	4.000 101.6
120	4.450 113.03	3.900 99.06
105	3.950 100.33	3.400 86.36
90	3.450 87.63	2.900 73.66

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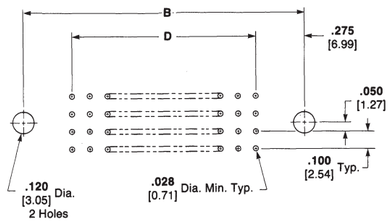
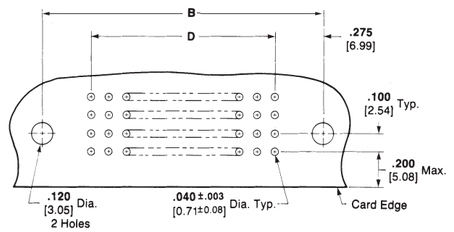
4-Row Assembly Recommended Printed Circuit Board Layouts

Receptacle Assemblies



Pin Header Assemblies



No. of Pos.	Dimensions	
	B	D
300	7.950 201.93	7.400 187.96
292	7.750 196.85	7.200 182.88
280	7.450 189.23	6.900 175.26
268	7.150 181.61	6.600 167.64
260	6.950 176.53	6.400 162.56
240	6.450 163.83	5.900 149.86
232	6.250 158.75	5.700 144.78
220	5.950 151.13	5.400 137.16
216	5.850 148.59	5.300 134.62
200	5.450 138.43	4.900 124.46
192	5.250 133.35	4.700 119.38
180	4.950 125.73	4.400 111.76
168	4.650 118.11	4.100 104.14
160	4.450 113.03	3.900 99.06
152	4.250 107.95	3.700 93.98
140	3.950 100.33	3.400 86.36
128	3.650 92.71	3.100 78.74
120	3.450 87.63	2.900 73.66
100	2.950 74.93	2.400 60.96
68	2.150 54.60	1.600 40.64
40	1.450 36.83	.900 22.86

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Japan: 81-44-844-8013
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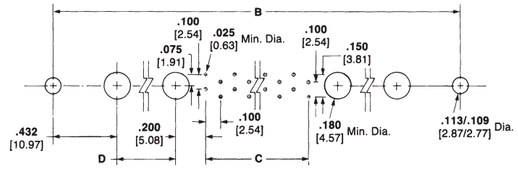
Hybrid Contacts Recommended Printed Circuit Board Layouts

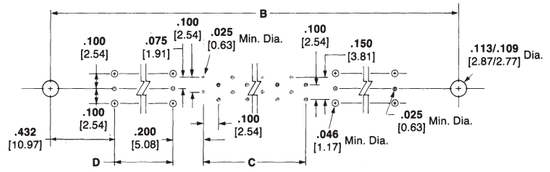
Receptacle Assemblies with Hybrid Contacts

With Cable



.014 x .019 [0.36 x 0.48] Channel Contacts
with Hybrid Printed Circuit Board Mount Sockets

With Solder Terminations



.014 x .019 [0.36 x0.48] Channel Contacts
with Vertical Coaxial Printed Circuit Board Mount Sockets

2 Hybrid Contact Connectors

No. of Box Contact Pos.	Dimensions B	C
128	7.565 192.15	6.300 160.02
122	7.265 184.53	6.000 152.4
118	7.065 179.45	5.800 147.32
108	6.565 166.75	5.300 134.62
98	6.065 154.05	4.800 121.92
88	5.565 141.35	4.300 109.22
78	5.065 128.65	3.800 96.52
68	4.565 115.95	3.300 83.82
58	4.065 103.25	2.800 71.12
48	3.565 90.55	2.300 58.42
38	3.065 77.85	1.800 45.72
28	2.565 65.15	1.300 33.02
18	2.065 52.45	.800 20.32

4 Hybrid Contact Connectors

No. of Box Contact Pos.	Dimensions B	C	D
120	7.565 192.15	5.900 149.86	.200 5.08
110	7.065 179.45	5.400 137.16	.200 5.08
100	6.565 166.75	4.900 124.46	.200 5.08
90	6.065 154.05	4.400 111.76	.200 5.08
80	5.565 141.35	3.900 99.06	.200 5.08
70	5.065 128.65	3.400 86.36	.200 5.08
60	4.565 115.95	2.900 73.66	.200 5.08
50	4.065 103.25	2.400 60.96	.200 5.08
40	3.565 90.55	1.900 48.26	.200 5.08
30	3.065 77.85	1.400 35.56	.200 5.08

6 Hybrid Contact Connectors

No. of Box Contact Pos.	Dimensions B	C	D
112	7.565 192.15	5.500 139.7	.400 10.16
102	7.065 179.45	5.000 127.0	.400 10.16
92	6.565 166.75	4.500 114.3	.400 10.16
82	6.065 154.05	4.000 101.6	.400 10.16
72	5.565 141.35	3.500 88.9	.400 10.16
62	5.065 128.65	3.000 76.2	.400 10.16
52	4.565 115.95	2.500 63.5	.400 10.16
42	4.065 103.25	2.000 50.8	.400 10.16
32	3.565 90.55	1.500 38.1	.400 10.16
22	3.065 77.85	1.000 25.4	.400 10.16

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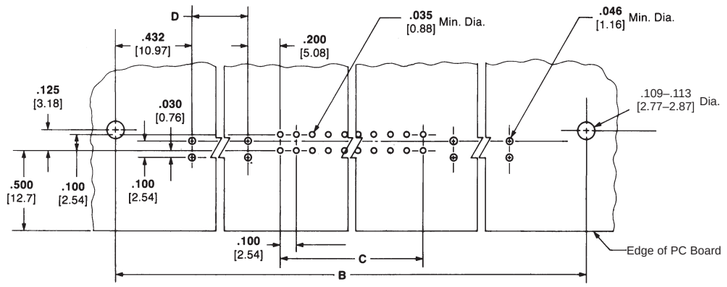
Hybrid Contacts Recommended Printed Circuit Board Layouts (Continued)

Pin Header Assemblies with Hybrid Cavities



2 Hybrid Contact Connectors

No. of Box Contact Pos.	Dimensions	
	B	C
128	7.565 192.15	6.300 160.02
122	7.265 184.53	6.000 152.4
118	7.065 179.45	5.800 147.32
108	6.565 166.75	5.300 134.62
98	6.065 154.05	4.800 121.92
88	5.565 141.35	4.300 109.22
78	5.065 128.65	3.800 96.52
68	4.565 115.95	3.300 83.82
58	4.065 103.25	2.800 71.12
48	3.565 90.55	2.300 58.42
38	3.065 77.85	1.800 45.72
28	2.565 65.15	1.300 33.02
18	2.065 52.45	.800 20.32

4 Hybrid Contact Connectors

No. of Box Contact Positions	Dimensions		
	B	C	D
120	7.565 192.15	5.900 149.86	.200 5.08
80	5.565 141.35	3.900 99.06	.200 5.08
70	5.065 128.65	3.400 86.36	.200 5.08
40	3.565 90.55	1.900 48.26	.200 5.08
30	3.065 77.85	1.400 35.56	.200 5.08

6 Hybrid Contact Connectors

No. of Box Contact Positions	Dimensions		
	B	C	D
112	7.565 192.15	5.500 139.7	.400 10.16
102	7.065 179.45	5.000 127.0	.400 10.16
92	6.565 166.75	4.500 114.3	.400 10.16
82	6.065 154.05	4.000 101.6	.400 10.16
72	5.565 141.35	3.500 88.9	.400 10.16
62	5.065 128.65	3.000 76.2	.400 10.16
52	4.565 115.95	2.500 63.5	.400 10.16
42	4.065 103.25	2.000 50.8	.400 10.16
32	3.565 90.55	1.500 38.1	.400 10.16
22	3.065 77.85	1.000 25.4	.400 10.16

8 Hybrid Contact Connectors

No. of Box Contact Positions	Dimensions		
	B	C	D
104	7.565 192.15	5.100 129.54	.600 15.24
94	7.065 179.45	4.600 116.84	.600 15.24
84	6.565 166.75	4.100 104.14	.600 15.24
74	6.065 154.05	3.600 91.44	.600 15.24
64	5.565 141.35	3.100 78.74	.600 15.24
54	5.065 128.65	2.600 66.04	.600 15.24
44	4.565 115.95	2.100 53.34	.600 15.24
34	4.065 103.25	1.600 40.64	.600 15.24
24	3.565 90.55	1.100 27.94	.600 15.24
14	3.065 77.85	.600 15.24	.600 15.24

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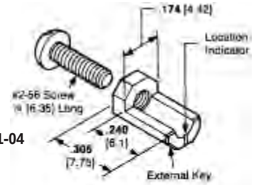
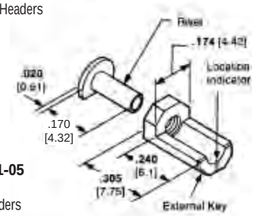
Keying Hardware — MIL-C-55302 Qualified

External Keys

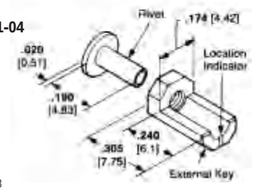


Receptacle Key
For use with Receptacles
Kit Part Number 530341-3
Kit includes 2 each of the following:
Keys, passivated stainless steel
Part Number 530341-1
Military Part Number M55302/31-04
Screws, #2-56 .250 [6.35] long

Pin Header Key
For use with 2-row Straddle Mount Pin Headers
Kit Part Number 530341-4[1]
Kit includes 2 each of the following:
Keys, passivated stainless steel
Part Number 530341-1
Military Part Number M55302/31-04
Rivets, nickel plated brass
Part Number 530347-1
Military Part Number M55302/31-05



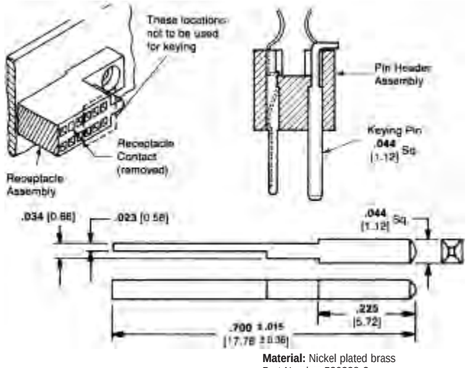
Pin Header Key
For use with 2-, 3-, and 4-row Pin Headers
Kit Part Number 530341-5[1]
Kit includes 2 each of the following:
Keys, passivated stainless steel
Part Number 530341-1
Military Part Number M55302/31-04
Rivets, nickel plated brass
Part Number 530347-3
Military Part Number M55302/31-10



[1]Rivet Clinching Tools:
2-Row Pin Headers—Tool Part Number 91117-1
(See instruction sheet 408-7803)
3-Row Pin Headers—Tool Part Number 91117-3
(See instruction sheet 408-6626)
4-Row Pin Headers—Tool Part Number 92-0800-003

Solid Keying Pin

Solid keying pins are for use on connectors when external keying is not used or on external keyed assemblies when more than 64 keying positions are required. Solid keying pins are not to be installed in the three dual positions at each end of the connector.

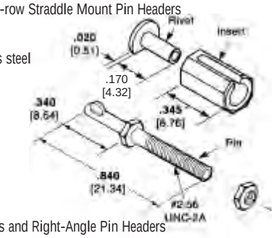


Material: Nickel plated brass
Part Number 530328-2
Military Part Number M55302/31-03

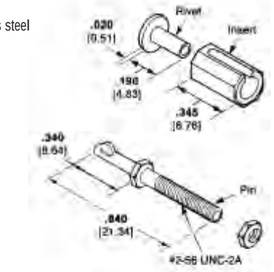
Assembly Instructions:
1. Remove pin and receptacle from desired keying locations.
2. Insert keying pin in pin header, secure by bending rear of pin over outside edge of housing, and trim excess material.

Guide Keys

Guide Keying Pin and Insert
For use with 2-row Receptacles and 2-row Straddle Mount Pin Headers
Kit Part Number 531715-1[1]
Kit includes 2 each of the following:
Guide keying pin, passivated stainless steel
Part Number 531713-1
Nut, #2-56
Part Number 23174-1
Guide keying insert,
passivated stainless steel
Part Number 531714-1
Rivet, nickel plated brass
Part Number 530347-9



Guide Keying Pin and Insert
For use with 2- and 3-row Receptacles and Right-Angle Pin Headers
Kit Part Number 531715-2[1]
Kit includes 2 each of the following:
Guide keying pin, passivated stainless steel
Part Number 531713-1
Nut, #2-56
Part Number 23174-1
Guide keying insert, passivated
stainless steel
Part Number 531714-1
Rivet, nickel plated brass
Part Number 530347-8

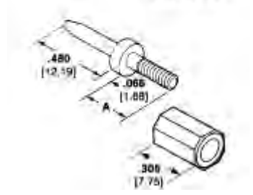


[1]Rivet Clinching Tools:
2-Row Pin Headers—Tool Part Number 91117-1
(See instruction sheet 408-7803)
3-Row Pin Headers—Tool Part Number 91117-4
(See instruction sheet 408-6627)

Guide Pin/Insert

Guide Pin
Passivated stainless steel

A	Part No.
.400 10.16	530345-1
.680 17.27	—
.750 19.05	530345-3

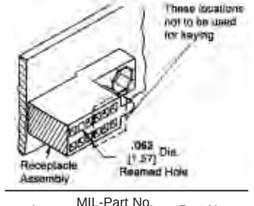


Guide Insert
Passivated stainless steel
Part Number 530346-1
(Consult Tyco Electronics for mounting recommendations)

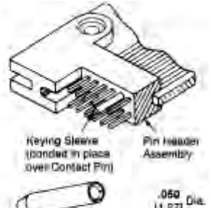
Keying Sleeve

Keying sleeves, like solid keying pins, are used as an alternative to external keys or when additional keying is required. When the keying sleeve is used on the pin header, the contact must be removed from the receptacle assembly and the cavity reamed to .062 [1.57] diameter.

Material — Nickel plated brass



L	MIL-Part No. M55302/	Part No.
.305 7.75	31-01	583254-3
.250 6.35	31-02	583254-4



Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Replacement Contacts — MIL-C-55302 Qualified

Plating Code

Contacts are plated in various thicknesses. These thicknesses are coded in the charts as follows:

1. — .000030 [0.00076] gold in the contact area, .000100 [0.00254] tin-lead on the tail over .000050 [0.00127] nickel on the entire contact.
2. — .000050 [0.00127] gold in the contact area, .000100 [0.00254] tin-lead on the tail over .000050 [0.00127] nickel on the entire contact.
3. — .000030 [0.00076] gold in the contact area, .000100 [0.00254] tin-lead on the tail over .000030 [0.00076] nickel on the entire contact.
4. — .000050 [0.00127] gold over .000030 [0.00076] nickel.
5. — .000050 [0.00127] gold in the contact area, .000100 [0.00254] tin-lead on the tail over .000030 [0.00076] nickel on the entire contact.
6. — .000030 [0.00076] gold in the contact area, in accordance with MIL-C-55302, .000100 [.00254] tin-lead on the tails over .000030 [0.00076] nickel on the entire contact.
7. — .000050 [0.00127] gold in the contact area, in accordance with MIL-C-55302 .000100 [0.00254] tin-lead on tails over .000050 [0.00127] nickel on the entire contact.

Contact Extraction

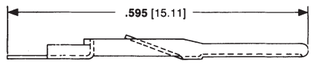
Pin Contacts
Extraction Tool
Part Number 91156-1

Receptacle Contacts
Extraction Tool
Part Number 91035-1
Military Part Number M81969/9-01

Posted Receptacle Contacts
Contact for Rack Mounting
Extraction Tool
Part Number 1-265871-7
(Extraction Tool Instruction sheet 408-2636)

Contact for PC Board
No tool needed — After de-soldering, extract by pressing on post end of contact.

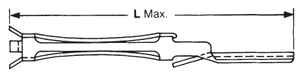
Pin Contacts



For Straddle Mount Pin Headers

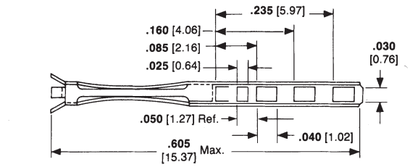
Plating Code	AMP Part No.
1	202947-2
2	202947-3

Receptacle Contacts



.014 x .019 [0.36 x 0.48]
Channel Contact

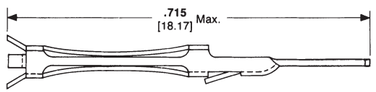
Plating Code	AMP Part No.
3	202946-1
4	202946-7



Solder Eyelet Contact
(Max. Wire Size, 26 AWG [0.15mm])

Plating Code	AMP Part No. 2-Row Connectors	AMP Part No. 3-Row Connectors
5	202946-7	202946-5
6	202946-1	202946-2

L Length Equals .540 Max. for 2-Row .619 Max for 3-Row



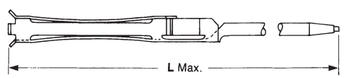
.010 x .020 [0.25 x 0.51]
Posted Contact[1]

Plating Code	MIL-Part No.	AMP Part No.
5	—	—
6	—	—
7	M55302/32-01	583218-3

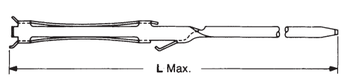
For 2-Row Only

[1]1.010 x .020 [0.25 x 0.51] posted contacts are used as replacement contacts in card extender assemblies.

Posted Receptacle Contacts



Wrap-Type Contact for Rack Mounting
Double Latch .025 x .025 [0.64 x 0.64] Post



Wrap-Type Contact for PC Mounting
Single Latch .022 x .027 [0.56 x 0.69] Post

No. Terminations	Dim. L	For Rack Mount (Double Latch) Plating Code 3 Part No.	For Rack Mount (Double Latch) Plating Code 4 MIL-Part No.	For Rack Mount (Double Latch) Plating Code 4 Part No.	For PC Mount (Single Latch) Plating Code 3 Part No.	For PC Mount (Single Latch) Plating Code 4 MIL-Part No.	For PC Mount (Single Latch) Plating Code 4 Part No.
1 High	.795 20.0	446629-6	M55302/32-05	1-446629-4	—	M55302/32-02	2-583812-6
2 High	.955 24.26	446629-9	M55302/32-06	1-446629-6	—	M55302/32-03	2-583812-8
3 High	1.115 28.32	1-446629-2	M55302/32-07	1-446629-8	583812-9	M55302/32-04	3-583812-0

Plating Code	AMP Part No.
3	583452-4
5	1-583452-9

Catalog 1308940
Revised 8-06

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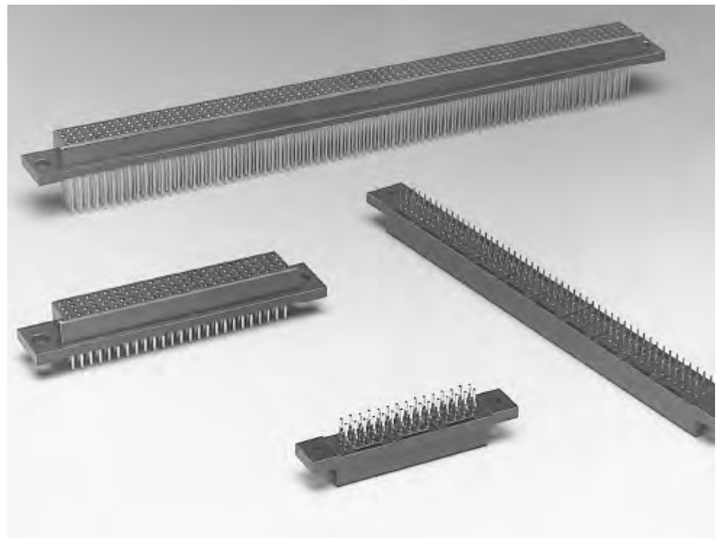
Vertical Receptacles with ACTION PIN Posts and Solder Post Contacts

Product Facts

- Horizontal motherboard stacking capability
- Mateable with AMP-HDI pin assemblies
- 4-beam box-type receptacle contact design provides four areas of contact per connection
- Available with ACTION PIN contacts or solder posts
- Inserts into standard .100 [2.54] grid
- Keying system provides 64 combinations without loss of contact count
- High temperature material permits vapor phase reflow soldering
- Low mating forces
- Highly economical for quality and density
- Product Specification 108-9003



Tyco Electronics vertical receptacle assemblies, when mated with AMP-HDI pin assemblies, permit horizontal stacking of motherboards. They are available with two, three or four rows of contacts on a .100 [2.54] grid and with a choice of either ACTION PIN posts or solder posts.

The required PC board hole sizes and patterns of these receptacle assemblies allow space-efficient circuitry layout. The box-type, quad redundant receptacle contacts with selective gold plating in the contact area deliver high reliability while maintaining low mating force.

In addition, contact and housing configurations prevent pin damage if a long connector is “peeled” apart from one end.

Features such as 64-combination keying and high temperature housing materials add to the appeal of Tyco Electronics vertical receptacle assemblies.

These connectors are highly specialized products for applications demanding their unusual characteristics.

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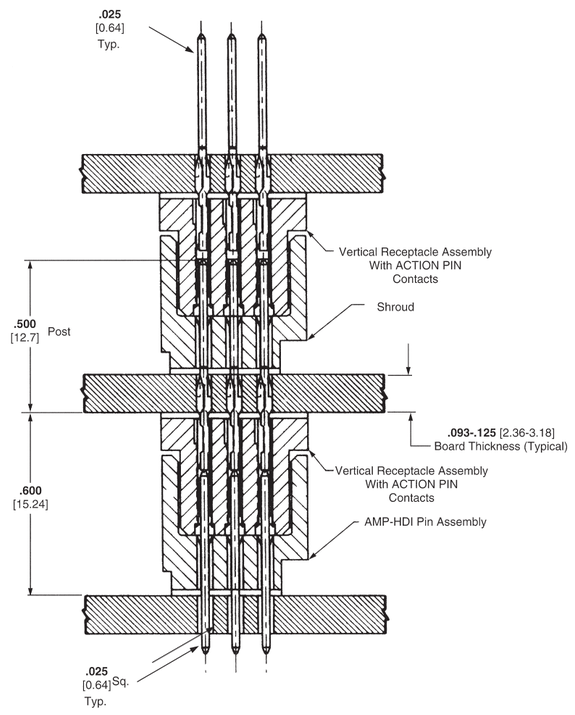
Horizontal Motherboard Stacking
(Not Recommended for MFBL Applications)

Multiple stacking of motherboards on backplanes is readily achieved using Tyco Electronics vertical receptacle assemblies and AMP-HDI pin assemblies. This unique board-to-board interconnection concept eliminates exposed contacts inherent with open pin fields. Vertical receptacle assemblies with either ACTION PIN posts or solder posts provide the same low .600 [15.24] stack height between boards.



Note: The .600 [15.24] board-to-board stacking height is also achieved using vertical receptacle assemblies with solder posts.

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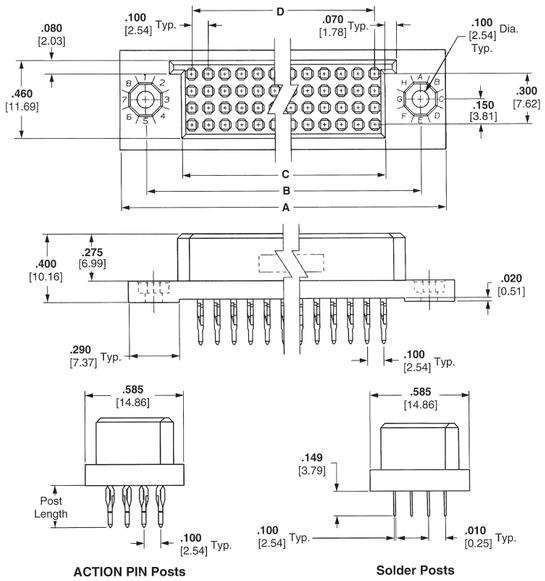
Four-Row Vertical Receptacle Assemblies Without Guide Holes



No. of Pos.	Dimensions A	B	C	D	Contact Finish	Part Numbers* ACTION PIN Posts .500 [12.7] Length	.250 [6.35] Length	Solder Posts .149 [3.78] Length	.180 [4.57] Length
300	**8.250** 209.55	**7.950** 201.93	**7.524** 191.11	**7.400** 187.95	A	—	1-533427-2	1-533285-2	—
					B	1-533656-2	—	—	—
					D	—	—	6-533285-2	—
280	**7.750** 196.85	**7.450** 189.23	**7.024** 178.41	**6.900** 175.26	A	—	—	1-533285-1	—
260	**7.250** 184.15	**6.950** 176.53	**6.524** 165.71	**6.400** 162.56	A	—	1-533427-0	1-533285-0	—
					D	—	—	6-533285-0	—
240	**6.750** 171.45	**6.450** 163.83	**6.024** 153.01	**5.900** 149.86	A	—	533427-9	533285-9	—
					B	533656-9	—	—	—
					D	—	—	5-533285-9	—
232	**6.550** 166.37	**6.250** 158.75	**5.824** 147.93	**5.700** 144.78	A	—	—	—	533499-2
					D	—	—	—	5-533499-2
216	**6.150** 156.21	**5.850** 148.59	**5.424** 137.77	**5.300** 134.62	A	—	—	—	533499-1
					D	—	—	—	5-533499-1
200	**5.750** 146.05	**5.450** 138.43	**5.024** 127.61	**4.900** 124.46	A	—	—	533285-7	—
					B	533656-7	—	—	—
					D	—	—	5-533285-7	—
180	**5.250** 133.35	**4.950** 125.73	**4.524** 114.91	**4.400** 111.76	B	533656-6	—	533285-6	—
					D	—	—	5-533285-6	—
160	**4.750** 120.65	**4.450** 113.03	**4.024** 102.21	**3.900** 99.06	A	—	533427-5	533285-5	533492-1
					C	—	—	650844-1	—
					D	—	—	5-533285-5	—
140	**4.250** 107.95	**3.950** 100.33	**3.524** 89.51	**3.400** 86.36	A	—	—	533285-4	—
128	**3.950** 100.33	**3.650** 92.71	**3.224** 81.89	**3.100** 78.74	A	—	533427-3	533285-3	—
					D	—	—	5-533285-3	—
100	**3.250** 82.55	**2.950** 74.93	**2.524** 64.11	**2.400** 60.96	A	533694-1	533427-1	533285-1	—
					B	533656-1	—	—	—
					D	—	—	5-533285-1	—

*Other connector sizes and solder post lengths can be made available. Consult Tyco Electronics.

ACTION PIN Posts and Solder Posts

Material and Finish

Housing — Brown glass-filled polyphenylene sulfide

Contacts — ACTION PIN (phosphor bronze), solder (beryllium copper), plated as follows:

A .000030 [0.00076] gold in contact area, tin-lead on posts, with entire contact underplated .000050-.000100 [0.00127-0.00254] nickel

B Gold flash over .000050-.000100 [0.00127-0.00254] nickel on entire contact, with .000030 [0.00076] gold on contact area and for .200 [5.08] from tip of ACTION PIN post

C .000050 [0.00127-0.00254] gold in contact area, tin-lead on posts, with entire contact underplated .000050-.000100 [0.00127-0.00254] nickel

D RoHS Part Numbers same as A plating except for tin on posts

Related Product Data

Mateable Connectors —

Vertical Pin Headers —
Base numbers 533435, 533254, 533270, 532448, 532436

90° Pin Headers —
Base numbers 533444, 533286
Consult Tyco Electronics for part number details.

Accessories —

Keys — page 1-94

Jackscrews — page 1-95

PCB Hole Layouts — page 1-90

Application Tooling — page 1-93

Technical Documents —
Product Specifications
108-9069, 108-26003
Application Specification
114-9010
Instruction Sheets 408-6927, 408-6979, 408-6989, 408-9185

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UK: 44-208-420-8341

Four-Row Vertical Receptacle Assemblies Without Guide Holes (Continued)

Material and Finish

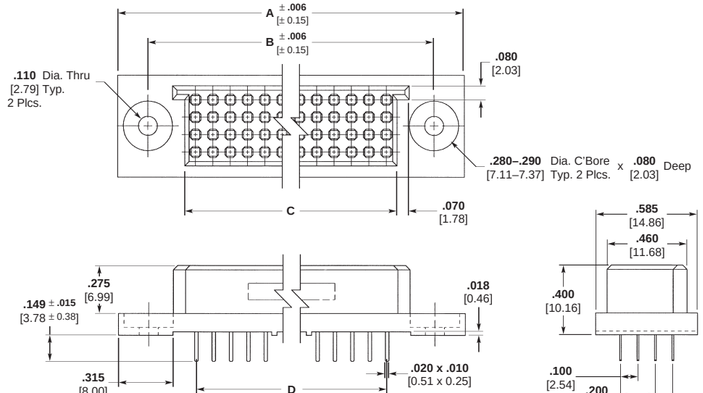
Housing — Natural (brown) polyphenylene sulfide

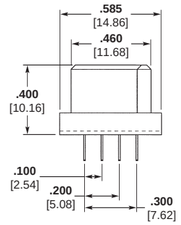
Contacts — Beryllium copper, .000050–.000100 [0.00127–0.00254] nickel underplate over .000030 [0.00076] gold in contact area, tin-lead plated solder tails

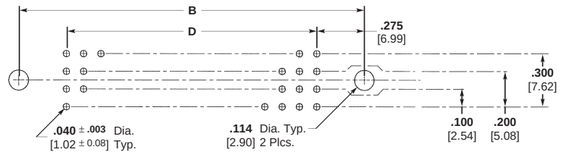
With Special Mounting Ears

Solder Posts .149 [3.78] Length
Mounting Ears Have .285 [7.24] C'Bore x .080 [2.03] Deep

No. of Pos.	Dimensions A	B	C	D	Contact Finish	Part No.
192	**5.600** 142.24	**5.450** 133.35	**4.824** 122.53	**4.700** 119.38	A	533484-1
68	**2.500** 63.50	**2.150** 54.61	**1.724** 43.79	**1.600** 40.64	A	533484-2

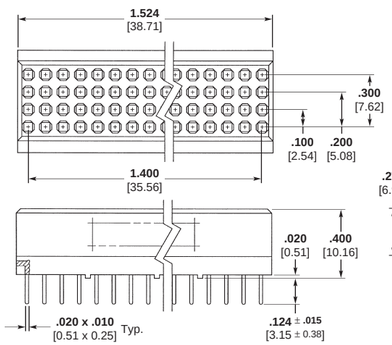


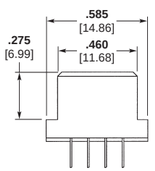


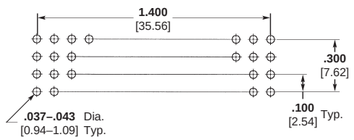


Recommended PC Board Layout

Without Mounting Ears







Recommended PC Board Layout

Part Number 533472-2
RoHS Part Number 5-533472-2
60 Position

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Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Three-Row Vertical Receptacle Assemblies Without Guide Holes

ACTION PIN Posts and Solder Posts

Material and Finish

Housing — Brown glass-filled polyphenylene sulfide

Contacts — ACTION PIN (phosphor bronze), solder (beryllium copper), plated as follows:

A .000030 [0.00076] gold in contact area; tin-lead on posts, with entire contact underplated .000050-.000100 [0.00127-0.00254] nickel

B Gold flash over .000050-.000100 [0.00127-0.00254] nickel on entire contact, with .000030 [0.00076] gold on contact area and for .200 [5.08] from tip of ACTION PIN post

C RoHS Part Numbers same as A plating except for tin on posts

Related Product Data

Mateable Connectors —

Vertical Pin Headers —
Base numbers 532432, 533061, 533093, 532447, 532433

90° Pin Headers —
Base numbers 533420, 533288

Consult Tyco Electronics for part number details.

Accessories —

Keys — page 1-94

Jackscrews — page 1-95

PCB Hole Layouts — page 1-91

Application Tooling — page 1-93

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108-9069, 108-26003
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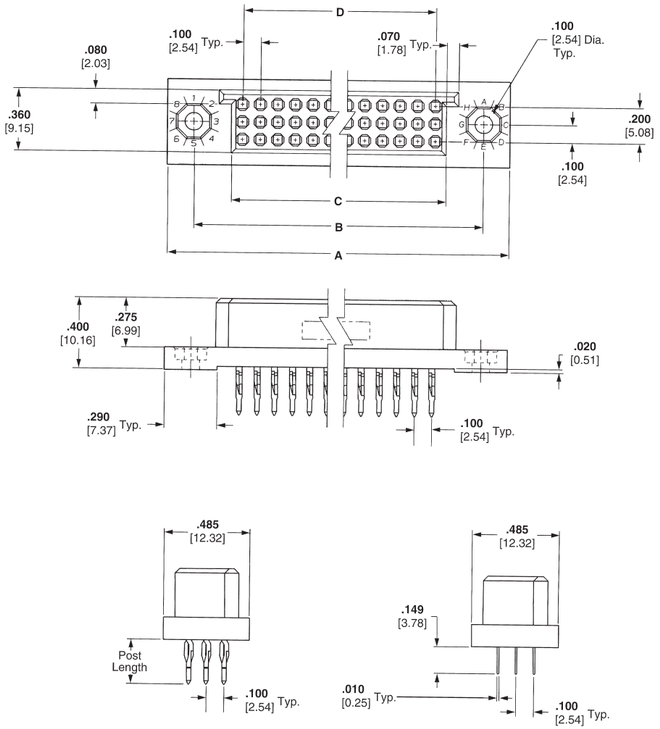
Instruction Sheets 408-6927, 408-6981, 408-6989, 408-9185



ACTION PIN Posts

Solder Posts

No. of Pos.	Dimensions A	B	C	D	Contact Finish	Part Numbers* ACTION PIN Posts .250 [6.35] Length	Solder Posts .149 [3.78] Length	Solder Posts .180 [4.57] Length
174	**6.550** 166.37	**6.250** 158.75	**5.824** 147.93	**5.700** 144.78	A	—	—	533495-3
					C	—	—	5-533495-3
150	**5.750** 146.05	**5.450** 138.43	**5.024** 127.61	**4.900** 124.46	A	533657-7	533287-7	—
					B	—	—	533495-2
					C	—	5-533287-7	5-533495-2
120	**4.750** 120.65	**4.450** 113.03	**4.024** 102.21	**3.900** 99.06	A	533657-5	533287-5	—
105	**4.250** 101.95	**3.950** 100.33	**3.524** 89.51	**3.400** 86.36	A	—	533287-4	—
					C	—	5-533287-4	—
96	**3.950** 100.33	**3.650** 92.71	**3.224** 81.89	**3.100** 78.74	A	—	533287-3	—
					C	—	5-533287-3	—

*Other connector sizes and solder post lengths can be made available, consult Tyco Electronics.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Two-Row Vertical Receptacle Assemblies Without Guide Holes

ACTION PIN Posts and Solder Posts

Material and Finish

Housing — Brown glass-filled polyphenylene sulfide
Contacts — ACTION PIN (phosphor bronze), solder (beryllium copper), plated as follows:

A .000030 [0.00076] gold in contact area, tin-lead on posts, with entire contact underplated .000050-.000100 [0.00127-0.00254] nickel

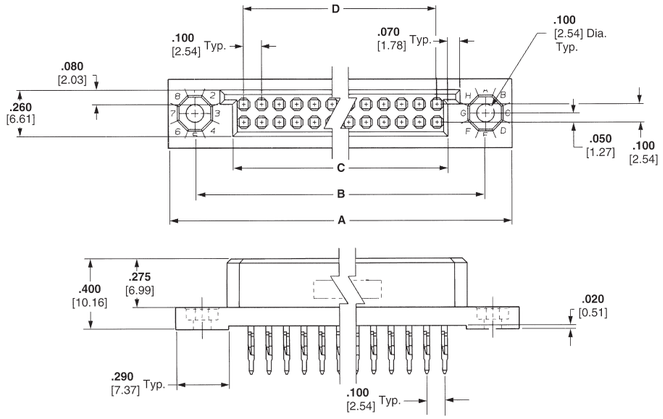
B Gold flash over .000050-.000100 [0.00127-0.00254] nickel on entire contact, with .000030 [0.00076] gold on contact area and for .200 [5.08] from tip of ACTION PIN post

C RoHS Part Numbers same as A plating except for tin on posts

Related Product Data

Mateable Connectors —
Vertical Pin Headers —
Base numbers 533060, 532446, 532430, 532091, 532430
90° Pin Headers —
Base numbers 533515, 533295
Consult Tyco Electronics for part number details.

Accessories —
Keys — page 1-94
Jackscrews — page 1-95
PCB Hole Layouts — page 1-91
Application Tooling — page 1-93
Technical Documents —
Product Specifications
108-9069, 108-26003
Application Specification
114-9010
Instruction Sheets 408-6927, 408-6980, 408-6989, 408-9185



ACTION PIN Posts **Solder Posts**

No. of Pos.	Dimensions A	B	C	D	Contact Finish	Part Numbers* ACTION PIN Posts .500 [12.7] Length	ACTION PIN Posts .250 [6.35] Length	Solder Posts .149 [3.78] Length
200	**10.750** 273.05	**10.450** 265.43	**10.024** 254.61	**9.900** 251.46	A	—	1-533650-9	—
80	**4.750** 120.65	**4.450** 113.03	**4.024** 102.21	**3.900** 99.06	B	533693-7	—	—
60	**3.750** 95.25	**3.450** 87.63	**3.024** 76.81	**2.900** 73.66	A	—	—	533289-5
					C	—	—	5-533289-5
40	**2.750** 69.85	**2.450** 62.23	**2.024** 51.41	**1.900** 48.26	A	533693-3	—	533289-3
20	**1.750** 44.45	**1.450** 36.83	**1.024** 26.10	**.900** 22.86	A	—	—	533289-1

*Other connector sizes and solder post lengths can be made available, consult Tyco Electronics.

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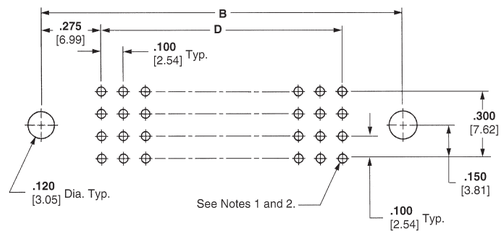
Recommended Printed Circuit Board Hole Layouts

**Four-Row
Receptacle Assemblies
Without Guide Holes**



**Vertical Receptacle Assemblies
with ACTION PIN Contacts and Solder Posts**

Notes: 1. ACTION PIN posts require .093 [2.36] min. thick PC board. For ACTION PIN post plated-through hole specifications, see page 1-92.
2. Plated-through hole diameter for solder posts is .037-.043 [0.94-1.09]; recommended pad diameter is hole diameter plus .020 [0.51].

No. of Pos.	Dimensions	
	B	D
300	**7.950** 201.93	**7.400** 187.96
280	**7.450** 189.23	**6.900** 175.26
260	**6.950** 176.53	**6.400** 162.56
240	**6.450** 163.83	**5.900** 149.86
232	**6.250** 166.37	**5.700** 144.78
216	**5.850** 148.59	**5.300** 134.62
200	**5.450** 138.43	**4.900** 124.46
180	**4.950** 125.73	**4.400** 111.76
160	**4.450** 113.03	**3.900** 99.06
140	**3.950** 100.33	**3.400** 86.36
128	**3.650** 92.71	**3.100** 78.74
120	**3.450** 87.63	**2.900** 73.66
100	**2.950** 74.93	**2.400** 60.96
40	**1.450** 36.83	**.900** 22.86

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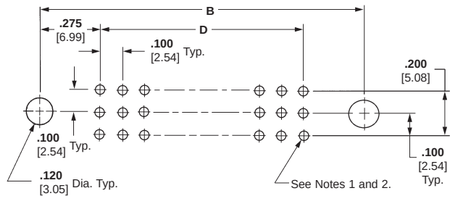
Recommended Printed Circuit Board Hole Layouts (Continued)

Three-Row Receptacle Assemblies Without Guide Holes

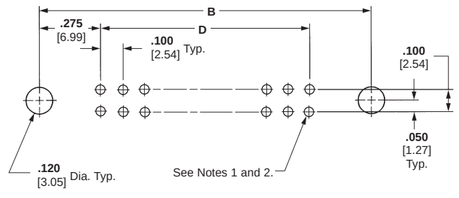


Vertical Receptacle Assemblies with ACTION PIN Contacts and Solder Posts

Notes: 1. ACTION PIN posts require .093 [2.36] min. thick PC board.
For ACTION PIN post plated-through hole specifications, see page 1-92.
2. Plated-through hole diameter for solder posts is .037-.043 [0.94-1.09]; recommended pad diameter is hole diameter plus .020 [0.51].

No. of Pos.	Dimensions	
	B	D
174	**6.250** 158.75	**5.700** 144.78
150	**5.450** 138.43	**4.900** 124.46
120	**4.450** 113.03	**3.900** 99.06
105	**3.950** 100.33	**3.400** 86.36
96	**3.650** 92.71	**3.100** 78.74

Two-Row Receptacle Assemblies Without Guide Holes



Vertical Receptacle Assemblies with ACTION PIN Contacts and Solder Posts

Notes: 1. ACTION PIN posts require .093 [2.36] min. thick PC board.
For ACTION PIN post plated-through hole specifications, see page 1-92.
2. Plated-through hole diameter for solder posts is .037-.043 [0.94-1.09]; recommended pad diameter is hole diameter plus .020 [0.51].

No. of Pos.	Dimensions	
	B	D
200	**10.450** 265.43	**9.900** 251.46
80	**4.450** 113.03	**3.900** 99.06
60	**3.450** 87.63	**2.900** 73.66
40	**2.450** 62.23	**1.900** 48.26
30	**1.950** 49.53	**1.400** 35.56
20	**1.450** 36.83	**.900** 22.86

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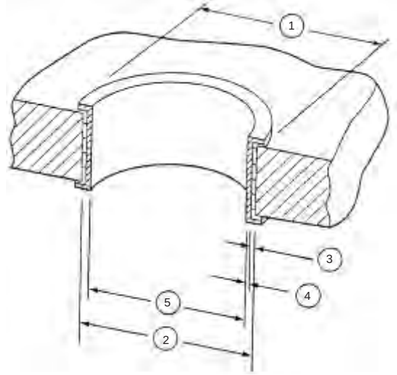
ACTION PIN Press-Fit Contacts

ACTION PIN contacts provide a reliable press-fit connection. Localized pressure in the interface area promotes oxide breakthrough and prevents corrosion in harsh environments to provide a reliable connection. Also, radial and axial distortion are controlled to meet today's standards for multilayer board applications.

PC Board Thickness

ACTION PIN contacts are designed for use in a variety of PC board thicknesses. However, certain ACTION PIN contacts are to be used in specific ranges of board thicknesses. For optimum performance, the recommended board thicknesses provided with the connector being used must be followed.



1. Annular Ring (See Note)
2. Drilled Hole
3. Copper Thickness
4. Tin-Lead Thickness
5. Plated-Through Hole

ACTION PIN Contact/PC Board Applications

Connector Type	ACTION PIN Contact Material Thickness	Drilled Hole Diameter ②	Plating Thicknesses		Plated-Through Hole Diameter ⑤	Radial Hole Distortion	
			Copper ③*	Tin-Lead ④		Average	Maximum
Vertical Receptacle Assemblies	**.025** 0.64	**.0453±.001** 1.151±0.03	**.001-.003** 0.03-0.08	**.0003** 0.008 Min.	**.037-.043** 0.94-1.09	Not Specified	Not Specified

*Maximum hardness of copper layer is 150 Knoop
Note: Recommended annular ring diameter is hole diameter plus .020 [0.51]

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Application Tooling

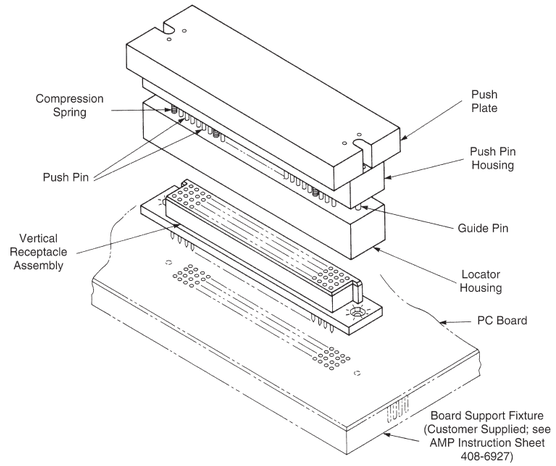
Receptacle assemblies with ACTION PIN contacts allow high speed, solderless backplane construction through reliable press-fit application. Press fitting connectors to printed circuit boards requires special seating tools which transfer application force directly to the contacts.

Each spring-loaded seating tool features a push plate, push pin housing, and locator housing. The push plate provides the bearing surface for the application tooling which forces the ACTION PIN posts into the PC board. The push pin housing holds the same number of push pins as the connector size (no. of contact positions). The locator housing fits over the connector body to align the components for proper seating. Compression springs (approximately one for every seven contacts) and guide pins (one at each end) provide tool alignment and stability.

Board support fixtures are used to support PC boards or backplanes while connectors are being assembled to the boards or backplanes. Tyco Electronics Instruction Sheet 408-6927 provides recommendations for manufacturing board support fixtures.

Force applied to the tool to seat the connectors can be provided by the Tyco Electronics seating machines shown below, or by commercially available hand-operated arbor presses such as Greenerd 3A or 3B. Refer to Instruction Sheet 408-9027 for use of Tyco Electronics adapter kits with these presses.

For tooling information, contact Technical Support.



Receptacle Assembly Configuration			Seating Tool Numbers
No. of Rows	No. of Pins/Row	Total No. of Pins	
Four (without Guide Holes)	25	100	58279-2
	30	120	58279-4
	32	128	58279-8
	35	140	58279-9
	45	180	58279-5
	60	240	58279-3
	65	260	58279-7
	67	268	58279-1
	75	300	58279-6
Three (without Guide Holes)	32	96	58277-2
	33	99	58277-3
	50	150	58277-4
	67	201	58277-1
Two (without Guide Holes)	15	30	58280-4
	28	56	58280-1
	35	70	58280-6
	60	120	58280-5
	67	134	58280-2
	70	140	58280-3

MANTA Servo Electric Press

Electric Servo Press created to satisfy the increasing need for a “Low Cost” method of controlled connector pressing into today’s complex circuit boards. The MANTA can precisely control force and speed of each pressing cycle. Quality feedback is accessible in the form of SPC analysis, display, and reports. The “C-Frame” design, with a 12-inch throat depth, accommodates a wide range of smaller printed circuit boards.

BMEP-3T/5T Bench Top Electric Servo Press (3 or 5 ton)

PC-controlled, cost effective bench mounted machine for semi-automatic pressing of ACTION PIN (Compliant Pin, Pressfit) connectors into printed circuit boards. The pressing force is delivered by an all-electric servomotor, providing precise control of force, speed, and seating height. A touch screen monitor provides a user-friendly interface and a bar code scanner provides PCB serial number input for product tracking.

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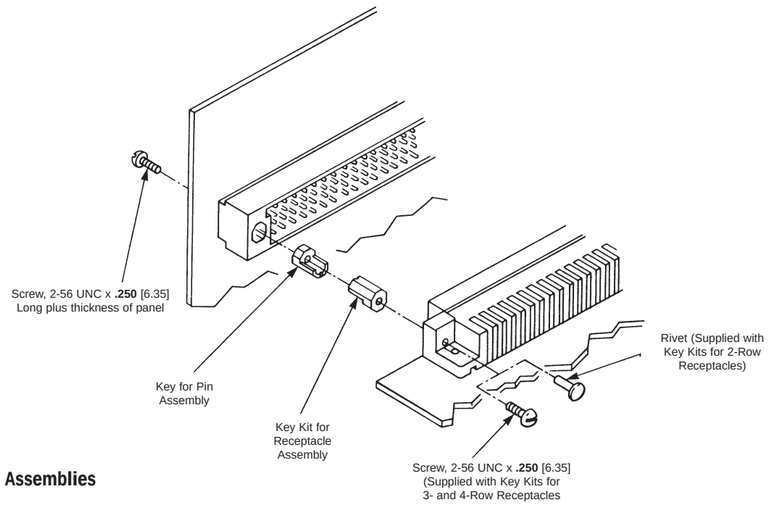
Keying Hardware and Applications

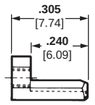


Keys for Pin Assemblies

Material and Finish
Passivated Stainless Steel

Key Part Number 530341-1

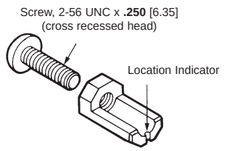
Key Part Number 530341-6
(contains 2 per package)



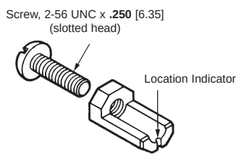
Note: Customer must supply screws; .250 [6.35] min. long, plus thickness of panel.

Key Kits for Three- and Four-Row Receptacles

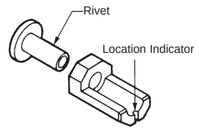
Material and Finish
Key — Passivated Stainless Steel
Screw — Passivated Stainless Steel



Kit Number 530341-7
(includes 2 keys and 2 screws)



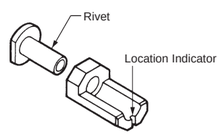
Kit Number 530341-3
(includes 2 keys and 2 screws)



Kit Number 530341-5
(includes 2 keys and 2 rivets)
Note: Use Clinching Tool Number 91117-3
(See Instruction Sheet 408-6626.)

Key Kit for Two-Row Receptacles

Material and Finish
Key — Passivated Stainless Steel
Rivet — Nickel plated brass



Kit Number 530341-4
(includes 2 keys and 2 rivets)
Note: Use Clinching Tool Number 91117-5
(See Instruction Sheet 408-9178.)

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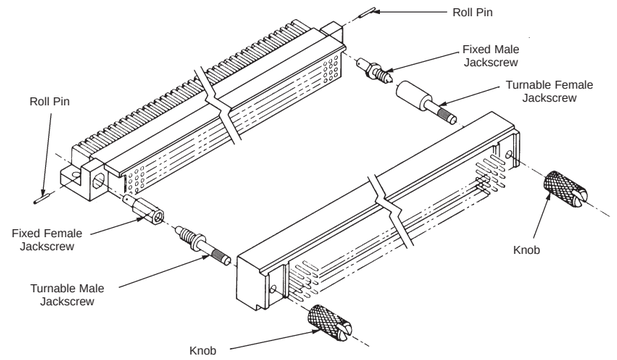
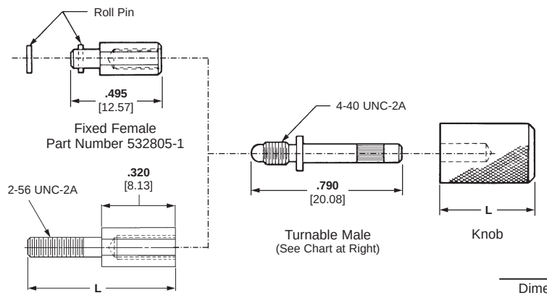
Mating Hardware and Applications

Jackscrews for Three- and Four-Row Connectors Only

See Instruction Sheet 408-6909.



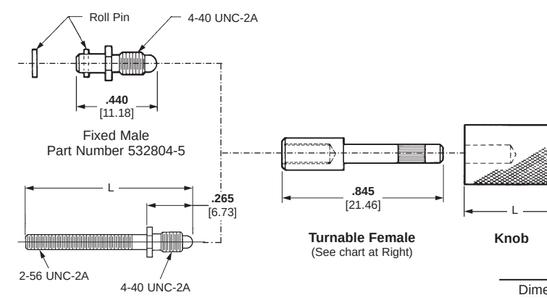
Dimension L	Material and Finish	Fixed Female (Threaded) Part Numbers
.750 19.05	Plain Stainless Steel	533424-1
	Passivated Stainless Steel	533424-2
.625 15.88	Plain Stainless Steel	533424-3
	Passivated Stainless Steel	533424-4
.525 14.61	Plain Stainless Steel	533424-5
	Passivated Stainless Steel	533424-6



Dimension L	Turnable Male Part Numbers
.500 12.70	532805-3*

*Knob with screwdriver slot

Dimension L	Material and Finish	Fixed Male (Threaded) Part Numbers
.695 17.65	Plain Stainless Steel	533423-1
	Passivated Stainless Steel	533423-2
.960 24.38	Plain Stainless Steel	533423-3



Dimension L	Turnable Male Part Numbers
.500 12.70	532804-3*

*Knob with screwdriver slot

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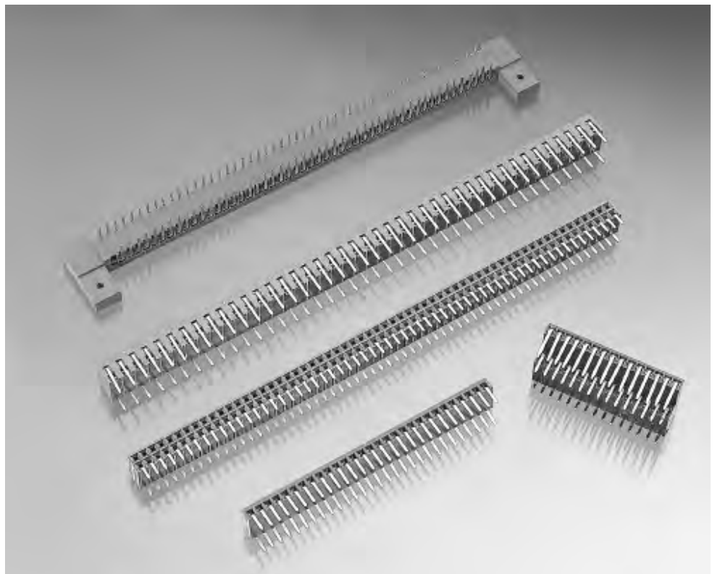
Introduction

Product Facts

- Qualified to MIL-C-55302/127 and /128
- Mates with .025 x .025 [0.64 x 0.64] posts
- Dual cantilever spring contact design and built-in anti-overstress
- Wide misalignment tolerances
- One-piece phosphor bronze contacts, plated gold over nickel per MIL-C-55302
- .100 [2.54] centerline spacing
- Choice of single or double row assemblies
- Assemblies available for .062 [1.57] or .093 [2.36] thick PC boards
- Special right-angle receptacle configurations available



AMPMODU Receptacle Assemblies per MIL-C-55302 are specifically designed to meet today's need for a reliable, modular interconnection system for advanced electronic packaging.

These right-angle assemblies mate with the electronic industry's popular, .025 x .025 [0.64 x 0.64] posts. This means that the AMPMODU Connector system may be used with a host of applications … from individual PC board mount posts to complex post headers and connectors.

Housings are made of blue diallyl phthalate, 94V-0 rated thermoplastic, and are pre-loaded with phosphor bronze contacts, plated .000050 [0.00127] gold over .000050 [0.00127] nickel per MIL-C-55302. A special AMPMODU Receptacle Assembly is available for high temperature requirements. This double row, right-angle assembly has a housing made of polyphenylene sulfide (PPS) GST-40F, per MIL-M-24519 with a choice of contact platings.

Keying plugs are available for all assembly configurations.

Technical Features

Center Spacing — 0.100 [2.54]

Housing Materials — Polyphenylene sulfide or diallyl phthalate

Flammability Rating — 94 V-O

Contact Material — Phosphor bronze

Contact Finish — .000050 [.00127] Gold or gold flash

Temperature Range — -85° to 257°F [-65° to 125°C]

Current Rating — 3 amp max.

Termination Resistance (max) — 12 milliohms max.

Performance Characteristics

Dielectric Withstand Voltage — 750 Vac at sea level

Insulation Resistance — 5000 megohms minimum

Contact Insertion Force — 6 oz. [1.67 N] max. per contact

Durability — 500 cycles

Vibration — MIL-STD-1344 method 2005 Cond III (15G)

Physical Shock — MIL-STD-1344 method 2004 Cond G (100G)

Thermal Shock — MIL-STD-1344 method 1003 Cond A

Temperature Humidity — MIL-STD-1344 method 1002 Type II

Technical Documents
Application spec. 114-25018

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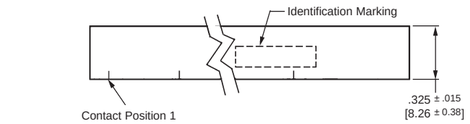
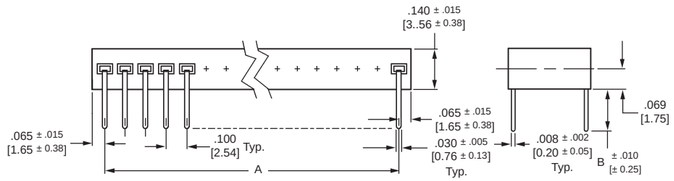
Receptacle Assemblies, Single Row

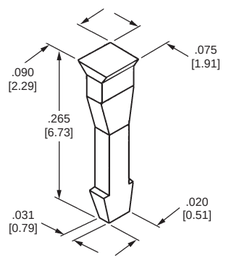
Material and Finish

Housing — In accordance with MIL-C-55302 or MIL-M-24519 type GST-40F

Contacts — In accordance with MIL-C-55302







No. of Pos.	Dimensions A	Dimensions B	Board Thickness	Military Part No M55302/127-	AMP Part No.
2	.100 2.54	.175 4.45	.125 3.18	023B	102275-1
3	.200 5.08	.175 4.45	.125 3.18	033B	102275-2
4	.300 7.62	.115 2.92	.062 1.57	041B	87968-3
		.175 4.45	.125 3.18	043B	102275-3
5	.400 10.16	.115 2.92	.062 1.57	051B	87968-4
		.175 4.45	.125 3.18	053B	102275-4
6	.500 12.70	.115 2.92	.062 1.57	061B	87968-5
		.175 4.45	.125 3.18	063B	102275-5
7	**.600** 15.24	.175 4.45	.125 3.18	073B	102275-6
8	.700 17.78	.175 4.45	.125 3.18	083B	102275-7
9	.800 20.32	.175 4.45	.125 3.18	093B	102275-8
10	.900 22.86	.115 2.92	.062 1.57	101B	87968-9
		.175 4.45	.125 3.18	103B	102275-9
11	1.000 25.40	.175 4.45	.125 3.18	113B	1-102275-0

Keying Plug —
Military Part Number
M55302/127-00KY
Part Number 102188-1

Catalog 1308940
Revised 8-06

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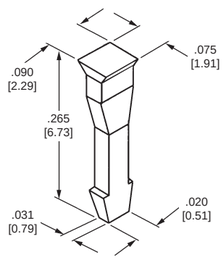
Japan: 81-44-844-8013
UK: 44-208-420-8341

Receptacle Assemblies, Single Row (Continued)

No. of Pos.	Dimensions A	Dimensions B	Board Thickness	Military Part No M55302/127-	AMP Part No.
12	1.100 27.94	.175 4.45	.125 3.18	123B	1-102275-1
13	1.200 30.48	.175 4.45	.125 3.18	133B	1-102275-2
15	1.400 35.56	.115 2.92	.062 1.57	151B	1-87968-4
		.175 4.45	.125 3.18	153B	1-102275-4
16	1.500 38.10	.175 4.45	.125 3.18	163B	1-102275-5
17	1.600 40.64	.175 4.45	.125 3.18	173B	1-102275-6
18	1.700 43.18	.175 4.45	.125 3.18	183B	1-102275-7
19	1.800 45.72	.175 4.45	.125 3.18	193B	1-102275-8
20	1.900 48.26	.175 4.45	.125 3.18	203B	1-102275-9
21	2.000 50.80	.145 3.68	.093 2.36	212B	2-87971-0
		.175 4.45	.125 3.18	213B	2-102275-0
22	2.100 5.34	.175 4.45	.125 3.18	223B	2-102275-1
23	2.200 55.88	.175 4.45	.125 3.18	233B	2-102275-2
24	2.300 58.42	.175 4.45	.125 3.18	243B	2-102275-3
25	2.400 60.96	.175 4.45	.125 3.18	253B	2-102275-4
26	2.500	.175 4.45	.125 3.18	263B	2-102275-5
27	2.600 66.04	.145 3.68	.093 2.36	272B	2-87971-6
		.175 4.45	.125 3.18	273B	2-102275-6
28	2.700 68.58	.175 4.45	.125 3.18	283B	2-102275-7
29	2.800 71.12	.175 4.45	.125 3.18	293B	2-102275-8
30	2.900 73.66	.175 4.45	.125 3.18	303B	2-102275-9
31	3.000 76.20	.175 4.45	.125 3.18	313B	3-102275-0
32	3.100 78.74	.175 4.45	.125 3.18	323B	3-102275-1
33	3.200 81.28	.175 4.45	.125 3.18	333B	3-102275-2
34	3.300 83.82	.175 4.45	.125 3.18	343B	3-102275-3
35	3.400 86.36	.175 4.45	.125 3.18	353B	3-102275-4
36	3.500 88.90	.175 4.45	.125 3.18	363B	3-102275-5
37	3.600 91.44	.175 4.45	.125 4.45	373B	3-102275-6
38	3.700 93.98	.145 3.68	.093 2.36	382B	3-87971-7
		.175 4.45	.125 3.18	383B	3-102275-7
39	3.800 96.52	.175 4.45	.125 3.18	393B	3-102275-8



Keying Plug —
Military Part Number
M55302/127-00KY
Part Number 102188-1

Catalog 1308940
Revised 8-06

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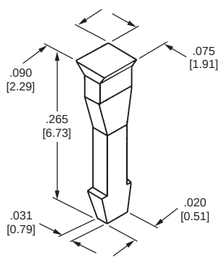
Receptacle Assemblies, Single Row (Continued)

No. of Pos.	Dimensions A	Dimensions B	Board Thickness	Military Part No M55302/127-	AMP Part No.
40	3.900 99.06	.115 2.92	.062 1.57	401B	3-87968-9
		145 3.68	.093 2.36	402B	3-87971-9
		.175 4.45	.125 3.18	403B	3-102275-9
41	4.000 101.60	.175 4.45	.125 3.18	413B	4-102275-0
42	4.100 104.14	.175 4.45	.125 3.18	423B	4-102275-1
43	4.200 106.68	.175 4.45	.125 3.18	433B	4-102275-2
44	4.300 109.22	.175 4.45	.125 3.18	443B	4-102275-3
45	4.400 111.76	.175 4.45	.125 3.18	453B	4-102275-4
46	4.500 114.30	.175 4.45	.125 3.18	463B	4-102275-5
47	4.600 116.84	.175 4.45	.125 3.18	473B	4-102275-6
48	4.100 119.38	.175 4.45	.125 3.18	483B	4-102275-7
49	4.800 121.92	.175 4.45	.125 3.18	493B	4-102275-8
50	4.900 124.46	.175 4.45	.125 3.18	503B	4-102275-9
51	5.000 127.00	.175 4.45	.125 3.18	513B	5-102275-0
53	5.200 132.08	.175 4.45	.125 3.18	533B	5-102275-2
54	5.300 134.62	.175 4.45	.125 3.18	543B	5-102275-3
55	5.400 137.16	.175 4.45	.125 3.18	553B	5-102275-4
56	5.500 139.70	.175 4.45	.125 3.18	563B	5-102275-5
57	5.600 142.24	.175 4.45	.125 3.18	573B	5-102275-6
58	5.700 144.78	.175 4.45	.125 3.18	583B	5-102275-7
59	5.800 147.32	.175 4.45	.125 3.18	593B	5-102275-8
60	5.900 149.86	.175 4.45	.125 3.18	603B	5-102275-9
61	6.000 152.40	.175 4.45	.125 3.18	613B	6-102275-0
62	6.100 154.94	.175 4.45	.125 3.18	623B	6-102275-1
63	6.200 157.48	.175 4.45	.125 3.18	633B	6-102275-2
64	6.300 160.02	.175 4.45	.125 3.18	643B	6-102275-3
65	6.400 162.56	.175 4.45	.125 3.18	653B	6-102275-4



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Catalog 1308940
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Receptacle Assemblies, Double Row

Material and Finish

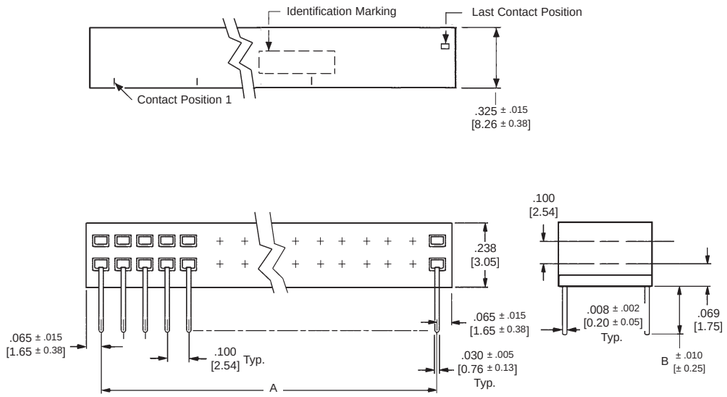
Housing — In accordance with MIL-C-55302 or MIL-M-24519 type GST-40F

Contacts — In accordance with MIL-C-55302

Plating Codes:

A — Gold flash over .000050 [0.00127] min. nickel on entire contact, .000050 [0.00127] min. gold on contact area

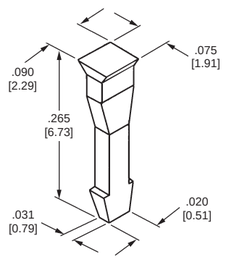
B — .000050 [0.00127] min. gold over .000050 [0.00127] min. nickel on the entire contact



Housing Configuration 1

Typical End View

No. of Pos.	Dimensions A	Dimensions B	Board Thickness	Plating Code A: Military Part No M55302/128-	Plating Code A: Part No.	Plating Code B: Military Part No. M55302/128-	Plating Code B: Part No.
4	**.100** 2.54	**.115** 2.92	**.062** 1.57	AA1A	87961-1	—	—
8	**.300** 7.62	**.145** 3.68	**.093** 2.36	AC1C	87964-3	—	—
10	**.400** 10.16	**.115** 2.92	**.062** 1.57	AD1A	87961-4	AD1B	87962-4
12	**.500** 12.70	**.115** 2.92	**.062** 1.57	AE1A	87961-5	—	—
		.145 3.68	**.093** 2.36	AE1C	87964-5	—	—
14	**.600** 15.24	**.115** 2.92	**.062** 1.57	AF1A	87961-6	AF1B	87962-6
16	**.700** 17.78	**.115** 2.92	**.062** 1.57	AG1A	87961-7	AG1B	87962-7
18	**.800** 20.32	**.115** 2.92	**.062** 1.57	—	—	AH1B	87962-8
		.145 3.68	**.093** 2.36	AH1C	87964-8	—	—
20	**.900** 22.86	**.115** 2.92	**.062** 1.57	AJ1A	87961-9	AJ1B	87962-9
		.145 3.68	**.093** 2.36	—	—	AJ1D	87965-9
22	**1.000** 25.40	**.115** 2.92	**.062** 1.57	AK1A	1-87961-0	AK1B	1-87962-0
		.175 4.45	**.125** 3.18	AK1E	1-102277-0	—	—
24	**1.100** 27.94	**.115** 2.92	**.062** 1.57	AL1A	1-87961-1	AL1B	1-87962-1
26	**1.200** 30.48	**.115** 2.92	**.062** 1.57	AM1A	1-87961-2	AM1B	1-87962-2
		.145 3.68	**.093** 2.36	AM1C	1-87964-2	—	—



Keying Plug —
Military Part Number
M55302/127-00KY
Part Number 102188-1

Catalog 1308940
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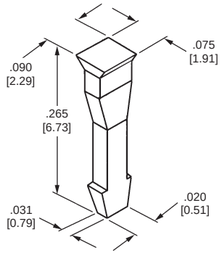
Receptacle Assemblies, Double Row (Continued)

No. of Pos.	Dimensions A	Dimensions B	Board Thickness	Plating Code A: Military Part No M55302/128-	Plating Code A: Part No.	Plating Code B: Military Part No. M55302/128-	Plating Code B: Part No.
28	**1.300** 33.02	**.115** 2.92	**.062** 1.57	AN1A	1-87961-3	AN1B	1-87962-3
30	**1.400** 35.56	**.115** 2.92	**.062** 1.57	AP1A	1-87961-4	AP1B	1-87962-4
		.145 3.68	**.093** 2.36	AP1C	1-87964-4	—	—
32	**1.500** 38.10	**.115** 2.92	**.062** 1.57	AQ1A	1-87961-5	AQ1B	1-87962-5
34	**1.600** 40.64	**.115** 2.92	**.062** 1.57	—	—	AR1B	1-87962-6
		.145 3.68	**.093** 2.36	AR1C	1-87964-6	—	—
		.175 4.45	**.125** 3.18	AR1E	1-102277-6	—	—
36	**1.700** 43.18	**.115** 2.92	**.062** 1.57	BA1A	1-87961-7	BA1B	1-87962-7
		.145 3.68	**.093** 2.36	BA1C	1-87964-7	BA1D	1-87965-7
		.175 4.45	**.125** 3.18	BA1E	1-102277-7	—	—
38	**1.800** 45.72	**.115** 2.92	**.062** 1.57	BB1A	1-87961-8	BB1B	1-87962-8
		.175 4.45	**.125** 3.18	—	—	—	—
40	**1.900** 48.26	**.115** 2.92	**.062** 1.57	BC1A	1-87961-9	BC1B	1-87962-9
		.145 3.68	**.093** 2.36	BC1C	1-87964-9	—	—
42	**2.000** 50.80	**.115** 2.92	**.062** 1.57	BD1A	2-87961-0	BD1B	2-87962-0
		.145 3.68	**.093** 2.36	BD1C	2-87964-0	—	—
44	**2.100** 53.34	**.115** 2.92	**.062** 1.57	—	—	BE1B	2-87962-1
		.175 4.45	**.125** 3.18	—	—	BE1F	2-102278-1
46	**2.200** 55.88	**.115** 2.92	**.062** 1.57	BF1A	2-87961-2	BF1B	2-87962-2
		.145 3.68	**.093** 2.36	BF1C	2-87964-2	—	—
48	**2.300** 58.42	**.115** 2.92	**.062** 1.57	BG1A	2-87961-3	—	—
		.145 3.68	**.093** 2.36	BG1C	2-87964-3	—	—
50	**2.400** 60.96	**.115** 2.92	**.062** 1.57	BH1A	2-87961-4	BH1B	2-87962-4
		.145 3.68	**.093** 2.36	BH1C	2-87964-4	—	—
		.175 4.45	**.125** 3.18	BH1E	2-102277-4	—	—
52	**2.500** 63.50	**.115** 2.92	**.062** 1.57	BJ1A	2-87961-5	BJ1B	2-87962-5
		.145 3.68	**.093** 2.36	BJ1C	2-87964-5	—	—
54	**2.600** 66.04	**.115** 2.92	**.062** 1.57	—	—	BK1B	2-87962-6
56	**2.700** 68.58	**.115** 2.92	**.062** 1.57	BL1A	2-87961-7	BL1B	2-87962-7
58	**2.800** 71.12	**.115** 2.92	**.062** 1.57	BM1A	2-87961-8	BM1B	2-87962-8
60	**2.900** 73.66	**.115** 2.92	**.062** 1.57	BN1A	2-87961-9	BN1B	2-87962-9
		.175 4.45	**.125** 3.18	BN1E	2-102277-9	BN1F	2-102278-9



Keying Plug —
Military Part Number
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Part Number 102188-1

Catalog 1308940
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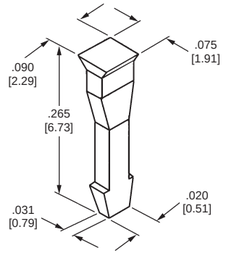
Receptacle Assemblies, Double Row (Continued)

No. of Pos.	Dimensions A	Dimensions B	Board Thickness	Plating Code A: Military Part No M55302/128-	Plating Code A: Part No.	Plating Code B: Military Part No. M55302/128-	Plating Code B: Part No.
62	**3.000** 76.20	**.115** 2.92	**.062** 1.57	—	—	BP1B	3-87962-0
		.145 3.68	**.093** 2.36	—	—	BP1D	3-87965-0
64	**3.100** 78.74	**.115** 2.92	**.062** 1.57	—	—	BQ1B	3-87962-1
66	**3.200** 81.28	**.115** 2.92	**.062** 1.57	BR1A	3-87961-2	BR1B	3-87962-2
		.175 4.45	**.125** 3.18	BR1E	3-102277-2	—	—
68	**3.300** 83.82	**.115** 2.92	**.062** 1.57	CA1A	3-87961-3	CA1B	3-87962-3
		.145 3.68	**.093** 2.36	CA1C	3-87964-3	—	—
70	**3.400** 86.36	**.115** 2.92	**.062** 1.57	CB1A	3-87961-4	CB1B	3-87962-4
		.145 3.68	**.093** 2.36	CB1C	3-87964-4	—	—
72	**3.500** 88.90	**.115** 2.92	**.062** 1.57	CC1A	3-87961-5	—	—
74	**3.600** 91.44	**.115** 2.92	**.062** 1.57	CD1A	3-87961-6	CD1B	3-87962-6
76	**3.700** 93.98	**.115** 2.92	**.062** 1.57	CE1A	3-87961-7	—	—
78	**3.800** 96.52	**.115** 2.92	**.062** 1.57	—	—	CF1B	3-87962-8
		.145 3.68	**.093** 2.36	CF1C	3-87964-8	—	—
80	**3.900** 99.06	**.115** 2.92	**.062** 1.57	CG1A	3-87961-9	CG1B	3-87962-9
		.145 3.68	**.093** 2.36	CG1C	3-87964-9	—	—
86	**4.200** 106.68	**.115** 2.92	**.062** 1.57	—	—	CK1B	4-87962-2
88	**4.300** 109.22	**.115** 2.92	**.062** 1.57	CL1A	4-87961-3	—	—
		.145 3.68	**.093** 2.36	—	—	CL1D	4-87965-3
90	**4.400** 111.76	**.115** 2.92	**.062** 1.57	CM1A	4-87961-4	—	—
		.175 4.45	**.125** 3.18	—	—	CM1F	4-102278-4
96	**4.700** 119.38	**.115** 2.92	**.062** 1.57	—	—	CQ1B	4-87962-7
98	**4.800** 121.92	**.115** 2.92	**.062** 1.57	CR1A	4-87961-8	—	—
		.145 3.68	**.093** 2.36	CR1C	4-87964-8	—	—
100	**4.900** 124.46	**.115** 2.92	**.062** 1.57	DA1A	4-87961-9	DA1B	4-87962-9
106	**5.200** 132.08	**.115** 2.92	**.062** 1.57	DD1A	5-87961-2	—	—
108	**5.300** 134.62	**.115** 2.92	**.062** 1.57	DE1A	5-87961-3	—	—
110	**5.400** 137.16	**.115** 2.92	**.062** 1.57	DF1A	5-87961-4	—	—
116	**5.700** 144.78	**.115** 2.92	**.062** 1.57	DJ1A	5-87961-7	DJ1B	5-87962-7
		.145 3.68	**.093** 2.36	DJ1C	5-87964-7	DJ1D	5-87965-7
120	**5.900** 149.86	**.115** 2.92	**.062** 1.57	—	—	DL1B	5-87962-9
122	**6.000** 152.40	**.115** 2.92	**.062** 1.57	DM1A	6-87961-0	DM1B	6-87962-0
124	**6.100** 154.94	**.115** 2.92	**.062** 1.57	DN1A	6-87961-1	—	—
130	**6.400** 162.66	**.115** 2.92	**.062** 1.57	DR1A	6-87961-4	DR1B	6-87962-4



Keying Plug —
Military Part Number
M55302/127-00KY
Part Number 102188-1

Catalog 1308940
Revised 8-06

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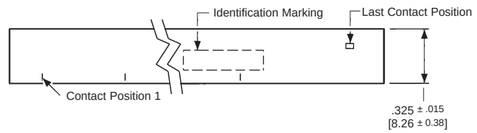
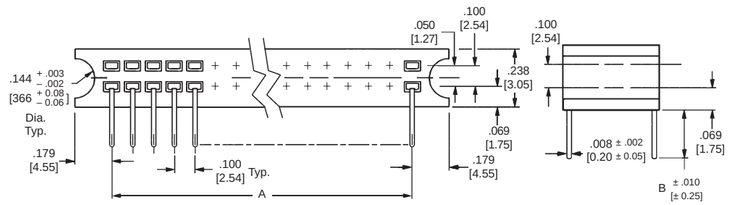
Japan: 81-44-844-8013
UK: 44-208-420-8341

Special Double Row Receptacle Assemblies





Material and Finish

Housing — In accordance with MIL-C-55302 or MIL-M-24519 type GST-40F

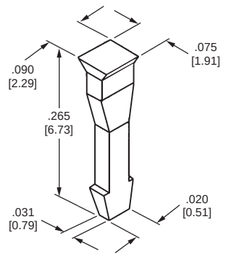
Contacts — Per MIL-C-55302

Plating Codes:

A — Gold flash over .000050 [0.00127] min. nickel on entire contact, .000050 [0.00127] min. gold on contact area

B — .000050 [0.00127] min. gold over .000050 [0.00127] min. nickel on the entire contact

No. of Pos.	Dimensions A	Dimensions B	Board Thickness	Plating Code A: Military Part No M55302/128-	Plating Code A: Part No.	Plating Code B: Military Part No. M55302/128-	Plating Code B: Part No.
22	**1.000** 25.40	**.115** 2.92	**.062** 1.57	AK2A	102192-5	—	—
26	**1.200** 30.48	**.175** 4.45	**.125** 3.18	AM2E	102281-6	—	—
50	**2.400** 60.96	**.115** 2.92	**.062** 1.57	BH2A	102192-8	—	—
		.145 3.68	**.093** 2.36	—	—	BH2D	102196-8
54	**2.600** 66.04	**.115** 2.92	**.062** 1.57	—	—	BK2B	102193-3
58	**2.800** 71.12	**.115** 2.92	**.062** 1.57	BM2A	102192-2	BM2B	102193-2
60	**2.900** 73.66	**.115** 2.92	**.062** 1.57	BN2A	102192-4	—	—
80	**3.900** 99.06	**.115** 2.92	**.062** 1.57	CG2A	102192-9	—	—
84	**4.100** 104.14	**.115** 2.92	**.062** 1.57	—	—	CJ2B	102193-1
100	**4.900** 124.46	**.115** 2.92	**.062** 1.57	DA2A	1-102192-0	DA2B	1-102193-0
102	**5.000** 127.00	**.115** 2.92	**.062** 1.57	—	—	DB2B	102193-7



Keying Plug —
Military Part Number
M55302/127-00KY
Part Number 102188-1

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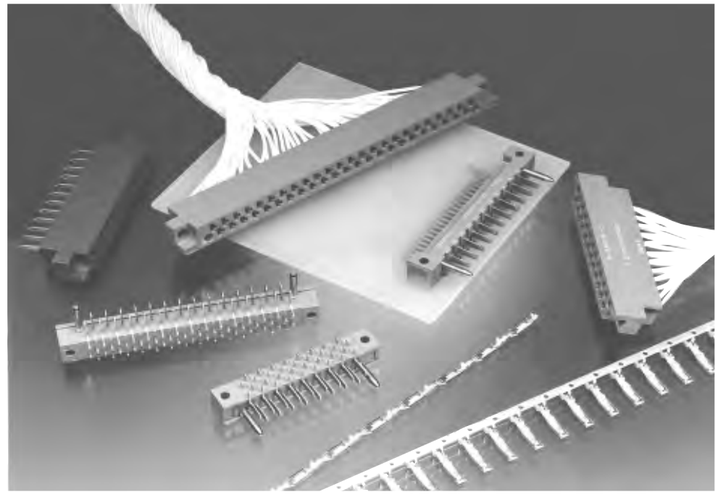
Introduction



Product Facts

AMP-BLADE II Connectors

- **Selective gold plating for economy with high performance**
- **Glass-filled polyester housing**

AMP-BLADE and Military Connectors

- **Full gold plating**
- **Diallyl phthalate housing rated from -85°F to 257°F [-65°C to 125°C]**
- **5 amps per contact**
- **Recognized under the Component Program of Underwriters Laboratories Inc. File No. E28476**

Various technical documents are available for your use:

Product Specifications describe technical performance characteristics and verification tests. They are intended for the Design, Component and Quality Engineer.

108-9004 Diallyl Phthalate

108-9009 Phenolic

108-9201 Contact Crimp

Instruction Sheets provide instructions for assembling or applying the product. They are intended for the Manufacturing Assembler or Operator.

Instructional material covering operation, setup, maintenance, repair, etc. is included with each machine, tool or die set. If this material is required prior to receiving your tooling, contact Technical Support for the applicable document.

Electrical Characteristics

Contact Rating — 5 amps

Operating Temperature — -85° to 257°F [-65° to 125°C] (Military)

For applications requiring the highest level of conductivity and reliability, AMP-BLADE Two-Piece Printed Circuit Edge Connectors meet all applicable performance requirements of MIL-C-21097.

The blade and receptacle design provides multiple areas of contact for maximum conductivity. Gold-over-nickel plating in mating areas of the contacts prevents metal migration and oxide build-up for additional reliability. Controlled insertion and extraction forces permit easy mating and unmating of connector assemblies.

A guide system helps prevent contact damage and provides positive alignment for reliable mating of connector halves.

The receptacle half of this two-piece connector accepts a variety of contact designs, but requires only that number of contacts which fulfills circuitry needs.

Crimp snap-in contacts are available in loose-piece or, to further reduce installed costs, in strip form for application by high-speed, automatic compression-crimping equipment.

Post-type contacts are specifically designed for wiring Tyco Electronics TERMI-POINT clips and tools. The connectors with post-type contacts also adapt to wrap-type terminations.

The split eyelet contact simplifies bus wiring by permitting wire to be easily snapped into the contact notch for soldering. Each contact accepts up to two 18 AWG [0.8 to 0.9 mm^2] stranded or 16 AWG [1.25 to 1.4 mm^2] solid wires.

High reliability, versatility and speed of assembly are features which recommend the AMP-BLADE Two-Piece Printed Circuit Edge Connectors for dense wiring in applications where rugged serviceability is a prime consideration.

Construction

Contact Material — Phosphor bronze per QQ-B-750

Contact Plating — **Gold plate** — MIL-G-45204; **Nickel plate** — QQ-N-290 (thickness as specified); Tin-lead per MIL-T-10727, Type 1, on solder tails

Contact Identification — Cavities identified on both faces of receptacle block

Performance

This connector meets performance requirements of MIL-C-21097

Altitude	Test Voltage (AC RMS)
Sea level	1,800 VAC
50,000 feet [15,240 m]	700 VAC
70,000 feet [21,336 m]	500 VAC

Individual-Contact Engaging and Separating Forces — 2 ounces to 16 ounces [0.6 N to 4.5 N]

Contact Resistance — 25 millivolts maximum at 5 amps

Vibration Tolerance — 10 to 2,000 hz. @ 15Gs per method 204B of MIL STD 202

Durability —

Gold Thickness	Cycles
.000015 0.00038	100
.000030 0.00076	250
.000050 0.00127	500

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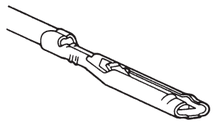
AMP-BLADE Connector for Snap-In Receptacle Contacts

Crimp, Snap-In Receptacle Contacts



Wire (Insulation) Ranges	Gold Plate Thickness	Side Feed Contact Part Number	
		Strip Form	Loose Piece*
24-20 AWG 0.2-0.5 mm² (**.040-.080** 1.02-2.03)	**.000030** 0.00076	531586-3[1] 5-531586-3[2]	531586-6[1] 5-531586-6[2]
	.000050 0.00127	531586-4	—
28-24 AWG 0.09-0.2 mm² (**.030-.060** 0.76-1.52)	**.000030** 0.00076	531587-3	531587-6
1: 18 AWG 0.8-0.9 mm² **or** **2: 20 or 22 AWG** 0.3-0.6 mm² (**.067-.090** 1.70-2.28)	**.000015** 0.00038	—	—
	.000030 0.00076	531589-3[1] 5-531589-3[2]	531589-6

*See page 1-111 for crimping tool.

Materials

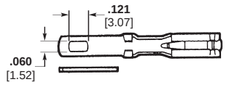
Contact — Phosphor bronze

[1] **Finish** — Selective gold plating in contact mating area over .000030 [0.00076] nickel, see table for gold thicknesses; tin-lead in wire barrel

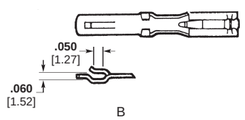
[2] **Finish** — RoHS Part Numbers are same as above except for tin in wire barrel

Wire Range AWG	Wire Range mm²	Insulation Range	Commercial Type: End Feed Strip Part No.	Commercial Type: Loose Piece Part No.	Military Type: Military Part No.	Military Type: End Feed Strip Part No.	Military Type: Loose Piece Part No.
			.000030 [0.00076] Gold Over .000030 [0.00076] Nickel		.000050 [0.00127] Gold Over .000030 [0.00076] Nickel		
24-20	0.2-0.6	**.040-.080** 1.02-2.03	66005-2	66010-2	21097/16-03	66005-3	66010-3
28-24	0.08-0.2	**.030-.060** 0.76-1.52	—	66011-2	21097/16-01	66009-3	66011-3
(2)20 or (2)22	0.183 or 0.643	**(2).045** to (2)1.14 **(2).072** to (2)1.83	66021-2	66026-2	21097/16-04	66021-3	66026-3
18	0.8	**.067-.090** 1.70-2.29	66021-2	66026-2	21097/16-04	66021-3	66026-3
28-24	0.08-0.2	**.078** 1.98	66027-2	—	21097/16-02	66027-3	—

Solder—Tab Receptacle Contacts



A



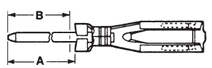
B

Materials

Contact — Phosphor bronze

Type	Maximum Extension Beyond Back Face of Block	Part Numbers—Loose Piece, Commercial Type: Gold Plate Thickness .000030 [0.00076] over .000030 [0.00076] Nickel
A	**.390** 9.91	66086-2
B	**.375** 9.52	66086-4

Post-Type Receptacle Contacts



Materials

Contact — Phosphor bronze

[1] **Finish** — Selective gold plating in contact mating area over .000030 [0.00076] nickel (see table for gold thicknesses); posts, tin plated

[2] **Finish** — RoHS Part Numbers have same finish as above except for tin on posts

Dimensions A	Dimensions B*	Gold Plate Thickness	Part Numbers - Loose Piece: .031 x .062 [0.79 x .157] Posts	Part Numbers - Loose Piece: .045 x .045 [1.14 x 1.14] Posts
.410 10.41	**.370** 9.40	**.000015** 0.00038	582652-1[1]	—
		.000030 0.00076	1-582261-1[1] 6-582261-1[2]	1-582364-1[1] 6-582364-1[2]
.640 16.26	**.600** 15.24	**.000015** 0.00038	582652-2[1]	—
		.000030 0.00076	1-582261-2[1] 6-582261-2[2]	1-582364-2[1]
.810 20.57	**.770** 19.56	**.000015** 0.00038	582652-3[1]	—
		.000030 0.00076	1-582261-3[1] 6-582261-3[2]	1-582364-3[1]
1.040 26.42	**1.000** 25.4	**.000015** 0.00038	582652-4[1]	—
		.000030 0.00076	1-582261-4[1]	1-582364-4[1]

*Post length after inserted into housing.

Catalog 1308940
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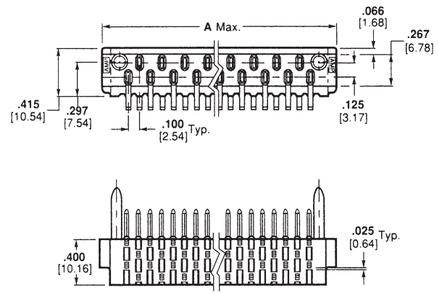
Board Half Housing Pre-loaded with Blade Type Contacts

Housing without Mounting Holes

Materials

Housing — Diallyl phthalate
Blade Contact — Gilding material
Finish — Selective gold plating in contact mating area over .000030 [0.00076] min. nickel. See table for gold thicknesses



No. of Positions	A (Max.)	Printed Circuit Board Thickness	Military Type CS, Diallyl Phthalate Housing: Military Part No. Gold Plating Thickness .000050 [0.00127]	Part No.
17	**2.070** 52.58	**.125** 3.18	21097/15-03	—
23	**2.670** 67.80	**.063** 1.59	21097/15-04	582843-9
		.094 2.38	21097/15-05	2-582843-0
		.125 3.18	21097/15-06	3-582843-2
35	**3.870** 98.30	**.063** 1.59	21097/15-10	1-582843-1
		.094 2.38	21097/15-11	2-582843-2
41	**4.470** 113.54	**.063** 1.59	21097/15-13	1-582843-2
		.094 2.38	21097/15-14	2-582843-3
47	**5.070** 128.80	**.063** 1.59	21097/15-16	1-582843-3
		.125 3.18	21097/15-18	3-582843-6

Notes:
1. AMP-BLADE contacts (gold plated) are molded into housing in predetermined positions to mate with receptacle housing.
2. Connectors can be furnished with the two middle rows of lines removed to fit existing board hole patterns.

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Board Half Housing Pre-loaded with Blade Type Contacts (Continued)

Housing with Mounting Holes

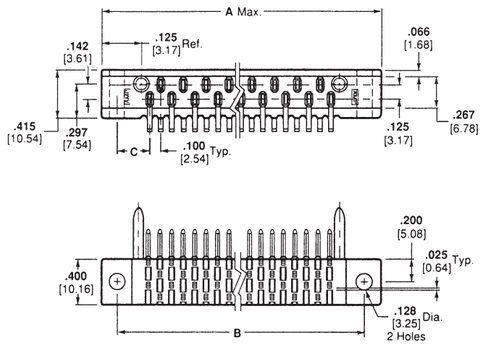
Materials

Housing — Diallyl phthalate

Blade Contact — Gilding metal

[3] **Finish** — Selective gold plating in contact mating area over .000030 [0.00076] min. nickel. See table for gold thicknesses. Gold flash on tails (2 rows) and tin-lead on remaining tails.

[4] **Finish** — RoHS Part Numbers are same as above except for tin on remaining tails



No. of Positions	A (Max.)	B	C	Printed Circuit Board Thickness	Commercial Type — Diallyl Phthalate Housing — Gold Plate Thickness .000015 [0.00030]	Commercial Type — Diallyl Phthalate Housing — Gold Plate Thickness .000030 [0.00076]	Military Type CS — Diallyl Phthalate Housing — Military Part No. Gold Plating Thickness .000050 [0.00127]	Military Type CS — Diallyl Phthalate Housing — Part No.
17	**2.390** 60.70	**2.130** 54.10	**.265** 6.73	**.063** 1.59	1-582390-1[3]	3-582152-1[3] 3-5582152-1[4]	21097/14-01	582843-2
				.094 2.38	—	—	21097/14-02	1-582843-4
				.125 3.18	—	—	21097/14-03	2-582843-5
23	**2.990** 54.10	**2.730** 69.34	**.265** 6.73	**.063** 1.59	—	3-582152-2[3] 3-5582152-2[4]	21097/14-04	582843-3
				.094 2.38	—	—	21097/14-05	582843-1
				.125 3.18	—	—	21097/14-06	2-582843-6
29	**3.590** 91.19	**3.330** 84.58	**.265** 6.73	**.063** 1.59	1-582390-3[3] 1-5582390-3[4]	3-582152-3[3] 3-5582152-3[4]	21097/14-07	582843-4
				.094 2.38	2-582390-3[3] 2-5582390-3[4]	—	21097/14-08	1-582843-5
35	**4.190** 106.43	**3.930** 99.82	**.265** 6.73	**.063** 1.59	1-582390-4[3] 1-5582390-4[4]	3-582152-4[3] 3-5582152-4[4]	21097/14-10	582843-5
				.094 2.38	2-582390-4[3] 2-5582390-4[4]	6-582152-4[3] 6-5582152-4[4]	21097/14-11	1-582843-6
				.125 3.18	—	—	21097/14-12	2-582843-8
41	**4.790** 121.67	**4.530** 115.06	**.265** 6.73	**.063** 1.59	1-582390-5[3]	3-582152-5[3] 3-5582152-5[4]	21097/14-13	582843-6
				.094 2.38	—	6-582152-5[3] 6-5582152-5[4]	21097/14-14	1-582843-7
				.125 3.18	3-582390-5[3] 3-5582390-5[4]	9-582152-5[3]	—	—
47	**5.623** 142.82	**5.363** 136.22	**.381** 9.68	**.063** 1.59	—	3-582308-1[3] 3-5582308-1[4]	21097/14-16	582843-7
				.094 2.38	2-582390-6[3] 2-5582390-6[4]	6-582308-1[3]	21097/14-17	1-582843-8
				.125 4.65	3-582390-6[3]	—	21097/14-18	3-582843-0

Notes:
1. AMP-BLADE contacts (gold plated) are molded into housing in predetermined positions to mate with receptacle housing.
2. Connectors can be furnished with the two middle rows of lines removed to fit existing board hole patterns.

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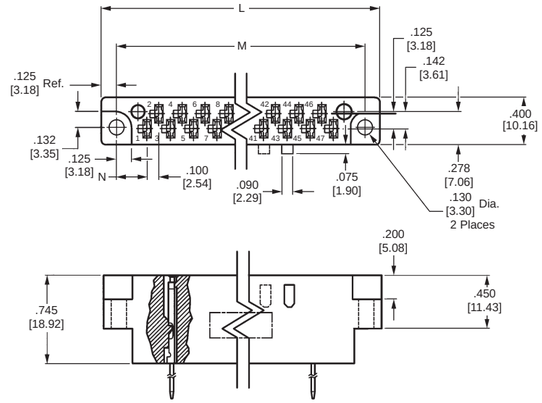
Wire-Half Assemblies and Housings

Pre-loaded Assemblies for Crimp Contacts, TERMI-POINT Clip or Wrap-Type Post Contacts, Solder/Weld Contacts

Materials

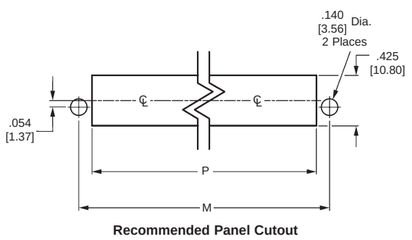
Housing — Diallyl phthalate glass-filled polyester, green
Contact — Phosphor bronze
Posts — Brass, tin plated



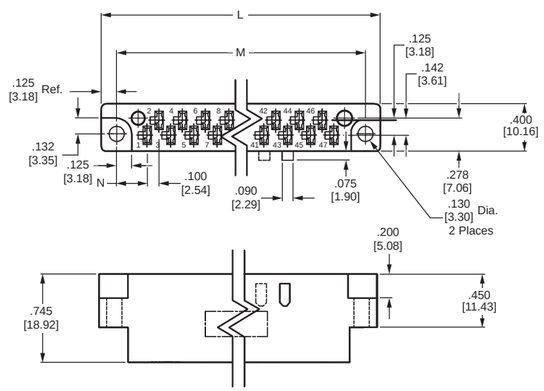
Receptacle Housing

Material

Diallyl phthalate



Recommended Panel Cutout



No. of Pos.	Post in.	Length mm	No. of Clip or Wrap Type Terminations	Dimensions L	M	N	Cutout Dim. for Mounting P	Diallyl Phthalate: Preloaded Housing Part No. .031 x .062 [0.79 x 1.57] Post Gold Plate Thickness .000030 [0.00076]	Housings for Crimp or Eyelet Type Contact: Commercial Type Part No.	Military Type CR-Receptacle: Military Part No.	Part No.
17	**.370**	9.40	1	**2.390** 60.71	**2.130** 54.10	**.265** 6.73	**1.910** 48.51	582828-4	3-582151-1	21097/13-01	5-582151-1
23	**.770**	19.65	3	**2.990** 75.95	**2.730** 69.34	**.265** 6.73	**2.510** 63.75	—	3-582151-2	21097/13-02	5-582151-2
29	**1.000** **.770** **.370**	25.40 19.65 9.40	4 3 1	**3.590** 91.19	**3.330** 84.58	**.265** 6.73	**3.110** 78.99	582830-1 582830-2 —	3-582151-3	21097/13-03	5-582151-3
35	**1.000** **.770** **.600** **.370**	25.40 19.65 15.24 9.40	4 3 2 1	**4.190** 106.43	**3.930** 99.82	**.265** 6.73	**3.710** 94.23	582831-1 — — 582831-4	3-582151-4	21097/13-04	5-582151-4
41	**.770** **.600** **.370**	19.65 15.24 9.40	3 2 1	**4.790** 121.67	**4.530** 115.06	**.265** 6.73	**4.310** 109.47	— — 582832-4	3-582151-5	21097/13-05	5-582151-5
47	**1.000** **.770** **.600** **.370**	25.40 19.65 15.24 9.40	4 3 2 1	**5.623** 142.82	**5.363** 136.22	**.381** 9.68	**5.143** 130.63	582819-1 582819-2 — —	3-582307-1	21097/13-06	5-582307-1

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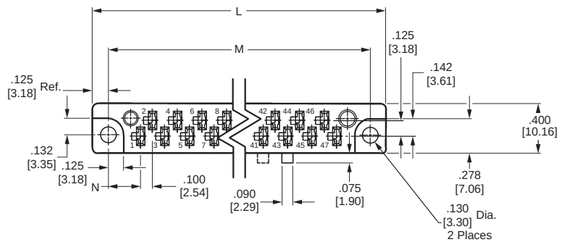
Receptacle Housings for Crimp Snap-in Contacts

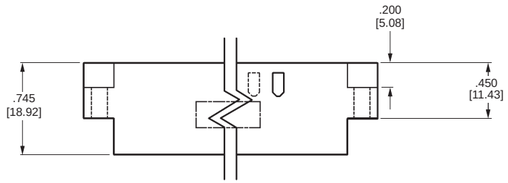
Material

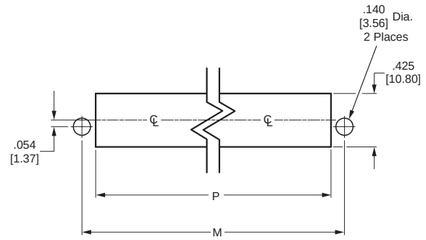
Glass-filled polyester, green

Related Product Data

Contact Part Numbers — page 1-105







Recommended Panel Cutout

No. of Pos.	Dimensions				AMP Part Number
	L	M	N	P	
17	**2.390** 60.71	**2.130** 54.10	**.265** 6.73	**1.910** 48.51	531590-1
23	**2.990** 75.95	**2.730** 69.34	**.265** 6.73	**2.510** 63.75	531590-2
29	**3.590** 91.19	**3.330** 84.58	**.265** 6.73	**3.110** 78.99	531590-3
35	**4.190** 106.43	**3.930** 99.82	**.265** 6.73	**3.710** 94.23	531590-4
41	**4.790** 121.67	**4.530** 115.06	**.265** 6.73	**4.310** 109.47	531590-5
47	**5.623** 142.82	**5.363** 136.22	**.381** 9.68	**5.143** 130.63	531590-6

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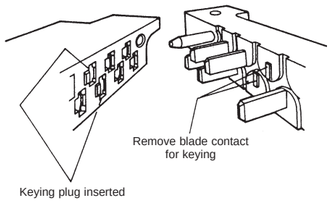
UK: 44-208-420-8341

AMP-BLADE Connector Keying

Keying Plugs

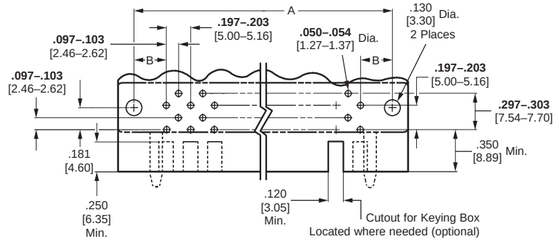
Keying Plug — Nylon
Part Number 1-582156-9
Military Part Number 21097/11-07



Keying of the connector can be achieved by plugging receptacle cavities. Insert keying plug into mating side of receptacle housing cavity. Remove corresponding blade contact from blade housing using tool number 811145.

Printed Circuit Board Layout

No. of Pos.	Dimensions A	Dimensions B
17	**2.130** 54.10	**.265** 6.73
23	**2.730** 69.34	**.265** 6.73
29	**3.330** 84.58	**.265** 6.73
35	**3.930** 99.82	**.265** 6.73
41	**4.530** 115.06	**.265** 6.73
47	**5.363** 136.22	**.381** 9.68



Note: If existing printed circuit board layout does not include the two middle rows of holes, Tyco Electronics can supply the connector with the middle rows of tines removed.

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Application Tooling

AMP-O-LECTRIC Machine

Substantial savings and the benefits of mass production are obtained with the AMP-BLADE Printed Circuit Connector through the use of AMP automatic machines. The AMP-BLADE receptacle contacts are available in strip form for this use (see table on AMP-BLADE receptacle contacts) and can be terminated to wire leads at rates up to 1500 per hour, depending on operator skill. Contact Tyco Electronics for complete specifications and part numbers.

Extraction Tool

Receptacle Contact Extraction Tool
Part Number 465199-1
Military Part Number M21097/18-01

Hand Crimping Tools

Hand Tool Part Number	Loose-Piece Receptacle Contact Part Number	Wire Combinations
91555-1	66010 531586	One 24, one 22 or one 20
	66010	Two 24 or two 22
59524-1	66010	One 22 or one 20
	66011	One 26 or one 24
	531587	One 28, one 26 or one 24
59525-1	66026 531589	Two 22 or two 20
90005-1	66026 531589	Two 20, one 18 or one 20 Two 22 or three 22

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Introduction

MIL-C-39012

- **Defines the general requirements and tests for radio frequency (RF) connectors used with flexible RF cables and certain other types of coaxial transmission lines. It includes the following series of connectors in this catalog: N, BNC, TNC, SMA**

MIL-C-55339

- **Defines the performance requirements and tests for between series and within series, RF coaxial connector adapters. The In-Series Adapters are shown in this catalog**

MIL-C-83517

- **Defines the general requirements and test for RF connectors used with coaxial, strip, or microstrip transmission line devices. It includes the SMA Receptacles as shown in this catalog**

Definition of Categories for MIL-C-39012

Category A — Flexible Cable
Field serviceable, no special tools required to assemble. Standard wrenches, soldering equipment, pliers, etc., are not defined as special tools. Captured center contact.

Category B — Flexible & Semi-Rigid Cable
Non-field replaceable, special tools may be required. These connectors may be used for original installations. Field replacement is intended to be made by Category A or C Connectors. Will not be stocked or procured by the Government. Captured and non-captured center contacts.

Category C — Flexible Cable
Field replaceable. Requires crimp tool and specified cable stripping dimensions. Captured center contact. Recommended crimp tool kit: Part Number 1055236-1.

Category D — Flexible Cable
Field replaceable. Requires crimp tool for center contact and outer ferrule; specified cable stripping dimensions (same as Category C) and defined piece parts. Captured center contact. Recommended crimp tool kit: Part Number 1055236-1.

Category E — Semi-Rigid Cable
Field replaceable. Requires specified cable stripping dimensions. Captured and non-captured center contact. Uses standard tool kit: Part Number 1055420-1.

Category F — Semi-Rigid Cable
Field replaceable. Requires crimp tool and specified cable stripping dimensions. Captured center contact. Recommended crimp tool kit: Part Number 1055835-1.

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N Series Connectors MIL-C-39012 — 50 Ohm

Product Facts

- **Dual "O" Crimp connectors are MIL-C-39012, Class II, Category B qualified**
- **Captive center contacts**
- **Completely crimpable application – one hand tool crimps all cables with single or double braided shields of a given size**
- **Impedance matching crimps**
- **Broad band performance – low VSWR**
- **Superior cable retention**
- **TEFLON dielectric**
- **Silver finish**

The Tyco Electronics N MIL-C-39012 Connector, featuring a .625 [15.88] - 24 threaded coupling for optimum stability, is highly suited for critical applications and environments. This medium sized connector can withstand shock and vibration for a low noise level and has a constant impedance of 50 ohms. It also features a captive center contact and provides excellent performance at frequencies up to 11 GHz, with voltages to 1000 volts rms.

This connector offers the added benefits of low overall applied cost with a labor-saving two-crimp assembly. The contact is simply crimped to the cable's center conductor, then both braid and cable support are simultaneously crimped to complete the termination.

N Series Connectors are available in standard plug, jack, bulkhead jack and right-angle plug configurations.

Materials

Brass — QQ-B-626
Beryllium Copper — QQ-C-530
Dielectric — TEFLON
TEFLON — MIL-P-19468
Copper, Annealed — QQ-C-576
Phosphor Bronze — QQ-B-750
Silicone Rubber — ZZ-R-765

Plating

Body —
Silver per QQ-S-365
Center Contact —
Gold per ASTM B488, type 3, grade C

Electrical Characteristics

Nominal Impedance — 50 ohms
Working Voltage — 1000 volts, rms at sea level
Frequency Range — 0 to 11 GHz
Voltage Standing Wave Ratio (VSWR) — Straight Plug or Jack- 1.3:1 max.
Right-Angle Plug —
1.35 max. at 0 to 9.0 GHz
1.50 max. at 9.0 to 11.0 GHz
Contact Resistance —
Outer Contact — 0.2 milliohms
Center Contact — 1.0 milliohms
Right-Angle — 2.5 milliohms
Insulation Resistance —
5000 megohms min.
Dielectric Withstanding Voltage — 2500 Volts, rms at sea level
RF Leakage — -90 dB min. at 2 to 3 GHz
RF Insertion Loss — 0.15 dB max. at 10 GHz; Right-Angle Plug, 0.3 dB max. at 10 GHz
Corona Level — 500 volts min. at 21 336 m [70,000 ft.]

Mechanical Characteristics

Mating/Unmating — Threaded coupling
Cable Attachment — Crimp type - center contact and braid
Coupling Nut Retention — 445 N [100 lbs.] min.
Cable Retention — 400 N [90 lbs.] min. RG 214/U Cable
Durability — 500 cycles per MIL-C-39012
Captive Contact — 27 N [6 lbs.] min. axial retention, either direction

Environmental Characteristics

Temperature Range —
-85°F to +329°F [-65°C to +165°C]
Vibration — MIL-STD-202, Method 204, Test Cond. B
Shock — MIL-STD-202, Method 213, Test Cond. I
Moisture Resistance — MIL-STD-202 Method 106
Salt Spray — MIL-STD-202, Method 101, Test Cond B
Temperature Cycling — MIL-STD-202, Method 107, Test Cond. B (except high temperature is +85°C)

Note: All data pertains to use with MIL-C-39012 specified cables only.

Termination Tooling

Integral Die —
Hand Tool Part Number 220015-1

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N Series Connectors MIL-C-39012 — 50 Ohm (Continued)

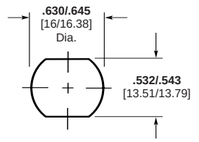
Dual Crimp Plugs MIL-C-39012/01

Military Part No.	AMP Part No.	Dim L	RG/U Cable
B0007 Weatherproof	225092-2	**1.859** 47.22	8, 8A, 213
B0007	51692-2	**1.687** 42.85	8,8A,213
B0013	51692-4	**1.687** 42.85	11, 11A, 216
B0012 Weatherproof	225092-7	**1.859** 47.22	225
B0008 Weatherproof	225092-1	**1.859** 47.22	9, 9A, 9B, 214
B0008	51692-1	**1.687** 42.85	9, 9A, 9B, 214

Crimp Jacks MIL-C-39012/02

Military Part No.	AMP Part No.	RG/U Cable
B0008	225093-2	8, 8A, 213

Crimp Bulkhead Jacks MIL-C-39012/03

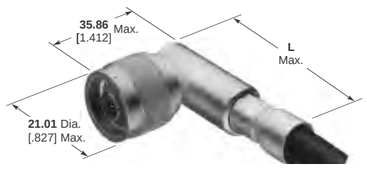


Maximum Panel Thickness **.250** [6.35]

Recommended Panel Cutout

Military Part No.	AMP Part No.	RG/U Cable
B0004 Weatherproof	225094-2	8, 8A, 213
B0005 Weatherproof	225094-1	9, 9A, 9B, 214

Crimp Right-Angle Plugs MIL-C-39012/05



Military Part No.	AMP Part No	Dim L	RG/U Cable
B0002	225014-2	**2.275** 57.79	8, 8A, 213
B0002 Weatherproof	225389-2	**2.453** 62.31	8, 8A, 213
B0003	225014-3	**2.275** 57.79	9, 9A, 9B, 214

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BNC Connectors MIL-C-39012 — 50 Ohm

Product Facts

- **Dual "O" Crimp Connectors are MIL-C-39012, Class II, Category A or B qualified**
- **Bayonet lock coupling for quick connect/disconnect**
- **Various connectors available in 50 ohm versions**
- **Fully intermateable with comparable BNC UG/U connectors**
- **Low VSWR**

Related Product Data

Performance Specifications — See chart below

Material Specifications — See chart below

Military Category — All MIL type "O" crimp connectors are Category B Type (Tyco Electronics Crimp Tooling), unless otherwise noted.

Packaging — All connectors are packaged individually.

The Tyco Electronics BNC RF MIL-C-39012 connector family with bayonet locking coupling provides highly reliable, quick connect/disconnect coaxial connections. Exclusive "O" crimp terminations allow positive insulation grip and require no soldering, providing terminations at a very low overall applied cost.

Available in 50 ohm versions, these connectors feature numerous styles including cable plugs and jacks. These connectors accept a wide range of coaxial cables and are intermateable with industry standard connectors designed to MIL-C-39012 specifications.

Characteristics	Category B "O" Crimp (MIL Type)
Electrical	
Impedance, Nom. (Ohms)	50
Working Voltage (Volts RMS)	500
Contact Resistance (Milliohms)	Inner: 1.5 Outer: 2.0
Initial Insulation Resistance (Megohms)	5000
Dielectric Withstanding Voltage (VAC)	1500
Corona Level at 70,000 ft. (Volts, RMS)	375
RF Leakage, Max. (dB)	-55 at 2-3 GHz
RF Insertion Loss, Max. (dB)	0.2 at 3 GHz
Frequency Range (GHz)	0-4
VSWR in Frequency Range Max.	1.30
Mechanical	
Force to Engage (lbs. [N])/couple, (in-lbs. [N-M]) max.	13.3/11.12 [3/2.5]
Coupling Nut Retention, Min. N [lbs.]	444.8 [100]
Cable Retention, N [lbs.]	266.9 [60] (RG58C/U)
Durability (Cycles)	500
Jam Nut Mounting Torque, Max. [N•m] (in. lbs.)	25 [2.8]
Environmental	
Temperature Range, Operating (C°)	-65 to +165[1] / -55 to +85[2]
Vibration	MIL-STD-202 Method 204 Cond. B
Physical Shock	MIL-STD-202 Method 213 Cond. G, 50 G's
Thermal Shock	MIL-STD-202 Method 107
Moisture Resistance	MIL-STD-202 Method 106
Salt Spray	MIL-STD-202 Method 101 Cond. B
Product Specification	108-12020

[1] Assembled to cable with polytetrafluoroethylene dielectric.
[2] Assembled to cable with polyethylene dielectric.

Connector Component	Category A & B "O" Crimp (MIL Type)
Connector Material	
Collar	Brass, QQ-B-626
Outer Contact (Plug)	Phos. Bronze, QQ-B-750
Shell (Jack)	Brass, QQ-B-626
Dielectric	TEFLON, MIL-P-19468
Center Contact (Plug)	Brass, QQ-B-626
Center Contact (Jack)	Beryl. Copper, ASTM-B-643 QQ-C-530
Gasket	Silicon Rubber, QQ-R-765
Ferrule	Copper, QQ-C-576
Connector Primary Finishes[1]	
Collar	Silver, QQ-S-365 Bright Nickel, QQ-N-290
Outer Contacts (Plug & Jack)	Silver, QQ-S-365 Bright Nickel, QQ-N-290
Center Contacts (Plug & Jack)	Gold MIL-G-45204
Ferrule[2]	Silver, QQ-S-365 Tin Lead, ASTM-B-545

[1] If more than one finish is listed, refer to individual catalog page(s) or customer drawings for exact specification.
[2] Ferrules with tin-lead finish are used with nickel plated outer contacts.

Catalog 1308940
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BNC Connectors MIL-C-39012 — 50 Ohm (Continued)

Dual Crimp Plugs MIL-C-39012/16

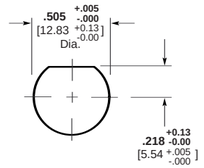
Military Part No.	AMP Part No.	Dim L	Category	RG/U Cable	Interchangeable Dies For PRO-CRIMPER Hand Tool 354940-1 or PRO-CRIMPER Adapter 679304-1	Interchangeable Dies for Hand Tool 69710-1 & 626 Pneu. Head 318161-1
B0004	2-331350-1	**1.328** 33.74	B	58,58A,58B,58C	220189-3 or 91901-1	69727
B0007	2-331350-9	**1.188** 30.18	B	142,142A;142B,400	220189-3 or 91901-1	69727
B0008	331350	**1.188** 30.18	B	124, 140, 210, 62, 62A, 62B, 59, 59A, 59B Belden 9291, 9209, 9269	58537-1	69669-1

Dual Crimp Jacks MIL-C-39012/17

Military Part No.	AMP Part No.	Category	RG/U Cable	Interchangeable Dies For PRO-CRIMPER Hand Tool 354940-1 or PRO-CRIMPER Adapter 679304-1	Interchangeable Dies for Hand Tool 69710-1 & 626 Pneu. Head 318161-1
B0004	2-331351-1	B	58, 58A, 58B, 58C	220189-3 or 91901-1	69727
B0008	331351	B	124, 140, 210, 62, 62A, 62B, 59, 59A 59B Belden 9291, 9209, 9269	58537-1	69669-1

Dual Crimp Bulkhead Jacks MIL-C-39012/19

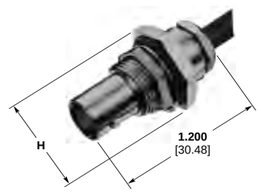
H = 11/16" across flats, **.800** [20.32] Max. across points



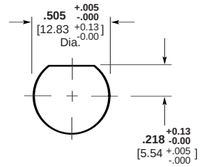
Recommended Panel Cutout
Maximum Panel Thickness **.125** [3.18]

Military Part No.	AMP Part No.	Category	RG/U Cable	Interchangeable Dies For PRO-CRIMPER Hand Tool 354940-1 or PRO-CRIMPER Adapter 679304-1	Interchangeable Dies for Hand Tool 69710-1 & 626 Pneu. Head 318161-1
B0003	1-331693-1	B	58, 58A, 58B, 58C	220189-3 or 91901-1	69727
B0007	331693	B	124, 140, 210, 62, 62A, 62B, 59, 59A, 59B, Belden 9291, 9209, 9269	58537-1	69669-1

Field Serviceable Bulkhead Jack MIL-C-39012/19



H = 11/16" across flats, **.800** [20.32] Max. across points



Recommended Panel Cutout
Maximum Panel Thickness **.240** [6.10]

Military Part No.	AMP Part No.	Category	RG/U Cable
-0102	221313-2	A	124, 140, 210, 62, 62A, 62B, 59, 59A, 59B, Belden 9291, 9209, 9269, 89269, 88241, Hi-Temp 62A, Times PL-62, Berk-Tek BTDC-59, BTDC-62, 302, 71, 71A, 71B

Catalog 1308940
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TNC Connectors MIL-C-39012 — 50 Ohm

Product Facts

- **Dual “O” Crimp Connectors are MIL-C-39012, Class II, Category B qualified**
- **50 ohm versions available**
- **Provides excellent performance at frequencies up to 11 GHz**
- **Standard and weatherproof versions available**
- **Plugs available for high temperature cable**

The Tyco Electronics TNC RF MIL-C-39012 connector family, with 7/16-28 threaded couplings, provides low noise levels and optimum stability, and can withstand the shock and vibration often present in harsh environments.

Available in 50 ohm versions, these connectors feature cable plugs and jacks. These connectors accept a wide range of coaxial cables and are intermateable with industry standard connectors designed to MIL-C-39012 specifications.

Related Product Data

Military Category — All crimp connectors are Category B Type (Tyco Electronics Crimp Tooling), unless otherwise noted.
Packaging — All connectors are packaged individually.

Characteristics	Category B “O” Crimp (MIL Type)
Electrical	
Impedance, Nom. (Ohms)	50
Working Voltage (Volts RMS)	500
Contact Resistance (Milliohms)	Inner: 1.5 Outer: 0.2
Initial Insulation Resistance (Megohms)	5000
Dielectric Withstanding Voltage (VAC)	1500
Corona Level at 70,000 ft. (Picocoulombs)	5 max. @375 VRMS
RF Leakage, Max. (dB)	60 at 2-3 GHz
RF Insertion Loss, Max. (dB)	0.18 at 9 GHz
Frequency Range (GHz)	0-11
VSWR in Frequency Range Max.	1.3
Mechanical	
Force to Engage/Couple, lbs. [N]	2/2 [8.9/8.9]
Coupling Nut Retention, Min. lbs. [N]	100 [444.8]
Cable Retention, lbs. [N]	60 [266.9] RG58C/U
Durability (Cycles)	500
Jam Nut Mounting Torque, Max. lbs. [N•m]	25 [2.8]
Environmental	
Temperature Range, Operating (C°)	-65 to +165[1] / -55 to +85[2]
Vibration	MIL-STD-202 Method 204 Cond. B
Physical Shock	MIL-STD-202 Method 213 Cond. I, (100 G’s)
Thermal Shock	MIL-STD-202 Method 107 Cond. B
Moisture Resistance	MIL-STD-202 Method 106
Salt Spray	MIL-STD-202 Method 101 Cond. B
Product Specification	108-12001

[1] Assembled to cable with polytetrafluoroethylene dielectric.
[2] Assembled to cable with polyethylene dielectric.

Characteristics	Category B “O” Crimp (MIL Type)
Connector Material	
Collar	Brass, QQ-B-626
Outer Contact (Plug)	Phos. Bronze, QQ-B-750 Beryl. Copper, QQ-C-530
Outer Contact (Jack)	Brass, QQ-B-626
Dielectric	TEFLON, MIL-P-19468
Center Contact (Plug)	Brass, QQ-B-626
Center Contact (Jack)	Beryl. Copper, ASTM-B-643 QQ-C-530
Gasket	Silicon Rubber, QQ-R-765
Ferrule	Copper, QQ-C-576
Connector Primary Finishes[1]	
Collar	Silver, QQ-S-365
Outer Contact (Plug & Jack)	Bright Nickel, QQ-N-290
Center Contact (Plug & Jack)	Silver, QQ-S-365
Ferrule	Gold, MIL-G-45204

[1] If several finishes are listed, refer to individual catalog page(s) or customer drawings for exact specification.

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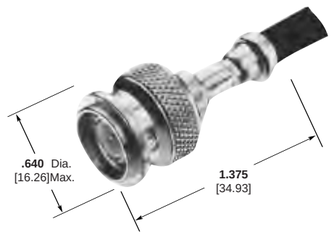
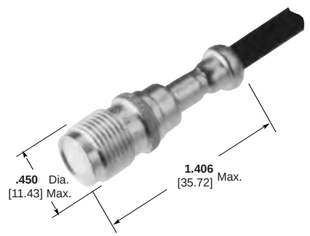
TNC Connectors MIL-C-39012 — 50 Ohm (Continued)

Dual Crimp Plugs MIL-C-39012/26 (Weatherproof)



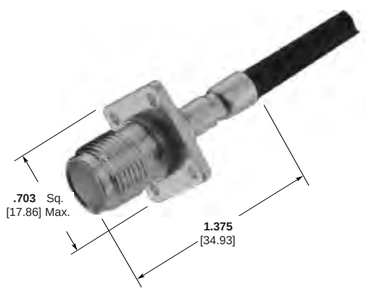
Military Part No.	AMP Part No.	RG/U Cable	Interchangeable Dies for PRO-CRIMPER Frame 354940-1
B0005	225550-2	58, 58A, 58B, 58C	91902-1
B0006	225550-6	142, 142A, 142B, 400	91902-1
B0007	225550-3	124, 140, 210, 62, 62A, 62B, 59, 59A, 59B, Belden 9291, 9209, 9269	91903-1
B0016	225550-1	55,55A, 55B, 223	91902-1

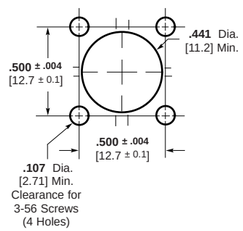
Crimp Jacks MIL-C-39012/27 (Weatherproof)



Military Part No.	AMP Part No.	RG/U Cable	Interchangeable Dies for PRO-CRIMPER Frame 354940-1
B0005	225551-2	58, 58A, 58B, 58C	91902-1
B0015	225551-5	141, 141A, 303	91902-1
B0016	225551-1	55, 55A, 55B, 223	91902-1
B0006	225551-6	142, 142A, 142B, 400	91902-1

Crimp Panel Jack MIL-C-39012/29





Recommended Panel Cutout

Military Part No.	AMP Part No.	RG/U Cable	CERTI-CRIMP Hand Tool with Integral Die
B0005	225348-2	58, 58A, 58B, 58C	220045-2

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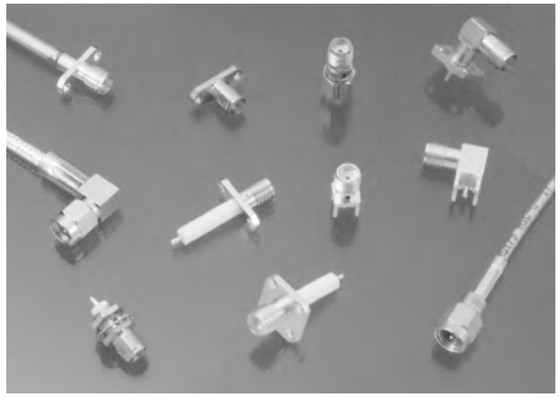
SMA Connectors MIL-C-39012

Product Facts

- Performance to 18 GHz
- Uses industry standard crimp tools and processes
- Qualified to MIL-C-39012



Tyco Electronics offers a complete line of SMA connectors. To satisfy the broad range of applications, SMA connectors are available in a broad range of standard configurations including; straight and right-angle cable applied plugs, bulkhead cable jacks, two and four hole flange mount panel jacks, straight and right-angle pcb mount jacks and various between and in-series adapters, including connectors for semi-rigid cable and micro-strip applications.

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SMA Connectors MIL-C-39012 (Continued)

Electrical Properties

MIL Type	Cable Military Slash Sheet M17/	Frequency Max. (GHz)	VSWR (fGHz)	Contact Resistance (milliohms max.)		Insulation Resistance (megohms min.)	Dielectric Withstanding Voltage (Volts RMS)	Corona Extinction Voltage at 70,000 Ft. (V RMS min.)	RF Transmission Loss (GHz)	RF High Potential at 5 MHz (V RMS)	RF Leakage (dB min.)
				Center Contact	Outer Contact						
MIL-C-39012/55	93-RG178	12.4	1.20+0.025	3	2	5,000	500	125	0.06 x sqrt (freq)	335	-60
	54-RG122, 119-RG174, 94-RG179, 113-RG316, 152-	12.4	1.15+0.02	3	2	5,000	750	190	0.06 x sqrt (freq)	500	-60
	28-RG058, 60-RG142, 84-RG223, 111-RG303, 128-RG400	12.4	1.15+0.01	3	2	5,000	1000	250	0.06 x sqrt (freq)	670	-60
	169-00001	12.4	1.15+0.01	3	2	5,000	500	125	0.06 x sqrt (freq)	335	-60
	173-00001, 172-00001, 157-00001	12.4	1.15+0.01	3	2	5,000	750	190	0.06 x sqrt (freq)	500	-60
	155-0001, 158-00001, 167-00001, 170-00001, 175-00001	12.4	1.15+0.01	3	2	5,000	1000	250	0.06 x sqrt (freq)	670	-60
MIL-C-39012/56	93-RG178	12.4	1.20+0.03	4	2	5,000	500	125	0.15 x sqrt (freq)	335	-60
	54-RG122, 119-RG174, 94-RG179, 113-RG316, 152-00001	12.4	1.15+0.03	4	2	5,000	750	190	0.15 x sqrt (freq)	500	-60
	28-RG058, 60-RG142, 84-RG223, 111-RG303, 128-RG400	12.4	1.15+0.02	4	2	5,000	1000	250	0.15 x sqrt (freq)	670	-60
	169-00001	12.4	1.15+0.02	4	2	5,000	500	125	0.15 x sqrt (freq)	335	-60
	173-00001, 172-00001 157-00001	12.4	1.15+0.02	4	2	5,000	750	190	0.15 x sqrt (freq)	500	-60
	155-0001, 158-00001, 167-00001, 170-00001, 175-00001	12.4	1.15+0.02	4	2	5,000	1000	250	0.15 x sqrt (freq)	670	-60
MIL-C-39012/57, /58 & /59	93-RG178	12.4	1.20+0.025	3	2	5,000	500	125	0.06 x sqrt (freq)	335	-60
	54-RG122, 119-RG174, 113-RG316	12.4	1.15+0.02	3	2	5,000	750	190	0.06 x sqrt (freq)	500	-60
	28-RG058, 60-RG142, 84-RG223, 111-RG303, 128-RG400	12.4	1.15+0.01	3	2	5,000	1000	250	0.06 x sqrt (freq)	670	-60
	169-00001	12.4	1.15+0.01	3	2	5,000	500	125	0.06 x sqrt (freq)	335	-60
	173-00001, 172-00001, 157-00001	12.4	1.15+0.01	3	2	5,000	750	190	0.06 x sqrt (freq)	500	-60
	155-0001, 158-00001, 167-00001, 170-00001, 175-00001	12.4	1.15+0.01	3	2	5,000	1000	250	0.06 x sqrt (freq)	670	-60
MIL-C-39012/60, & /61	—	N/A	N/A	3	2	5,000	1000	250	N/A	670	N/A
MIL-C-39012/79	133-RG405, 133-00001 Thru 133-00011 Captive	18	1.07+0.01	3	2	5,000	1000	250	0.03 x sqrt (freq)	670	-90
	130-RG402, 130-00001 Thru 133-00007 Captive	18	1.05+0.01	3	2	5,000	1500	375	0.03 x sqrt (freq)	1000	-90
	133-RG405, 133-00001 Thru 133-00011 Non-Captive	18	1.07+0.008	3	2	5,000	1000	250	0.03 x sqrt (freq)	670	-90
	130-RG402, 130-00001 Thru 130-00007 Non-Captive	18	1.05+0.008	3	2	5,000	1500	375	0.03 x sqrt (freq)	1000	-90
MIL-C-39012/80	133-RG405, 133-00001 Thru 133-00011	18	1.10+0.01	4	2	5,000	1000	250	0.05 x sqrt (freq)	670	-90
	130-RG402, 130-00001 Thru 130-00007	18	1.10+0.01	4	2	5,000	1500	375	0.05 x sqrt (freq)	1000	-90
MIL-C-39012/81, /82 & /83	133-RG405, 133-00001 Thru 133-00011 Captive	18	1.07+0.01	3	2	5,000	1000	250	0.03 x sqrt (freq)	670	-90
	130-RG402, 130-00001 Thru 133-00007 Captive	18	1.05+0.01	3	2	5,000	1500	375	0.03 x sqrt (freq)	1000	-90
	133-RG405, 133-00001 Thru 133-00011 Non-Captive	18	1.07+0.008	3	2	5,000	1000	250	0.03 x sqrt (freq)	670	-90
	130-RG402, 130-00001 Thru 130-00007 Non-Captive	18	1.05+0.008	3	2	5,000	1500	375	0.03 x sqrt (freq)	1000	-90
MIL-C-39012/92	—	18	1.035+0.005	N/A	2	5,000	N/A	250	0.03 x sqrt (freq)	670	-90
MIL-C-39012/93 & /94	—	18	N/A	3	2	5,000	1000	250	N/A	670	N/A

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UK: 44-208-420-8341

SMA Connectors MIL-C-39012 (Continued)

Mechanical and Environmental Properties

MIL Type	Force to Engage (in-lbs)	Coupling Nut Retention (lbs.)	Coupling Proof Torque (in-lbs)	Cable Retention			Insertion	Withdrawal	Connector Durability	Recommended Mating Torque (in lbs.)
				Dia.	Lbs. Min.	In.-Ounces				
MIL-C-39012/55	2 max.	60	15 min.	0.036 [0.91] 0.067 [1.70] 0.110 [2.79] 0.122 [3.10]	10 20 30 40	N/A	N/A	N/A	500 cycles min.	7-10
MIL-C-39012/56	2 max.	60	15 min.	0.036 [0.91] 0.067 [1.70] 0.110 [2.79] 0.122 [3.10]	10 20 30 40	N/A	N/A	N/A	500 cycles min.	7-10
MIL-C-39012/57, /58 & /59	2 max.	N/A	N/A	0.036 [0.91] 0.067 [1.70] 0.110 [2.79] 0.122 [3.10]	10 20 30 40	N/A	2 lbs. max. w/ .0370 dia. pin	1 oz. min. w/ .0355 dia. pin	500 cycles min.	7-10
MIL-C-39012/60, & /61	2 max.	N/A	N/A	N/A	N/A	N/A	2 lbs. max. w/ .0370 dia. pin	1 oz. min. w/ .0355 dia. pin	500 cycles min.	7-10
MIL-C-39012/79	2 max.	60	15 min.	133-RG405, 133-00001 Thru 133-00011	30	16	N/A	N/A	500 cycles min.	7-10
				130-RG402, 130-00001 Thru 130-00007	60	55				
MIL-C-39012/80	2 max.	60	15 min.	133-RG405, 133-00001 Thru 133-00011	30	16	N/A	N/A	500 cycles min.	7-10
				130-RG402, 130-00001 Thru 130-00007	60	55				
MIL-C-39012/81, /82 & /83	2 max.	N/A	N/A	133-RG405, 133-00001 Thru 133-00011	30	16	2 lbs. max. w/ .0370 dia. pin	1 oz. min. w/ .0355 dia. pin	500 cycles min.	7-10
				130-RG402, 130-00001 Thru 130-00007	60	55				
MIL-C-39012/92	2 max.	60	15 min.	N/A	N/A	N/A	N/A	N/A	100 cycles min.	7-10
MIL-C-39012/93 & /94	2 max.	N/A	N/A	N/A	N/A	N/A	2 lbs. max. w/ .0370 dia. pin	1 oz. min. w/ .0355 dia. pin	500 cycles min.	7-10

Environmental

MIL Type	Vibration	Shock	Thermal Shock	Corrosion (Salt Spray)	Moisture Resistance
MIL-C-39012/55	MIL-STD-202 Method 204 Cond. D No Discontinuity	MIL-STD-202 Method 213 Cond. 1 No Discontinuity	MIL-STD-202 Method 107 Cond. B Except T_{HI} 85C	MIL-STD-202 Method 101 Cond. B	MIL-STD-202, Method 106 No Measurement @ High Humidity Insulation Resistance 200 Megaohms with 5 min. of removal from humidity
MIL-C-39012/56	MIL-STD-202 Method 204 Cond. D No Discontinuity	MIL-STD-202 Method 213 Cond. 1 No Discontinuity	MIL-STD-202 Method 107 Cond. B Except T_{HI} 85C	MIL-STD-202 Method 101 Cond. B	MIL-STD-202, Method 106 No Measurement @ High Humidity Insulation Resistance 200 Megaohms with 5 min. of removal from humidity
MIL-C-39012/57, /58 & /59	MIL-STD-202 Method 204 Cond. D No Discontinuity	MIL-STD-202 Method 213 Cond. 1 No Discontinuity	MIL-STD-202 Method 107 Cond. B Except T_{HI} 85C	MIL-STD-202 Method 101 Cond. B	MIL-STD-202, Method 106 No Measurement @ High Humidity Insulation Resistance 200 Megaohms with 5 min. of removal from humidity
MIL-C-39012/60, & /61	MIL-STD-1344 Method 2005 Cond. IV No Discontinuity	MIL-STD-1344 Method 2004 Cond. G No Discontinuity	MIL-STD-1344 Method 1003 Cond. A Except T_{HI} 200C	MIL-STD-1344 Method 1001 Cond. B	MIL-STD-1344, Method 1002, Type II No Measurement @ High Humidity Insulation Resistance 200 Megaohms with 5 min. of removal from humidity
MIL-C-39012/79	MIL-STD-202 Method 204 Cond. D No Discontinuity	MIL-STD-202 Method 213 Cond. 1 No Discontinuity	MIL-STD-202 Method 107 Cond. B Except T_{HI} 115C	MIL-STD-202 Method 101 Cond. B	MIL-STD-202, Method 106 No Measurement @ High Humidity Insulation Resistance 200 Megaohms with 5 min. of removal from humidity
MIL-C-39012/80	MIL-STD-202 Method 204 Cond. D No Discontinuity	MIL-STD-202 Method 213 Cond. 1 No Discontinuity	MIL-STD-202 Method 107 Cond. B Except T_{HI} 115C	MIL-STD-202 Method 101 Cond. B	MIL-STD-202, Method 106 No Measurement @ High Humidity Insulation Resistance 200 Megaohms with 5 min. of removal from humidity
MIL-C-39012/81, /82 & /83	MIL-STD-202 Method 204 Cond. D No Discontinuity	MIL-STD-202 Method 213 Cond. 1 No Discontinuity	MIL-STD-202 Method 107 Cond. B Except T_{HI} 115C	MIL-STD-202 Method 101 Cond. B	MIL-STD-202, Method 106 No Measurement @ High Humidity Insulation Resistance 200 Megaohms with 5 min. of removal from humidity
MIL-C-39012/92	MIL-STD-202 Method 204 Cond. D No Discontinuity	MIL-STD-202 Method 213 Cond. 1 No Discontinuity	MIL-STD-202 Method 107 Cond. B Except T_{HI} 115C	MIL-STD-202 Method 101 Cond. B	MIL-STD-202, Method 106 No Measurement @ High Humidity Insulation Resistance 200 Megaohms with 5 min. of removal from humidity
MIL-C-39012/93 & /94	MIL-STD-202 Method 204 Cond. D No Discontinuity	MIL-STD-202 Method 213 Cond. 1 No Discontinuity	MIL-STD-202 Method 107 Cond. B Except T_{HI} 125C	MIL-STD-202 Method 101 Cond. B	MIL-STD-202, Method 106 No Measurement @ High Humidity Insulation Resistance 200 Megaohms with 5 min. of removal from humidity

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Revised 8-06

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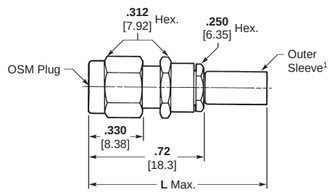
Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

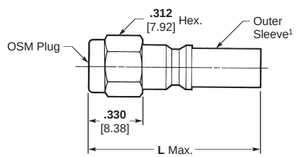
USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

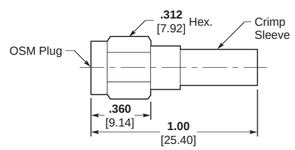
MIL-C-39012/55



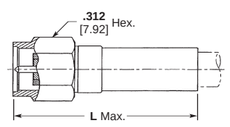
Outline 1



Outline 2



Outline 3



Outline 4

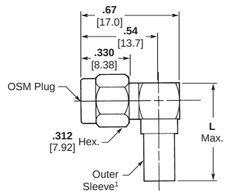
Military Part No.	AMP Part No.	M/A-COM[3] Part No. (Ref. Only)	Outline	Cat.[1]	RG/U Cable	Dim. L
-3006	1051757-1	2031-8006-92	1	A	178	**1.030** [26.16]
-3007	1051759-1	2031-8007-92	1	A	174, 316	**1.030** [26.16]
-3008	1051760-1	2031-8008-92	2	A	122	**1.030** [26.16]
-3009	1051762-1	2031-8009-92	2	A	58, 142, 223	**1.030** [26.16]
-3010	1051763-1	2031-8010-92	2	A	303	**1.030** [26.16]
B3011	1051764-1	2031-8011-92	1	B	178	**1.250** [31.75]
B3012	1051766-1	2031-8012-92	2	B	174, 316	**1.250** [31.75]
B3013	1051767-1	2031-8013-92	2	B	122	**1.250** [31.75]
B3014	1051768-1	2031-8014-92	2	B	58	**1.250** [31.75]
B3015	1051769-1	2031-8015-92	2	B	142	**1.250** [31.75]
B3016	1051770-1	2031-8016-92	2	B	223	**1.250** [31.75]
B3017	1484541-1	2031-8017-92	2	B	303	**1.250** [31.75]
B3018	1051771-1	2031-8018-92	1	B	178	**1.375** [34.93]
B3019	1056413-1	2031-8019-92	1	B	174, 316	**1.375** [34.93]
B3019	225532-4[2]	—	4	B	174, 188, 188A, 316	**.950** [24.13]
B3020	1051774-1	2031-8020-92	2	B	122	**1.375** [34.93]
B3021	1051775-1	2031-8021-92	2	B	58	**1.375** [34.93]
B3021	225532-1[2]	—	4	B	58, 58A, 58B, 58C	**1.030** [26.16]
B3022	1051776-1	2031-8022-92	2	B	142	**1.375** [34.93]
B3022	225532-3[2]	—	4	B	142, 142A, 142B, 400, Belden 84142	**1.030** [26.16]
B3023	1051777-1	2031-8023-92	2	B	223	**1.375** [34.93]
B3023	1-225532-0[2]	—	4	B	223, 55, 55A, 55B	**1.030** [26.16]
B3024	1051778-1	2031-8024-92	2	B	303	**1.375** [34.93]
B3024	225532-9[2]	—	4	B	141, 141A, 303	**1.030** [26.16]
-3025	1051780-1	2031-8025-92	1	C	178	**1.250** [31.75]
-3026	1051782-1	2031-8026-92	1	C	174, 316	**1.250** [31.75]

Military Part No.	AMP Part No.	M/A-COM[3] Part No. (Ref. Only)	Outline	Cat.[1]	RG/U Cable	Dim. L
-3027	1051783-1	2031-8027-92	2	C	122	**1.250** [31.75]
-3028	1051785-1	2031-8028-92	2	C	142, 223	**1.250** [31.75]
-3029	1051787-1	2031-8029-92	2	C	58, 303	**1.250** [31.75]
*-3106	1051789-1	2031-8106-92	1	A	178	**1.030** [26.16]
*-3107	1051791-1	2031-8107-92	1	A	174, 316	**1.030** [26.16]
*-3108	1051792-1	2031-8108-92	2	A	122	**1.030** [26.16]
*-3109	1051794-1	2031-8109-92	2	A	58, 142, 223	**1.030** [26.16]
*-3110	1051795-1	2031-8110-92	2	A	303	**1.030** [26.16]
*B3111	1051796-1	2031-8111-92	1	B	178	**1.250** [31.75]
*B3112	1051797-1	2031-8112-92	2	B	174, 316	**1.250** [31.75]
*B3113	1051798-1	2031-8113-92	2	B	122	**1.250** [31.75]
*B3114	1051799-1	2031-8114-92	2	B	58	**1.250** [31.75]
*B3115	1051800-1	2031-8115-92	2	B	142	**1.250** [31.75]
*B3116	1051801-1	2031-8116-92	2	B	223	**1.250** [31.75]
*B3117	1051802-1	2031-8117-92	2	B	303	**1.250** [31.75]
*B3118	1051803-1	2031-8118-92	1	B	178	**1.375** [34.93]
*B3119	1051804-1	2031-8119-92	1	B	174, 316	**1.375** [34.93]
*B3120	1051805-1	2031-8120-92	2	B	122	**1.375** [34.93]
*B3121	1051806-1	2031-8121-92	2	B	58	**1.375** [34.93]
*B3122	1051807-1	2031-8122-92	2	B	142	**1.375** [34.93]
*B3123	1051808-1	2031-8123-92	2	B	223	**1.375** [34.93]
*B3124	1051809-1	2031-8124-92	2	B	303	**1.375** [34.93]
*-3125	1051810-1	2031-8125-92	1	C	178	**1.250** [31.75]
*-3126	1051812-1	2031-8126-92	1	C	174, 316	**1.250** [31.75]
*-3127	1051813-1	2031-8127-92	2	C	122	**1.250** [31.75]
*-3128	1051815-1	2031-8128-92	2	C	142, 223	**1.250** [31.75]
*-3129	1051816-1	2031-8129-92	2	C	58, 303	**1.250** [31.75]
-3502	1051788-1	2031-8052-92	2	D	142, 400	**1.250** [31.75]
*-3602	1051817-1	2031-8162-92	2	D	142, 400	**1.250** [31.75]

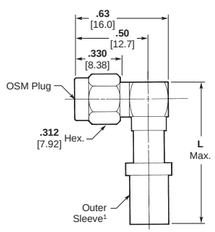
* No safety wire holes.
[1] Category A: solder sleeve; Categories B, C and D: crimp sleeve.
[2] Use Integral Die Crimp Tool Part Number 220061-1.
[3] -92 indicates passivated stainless steel finish.
See page 2-4 for description of categories and pages 2-83 to 2-88 for tooling (unless noted otherwise).

SMA Connectors MIL-C-39012 — For Flexible Cable (Continued)

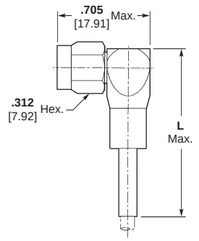
MIL-C-39012/56



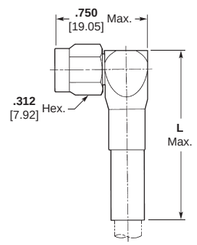
Outline 1



Outline 2



Outline 3



Outline 4

Military Part No.	AMP Part No.	M/A-COM[3] Part No. (Ref. Only)	Outline	Cat.[1]	RG/U Cable	Dim. L
-3006	1052149-1	2037-8006-92	1	A	178	**1.125** [28.58]
-3007	1052151-1	2037-8007-92	1	A	174, 316	**1.125** [28.58]
-3008	1052152-1	2037-8008-92	1	A	122	**1.125** [28.58]
-3009	1052154-1	2037-8009-92	1	A	58, 142, 223	**1.125** [28.58]
-3010	1052155-1	2037-8010-92	1	A	303	**1.125** [28.58]
B3011	1052156-1	2037-8011-92	1	B	178	**1.250** [31.75]
B3012	1052157-1	2037-8012-92	1	B	174, 316	**1.250** [31.75]
B3013	1052158-1	2037-8013-92	1	B	122	**1.250** [31.75]
B3014	1052159-1	2037-8014-92	1	B	58	**1.250** [31.75]
B3015	1052160-1	2037-8015-92	1	B	142	**1.250** [31.75]
B3016	1052161-1	2037-8016-92	1	B	223	**1.250** [31.75]
B3017	1052162-1	2037-8017-92	1	B	303	**1.250** [31.75]
B3018	1052163-1	2037-8018-92	1	B	178	**1.375** [34.93]
B3019	1052165-1	2037-8019-92	1	B	174, 316	**1.375** [34.93]
B3019	225609-4[2]	—	3	B	174, 188, 188A, 316	**1.187** [30.15]
B3020	1052166-1	2037-8020-92	1	B	122	**1.375** [34.93]
B3021	1052167-1	2037-8021-92	1	B	58	**1.375** [34.93]
B3021	225609-1[2]	—	4	B	58, 58A, 58B, 58C	**1.250** [31.75]
B3022	1052168-1	2037-8022-92	1	B	142	**1.375** [34.93]
B3022	225609-3[2]	—	4	B	142, 142A, 142B, 400, Belden 84142	**1.250** [31.75]
B3023	1052169-1	2037-8023-92	1	B	223	**1.375** [34.93]
B3024	1052170-1	2037-8024-92	1	B	303	**1.375** [34.93]
-3025	1052171-1	2037-8025-92	1	C	178	**1.375** [34.93]
-3026	1052173-1	2037-8026-92	1	C	174, 316	**1.375** [34.93]
-3027	1052174-1	2037-8027-92	1	C	122	**1.375** [34.93]
-3028	1052176-1	2037-8028-92	1	C	142, 223	**1.375** [34.93]

Military Part No.	AMP Part No.	M/A-COM[3] Part No. (Ref. Only)	Outline	Cat.[1]	RG/U Cable	Dim. L
-3029	1052177-1	2037-8029-92	1	C	58, 303	**1.375** [34.93]
*-3106	1052179-1	2037-8106-92	1	A	178	**1.125** [28.58]
*-3107	1052181-1	2037-8107-92	1	A	174, 316	**1.125** [28.58]
*-3108	1052182-1	2037-8108-92	1	A	122	**1.125** [28.58]
*-3109	1052184-1	2037-8109-92	1	A	58, 142, 223	**1.125** [28.58]
*-3110	1052185-1	2037-8110-92	1	A	303	**1.125** [28.58]
*B3111	1052186-1	2037-8111-92	1	B	178	**1.250** [31.75]
*B3112	1052187-1	2037-8112-92	1	B	174, 316	**1.250** [31.75]
*B3113	1052188-1	2037-8113-92	1	B	122	**1.250** [31.75]
*B3114	1052189-1	2037-8114-92	1	B	58	**1.250** [31.75]
*B3115	1052190-1	2037-8115-92	1	B	142	**1.250** [31.75]
*B3116	1052191-1	2037-8116-92	1	B	223	**1.250** [31.75]
*B3117	1052192-1	2037-8117-92	1	B	303	**1.250** [31.75]
*B3118	1052193-1	2037-8118-92	1	B	178	**1.375** [34.93]
*B3119	1052194-1	2037-8119-92	1	B	174, 316	**1.375** [34.93]
*B3120	1052195-1	2037-8120-92	1	B	122	**1.375** [34.93]
*B3121	1052196-1	2037-8121-92	1	B	58	**1.375** [34.93]
*B3122	1052197-1	2037-8122-92	1	B	142	**1.375** [34.93]
*B3123	1052198-1	2037-8123-92	1	B	223	**1.375** [34.93]
*B3124	1052199-1	2037-8124-92	1	B	303	**1.375** [34.93]
*-3125	1052201-1	2037-8125-92	1	C	178	**1.375** [34.93]
*-3126	1052203-1	2037-8126-92	1	C	174, 316	**1.375** [34.93]
*-3127	1052204-1	2037-8127-92	1	C	122	**1.375** [34.93]
*-3128	1052206-1	2037-8128-92	1	C	142, 223	**1.375** [34.93]
*-3129	1052207-1	2037-8129-92	1	C	58, 303	**1.375** [34.93]
-3502	1052178-1	2037-8052-92	2	D	142, 400	**1.375** [34.93]
*-3602	1086723-1	2037-8162-92	2	D	142, 400	**1.375** [34.93]

* No safety wire holes.
[1] Category A: solder sleeve; Categories B, C and D: crimp sleeve.
[2] Use Integral Crimp Tool Part Number 220061-1.
[3] -92 indicates passivated stainless steel finish.
See page 2-4 for description of categories and pages 2-83 to 2-88 for tooling (unless noted otherwise).

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

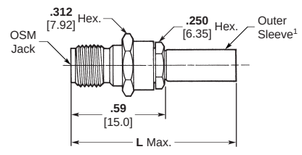
Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

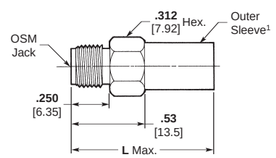
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

SMA Connectors MIL-C-39012 — For Flexible Cable (Continued)

MIL-C-39012/57



Outline 1



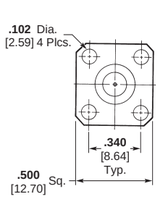
Outline 2

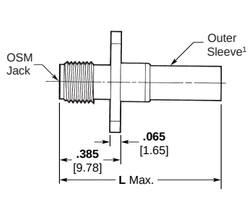
Military Part No.	AMP Part No.	M/A-COM2 Part No. (Ref. Only)	Outline	Cat.1	RG/U Cable	Dim. L
-3006	1090174-1	2032-8006-92	1	A	178	**.960** [24.38]
-3007	1051900-1	2032-8007-92	1	A	174, 316	**.960** [24.38]
-3008	1051901-1	2032-8008-90	2	A	122	**.960** [24.38]
-3009	1051902-1	2032-8009-90	2	A	58, 142, 223	**.960** [24.38]
-3010	1051903-1	2032-8010-90	2	A	303	**.960** [24.38]
B3011	1051904-1	2032-8011-92	1	B	178	**1.265** [32.13]
B3012	1051905-1	2032-8012-92	1	B	174, 316	**1.265** [32.13]
B3013	1051906-1	2032-8013-92	2	B	122	**1.265** [32.13]
B3014	1051907-1	2032-8014-92	2	B	58	**1.265** [32.13]
B3015	1051908-1	2032-8015-92	2	B	142	**1.265** [32.13]
B3016	1051909-1	2032-8016-92	2	B	223	**1.265** [32.13]
B3017	1051910-1	2032-8017-92	2	B	303	**1.265** [32.13]
B3018	1051911-1	2032-8018-92	1	B	178	**1.265** [32.13]

Military Part No.	AMP Part No.	M/A-COM2 Part No. (Ref. Only)	Outline	Cat.1	RG/U Cable	Dim. L
B3019	1051912-1	2032-8019-92	1	B	174, 316	**1.265** [32.13]
B3020	1051913-1	2032-8020-92	2	B	122	**1.265** [32.13]
B3021	1051914-1	2032-8021-92	2	B	58	**1.265** [32.13]
B3022	1051915-1	2032-8022-92	2	B	142	**1.265** [32.13]
B3023	1051916-1	2032-8023-92	2	B	223	**1.265** [32.13]
B3024	1051917-1	2032-8024-92	2	B	303	**1.265** [32.13]
-3025	1051918-1	2032-8025-92	1	C	178	**1.265** [32.13]
-3026	1051919-1	2032-8026-92	1	C	174, 316	**1.265** [32.13]
-3027	1051920-1	2032-8027-92	2	C	122	**1.265** [32.13]
-3028	1051921-1	2032-8028-92	2	C	142, 223	**1.265** [32.13]
-3029	1051922-1	2032-8029-92	2	C	58, 303	**1.265** [32.13]
-3502	1051923-1	2032-8052-92	2	D	142, 400	**1.265** [32.13]

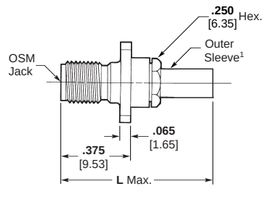
[1] Category A: solder sleeve; Categories B, C and D: crimp sleeve.
[2] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.
See page 2-4 for description of categories and pages 2-83 to 2-88 for tooling.

MIL-C-39012/58





Outline 3



Outline 4

Military Part No.	AMP Part No.	M/A-COM2 Part No. (Ref. Only)	Outline	Cat.1	RG/U Cable	Dim. L
-3006	1052037-1	2036-8006-92	4	A	178	**.960** [24.38]
-3007	1052038-1	2036-8007-92	4	A	174, 316	**.960** [24.38]
-3008	1052039-1	2036-8008-90	3	A	122	**.960** [24.38]
-3009	1052040-1	2036-8009-90	3	A	58, 142, 223	**.960** [24.38]
-3010	1052041-1	2036-8010-90	3	A	303	**.960** [24.38]
B3011	1052042-1	2036-8011-92	4	B	178	**1.265** [32.13]
B3012	1254028-1	2036-8012-92	4	B	174, 316	**1.265** [32.13]
B3013	1484499-1	2036-8013-92	3	B	122	**1.265** [32.13]
B3014	1484500-1	2036-8014-92	3	B	58	**1.265** [32.13]
B3015	1052043-1	2036-8015-92	3	B	142	**1.265** [32.13]
B3016	1484501-1	2036-8016-92	3	B	223	**1.265** [32.13]
B3017	1484502-1	2036-8017-92	3	B	303	**1.265** [32.13]
B3018	1052044-1	2036-8018-92	4	B	178	**1.265** [32.13]

Military Part No.	AMP Part No.	M/A-COM2 Part No. (Ref. Only)	Outline	Cat.1	RG/U Cable	Dim. L
B3019	1484503-1	2036-8019-92	4	B	174, 316	**1.265** [32.13]
B3020	1484504-1	2036-8020-92	3	B	122	**1.265** [32.13]
B3021	1484505-1	2036-8021-92	3	B	58	**1.265** [32.13]
B3022	1052045-1	2036-8022-92	3	B	142	**1.265** [32.13]
B3023	1484506-1	2036-8023-92	3	B	223	**1.265** [32.13]
B3024	1484507-1	2036-8024-92	3	B	303	**1.265** [32.13]
-3025	1052046-1	2036-8025-92	4	C	178	**1.125** [28.58]
-3026	1052047-1	2036-8026-92	4	C	174, 316	**1.125** [28.58]
-3027	1052048-1	2036-8027-92	3	C	122	**1.125** [28.58]
-3028	1052049-1	2036-8028-92	3	C	142, 223	**1.125** [28.58]
-3029	1052050-1	2036-8029-92	3	C	58, 303	**1.125** [28.58]
-3502	1052051-1	2036-8052-92	3	D	142, 400	**1.125** [28.58]

[1] Category A: solder sleeve; Categories B, C and D: crimp sleeve.
[2] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.
See page 2-4 for description of categories and pages 2-83 to 2-88 for tooling.

Catalog 1308940
Revised 8-06

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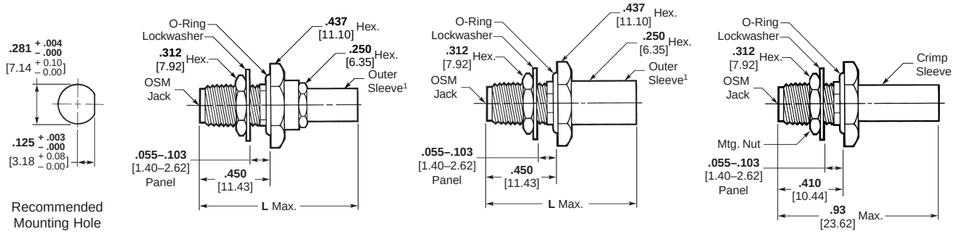
Japan: 81-44-844-8013
UK: 44-208-420-8341

SMA Connectors MIL-C-39012 — For Flexible Cable (Continued)

MIL-C-39012/59



Military Part No.	AMP Part No.	M/A-COM3 Part No. (Ref. Only)	Outline	Cat.1	RG/U Cable	Dim. L
-3006	1051981-1	2034-8006-92	1	A	178	**.960** [24.38]
-3007	1051982-1	2034-8007-92	1	A	174, 316	**.960** [24.38]
-3008	1051983-1	2034-8008-90	2	A	122	**.960** [24.38]
-3009	1051984-1	2034-8009-90	2	A	58, 142, 223	**.960** [24.38]
-3010	1051985-1	2034-8010-90	2	A	303	**.960** [24.38]
B3011	1362216-1	2034-8011-92	1	B	178	**1.265** [32.13]
B3012	1051986-1	2034-8012-92	1	B	174, 316	**1.265** [32.13]
B3013	1083993-1	2034-8013-92	2	B	122	**1.265** [32.13]
B3014	1331293-1	2034-8014-92	2	B	58	**1.265** [32.13]
B3015	1253627-1	2034-8015-92	2	B	142	**1.265** [32.13]
B3016	1221165-1	2034-8016-92	2	B	223	**1.265** [32.13]
B3017	1484542-1	2034-8017-92	2	B	303	**1.265** [32.13]
B3018	1051987-1	2034-8018-92	1	B	178	**1.265** [32.13]

Military Part No.	AMP Part No.	M/A-COM3 Part No. (Ref. Only)	Outline	Cat.1	RG/U Cable	Dim. L
B3019	1051988-1	2034-8019-92	1	B	174, 316	**1.265** [32.13]
B3020	1484543-1	2034-8020-92	2	B	122	**1.265** [32.13]
B3021	1087842-1	2034-8021-92	2	B	58	**1.265** [32.13]
B3022	1051989-1	2034-8022-92	2	B	142	**1.265** [32.13]
B3023	1051990-1	2034-8023-92	2	B	223	**1.265** [32.13]
B3024	1051991-1	2034-8024-92	2	B	303	**1.265** [32.13]
-3025	1051992-1	2034-8025-92	1	C	178	**1.125** [28.58]
-3026	1051994-1	2034-8026-92	1	C	174, 316	**1.125** [28.58]
-3027	1051995-1	2034-8027-92	2	C	122	**1.125** [28.58]
-3028	1051996-1	2034-8028-92	2	C	142, 223	**1.125** [28.58]
-3029	1051997-1	2034-8029-92	2	C	58, 303	**1.125** [28.58]
-3502	1051998-1	2034-8052-92	2	D	142, 400	**1.265** [32.13]

1 Category A: solder sleeve; Categories B, C and D: crimp sleeve.
3 -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.
See page 2-4 for description of categories and pages 2-83 to 2-88 for tooling (unless noted otherwise).

Catalog 1308940
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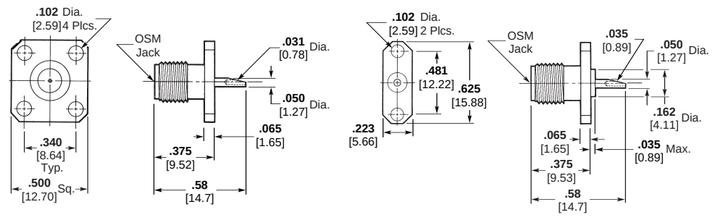
Japan: 81-44-844-8013
UK: 44-208-420-8341

SMA Connectors MIL-C-39012 — Panel Mount

MIL-C-39012/60

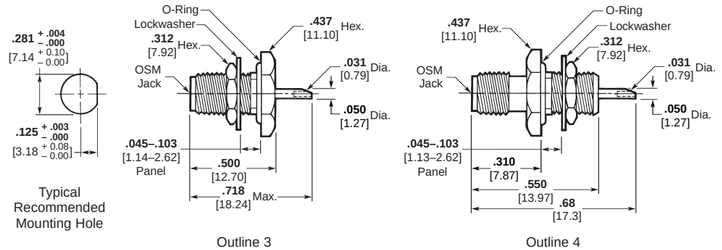


Outline 1 Outline 2

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline
-3001	1052924-1	2052-8001-92	1
-3002	1052926-1	2052-8002-92	2

[1] -92 indicates passivated stainless steel finish.

MIL-C-39012/61



Typical Recommended Mounting Hole

Outline 3 Outline 4

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline
-3001	1053118-1	2056-8011-92	3
-3002	1484516-1	2058-8012-92	4

[1] -92 indicates passivated stainless steel finish.

Catalog 1308940
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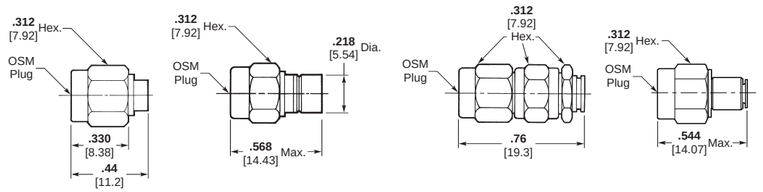
SMA Connectors MIL-C-39012 — For Semi-Rigid Cable

MIL-C-39012/79



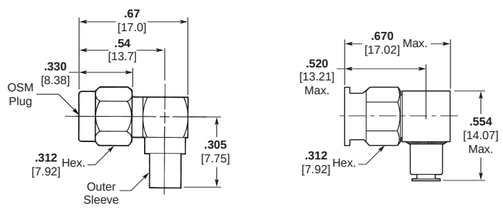
Outline 1 Outline 2 Outline 3 Outline 4

Military Part No.	AMP Part No.	M/A-COM[4] Part No. (Ref. Only)	Outline	Category	RG/U Cable
B3001	1050774-1	2001-8001-92	1	B	405
B3002	1050776-1	2001-8002-92	1	B	402
B3003	1050777-1	2001-8003-92	3	B	405
B3003	1050813-1	2001-8991-92	2[1]	B	405
B3003	1089686-1[2]	2001-8203-92	2	B	405
B3004	1050779-1	2001-8004-92	3	B	402
B3004	1050792-1[2]	2001-8204-92	2	B	402
-3007	1050781-1	2001-8007-92	3	E	405
-3008	1050783-1	2001-8008-92	3	E	402
*B3101	1050785-1	2001-8101-92	1	B	405
*B3102	1050786-1	2001-8102-92	1	B	402
*B3103	1050787-1	2001-8103-92	3	B	405
*B3103	1050797-1[2]	2001-8303-92	2	B	405
*B3103	1050812-1	2001-8981-92	2[1]	B	405

Military Part No.	AMP Part No.	M/A-COM[4] Part No. (Ref. Only)	Outline	Category	RG/U Cable
*B3103	227868-1[3]	—	4	B	405
*B3104	1050788-1	2001-8104-92	3	B	402
*B3104	1050799-1	2001-8304-92	2	B	402
*B3104	227743-1[3]	—	4	B	402
*-3107	1050789-1	2001-8107-92	3	E	405
*-3108	1050790-1	2001-8108-92	3	E	402
-3207	1050793-1	2001-8207-92	2	F	405
-3207	228639-3[3]	—	4	F	405
-3208	1050794-1	2001-8208-92	2	F	402
*-3307	1050800-1	2001-8307-92	2	F	405
*-3307	228639-1[3]	—	4	F	405
*-3308	1050801-1	2001-8308-92	2	F	402
*-3308	228634-1[3]	—	4	F	402
-3311	1050803-1	2001-8311-92	2	F	405

* No safety wire holes.
[1] Low profile version; overall length .393 [9.98] max.
[2] OSCC solderless compression crimp version.
[3] Use Hand Tool Kit Part Number 59981-1 which includes Die Set Part Number 312253-2 and Locator Part Number 220221-2.
[4] -92 indicates passivated stainless steel finish.
See page 2-4 for description of categories and pages 2-83 to 2-88 for tooling (unless noted otherwise).

MIL-C-39012/80



Outline 5 Outline 6

Military Part No.	AMP Part No.	M/A-COM[2] Part No. (Ref. Only)	Outline	Category	RG/U Cable
B3001	1051160-1	2007-8001-92	5	B	405
B3002	1051161-1	2007-8002-92	5	B	402
B3003	1051163-1	2007-8003-92	5	B	405
B3004	1051164-1	2007-8004-92	5	B	402
-3005	1051165-1	2007-8005-92	5	E	405
-3006	1051166-1	2007-8006-92	5	E	402
-3007	1051168-1	2007-8007-92	5	E	405
-3008	1051170-1	2007-8008-92	5	E	402
*B3101	1051171-1	2007-8101-92	5	B	405
*B3102	1051172-1	2007-8102-92	5	B	402

Military Part No.	AMP Part No.	M/A-COM[2] Part No. (Ref. Only)	Outline	Category	RG/U Cable
*B3103	1051173-1	2007-8103-92	5	B	405
*B3104	1051174-1	2007-8104-92	5	B	402
*-3105	1051175-1	2007-8105-92	5	E	405
*-3106	1051176-1	2007-8106-92	5	E	402
*-3107	1051177-1	2007-8107-92	5	E	405
*-3108	1051178-1	2007-8108-92	5	E	402
-3207	228583-3	—	6	F	405
*-3307	228583-1	—	6	F	405
-3308	228626-1	—	6	F	402

* No safety wire holes.
[1] Use Hand Tool Kit Part Number 59981-1 which includes Die Set Part Number 312253-1 and Locator Part Number 312173-1.
[2] -92 indicates passivated stainless steel finish.
See page 2-4 for description of categories and pages 2-83 to 2-88 for tooling (unless noted otherwise).

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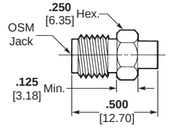
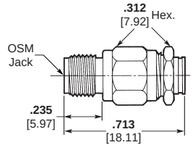
SMA Connectors MIL-C-39012 — For Semi-Rigid Cable (Continued)

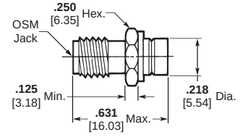
MIL-C-39012/81



Outline 1



Outline 2



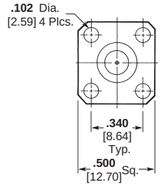
Outline 3

Military Part No.	AMP Part No.	M/A-COM[2] Part No. (Ref. Only)	Outline	Category	RG/U Cable
B3001	1050923-1	2002-8001-90	1	B	405
B3002	1050924-1	2002-8002-90	1	B	402
B3003	1084643-1	2002-8003-92	2	B	405
B3003	1050932-1[1]	2002-8203-92	3	B	405
B3004	1050925-1	2002-8004-92	2	B	402
B3004	1050933-1[1]	2002-8204-92	3	B	402

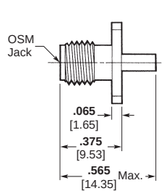
Military Part No.	AMP Part No.	M/A-COM[2] Part No. (Ref. Only)	Outline	Category	RG/U Cable
-3005	1050926-1	2002-8005-90	1	E	405
-3006	1050928-1	2002-8006-90	1	E	402
-3007	1050929-1	2002-8007-92	2	E	405
-3008	1050931-1	2002-8008-92	2	E	402
-3207	1050934-1[1]	2002-8207-92	3	F	405
-3208	1050935-1[1]	2002-8208-92	3	F	402

[1] OSCC solderless compression crimp version.
[2] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.
See page 2-4 for description of categories and pages 2-83 to 2-88 for tooling.

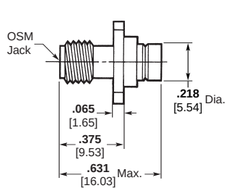
MIL-C-39012/82



Outline 4



Outline 5



Outline 6

Military Part No.	AMP Part No.	M/A-COM[2] Part No. (Ref. Only)	Outline	Category	RG/U Cable
B3001	1051087-1	2006-8001-90	4	B	405
B3002	1051088-1	2006-8002-90	4	B	402
B3003	1051089-1	2006-8003-92	6	B	405
B3003	1051095-1[1]	2006-8203-92	5	B	405
B3004	1051090-1	2006-8004-92	6	B	402
B3004	1051096-1[1]	2006-8204-92	5	B	402

Military Part No.	AMP Part No.	M/A-COM[2] Part No. (Ref. Only)	Outline	Category	RG/U Cable
-3005	1051091-1	2006-8005-90	4	E	405
-3006	1051092-1	2006-8006-90	4	E	402
-3007	1051093-1	2006-8007-92	6	E	405
-3008	1051094-1	2006-8008-92	6	E	402
-3207	1051097-1[1]	2006-8207-92	5	F	405
-3208	1051098-1[1]	2006-8208-92	5	F	402

[1] OSCC solderless compression crimp version.
[2] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.
See page 2-4 for description of categories and pages 2-83 to 2-88 for tooling.

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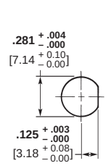
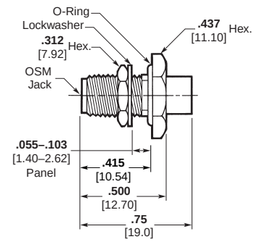
UK: 44-208-420-8341

SMA Connectors MIL-C-39012 — For Semi-Rigid Cable (Continued)

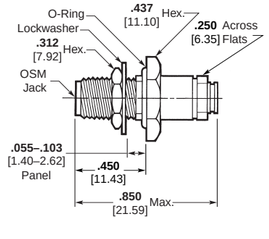
MIL-C-39012/83



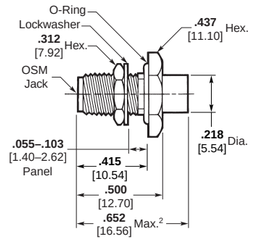
Recommended Mounting Hole



Outline 1



Outline 2



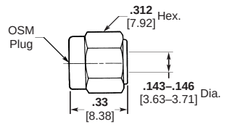
Outline 3

Military Part No.	AMP Part No.	M/A-COM[3] Part No. (Ref. Only)	Outline	Category	RG/U Cable
B3001	1051022-1	2004-8001-90	1	B	405
B3002	1051023-1	2004-8002-90	1	B	402
B3003	1051024-1	2004-8003-92	2	B	405
B3003	1051030-1[1]	2004-8203-92	3	B	405
B3004	1051025-1	2004-8004-92	2	B	402
B3004	1051031-1[1]	2004-8204-92	3	B	402

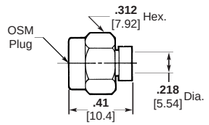
Military Part No.	AMP Part No.	M/A-COM[3] Part No. (Ref. Only)	Outline	Category	RG/U Cable
-3005	1051026-1	2004-8005-90	1	E	405
-3006	1051027-1	2004-8006-90	1	E	402
-3007	1051028-1	2004-8007-92	2	E	405
-3008	1051029-1	2004-8008-92	2	E	402
-3207	1051032-1[1, 2]	2004-8207-92	3	F	405
-3208	1051033-1[1, 2]	2004-8208-92	3	F	402

[1] OSCC Solderless Compression Crimp version.
[2] Category F Only: Overall Length; .620 [15.75] Max.
[3] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.
See page 2-4 for description of categories and pages 2-83 to 2-88 for tooling.

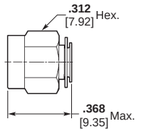
MIL-C-39012/92



Outline 4



Outline 5



Outline 6

Military Part No.	AMP Part No.	M/A-COM[3] Part No. (Ref. Only)	Outline	Category	RG/U Cable
B3001	1050805-1	2001-8901-92	4	B	402
B3001	1050808-1[1]	2001-8921-92	5	B	402
B3001	1484517-1[1]	2001-8941-92	4	B	402
*B3101	1050807-1	2001-8911-92	4	B	402
*B3101	1050809-1[1]	2001-8931-92	5	B	402

Military Part No.	AMP Part No.	M/A-COM[3] Part No. (Ref. Only)	Outline	Category	RG/U Cable
*B3101	1050810-1[1]	2001-8951-92	4	B	402
B3101	227531-1[2]	—	6	B	402
-3201	1050791-1[1]	2001-8201-92	5	F	402
*-3301	1050796-1[1]	2001-8301-92	5	F	402
-3301	228635-1[2]	—	6	F	402

* No safety wire holes.
[1] OSCC Solderless Compression Crimp version.
[2] Use Hand Tool Kit Part Number 59981-1 which includes Die Set Part Number 312253-1 and Locator Part Number 220220-2.
[3] -92 indicates passivated stainless steel finish.
See page 2-4 for description of categories and pages 2-83 to 2-88 for tooling.

Catalog 1308940
Revised 8-06

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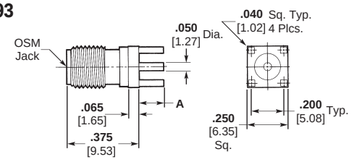
SMA Connectors MIL-C-39012 — Printed Circuit Mount

MIL-C-39012/93

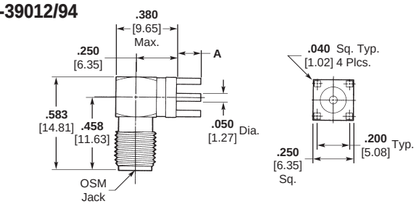


Outline 1

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-3001	1053372-1	2062-8001-90	1	.155 3.94
-3002	1053374-1	2062-8002-90	1	.125 3.18
-3003	1053376-1	2062-8003-90	1	.093 2.36

[1] -90 indicates gold plated finish.

MIL-C-39012/94



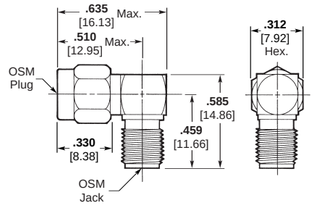
Outline 2

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-3001	1053396-1	2064-8001-90	2	.155 3.94
-3002	1053398-1	2064-8002-90	2	.125 3.18
-3003	1053400-1	2064-8003-90	2	.093 2.36

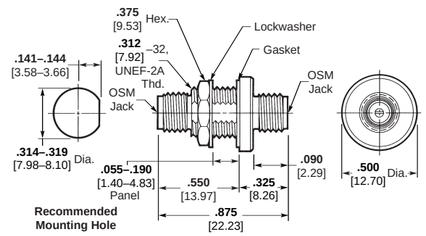
[1] -90 indicates gold plated finish.

In-Series Adapters MIL-A-55339

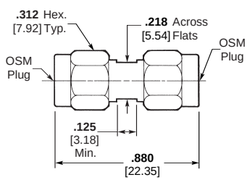
MIL-A-55339



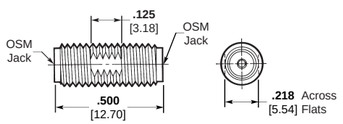
Outline 1



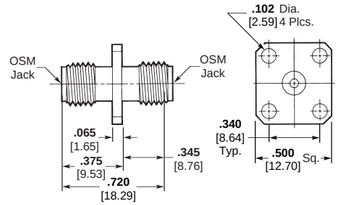
Outline 2



Outline 3



Outline 4



Outline 5

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline
/02-30001	1055091-1	2088-8001-92	1
/28-30001	1054986-1	2084-8001-92	2
/28-30002	1054988-1	2084-8002-92	5
/29-30001	1053765-1	2081-8001-92	3
*/29-30101	1053767-1	2081-8101-92	3
/31-30001	1053633-1	2080-8001-92	4

* No safety wire holes.
[1] -92 indicates passivated stainless steel finish.

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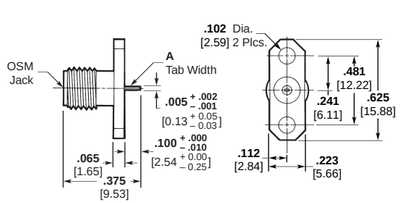
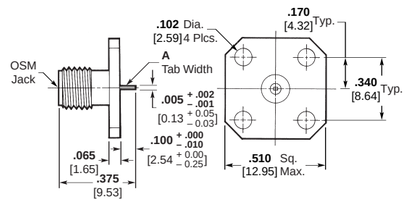
SMA Receptacles MIL-C-83517 — Panel Mount

MIL-C-83517/1



Outline 1



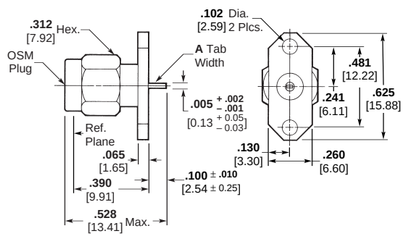
Outline 2

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-31001	1052928-1	2052-8003-92	1	.020 ±.002 0.51 ±.051
-31002	1052930-1	2052-8004-92	1	.050 ±.001 1.27 ±.025
-31003	1052932-1	2052-8005-92	2	.020 ±.002 0.51 ±.051
-31004	1052934-1	2052-8006-92	2	.050 ±.001 1.27 ±.025

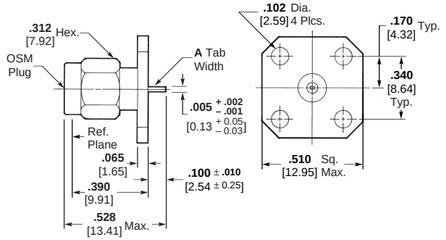
Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-32001	1052927-1	2052-8003-90	1	.020 ±.002 0.51 ±.051
-32002	1052929-1	2052-8004-90	1	.050 ±.001 1.27 ±.025
-32003	1052931-1	2052-8005-90	2	.020 ±.002 0.51 ±.051
-32004	1052933-1	2052-8006-90	2	.050 ±.001 1.27 ±.025

[1] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.

MIL-C-83517/2



Outline 3



Outline 4

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-31001	1052409-1	2051-8001-92	3	.020 ±.002 0.51 ±.051
-31002	1052411-1	2051-8002-92	3	.050 ±.001 1.27 ±.025
-31003	1052413-1	2051-8003-92	4	.020 ±.002 0.51 ±.051
-31004	1052415-1	2051-8004-92	4	.050 ±.001 1.27 ±.025

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-32001	1052408-1	2051-8001-90	3	.020 ±.002 0.51 ±.051
-32002	1052410-1	2051-8002-90	3	.050 ±.001 1.27 ±.025
-32003	1052412-1	2051-8003-90	4	.020 ±.002 0.51 ±.051
-32004	1052414-1	2051-8004-90	4	.050 ±.001 1.27 ±.025

[1] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.

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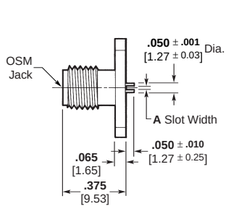
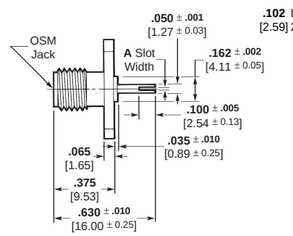
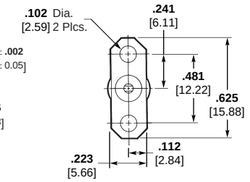
MIL-C-83517/3

SMA Receptacles MIL-C-83517 — Panel Mount (Continued)

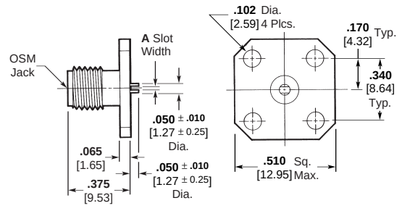


Outline 1





Outline 2



Outline 3

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-31001	1052936-1	2052-8007-92	1	.012 +.003/–.001 0.30 +0.08/–0.03
-31002	1052938-1	2052-8008-92	1	.018 +.003/–.001 0.46 +0.08/–0.03
-31003	1052940-1	2052-8009-92	1	.028 +.003/–.001 0.71 +0.08/–0.03
-31004	1052942-1	2052-8010-92	3	.012 +.003/–.001 0.30 +0.08/–0.03
-31005	1052944-1	2052-8011-92	3	.018 +.003/–.001 0.46 +0.08/–0.03
-31006	1052946-1	2052-8012-92	3	.028 +.003/–.001 0.71 +0.08/–0.03
-31007	1052948-1	2052-8013-92	2	.025 ±.002 0.64 ±0.05

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-32001	1052935-1	2052-8007-90	1	.012 +.003/–.001 0.30 +0.08/–0.03
-32002	1052937-1	2052-8008-90	1	.018 +.003/–.001 0.46 +0.08/–0.03
-32003	1052939-1	2052-8009-90	1	.028 +.003/–.001 0.71 +0.08/–0.03
-32004	1052941-1	2052-8010-90	3	.012 +.003/–.001 0.30 +0.08/–0.03
-32005	1052943-1	2052-8011-90	3	.018 +.003/–.001 0.46 +0.08/–0.03
-32006	1052945-1	2052-8012-90	3	.028 +.003/–.001 0.71 +0.08/–0.03
-32007	1052947-1	2052-8013-90	2	.025 ±.002 0.64 ±0.05

[1] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.

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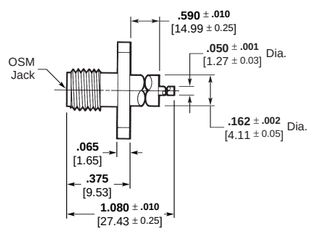
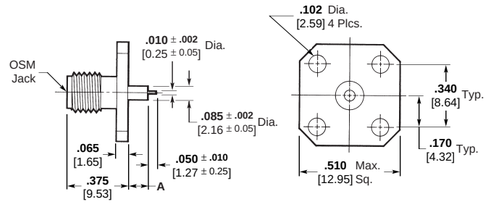
SMA Receptacles MIL-C-83517 — Panel Mount (Continued)

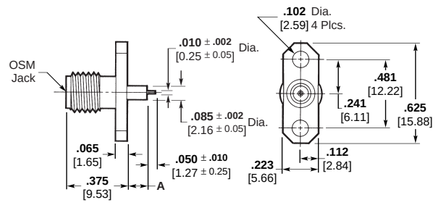
MIL-C-83517/4



Outline 1



Outline 2



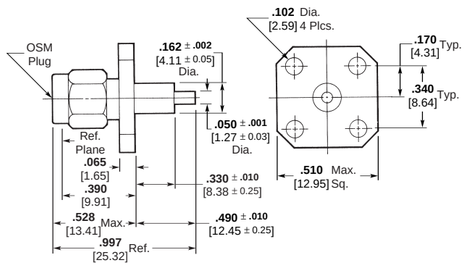
Outline 3

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-31001	1052950-1	2052-8014-92	3	.057 ±.003 1.45 ±.076
-31002	1052952-1	2052-8015-92	3	.125 ±.003 3.18 ±.076
-31003	1052954-1	2052-8016-92	2	.057 ±.003 1.45 ±.076
-31004	1052956-1	2052-8017-92	2	.125 ±.003 3.18 ±.076
-31005	1052958-1	2052-8018-92	1	N/A

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-32001	1052949-1	2052-8014-90	3	.057 ±.003 1.45 ±.076
-32002	1052951-1	2052-8015-90	3	.125 ±.003 3.18 ±.076
-32003	1052953-1	2052-8016-90	2	.057 ±.003 1.45 ±.076
-32004	1052955-1	2052-8017-90	2	.125 ±.003 3.18 ±.076
-32005	1052957-1	2052-8018-90	1	N/A

[1] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.

MIL-C-83517/5



Outline 4

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline
-31001	1052417-1	2051-8005-92	4
-32001	1052416-1	2051-8005-90	4

[1] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.

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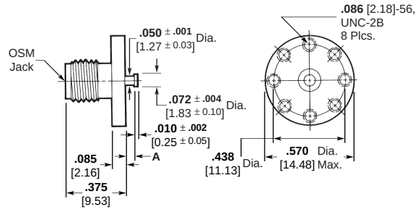
SMA Receptacles MIL-C-83517 — Surface Launch

MIL-C-83517/6

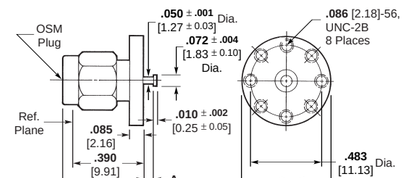


Outline 1

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-31001	1053423-1	2066-8001-92	1	**.060 ±.003** 1.52 ±0.08
-31002	1053425-1	2066-8002-92	1	**.120 ±.003** 3.05 ±0.08
-32001	1053422-1	2066-8001-90	1	**.060 ±.003** 1.52 ±0.08
-32002	1053424-1	2066-8002-90	1	**.120 ±.003** 3.05 ±0.08

[1] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.

MIL-C-83517/7

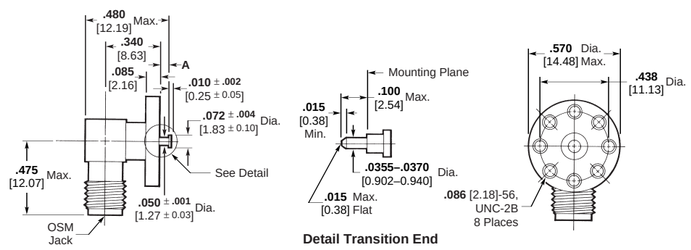


Outline 2

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-31001	1053429-1	2067-8001-92	2	**.060 ±.003** 1.52 ±0.08
-31002	1053431-1	2067-8002-92	2	**.120 ±.003** 3.05 ±0.08
-32001	1053428-1	2067-8001-90	2	**.060 ±.003** 1.52 ±0.08
-32002	1053430-1	2067-8002-90	2	**.120 ±.003** 3.05 ±0.08

[1] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.

MIL-C-83517/8



Detail Transition End

Outline 3

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-31001	1053451-1	2068-8001-92	3	**.060 ±.003** 1.52 ±0.08
-31002	1053453-1	2068-8002-92	3	**.120 ±.003** 3.05 ±0.08
-32001	1053450-1	2068-8001-90	3	**.060 ±.003** 1.52 ±0.08
-32002	1053452-1	2068-8002-90	3	**.120 ±.003** 3.05 ±0.08

[1] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.

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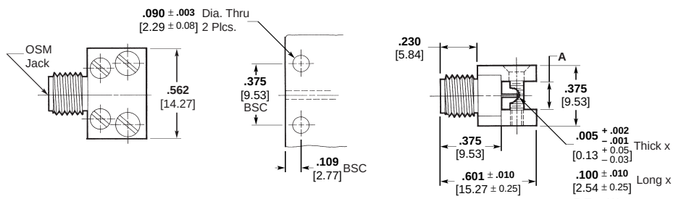
Japan: 81-44-844-8013
UK: 44-208-420-8341

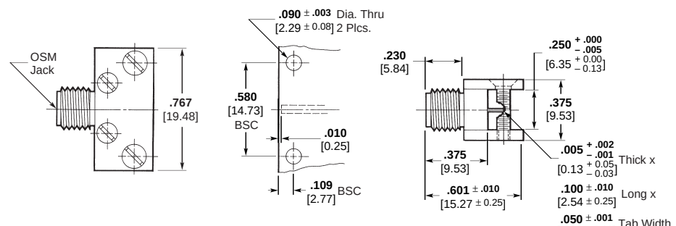
SMA Receptacles MIL-C-83517 — End Launch

MIL-C-83517/9



Mounting Hole Pattern

Outline 1



Mounting Hole Pattern

Outline 2

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A	Dimension B
-31001	1053476-1	2070-8001-92	1	**.057–.064** 1.45–1.63	**.025 ± .002** 0.64 ± 0.05
-31002	1053478-1	2070-8002-92	1	**.120–.127** 3.05–3.23	**.050 ± .001** 1.27 ± 0.03
-31003	1053480-1	2070-8003-92	1	**.245–.250** 6.22–6.35	**.050 ± .001** 1.27 ± 0.03
-31004	1053482-1	2070-8004-92	2	N/A	N/A
-32001	1053475-1	2070-8001-90	1	**.057–.064** 1.45–1.63	**.025 ± .002** 0.64 ± 0.05
-32002	1053477-1	2070-8002-90	1	**.120–.127** 3.05–3.23	**.050 ± .001** 1.27 ± 0.03
-32003	1053479-1	2070-8003-90	1	**.245–.250** 6.22–6.35	**.050 ± .001** 1.27 ± 0.03
-32004	1053481-1	2070-8004-90	2	N/A	N/A

[1] -92 indicates passivated stainless steel finish.
-90 indicates gold plated finish.

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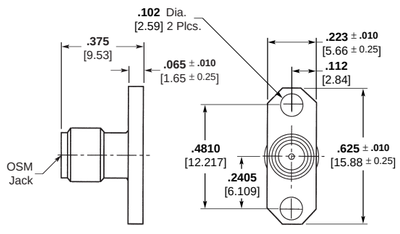
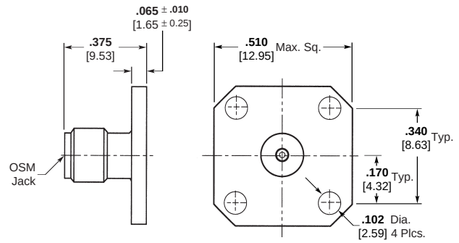
SMA Receptacles MIL-C-83517 — Field Replaceable Launchers

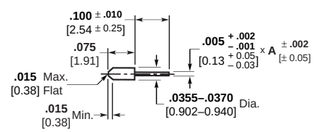
MIL-C-83517/10



Outline 1



Outline 2



Transition Pin Detail

Military Part No.	AMP Part No.	M/A-COM[1] Part No. (Ref. Only)	Outline	Dimension A
-31001	1052959-1	2052-8019-92	1	—
-31003	1052962-1	2052-8021-92	2	—
-31005	1052963-1	2052-8023-92	1	**.020 ± .002** 0.51 ± 0.05
-31006	1484518-1	2052-8024-92	1	**.050 ± .002** 1.27 ± 0.05
-31015	1484519-1	2052-8033-92	2	**.020 ± .002** 0.51 ± 0.05
-31016	1484520-1	2052-8034-92	2	**.050 ± .002** 1.27 ± 0.05
-32001	1484521-1	2052-8019-90	1	—
-32003	1052961-1	2052-8021-90	2	—
-32005	1484522-1	2052-8023-90	1	**.020 ± .002** 0.51 ± 0.05
-32006	1484523-1	2052-8024-90	1	**.050 ± .002** 1.27 ± 0.05
-32015	1484524-1	2052-8033-90	2	**.020 ± .002** 0.51 ± 0.05
-32016	1484525-1	2052-8034-90	2	**.050 ± .002** 1.27 ± 0.05

[1] -92 indicates passivated stainless steel finish.
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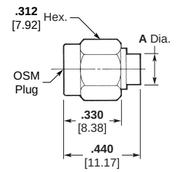
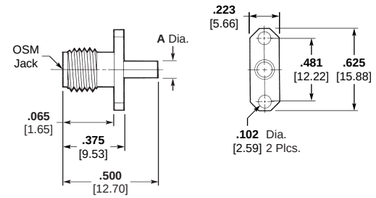
SMA Connectors for Semi-Rigid Cable

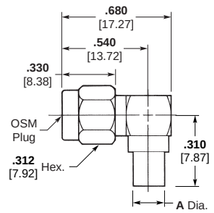
Captured Center Contact



Outline 66



Outline 67



Outline 68

DSCC Part Number	M/A-COM Part Number (Ref. Only)	Outline	Dim. A	Assembly Procedure 408-	RG/U Cable	AMP Part Number
84149SSG	2001-5397-02	66	**.180** 4.57	4943	402	1050605-1
84149SSG-1	2001-5557-02	66	**.180** 4.57	4764	402	1050629-1
84149SSGA	2001-5431-02	66	**.120** 3.05	—	405	1050609-1
84149SSGA-1	2001-5558-02	66	**.120** 3.05	4765	405	1050631-1
85022SSG	2006-5151-00	67	**.180** 4.57	—	402	1051063-1
85022SSG-1	2006-5192-00	67	**.180** 4.57	4767	402	1221162-1
85022SSGA	2006-5150-00	67	**.120** 3.05	4857	405	1051062-1
85022SSGA-1	2006-5193-00	67	**.120** 3.05	4833	405	1051067-1
85037SSG	2007-5115-02	68	**.180** 4.57	4830	402	1051119-1
85037SSGA	2007-5116-02	68	**.120** 3.05	—	405	1051120-1

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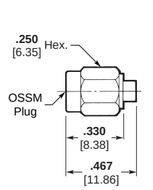
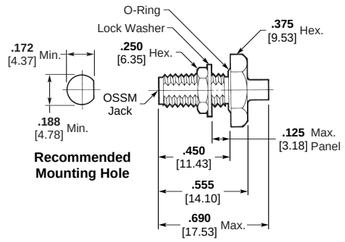
SSMA Connectors for Semi-Rigid Cable and Flexible Cable

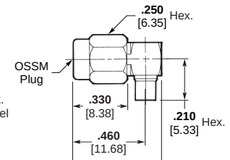
Non-Captured Center Contact



Outline 69



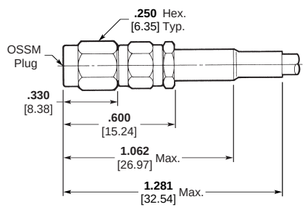
Outline 70



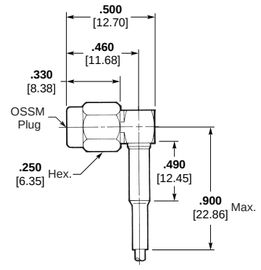
Outline 71

DSCC Part Number	M/A-COM Part Number (Ref. Only)	Outline	Assembly Procedure 408-	RG/U Cable	AMP Part Number
86116ZSG	1001-5045-92	69	4622	405	1045358-1
86117ZSG	1004-5005-90	70	—	405	1045398-1
86118ZSG	1007-5015-92	71	4968	405	1045418-1

Captured Center Contact



Outline 72



Outline 73

DSCC Part Number	M/A-COM Part Number (Ref. Only)	Outline	Assembly Procedure 408-	RG/U Cable	AMP Part Number
86119ZSG	1031-5031-92	72	—	174, 316, 179	1045486-1
86120ZSG	1037-5032-92	73	4759	174, 316, 179	1045517-1

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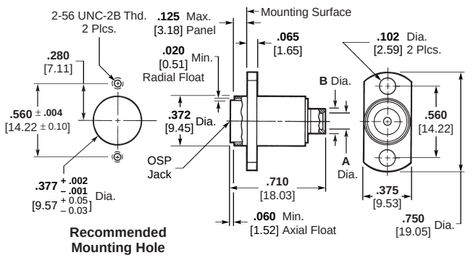
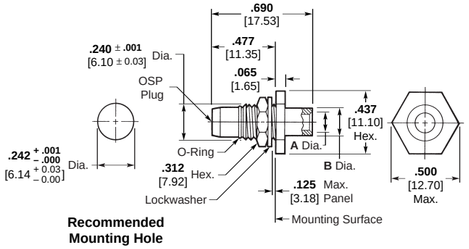
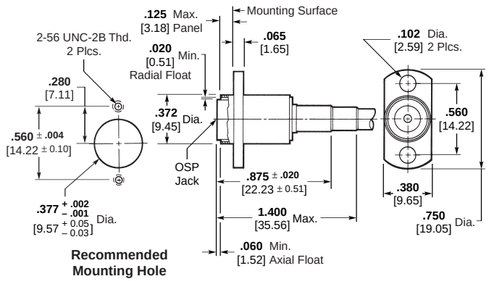
BMA Blindmate Connectors for Semi-Rigid and Flexible Cable



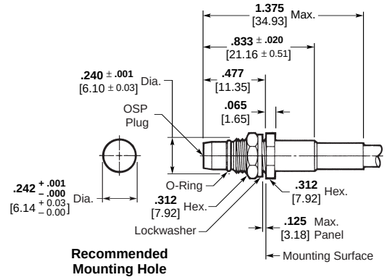
Outline 74



Outline 75



Outline 76



Outline 77

DSCC Part Number	M/A-COM Part Number (Ref. Only)	Outline	Assembly Procedure 408-	RG/U Cable	AMP Part Number
85071ZSGA	4506-5015-02[1]	74	8260	402	1059424-1
85071ZSGB	4506-5016-02[1]	74	8263	405	1059426-1
85072ZSGA	4503-5022-00[2]	75	8259	402	1059384-1
85072ZSGB	4503-5023-00[2]	75	8265	405	1059386-1
85073ZSGA	4536-5007-02[3]	76	8266	179, 55, 187, 188, 316	1059529-1
85073ZSGB	4536-5008-02[3]	76	8267	55, 142, 223, 400	1059530-1
85074ZSGA	4533-5007-02[3]	77	8271	179, 174, 187, 188, 316	1059518-1
85074ZSGB	4533-5008-02[3]	77	8270	55, 142, 223, 400	1059519-1

[1] Finish: Inner housing that is soldered to cable is gold plated. Outer housing is passivated stainless steel.
[2] Finish: Housing that is soldered to cable outer conductor is gold plated.
[3] Finish: Passivated stainless steel. For gold plate, change the Part Number suffix from -02 to -00.

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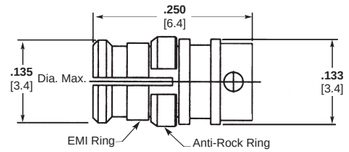
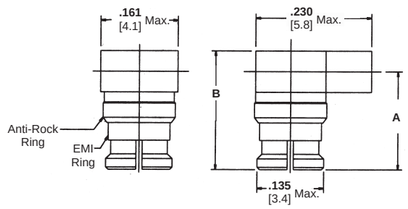
SMP Microminiature Push-On Coaxial Connectors for Semi-Rigid Cable

Straight Cable Jack Solder Attachment



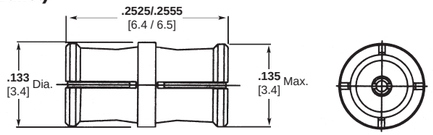
DSCC Part Number	M/A-COM Part Number (Ref. Only)	RG/U Cable	AMP Part Number
94008ZCG-2	2902-5005-62	.047 Semi-Rigid	1056521-1
94008ZCG-1	2902-5006-62	RG-405	1056522-1

Right Angle Cable Jack Solder Attachment



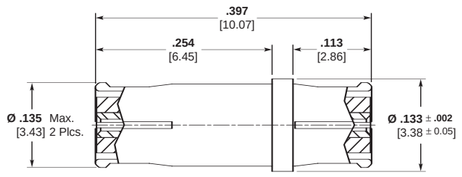
DSCC Part Number	M/A-COM Part Number (Ref. Only)	RG/U Cable	AMP Part Number
94008ZCG-4	2908-5006-62	.047 Semi-Rigid	1056550-1
94008ZCG-3	2908-5007-62	RG-405	1056551-1

Jack to Jack Adapter (Bullet)



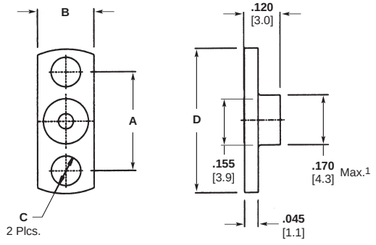
DSCC Part Number	M/A-COM Part Number (Ref. Only)	RG/U Cable	AMP Part Number
94007ZCG-1	2980-5004-62	—	1056703-1

Jack to Jack Adapter (SMP)



DSCC Part Number	RG/U Cable	AMP Part Number
94007ZCG-2	—	1757023-1

Shroud — 2-Hole Flange Surface Mount



DSCC Part No.	Dimension A	B	C	D	Shroud Design	AMP Part Number
94007ZSP-3					Full Detent	1056740-1
94007ZSP-3L	**.328** 8.33	**.187** 4.75	**.098** 2.49	**.480** 12.19	Limited Detent	1757024-1
94007ZSP-3S					Smooth Bore	1757025-1
94007ZSP-4					Full Detent	1056741-1
94007ZSP-4L	**.481** 12.22	**.223** 5.66	**.102** 2.59	**.625** 15.88	Limited Detent	1757026-1
94007ZSP-4S					Smooth Bore	1757027-1
94007ZSP-5					Full Detent	1056742-1
94007ZSP-5L	**.282** 7.16	**.165** 4.19	**.073** 1.85	**.400** 10.16	Limited Detent	1757028-1
94007ZSP-5S					Smooth Bore	1757029-1
94007ZSP-6SC	**.352** 8.94	**.235** 5.97	**.073** 1.85	**.470** 11.94	Smooth Bore	1757030-1

[1] **.235** [5.97] Max. for Part Number 94007ZSP-6SC

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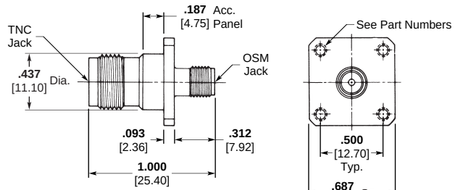
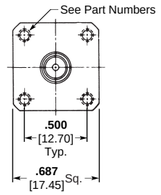
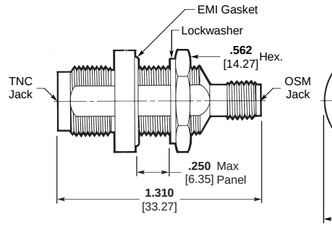
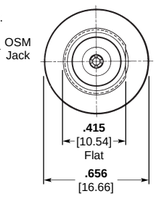
Between Series Adapters



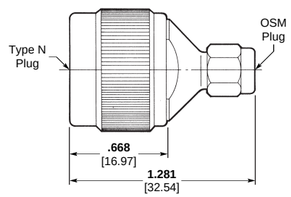


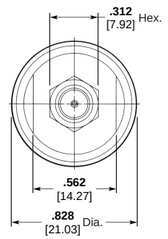
Outline 78



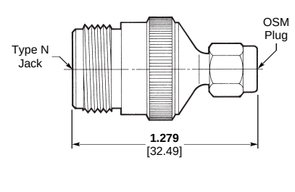


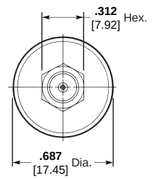
Outline 79



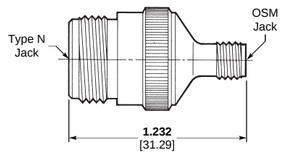


Outline 80

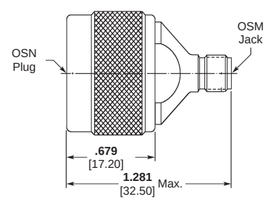


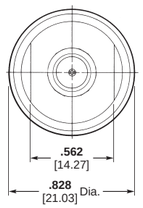


Outline 81



Outline 82





Outline 83

DSCC Part Number	M/A-COM Part Number (Ref. Only)	Outline	Description	AMP Part Number
8501814FP-1[1]	3180-4034-02[1]	78	SMA Jack to TNC Jack	1057848-1
8501814FP-2[2]	3180-4036-02[2]	78	SMA Jack to TNC Jack	1080294-1
8501814FP-3	3184-4002-02	79	SMA Jack to TNC Jack	1057911-1
8604412SP-1	3081-4002-02	80	SMA Plug to Type N Plug	1057371-1
8604412SP-2	3082-4022-02	81	SMA Plug to Type N Jack	1057400-1
8604412SP-3	3080-4014-02	82	SMA Jack to Type N Jack	1057356-1
8604412SP-4	3082-4031-02	83	TNC Plug to SMA Jack	1057403-1

[1] .125 [3.20] Dia. Typ. (4 Plcs.)
[2] Tapped holes to accommodate 3-56 UNF mounting screws.

* Defense Electronics Supply Center, Dayton, Ohio

Catalog 1308940
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Hong Kong: 852-2735-1628
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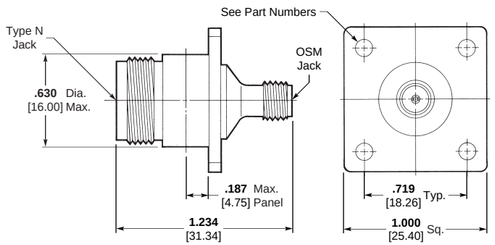
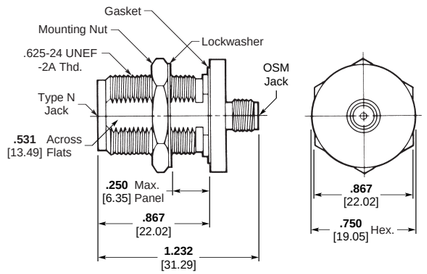
Between Series Adapters (Continued)



Outline 84



Outline 85

Outline 86

DSCC Part Number	M/A-COM Part Number (Ref. Only)	Outline	Description	AMP Part Number
8503812FP-1[1]	3080-4010-02[1]	84	SMA Jack to Type N Jack	1057354-1
8503812FP-2[2]	3080-4015-02[2]	84	SMA Jack to Type N Jack	1057357-1
8503812FP-3	3084-4001-00	85	SMA Jack to Type N Jack	1057465-1
8503812FP-4[1]	3082-4028-02[1]	86	SMA Plug to Type N Jack	1057402-1
8503812FP-5[2]	3082-4029-02[2]	86	SMA Plug to Type N Jack	1252992-1
8503812FP-6[1]	3080-4019-02[1]	84	SMA Jack to Type N Jack	1057359-1
8503812FP-7[2]	3080-4020-02[2]	84	SMA Jack to Type N Jack	1087866-1

[1] .125 [3.20] Dia. Typ. (4 Plcs.)
[2] Tapped holes to accommodate 3-56 UNF mounting screws.

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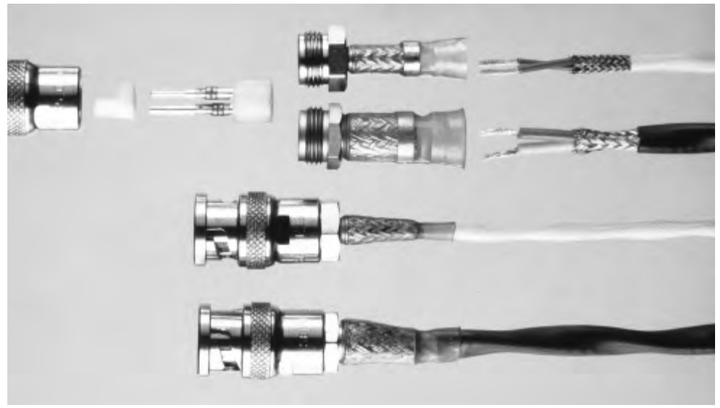
RF One-Step BNC/TNC Connectors



Product Facts

- Easy, quick installation
- Outstanding cable-retention force
- Solder-solder connection type (center conductor and braid)
- One-step termination for easy, quick installation and lower installed cost
- Exceptional cable retention force to withstand high vibration and frequent mates and unmates
- Fully soldered center conductor and braid
- Excellent built-in strain relief against vibration and excessive handling
- Long-term reliability
- Controlled soldering termination
- Use with standard RG/U cables and Raychem Cheminax cables
- Three product sizes to accommodate a wide range of cables
- Meets performance requirements of MIL-C-39012 up to 2.8 GHz

Applications

One-Step BNC/TNC connectors are single-piece assemblies for terminating the center conductor and the braid of a broad range of coaxial cables.

The connectors are fully intermateable with MIL-C-39012 connectors and are available in 50-ohm and 75-ohm versions.

Specifications	Installation	
Raychem RB-115	For proper installation of these devices, the correct heating tool and reflector attachment must be used. Any one of the following Raychem heating tools is recommended: • Steinel® Model HL1802E • CV-1981	Refer to Raychem installation procedure RPIP 683-00 for detailed instructions.

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RF One-Step BNC/TNC Connectors (Continued)

Product Options and Part Numbering System

RXX - XX - X - XX

Connector Style

Dash No. -XX	Style	Connector Type TNC	Connector Type BNC
-00	Straight plug	24.5 Max. [.965]	24.5 max. [.965]
-01	Right-angle plug	33.5 Max. [1.32], 28 [1.09]	31.5 max. [1.23], 28 [1.09]
-02	Straight bulkhead jack	25.4 max. [1.0]	25.4 Max. [1.0]
-03	Straight jack	25.4 max. [1.0]	25.4 Max. [1.0]
-04	Straight panel jack	25.4 Max. [1.0], 4 x M2.5 x 0.45	25.4 Max. [1.0], 4 x M2.5 x 0.45

Male

Female

Connector size

L = Large
M = Medium
S = Small

50 = 50 ohms
75 = 75 ohms

D = Nickel-plated brass body, gold-plated brass pin

B = BNC
T = TNC

Example: RBD-50-L-00 is a BNC connector, 50 ohms, large size, with straight plug body.

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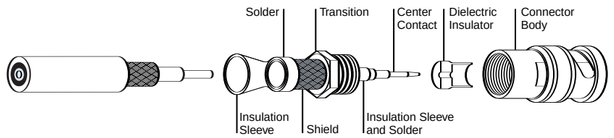
RF One-Step BNC/TNC Connectors (Continued)

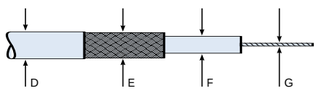
Product Characteristics



Material		
Center contact		Gold-plated beryllium copper (female)
		Gold-plated brass (male)
Dielectric insulator		PTFE
Transition		Silver-plated brass
Connector body		Nickel-plated brass
Solder and flux		Sn63Pb37, RMA flux
Braided shield		Tin-plated copper wire per ASTM B3
Insulation sleeve		Radiation-crosslinked, heat-shrinkable polyvinylidene fluoride, transparent blue
Strain relief/sealing sleeve		Radiation-crosslinked, heat-shrinkable modified polyolefin with adhesive, black
Typical Performance		
Dielectric withstand voltage		1500 V
Insulation resistance		5000 megohms
Temperature rating		-55˚C to 150˚C [-67˚F to 302˚F]
Contact resistance-straight		Inner = 1.5 milliohms, outer = 1.0 milliohm
Contact resistance — right-angle		Inner = 2.5 milliohms, outer = 1.5 milliohms
Cable retention force		295N (66 lb) to 822N (196 lb)
Voltage rating		500 V RMS
Connector durability		500 mating cycles minimum
Electrical Performance		
Nominal impedance		50 and 75 ohms
Frequency range		Up to 2.8 GHz

Part Selection Process

1. From Product Options and Part Numbering System on page 2-36, select the connector style you need (BNC or TNC, plug or jack, male or female contacts).
2. From the tables that follow, find the appropriate table for the connector style you selected.
3. From the appropriate table, select the connector part number based on the RG cable type or Raychem cable part number. For cable types not shown use the cable dimensions.
   Note: The cable dimensions in each table are keyed to the diagram below.



Catalog 1308940
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Japan: 81-44-844-8013
UK: 44-208-420-8341

RF One-Step BNC/TNC Connectors (Continued)

Impedance (ohms)	Cable Type: RG Cables	Cable Type: Raychem Cables	Cable Dimensions: D (Min.–Max.)	Cable Dimensions: E (Min.–Max.)	Cable Dimensions: F (Max.)	Cable Dimensions: G (Max.)	Part No.
BNC Straight Plugs, Male Contacts							
50	RG-174, RG-178, RG-188, RG-196,RG–316	5026A1311, 5028A1317, 5030A1317	1.50–5.50 [.060–.217]	0.90–3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RBD-50-S-00
50	RG-58, RG-141, RG-142, RG-303, RG-400	5019D3318, 5021D1331, 5020A1311	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.00 [.118]	1.25 [.050]	RBD-50-M-00
50	RG-165, RG-215, RG-213, RG-225, RG-214	5012F3332, 5012A3311	5.00–12.50 [.197–.500]	4.10–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RBD-50-L-00
75	RG-179, RG-187	7530A1317	1.50–5.00 [.060–.217]	5 0.90-3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RBD-75-S-00
75	—	7524A1311, 7528A1317	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.70 [.126]	1.25 [.050]	RBD-75-M-00
75	RG-6, RG-11, RG-12, RG-59 RG-144, RG-216	—	5.00–.12.50 [.197–.500]	4.10–9.50 [.161–.375]	7.3 [.287]	2.45 [.100]	RBD-75-L-00
BNC Right-Angle Plugs, Male Contacts							
50	RG-174, RG-178, RG-188, RG-196,RG–316	5026A1311, 5028A1317, 5030A1317	1.50–5.50 [.060–.217]	0.90–3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RBD-50-S-01
50	RG-58, RG-141, RG-142, RG-303, RG-400	5019D3318, 5021D1331, 5020A1311	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.00 [.118]	1.25 [.050]	RBD-50-M-01
50	RG-165, RG-215, RG-213, RG-225, RG-214	5012F3332, 5012A3311	5.00–12.50 [.197–.500]	4.1–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RBD-50-L-01
75	RG-179, RG-187	7530A1317	1.50–5.50 [.060–.217]	0.9-3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RBD-75-S-01
75	—	524A1311, 7528A1317	3.50–7.00 [.138–.276]	2.1–5.00 [.083–.197]	3.70 [.146]	1.25 [.050]	RBD-75-M-01
75	RG-6, RG-11, RG-12, RG-59 RG-144, RG-216	—	5.00–12.50 [.197–.500]	4.1–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RBD-75-L-01
BNC Straight Bulkhead Jacks, Female Contacts							
50	RG-174, RG-178, RG-188, RG-196,RG–316	5026A1311, 5028A1317, 5030A1317	1.50–5.50 [.060–.217]	0.90–3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RBD-50-S-02
50	RG-58, RG-141, RG-142, RG-303, RG-400	5019D3318, 5021D1331, 5020A1311	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.00 [.118]	1.25 [.050]	RBD-50-M-02
50	RG-165, RG-215, RG-213, RG-225, RG-214	5012F3332, 5012A3311	5.00–12.50 [.197–.500]	4.10–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RBD-50-L-02
75	RG-179, RG-187	7530A1317	1.50–5.00 [.060–.217]	5 0.90-3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RBD-75-S-02
75	—	75 7524A1311, 7528A1317	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.70 [.146]	1.25 [.050]	RBD-75-M-02
75	RG-6, RG-11, RG-12, RG-59 RG-144, RG-216	—	5.00-12.50 [.197–.500]	4.10–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RBD-75-L-02
BNC Straight Jacks, Female Contacts							
50	RG-174, RG-178, RG-188, RG-196,RG–316	5026A1311, 5028A1317, 5030A1317	1.50–5.50 [.060–.217]	0.90–3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RBD-50-S-03
50	RG-58, RG-141, RG-142, RG-303, RG-400	5019D3318, 5021D1331, 5020A1311	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.00 [.118]	1.25 [.050]	RBD-50-M-03
50	RG-165, RG-215, RG-213, RG-225, RG-214	5012F3332, 5012A3311	5.00–12.50 [.197–.500]	4.10–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RBD-50-L-03
75	RG-179, RG-187	7530A1317	1.50–5.50 [.060–.217]	0.90–3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RBD-75-S-03
75	—	75 7524A1311, 7528A1317	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.70 [.146]	1.25 [.050]	RBD-75-M-03
75	RG-6, RG-11, RG-12, RG-59 RG-144, RG-216	—	5.00–12.50 [.197–.500]	4.10–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RBD-75-L-03
BNC Straight Panel Jacks, Female Contacts							
50	RG-174, RG-178, RG-188, RG-196,RG–316	5026A1311, 5028A1317, 5030A1317	1.50–5.50 [.060–.217]	0.90–3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RBD-50-S-04
50	RG-58, RG-141, RG-142, RG-303, RG-400	5019D3318, 5021D1331, 5020A1311	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.00 [.118]	1.25 [.050]	RBD-50-M-04
50	RG-165, RG-215, RG-213, RG-225, RG-214	5012F3332, 5012A3311	5.00–12.50 [.197–.500]	4.10–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RBD-50-L-04
75	RG-179, RG-187	7530A1317	1.50–5.50 [.060–.217]	0.90–3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RBD-75-S-04
75	—	7524A1311, 7528A1317	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.70 [.146]	1.25 [.050]	RBD-75-M-04
75	RG-6, RG-11, RG-12, RG-59 RG-144, RG-216	—	5.00–12.50 [.197–.500]	4.10–9.5o [.161–.375]	7.30 [.287]	2.45 [.100]	RBD-75-L-04

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RF One-Step BNC/TNC Connectors (Continued)

TNC Coaxial Connectors

Impedance (ohms)	Cable Type: RG Cables	Cable Type: Raychem Cables	Cable Dimensions: D (Min.–Max.)	Cable Dimensions: E (Min.–Max.)	Cable Dimensions: F (Max.)	Cable Dimensions: G (Max.)	Part No.
TNC Straight Plugs, Male Contacts							
50	RG-174, RG-178, RG-188, RG-196,RG–316	5026A1311, 5028A1317, 5030A1317	1.50–5.50 [.060–.217]	0.90–3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RTD-50-S-00
50	RG-58, RG-141, RG-142, RG-303, RG-400	5019D3318, 5021D1331, 5020A1311	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.00 [.118]	1.25 [.050]	RTD-50-M-00
50	RG-165, RG-215, RG-213, RG-225, RG-214	5012F3332, 5012A3311	5.00–12.50 [.197–.500]	4.10–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RTD-50-L-00
75	RG-179, RG-187	7530A1317	1.50–5.50 [.060–.217]	0.90-3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RTD-75-S-00
75	—	7524A1311, 7528A1317	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.70 [.146]	1.25 [.050]	RTD-75-M-00
75	RG-6, RG-11, RG-12, RG-59 RG-144, RG-216	—	5.00–12.50 [.197–.500]	4.10–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RTD-75-L-00
TNC Straight Jacks, Female Contacts							
50	RG-174, RG-178, RG-188, RG-196,RG–316	5026A1311, 5028A1317, 5030A1317	1.5–5.5 [.060–.217]	0.9–3.0 [.035–.118]	1.55 [.060]	0.65 [.025]	RTD-50-S-03
50	RG-58, RG-141, RG-142, RG-303, RG-400	5019D3318, 5021D1331, 5020A1311	3.5–7.0 [.138–.276]	2.1–5.0 [.083–.197]	3.0 [.118]	1.25 [.050]	RTD-50-M-03
50	RG-165, RG-215, RG-213, RG-225, RG-214	5012F3332, 5012A3311	5.0–12.5 [.197–.500]	4.1–9.5 [.161–.375]	7.3 [.287]	2.45 [.100]	RTD-50-L-03
75	RG-179, RG-187	7530A1317	1.5–5.5 [.060–.217]	0.9–3.0 [.035–.118]	1.55 [.060]	0.65 [.025]	RTD-75-S-03
75	—	7524A1311, 7528A1317	3.5–7.0 [.138–.276]	2.1–5.0 [.083–.197]	3.7 [.146]	1.25 [.050]	RTD-75-M-03
75	RG-6, RG-11, RG-12, RG-59 RG-144, RG-216	—	5.0–12.5 [.197–.500]	4.1–9.5 [.161–.375]	7.3 [.287]	2.45 [.100]	RTD-75-L-03
TNC Straight Panel Jacks, Female Contacts							
50	RG-174, RG-178, RG-188, RG-196,RG–316	5026A1311, 5028A1317, 5030A1317	1.5–5.5 [.060–.217]	0.9–3.0 [.035–.118]	1.55 [.060]	0.65 [.025]	RTD-50-S-04
50	RG-58, RG-141, RG-142, RG-303, RG-400	5019D3318, 5021D1331, 5020A1311	3.5–7.0 [.138–.276]	2.1–5.0 [.083–.197]	3.0 [.118]	1.25 [.050]	RTD-50-M-04
50	RG-165, RG-215, RG-213, RG-225, RG-214	5012F3332, 5012A3311	5.0–12.5 [.197–.500]	4.1–9.5 [.161–.375]	7.3 [.287]	2.45 [.100]	RTD-50-L-04
75	RG-179, RG-187	7530A1317	1.5–5.5 [.060–.217]	0.9–3.0 [.035–.118]	1.55 [.060]	0.65 [.025]	RTD-75-S-04
75	—	7524A1311, 7528A1317	3.5–7.0 [.138–.276]	2.1–5.0 [.083–.197]	3.7 [.146]	1.25 [.050]	RTD-75-M-04
75	RG-6, RG-11, RG-12, RG-59 RG-144, RG-216	—	5.0–12.5 [.197–.500]	4.1–9.5 [.161–.375]	7.3 [.287]	2.45 [.100]	RTD-75-L-04

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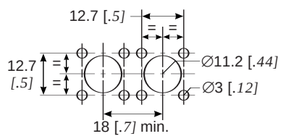
RF One-Step BNC/TNC Connectors (Continued)

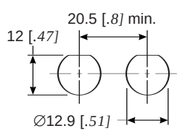
TNC Coaxial Connectors

Panel thickness: 3.2 [.125] max.

RBD-XX-X-04
RTD-XX-X-04



RBD-XX-X -02
RTD-XX-X -02



Cable Type			Cable Dimensions				Part No.
Impedance (ohms)	RG Cables	Raychem Cables	D (Min.–Max.)	E (Min.–Max.)	F (Max.)	G (Max.)	
TNC Straight Bulkhead Jacks, Female Contacts							
50	RG-174, RG-178, RG-188, RG-196,RG–316	5026A1311, 5028A1317, 5030A1317	1.50–5.50 [.060–.217]	0.90–3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RTD-50-S-02
50	RG-58, RG-141, RG-142, RG-303, RG-400	5019D3318, 5021D1331, 5020A1311	3.5–7.0 [.138–.276]	2.10–5.00 [.083–.197]	3.00 [.118]	1.25 [.050]	RTD-50-M-02
50	RG-165, RG-215, RG-213, RG-225, RG-214	5012F3332, 5012A3311	5.0–12.5 [.197–.500]	4.10–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RTD-50-L-02
75	RG-179, RG-187	7530A1317	1.5–5.5 [.060–.217]	0.90–3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RTD-75-S-02
75	—	7524A1311, 7528A1317	3.5–7.0 [.138–.276]	2.10–5.00 [.083–.197]	3.70 [.146]	1.25 [.050]	RTD-75-M-02
75	RG-6, RG-11, RG-12, RG-59 RG-144, RG-216	—	5.0–12.5 [.197–.500]	4.10–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RTD-75-L-02
TNC Right-Angle Plugs, Male Contacts							
50	RG-174, RG-178, RG-188, RG-196,RG–316	5026A1311, 5028A1317, 5030A1317	1.50–5.50 [.060–.217]	0.90–3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RTD-50-S-01
50	RG-58, RG-141, RG-142, RG-303, RG-400	5019D3318, 5021D1331, 5020A1311	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.00 [.118]	1.25 [.050]	RTD-50-M-01
50	RG-165, RG-215, RG-213, RG-225, RG-214	5012F3332, 5012A3311	5.00–12.50 [.197–.500]	4.10–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RTD-50-L-01
75	RG-179, RG-187	7530A1317	1.50–5.50 [.060–.217]	0.90–3.00 [.035–.118]	1.55 [.060]	0.65 [.025]	RTD-75-S-01
75	—	7524A1311, 7528A1317	3.50–7.00 [.138–.276]	2.10–5.00 [.083–.197]	3.70 [.146]	1.25 [.050]	RTD-75-M-01
75	RG-6, RG-11, RG-12, RG-59 RG-144, RG-216	—	5.0–12.5 [.197–.500]	4.10–9.50 [.161–.375]	7.30 [.287]	2.45 [.100]	RTD-75-L-01

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UK: 44-208-420-8341

OSP (BMA) Miniature Modular Blind Mate Connectors

Features

- Interface designed for multiple interconnects
- For high performance microwave system requirements
- Bulkhead or panel mount
- For semi-rigid cable

OSP (BMA) miniature connectors for semi-rigid cable meet high performance requirements for microwave multiple interconnects. Standard units are available in bulkhead or panel mount designs for either direct solder or OSCC solderless compression crimp attachment. Complete tooling for both versions is located in the Tool Section of this catalog.

Jack connectors are available in either float or rigid mount. Rigid mount units will function to specifications up to ±.10 [.004] radial misalignment with the mating plug connector. Applications requiring greater than ±.10 [.004] radial misalignment can use either the float design or floating connector plates with guide pins.

The OSCC Solderless Compression Crimp attachment meets high performance requirements for microwave system applications. The cable attachment is permanent and highly reliable.

Ease of assembly permits users unskilled in soldering techniques to rapidly produce cable assemblies with consistently excellent mechanical and electrical performance.

METRIC

Dimensions in this OSP (BMA) section are millimeters over inches. All other pages are inches over millimeters.

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OSP (BMA) Miniature Modular Blind Mate Connectors (Continued)

The specifications given refer specifically to mated pair of Part Numbers 1059410-1 and 1059402-1 (RG 402) and 1059412-1 and 1059404-1 (RG 405). Specifications on other connectors are available on request.

The general electrical, mechanical and environmental specifications in the following table are recommended for procurement documents or drawings.

Engineering Data

Impedance —	50 ohms
Frequency —	dc to 22.0 GHz
Temperature Rating —	-65° to 125° C

Electrical	RG 402 (.141) Semi-Rigid	RG 405 (.085) Semi-Rigid
VSWR —		
dc - 18.0 GHz	1.02 + .005f (GHz)	1.05 + .005f (GHz)
18.0 - 22.0 GHz	1.02 + .008f (GHz)	1.05 + .009f (GHz)
RF Transmission Loss —	.03 x $\sqrt{f}$ (GHz)	.03 x $\sqrt{f}$ (GHz)
Insulation Resistance —	5,000 megohms min.	5,000 megohms min.
Contact Resistance —		
Center Contact	2.0 milliohms max.	2.0 milliohms max.
Outer Contact	2.0 milliohms max.	2.0 milliohms max.
Outer Contact to Cable	0.5 milliohms max.	0.5 milliohms max.
Dielectric Withstanding Voltage —	1500 volts RMS	1000 volts RMS
Corona Extinction Voltage at 70,000 Ft.—	375 volts min.	335 volts min.
RF High Potential at 5 MHz —	1,000 volts RMS	670 volts RMS
RF Leakage Interface Only —	-(90-fGHz) dB min. (fully mated)	-(90-fGHz) dB min. (fully mated)
Power Handling —	300W at 3 GHz (sea level) and room temperature	

Environmental

Corrosion —	Method 101, Condition B, MIL-STD-202
Vibration —	Method 204, Condition D, 20G's, MIL-STD-202
Shock —	Method 213, Condition I, 100G's, MIL-STD-202
Temperature Cycling —	Method 107, Condition B, MIL-STD-202
Moisture Resistance —	Method 106, MIL-STD-202

Material

Housing —	Corrosion resistant steel Type 303 (stainless) per ASTM A484 and A582
Center Contact —	Beryllium copper per ASTM-B-196
Dielectric —	TFE fluorocarbon per ASTM-D-1457
Gasket (O'Ring) —	MIL-P-25732

Mechanical

Force to Engage —	3 pounds max.
Force to Disengage —	1.5 pounds max.
Center Contact Retention —	6 pounds min.
Durablilty —	5,000 Cycles
Radial Misalignment —	
Rigid Mount	±.10 [±. 004]
Float Mount	±.51 [±.020]

Mating Characteristics

Jack Connector —		
Center Contact Socket	Oversize test Pin —	.945 + .003 [.0372 + .0001] dia.
	Test Pin Finish —	16 micro inch
	Insertion Depth —	.76/1.14 [.030/.045]
	Number of Insertions —	3
Insertion Force	Test Pin —	.940 + .003 [.0370 + .0001] dia.
	Test Pin Finish —	16 micro inch
	Insertion Depth —	1.27/1.91 [.050/.075]
	Insertion Force —	3 pounds max.
Withdrawal Force	Test Pin —	.90 + .003 [.0355 - .0001] dia.
	Test Pin Finish —	16 micro inch
	Insertion Depth —	1.27/1.91 [.050/.075]
	Withdrawal —	1 ounce min.

Finish

Center Contact —	Gold plate per MIL-G-45204, Type II, Class 1 over copper plate per MIL-C-14550
Housing —	Gold plate per MIL-G-45204, Typ II, Class 0 over nickel plate per QQ-N-290, Class 2 or passivate per ASTM-A380

All dimensions shown are nominal. Contact the factory for specific tolerances.

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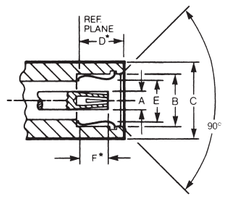
OSP (BMA) Miniature Modular Blind Mate Connectors (Continued)

Interface Mating Dimensions

The connector interface, specifically designed for multiple interconnects, maintains reliable performance over the typical mechanical tolerance required in cost effective packaging.

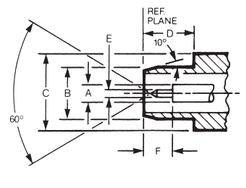
The interface test data shows excellent performance is maintained with mating gaps up to 0.38 [.015].

Meets MIL-STD-348 Figure 321. Intermateable to BMA Connectors.



Jack

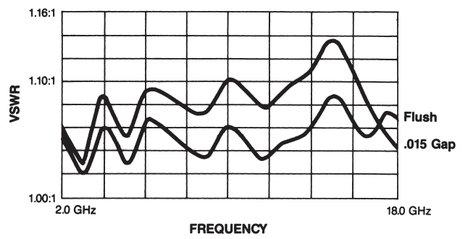
Letter	Dimensions	
A	**1.78** .070	Nom.
B	**5.72** .225	Min.
C	**7.62** .300	Ref.
D	**5.00** .197	Nom.*
E	**5.08** .200	Max.
F	**3.23** .127	Max.*



Plug

Letter	Dimensions	
A	**1.78** .070	Nom.
B	**5.33** .210	Nom.
C	**7.62** .300	Ref.
D	**5.05** .199	Min.
E	**0.91** .036	Nom.
F	**3.25** .128	Min.

*With spring bottomed



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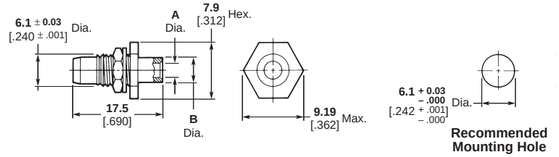
For Semi-Rigid Cable, 2.16 [.085] and 3.58 [.141] Dia., Direct Solder Attachment

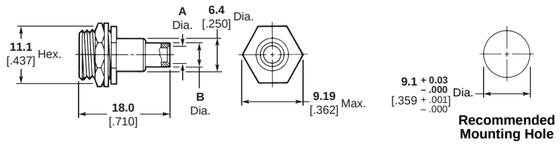
Bulkhead Feedthrough Cable Plug Rear Mount



Cable	Plating	Dimensions A	Dimensions B	M/A-COM Part No. (Ref. Only)	Part No.
RG-402/U **3.58** .141	Gold	**3.7** .144	**4.6** .180	4503-7941-00	**1059402-1**
RG-405/U **2.16** .085	Gold	**2.3** .089	**3.0** .120	4503-7985-00	**1059404-1***

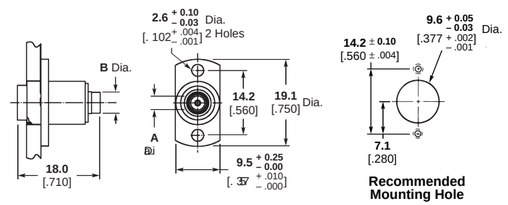
*Non-SCD.

Bulkhead Feedthrough Cable Jack Rigid Rear Mount



Cable	Plating	Dimensions A	Dimensions B	M/A-COM Part No. (Ref. Only)	Part No.
RG-402/U **3.58** .141	Gold	**3.7** .144	**4.6** .180	4504-7941-00	**1059410-1**
RG-405/U **2.16** .085	Gold	**2.3** .089	**3.0** .120	4504-7985-00	**1059412-1**

Flange Mount Cable Jack Floating Rear Mount



Cable	Dimensions A	Dimensions B	M/A-COM Part No. (Ref. Only)	Part No.
RG-402/U **3.58** .141	**3.7** .144	**4.6** .180	4506-7941-02	**1059453-1**
RG-405/U **2.16** .085	**2.3** .089	**3.0** .120	4506-7985-02	**1059456-1**

Finish: Inner housing that is soldered to cable is gold plated. Outer housing is passivated stainless steel.
When using semi-rigid cable, it is recommended that a service loop be used to facilitate the float features of the connector.

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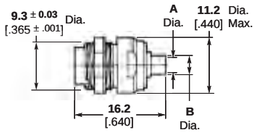
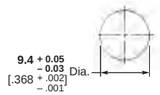
For Semi-Rigid Cable, 2.16 [.085] and 3.58 [.141] Dia., Direct Solder Attachment (Continued)

Low Profile – Bulkhead Feedthrough Cable Jack – Floating Rear Mount



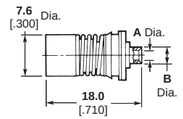


Recommended Mounting Hole

Cable	Plating	Dimensions A	Dimensions B	M/A-COM Part No. (Ref. Only)	Part No.
RG-402/U **3.58** .141	Gold	**3.7** .144	**4.6** .180	4522-7941-02	**1059505-1**
RG-405/U **2.16** .085	Gold	**2.3** .089	**3.0** .120	4522-7985-02	**104485-1**

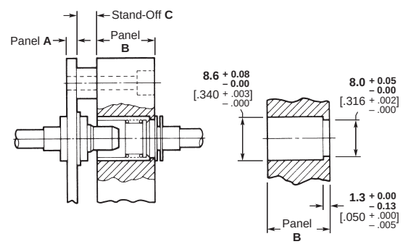
When using semi-rigid cable, it is recommended that a service loop be used to facilitate the float features of the connector.

Low Profile – Panel Feedthrough Cable Jack – Floating Rear Mount



Cable	Plating	Dimensions A	Dimensions B	M/A-COM Part No. (Ref. Only)	Part No.
RG-402/U **3.58** .141	Gold	**3.7** .144	**4.6** .180	4510-7941-00	**1059465-1**
RG-405/U **2.16** .085	Gold	**2.3** .089	**3.0** .120	4510-7985-00	**1059467-1**

Recommended removal tool part number 1059774-1 is described in Tool Section.
When using semi-rigid cable, it is recommended that a service loop be used to facilitate the float features of the connector.



Recommended Mounting Detail

Panel A ±.003	Panel B ±.003	Stand-Off Panel C +.050/–.000
2.3 .090	**9.5** .375	**7.2** .285
2.3 .090	**11.1** .438	**5.6** .222
2.3 .090	**12.7** .500	**4.1** .160
3.2 .125	**9.5** .375	**6.4** .250
3.2 .125	**11.1** .438	**4.7** .187
3.2 .125	**12.7** .500	**3.2** .125

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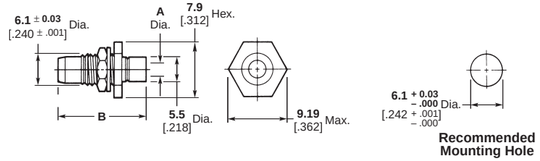
UK: 44-208-420-8341

For Semi-Rigid Cable, 2.16 [.085] and 3.58 [.141] Dia., OSCC Solderless Compression Crimp Attachment

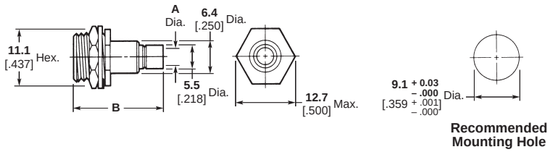
Bulkhead Feedthrough Cable Plug Fixed Rear Mount



Cable	Plating	Dim. A	Dim. B		M/A-COM Part No. (Ref. Only)	Part No.
			Before Crimping	After Crimping		
RG-405/U **2.16** .085	Passivated Stainless Steel	**2.2** .088	**19.8** .782	**17.2** .677	4503-7685-02	**1059399-1**

Outline drawing shows after crimp dimensions.

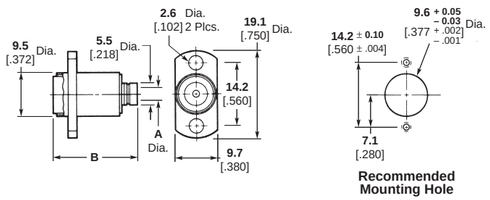
Bulkhead Feedthrough Cable Jack Fixed Rear Mount



Cable	Plating	Dim. A	Dim. B		M/A-COM Part No. (Ref. Only)	Part No.
			Before Crimping	After Crimping		
RG-402/U **3.58** .141	Passivated Stainless Steel	**3.6** .143	**21.1** .830	**18.2** .715	4504-7641-02	**1059408-1**

Outline drawing shows after crimp dimensions.

Flange Mount Cable Jack Floating Rear Mount



Cable	Plating	Dim. A	Dim. B		M/A-COM Part No. (Ref. Only)	Part No.
			Before Crimping	After Crimping		
RG-402/U **3.58** .141	Passivated Stainless Steel	**3.6** .143	**22.6** .891	**19.8** .780	4506-7641-02	**1059451-1**
RG-405/U **2.16** .085	Passivated Stainless Steel	**2.2** .088	**22.6** .891	**19.8** .780	4506-7685-02	**1059452-1**

Outline drawing shows after crimp dimensions.
When using semi-rigid cable, it is recommended that a service loop be used to facilitate the float features of the connector.

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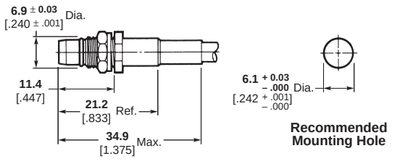
OSP (BMA) Miniature Modular Blind Mate Connectors (Continued)

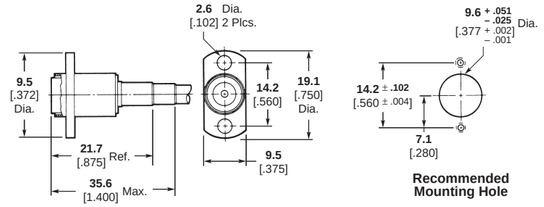
For Flexible Cable, Crimp Attachment

Bulkhead Feedthrough Cable Plug Rear Mount



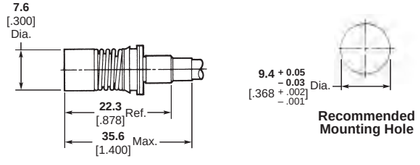
Cable	Plating	M/A-COM Part No. (Ref. Only)	Part No.
RG-174/U, 179, 187, 188, 316	Passivated Stainless Steel	4533-7388-02	**1059523-1**

Flange Mount Cable Jack Floating Rear Mount



Cable	Plating	M/A-COM Part No. (Ref. Only)	Part No.
RG-55/U, 142, 223, 400	Passivated Stainless Steel	4536-7341-02	**1059540-1**
RG-174/U, 179, 187, 188, 316	Passivated Stainless Steel	4536-7388-02	**1059541-1**
RG-178, Double Braid	Passivated Stainless Steel	4536-5014-02	**1058572-1**

Low Profile – Panel Feedthrough Cable Jack – Rear Mount



Cable	Plating	M/A-COM Part No. (Ref. Only)	Part No.
RG-174/U, 179, 187, 188, 316	Passivated Stainless Steel	4540-7388-02	**1059551-1**

Refer to Recommended Mounting Hole Detail for Semi-Rigid Cable Low Profile Feedthrough Cable Jack.
Recommended removal tool part number 1059774-1 is described in Tool Section.

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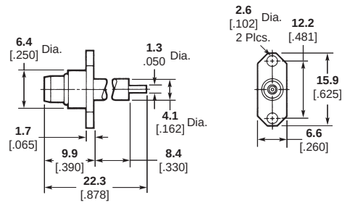
UK: 44-208-420-8341

OSP (BMA) Miniature Modular Blind Mate Connectors (Continued)

Panel Mount

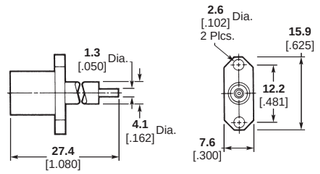
Straight Terminal

2-Hole Flange Mount Plug Receptacle



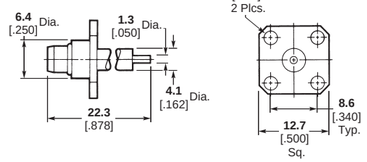
Plating	M/A-COM Part No. (Ref. Only)	Part No.
Passivated Stainless Steel	4551-1352-02	**1049678-1**

2-Hole Flange Mount Jack Receptacle



Plating	M/A-COM Part No. (Ref. Only)	Part No.
Passivated Stainless Steel	4552-1352-02	**1059596-1**

4-Hole Flange Mount Plug Receptacle



Plating	M/A-COM Part No. (Ref. Only)	Part No.
Passivated Stainless Steel	4551-1201-02	**1329846-1**

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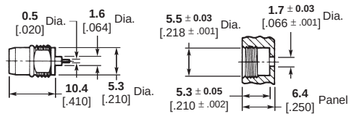
OSP (BMA) Miniature Modular Blind Mate Connectors (Continued)

Panel Mount (Continued)

Straight Terminal

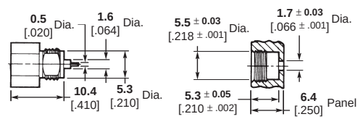
Threaded Installation – Panel Feedthrough Plug Receptacle



Recommended Mounting Hole

Plating	M/A-COM Part No. (Ref. Only)	Part No.
Passivated Stainless Steel	4557-5009-02	**1059617-1**

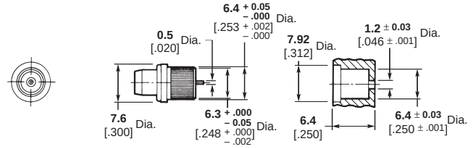
Threaded Installation – Panel Feedthrough Jack Receptacle



Recommended Mounting Hole

Plating	M/A-COM Part No. (Ref. Only)	Part No.
Passivated Stainless Steel	4558-5009-02	**1059657-1**

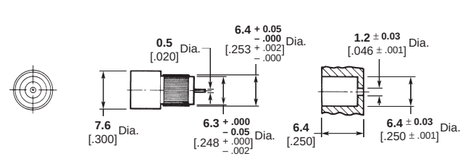
Press Fit Installation – Panel Feedthrough Plug Receptacle



Recommended Mounting Hole

Plating	M/A-COM Part No. (Ref. Only)	Part No.
Passivated Stainless Steel	4557-5368-02	**1059651-1**

Press Fit Installation – Panel Feedthrough Jack Receptacle



Recommended Mounting Hole

Plating	M/A-COM Part No. (Ref. Only)	Part No.
Passivated Stainless Steel	4558-1154-02	**1059654-1**

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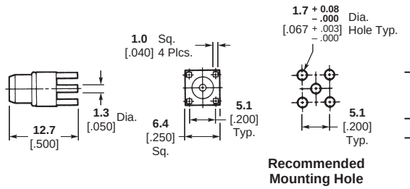
OSP (BMA) Miniature Modular Blind Mate Connectors (Continued)

Panel Mount (Continued)

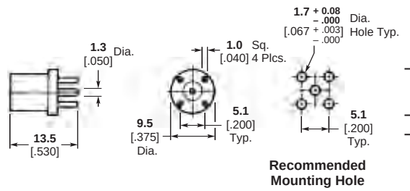
Straight Terminal Printed Circuit Board

Straight Plug Receptacle – Captured Contact



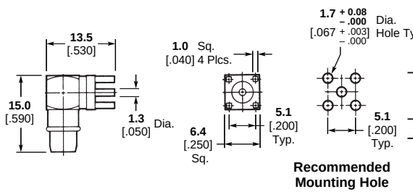
Plating	M/A-COM Part No. (Ref. Only)	Part No.
Gold	4563-0000-00	**1059684-1**

Straight Jack Receptacle – Captured Contact



Plating	M/A-COM Part No. (Ref. Only)	Part No.
Gold	4562-0000-00	**1059681-1**

Right Angle Plug Receptacle – Captured Contact



Plating	M/A-COM Part No. (Ref. Only)	Part No.
Gold	4565-0000-00	**1059691-1**

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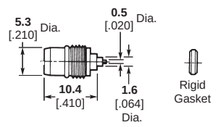
OSP (BMA) Miniature Modular Blind Mate Connectors (Continued)

Hermetically Sealed

Metal-To-Metal

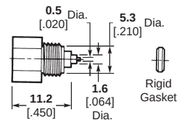
Rigid Gasket Seal – Panel Feedthrough Plug Receptacle



VSWR (GHz)	RF Leakage (dB)	Plating	M/A-COM Part No. (Ref. Only)	Part No.
1.04 + .009f	–(90-fGHz)	Passivated stainless steel	4557-5119-02	**1059632-1**

Installation Thermal Limit: 250°C.
Recommended Mounting Hole Detail A follows, page 1-52.

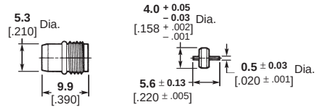
Rigid Gasket Seal – Panel Feedthrough Jack Receptacle



VSWR (GHz)	RF Leakage (dB)	Plating	M/A-COM Part No. (Ref. Only)	Part No.
1.04 + .009f	–(90-fGHz)	Passivated stainless steel	4558-5119-02	**1059665-1**

Installation Thermal Limit: 250°C.
Recommended Mounting Hole Detail A follows, page 1-52.

Field Replaceable Solder and Braze-In Panel Feedthrough Plug Receptacle



VSWR (GHz)	RF Leakage (dB)	Plating	M/A-COM Part No. (Ref. Only)	Part No.
1.06 + .01f	–(90-fGHz)	Passivated stainless steel	4557-5329-02	**1059637-1**

Recommended Mounting Detail B or E follows, page 1-52.

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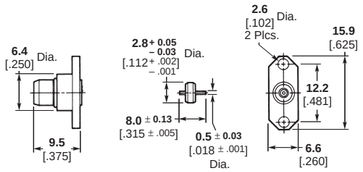
UK: 44-208-420-8341

OSP (BMA) Miniature Modular Blind Mate Connectors (Continued)

Hermetically Sealed
(Continued)

2-Hole Flange Mount Plug Receptacle With EMI/RFI Gasket – 0.5 [.018] Dia. Contact

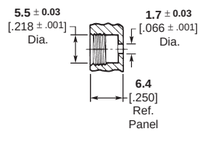


VSWR (GHz)	RF Leakage (dB)	Plating	M/A-COM Part No. (Ref. Only)	Part No.
1.06 + .01f	–(90-fGHz)	Passivated stainless steel	4551-3357-02	**1059572-1**

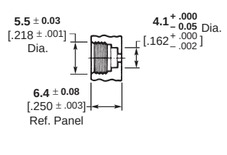
Recommended Mounting Detail D follows at bottom of this page.

Recommended Mounting Hole Detail

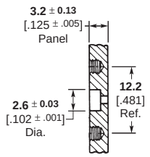
Detail A*



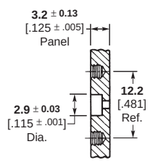
Detail B* (6.35 [.250] Panel Thickness)



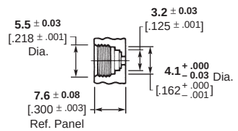
Detail C*



Detail D*



Detail E*



*Consult appropriate Instruction Sheet for complete mounting details.

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OSSP Subminiature Modular Blind Mate Connectors

Features

- Subminiature version of OSP (BMA) Blind Mate Connectors
- For space savings
- Family of connectors and adapters

METRIC

Dimensions in this OSSP section are millimeters over inches. All other pages are inches over millimeters.

OSSP connectors are a subminiature version of the OSP (BMA) blind mate series. Connectors in this series incorporate the design elements of the OSP (BMA) interface including the float and mismate features. OSSP blind mates are about 40% smaller than OSP (BMA) connectors and are designed to be used in applications where space is at a premium.

A complete family of OSSP connectors and adapters is available including cable connectors, fixed and float mount panel connectors and hermetic connectors. Rigid mount units will function to specifications up to ±.064 [±.0025] radial misalignment with the mating plug connector. Applications requiring greater than ±.064 [±.0025] radial misalignment can use either the float design or floating connector plates with guide pins.

Engineering Data

Impedance —	50 ohms
Frequency —	dc to 28.0 GHz
Temperature Rating —	-65° to 125° C

Electrical

	RG-405 (.085) Semi-Rigid
VSWR —	1.05 + .01f (GHz)
RF Transmission Loss —	.040 x $\sqrt{f}$ (GHz)
Insulation Resistance —	5,000 megohms min.
Contact Resistance —	
Center Contact	6.0 milliohms max.
Outer Contact	3.0 milliohms max.
Outer Contact to Cable	0.5 milliohms max.
Dielectric Withstanding Voltage —	675 volts RMS
Corona Extinction Voltage at 70,000 Ft.—	250 volts min.
RF High Potential at 5 MHz —	675 volts RMS
RF Leakage Interface Only —	-(90-fGHz) dB min. (fully mated)
Power Handling —	300W at 3 GHz (sea level) and room temperature

Environmental

Corrosion —	Method 101, Condition B, MIL-STD-202
Vibration —	Method 204, Condition D, 20G's, MIL-STD-202
Shock —	Method 213, Condition I, 100G's, MIL-STD-202
Temperature Cycling —	Method 107, Condition B, MIL-STD-202
Moisture Resistance —	Method 106, MIL-STD-202

Material

Housing —	Corrosion resistant steel Type 303 (stainless) per ASTM A484 and A582
Center Contact —	Beryllium copper per ASTM-B-196
Dielectric —	TFE fluorocarbon per ASTM-D-1457
Gasket (O'Ring) —	MIL-P-25732

Mechanical

Force to Engage —	3 pounds max.
Force to Disengage —	1.5 pounds max.
Center Contact Retention —	4 pounds min.
Durablilty —	1,000 Cycles
Radial Misalignment —	
Rigid Mount	±.06 [±.0025]
Float Mount	±.51 [±.020]

Mating Characteristics

Jack Connector —

Center Contact Socket	Oversize test Pin —	.533 + .003 [.0210 + .0001] dia.
	Test Pin Finish —	16 micro inch max.
	Insertion Depth —	.76/1.14 [.030/.045]
	Number of Insertions —	3
Insertion Force	Test Pin —	.528 + .003 [.0208 + .0001] dia.
	Test Pin Finish —	16 micro inch
	Insertion Force —	3 pounds max.
Withdrawal Force	Test Pin —	.495 + .003 [.0195 - .0001] dia.
	Test Pin Finish —	16 micro inch max.
	Insertion Depth —	1.27/1.91 [.050/.075]
	Withdrawal —	1/2 ounce min.

Finish

Center Contact —	Gold plate per MIL-G-45204, Type II, Class 0 over nickel plate per QQ-N-290, Class 2 or passivate per ASTM-A380
Housing —	Gold plate per MIL-G-45204, Type II, Class 0 over nickel plate per QQ-N-290, Class 2 or passivate per ASTM-A380

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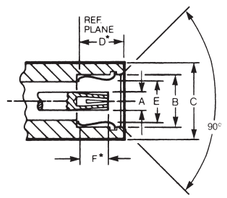
OSSP Subminiature Modular Blind Mate Connectors (Continued)

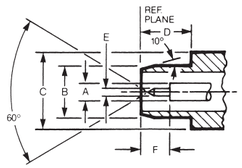
Interface Mating Dimensions

The connector interface, specifically designed for multiple interconnects, maintains reliable performance over the typical mechanical tolerance required in cost effective packaging.

The interface test data shows excellent performance is maintained with mating gaps up to .015 inch.



Jack



Plug

Description	Dimensions					
	A	B	C	D	E	F
Jack	**1.22** 0.48 Nom.	**3.91** .154 Min.	**5.33** .210 Ref.	**5.00** .197 Nom.*	**3.35** .132 Max.	**3.23** .127 Max.*
Plug	**1.22** 0.48 Nom.	**3.56** .140 Nom.	**5.33** .210 Ref.	**5.00** .199 Min.	**0.51** .020 Nom.	**3.25** .128 Min.

*With spring bottomed.

Catalog 1308940
Revised 8-06

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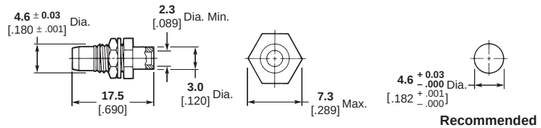
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

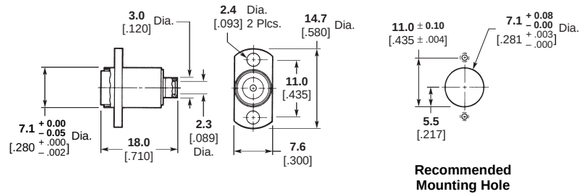
For Semi-Rigid Cable, 2.16 [.085] Dia., Direct Solder Attachment

Bulkhead Feedthrough Cable Plug — Rear Mount



Cable	Plating	M/A-COM Part No.	Part No.
RG-405/U, **2.16** [.085]	Gold	4703-7985-00	**1255511-1**

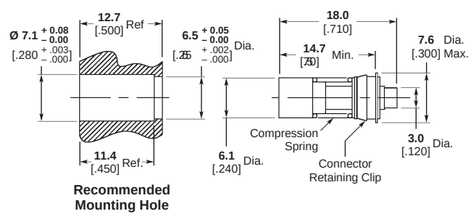
Flange Mount Cable Jack — Floating Rear Mount



Cable	M/A-COM Part No.	Part No.
RG-405/U, **2.16** [.085]	4706-7985-02	**1059868-1**

Finish: Inner housing that is soldered to cable is gold plated. Outer housing is passivated stainless steel.
When using semi-rigid cable, it is recommended that a service loop be used to facilitate the float features of the connector.

Feedthru Snap-In



Cable	M/A-COM Part No.	Part No.
RG-405/U, **2.16** [.085]	4710-7985-00	**1059874-1**

Catalog 1308940
Revised 8-06

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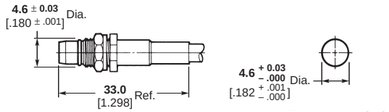
OSSP Subminiature Modular Blind Mate Connectors (Continued)

For Flexible Cable, Crimp Attachment

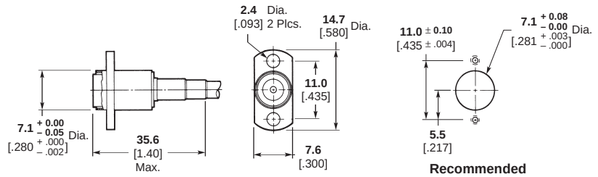
Bulkhead Feedthrough Cable Plug — Rear Mount



Recommended Mounting Hole

Cable	Plating	M/A-COM Part No. (Ref. Only)	Part No.
RG-174/U, 188/U, 316U	Passivated Stainless Steel	4733-7388-02	**1059886-1**

Flange Mount Cable Jack — Floating Rear Mount



Recommended Mounting Hole

Cable	Plating	M/A-COM Part No. (Ref. Only)	Part No.
RG-188/U, 316 Double Braided Only	Passivated Stainless Steel	4736-7316-02	**1059888-1**
RG-174/U, 188/U, 316U	Passivated Stainless Steel	4736-5001-02	**1059887-1**

Catalog 1308940
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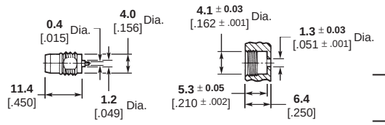
OSSP Subminiature Modular Blind Mate Connectors (Continued)

For Panel Mount

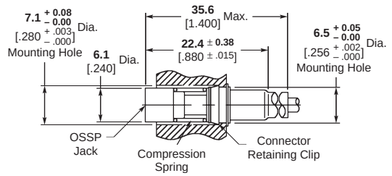
Straight Terminal

Threaded Installation — Panel Feedthrough Plug Receptacle



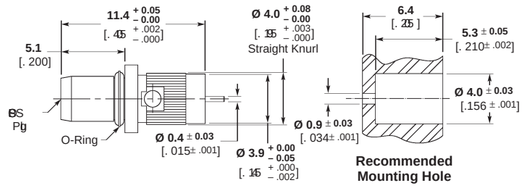
Plating	M/A-COM Part No. (Ref. Only)	Part No.
Passivated Stainless Steel	4757-5006-02	**1059903-1**

Feedthru Snap-In Cable Jack



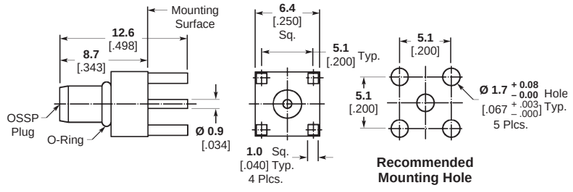
M/A-COM Part No. (Ref. Only)	Part No.
4740-7388-00	**1059889-1**

PCB Vertical Plug



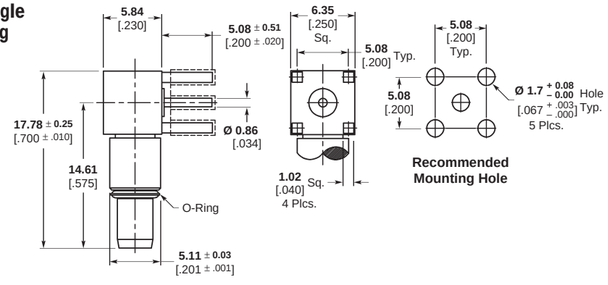
M/A-COM Part No. (Ref. Only)	Part No.
4757-1154-02	**1059901-1**

Press-In Plug



M/A-COM Part No. (Ref. Only)	Part No.
4763-0000-00	**1059919-1**

PCB Right Angle Bulkhead Plug



Part No.
1484546-1

Catalog 1308940
Revised 8-06

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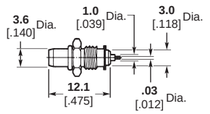
OSSP Subminiature Modular Blind Mate Connectors (Continued)

Hermetically Sealed

Metal to Metal

Formable Gasket — Panel Feedthrough Plug Receptacle

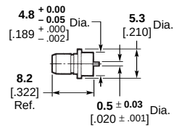


VSWR (GHz)	RF Leakage (dB)	Plating	M/A-COM Part No. (Ref. Only)	Part No.
1.06 + .01f	–(85-fGHz)	Gold	4757-5014-00	**1059905-1**

Recommended Mounting Hole Detail A at bottom of this page.

Solder and Braze-In

Panel Feedthrough Plug Receptacle

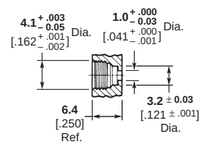


VSWR (GHz)	RF Leakage (dB)	Plating	M/A-COM Part No. (Ref. Only)	Part No.
1.06 + .01f	–(85-fGHz)	Gold	4757-3204-00	**1059902-1**

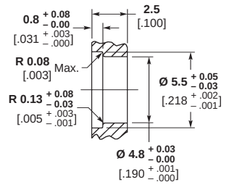
Recommended Mounting Hole Detail B at bottom of this page.

Recommended Mounting Hole Detail for Hermetically Sealed

Detail A*



Detail B*



*Consult appropriate Instruction Sheet for complete mounting procedure.

Catalog 1308940
Revised 8-06

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SMP Microminiature Push-On Coaxial Connectors

Features

- Intermateable with Gilbert GPO™ Series
- Enhanced performance features
- Simplified Assembly
- DSCC Approved

SMP microminiature push-on coaxial connectors provide solutions for today's modular designs with denser packaging requirements. The extremely small size of the SMP offers a versatile solution for high density packaging allowing connector center-to-center spacing of 0.17 [4.32]. The push-on interface facilitates easier assembly and test with a positive snap-in feature to indicate a fully mated connection. The rugged SMP interface can better withstand harsh environments of mechanical shock and vibration, typically found in military or aerospace related applications. This SMP connector interface is the standard used by Defense Electronics Supply Center (DSCC) to generate the SMP push-on connector series. For DSCC Part Numbers, see page 2-32.

SMP connectors can be your design solution for mechanical packaging and frequency response. The SMP interface provides 0.010" of radial misalignment for critical blindmate applications. Mating forces are strictly controlled for reliable connections per mated pair or when simultaneously mating multiple connectors. Cable jacks include an anti-rocking ring for reliable mechanical performance for harsh operating environments. SMP connectors offer enhanced broadband VSWR performance of 1.15:1 max thru 26.5GHz and 1.70:1 max thru 40GHz.

Standard design SMP configurations include cable connectors, straight and right-angle, for 0.047 and 0.085 semi-rigid cable, full detent, limited detent and smooth bore mating shrouds that can be bulkhead or flange mounted and glass feedthroughs for coax to circuit launchers. In-series adapters for module-to-module intermating and between series adapters for integrating or testing systems or components parameters.

SMP Shroud and Jack-to-Jack Adapter Assembly

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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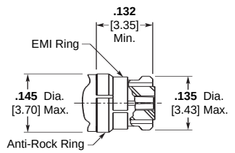
SMP Microminiature Push-On Coaxial Connectors (Continued)

Specifications

General		
Materials and Finishes		
Housings and Center Contacts	Beryllium Copper per ASTM-B-196; gold plate over nickel plate	
Dielectric	PTFE Fluorocarbon per ASTM-D-1457	
Shrouds	Stainless steel per ASTM-A582 Type 303; passivate per ASTM-A380	
Hermetic Seal	Glass bead	
Electrical		
Frequency Range	dc - 40.0 GHz	
VSWR	1.10:1 Maximum dc - 23.0 GHz 1.15:1 Maximum 23.0 - 26.5 GHz 1.70:1 Maximum 40.0 GHz	
Voltage Rating	335 Vrms maximum at sea level	
Insertion Loss	$0.10\ f\sqrt{(GHz)}$ dB	
Insulation Resistance	5000 megohms minimum	
Dielectric Withstanding Voltage	500 volts (VRMS minimum)	
RF High Potential	325 volts (VRMS minimum) @ 5 MHz	
Impedance	50 ohms nominal	
RF Leakage	-80dB to 3 GHz, -65dB from 3 to 26.5 GHz minimum	
Contact Resistance	Initial center contact 6.0 milliohms maximum Outer contact 2.0 milliohms maximum	
Mechanical		
Durability	100 mating cycles minimum - (full detent)	
Radial Misalignment	±0.010 minimum	
Axial Misalignment	.000/.010	
Force to Engage	full detent limited detent smooth bore	15.0 lbs. maximum 10.0 lbs. maximum 2.0 lbs. maximum
Force to Disengage	full detent limited detent smooth bore	5.0 lbs. minimum 2.0 lbs. minimum 0.5 lbs. minimum
Center Contact Retention	1.5 lbs. minimum axial force	
Environmental		
Operating Temperature	-85°F to +329°F [-65°C to +165°C]	
Vibration	per MIL-STD-202, method 204, test condition D	
Shock	per MIL-STD-202, method 213, test condition I	
Thermal Shock	per MIL-STD-202, method 107, test condition B	
Moisture Resistance megohms	per MIL-STD-202, method 106, except step 7b shall be omitted. Resistance shall be 1000 within 5 minutes after removal from humidity.	

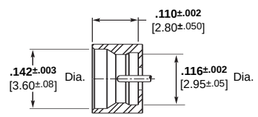
Interface Dimensions

Jack

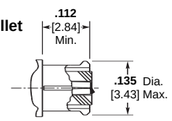


Shroud

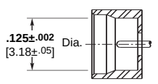
Full Detent



Bullet



Smooth Bore



Note: These dimensions comply with MIL-STD-348.

Catalog 1308940
Revised 8-06

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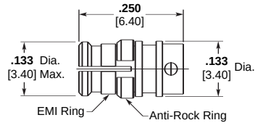
SMP Microminiature Push-On Coaxial Connectors (Continued)

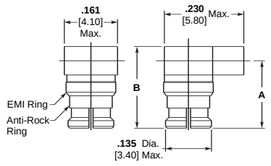
Jacks (Continued)

Straight Cable Jack, Solder Attachment



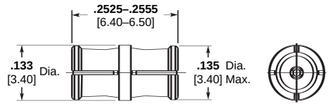
Cable	M/A-COM Part No. (Ref. only)	Part No.
.047 Semi-Rigid	2902-5005-62	1056521-1
.085 Semi-Rigid (RG-405)	2902-5006-62	1056522-1

Right-Angle Cable Jack, Solder Attachment



Cable	Dim. A	Dim. B	M/A-COM Part No. (Ref. only)	Part No.
.047 Semi-Rigid	**.190** 4.80	**.230** 5.80	2908-5006-62	1056550-1
.085 Semi-Rigid (RG-405)	**.209** 5.30	**.265** 6.70	2908-5007-62	1056551-1

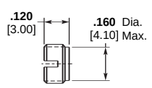
Jack to Jack Adapter (Bullet)



M/A-COM Part No. (Ref. only)	Part No.
2980-5004-62	1056703-1

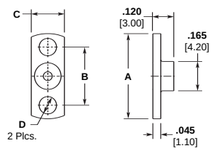
Shrouds

Shroud — Threaded



Description	M/A-COM Part No. (Ref. only)	Part No.
Full Detent	2998-5045-02	1056745-1
Limited Detent	2998-5043-02	1056743-1
Smooth Bore	2998-5044-02	1056744-1

Shroud — 2 Hole Flange Surface Mount



Description	Dim. A	Dim. B	Dim. C	Dim. D	M/A-COM Part No. (Ref. only)	Part No.
Full Detent	**.480** 12.20	**.328** 8.30	**.187** 4.70	**.098** 2.50	2998-5039-02	1056740-1
	.622 15.80	**.480** 12.20	**.224** 5.70	**.102** 2.60	2998-5040-02	1056741-1
	.400 10.20	**.282** 7.20	**.165** 4.20	**.075** 1.90	2998-5041-02	1056742-1
Limited Detent	**.480** 12.20	**.328** 8.30	**.187** 4.70	**.098** 2.50	—	1757024-1
	.622 15.80	**.480** 12.20	**.224** 5.70	**.102** 2.60	—	1757026-1
	.400 10.20	**.282** 7.20	**.165** 4.20	**.075** 1.90	—	1757028-1
Smooth Bore	**.480** 12.20	**.328** 8.30	**.187** 4.70	**.098** 2.50	—	1757025-1
	.622 15.80	**.480** 12.20	**.224** 5.70	**.102** 2.60	—	1757027-1
	.400 10.20	**.282** 7.20	**.165** 4.20	**.075** 1.90	—	1757029-1

For DSCC Part Numbers, see page 2-32.

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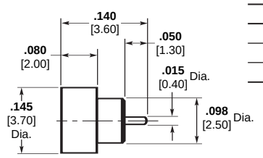
SMP Microminiature Push-On Coaxial Connectors (Continued)

Shrouds (Continued)

Shroud — Press Fit

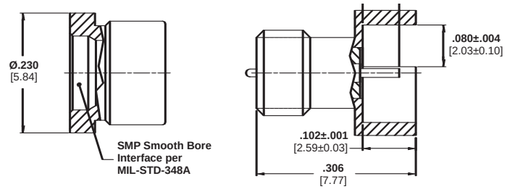
Description	Dim. A	Dim. B	M/A-COM Part No. (Ref. only)	Part No.
Full Detent	.182 4.60	.115 2.90	2998-5005-02	1056726-1
Limited Detent	.174 4.40	.120 3.00	2998-5033-02	1056734-1
	.154 3.90	.080 2.00	2998-5035-02	1056736-1

Shroud — Solder-In Hermetic



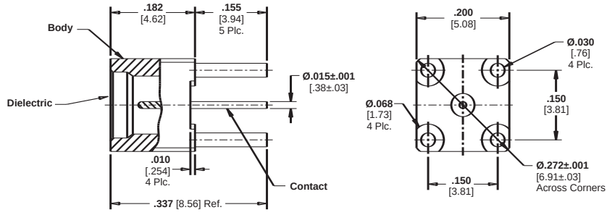
Description	M/A-COM Part No. (Ref. only)	Part No.
Full Detent	2998-5054-94	1056750-1
Limited Detent	2998-5055-94	1056751-1
Smooth Bore	2998-5056-94	1056752-1

PCB Plug, Bulkhead Mount, Smooth Bore



Part No.
1663678-1

PCB Thru-Hole Mount, Smooth Bore



Part No.
1663679-1

Catalog 1308940
Revised 8-06

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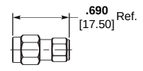
UK: 44-208-420-8341

SMP Microminiature Push-On Coaxial Connectors (Continued)

Between Series Adapters

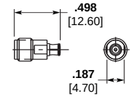
Between Series Coaxial Transmission Line Adapters provide convenient transitions between popular series coaxial connectors. The adapter design provides a minimum length consistent with good electrical performance. The small size, low VSWR, and broad frequency coverage permits a wide range of applications in both measurement and systems use.

SMA Plug – OSMP Plug



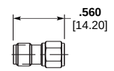
Part Number 1056706-1
M/A-COM Part No. (Ref. only)
2981-2241-00

SMA Jack – OSMP Jack



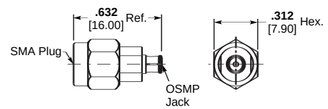
Part Number 1056702-1
M/A-COM Part No. (Ref. only)
2980-2240-00

SMA Jack – OSMP Plug



Part Number 1056707-1
M/A-COM Part No. (Ref. only)
2982-2240-00

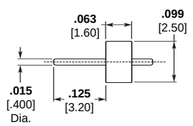
OSMP Jack – SMA Plug



Part Number 1056708-1
M/A-COM Part No. (Ref. only)
2982-2241-00

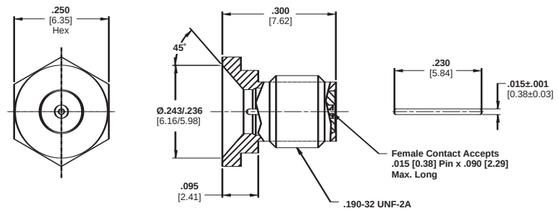
Miscellaneous

Glass Bead Assembly



M/A-COM Part No. (Ref. only)	Part No.
2998-5022-94	1056728-1

Plug Assembly, Thread-In with Sliding Pin



Part No.
1663670-1

Catalog 1308940
Revised 8-06

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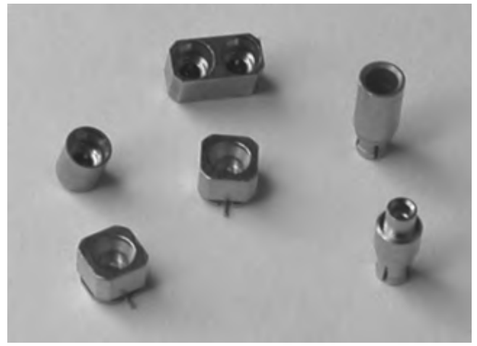
UK: 44-208-420-8341

SMPM Micro-Miniature Push-on Coaxial Connectors

Product Facts

- **Push-on style interconnect, allowing control of the mating forces when mating multiple connectors**
- **30% smaller than SMP interconnects**
- **Complies with MIL-STD-348A**



Description

A high performance micro-miniature, push-on coaxial interconnect system.

Extremely small size interconnection that offers a versatile solution for high density packaging, allowing center-to-center spacing of 0.135".

Applications

Military and Aerospace applications for communi-cations, radar systems, antennas.

Industrial applications that require a rugged, densely packaged RF interconnect system.

Product Offering

- Shrouds; flange mount, thread-in and press-in (full detent and smooth bore)
- Hermetic shrouds (single and dual positions)
- Edge mount PCB shrouds
- Thru-hole mount PCB shrouds
- Surface mount PCB shrouds (full detent, smooth bore and catcher's mitt designs)
- Adapters, custom lengths and spring loaded options
- Straight and right-angle jacks for .047 cable

Electrical Performance

VSWR — 1.40:1 max. to 40 GHz

Impedance — 50 ohm

Mechanical

Force to Engage —
Full detent — 4.25 lbs. typical
Smooth Bore — 2.5 lbs. typical

Force to Disengage —
Full detent — 6.5 lbs typical
Smooth Bore — 1.5 lbs. typical

Radial Misalignment — ± .010"

Material and Finish

Housings and Center Contacts — Beryllium Copper per ASTM-B-196; gold plate over nickel plate

Dielectric — PTFE Fluorocarbon per ASTM-D-1457

Shrouds — Stainless steel per ASTM-A582 Type 303; passivate per ASTM-A380

Hermetic Seal — Glass bead

Standards and Specifications

MIL-STD-348A

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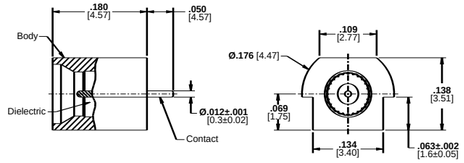
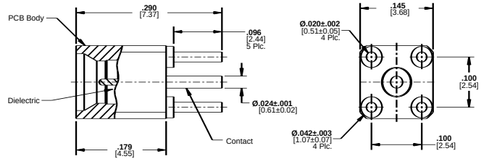
SMPM Micro-Miniature Push-on Coaxial Connectors (Continued)

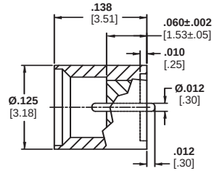
PCB Edge Mount
Part Number 1757640-1



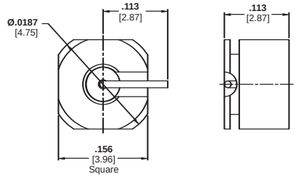
Vertical, Thru-Hole PCB Mount
Part Number 1757644-1



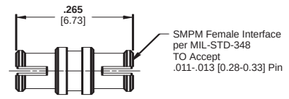
Hermetic Smooth Bore
Part Number 1663433-1



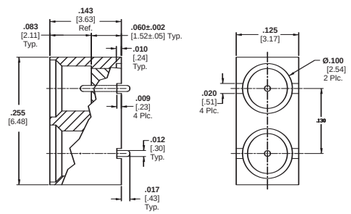
PCB Surface Mount, Smooth Bore
Part Number 1757253-1



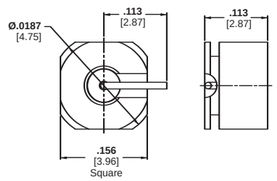
Female Bullet Adapter
Part Number 1757256-1



Hermetic, Smooth Bore, 2 Position
Part Number 1663434-1



PCB Surface Mount, Full Detent
Part Number 1757254-1



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OSMM Microminiature Connectors

The microminiature series has been developed to meet the increasing demand for smaller connector size. This series is small, but still very rugged for its relative size.

The interface mating design insures precise outer shell alignment before engagement of the inner contacts. The OSMM Series is compatible with smaller diameter semi-rigid cable.

Design and Construction

All shell and body parts are made of stainless steel for ruggedness and long life. The dielectric is PTFE fluorocarbon. The center contacts are made of beryllium copper, gold plated. The coupling thread is .138-40 UNF thread.

Types

The OSMM Series connectors are available for appropriate size semi-rigid and flexible coaxial cables. Panel and bulkhead mount are also available to provide complete flexibility to component and system design.

Application

Typical applications include requirements from low RF to high microwave frequencies. The higher order moding for this series is above 45.0 GHz, but the primary feature is the microminiature size.

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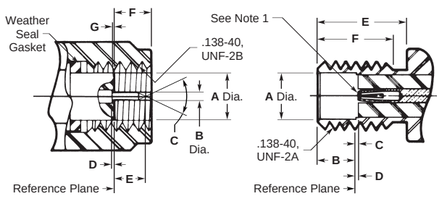
Interface Mating Dimensions



Plug

Dim.	Min.	Max.
A	**.0930** 2.36	**.0946** 2.43
B	**.0150** 0.38	**.0163** 0.42
C	60°	90°
D	**.000** 0.00	**.010** 0.25
E	**.055** 1.40	**.070** 1.78
F	**.065** 1.65	**.099** 2.29
G	**.000** 0.00	**.010** 0.25

Jack

Dim.	Min.	Max.
A	**.096** 2.44	**.097** 2.46
B	**.076** 1.98	**.082** 2.08
C	**.000** 0.00	**.010** 0.25
D	**.000** 0.00	**.010** 0.25
E	**.175** 4.45	—
F	**.140** 3.56	—

1. ID to meet VSWR and contact resistance when mated with .0155 +.0008/-.0005 [0.0394 +.0203/-.0127] dia. pin.
2. When fully engaged, the two reference planes must coincide with metal to metal contact.

Specifications

Requirement	MIL-C-39012 Applicable Paragraph	Detail
General		
Material	3.3	Steel corrosion resistant per ASTM-A-582 and ASTM-A-484, Type 303. Beryllium copper per ASTM B 196. PTFE Fluorocarbon per ASTM-D-1457.
Finish which	3.31	Center contacts shall be gold plated to a min. thickness of .00005 [0.0013] in accordance with MIL-G-45204, Typ I, Grade C. All other metal parts shall be finished as to provide a connector meets the corrosion requirements.
Design	3.4	The design shall be such that the outline shown in this catalog and the interface dimensions of MIL-STD-348A are met.
Electrical		
Insulation Resistance	3.11	The insulation resistance shall not be less than 5,000 megohms.
Corona Level	3.22	The connector shall not exhibit breakdown when the voltage is 150 volts rms at 70,000 ft.
Dielectric Withstanding Voltage	3.17	The magnitude of the test voltage shall be 500 volts rms at sea level.
RF HIgh Potential	3.23	The withstanding voltage is 375 volts rms at 5 MHz. Leakage current is not applicable.
Contact Resistance	3.16	Center contact resistance: 3.5 milliohms max. Outer contact resistance: 2.8 milliohms max.
VSWR	3.14	No military slash sheet applies. Consult factory. Frequency range dependent on cable used.
RF Leakage	3.26	No military slash sheet applies. Consult factory.
Insertion Loss	3.27	No military slash sheet applies. Consult factory. Frequency range dependent on cable used.
Mechanical		
Force to Engage	3.5.1	The torque required to engage and disengage shall not exceed 1 in.-lbs. The longitudinal force is not applicable.
Coupling Nut Retention	3.25	40 lbs. min. Applicable for plug connectors only.
Coupling Proof Torque	3.6	4 in.-lbs. min. Applicable for plug connectors only.
Cable Retention	3.24	No military slash sheet applies. Consult factory.
Mating Characteristics max.	3.7	Applicable to jack connectors only. Oversize pin .0165 [0.419] min. dia., .045 [1.14] deep; insertion force 3 lbs. max. with .0163 [0.414] min. dia. pin; withdrawal force 0.5 oz. min. with .015 [0.38] dia. pin.
Connector Durability	3.15	The connector to be tested and its mating connector shall be subjected to 500 insertion and withdrawal cycles at 12 cycles per minute max. The connector shall show no evidence of mechanical failure and shall meet the mating characteristic requirements.
Recommended Mating Torque	—	2 in.-lbs.
Environmental		
Vibration	3.18	Specification MIL-STD-202, method 204, test condition D.
Shock	3.19	Specification MIL-STD-202, method 213, test condition I.
Thermal Shock	3.20	No military slash sheet applies. Consult factory.
Corrosion (Salt Spray)	3.13	Specification MIL-STD-202, method 101, test condition B.
Moisture Resistance	3.21	Specification MIL-STD-202, method 106. No measurements at high humidity. Insulation resistance

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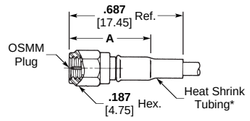
OSMM Microminiature Connectors (Continued)

For Flexible and Semi-Rigid Cables

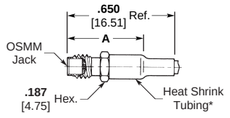
Straight Cable Plug



Cable	Attachment	Dim. A	M/A-COM Part No. (Ref. only)	Part Number
RG 196/U Flexible	Crimp	.450 11.40 Ref.	4031-7196-00	1059057-1
.047 Dia.* Semi-Rigid	Direct Solder	.360 9.20 Ref.	4001-7947-00	1058955-1

* Semi-rigid versions do not use heat shrink tubing.
Finish: Gold plate.

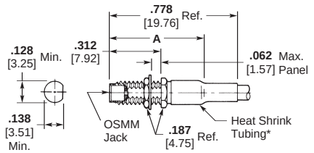
Straight Cable Jack



Cable	Attachment	Dim. A	M/A-COM Part No. (Ref. only)	Part Number
.047 Dia.* Semi-Rigid	Direct Solder	.330 8.40 Ref.	4002-7947-00	1058958-1

* Semi-rigid versions do not use heat shrink tubing.
Finish: Gold plate.

Bulkhead Feedthrough Cable Jack

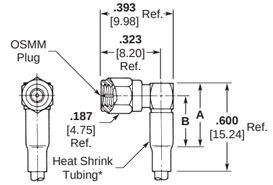


Recommended Mounting Hole

Cable	Attachment	Dim. A	M/A-Com Part No. (Ref. only)	Part Number
RG 196/U Flexible	Crimp	.565 14.40 Ref.	4034-7196-00	1059060-1
.047 Dia.* Semi-Rigid	Direct Solder	.458 11.60 Ref.	4004-7947-00	1058990-1

* Semi-rigid versions do not use heat shrink tubing.
Finish: Gold plate.

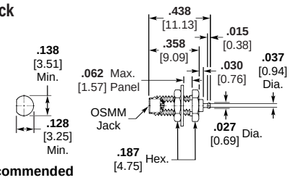
Right-Angle Cable Plug



Cable	Attachment	Dim. A	Dim. B	M/A-Com Part No. (Ref. only)	Part Number
.047 Dia.* Semi-Rigid	Direct Solder	.256 6.50 Ref.	.178 4.50 Ref.	4007-7947-00	1058993-1

* Semi-rigid versions do not use heat shrink tubing.
Finish: Gold plate.

Bulkhead Feedthrough Jack

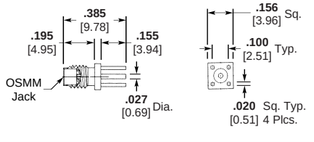


Recommended Mounting Hole

Description	M/A-COM Part No. (Ref. only)	Part Number
Captured Center Contact* Turret Terminal Rear Mount	4056-0000-00	1059073-1

* Contact captivation per U.S. patent number 3,292,117.
Finish: Gold plate.

Printed Circuit Board Straight Jack



Description	M/A-COM Part No. (Ref. only)	Part Number
Captured Center Contact* Straight Terminal	4062-0000-00	1059081-1

* Contact captivation per U.S. patent number 3,292,117.
Finish: Gold plate.

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SSMA Subminiature Coaxial Connectors

Introduction

The success of the SMA connector created a need for a smaller version for reduced packaging requirements. The SSMA series was designed to a size compatible with smaller diameter semi-rigid cable. The coupling thread is 10-36 UNS thread.

Design and Construction

As with the SMA series, all shell and body parts are made of stainless steel for ruggedness and long life. The dielectric is solid PTFE fluorocarbon. The center contacts are made of beryllium copper, gold plated.

Types

SSMA connectors are available for both semi-rigid and flexible coaxial cable. Panel and bulkhead mount, strip transmission line type, microstrip transmission type and hermetically sealed connectors and in-series adapters give designers complete flexibility for component and system design.

Upper Operating Frequency Limits

The standard SSMA series allows operation to 38.0 GHz. The extended frequency SSMA series allows high order mode free operation beyond 40.0 GHz. The extended frequency series directly mates with the standard SSMA series with minimum discontinuity.

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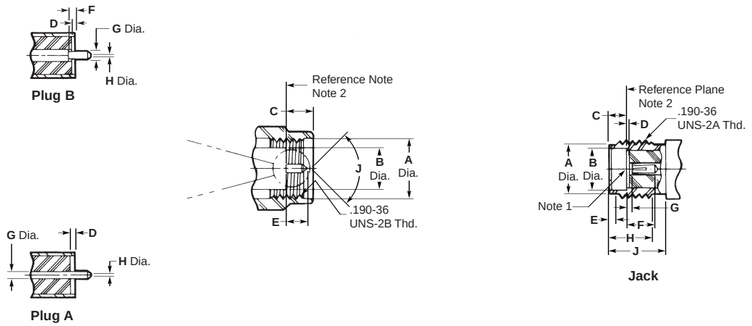
SSMA Subminiature Coaxial Connectors (Continued)

Interface Mating Dimensions



Plug

Dim.	Min.	Max.
A	**.196** 4.98	**.202** 5.13
B	**.124** 3.15	**.127** 3.22
C	**.100** 2.54	**.133** 3.38
D	**.000** 0.00	**.007** 0.25
E	**.050** 1.27	**.065** 1.65
F	**.000** 0.00	**.010** 0.25
G	**.020** 0.50	**.021** 0.53
H	**.000** 0.00	**.010** 0.25
J	70°	95°

Jack

Dim.	Min.	Max.
A	**.153** 3.89	**.160** 4.06
B	**.127** 3.23	**.130** 3.30
C	**.075** 1.91	**.077** 1.96
D	**.000** 0.00	**.007** 0.25
E	**.020** 0.51	**.040** 1.02
F	**.075** 1.91	—
G	**.000** 0.00	**.010** 0.25
H	**.190** 4.83	**.210** 5.33
J	**.230** 5.84	—

1. ID to meet VSWR and contact resistance when mated with .020 +.0008/-.0005 [0.51 +.0203/-.0127] dia. pin.
2. When fully engaged, the two reference planes must coincide with metal to metal contact.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

SSMA Subminiature Coaxial Connectors (Continued)

Specifications

General	
Materials	Steel corrosion resistant per ASTM-A-582 and ASTM-A-484, Type 303. Beryllium copper per ASTM B 196. PTFE Fluorocarbon per ASTM-D-1457.
Finishes which	Center contacts shall be gold plated to a min. thickness of .00005 [0.0013] in accordance with MIL-G-45204, Typ I, Grade C. All other metal parts shall be finished as to provide a connector meets the corrosion requirements.
Design	The design shall be such that the outline shown in this catalog and the interface dimensions of MIL-STD-348A are met.
Electrical	
Insulation Resistance	The insulation resistance shall not be less than 5,000 megohms.
Corona Level	The connector shall not exhibit breakdown when the voltage is 190 volts rms at 70,000 ft.
Dielectric Withstanding Voltage	The magnitude of the test voltage shall be 750 volts rms at sea level.
RF HIgh Potential	The withstanding voltage is 500 volts rms at 5 MHz. Leakage current is not applicable.
Contact Resistance	Center contact resistance: 2 milliohms max. Outer contact resistance: 2 milliohms max.
VSWR	Refer to applicable military slash sheet or consult factory. Frequency range dependent on cable used.
RF Leakage	Refer to applicable military slash sheet or consult factory.
Insertion Loss	Refer to applicable military slash sheet or consult factory. Frequency range dependent on cable use.
Mechanical	
Force to Engage	The torque required to engage and disengage shall not exceed 2 in.-lbs. The longitudinal force is not applicable.
Coupling Nut Retention	60 lbs. min. Applicable for plug connectors only.
Coupling Proof Torque	5 in.-lbs. min. Applicable for plug connectors only.
Cable Retention	Refer to applicable military slash sheet or consult factory.
Mating Characteristics	Applicable to jack connectors only. Reference MIL-STD-348A for dimensions; oversize pin .021 [0.53] min. dia., .045 [1.14] deep; insertion force 3 lbs. max. with .0208 [0.528] min. dia. pin; withdrawal force 1 oz. min. with .0195 [0.495] max. dia. pin.
Connector Durability	The connector to be tested and its mating connector shall be subjected to 500 insertion and withdrawal cycles at 12 cycles per minute max. The connector shall show no evidence of mechanical failure and shall meet the mating characteristic requirements.
Recommended Mating Torque	5 in.-lbs.
Environmental	
Vibration	Specification MIL-STD-202, method 204, test condition D.
Shock	Specification MIL-STD-202, method 213, test condition I.
Thermal Shock	Refer to applicable military slash sheet or consult factory.
Corrosion (Salt Spray)	Specification MIL-STD-202, method 101, test condition B.
Moisture Resistance	Specification MIL-STD-202, method 106. No measurements at high humidity. Insulation resistance shall be at least 200 megohms within 5 minutes of removal from humidity.

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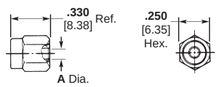
SSMA Subminiature Coaxial Connectors (Continued)

For Semi-Rigid Cable

.085 [2.16] Dia. Direct Solder Attachment

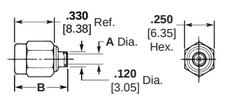
Straight Cable Plug (Without Center Contact)



M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	RG/U Cable	Cable Dielectric
1001-7985-02	1045370-1	.088 2.22 Min.	405	Solid PTFE

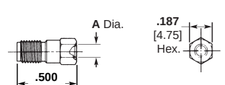
Electrical
DC — 40.0 GHz

Straight Cable Plug (With Center Contact)



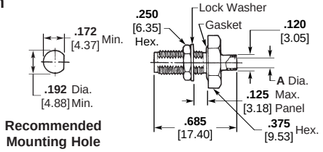
M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	Dim. B	RG/U Cable	Cable Dielectric
1001-5004-02	1045351-1	.088 2.22 Min.	.447 11.35 Ref.	405	Solid PTFE

Straight Cable Jack (With Center Contact)



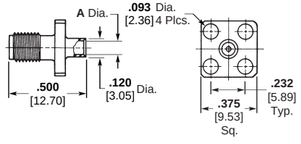
M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	RG/U Cable	Cable Dielectric
1002-7985-00	1045381-1	.088 2.22 Min.	405	Solid PTFE

Bulkhead Feed-through Cable Jack



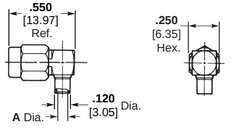
M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	RG/U Cable	Cable Dielectric
1004-7985-00	1045401-1	.088 2.22 Min.	405	Solid PTFE

Flange Mount Cable Jack



M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	RG/U Cable	Cable Dielectric
1006-7985-00	1045410-1	.088 2.22 Min.	405	Solid PTFE

Right-Angle Cable Plug



M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	RG/U Cable	Cable Dielectric
1007-7985-02	1045423-1	.088 2.22 Min.	405	Solid PTFE

Finish: Passivated stainless steel, -02. For gold plated coupling nut, change the Part Number suffix from -02 to -00. Inner housing that is soldered to cable is gold plated.
Refer to recommended assembly tools in Application Tooling Section.

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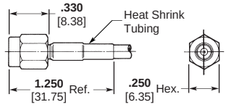
SSMA Subminiature Coaxial Connectors (Continued)

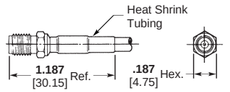
For Flexible Cable — Solder Attachment

Straight Cable Plug[1, 3]



M/A-COM Part No. (Ref. Only)	Part No.	RG/U Cable
1031-5001-02	1045477-1	178/U, 196
1031-5002-02	1045482-1	174/U, 179, 187, 188, 316

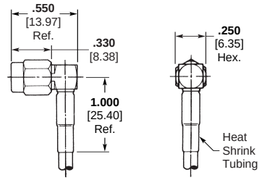
Straight Cable Jack[3]



M/A-COM Part No. (Ref. Only)	Part No.	RG/U Cable
1032-5001-00	1045496-1	178/U, 196
1032-5002-00	1045497-1	174/U, 179, 187, 188, 316

Finish: Gold plated. Inner housing that is soldered to cable is gold plated.

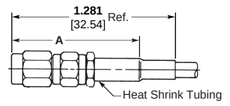
Right-Angle Cable Plug[1]



M/A-COM Part No. (Ref. Only)	Part No.	RG/U Cable
1037-5001-02	1045508-1	178/U, 196
1037-5002-02	1045511-1	174/U, 179, 187, 188, 316

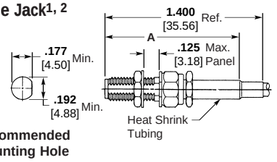
For Flexible Cable — Crimp Attachment

Straight Cable Plug[1, 2]



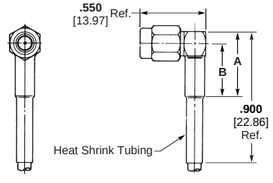
M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	RG/U Cable
1031-7188-02	1045489-1	1.062 26.97 Ref.	174/U, 179, 187, 188, 316

Bulkhead Feed-through Cable Jack[1, 2]



M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	RG/U Cable
1034-7196-02	1045506-1	1.050 26.67 Ref	178/U, 196
1034-7188-02	1045503-1	1.180 29.97 Ref.	174/U, 179, 187, 188, 316

Right-Angle Cable Plug[1, 2]



M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	Dim. B	RG/U Cable
1037-7188-02	1045520-1	.625 15.88 Ref	.525 13.34 Ref.	174/U, 179, 187, 188, 316

Refer to recommended assembly tools in Application Tooling Section.

1. Finish: Passivated stainless steel, -02. For gold plated coupling nut, change the Part Number suffix from -02 to -00.
   Inner housing that is soldered to cable is gold plated.
2. Captured contact.

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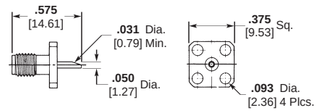
SSMA Subminiature Coaxial Connectors (Continued)

Panel Mount Receptacles

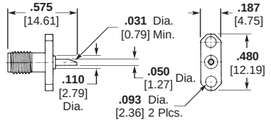
Solder Pot Terminals

Flange Mount Jack Receptacle[1]



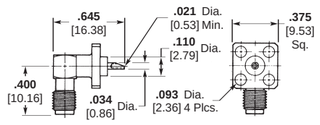
M/A-COM Part No. (Ref. Only)	Part No.
1052-0000-00	1045568-1

Flange Mount Jack Receptacle[1]



M/A-COM Part No. (Ref. Only)	Part No.
1052-1300-02	1045582-1

Flange Mount Jack Receptacle[1]



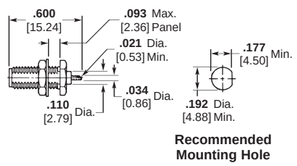
M/A-COM Part No. (Ref. Only)	Part No.
1054-5005-02	1045621-1

Bulkhead Mount Receptacles

Solder Pot Terminals

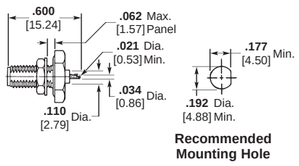
Bulkhead Feed-through Jack Receptacles[1]

Rear Mount



M/A-COM Part No. (Ref. Only)	Part No.
1056-0000-02	1045630-1

Rear Mount (With “O” Ring)

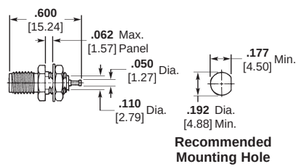


M/A-COM Part No. (Ref. Only)	Part No.
1056-1100-02	1045632-1

Turret Terminal

Bulkhead Feed-through Jack Receptacle[1]

Front Mount



M/A-COM Part No. (Ref. Only)	Part No.
1058-0000-02	1045637-1

Finish: Passivated stainless steel, -02. For gold plate, change the Part Number suffix from -02 to -00.
1. Captured Center Contact.

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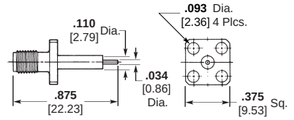
SSMA Subminiature Coaxial Connectors (Continued)

Panel Mount Receptacles

Straight Terminal

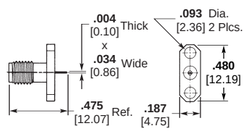
Flange Mount Jack Receptacle[2]



M/A-COM Part No. (Ref. Only)	Part No.
1052-1200-12	1045576-1
1052-1201-02	1045578-1

Tab Terminal

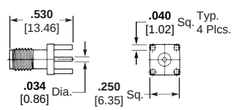
Flange Mount Jack Receptacle[2]



M/A-COM Part No. (Ref. Only)	Part No.
1052-1302-02	1045586-1

Printed Circuit Boards

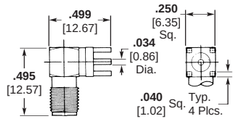
Straight Jack



M/A-COM Part No. (Ref. Only)	Part No.
1062-0000-00	1045672-1

Finish: Gold plate.

Right-Angle Jack

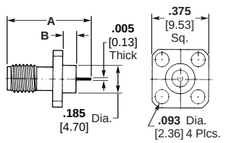


M/A-COM Part No. (Ref. Only)	Part No.
1064-0000-00	1045677-1

Circuits

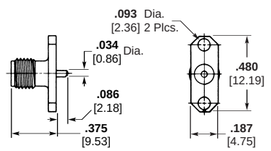
Microstrip Transmission Line Circuits, Flange Mount Jack[1]

Tab Terminal



M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	Dim. B
1052-1132-00	1045573-1	.600 15.24 Ref.	.125 3.18 Ref.

Solderless Compression Terminal



M/A-COM Part No. (Ref. Only)	Part No.
1052-5013-00	1045607-1

Finish: Passivated stainless steel, -02. For gold plate, change the Part Number suffix from -02 to -00.

1. Captured center contact.
2. Non-captured center contact.

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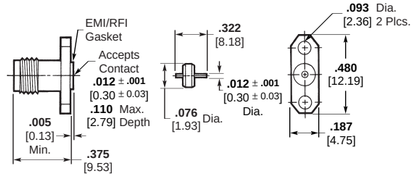
SSMA Subminiature Coaxial Connectors (Continued)

Hermetically Sealed

Metal-To-Metal Hermetic Seal

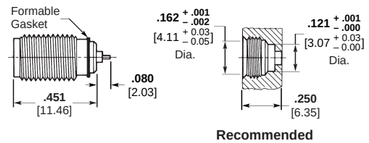
Jack Receptacle With EMI/RFI Gasket, Field Replaceable Solder and Braze-In[1, 4]



M/A-COM Part No. (Ref. Only)	Part No.
1052-3355-02	1045598-1

Electrical
VSWR (GHz) — 1.07 + .011f
RF Leakage (dB) — –(100 – fGHz)

Feed-through Jack Receptacle, Formable Gasket[2, 4]

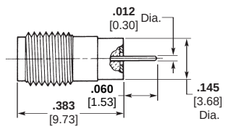


M/A-COM Part No. (Ref. Only)	Part No.
1058-5014-00	1045651-1

Electrical
VSWR (GHz) — 1.05 + .01f
RF Leakage (dB) — –(100 – fGHz)

Mechanical
Installation Thermal Limit — 250°C

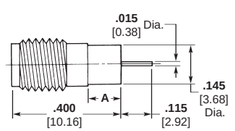
Feed-through Jack Receptacle, Solder and Braze-In[3]



M/A-COM Part No. (Ref. Only)	Part No.
1058-3203-00	1045647-1

Electrical
VSWR (GHz) — 1.05 + .014f
RF Leakage (dB) — –(70 – fGHz)

Panel Feed-through Jack Receptacle, Solder and Braze-In



M/A-COM Part No. (Ref. Only)	Part No.	Dim. A
1058-3121-00	1045643-1	.093 2.36
1058-3122-00	1045645-1	.125 3.18
1058-3123-00	1045646-1	.187 4.75

Finish: Gold plate.

1. Finish: Passivated stainless steel, -02. For gold plate, change the Part Number suffix from -02 to -00.
2. Finish: Gold plate, -00. For passivated stainless steel, change the Part Number suffix from -00 to -02. For nickel plate, change the suffix from -00 to -10.
3. Finish: Gold plate, -00. This unit has a unique self-matching compensation step, allowing direct attachment to the substrate, resulting in minimal package size.
4. Refer to recommended assembly tools in Application Tooling section.

Catalog 1308940
Revised 8-06

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

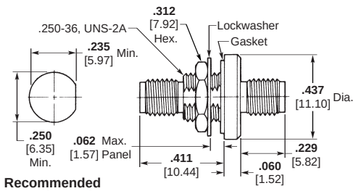
SSMA Subminiature Coaxial Connectors (Continued)

Hermetically Sealed
(Continued)

Panel Feed-through Hermetic Adapter

Jack to Jack[1]

Electrical
VSWR (GHz) — 1.10 + .01f
RF Leakage (dB) — –(100 – fGHz)

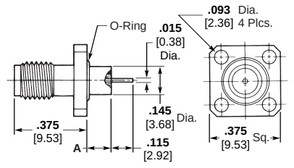


M/A-COM Part No. (Ref. Only)	Part No.
1084-1100-00	1045725-1

O-Ring Gasket Hermetic Seal

Flange Mount Jack Receptacle[1, 2]

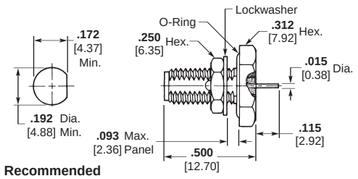
Electrical
VSWR (GHz) — 1.05 + .01f
RF Leakage (dB) — –(70 – fGHz)



M/A-COM Part No. (Ref. Only)	Part No.	Dim. A
1052-3121-00	1045593-1	.093 2.36

Rear Mount Jack Receptacle[1, 2]

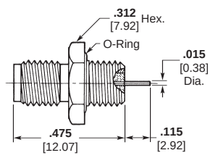
Electrical
VSWR (GHz) — 1.05 + .014f
RF Leakage (dB) — –(70 – fGHz)



M/A-COM Part No. (Ref. Only)	Part No.
1056-3100-00	1045633-1

Bulkhead Feed-through Front Mount Jack Receptacle

Electrical
VSWR (GHz) — 1.05 + .01f
RF Leakage (dB) — –(70 – fGHz)



M/A-COM Part No. (Ref. Only)	Part No.
1058-3100-00	1045642-1

1. Finish: Gold plate, -00. For passivated stainless steel, change the Part Number suffix from -00 to -02.
2. On passivated versions (-02), pins are pre-tinned using Sn60 solder.

Catalog 1308940
Revised 8-06

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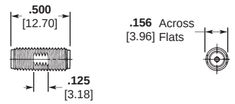
SSMA Subminiature Coaxial Connectors (Continued)

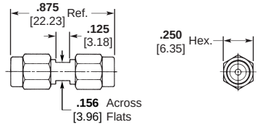
In-Series Adapters

Jack to Jack Adapter



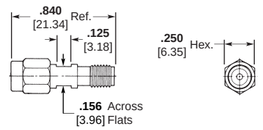
M/A-COM Part No. (Ref. Only)	Part No.
1080-0000-02	1045701-1

Plug to Plug Adapter



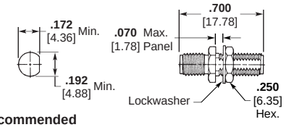
M/A-COM Part No. (Ref. Only)	Part No.
1081-0000-02	1045704-1

Plug to Jack Adapter (Connector Saver)



M/A-COM Part No. (Ref. Only)	Part No.
1082-0000-02	1045708-1

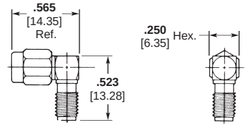
Bulkhead Mount Jack to Jack Adapter



Recommended Mounting Hole

M/A-COM Part No. (Ref. Only)	Part No.
1084-0000-02	1045723-1

Right-Angle Plug to Jack Adapter



M/A-COM Part No. (Ref. Only)	Part No.
1088-0000-02	1045747-1

Finish: Passivated stainless steel, -02. For gold plate, change the Part Number suffix from -02 to -00.

Catalog 1308940
Revised 8-06

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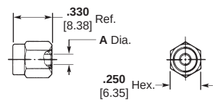
SSMA Subminiature Coaxial Connectors (Continued)

High Frequency For Semi-Rigid Cable

.085 [2.16] and .070 [1.78] Dia. — Direct Solder Attachment

Straight Cable Plug (Without Center Contact)[1, 3]



Specifications

Nominal Impedance — 50 ohms

Frequency Range — dc to 40 GHz

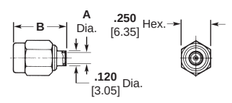
Voltage Standing Wave Ratio — 1.07 + .010 f (GHz)

Insertion Loss — .04 x $\sqrt{f\ (GHz)}$ = dB max.

Voltage Rating — 250 volts RMS max. working voltage

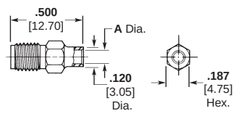
M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	RG/U Cable	Cable Dielectric
1001-7985-00	1045369-1	.087 2.2	405	Solid PTFE

Straight Cable Plug Center Contact[1, 3]



M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	Dim. B	RG/U Cable	Cable Dielectric
1401-7985-00	1046477-1	.088 2.22	.447 11.35	405	Solid PTFE

Straight Cable Jack[3]

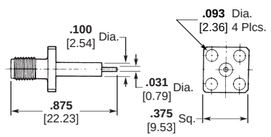


M/A-COM Part No. (Ref. Only)	Part No.	Dim. A	RG/U Cable	Cable Dielectric
1402-7985-00	1046479-1	.088 2.22	405	Solid PTFE

Finish: Gold plate.

Panel Mount — Straight Terminal

Flange Mount Jack Receptacle[2, 4]



M/A-COM Part No. (Ref. Only)	Part No.
1452-1201-02	1402389-1

1. Finish: Gold plated, -00. For passivated stainless steel coupling nut, change the Part Number suffix from -00 to -02.
   Inner housing that is soldered to cable is gold plated.
2. Finish: Passivated stainless steel, -02. For gold plate, change the Part Number suffix from -02 to -00.
3. Refer to recommended assembly tools in Appication Tooling Section.

Catalog 1308940
Revised 8-06

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7mm Precision Coaxial Connectors

The 7mm Precision Hermaphrodite Coaxial Connectors are made available for laboratory instrumentation use. The construction is resonance free through 18.0 GHz. An economical sexed version is also made available using threaded outer plug and jack configuration. This version will mate directly to the hermaphroditic types without degradation of performance. These are available to attach to .141 [3.58], .250 [6.35] and .325 [8.26] diameter semi-rigid cables, and to RG-214/U and RG-142B/U flexible cables.

Design and Construction

The outer shell and coupling mechanisms are made of polished stainless steel. The inner contact is made of gold plated beryllium copper. A special resonance free to 18.0 GHz supporting bead is used to capture the center contact.

Assembly Tool

Optional assembly tool, Part Number 7098-5001, may be ordered separately for assembly convenience.

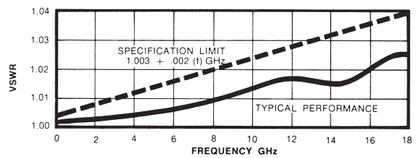
Electrical Performance

Impedance — 50 Ohms

Frequency Range — 0-18 GHz

VSWR — 1.003 + .002 (f)GHz (See curve)

Temperature Range — -55°C to +85°C

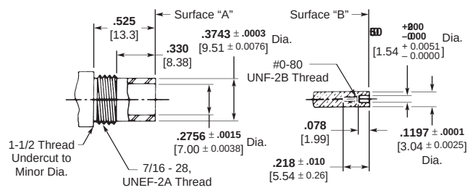


Preparation to Mating Section

Strict adherence to the dimensions shown for outer and inner conductors is a requirement for precision performance.

Notes:

1. Surface “A” to be perpendicular to .2756 [7.00] and .3743 [9.51] diameters within .0005 [0.01] T.I.R.
2. Surface “B” to be perpendicular to .1197 [3.04] and .0605 [1.54] diameters within .0005 [0.01] T.I.R.
3. Surface “B” to be flush to .0005 [0.01] below face of outer conductor surface “A”



Outer Conductor

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
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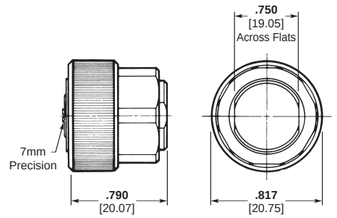
7mm Precision Coaxial Connectors (Continued)

7mm Precision Connector (Hermaphrodite)

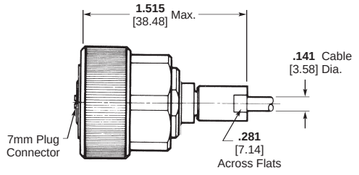


M/A-COM Part No. (Ref. Only)	Part No.
7000-0000-00	1061683-1

Finish: Polished stainless steel

For Semi-Rigid Cable, Clamp Attachment

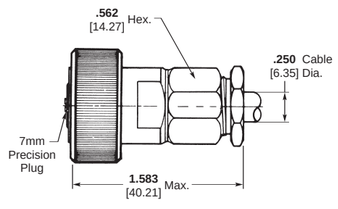
Straight Cable Plug



M/A-COM Part No. (Ref. Only)	Cable Dielectric	Cable	Part No.
7301-5038-02	Solid TFE	RG 402/U **.141** [3.58]	1061932-1

Finish: Polished stainless steel
Flexible cable connectors available.
Refer to recommended assembly tools in Tool Section.

Straight Cable Plug



M/A-COM Part No. (Ref. Only)	Cable Dielectric	Cable	Part No.
7301-7650-00	Solid TFE	RG 401/U **.250** [6.35]	1061934-1

Finish: Polished stainless steel
Flexible cable connectors available.
Refer to recommended assembly tools in Tool Section.

Catalog 1308940
Revised 8-06

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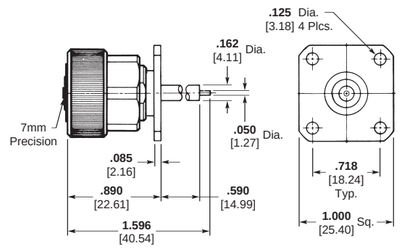
7mm Precision Coaxial Connectors (Continued)

Panel Mount, Straight Terminal

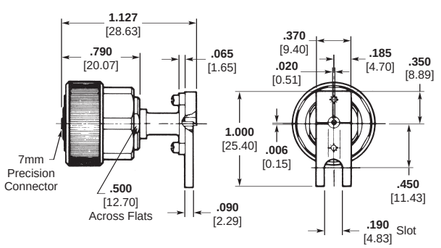
Flange Mount Receptacle



M/A-COM Part No. (Ref. Only)	Part No.
7052-1201-00	1061706-1

Finish: Polished stainless steel

7mm Adapter to MIC Fixture

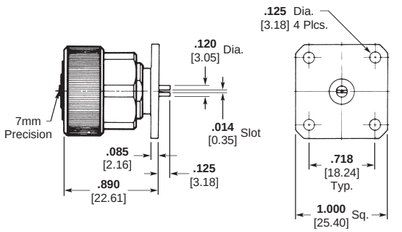


M/A-COM Part No. (Ref. Only)	Part No.
7052-5013-00	1061709-1

Finish: Polished stainless steel

Panel Mount, Slot Terminal

Flange Mount Receptacle



M/A-COM Part No. (Ref. Only)	Part No.
7052-5005-00	1061708-1

Finish: Polished stainless steel

Catalog 1308940
Revised 8-06

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Hand Tools

Tyco Electronics CERTI-CRIMP Hand Tools are our top-of-the-line crimping tools featuring the original ratcheted crimp control. All tools are designed to exacting specifications, and manufactured using high quality materials to provide long service life. Recommended for low production runs, repairs and prototype work, and applications requiring consistent, highly-reliable terminations. See Catalog 65780 for further information.

Typical CERTI-CRIMP Hand Tools with Integral (Non-Interchangeable) Dies

Part Number 58537-1 (used with PRO-CRIMPER Tool Frame 354940-1)
for 50 Ohm BNC Dual Crimp MIL Type Connectors

Part Number 220015-1
for 50 Ohm N Connectors

CERTI-CRIMP Hand Tool with Interchangeable Dies

Part Number 69710

Hand Tool Kit for SMA and Blindmate Connectors

Part Number 59981-1

Item Description	Part Numbers	
	AMP	Military (M22520/)
Hand Tool	59980-1	36-01
Plug Locator (without Center Contact)	220220-2	36-06
Plug Locator (with Center Contact)	220221-2	36-04
Jack Locator	220222-2	36-05
Die Set for RG-402/U Cable (.141 [3.58] O.D.)	312253-1	36-03
Die Set for RG-405/U Cable (.086 [2.18] O.D.)	312253-2	36-02
Cutoff Fixture	311395-1	36-09
Cable Dressing Fixture	311396-1	36-07
Trimmer Tool	312317-1	36-08
Cable Bend Fixture Assembly Includes following 6 items:	220224-1	36-10
Bend Segment, RG-402/U (.125 [3.18] Radius)	311386-1	36-11
Bend Segment, RG-402/U (.250 [6.35] Radius)	311386-2	36-12
Bend Segment, RG-405/U	311386-3	36-13
Tool Holder	311392-1	—
Limiting Pin	307581-1	—
Conforming Block	312067-1	—
Hex Wrench	21027-6	—
Carrying Case	13126-1	—
Insert, Case	13127-1	—

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

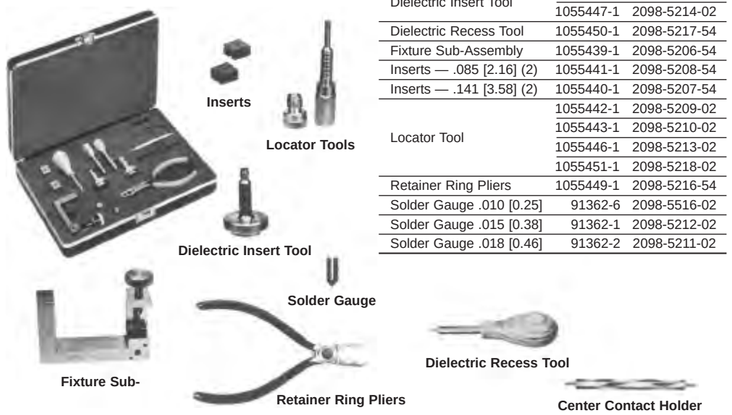
Application Tooling (Continued)

Solder Assembly Kit Brass SMA Connectors

Kit Part Number 1055420-1

(M/A-COM Kit Part Number 2098-5066-54)

For installation of SMA connectors to .035 [0.89] and .141 [3.58] diameter semi-rigid cable



Item Description	Part No.	M/A-COM Part No. (Ref. Only)
Center Contact Holder	1055454-1	2098-5221-10
Dielectric Insert Tool	1055448-1	2098-5215-02
	1055447-1	2098-5214-02
Dielectric Recess Tool	1055450-1	2098-5217-54
Fixture Sub-Assembly	1055439-1	2098-5206-54
Inserts — .085 [2.16] (2)	1055441-1	2098-5208-54
Inserts — .141 [3.58] (2)	1055440-1	2098-5207-54
Locator Tool	1055442-1	2098-5209-02
	1055443-1	2098-5210-02
	1055446-1	2098-5213-02
	1055451-1	2098-5218-02
Retainer Ring Pliers	1055449-1	2098-5216-54
Solder Gauge .010 [0.25]	91362-6	2098-5516-02
Solder Gauge .015 [0.38]	91362-1	2098-5212-02
Solder Gauge .018 [0.46]	91362-2	2098-5211-02

Universal Compression Crimp Tool

Kit Part Number 1055835-1

(M/A-COM Kit Part Number 2598-5200-54)

Tyco Electronics Universal Compression Crimp Tool offers the ability to rapidly produce cable assemblies using solderless compression crimp connectors with semi-rigid cables. This universal assembly tool kit will attach SMA, OSP (BMA), N and TNC series connectors to .141 [3.58], .085 [2.16] and .250 [6.35] cable quickly and consistently with excellent mechanical and electrical results.

The tool kit permits single hand assembly. Anvils and cable supports can be quickly changed. Crimp lengths can be adjusted from .001 [.025] to 1.000 [25.4] in increments of .001 [.025]. Sharp radius bends in cables are easily accommodated. The kit contains:

Description	Part No.	M/A-COM Part No. (Ref. Only)
Crimp Frame	1055831-1	2598-5196-54
Calibration Gauge	1055832-1	2598-5197-54
.141 [3.58] Cable Support	1055833-1	2598-5198-54
.085 [2.16] Cable Support	1055834-1	2598-5199-54
SMA Plug Anvil	1055836-1	2598-5201-54
SMA Jack Anvil	1055837-1	2598-5202-54
Type N Plug Anvil	1055838-1	2598-5203-54
Type N Jack Anvil	1055839-1	2598-5204-54
TNC Plug Anvil	1055840-1	2598-5205-54
TNC Jack Anvil	1055841-1	2598-5206-54
OSP (BMA) Plug Anvil	1055842-1	2598-5207-54
OSP (BMA) Jack Anvil	1055843-1	2598-5208-54

All tools may be purchased separately.

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

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UK: 44-208-420-8341

Application Tooling (Continued)

MIL-C-22520/10-01 Equivalent Hex Crimp Kit

Kit Part Number 1055236-1

(M/A-COM Kit Part Number 2098-0105-54)

For military specified applications requiring quick and efficient cable to connector attachment. Five popular hex die sizes are available to crimp the outer cable conductor to connector housings.

Die Change Tool

Crimp Tool

Hex Die

The kit contains:

Description	Part Number	M/A-COM Part Number (Ref. Only)
Crimp Tool	1060713-1	9098-5105-54
Die Change Tool	1060716-1	5698-5014-54
Hex Die — A, B, C	1060714-1	5698-5015-54
Hex Die — D, E	1060715-1	5698-5016-54

All tools may be purchased separately.
For the assembly of SMA connectors,
Accessory Kit Part Number 1055421-1 is required.

A basic instruction sheet, included with the kit, aids in proper die selection

Hex Die Part Number	M/A-COM Hex Die Part Number (Ref. Only)	Die	Hex Size ±.003 [0.08]	For Use With RG/U Cable
1060714-1	5698-5015-54	A	**.105** 2.67	178B & 196A
		B	**.213** 5.41	55B, 58C, 141A, 142B, 223, 303, & 400
		C	**.128** 3.25	174, 174B, 179, 187A, 188A, & 316
1060715-1	5698-5016-54	D	**.178** 4.52	180B, 195A, & 122
		E	**.255** 6.48	59, 62A, 71B, 210, & 302

Additional Dies Available

Hex Die Part Number	M/A-COM Hex Die Part Number (Ref. Only)	Hex Size ±.003 [0.08]	For Use With RG/U Cable
1055270-1	2098-0323-54	**.151** 3.84	RD316 Double Braid

SMA Crimp Tool Accessory Kit

Kit Part Number 1055421-1

(M/A-COM Kit Part Number 2098-5067-54)

For installation of SMA connectors to flexible braided cable. Crimp type SMA connectors require Hex Crimp Kit Part Number 1055236-1.

The kit contains:

Description	Part Number	M/A-COM Part Number (Ref. Only)
Center Contact Holder	1055454-1	2098-5221-10
Locator Tool	1055446-1	2098-5213-02
Locator Tool	1055451-1	2098-5218-02
Solder Gauge .015 [0.38]	91362-1	2098-5212-02

All tools may be purchased separately.

Locator Tool

Solder Gauge

Center Contact Holder

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Application Tooling (Continued)

Stripping Tools

The hand-operated Tyco Electronics Coaxial Cable Stripper features interchangeable, color-coded blade cassettes and V-blocks to accommodate 2- or 3-step stripping for cable diameters ranging from 2.54 [.10] through 7.62 [.30]. You strip cable by simply clamping and rotating the tool around the cable. See Instruction Sheet IS 2766 for further information.

For Use With Connector Type	Tool No.
BNC Single Crimp	603995-1
BNC Commercial and UHF Miniature	603995-2
UHF Standard	603995-3
BNC MIL Type Dual Crimp	603995-5
BNC Commercial Dual Crimp	603995-6

Semi-Rigid Cable Tooling

The tools listed here are designed specifically to strip and terminate semi-rigid cable. These tools operate basically the same as the flexible cable tools, in that they produce uniform terminations time after time, without heat damage from soldering.

Hand Tool for BNC and TNC Semi-Rigid Cable Connectors

Part Number 59980-1
Frame only — does not include dies and locator

Manual Trim and Point Tool

Tyco Electronics offers a manual tool that performs both trimming and pointing operations. Tools are available for .141 [3.58] and .085 [2.16] diameter semi-rigid cable. These hand-operated tools are ideally suited for engineering, small production runs or field use. They feature tungsten carbide cutters for durability up to 30 times longer than the life of a high speed steel cutter. Replacement cutters are interchangeable and may be purchased separately.

Tool Part Number	M/A-COM Tool Part Number (Ref. Only)	Cable	Trim Length
1055811-1	2598-5116-54	RG-402/U (.141 [3.58])	**.085** 2.16 Fixed
1055815-1	2598-5120-54	RG-405/U (.085 [2.16])	**.070** 1.78 Fixed
1055823-1	2598-5137-54	RG-402/U (.141 [3.58])	Adjustable*
1055824-1	2598-5138-54	RG-405/U (.085 [2.16])	Adjustable*

*Adjustable trim length from .050 [1.27] to .140 [3.56].

Replacement Cutters

Trimmer: Part Number 1055813-1
Pointer: Part Number 1055814-1

Replacement Collets

Part Number	M/A-COM Part Number (Ref. Only)	Cable
1055825-1	2598-5145-54	RG-402/U (.141 [3.58])
1055827-1	2598-5167-54	RG-405/U (.085 [2.16])

Cable Benders for Semi-Rigid Cable

Cable Bender

Description	Part Number	M/A-COM Part Number (Ref. Only)	Bend Radius*
Cable Bender for RG-405/U (.085 [2.16])	1055479-1	2098-5287-54	1/4 [6.4] 3/8 [9.8]
Cable Bender for RG-402/U (.141 [3.58])	1055478-1	2098-5286-54	3/8 [9.8] 1/2 [12.7]

*Radius of the bend is measured from the centerline of the cable.

Trimming Tools for Semi-Rigid Cable

For soldered semi-rigid cable connectors using the cable center conductor as its contact. These tools are optional for most installations but recommended for optimum connector performance.

Trim Tool

Description	Part Number	M/A-COM Part Number (Ref. Only)
Trim Tool for SMA Connectors RG-402/U (.141 [3.58])	1055455-1	2098-5272-02
Trim Tool for SSMA Connectors RG-405/U (.085 [2.16])	1055465-1	2098-5269-02

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Application Tooling (Continued)

Cable Trimmers for Production

Tyco Electronics cable trimmers are designed for production trimming of RG-402/U (.141 [3.58]) and RG-405/U (.085 [2.16]) coaxial cables in preparation for connector installation. The trimming operation produces an unusually clean, burr-free cut with minimum smear. The length and depth of cut are adjustable. Replacement hardware can be used with either tool.

Cable Trimmers

Description	Part Number	M/A-COM Part Number (Ref. Only)
RG-402/U (.141 [3.58])	1055526-1	2098-5676-54
RG-405/U (.085 [2.16])	1055530-1	2098-5686-54

Replacement Hardware

Description	Part Number	M/A-COM Part Number (Ref. Only)
Saw Blade	1055524-1	2098-5674-54
Trim Saw Block (.141 [3.58])	1055527-1	2098-5678-54
Trim Saw Block (.085 [2.16])	1055528-1	2098-5679-54

Cable Pointers for Production

Tyco Electronics cable pointers are designed to point straight and bent cables and are adjustable for desired center conductor length. The cable pointers cut 90° point on copper as well as copper-clad center conductors.

Cable Pointers

Description	Part Number	M/A-COM Part Number (Ref. Only)	Cable	Replacement Cutter Part Number	M/A-COM Replacement Cutter Part Number (Ref. Only)
Single Pointer	1055525-1	2098-5675-54	RG-402/U (.141 [3.58])	1055529-1	2098-5681-54
Single Pointer	1080269-1	2098-5685-54	RG-405/U (.085 [2.16])		

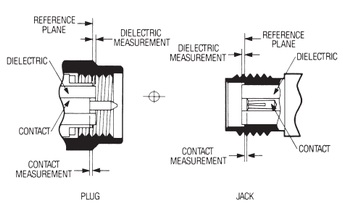
Interface Inspection Gauges

Tyco Electronics offers Connector Interface Gauges. They have shock proof and fully jeweled dial indicators. The rugged construction of the dial mechanism minimizes the need for repair or replacement.

The gauge heads are manufactured from a corrosion resistant, hardening stainless steel which is heat treated for longer life. All critical surfaces are ground and lapped for precision fit and superior surface finish. The heads are securely fastened onto the dial indicator for no movement between the gauge head and the dial indicator spindle allowing for precise measurements.

Like the gauge heads, the plungers are specially designed to provide strength and durability.

Connector	Type	Gauge Kit Part Number	M/A-COM Gauge Kit Part Number (Ref. Only)
SMA	Jack	1055496-1	2098-5455-54
	Plug	1055497-1	2098-5456-54



SMA Interface Example

Catalog 1308940
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Application Tooling (Continued)

SSMA Connectors

Kit Part Number 1055466-1

(M/A-COM Kit Part Number 2098-5270-54)

For installation of SSMA connectors to .070 [1.78] and .085 [2.16] diameter semi-rigid cable.

Item Description	Part No.	M/A-COM Part No. (Ref. Only)
Center Contact Holder	1055463-1	2098-5237-10
Dielectric Insert Tool	1055458-1	2098-5233-02
	1055459-1	2098-5234-02
Dielectric Recess Tool	1055460-1	2098-5235-54
Fixture Sub-Assembly	1055439-1	2098-5206-54
Inserts — .070 [1.78] (2)	1055547-1	2098-5831-54
Inserts — .085 [2.16] (2)	1055441-1	2098-5208-54
Locator Tool	1055461-1	2098-5236-02
	1055464-1	2098-5238-02
	1055456-1	2098-5231-02
	1055457-1	2098-5232-02
Retainer Ring Pliers	1055449-1	2098-5216-54
Solder Gauge .015 [0.38]	91362-1	2098-5212-02

All tools may be purchased separately.

Econo-Crimp Assembly Kit

Kit Part Number 1055779-1

(M/A-COM Kit Part Number 2598-5005-54)

For quick and efficient cable to connector attachment. Five popular hex die sizes are available to crimp the outer cable conductor to connector housings.

Crimp Tool

Hex Die

Item Description	Part No.	M/A-COM Part No. (Ref. Only)
Crimp Tool	1055780-1	2598-5006-54
Hex Die — A, B, C	1055781-1	2598-5007-54
Hex Die — D, E	1055782-1	2598-5008-54

All tools may be purchased separately.
For the assembly of SMA connectors, Accessory Kit Part Number 2098-5067-54 is required. For SSMA connectors, Accessory Kit Part Number 2098-5272-54 is required.

Hex Die Part Number	M/A-COM Hex Die Part Number (Ref. Only)	Die	Hex Size ±.003 [0.08]	For Use With RG/U Cable
1055781-1	2598-5007-54	A	**.105** 2.67	178B & 196A
		B	**.213** 5.41	55B, 58C, 141A, 142B, 223, 303, & 400
		C	**.128** 3.25	174, 174B, 179, 187A, 188A, & 316
1055782-1	2598-5008-54	D	**.178** 4.52	180B, 195A, & 122
		E	**.255** 6.48	59, 62A, 71B, 210, & 302

SSMA Crimp Tool Accessories

Kit Part Number 1055467-1

(M/A-COM Kit Model Number T-550)

For installation of SSMA connectors to flexible braided cable. Crimp type SSMA connectors require Hex Crimp Kit Part Number 1055779-1.

Locator Tool

Center Contact Holder

Description	Part Number	M/A-COM Part Number (Ref. Only)
Center Contact Holder	1055463-1	2098-5237-10
Locator Tool	1055461-1	2098-5236-02
	1055464-1	2098-5238-02

All tools may be purchased separately.

Catalog 1308940
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Cross Reference

Military Part Number	M/A-COM Part Number (Ref. Only)	Tyco Electronics Part Number
M39012/01B0012		225092-7
M39012/01B0013		51692-4
M39012/01B007		225092-2
M39012/01B008		225092-1
M39012/02B008		225093-2
M39012/03B0004		225094-2
M39012/03B0005		225094-1
M39012/05B0002		225014-2
M39012/05B0002		225389-2
M39012/05B0003		225014-3
M39012/16B0004		2-331350-1
M39012/16B0007		2-331350-9
M39012/16B0008		331350
M39012/17B0004		2-331351-1
M39012/17B0008		331351
M39012/19-0102		221313-2
M39012/19B0003		1-331693-1
M39012/19B0007		331693
M39012/26B0005		225550-2
M39012/26B0006		225550-6
M39012/26B0007		225550-3
M39012/26B0016		225550-1
M39012/27B0005		225551-2
M39012/27B0006		225551-6
M39012/27B0015		225551-5
M39012/27B0016		225551-1
M39012/29B0005		225348-2
M39012/55-3006	2031-8006-92	1051757-1
M39012/55-3007	2031-8007-92	1051759-1
M39012/55-3008	2031-8008-92	1051760-1
M39012/55-3009	2031-8009-92	1051762-1
M39012/55-3010	2031-8010-92	1051763-1
M39012/55-3025	2031-8025-92	1051780-1
M39012/55-3026	2031-8026-92	1051782-1
M39012/55-3027	2031-8027-92	1051783-1
M39012/55-3028	2031-8028-92	1051785-1
M39012/55-3029	2031-8029-92	1051787-1
M39012/55-3106	2031-8106-92	1051789-1
M39012/55-3107	2031-8107-92	1051791-1
M39012/55-3108	2031-8108-92	1051792-1
M39012/55-3109	2031-8109-92	1051794-1
M39012/55-3110	2031-8110-92	1051795-1
M39012/55-3125	2031-8125-92	1051810-1
M39012/55-3126	2031-8126-92	1051812-1
M39012/55-3127	2031-8127-92	1051813-1
M39012/55-3128	2031-8128-92	1051815-1
M39012/55-3129	2031-8129-92	1051816-1
M39012/55-3502	2031-8052-92	1051788-1
M39012/55-3602	2031-8162-92	1051817-1
M39012/55B3011	2031-8011-92	1051764-1
M39012/55B3012	2031-8012-92	1051766-1
M39012/55B3013	2031-8013-92	1051767-1
M39012/55B3014	2031-8014-92	1051768-1
M39012/55B3015	2031-8015-92	1051769-1
M39012/55B3016	2031-8016-92	1051770-1
M39012/55B3017	2031-8017-92	1484541-1
M39012/55B3018	2031-8018-92	1051771-1
M39012/55B3019		225532-4
M39012/55B3019	2031-8019-92	1056413-1
M39012/55B3020	2031-8020-92	1051774-1
M39012/55B3021		225532-1

Military Part Number	M/A-COM Part Number (Ref. Only)	Tyco Electronics Part Number
M39012/55B3021	2031-8021-92	1051775-1
M39012/55B3022		225532-3
M39012/55B3022	2031-8022-92	1051776-1
M39012/55B3023		1-225532-0
M39012/55B3023	2031-8023-92	1051777-1
M39012/55B3024		225532-9
M39012/55B3024	2031-8024-92	1051778-1
M39012/55B3111	2031-8111-92	1051796-1
M39012/55B3112	2031-8112-92	1051797-1
M39012/55B3113	2031-8113-92	1051798-1
M39012/55B3114	2031-8114-92	1051799-1
M39012/55B3115	2031-8115-92	1051800-1
M39012/55B3116	2031-8116-92	1051801-1
M39012/55B3117	2031-8117-92	1051802-1
M39012/55B3118	2031-8118-92	1051803-1
M39012/55B3119	2031-8119-92	1051804-1
M39012/55B3120	2031-8120-92	1051805-1
M39012/55B3121	2031-8121-92	1051806-1
M39012/55B3122	2031-8122-92	1051807-1
M39012/55B3123	2031-8123-92	1051808-1
M39012/55B3124	2031-8124-92	1051809-1
M39012/56-3006	2037-8006-92	1052149-1
M39012/56-3007	2037-8007-92	1052151-1
M39012/56-3008	2037-8008-92	1052152-1
M39012/56-3009	2037-8009-92	1052154-1
M39012/56-3010	2037-8010-92	1052155-1
M39012/56-3025	2037-8025-92	1052171-1
M39012/56-3026	2037-8026-92	1052173-1
M39012/56-3027	2037-8027-92	1052174-1
M39012/56-3028	2037-8028-92	1052176-1
M39012/56-3029	2037-8029-92	1052177-1
M39012/56-3106	2037-8106-92	1052179-1
M39012/56-3107	2037-8107-92	1052181-1
M39012/56-3108	2037-8108-92	1052182-1
M39012/56-3109	2037-8109-92	1052184-1
M39012/56-3110	2037-8110-92	1052185-1
M39012/56-3125	2037-8125-92	1052201-1
M39012/56-3126	2037-8126-92	1052203-1
M39012/56-3127	2037-8127-92	1052204-1
M39012/56-3128	2037-8128-92	1052206-1
M39012/56-3129	2037-8129-92	1052207-1
M39012/56-3502	2037-8052-92	1052178-1
M39012/56-3602	2037-8162-92	1086723-1
M39012/56B3011	2037-8011-92	1052156-1
M39012/56B3012	2037-8012-92	1052157-1
M39012/56B3013	2037-8013-92	1052158-1
M39012/56B3014	2037-8014-92	1052159-1
M39012/56B3015	2037-8015-92	1052160-1
M39012/56B3016	2037-8016-92	1052161-1
M39012/56B3017	2037-8017-92	1052162-1
M39012/56B3018	2037-8018-92	1052163-1
M39012/56B3019		225609-4
M39012/56B3019	2037-8019-92	1052165-1
M39012/56B3020	2037-8020-92	1052166-1
M39012/56B3021		225609-1
M39012/56B3021	2037-8021-92	1052167-1
M39012/56B3022		225609-3
M39012/56B3022	2037-8022-92	1052168-1
M39012/56B3023	2037-8023-92	1052169-1
M39012/56B3024	2037-8024-92	1052170-1
M39012/56B3111	2037-8111-92	1052186-1

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M39012/56B3112	2037-8112-92	1052187-1
M39012/56B3113	2037-8113-92	1052188-1
M39012/56B3114	2037-8114-92	1052189-1
M39012/56B3115	2037-8115-92	1052190-1
M39012/56B3116	2037-8116-92	1052191-1
M39012/56B3117	2037-8117-92	1052192-1
M39012/56B3118	2037-8118-92	1052193-1
M39012/56B3119	2037-8119-92	1052194-1
M39012/56B3120	2037-8120-92	1052195-1
M39012/56B3121	2037-8121-92	1052196-1
M39012/56B3122	2037-8122-92	1052197-1
M39012/56B3123	2037-8123-92	1052198-1
M39012/56B3124	2037-8124-92	1052199-1
M39012/57-3006	2032-8006-92	1090174-1
M39012/57-3007	2032-8007-92	1051900-1
M39012/57-3008	2032-8008-90	1051901-1
M39012/57-3009	2032-8009-90	1051902-1
M39012/57-3010	2032-8010-90	1051903-1
M39012/57-3025	2032-8025-92	1051918-1
M39012/57-3026	2032-8026-92	1051919-1
M39012/57-3027	2032-8027-92	1051920-1
M39012/57-3028	2032-8028-92	1051921-1
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M39012/57-3502	2032-8052-92	1051923-1
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M39012/58-3026	2036-8026-92	1052047-1
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M39012/58B3011	2036-8011-92	1052042-1
M39012/58B3012	2036-8012-92	1254028-1
M39012/58B3013	2036-8013-92	1484499-1
M39012/58B3014	2036-8014-92	1484500-1
M39012/58B3015	2036-8015-92	1052043-1
M39012/58B3016	2036-8016-92	1484501-1
M39012/58B3017	2036-8017-92	1484502-1
M39012/58B3018	2036-8018-92	1052044-1
M39012/58B3019	2036-8019-92	1484503-1
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M39012/58B3021	2036-8021-92	1484505-1
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M39012/59-3006	2034-8006-92	1051981-1
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M39012/59B3022	2034-8022-92	1051989-1
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M39012/60-3002	2052-8002-92	1052926-1
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M39012/79-3207		228639-3
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M39012/79B3104	2001-8304-92	1050799-1
M39012/80-3005	2007-8005-92	1051165-1

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M39012/80-3006	2007-8006-92	1051166-1
M39012/80-3007	2007-8007-92	1051168-1
M39012/80-3008	2007-8008-92	1051170-1
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M39012/80-3107	2007-8107-92	1051177-1
M39012/80-3108	2007-8108-92	1051178-1
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M39012/80B3101	2007-8101-92	1051171-1
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M39012/80B3103	2007-8103-92	1051173-1
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M83517/2-32004	2051-8004-90	1052414-1
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M83517/6-31001	2066-8001-92	1053423-1
M83517/6-31002	2066-8002-92	1053425-1

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M83517/6-32001	2066-8001-90	1053422-1
M83517/6-32002	2066-8002-90	1053424-1
M83517/7-31001	2067-8001-92	1053429-1
M83517/7-31002	2067-8002-92	1053431-1
M83517/7-32001	2067-8001-90	1053428-1
M83517/7-32002	2067-8002-90	1053430-1
M83517/8-31001	2068-8001-92	1053451-1
M83517/8-31002	2068-8002-92	1053453-1
M83517/8-32001	2068-8001-90	1053450-1
M83517/8-32002	2068-8002-90	1053452-1
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M83517/9-32001	2070-8001-90	1053475-1
M83517/9-32002	2070-8002-90	1053477-1
M83517/9-32003	2070-8003-90	1053479-1
M83517/9-32004	2070-8004-90	1053481-1
M83517/10-31001	2052-8019-92	1052959-1
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M83517/10-31004	2052-8023-92	1052963-1
M83517/10-31005	2052-8023-92	1052963-1
M83517/10-31006	2052-8024-92	1484518-1
M83517/10-31015	2052-8033-92	1484519-1
M83517/10-31016	2052-8034-92	1484520-1
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M83517/10-32006	2052-8024-90	1484523-1
M83517/10-32015	2052-8033-90	1484524-1
M83517/10-32016	2052-8034-90	1484525-1

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Introduction

The Nanonics 50 ohm coaxial connector system combines the benefits of the rectangular DUALOBE connectors while offering the flexibility to terminate up to nine coaxial contacts within the same metal connector housing. Furthermore, with this unique design, five signal contacts, terminated with 30 AWG or smaller discrete wire, can also be integrated into this connector package. These connectors are typically used in applications with frequencies up to 20 GHz.

RG-178 coax coaxial cable is the standard cable used on these connectors. The receptacle coax connector is also available in a horizontal surface mount configuration allowing for wire to board applications. Harness assemblies and custom configurations can also be accommodated.

Specifications

Technical and Performance Data

Electrical

Contact Resistance – .003 - .008 ohms

Current Rating – 1 amp max. per contact

Dielectric Withstanding Voltage – Volts RMS 60 Hz at room ambient conditions. At sea level 500V. At 70,000 ft. 150V.

Insulation Resistance – 5000 megohms min. (@ 500 VDC) at room ambient conditions.

Magnetic Permeability – 2 mu max.

Temperature Range — -55˚C to +125˚C

Outer Coaxial Contacts – BeCu Alloy plated with gold per MIL-G-45204 over nickel

Dielectric Insert – Teflon

Braid Termination – Soldered to outer coaxial contacts with SN63P637 solder

Backpotting – Standard for wire terminations

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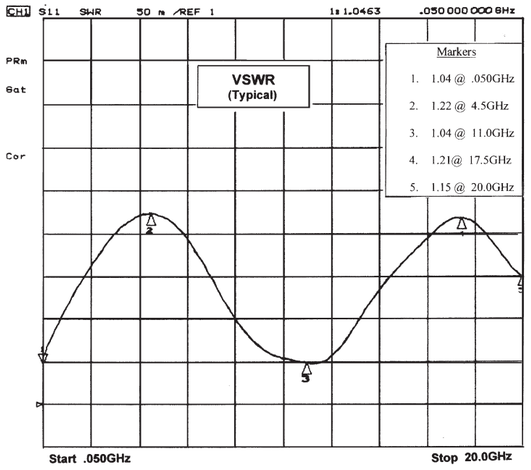
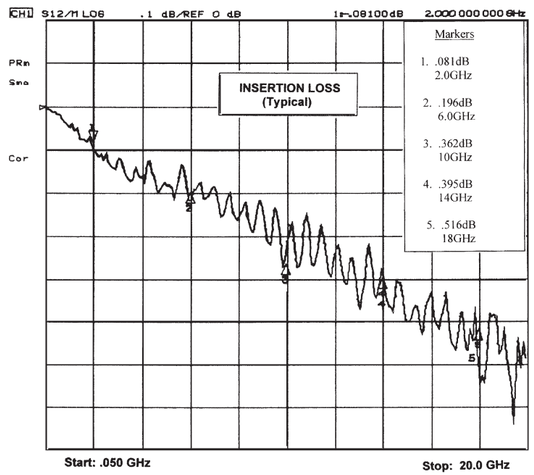
Typical VSWR and Insertion Loss

Note: Insertion Loss of 30 AWG Coax Cable @ (50 Ohm) is approximately 1.0db/ft. @ 3 GHz. The connector system with 6" of coax on each side, is better than 1.5db @ 3 GHz.





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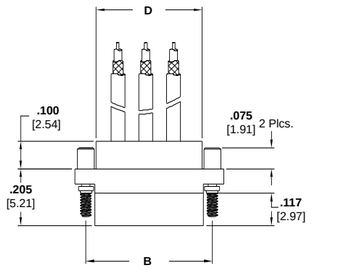
50 Ohm Coax Connectors

Plug

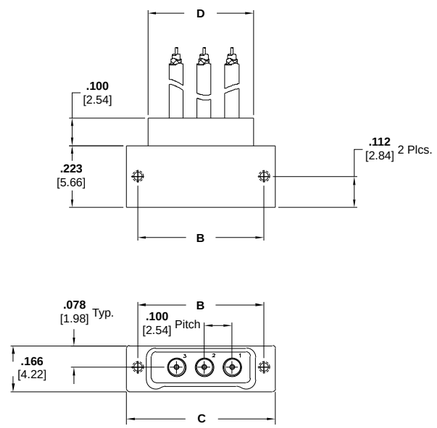
Receptacle

Product Facts

- Metal Shell
- Standard Sizes: 1-9
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations



Plug Assembly
Drawing Number 1589070



Receptacle Assembly
Drawing Number 1589071

Size	Dimensions			
	B	C	D	No. Coax
1	**0.254** [6.45]	**0.335** [8.51]	**0.180** [4.57]	1
2	**0.354** [8.99]	**0.435** [11.05]	**0.280** [7.11]	2
3	**0.454** [11.53]	**0.535** [13.59]	**0.380** [9.65]	3
4	**0.554** [14.07]	**0.635** [16.13]	**0.480** [12.19]	4
5	**0.654** [16.61]	**0.735** [18.67]	**0.580** [14.73]	5
6	**0.754** [19.15]	**0.835** [21.21]	**0.680** [17.27]	6
7	**0.854** [21.69]	**0.935** [23.75]	**0.780** [19.81]	7
8	**0.954** [24.23]	**1.035** [26.29]	**0.880** [22.35]	8
9	**1.054** [26.77]	**1.135** [28.83]	**0.980** [24.89]	9

Catalog 1308940
Revised 8-06

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USA: 1-800-522-6752
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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Part Numbering Guideline for 50 Ohm Coax Connectors

Coax Only Connectors - Wire Terminations

CX XXX XX 2 RG XXX X

Class/Type

CX Coax, 50 Ohm

Positions

010 1 Position
020 2 Position
030 3 Position
040 4 Position
050 5 Position
060 6 Position
070 7 Position
080 8 Position
090 9 Position

Configuration

PC Plug
SC Receptacle

Conductor Size

2 30 AWG

Conductor Type

RG RG 178 Coaxial Cable

Conductor Length

XXX Three numbers only, length is in inches (i.e. 012 = twelve inches)
CXX A “C” follwed by two numbers, length is in centimeters (i.e. C06 = 6 centimeters)
MXX An “M” followed by two numbers, length is in meters (i.e. M02 = 2 meters)

Threads/Jackscrews

Threads (Receptacles Only)	Jackscrews (Plugs Only)
N Thread for 1.0 mm Jackscrews	**M** 1.0 mm Non Captive Jackscrews
Q Thread for 1.2 mm Jackscrews	**N** 1.0 mm Captive Jackscrews
	Q 1.2 mm Captive Jackscrews

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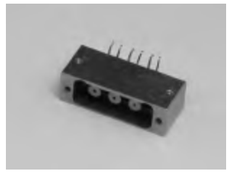
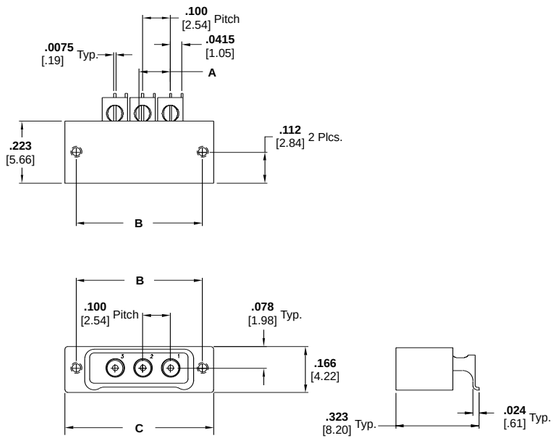
Horizontal SMT 50 Ohm Coax Connectors



Surface Mount

Product Facts

- Metal Shell
- Standard Sizes: 1-9
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations



Receptacle Assembly
Drawing Number 1589072

Size	Dimensions A	B	C	No. Coax
1	**0.0125** [.32]	**0.254** [6.45]	**0.335** [8.51]	1
2	**0.0625** [1.59]	**0.354** [8.99]	**0.435** [11.05]	2
3	**0.1125** [2.86]	**0.454** [11.53]	**0.535** [13.59]	3
4	**0.1625** [4.13]	**0.554** [14.07]	**0.635** [16.13]	4
5	**0.2125** [5.40]	**0.654** [16.61]	**0.735** [18.67]	5
6	**0.2625** [6.67]	**0.754** [19.15]	**0.835** [21.21]	6
7	**0.3125** [7.94]	**0.854** [21.69]	**0.935** [23.75]	7
8	**0.3625** [9.21]	**0.954** [24.23]	**1.035** [26.29]	8
9	**0.4125** [10.48]	**1.054** [26.77]	**1.135** [28.83]	9

Part Numbering Guideline for Horizontal SMT 50 Ohm Coax Connectors

Coax Only Connectors - SMT Termination

CX XXX L2 XXX X

Class/Type
CX Coax, 50 ohm

Positions
010 1 Position
020 2 Position
030 3 Position
040 4 Position
050 5 Position
060 6 Position
070 7 Position
080 8 Position
090 9 Position

Configuration
L2 Receptacle, Horizontal SMT

Mounting Hardware
A 1.2 mm x .160"
H 1.0 mm x .160"

Jackscrew Threads
Threads
N Thread for 1.0 mm Jackscrews
Q Thread for 1.2 mm Jackscrews

Catalog 1308940
Revised 8-06

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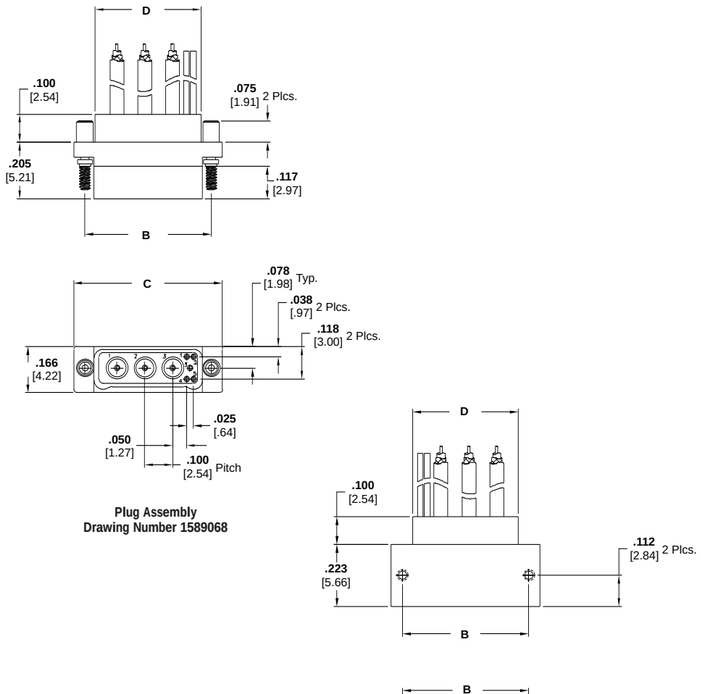
50 Ohm Coax with Mixed Signal Connectors

Plug

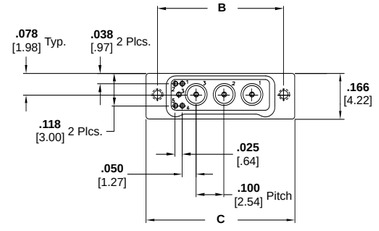
Receptacle

Product Facts

- Metal Shell
- Standard Sizes: 1-9 coaxial contacts with 5 signal contacts
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations



Plug Assembly
Drawing Number 1589068



Receptacle Assembly
Drawing Number 1589069

Size	Dimensions			
	B	C	D	No. Coax
1	**0.254** [6.45]	**0.335** [8.51]	**0.180** [4.57]	1
2	**0.354** [8.99]	**0.435** [11.05]	**0.280** [7.11]	2
3	**0.454** [11.53]	**0.535** [13.59]	**0.380** [9.65]	3
4	**0.554** [14.07]	**0.635** [16.13]	**0.480** [12.19]	4
5	**0.654** [16.61]	**0.735** [18.67]	**0.580** [14.73]	5
6	**0.754** [19.15]	**0.835** [21.21]	**0.680** [17.27]	6
7	**0.854** [21.69]	**0.935** [23.75]	**0.780** [19.81]	7
8	**0.954** [24.23]	**1.035** [26.29]	**0.880** [22.35]	8
9	**1.054** [26.77]	**1.135** [28.83]	**0.980** [24.89]	9

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Part Numbering Guideline for 50 Ohm Coax with Mixed Signal Connectors

Coax w/ Mixed Signal Connectors - Wire Terminations

CX XXX XX 2 R X XXX X

Class/Type
CX Coax, 50 ohm

Positions
015 1 Position w/ 5 Signals
025 2 Position w/ 5 Signals
035 3 Position w/ 5 Signals
045 4 Position w/ 5 Signals
055 5 Position w/ 5 Signals
065 6 Position w/ 5 Signals
075 7 Position w/ 5 Signals
085 8 Position w/ 5 Signals
095 9 Position w/ 5 Signals

Configuration
PC Plug
SC Receptacle

Conductor Size
2 30 AWG 7 Strand

Conductor Type (Coax)
R RE-178 Coaxial Cable

Conductor Type (Signals)
C Color Coded Teflon
X White Teflon

Conductor Length
XXX Three numbers only, length is in inches (i.e. 012 = twelve inches)
CXX A “C” follwed by two numbers, length is in centimeters (i.e. C06 = 6 centimeters)
MXX An “M” followed by two numbers, length is in meters (i.e. M02 = 2 meters)

Threads/Jackscrew

Threads (Receptacles Only)	Jackscrews (Plugs Only)
N Thread for 1.0 mm Jackscrews	**M** 1.0 mm Non Captive Jackscrews
Q Thread for 1.2 mm Jackscrews	**N** 1.0 mm Captive Jackscrews
	Q 1.2 mm Captive Jackscrews

Catalog 1308940
Revised 8-06

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Part Number Index Cross Reference

Nanonics Part Number	Tyco Part Number
Coax Only	
CX010PC2RG006N	0-1589070-1
CX010PC2RG018N	0-1589070-2
CX010PC2RG048Q	2-1589070-8
CX010PC2RG072N	0-1589070-3
CX010PC2RGC10Q	2-1589070-1
CX010SC2RG048Q	2-1589071-3
CX020PC2RG018N	0-1589070-4
CX020PC2RG048N	2-1589070-5
CX020PC2RG060N	1-1589070-8
CX020SC2RG012N	2-1589071-0
CX020SC2RG018N	2-1589071-5
CX020SC2RG024N	0-1589071-8
CX020SC2RG024Q	2-1589071-8
CX020SC2RG060N	2-1589071-2
CX030PC2RG006N	0-1589070-5
CX030PC2RG012	0-1589070-6
CX030PC2RG012N	0-1589070-7
CX030PC2RG018N	0-1589070-8
CX030PC2RG020Q	0-1589070-9
CX030PC2RG048N	2-1589070-4
CX030PC2RG060N	2-1589070-6
CX030SC2RG006N	0-1589071-3
CX030SC2RG012	0-1589071-4
CX030SC2RG012N	1-1589071-8
CX030SC2RG060N	2-1589071-1
CX040PC2RG012N	1-1589070-0
CX040PC2RG030N	1-1589070-1
CX040PC2RG039Q	3-1589070-7
CX040PC2RG060N	1-1589070-7
CX040SC2RG012	0-1589071-5
CX040SC2RG024N	0-1589071-7
CX050PC2RG006N	1-1589070-4
CX050SC2RG006N	1-1589071-9
CX060PC2RG012N	3-1589070-8
CX060PC2RG012Q	3-1589070-3
CX060PC2RG018N	3-1589070-5
CX060PC2RG036N	3-1589070-0
CX060PC2RG072N	3-1589070-1
CX060PC2RG144N	3-1589070-2
CX060PC2RGC10Q	2-1589070-0
CX060SC2RG012Q	2-1589071-6
CX070PC2RGC10Q	2-1589070-3
CX080PC2RG006N	2-1589070-2
CX080PC2RG012N	3-1589070-9
CX080PC2RG012Q	3-1589070-4
CX080PC2RG018N	3-1589070-6
CX080PC2RG024N	2-1589070-9
CX080PC2RG036N	1-1589070-5
CX080PC2RG048N	1-1589070-6
CX080PC2RG060N	1-1589070-9
CX080PC2RGC10N	2-1589070-7
CX080SC2RG012N	2-1589071-4
CX080SC2RG012Q	2-1589071-7
CX080SC2RG015N	1-1589071-7
CX080SC2RG024N	0-1589071-9
CX090PC2RG036N	1-1589070-2
CX090SC2RG036N	0-1589071-6

Nanonics Part Number	Tyco Part Number
Coax with Mixed Signals	
CX015PC2RC012	0-1589068-1
CX015PC2RC012N	0-1589068-5
CX015SC2RC012N	0-1589069-1
CX035PC2RC006N	0-1589068-2
CX035PC2RC018N	0-1589068-3
CX035SC2RC006N	0-1589069-2
CX035SC2RC018N	0-1589069-3
CX045PC2RC006N	0-1589068-4
CX045PC2RC036N	0-1589068-9
CX045PC2RC036Q	1-1589068-0
CX045SC2RC006N	0-1589069-4
CX045SC2RC006Q	0-1589069-7
CX055PC2RC006N	0-1589068-6
CX055SC2RC006N	0-1589069-5
CX095PC2RC006N	0-1589068-7
CX095PC2RC036N	0-1589068-8
CX095SC2RC006N	0-1589069-6

Nanonics Part Number	Tyco Part Number
Horizontal SMT Coax	
CX010L2AQ	1-1589072-3
CX010L2HN	0-1589072-1
CX020L2HN	1-1589072-2
CX030L23N	0-1589072-2
CX030L23Q	0-1589072-5
CX030L2HN	0-1589072-3
CX040L2AQ	1-1589072-0
CX040L2HN	1-1589072-6
CX050L23Q	0-1589072-6
CX050L2HN	0-1589072-9
CX060L2AQ	1-1589072-1
CX060L2HN	1-1589072-5
CX070L2AQ	1-1589072-4
CX080L2HN	0-1589072-4

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Introduction

Product Facts

- Designed to accept 50, 70 and 93 ohm miniature coaxial cables
- Three types of connectors: Screw-on Series, Slide-on Series and Quick-Connect Series
- Temperature range — -85°F to +257°F [-65°C to +125°C] (with neoprene gasket or bend relief cap) -80°F to 392°F [-62°C to +200°C] (with silicone gasket or bend relief cap)
- Dielectric Withstanding Voltage — 1000 volts RMS at sea level
- Contact Resistance — 3 milliohms max., D.C.
- Captive Contacts — Terminated connector contacts captivated from movement in both directions

MICRODOT Standard Coaxial Connectors are designed to accept 50, 70, and 93 Ohm miniature coaxial cables. These connectors are available as Screw-On Series, Slide-On Series, or Quick-Connect Series. The Screw-On Series is intermateable with the Gold Plated Crimp Style Coaxial Connector Series and offers the dependability of a threaded coupling. For enhanced safety, choose connectors with wire holes.

Choose Slide-On Series for the fastest, most convenient mating and unmating.

The Quick-Connect Series offers the convenience of Slide-On coupling with added retention provided by a snap ring located on the jack/receptacle side.

Consult Tyco Electronics for special cable accommodations and mounting features.

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Standard Connectors

Performance Data Summary
For Standard Connectors

Mechanical

Captive Contacts — Terminated connector contacts captivated from movement in both directions.

Cable Retention —
50 Ohm connectors, 15 lb. min.[1]
70 Ohm connectors, 25 lb. min.[1]
93 Ohm connectors, 35 lb. min.[1]

Recommended Coupling Torque (Threaded Interface) —
8 inch/pounds max.

Recommended Receptacle Mounting Torque (All Series) —
8 inch/pounds max.

Unmating Force (Slide-On Series) —
1-7 pounds.

Contact Protection (Unmated) —
Pin contact protected by coupling nut (threaded series)[2] or by housing (Quick-Connect and Slide-On Series). Socket protected by insulator and housing.

Assembly Methods

Straight Plugs & Jacks — Cable Inner Conductor: Soldered to contact. Cable Shield: Crimped to jerk ring (solder optional).

Angle Plugs — Cable Inner Conductor: Soldered to contact. Cable Shield: Soldered to ring & housing.

Environmental

Temperature Range (Continuous Service) — -85°F to +257°F [-65°C to +125°C] (with Neoprene gasket or bend relief cap). -80°F to 392°F [-62°C to +200°C] (with Silicone gasket or bend relief cap).

Vibration[3,4] — MIL-STD-202, Method 204, Test condition B (15 G peak). No physical damage or electrical discontinuities in excess of 1 microsecond.

Shock[3,4] — MIL-STD-202, Method 213, Test Condition H. No physical damage or electrical discontinuity after shock.

Thermal Shock — MIL-STD-202, Method 107, Test Condition B.

Moisture Resistance[3] — MIL-STD-202, Method 106.

Salt Spray[3] — MIL-STD-202, Method 101, Test Condition B (48 hours).

Electrical

Impedance — Designed to be compatible with 50, 70, or 93 Ohm miniature coaxial cable.

Dielectric Withstanding Voltage — 1000 volts RMS at sea level.

Contact Resistance — 3 milliohms max., D.C.

Current Capacity — 3 amps, D.C.

Insulation Resistance — 5 x 10^3 Megohms min. @ 500 volts D.C.

Voltage Standing Wave Ratio[5] (VSWR) — Typical 50 Ohm series, 1.2 max. to 2 GHz.

Materials

Housing, Nut, Jerk Ring — Brass per ASTM-B-16.

Insulator — TEFLON per ASTM-D-1710.

Pin Contact (Plugs) — Brass per ASTM-B-16.

Socket Contact (Jacks & Receptacles) — Beryllium Copper per ASTM-B-196.

Bend Relief Caps (Plugs & Jacks) — Neoprene or Silicone Rubber per ZZ-R-765.

Gaskets (Jacks & Receptacles) — Neoprene or Silicone Rubber per ZZ-R-765.

Lockwasher — #425 Bronze Alloy.

Plating

Contacts — Gold per MIL-G-45204, Type II, Grade C, Class 1.

Housing, Nut, Jerk Ring, Lockwasher — Silver per QQ-S-365, Type II, Grade A, .0002 [.005] min.

Notes:
[1]Termination to cables with foamed dielectrics excluded. Straight connector jerk rings must be soldered to cable shield.
[2]Pin protector required. See individual connector specifications.
[3]Screw-On Series, threaded interface.
[4]Tyco Electronics recommends the use of safety wired connectors in vibration and shock environment. See individual specifications for connectors with safety wire holes.
[5]VSWR is a system specification. Where performance is critical, purchase Tyco Electronics cable assemblies with Screw-On or Quick-Connect Series connectors and specify VSWR testing and mating connector part number.

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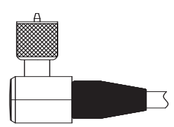
Standard Connectors — Screw-On Series

See page 2-138 for mating options.

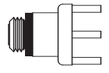
Plug

S-50 Ohm Series	S-70 Ohm Series	S-93 Ohm Series
032-0021-0001	032-0010-0001	032-0011-0001
032-0023-0001	032-0022-0001	032-0017-0001
032-0025-0001	032-0067-0001	032-0066-0001
032-0033-0001	032-0078-0001	032-0071-0001
032-0097-0001	032-0222-0001	032-0092-0001
032-0098-0001	052-0092-0001	032-0099-0001
032-0155-0001		052-0200-0001
032-0156-0001		
052-0213-0001		
052-0235-0001		
052-0235-0003		
052-0370-0001		
052-0542-0001		



Right-Angle Plug

S-50 Ohm Series	S-70 Ohm Series	S-93 Ohm Series
032-0015-0001	032-0013-0001	032-0014-0001
052-0204-0001	052-0299-0001	032-0068-0001
052-0215-0001	052-0379-0001	032-0153-0001
052-0337-0001		052-0207-0001
		052-0298-0001
		052-0304-0022

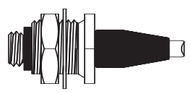


Printed Circuit Receptacle

S-50 Ohm Series	S-70 Ohm Series	S-93 Ohm Series
031-0059-0001	031-0069-0001	031-0067-0001
031-0062-0001		031-0080-0001
051-0450-0001		

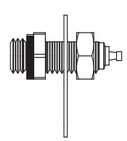
Jack

S-50 Ohm Series	S-70 Ohm Series	S-93 Ohm Series
031-0034-0001	031-0036-0001	031-0037-0001
051-0467-0001	031-0090-0001	031-0088-0001



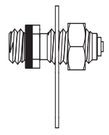
Bulkhead Jack

S-50 Ohm Series	S-70 Ohm Series	S-93 Ohm Series
031-0033-0001	031-0048-0001	031-0032-0001
		031-0089-0001



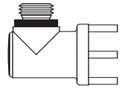
Receptacle

S-50 Ohm Series	S-70 Ohm Series	S-93 Ohm Series
031-0050-0001	031-0051-0001	031-0052-0001
051-0318-0001		



Receptacle

S-50 Ohm Series	S-70 Ohm Series	S-93 Ohm Series
031-0001-0001	031-0017-0001	031-0016-0001
031-0001-0003	031-0018-0001	031-0019-0001
031-0002-0001		031-0046-0001
031-0003-0001		
031-0024-0001		
051-0125-0001		



Right-Angle Printed Circuit Receptacle

S-50 Ohm Series	S-70 Ohm Series	S-93 Ohm Series
031-0061-0001	031-0072-0001	031-0073-0001
051-0459-0001		

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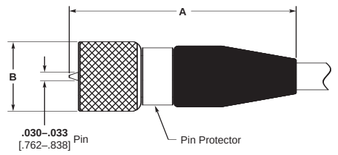
UK: 44-208-420-8341

Standard Connectors — Screw-On Series (Continued)

Plugs

S-50, 70 & 93



Part No.	Dim. A	Dim. B	Cable Jacket Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.	Assembly Tool
S-50 Series (50 Ohm) .190 [4.83] -32 UNF-2B Thread							
032-0021-0001	**.745** 18.92	**.230** 5.84 Dia.	**.087** 2.21	[1]Solderless Assembly	408-08521	RF-ASMB-88	010-0003-0000
032-0023-0001	**.745** 18.92	**.230** 5.84 Dia.	**.087** 2.21	[1]	408-08522	RF-ASMB-89	010-0003-0000
032-0025-0001	**.745** 18.92	**.230** 5.84 Dia.	**.093** 2.36	[1]Solderless Assembly	408-08521	RF-ASMB-88	010-0003-0000
032-0033-0001	**.745** 18.92	**.230** 5.84 Dia.	**.093** 2.36	[1]	408-08522	RF-ASMB-89	010-0003-0000
032-0097-0001	**.745** 18.92	**.250** 6.35 Hex.	**.087** 2.21	[1]Solderless Assembly, Hex Nut	408-08521	RF-ASMB-88	010-0003-0000
032-0098-0001	**.745** 18.92	**.250** 6.35 Hex.	**.087** 2.21	Hex Nut	408-08522	RF-ASMB-89	010-0003-0000
032-0155-0001	**.700** 17.78	**.250** 6.35 Hex.	**.088** 2.24	[1,2]Hex Nut, .187 [4.75] Hex Cable Clamp Nut	408-08522	RF-ASMB-89	010-0003-0000
032-0156-0001	**.700** 17.78	**.250** 6.35 Dia.	**.088** 2.24	[1,2].187 [4.75] Hex Cable Clamp Nut	408-08522	RF-ASMB-89	010-0003-0000
052-0213-0001	**.745** 18.92	**.250** 6.35 Hex.	**.087** 2.21	[1]Solderless, Hex Nut w/ Safety Wire Holes, .021 [0.53] Wire Max.	408-08521	RF-ASMB-88	010-0003-0000
052-0235-0001	**.745** 18.92	**.250** 6.35 Hex.	**.087** 2.21	[1,2]Hex Nut	408-08522	RF-ASMB-89	010-0003-0000
052-0235-0003	**.745** 18.92	**.250** 6.35 Hex.	**.087** 2.21	[1,2]Hex Nut w/ Safety Wire Holes, .021 [0.53] Wire Max.	408-08522	RF-ASMB-89	010-0003-0000
052-0370-0001	**.745** 18.92	**.250** 6.35 Hex.	**.093** 2.36	[1]Hex Nut, Designed for Dual Shield Cable	408-08522	RF-ASMB-89	010-0003-0000
052-0542-0001	**.745** 18.92	**.250** 6.35 Hex.	**.087** 2.21	[1]Hex Nut	408-08522	RF-ASMB-89	010-0003-0000
S-70 Series (70 Ohm) .216 [5.49] -32 UNEF-2B Thread							
032-0010-0001	**.760** 19.30	**.255** 6.48 Dia.	**.093** 2.36	[1]Solderless Assembly	408-08521	RF-ASMB-88	010-0004-0000
032-0022-0001	**.760** 19.30	**.255** 6.48 Dia.	**.093** 2.36	[1]	408-08525	RF-ASMB-95	010-0004-0000
032-0067-0001	**.755** 19.18	**.255** 6.48 Dia.	**.108** 2.74	[1]	408-08522	RF-ASMB-89	010-0035-0000
032-0078-0001	**.755** 19.18	**.255** 6.48 Dia.	**.108** 2.74	[1]Solderless Assembly	408-08521	RF-ASMB-88	010-0035-0000
032-0222-0001	**.760** 19.30	**.281** 7.14 Hex.	**.093** 2.36	[1]Hex Nut w/ Safety Wire Holes, .014 [0.35] Wire Max.	408-08525	RF-ASMB-95	010-0004-0000
052-0092-0001	**.760** 19.30	**.255** 6.48 Dia.	**.093** 2.36	[2]	408-08525	RF-ASMB-95	010-0004-0000
S-93 Series (93 Ohm) .250 [6.35] -32 UNEF-2B Thread							
032-0011-0001	**.760** 19.30	**.320** 8.13 Dia.	**.134** 3.40	[1]Solderless Assembly	408-08521	RF-ASMB-88	010-0005-0000
032-0017-0001	**.760** 19.30	**.320** 8.13 Dia.	**.134** 3.40	[1]	408-08525	RF-ASMB-95	010-0005-0000
032-0066-0001	**.950** 24.13	**.350** 8.89 Dia.	**.154** 3.91	[1]Silicone Bend Relief Cap	408-08523	RF-ASMB-90	—
032-0071-0001	**.760** 19.30	**.320** 8.13 Dia.	**.134** 3.40	[1]Cable Inner Conductor, .031 [0.78] Max.	408-08525	RF-ASMB-95	010-0005-0000
032-0092-0001	**.760** 19.30	**.320** 8.13 Dia.	**.155** 3.94	[1]	408-08525	RF-ASMB-95	010-0044-0000
032-0099-0001	**.760** 19.30	**.312** 7.92 Hex.	**.134** 3.40	[1]Hex Nut	408-08525	RF-ASMB-95	010-0005-0000
052-0200-0001	**.760** 19.30	**.312** 7.92 Hex.	**.134** 3.40	[1]Hex Nut w/ Safety Wire Holes, .015 [0.38] Wire Max.	408-08525	RF-ASMB-95	010-0005-0000

[1]Pin protected.
[2]Hole in ferrule permits soldering to clamp ring and shield for increased cable pullout strength.

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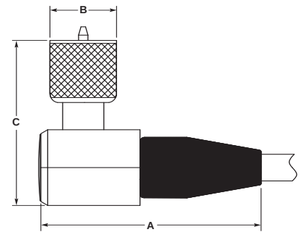
Standard Connectors — Screw-On Series (Continued)

Right-Angle Plugs
S-50, 70 & 93



Part No.	Dim. A	Dim. B	Dim. C	Cable Jacket Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.	Assembly Tool
S-50 Series (50 Ohm) .190 [4.83] -32 UNF-2B Thread								
032-0015-0001	**.735** 18.67	**.225** 5.72 Dia.	**.570** 14.48	**.092** 2.34		408-08520	RF-ASMB-87	010-0016-0000
052-0204-0001	**.735** 18.67	**.250** 6.35 Hex.	**.570** 14.48	**.092** 2.34	Hex Nut	408-08520	RF-ASMB-87	010-0016-0000
052-0215-0001	**.735** 18.67	**.250** 6.35 Hex.	**.570** 14.48	**.092** 2.34	Hex Nut w/ Safety Wire Holes, .021 [.533] Wire Max.	408-08520	RF-ASMB-87	010-0016-0000
052-0337-0001	**.745** 18.92	**.225** 5.72 Dia.	**.570** 14.48	**.111** 2.82	Dual Shield Cable	408-08520	RF-ASMB-87	010-0016-0000
S-70 Series (70 Ohm) .216 [5.49] -32 UNEF-2B Thread								
032-0013-0001	**.745** 18.92	**.255** 6.48 Dia.	**.570** 14.48	**.111** 2.82		408-08520	RF-ASMB-87	010-0016-0000
052-0299-0001	**.745** 18.92	**.281** 7.14 Hex.	**.570** 14.48	**.111** 2.82	Hex Nut w/ Safety Wire Holes, .014 [.355] Wire Max.	408-08520	RF-ASMB-87	010-0016-0000
052-0379-0001	**.745** 18.92	**.281** 7.14 Hex.	**.570** 14.48	**.111** 2.82	Hex Nut	408-08520	RF-ASMB-87	010-0016-0000
S-93 Series (93 Ohm) .250 [6.35] -32 UNEF-2B Thread								
032-0014-0001	**.745** 18.92	**.320** 8.13 Dia.	**.630** 16.00	**.134** 3.40		408-08520	RF-ASMB-87	010-0017-0000
032-0068-0001	**.745** 18.92	**.320** 8.13 Dia.	**.630** 16.00	**.155** 3.94		408-08520	RF-ASMB-87	010-0017-0000
032-0153-0001	**.745** 18.92	**.312** 7.92 Hex.	**.630** 16.00	**.155** 3.94	Hex Nut	408-08520	RF-ASMB-87	010-0017-0000
052-0207-0001	**.745** 18.92	**.312** 7.92 Hex.	**.630** 16.00	**.134** 3.40	Hex Nut	408-08520	RF-ASMB-87	010-0017-0000
052-0298-0001	**.745** 18.92	**.312** 7.92 Hex.	**.630** 16.00	**.134** 3.40	Hex Nut w/ Safety Wire Holes, .015 [.381] Wire Max.	408-08520	RF-ASMB-87	010-0017-0000
052-0304-0022	**.745** 18.92	**.312** 7.92 Hex.	**.630** 16.00	**.155** 3.94	Hex Nut w/ Safety Wire Holes, .015 [.381] Wire Max., Silicone Bend Relief Cap	408-08520	RF-ASMB-87	010-0017-0000

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Jacks

S-50, 70 & 93

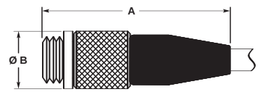


Fig. 1

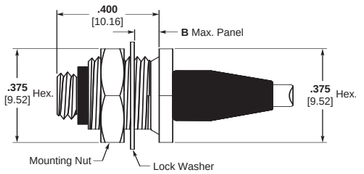
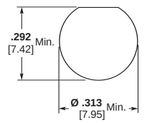


Fig. 2



Mounting Hole

Part No.	Fig.	Dim. A	Dim. B	Cable Jacket Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.	Assembly Tool
S-50 Series (50 Ohm) .190 [4.83] -32 UNF-2A Thread								
031-0033-0001	2	**.870** 22.10	**.140** 3.56	**.088** 2.24		408-08522	RF-ASMB-89	010-0003-0000
031-0034-0001	1	**.750** 19.05	**.235** 5.97	**.087** 2.21		408-08522	RF-ASMB-89	010-0003-0000
051-0467-0001	1	**.720** 18.30	**.235** 5.97	**.079** 2.01	Hex Collet Cable Clamp	408-08522	RF-ASMB-89	010-0003-0000
S-70 Series (70 Ohm) .216 [5.49] -32 UNEF-2A Thread								
031-0036-0001	1	**.760** 19.30	**.255** 6.48	**.093** 2.36		408-08522	RF-ASMB-89	010-0004-0000
031-0048-0001	2	**.880** 22.35	**.140** 3.56	**.093** 2.36		408-08525	RF-ASMB-95	010-0004-0000
031-0090-0001	1	**.760** 19.30	**.255** 6.48	**.109** 2.77		408-08522	RF-ASMB-89	010-0035-0000
S-93 Series (93 Ohm) .250 [6.35] -32 UNEF-2A Thread								
031-0032-0001	2	**.880** 22.35	**.155** 3.94	**.134** 3.40		408-08525	RF-ASMB-95	010-0005-0000
031-0037-0001	1	**.760** 19.30	**.320** 8.13	**.134** 3.40		408-08525	RF-ASMB-95	010-0005-0000
031-0088-0001	1	**1.000** 25.40	**.320** 8.13	**.154** 3.91		408-08533	RF-ASMB-106	—
031-0089-0001	2	**.750** 19.05	**.140** 3.56	**.154** 3.91	No Mounting Flat, Hex Nut Cable Clamp	408-08524	RF-ASMB-92	—

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Standard Connectors — Screw-On Series (Continued)

Receptacles

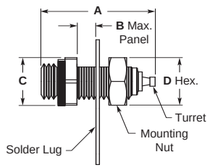


Fig. 1

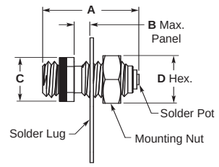
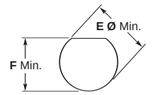


Fig. 2



Mounting Hole for Fig. 1 & 2

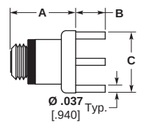


Fig. 3

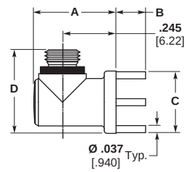
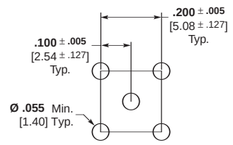


Fig. 4



Mounting Pattern for Fig. 3 & 4

Part No.	Fig.	Dim. A	Dim. B	Dim. C		Dim. D	Dim. E	Dim. F	Special Features
S-50 Series (50 Ohm) .190 [4.83] -32 UNF-2A Thread									
031-0001-0001	2	**.515** 13.08	**.080** 2.03	**.187** 4.75	Wrench Flats	**.250** 6.35	**.191** 4.85	—	No Mounting Flat
031-0001-0003	2	**.510** 12.95	**.110** 2.80	**.187** 4.75	Wrench Flats	**.250** 6.35	**.191** 4.85	—	No Mounting Flat
031-0002-0001	2	**.515** 13.08	**.150** 3.81	**.187** 4.75	Wrench Flats	**.250** 6.35	**.191** 4.85	—	No Mounting Flat
031-0003-0001	2	**.255** 6.48	—	**.187** 4.75	Wrench Flats	—	**.190** 4.83 -32	—	No Nut or Solder Lug, Threads into Panel
031-0024-0001	2	**.555** 14.10	**.120** 3.05	**.344** 8.74	Wrench Flats	**.438** 11.13	**.345** 8.76	—	Housing Isolated by Nylon Insulator
031-0050-0001	1	**.605** 15.37	**.160** 4.06	**.250** 6.35	Hex.	**.250** 4.75	**.191** 4.85	**.173** 4.39	
031-0059-0001	3	**.340** 8.64	**.155** 3.93	**.330** 8.38	Dia.	—	—	—	
031-0061-0001	4	**.425** 10.80	**.155** 3.93	**.330** 8.38	Dia.	**.480** 12.20	—	—	
031-0062-0001	3	**.345** 8.76	**.250** 6.35	**.330** 8.38	Dia.	—	—	—	
051-0125-0001	2	**.315** 8.00	**.125** 3.18	**.187** 4.75	Wrench Flats	—	**.138** 3.50	—	No Mounting Thread, Solder or Press into Panel
051-0318-0001	1	**.605** 15.37	**.160** 4.06	**.250** 6.35	Hex.	**.250** 4.75	**.191** 4.85	**.173** 4.39	w/ Safety Wire Holes, .014 [.355] Wire Max.
051-0450-0001	3	**.340** 8.64	**.050** 1.27	**.330** 8.38	Dia.	—	—	—	
051-0459-0001	4	**.425** 10.80	**.155** 3.93	**.330** 8.38	Dia.	**.480** 12.20	—	—	3 Outer Legs
S-70 Series (70 Ohm) .216 [5.49] -32 UNEF-2A Thread									
031-0017-0001	2	**.555** 14.10	**.100** 2.54	**.250** 6.35	Hex.	**.281** 7.14	**.217** 5.51	—	No Mounting Flat
031-0018-0001	2	**.555** 14.10	**.160** 4.06	**.250** 6.35	Hex.	**.281** 7.14	**.217** 5.51	—	No Mounting Flat
031-0051-0001	1	**.605** 15.37	**.160** 4.06	**.250** 6.35	Hex.	**.281** 7.14	**.217** 5.51	**.197** 5.00	
031-0069-0001	3	**.340** 8.64	**.155** 3.94	**.330** 8.38	Dia.	—	—	—	
031-0072-0001	4	**.425** 10.80	**.155** 3.94	**.330** 8.38	Dia.	**.480** 12.20	—	—	

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Receptacles (Continued)

Part No.	Fig.	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Special Features
S-93 Series (93 Ohm) .250 [6.35] -32 UNEF-2A Thread								
031-0016-0001	2	**.555** 14.10	**.100** 2.54	**.312** 7.92 Hex.	**.312** 7.92	**.251** 6.38	—	No Mounting Flat
031-0019-0001	2	**.555** 14.10	**.160** 2.54	**.312** 7.92 Hex.	**.312** 7.92	**.251** 6.38	—	No Mounting Flat
031-0046-0001	2	**.555** 3.05	**.120** 3.05	**.345** 8.76 Wrench Flats	**.438** 11.13	**.345** 8.76	—	Housing Isolated by Nylon Insulator
031-0052-0001	1	**.605** 15.37	**.160** 2.54	**.312** 7.92 Hex.	**.312** 7.92	**.251** 6.38	**.232** 5.89	
031-0067-0001	3	**.340** 8.64	**.155** 3.94	**.330** 8.38 Dia.	—	—	—	
031-0073-0001	4	**.425** 10.80	**.155** 3.94	**.330** 8.38 Dia.	**.480** 12.20	—	—	
031-0080-0001	3	**.345** 8.76	**.250** 6.35	**.330** 8.38 Dia.	—	—	—	

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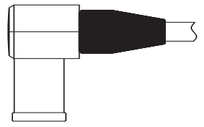
Standard Connectors — Slide-On Series

All plugs shown below mate with all jacks/receptacles shown below.

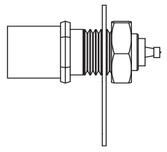
Plug

SOS-50 Ohm Series	SOS-70 Ohm Series	SOS-93 Ohm Series
032-0055-0001	032-0060-0001	032-0077-0001
	032-0087-0001	032-0084-0001



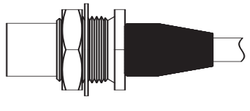
Right-Angle Plug

SOS-50 Ohm Series	SOS-70 Ohm Series	SOS-93 Ohm Series
032-0063-0001	032-0062-0001	032-0059-0001
		032-0083-0001



Plug Receptacle

SOS-50 Ohm Series	SOS-70 Ohm Series	SOS-93 Ohm Series
032-0042-0001	032-0042-0001	032-0042-0001
052-0061-0001	052-0061-0001	052-0061-0001
052-0471-0001	052-0471-0001	052-0471-0001

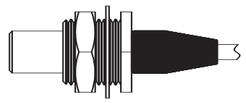


Bulkhead Plug

SOS-50 Ohm Series	SOS-70 Ohm Series	SOS-93 Ohm Series
032-0056-0001	032-0061-0001	032-0058-0001

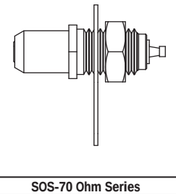
Jack

SOS-50 Ohm Series	SOS-70 Ohm Series	SOS-93 Ohm Series
031-0053-0001	031-0095-0001	031-0063-0001
		031-0093-0001



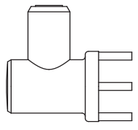
Bulkhead Jack

SOS-50 Ohm Series	SOS-70 Ohm Series	SOS-93 Ohm Series
031-0054-0001		031-0064-0001
		031-0094-0001



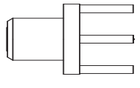
Receptacle

SOS-50 Ohm Series	SOS-70 Ohm Series	SOS-93 Ohm Series
031-0049-0001	031-0049-0001	031-0049-0001
051-0258-0001	051-0258-0001	051-0258-0001
051-0325-0001	051-0325-0001	051-0325-0001



Right-Angle Printed Circuit Receptacle

SOS-50 Ohm Series	SOS-70 Ohm Series	SOS-93 Ohm Series
031-0070-0001	031-0070-0001	031-0070-0001



Printed Circuit Receptacle

SOS-50 Ohm Series	SOS-70 Ohm Series	SOS-93 Ohm Series
031-0060-0001	031-0060-0001	031-0060-0001
031-0065-0001	031-0065-0001	031-0065-0001

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UK: 44-208-420-8341

Standard Connectors — Slide-On Series (Continued)

Straight Plugs

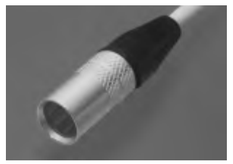


Fig. 1

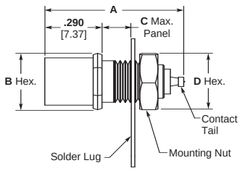


Fig. 2
Plug Receptacle

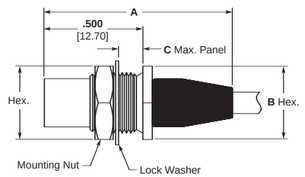
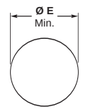


Fig. 3
Bulkhead Plug



Mounting Hole
for Fig. 2 & 3

Part No.	Fig.	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Cable Max. Jacket	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.	Assembly Tool
SOS-50 Series (50 Ohm)											
032-0042-0001	2	**.705** 17.91	**.250** 6.35	**.160** 4.06	**.281** 7.14	**.217** 5.51	—	Turret Pin Contact Tail	—	—	—
032-0055-0001	1	**.870** 22.10	**.250** 6.35	—	—	—	**.088** 2.24		408-08526	RF-ASMB-97	010-0007-0000
032-0056-0001	3	**.950** 24.13	**.375** 9.53	**.145** 3.68	**.375** 9.53	**.313** 7.95	**.088** 2.24		408-08526	RF-ASMB-97	010-0007-0000
052-0061-0001	2	**.750** 19.05	**.250** 6.35	**.160** 4.06	**.281** 7.14	**.217** 5.51	—	Solder Pot Contact Tail	—	—	—
052-0471-0001	2	**.590** 14.99	**.250** 6.35	**.095** 2.41	**.281** 7.14	**.217** 5.51	—	Straight Pin Contact Tail[1]	—	—	—
SOS-70 Series (70 Ohm)											
032-0042-0001	2	**.705** 17.91	**.250** 6.35	**.160** 4.06	**.281** 7.14	**.217** 5.51	—	Turret Pin Contact Tail	—	—	—
032-0060-0001	1	**.880** 22.35	**.250** 6.35	—	—	—	**.093** 2.36		408-08529	RF-ASMB-102	010-0007-0000
032-0061-0001	3	**.960** 24.38	**.375** 9.53	**.145** 3.68	**.375** 9.53	**.313** 7.95	**.093** 2.36		408-08526	RF-ASMB-97	010-0007-0000
032-0087-0001	1	**.880** 22.35	**.250** 6.35	—	—	—	**.108** 2.24		408-08526	RF-ASMB-97	010-0036-0000
052-0061-0001	2	**.750** 19.05	**.250** 6.35	**.160** 4.06	**.281** 7.14	**.217** 5.51	—	Solder Pot Contact Tail	—	—	—
052-0471-0001	2	**.590** 14.99	**.250** 6.35	**.095** 2.41	**.281** 7.14	**.217** 5.51	—	Straight Pin Contact Tail[1]	—	—	—
SOS-93 Series (93 Ohm)											
032-0042-0001	2	**.705** 17.91	**.250** 6.35	**.160** 4.06	**.281** 7.14	**.217** 5.51	—	Turret Pin Contact Tail	—	—	—
032-0058-0001	3	**.960** 24.38	**.375** 9.53	**.145** 3.68	**.375** 9.53	**.313** 7.95	**.134** 3.40		408-08529	RF-ASMB-102	010-1008-0000
032-0077-0001	1	**.880** 22.35	**.250** 6.35	—	—	—	**.134** 3.40		408-08529	RF-ASMB-102	010-1008-0000
032-0084-0001	1	**1.06** 26.92	**.250** 6.35	—	—	—	**.154** 3.91		408-08523	RF-ASMB-90	—
052-0061-0001	2	**.750** 19.05	**.250** 6.35	**.160** 4.06	**.281** 7.14	**.217** 5.51	—	Solder Pot Contact Tail	—	—	—
052-0471-0001	2	**.590** 14.99	**.250** 6.35	**.095** 2.41	**.281** 7.14	**.217** 5.51	—	Straight Pin Contact Tail[1]	—	—	—

[1]Lockwasher supplied in place of solder lug.

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Standard Connectors — Slide-On Series (Continued)

Jacks

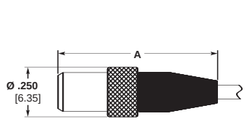


Fig. 1

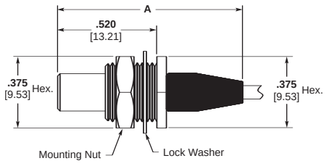
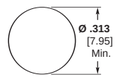


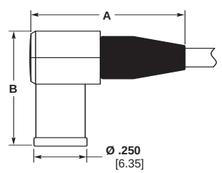
Fig. 2



Mounting Hole

Part No.	Fig.	Dim. A	Cable Jacket Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.	Assembly Tool
SOS-50 Series (50 Ohm)							
031-0053-0001	1	**.800** 20.32	**.088** 2.24		408-08531	RF-ASMB-104	010-0007-0000
031-0054-0001	2	**.970** 24.64	**.088** 2.24		408-08531	RF-ASMB-104	010-0007-0000
SOS-70 Series (70 Ohm)							
031-0095-0001	1	**.810** 20.57	**.108** 2.74		408-08531	RF-ASMB-104	010-0036-0000
SOS-93 Series (93 Ohm)							
031-0063-0001	1	**.810** 20.57	**.134** 3.40		408-08530	RF-ASMB-103	010-1008-0000
031-0064-0001	2	**.980** 24.89	**.134** 3.40		408-08530	RF-ASMB-103	010-1008-0000
031-0093-0001	1	**1.100** 27.94	**.154** 3.91	.305 [7.75] Dia. Over B.R. Cap	408-08532	RF-ASMB-105	—
031-0094-0001	2	**.750** 19.05	**.154** 3.91	Hex Nut Cable Clamp	408-08524	RF-ASMB-92	—

Right-Angle Plugs



Part No.	Dim. A	Dim. B	Cable Max. O.D.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.	Assembly Tool
SOS-50 Series (50 Ohm)							
032-0063-0001	**.735** 18.67	**.545** 13.84	**.092** 2.34		408-08520	RF-ASMB-87	010-0016-0000
SOS-70 Series (70 Ohm)							
032-0062-0001	**.745** 18.92	**.545** 13.84	**.111** 2.82		408-08520	RF-ASMB-87	010-0016-0000
SOS-93 Series (93 Ohm)							
032-0059-0001	**.745** 18.92	**.605** 15.37	**.134** 3.40		408-08520	RF-ASMB-87	010-0017-0000
032-0083-0001	**.745** 18.92	**.605** 15.37	**.155** 3.94		408-08520	RF-ASMB-87	010-0017-0000

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Standard Connectors — Slide-On Series (Continued)

Receptacles

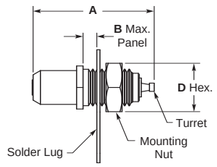


Fig. 1

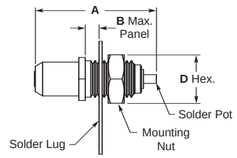
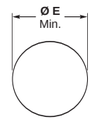


Fig. 2



Mounting Hole
for Fig. 1 & 2

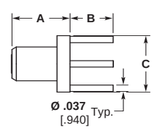


Fig. 3

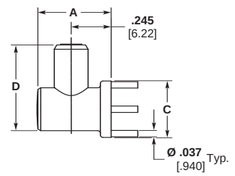
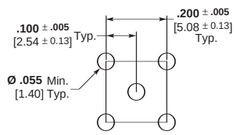


Fig. 4



Mounting Pattern
for Fig. 3 & 4

Part No.	Fig.	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Special Features
SOS-50 (50 Ohm), SOS-70 (70 Ohm), & SOS-93 (93 Ohm) Series							
031-0049-0001	1	**.715** 18.16	**.160** 4.06	**.250** 6.35 Hex.	**.281** 7.14	**.217** 5.51	
031-0060-0001	3	**.340** 8.64	**.155** 3.94	**.330** 8.38 Dia.	—	—	
031-0065-0001	3	**.340** 8.64	**.250** 6.35	**.330** 8.38 Dia.	—	—	
031-0070-0001	4	**.425** 10.79	**.155** 3.94	**.330** 8.38 Dia.	**.540** 13.72	—	
051-0258-0001	2	**.715** 18.16	**.160** 4.06	**.250** 6.35 Hex.	**.281** 7.14	**.217** 5.51	
051-0325-0001	1	**.570** 14.48	**.140** 3.56	**.250** 6.35 Hex.	—	**.216-32** 5.49 Thd.	No Nut or Lockwasher, Threads into Panel

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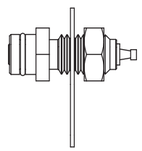
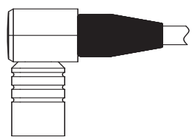
Plug

QC-50 Ohm Series	QC-70 Ohm Series	QC-93 Ohm Series
032-0002-0001	032-0016-0001	032-0012-0001
032-0030-0001	032-0031-0001	032-0032-0001
	032-0079-0001	032-0072-0001

Jack

QC-50 Ohm Series	QC-70 Ohm Series	QC-93 Ohm Series
031-0038-0001		031-0040-0001



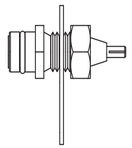


Right-Angle Plug

QC-50 Ohm Series	QC-70 Ohm Series	QC-93 Ohm Series
032-0026-0001	032-0027-0001	032-0020-0001
		052-0228-0001

Receptacle

QC-50 Ohm Series	QC-70 Ohm Series	QC-93 Ohm Series
031-0057-0001	031-0057-0001	031-0058-0001
		031-0085-0001



Receptacle

QC-50 Ohm Series	QC-70 Ohm Series	QC-93 Ohm Series
031-0004-0001	031-0004-0001	031-0020-0001
031-0005-0001	031-0005-0001	031-0021-0001
031-0006-0001	031-0006-0001	
051-0586-0001	051-0586-0001	

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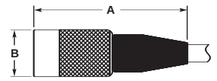
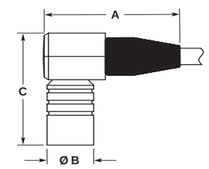
Japan: 81-44-844-8013
UK: 44-208-420-8341

Straight Plugs



Part No.	Dim. A	Dim. B	Cable Jacket Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.	Assembly Tool
QC-50 Series (50 Ohm)							
032-0002-0001	**.820** 20.83	**.250** 6.35	**.093** 2.36	Solderless Assembly	408-08527	RF-ASMB-100	010-0007-0000
032-0030-0001	**.820** 20.83	**.250** 6.35	**.093** 2.36		408-08526	RF-ASMB-97	010-0007-0000
QC-70 Series (70 Ohm)							
032-0016-0001	**.830** 21.08	**.250** 6.35	**.093** 2.36	Solderless Assembly	408-08527	RF-ASMB-100	010-0007-0000
032-0031-0001	**.830** 21.08	**.250** 6.35	**.093** 2.36		408-08529	RF-ASMB-102	010-0007-0000
032-0079-0001	**.840** 21.34	**.250** 6.35	**.108** 2.74		408-08526	RF-ASMB-97	010-0036-0000
QC-93 Series (93 Ohm)							
032-0012-0001	**.845** 21.46	**.312** 7.92	**.134** 3.40	Solderless Assembly	408-08527	RF-ASMB-100	010-0008-0000
032-0032-0001	**.845** 21.46	**.312** 7.92	**.134** 3.40		408-08529	RF-ASMB-102	010-0008-0000
032-0072-0001	**1.050** 26.67	**.312** 7.92	**.154** 3.91	Mates with 031-0085-0001 Only	408-08523	RF-ASMB-90	—

Right-Angle Plugs



Part No.	Dim. A	Dim. B	Dim. C	Cable Jacket Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.	Assembly Tool
QC-50 Series (50 Ohm)								
032-0026-0001	**.735** 18.67	**.250** 6.35	**.605** 15.37	**.092** 2.34		408-08520	RF-ASMB-87	010-0016-0000
QC-70 Series (70 Ohm)								
032-0027-0001	**.745** 18.92	**.250** 6.35	**.605** 15.37	**.111** 2.82		408-08520	RF-ASMB-87	010-0016-0000
QC-93 Series (93 Ohm)								
032-0020-0001	**.745** 18.92	**.312** 7.92	**.635** 16.13	**.134** 3.40		408-08520	RF-ASMB-87	010-0017-0000
052-0228-0001	**.745** 18.92	**.312** 7.92	**.720** 18.29	**.155** 3.94	Mates with 031-0085-0001 Only	408-08520	RF-ASMB-87	010-0017-0000

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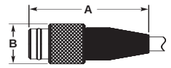
Jacks



Part No.	Dim. A	Dim. B	Cable Jacket Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.	Assembly Tool
QC-50 Series (50 Ohm)							
031-0038-0001	**.750** 19.05	**.250** 6.35	**.093** 2.36		408-08531	RF-ASMB-104	010-0007-0000
QC-93 Series (93 Ohm)							
031-0040-0001	**.760** 19.30	**.320** 8.13	**.134** 3.40		408-08530	RF-ASMB-103	010-1009-0000

Receptacles

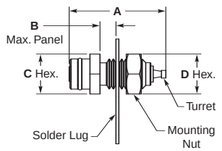


Fig. 1

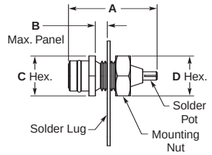
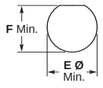


Fig. 2



Mounting Hole

Part No.	Fig.	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Special Features
QC-50 Series (50 Ohm) & QC-70 Series (70 Ohm)								
031-0004-0001	2	**.555** 14.10	**.095** 2.41	**.250** 6.35	**.250** 6.35	**.191** 4.85	—	No Mounting Flat
031-0005-0001	2	**.555** 14.10	**.165** 4.19	**.250** 6.35	**.250** 6.35	**.191** 4.85	—	No Mounting Flat
031-0006-0001	2	**.250** 6.35	—	**.250** 6.35	—	**.190-32** 4.83 Thd	—	No Nut or Solder Lug, Threads into Panel
031-0057-0001	1	**.605** 15.37	**.165** 4.19	**.250** 6.35	**.250** 6.35	**.191** 4.85	**.173** 4.39	
051-0586-0001	2	**.555** 14.10	**.165** 4.19	**.250** 6.35	**.250** 6.35	**.191** 4.85	—	No Mounting Flat, Split Solder Lug
QC-93 Series (93 Ohm)								
031-0020-0001	2	**.555** 14.10	**.095** 2.41	**.312** 7.92	**.312** 7.92	**.251** 6.38	—	No Mounting Flat
031-0021-0001	2	**.555** 14.10	**.165** 4.19	**.312** 7.92	**.312** 7.92	**.251** 6.38	—	No Mounting Flat
031-0058-0001	1	**.605** 15.37	**.160** 4.06	**.312** 7.92	**.312** 7.92	**.251** 6.38	**.232** 5.89	
031-0085-0001	1	**.715** 18.16	**.165** 4.19	**.312** 7.92	**.312** 7.92	**.251** 6.38	—	No Mounting Flat, Mates with 032-0072-0001 & 052-0228-0001 Only

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Standard Connectors — Twinax Series

Twinax Plugs:

For cables with two inner conductors and one shield

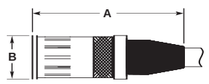


Fig. 1
Slide-On Series

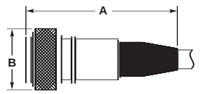


Fig. 2
Screw-On Series

Part No.	Fig.	Dim. A	Dim. B	Cable Jacket Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.	Assembly Tool
032-0088-0001	1	**1.085** 27.56	**.312** 7.92	**.167** 4.24		408-08528	RF-ASMB-101	010-0031-0000
032-0093-0001	1	**1.085** 27.56	**.312** 7.92	**.123** 3.12		408-08528	RF-ASMB-101	010-0031-0000
052-0229-0001	2	**1.085** 27.56	**.440** 11.18	**.123** 3.12		408-08517	RF-ASMB-61	010-0172-0000
052-0324-0001	2	**1.095** 27.81	**.440** 11.18	**.167** 4.24		408-08517	RF-ASMB-61	010-0172-0000

Twinax Receptacles and Jacks:

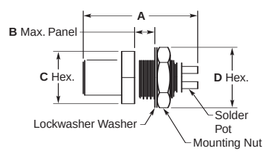


Fig. 1
Slide-On Series

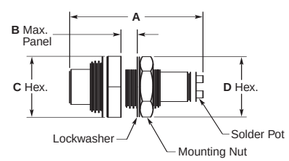


Fig. 2
Slide-On Series or Screw-On Series

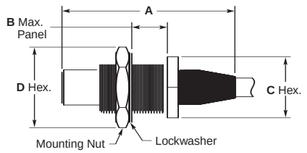
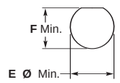


Fig. 3
Slide-On Series or Screw-On Series



Mounting Hole

Part No.	Fig.	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Cable Max. Jacket	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.	Assembly Tool
031-0098-0001	1	**.812** 20.62	**.155** 3.94	**.375** 9.53	**.375** 9.53	**.313** 7.95	**.292** 7.42	—		—	—	—
051-0248-0001	2	**.960** 24.38	**.155** 3.94	**.437** 11.10	**.375** 9.53	**.313** 7.95	**.292** 7.42	—		—	—	—
051-0358-0001	3	**1.060** 26.92	**.075**[1] 1.91	**.437** 11.10	**.500** 12.7	**.376** 9.55	**.351** 8.92	**.167** 4.24	Lockwasher not included	408-08516	RF-ASMB-44	010-0186-0000
051-0389-0001	3	**1.255** 31.88	**.255**[2] 6.48	**.437** 11.10	**.500** 12.7	**.376** 9.55	**.351** 8.92	**.167** 4.24		408-08516	RF-ASMB-44	010-0186-0000

[1].075 [1.91] Max. Panel when mated with a Screw-On plug, .180 [4.57] Max. Panel when mated with a Slide-On plug.
[2].255 [6.48] Max. Panel when mated with a Screw-On plug, .360 [9.14] Max. Panel when mated with a Slide-On plug.

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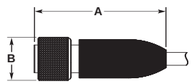
Japan: 81-44-844-8013
UK: 44-208-420-8341

Standard Connectors — Triax Series and Terminals

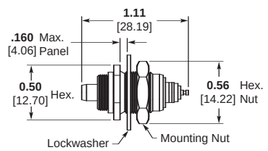
Triax Plugs:

For cables with one inner conductor and two isolated shields

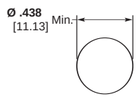


Part No.	Dim. A	Dim. B	Cable Jacket Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.	Assembly Tool
052-0130-0001	**1.37** 34.80	**.440** 11.18 Dia.	**.124** 3.15		408-08514	RF-ASMB-20	—
052-0138-0001	**1.37** 34.80	**.440** 11.18 Dia.	**.183** 4.65		408-08515	RF-ASMB-21	—
052-0593-0001	**1.37** 34.80	**.438** 11.13 Hex.	**.214** 5.44	Hex Nut w/ Safety Wire Holes, .027 [.686] Wire Max.	408-08518	RF-ASMB-73	—

Triax Receptacle:

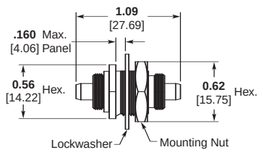


Part Number 051-0618-0001

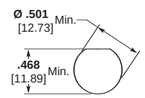


Mounting Hole

Triax Adapter:



Part Number 053-0161-0001
Mates with Triax Plug, Both Ends



Mounting Hole

Terminals

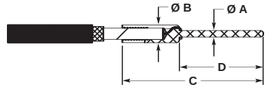


Fig. 1

Fig. 2

Terminals are gold plated. See applicable MICRODOT drawing for solder and crimp instructions.

Part No.	Fig.	Dim. A	Dim. B	Dim. C	Dim. D	Cable Max. Dielectric	Cable Max. Inner Conductor
053-0354-0003	1	**.030** .762	**.080** 2.03	**.630** 16.00	**.375** 9.53	**.050** 1.27	**.015** .381
053-0249-0001	1	**.030** .762	**.105** 2.67	**.630** 16.00	**.375** 9.53	**.071** 1.80	**.021** .533
053-0495-0001	1	**.030** .762	**.125** 3.18	**.880** 22.35	**.610** 15.49	**.083** 2.11	**.022** .559
053-0656-0001	1	**.030** .762	**.145** 3.68	**.880** 22.35	**.375** 9.53	**.108** 2.74	**.023** .584
053-0294-0002	1	**.030** .762	**.145** 3.68	**.880** 22.35	**.625** 15.88	**.108** 2.74	**.023** .584
033-0115-0002	2	**.040** 1.02	**.063** 1.60	**.255** 6.48	**.100** 2.54	**.042** 1.07	**.023** .584
033-0116-0001	2	**.040** 1.02	**.094** 2.39	**.300** 7.62	**.100** 2.54	**.068** 1.73	**.023** .584
033-0117-0001	2	**.040** 1.02	**.140** 3.56	**.350** 8.89	**.200** 5.08	**.108** 2.74	**.023** .584
053-0154-0001	1	**.041** 1.04	**.080** 2.03	**.430** 10.92	**.175** 4.45	**.050** 1.27	**.019** .483
053-0250-0001	1	**.041** 1.04	**.080** 2.03	**.505** 12.83	**.250** 6.35	**.050** 1.27	**.019** .483
053-0020-0003	1	**.041** 1.04	**.080** 2.03	**.630** 16.00	**.375** 9.53	**.050** 1.27	**.015** .381
053-0021-0003	1	**.041** 1.04	**.105** 2.67	**.630** 16.00	**.375** 9.53	**.071** 1.80	**.023** .584
053-0267-0003	1	**.041** 1.04	**.105** 2.67	**.875** 22.23	**.625** 15.88	**.071** 1.80	**.023** .584
053-0265-0001	2	**.041** 1.04	**.128** 3.25	**.505** 12.83	**.250** 6.35	**.102** 2.59	**.021** .533
053-0230-0001	2	**.041** 1.04	**.128** 3.25	**.630** 16.00	**.375** 9.53	**.102** 2.59	**.018** .457
053-0155-0001	1	**.041** 1.04	**.145** 3.68	**.430** 10.82	**.175** 4.45	**.108** 2.74	**.023** .584
053-0022-0003	1	**.041** 1.04	**.145** 3.68	**.630** 16.00	**.375** 9.53	**.108** 2.74	**.023** .584
053-0388-0001	2	**.042** 1.07	**.098** 2.49	**.500** 12.70	**.250** 6.35	**.065** 1.65	**.021** .533
053-0251-0001	2	**.042** 1.07	**.098** 2.49	**.630** 16.00	**.375** 9.53	**.065** 1.65	**.021** .533

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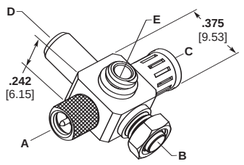
Standard Connectors — Module Blocks



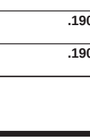
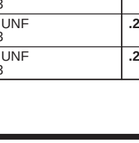
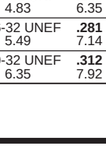
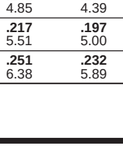
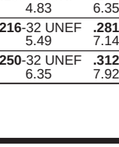
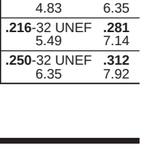
The five faces of basic block can be used to mount any one of 10 different terminations. The 5 faces are coded with letters as shown above. The 10 terminations are coded with Nos. 1–10. Part number, to be complete, must show face location and termination Nos. desired. (Ex: illustration shows 033-0042—A2—B7—C6—D5—E1) Ordering part number will be converted to a MICRODOT assigned number at time of ordering.

We do not stock complete assemblies.

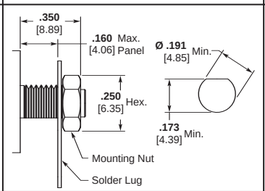
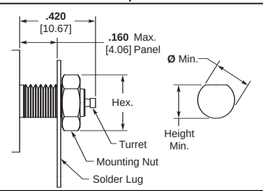
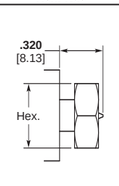
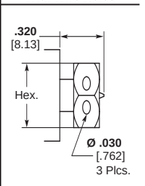
Size	Part No.	Dim. H
50 Ohm	033-0042*	**.250** 6.35
70 Ohm	033-0043*	**.250** 6.35
93 Ohm	033-0044*	**.300** 7.62

*Part number to be completed by customer. A Computer Part Number will be assigned by Tyco Electronics.

Interfaces/Terminations

Termination Number	1	2	3	4	5	6
Mating Type	S	S	QC	QC	SOS	SOS
Description	Receptacle	Plug with Knurl Nut	Receptacle	Plug	Receptacle	Plug
						
	Thread	Thread Dia.		Dia.		Dia.
50 Series	**.190**-32 UNF 4.83	**.190**-32 UNF 4.83 **.230** 5.84		**.250** 6.35		**.250** 6.35
70 Series	**.216**-32 UNEF 5.49	**.216**-32 UNEF 5.49 **.255** 6.48		**.250** 6.35		**.250** 6.35
93 Series	**.250**-32 UNEF 6.35	**.250**-32 UNEF 6.35 **.320** 8.13		**.312** 7.92		**.250** 6.35

Interfaces/Terminations (Continued)

Termination Number	7	8			9		10	
Mating Type	—	—			S		S	
Description	Bulkhead Stud	Bulkhead Receptacle			Plug with Hex. Nut		Plug, Hex. Nut With Wire Holes	
								
	Thread	Thread	Hex.	Min. Hole Dia.	Min. Hole Height	Thread	Hex.	Thread	Hex.
50 Series	**.190**-32 UNF 4.83	**.190**-32 UNF 4.83	**.250** 6.35	**.191** 4.85	**.173** 4.39	**.190**-32 UNF 4.83	**.250** 6.35	**.190**-32 UNF 4.83	**.250** 6.35
70 Series	**.190**-32 UNF 4.83	**.216**-32 UNEF 5.49	**.281** 7.14	**.217** 5.51	**.197** 5.00	**.216**-32 UNEF 5.49	**.281** 7.14	**.216**-32 UNEF 5.49	**.281** 7.14
93 Series	**.190**-32 UNF 4.83	**.250**-32 UNEF 6.35	**.312** 7.92	**.251** 6.38	**.232** 5.89	**.250**-32 UNEF 6.35	**.312** 7.92	**.250**-32 UNEF 6.35	**.312** 7.92

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Standard Connectors — Caps, Hoods

Caps, Screw-On Series
For Receptacles and Jacks

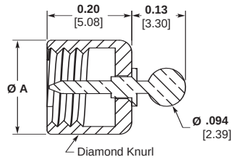


Fig. 1
With Grounding Pin

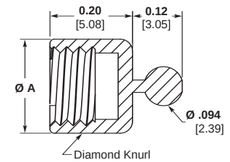


Fig. 2
Without Grounding Pin

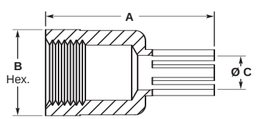
Part No.	Fig.	Dim. A
S-50 Series		
033-0046-0001	1	**.235** 5.97
033-0056-0001	2	**.235** 5.97
S-70 Series		
033-0047-0001	1	**.255** 6.48
033-0057-0001	2	**.255** 6.48
S-93 Series		
033-0048-0001	1	**.315** 8.00
033-0058-0001	2	**.315** 8.00

Material — Brass per QQ-B-626

Finish — Silver plate per QQ-S-365, .0002 [.005] min.

Note: All caps can be supplied with .094 [2.39] Dia. bead chain and end ring. When ordering, specify chain length and end ring hole size (.130 [3.30], .140 [3.56], .167 [4.24], or .193 [4.90] Dia.)

Receptacle Hoods



Part No.	Dim. A	Dim. B	Dim. C	Thread	For Receptacle Series
033-0067-0001	**.490** 12.45	**.250** 6.35	**.098** 2.49	**.190**-32 UNF 4.83	S-50, QC-50, QC-70
033-0068-0001	**.490** 12.45	**.250** 6.35	**.114** 2.90	**.216**-32 UNEF 5.49	S-70, SOS-50, SOS-70, SOS-93
033-0069-0001	**.490** 12.45	**.312** 7.92	**.156** 3.96	**.250**-32 UNEF 6.35	S-93, QC-93
033-0084-0001	**.490** 12.45	**.250** 6.35	**.156** 3.96	**.216**-32 UNEF 5.49	S-70, SOS-50, SOS-70, SOS-93
053-0147-0001	**.840** 21.34	**.437** 11.10	**.156** 3.96	**.375**-32 UNEF 9.53	Twinax/Triax Receptacle

Material — Brass per QQ-B-626

Finish — Silver plate per QQ-S-365, .0002 [.005] min.

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Standard Connectors — Adapters

Feed-Thru Adapters for Screw-On Series

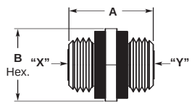


Fig. 1

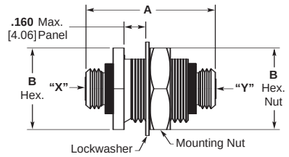
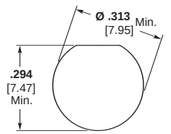


Fig. 2

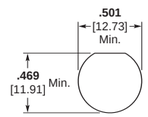


Mounting Hole

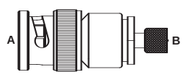
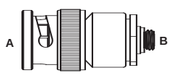
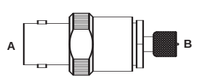
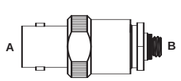
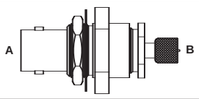
Part No.	Fig.	Dim. A	Dim. B	End "X" Is	End "Y" Is
033-0001-0001	1	**.300** 7.62	**.250** 6.35	S-50 Receptacle	S-50 Receptacle
033-0053-0001	2	**.600** 15.24	**.375** 9.53	S-50 Receptacle	S-50 Receptacle
033-0023-0001	1	**.400** 10.16	**.250** 6.35	S-70 Receptacle	S-70 Receptacle
033-0054-0001	2	**.600** 15.24	**.375** 9.53	S-70 Receptacle	S-70 Receptacle
033-0036-0001	1	**.410** 10.41	**.312** 7.92	S-93 Receptacle	S-93 Receptacle
033-0055-0001	2	**.600** 15.24	**.375** 9.53	S-93 Receptacle	S-93 Receptacle

BNC and TNC/MICRODOT Adapters for Screw-On, Slide-On, and Quick-Connect Series

For mating BNC/TNC connectors to MICRODOT standard connectors.



Mounting Hole

End "A" Is:	Configuration	End "B" Is:	50 Series Part No.	70 Series Part No.	93 Series Part No.
BNC Plug		Screw-On (S) Type Plug	033-0103-0001	033-0107-0001	033-0111-0001
BNC Plug		Screw-On Type Receptacle	033-0101-0001	033-0105-0001	033-0109-0001
BNC Receptacle		Screw-On (S) Type Plug	033-0104-0001	053-0108-0001	033-0112-0001
BNC Receptacle		Screw-On (S) Type Receptacle	033-0102-0001	033-0106-0001	033-0110-0001
BNC Bulkhead Receptacle		Screw-On (S) Type Plug	033-0127-0001[1]	—	033-0129-0001[1]

[1]Mounting information: Housing Hex. .688 [17.48], Mtg. Nut Hex. .625 [15.88], Max. Panel .090 [2.29].

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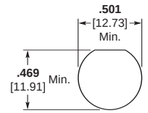
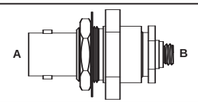
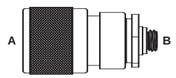
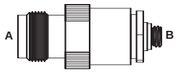
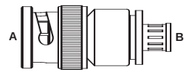
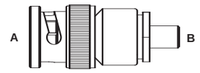
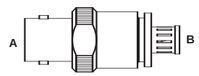
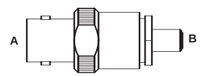
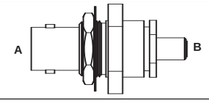
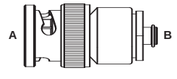
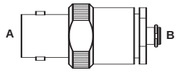
Standard Connectors — Adapters (Continued)

BNC and TNC/MICRODOT Adapters for Screw-On, Slide-On, and Quick-Connect Series (Continued)



Mounting Hole

End "A" Is:	Configuration	End "B" Is:	50 Series Part No.	70 Series Part No.	93 Series Part No.
BNC Bulkhead Receptacle		Screw-On (S) Type Receptacle	033-0090-0001[1]	033-0125-0001[1]	033-0126-0001[1]
TNC Plug		Screw-On (S) Type Receptacle	033-0141-0001	033-0143-0001	033-0145-0001
TNC Receptacle		Screw-On (S) Type Receptacle	033-0153-0001	—	—
BNC Plug		Slide-On (SOS) Type Plug	053-0339-0001	053-0339-0001	053-0339-0001
BNC Plug		Slide-On (SOS) Type Receptacle	033-0081-0001	033-0081-0001	033-0081-0001
BNC Receptacle		Slide-On (SOS) Type Plug	033-0092-0001	033-0092-0001	033-0092-0001
BNC Receptacle		Slide-On (SOS) Type Receptacle	033-0082-0001	033-0082-0001	033-0082-0001
BNC Bulkhead Receptacle		Slide-On (SOS) Type Receptacle	033-0124-0001[1]	033-0124-0001[1]	033-0124-0001[1]
BNC Plug		Quick-Connect (QC) Type Receptacle	033-0093-0001	033-0093-0001	033-0097-0001
BNC Receptacle		Quick-Connect (QC) Type Receptacle	033-0094-0001	033-0094-0001	—

[1]Mounting information: Housing Hex. .688 [17.48], Mtg. Nut Hex. .625 [15.88], Max. Panel .090 [2.29].

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Gold Plated Crimp Style Coaxial Connectors

Performance Data Summary
For Gold Plated Crimp Style Coaxial Connectors

Mechanical

Captive Contacts — Terminated connector contacts captivated from movement in both directions.

Cable Retention —
50 Ohm connectors, 15 lb. min.
70 Ohm connectors, 25 lb. min.
93 Ohm connectors, 25 lb. min.

Recommended Coupling Torque (Threaded Interface) —
8 inch/pounds max. [.904 Nm]

Recommended Receptacle Mounting Torque (Threaded Interface) — 8 inch/pounds max. [.904 Nm]

Contact Protection (Unmated) — Pin contact protected by coupling nut. Socket protected by insulator and housing.

Assembly Methods

Straight Plugs & Jacks — Cable Inner Conductor: Crimped to contact. Cable Shield: Crimped under housing.

Right-Angle Plugs — Cable Inner Conductor: Crimped to contact. Cable Shield: Crimped under housing.

Environmental

Temperature Range (Continuous Service) — -80°F to +392°F. [-62°C to +200°C].

Vibration[1,2] — MIL-STD-202, Method 204, Test condition B (15 G peak). No physical damage or electrical discontinuities in excess of 1 microsecond.

Shock[1,2] — MIL-STD-202, Method 213, Test Condition H. No physical damage or electrical discontinuity after shock.

Thermal Shock — MIL-STD-202, Method 107, Test Condition C.

Moisture Resistance[1] — MIL-STD-202, Method 106.

Salt Spray[1] — MIL-STD-202, Method 101, Test Condition B (48 hours).

Electrical

Impedance — Designed to be compatible with 50, 70, or 93 Ohm miniature coaxial cable.

Dielectric Withstanding Voltage — 1000 volts RMS at sea level.

Contact Resistance — 4 milliohms max., D.C.

Contact Capacity — 3 amps, D.C.

Insulation Resistance — 5 x 10^3 Megohms min. @ 500 volts D.C.

Voltage Standing Wave Ratio[3] (VSWR) — Typical 50 Ohm series, 1.2 max. to 2 GHz.

Materials

Housing, Nut, Inner Sleeve — Brass per ASTM-B-16, 35% Zinc.

Insulator — TEFLON per ASTM-D-1710.

Pin & Socket Contacts — Beryllium Copper per ASTM-B-196.

Middle Sleeve — Copper Alloy.

Facial Seal[4], Sealing Sleeve & Gasket — Silicone Rubber per ZZ-R-765.

Lockwasher — #425 Bronze Alloy.

Plating

Contacts, Housing, Nut, Inner Sleeve, Middle Sleeve, Lockwasher — Gold per MIL-G-45204, Type II, Grade C, Class 1.

NOTES:
[1]Screw-On Series threaded interface.
[2]Tyco Electronics recommends the use of wired connectors in vibration and shock environments. See individual specifications for connectors with wire holes.
[3]VSWR is a system specification. Where performance is critical, purchase Tyco Electronics cable assemblies (See page 2-137) and specify VSWR testing and mating connector part numbers.

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UK: 44-208-420-8341

Gold Plated Crimp Style Coaxial Connectors — Screw-On Series

Straight Plugs

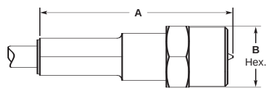

Fig. 1
Partial Hex. Nut

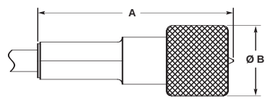

Fig. 2
Knurl Nut

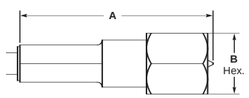

Fig. 3
Full Hex. Nut

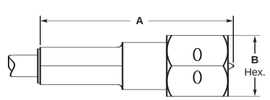

Fig. 4
Hex. Nut w/ 3 Safety Wire Holes

Part No.	Fig.	Dim. A	Dim. B	Cable Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.
50 Ohm Series .190 [4.83] -32 UNF-2B Thread							
132-0112-0001	1	**.800** 20.32	**.250** 6.35	**.088** 2.24		408-08508	RF-ASMB-8
132-0112-0002	2	**.800** 20.32	**.250** 6.35	**.088** 2.24		408-08508	RF-ASMB-8
132-0112-0003	3	**.800** 20.32	**.250** 6.35	**.088** 2.24		408-08508	RF-ASMB-8
132-0112-0004	4	**.800** 20.32	**.250** 6.35	**.088** 2.24		408-08508	RF-ASMB-8
132-0113-0001	1	**.800** 20.32	**.250** 6.35	**.088** 2.24	With environmental seal	408-08508	RF-ASMB-8
132-0113-0002	2	**.800** 20.32	**.250** 6.35	**.088** 2.24	With environmental seal	408-08508	RF-ASMB-8
132-0113-0003	3	**.800** 20.32	**.250** 6.35	**.088** 2.24	With environmental seal	408-08508	RF-ASMB-8
132-0113-0004	4	**.800** 20.32	**.250** 6.35	**.088** 2.24	With environmental seal	408-08508	RF-ASMB-8
132-0114-0001	1	**.800** 20.32	**.250** 6.35	**.110** 2.79		408-08508	RF-ASMB-8
132-0114-0002	2	**.800** 20.32	**.250** 6.35	**.110** 2.79		408-08508	RF-ASMB-8
132-0114-0003	3	**.800** 20.32	**.250** 6.35	**.110** 2.79		408-08508	RF-ASMB-8
132-0114-0004	4	**.800** 20.32	**.250** 6.35	**.110** 2.79		408-08508	RF-ASMB-8
132-0115-0001	1	**.800** 20.32	**.250** 6.35	**.110** 2.79	With environmental seal	408-08508	RF-ASMB-8
132-0115-0002	2	**.800** 20.32	**.250** 6.35	**.110** 2.79	With environmental seal	408-08508	RF-ASMB-8
132-0115-0003	3	**.800** 20.32	**.250** 6.35	**.110** 2.79	With environmental seal	408-08508	RF-ASMB-8
132-0115-0004	4	**.800** 20.32	**.250** 6.35	**.110** 2.79	With environmental seal	408-08508	RF-ASMB-8
132-0509-0002	2	**.800** 20.32	**.250** 6.35	**.116** 2.95	Dual shield cable version of RG 188 & 316	408-08508	RF-ASMB-8
70 Ohm Series .216 [5.49] -32 UNEF-2B Thread							
132-0200-0001	1	**.800** 20.32	**.281** 7.14	**.110** 2.79		408-08508	RF-ASMB-8
132-0200-0002	2	**.800** 20.32	**.290** 7.37	**.110** 2.79		408-08508	RF-ASMB-8
132-0200-0003	3	**.800** 20.32	**.281** 7.14	**.110** 2.79		408-08508	RF-ASMB-8
132-0200-0004	4	**.800** 20.32	**.281** 7.14	**.110** 2.79		408-08508	RF-ASMB-8
132-0201-0001	1	**.800** 20.32	**.281** 7.14	**.110** 2.79	With environmental seal	408-08508	RF-ASMB-8
132-0201-0002	2	**.800** 20.32	**.290** 7.37	**.110** 2.79	With environmental seal	408-08508	RF-ASMB-8
132-0201-0003	3	**.800** 20.32	**.281** 7.14	**.110** 2.79	With environmental seal	408-08508	RF-ASMB-8
132-0201-0004	4	**.800** 20.32	**.281** 7.14	**.110** 2.79	With environmental seal	408-08508	RF-ASMB-8

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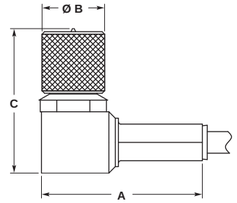
UK: 44-208-420-8341

Straight Plugs (Continued)

Part No.	Fig.	Dim. A	Dim. B	Cable Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.
93 Ohm Series .250 [6.35] -32 UNEF-2B Thread							
132-0300-0001	1	**.795** 20.19	**.312** 7.92	**.155** 3.94		408-08508	RF-ASMB-8
132-0300-0002	2	**.795** 20.19	**.320** 8.13	**.155** 3.94		408-08508	RF-ASMB-8
132-0300-0003	3	**.795** 20.19	**.312** 7.92	**.155** 3.94		408-08508	RF-ASMB-8
132-0300-0004	4	**.795** 20.19	**.312** 7.92	**.155** 3.94		408-08508	RF-ASMB-8
132-0301-0001	1	**.795** 20.19	**.312** 7.92	**.155** 3.94	With environmental seal	408-08508	RF-ASMB-8
132-0301-0002	2	**.795** 20.19	**.320** 8.13	**.155** 3.94	With environmental seal	408-08508	RF-ASMB-8
132-0301-0003	3	**.795** 20.19	**.312** 7.92	**.155** 3.94	With environmental seal	408-08508	RF-ASMB-8
132-0301-0004	4	**.795** 20.19	**.312** 7.92	**.155** 3.94	With environmental seal	408-08508	RF-ASMB-8

Right-Angle Plugs



Knurl Nut

Part No.	Dim. A	Dim. B	Dim. C	Cable Jacket Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.
50 Ohm Series .190 [4.83] -32 UNF-2B Thread							
132-0116-0002	**.660** 16.76	**.250** 6.35	**.620** 15.75	**.088** 2.24		408-08509	RF-ASMB-11
132-0117-0002	**.660** 16.76	**.250** 6.35	**.620** 15.75	**.088** 2.24	With environmental seal	408-08509	RF-ASMB-11
132-0118-0002	**.695** 17.65	**.250** 6.35	**.650** 16.51	**.110** 2.79		408-08509	RF-ASMB-11
132-0119-0002	**.695** 17.65	**.250** 6.35	**.650** 16.51	**.110** 2.79	With environmental seal	408-08509	RF-ASMB-11
70 Ohm Series .216 [5.49] -32 UNEF-2B Thread							
132-0202-0002	**.695** 17.65	**.290** 7.37	**.650** 16.51	**.110** 2.79		408-08509	RF-ASMB-11
132-0203-0002	**.695** 17.65	**.290** 7.37	**.650** 16.51	**.110** 2.79	With environmental seal	408-08509	RF-ASMB-11
93 Ohm Series .250 [6.35] -32 UNEF-2B Thread							
132-0302-0002	**.710** 18.03	**.320** 8.13	**.680** 17.27	**.155** 3.94		408-08509	RF-ASMB-11
132-0303-0002	**.710** 18.03	**.320** 8.13	**.680** 17.27	**.155** 3.94	With environmental seal	408-08509	RF-ASMB-11

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Gold Plated Crimp Style Coaxial Connectors — Screw-On Series (Continued)

Jacks

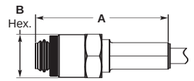


Fig. 1

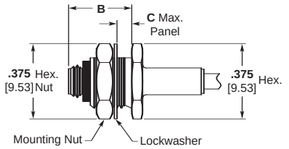
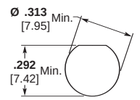


Fig. 2



Mounting Hole

Part No.	Fig.	Dim. A	Dim. B	Dim. C	Cable Jacket Max.	Special Features	Instruction Sheet No.	Former MICRODOT I.S. No.
50 Ohm Series .190 [4.83] -32 UNF-2B Thread								
131-0134-0001	1	**.770** 19.56	**.250** 6.35	—	**.088** 2.24		408-08508	RF-ASMB-8
131-0135-0001	2	**.770** 19.56	**.360** 9.14	**.105** 2.67	**.088** 2.24		408-08508	RF-ASMB-8
131-0136-0001	1	**.770** 19.56	**.250** 6.35	—	**.110** 2.79		408-08508	RF-ASMB-8
131-0137-0001	2	**.770** 19.56	**.360** 9.14	**.105** 2.67	**.110** 2.79		408-08508	RF-ASMB-8
131-0150-0001	1	**.770** 19.56	**.250** 6.35	—	**.116** 2.95	Dual Shield Cable Version of RG 188 & 316	408-08508	RF-ASMB-8
131-0151-0001	2	**.770** 19.56	**.360** 9.14	**.105** 2.67	**.116** 2.95	Dual Shield Cable Version of RG 188 & 316	408-08508	RF-ASMB-8
70 Ohm Series .216 [5.49] -32 UNEF-2B Thread								
131-0200-0001	1	**.770** 19.56	**.281** 7.14	—	**.110** 2.79		408-08508	RF-ASMB-8
131-0201-0001	2	**.770** 19.56	**.360** 9.14	**.100** 2.54	**.110** 2.79		408-08508	RF-ASMB-8
93 Ohm Series .250 [6.35] -32 UNEF-2B Thread								
131-0300-0001	1	**.760** 19.30	**.312** 7.92	—	**.155** 3.94		408-08508	RF-ASMB-8
131-0301-0001	2	**.760** 19.30	**.350** 8.89	**.095** 2.41	**.155** 3.94		408-08508	RF-ASMB-8

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Gold Plated Crimp Style Coaxial Connectors — Screw-On Series (Continued)

Receptacles

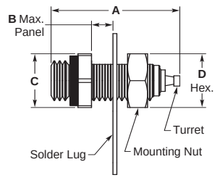


Fig. 1

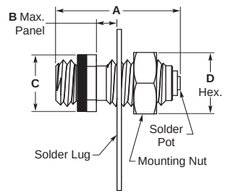
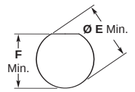


Fig. 2



Mounting Hole for Fig. 1 & 2

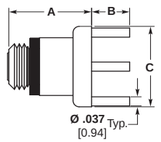


Fig. 3

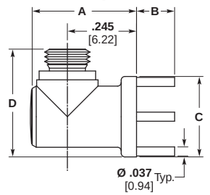
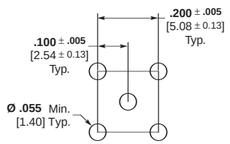


Fig. 4



Mounting Pattern for Fig. 3 & 4

Part No.	Fig.	Dim. A	Dim. B	Dim. C		Dim. D	Dim. E	Dim. F	Special Features
50 Ohm Series .190 [4.83] -32 UNF-2A Thread									
131-0138-0002	1	**.605** 15.37	**.160** 4.06	**.250** 6.35	Hex.	**.250** 6.35	**.191** 4.85	**.173** 4.39	
131-0139-0002	2	**.515** 13.08	**.150** 3.81	**.187** 4.75	Wrench Flats	**.250** 6.35	**.191** 4.85	—	No Mounting Flat
131-0140-0001	2	**.255** 6.48	—	**.187** 4.75	Wrench Flats	—	**.190** 4.83	-32 Thd. —	No Nut or Solder Lug, Threads into Panel
131-0141-0002	3	**.340** 8.64	**.155** 3.94	**.330** 8.38	Dia.	—	—	—	
131-0142-0002	4	**.425** 10.80	**.155** 3.94	**.330** 8.38	Dia.	**.480** 12.19	—	—	
70 Ohm Series .216 [5.49] -32 UNEF-2A Thread									
131-0202-0002	1	**.605** 15.37	**.160** 4.06	**.250** 6.35	Hex.	**.281** 7.14	**.217** 5.51	**.197** 5.00	
131-0705-0001	3	**.340** 8.64	**.155** 3.94	**.330** 8.38	Dia.	—	—	—	
93 Ohm Series .250 [6.35] -32 UNEF-2A Thread									
131-0303-0002	3	**.340** 8.64	**.155** 3.94	**.330** 8.38	Dia.	—	—	—	
131-0304-0001	4	**.425** 10.80	**.155** 3.94	**.330** 8.38	Dia.	**.480** 12.19	—	—	
131-0904-0001	1	**.605** 15.37	**.160** 4.06	**.312** 7.92	Hex.	**.312** 7.92	**.251** 6.38	**.232** 5.89	

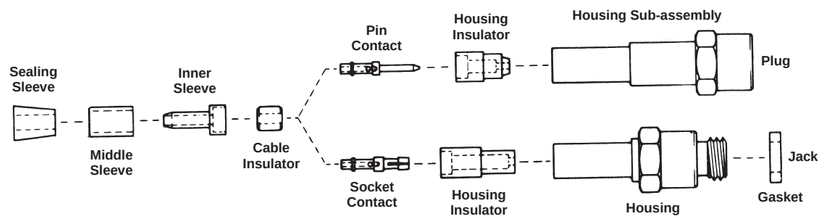
Gold Plated Crimp Style Coaxial Connectors Assembly Tools

Table 1. Contact Crimp Tools

MICRODOT Part No.	Manufacturers Part No.
010-0065-0000	Astro Tool A-810-3

Table 2. Housing Crimp Tools

MICRODOT Part No.	Thomas & Betts Part No.	Max. Cable Diameter
010-0081-0000	WT-400	**.088** [2.24]
010-0082-0000	WT-402	**.110** [2.79]
010-0083-0000	WT-406	**.155** [3.94]



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LEPRA/CON Ultra-Miniature Connectors

Performance Data Summary
For LEPRA/CON Connectors

Mechanical

Captive Contacts — Terminated connector contacts captivated from movement in both directions.

Cable Retention — 10 lb. min. when properly assembled to RG196/U and RG178/U cable.

Recommended Coupling Torque (Threaded Interface) — 24 inch/ounces max.

Recommended Receptacle Mounting Torque (All Series) — 24 inch/ounces max.

Typical Cable Acceptance Dimensions — Inner conductor: .012 [0.31] nom. Dielectric: .039 [0.99] max. Shield: .059 [1.50] max. Jacket: .081 [2.06] max.

Contact Protection (Unmated) — Twist pin contact protected from damage by insulator. Tube socket protected by connector housing.

Assembly Methods

Straight Plugs & Jacks — Cable Inner Conductor: Crimped to contact. Cable Shield: Crimped under housing.

Right-Angle Plugs — Cable Inner Conductor: Soldered to contact. Cable Shield: Crimped under housing.

Environmental

Temperature Range (Continuous Service) — -85°F to +392°F [-65°C to +200°C].

Vibration[1,2] — MIL-STD-202, Method 204, Test Condition B (15 G peaks). No physical damage or electrical discontinuities in excess of 1 microsecond.

Shock[1,2] — MIL-STD-202, Method 213, Test Condition H. No physical damage or electrical discontinuity after shock.

Thermal Shock — MIL-STD-202, Method 107, Test Condition C.

Moisture Resistance[1] — MIL-STD-202, Method 106.

Salt Spray[1] — MIL-STD-202, Method 101, Test Condition B (48 hours).

Electrical

Impedance — Designed to be compatible with 50 Ohm coaxial cable RG178/U.

Dielectric Withstanding Voltage — 450 volts RMS at sea level, 250 volts RMS at 50,000 ft [15,240 m], 150 volts RMS at 70,000 ft. [21,336 m]

Contact Resistance — 8 milliohms max., D.C.

Contact Capacity — 3 amps, D.C.

Insulation Resistance — 10^4 Megohms min. @ 500 volts D.C.

Voltage Standing Wave Ratio[3] (VSWR) — Typical 50 Ohm Series, 1.2 Maximum to 2 GHz.

Materials

Housing, Nut, Ferrule — Brass per ASTM-B-16.

Insulator — TEFLON per ASTM-D-1710.

Pin & Socket Contact — Copper Alloy.

Crimp Sleeve — Copper Alloy.

Lockwasher — #425 Bronze Alloy.

Plating

Contacts, Housing, Nut, Ferrule, Crimp Sleeve, Lockwasher — Gold per MIL-G-45204, Type II, Grade C, Class 1.

Notes:
[1]Screw-On Series, threaded interface.
[2]Tyco Electronics recommends the use of safety wired connectors in vibration and shock environments. See individual specifications with wire holes.
[3]VSWR is a system specification. Where performance is critical, purchase Tyco Electronics cable assemblies with Screw-On connectors (See page 2-139) and specify VSWR testing and mating connector part numbers.

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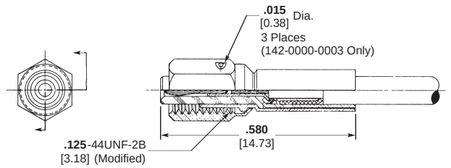
LEPRA/CON Ultra-Miniature Connectors — Screw-On Series

Featuring Twist Pin, Pin and Socket Contacts, Standard Interface

MICRODOT twist pin, pin and socket contacts are used in LEPRA/CON connectors. Twist pin contact pins are produced from beryllium copper material with a gold-plated finish and constructed with helically-wound stress free cable of spring copper around a highly conductive soft copper core, terminated with a hemispherical weld. Twist pin contacts contain seven self-wiping spring surfaces, designed for consistent continuity and very low noise level. Twist pin contacts are self-aligning because of the contact-engaging-end configuration. The sockets are a closed entry tubular-type contact, made of gold-plated copper alloy.

The connectors are designed to be used with coaxial cables RG196/U and RG178/U.

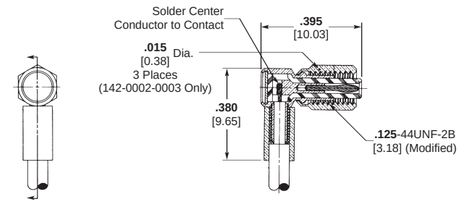
The connectors are designed with the contacts completely protected for reliability. The use of twist pin contacts makes the connectors very rugged for their size.



Straight Plugs[1]

Part No.	Nut Style
142-0000-0001	**.156** [3.96] Hex.
142-0000-0002	**.160** [4.06] Dia. Knurl
142-0000-0003	**.156** [3.96] Hex. w/ Safety Wire Holes

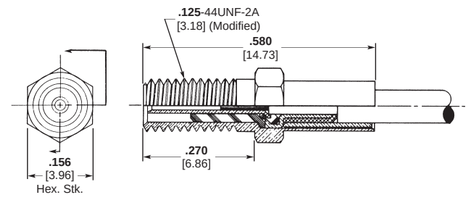
Assembly instructions: RF-ASMB-12



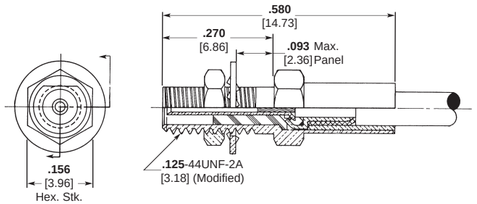
Right-Angle Plug[1]

Part No.	Nut Style
142-0002-0001	**.156** [3.96] Hex.
142-0002-0002	**.160** [4.06] Dia. Knurl
142-0002-0003	**.156** [3.96] Hex. w/ Safety Wire Holes

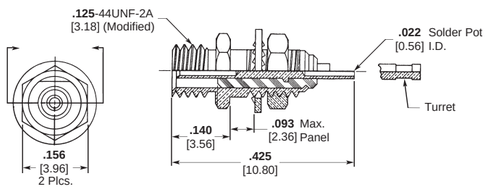
Assembly instructions: RF-ASMB-13



Jack[1]
Part Number 141-0000-0001
Instruction Sheet Number 408-08510
Former MICRODOT I.S. Number RF-ASMB-12

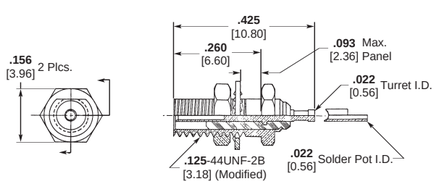


Bulkhead Jack[1]
Part Number 141-0001-0001
Instruction Sheet Number 408-08510
Former MICRODOT I.S. Number RF-ASMB-12



Front Mount Receptacle[1]

Part No.	Contact Tail
141-0002-0001	Turret
141-0002-0002	Solder Pot



Rear Mount Receptacle[1]

Part No.	Contact Tail
141-0003-0001	Turret
141-0003-0002	Solder Pot

[1]Mounting hole pattern and assembly tools shown on page 2-133.

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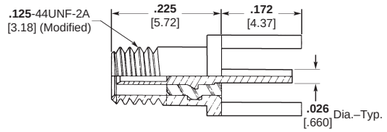
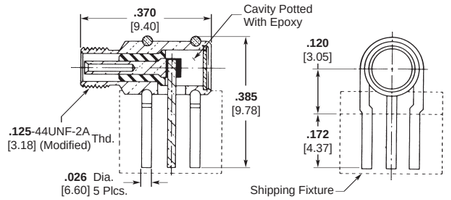
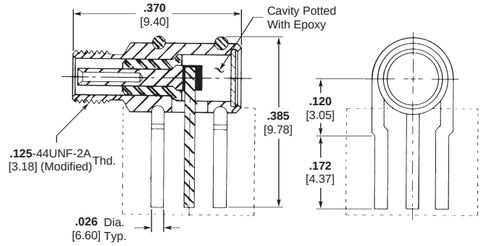
Featuring Twist Pin, Pin and Socket Contacts, Standard Interface (Continued)



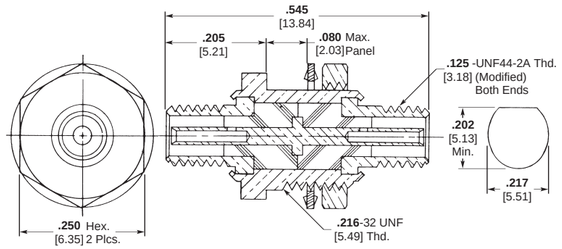
Straight Printed Circuit Receptacle[1]
Part No. 141-0004-0001



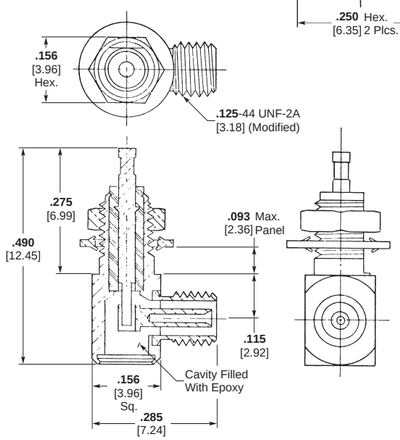
Right-Angle Printed Circuit Receptacle[1]
(Small Mounting Pattern)
Part Number 141-0019-0001



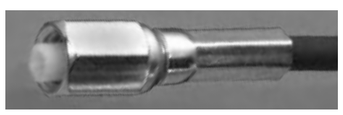
Right-Angle Printed Circuit Receptacle[1]
(Standard Mounting Pattern)
Part Number 141-0010-0001



Feed-Thru Bulkhead Adapter
(Both Ends are Receptacle Interface)
Part Number 143-0005-0001



Right-Angle Receptacle[1]
Part Number 141-0013-0001



Straight Plug

[1]Mounting hole pattern and assembly tools shown on page 2-133.

Catalog 1308940
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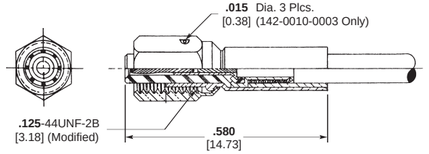
LEPRA/CON Ultra-Miniature Connectors — Screw-On Series (Continued)

Featuring Twist Pin, Pin and Socket Contacts with Locking Interface

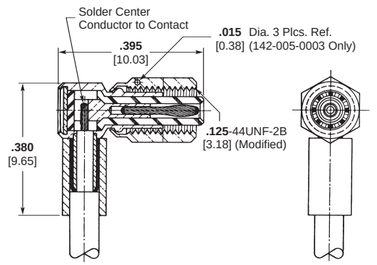
The MICRODOT LEPRA/CON coaxial connector series is now offered with a unique locking interface feature. This new coupling design permits the user to lock the coaxial plug, when mated to its receptacle, preventing any axial rotation. This adaptation is especially popular on connector installations requiring straight or 90° cable terminations firmly held in a fixed position. The locking interface is especially suited for telecommunications and instrumentation applications.



Straight Plug[1]

Part No.	Nut Style
142-0010-0001	**.156** [3.96] Hex.
142-0010-0002	**.160** [4.06] Dia. Knurl
142-0010-0003	**.156** [3.96] Hex. w/ Safety Wire Holes

Assembly instructions: RF-ASMB-12, 142-0010-0001



Right-Angle Plug[1]

Part No.	Nut Style
142-0005-0001	**.156** [3.96] Hex.
142-0005-0002	**.160** [4.06] Dia. Knurl
142-0005-0003	**.156** [3.96] Hex. w/ Safety Wire Holes

Assembly instructions: RF-ASMB-13, 142-0005-0001

[1]Assembly tools; page 2-133.

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Japan: 81-44-844-8013
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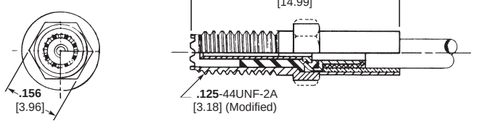
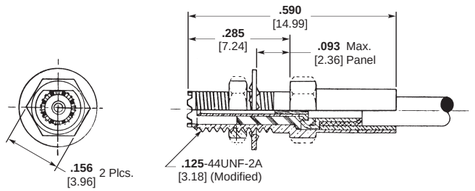
Featuring Twist Pin, Pin and Socket Contacts with Locking Interface

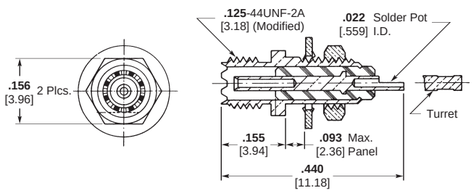
(Continued)



Straight Jack[1]
Part Number 141-0017-0001
Instruction Sheet Number 408-08510
Former MICRODOT I.S. Number RF-ASMB-12

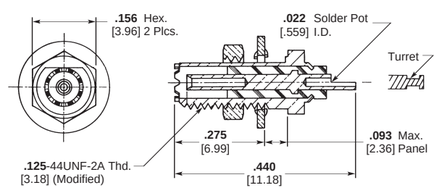


Bulkhead Jack[1]
Part Number 141-0014-0001
Instruction Sheet Number 408-08510
Former MICRODOT I.S. Number RF-ASMB-12



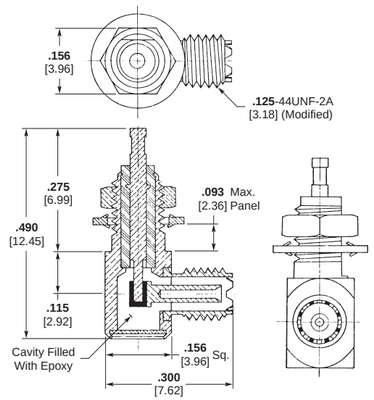
Front Mount Receptacle[1]

Part No.	Contact Tail
141-0012-0001	Solder Pot
141-0012-0002	Turret

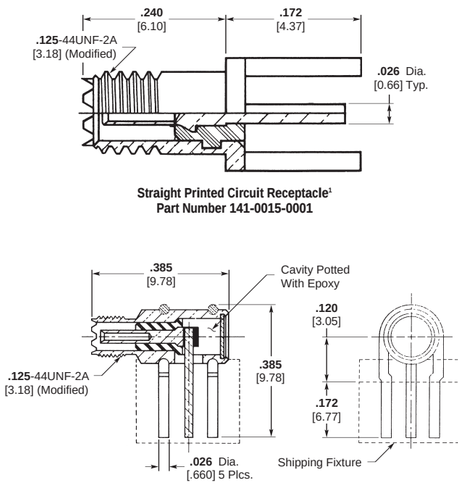


Rear Mount Receptacle w/ Locking Interface[1]

Part No.	Contact Tail
141-0011-0001	Turret
141-0011-0002	Solder Pot



Right-Angle Receptacle[1]
Part Number 141-0020-0001



Straight Printed Circuit Receptacle[1]
Part Number 141-0015-0001

Right-Angle Printed Circuit Receptacle[1]
Part Number 141-0023-0001

[1]Mounting hole pattern and assembly tools shown on page 2-133.

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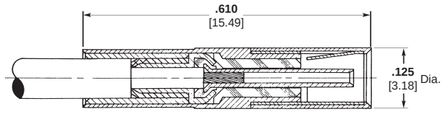
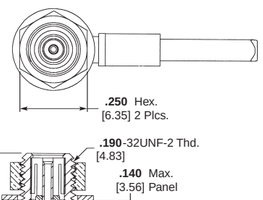
LEPRA/CON Ultra-Miniature Connectors — Slide-On Series

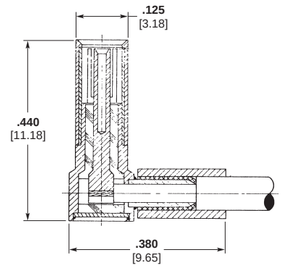
Featuring Twist Pin, Pin and Socket Contacts

LEPRA/CON Slide-On Connectors offer a convenient mating style along with Ultra-miniature size. Inner contacts are twist pin tubular sockets in plugs and twist pin contacts for jacks and receptacles. Positive housing contact is provided by a three finger contact in the plug housing.

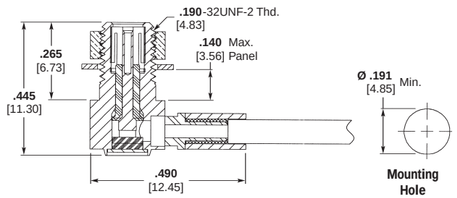


Straight Plug[1]
Part Number 142-1000-0001
Instruction Sheet Number 408-08512
Former MICRODOT I.S. Number RF-ASMB-15

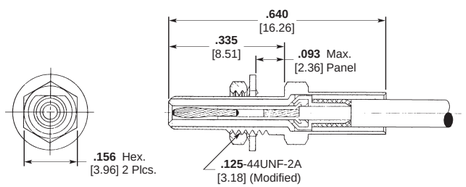




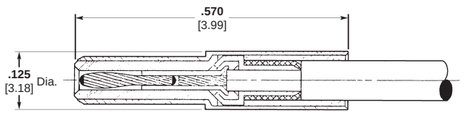
Right-Angle Plug[1]
Part Number 142-1002-0001
Instruction Sheet Number 408-08513
Former MICRODOT I.S. Number RF-ASMB-16



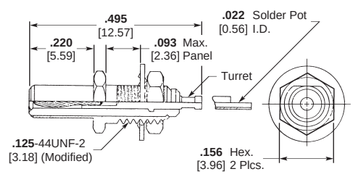
Right-Angle Bulkhead Mount Plug[1]
Part Number 142-1021-0001
Instruction Sheet Number 408-08519
Former MICRODOT I.S. Number RF-ASMB-76



Straight Bulkhead Jack[1]
Part Number 141-1001-0001
Instruction Sheet Number 408-08512
Former MICRODOT I.S. Number RF-ASMB-15



Straight Jack[1]
Part Number 141-1000-0001
Instruction Sheet Number 408-08512
Former MICRODOT I.S. Number RF-ASMB-15



Front Mount Receptacle[1]

Part No.	Contact Tail
141-1002-0001	Turret
141-1002-0002	Solder Pot

[1]Mounting hole and assembly tools shown on page 2-133.

Catalog 1308940
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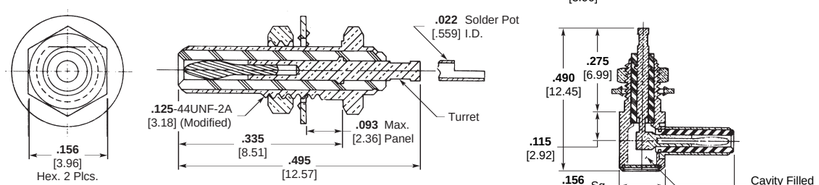
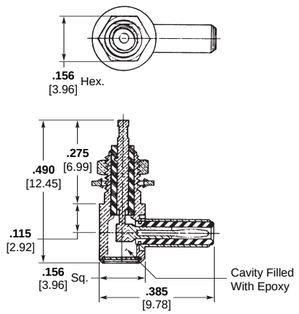
Featuring Twist Pin, Pin and Socket Contacts
(Continued)



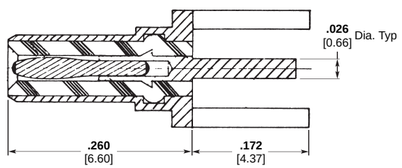
Rear Mount Receptacle



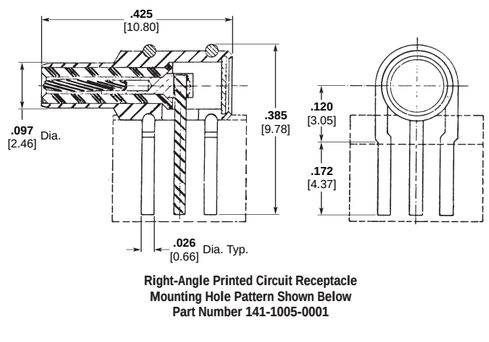
Right-Angle Receptacle
Mounting Hole Shown Below
Part Number 141-1012-0001

Part No.	Contact Tail
141-1003-0001	Turret
141-1003-0002	Solder Pot

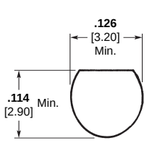
Mounting Hole shown below.



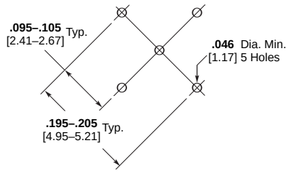
Straight Printed Circuit Receptacle
Mounting Hole Pattern Shown Below
Part Number 141-1004-0001



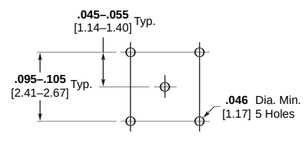
Right-Angle Printed Circuit Receptacle
Mounting Hole Pattern Shown Below
Part Number 141-1005-0001



Bulkhead Receptacle Mounting Hole



Standard Pattern



Small Pattern
Connectors 141-0019-0001
and 141-0023-0001 Only

Printed Circuit Receptacle Mounting Hole Pattern

LEPRA/CON Connector Assembly Tools

Housing Crimp Tool

MICRODOT Part No.	Thomas & Betts Part No.
010-0132-0000	WT-419

Contact Crimp Tool

Connector	Contact Crimp No.	Astro Tool Part No.
Straight Connector Only	010-0150-0000	A-826-1
141-1001-0001	010-0161-0000	827

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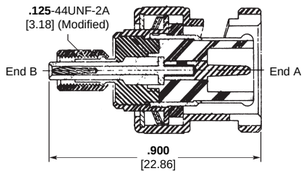
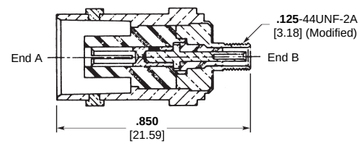
BNC / LEPRA/CON Connector Adapters



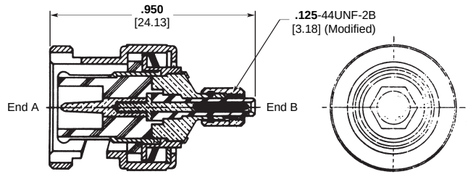
End "B" is MICRODOT Screw-On Plug — End "A" is BNC Plug

Part Number 143-0001-0001



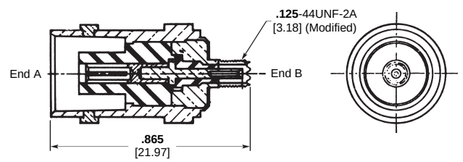
End "A" is BNC Receptacle — End "B" is MICRODOT Screw-On Receptacle

Part Number 143-0003-0001



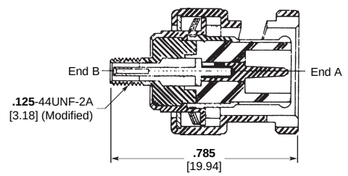
End "A" is BNC Plug — End "B" is MICRODOT Screw-On Plug with Locking Interface

Part Number 143-0029-0001



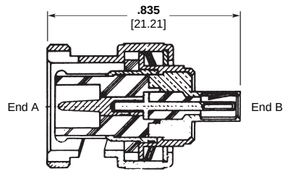
End "A" is BNC Receptacle — End "B" is MICRODOT Screw-On Receptacle with Locking Interface

Part Number 143-0032-0001



End "B" is Screw-On Receptacle — End "A" is BNC Plug

Part Number 143-0002-0001



End "A" is BNC Plug — End "B" is MICRODOT Slide-On Plug

Part Number 143-1000-0001

Catalog 1308940
Revised 8-06

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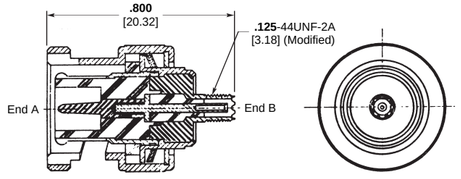
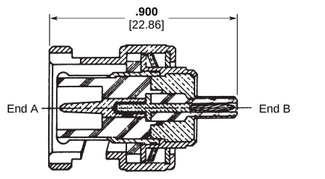
BNC / LEPRA/CON Connector Adapters
(Continued)



End "A" is BNC Plug

End "B" is MICRODOT Receptacle with Locking Interface

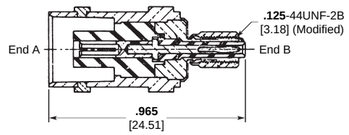
Part Number 143-0031-0001



End "A" is BNC Plug

End "B" is MICRODOT Slide-On Receptacle

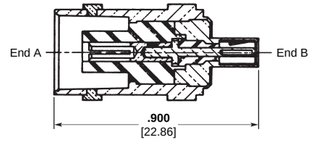
Part Number 143-1002-0001



End "A" is BNC Receptacle

End "B" is MICRODOT Screw-On Plug

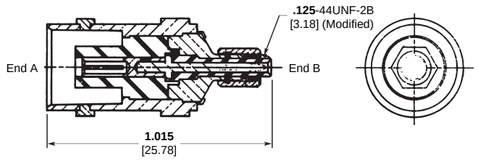
Part Number 143-0004-0001



End "A" is BNC Receptacle

End "B" is MICRODOT Slide-On Plug

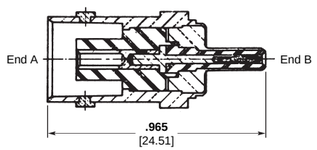
Part Number 143-1001-0001



End "A" is BNC Receptacle

End "B" is MICRODOT Screw-On Plug with Locking Interface

Part Number 143-0030-0001



End "A" is BNC Receptacle

End "B" is MICRODOT Slide-On Receptacle

Part Number 143-1003-0001

Catalog 1308940
Revised 8-06

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C. America: 57-1-254-4444

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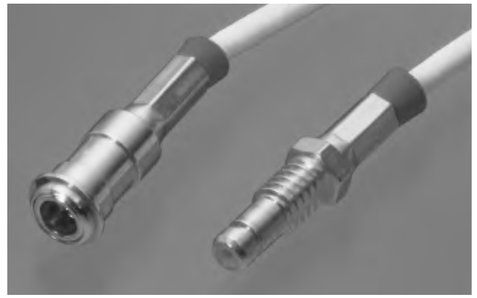
UK: 44-208-420-8341

LEPRA/CON Ultra-Miniature Connectors — Snap-Lock Series

Product Facts

- **Simple coupling design eliminates the need for tools and saves assembly time**
- **Positive locking mechanism provides its own fail-safe features**
- **Inspection of the mated connector is fast, simple and effective**
- **Push-Pull design allows higher panel density**
- **Quick-connect and disconnect features**



Performance Data Summary
For Snap-Lock Connectors

Electrical

Impedance — Designed to be compatible with 50 Ohm coaxial cables (Dual Shield RG 196).

Dielectric Withstanding Voltage — 450 volts RMS at sea level (Operating).

Contact Resistance — 8 milliohms max. at 3 amps. Average resistance: 4 milliohms

Insulation Resistance — 10^4 megohms min.

Voltage Standing Wave Ratio (VSWR) — 3.4 max., 1.3 min. to 12 GHz.

Environmental

Temperature Range — -85°F to +257°F [-65°C to +125°C].

Vibration — MIL-STD-202, Method 204, Test condition D. No change in electrical discontinuity in excess of 1 microsecond.

Shock — MIL-STD-202, Method 213A, Test Condition C. No electrical discontinuity or evidence of physical damage.

Mechanical

Cable Acceptance Dimensions — Center conductor: .012 [0.31] nom. Dielectric: .040 [1.02] max. Shield: .080 [2.03] max. Jacket: .090 [2.29] max..

All-Crimp Assembly — Center contacts and shield are crimped individually.

Durability — 500 mating cycles.

Materials

Body and Body Components — Brass per QQ-B-626 Comp 360.

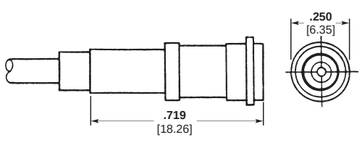
Contact Material — Copper Alloy.

Crimp Sleeves — Leaded Copper.

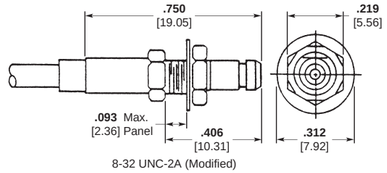
Insulators — TEFLON per ASTM-D-1710.

Lockwashers — #425 Bronze Alloy.

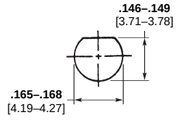
Plating — Gold per MIL-G-45204, Type II, Grade C, Class 1.



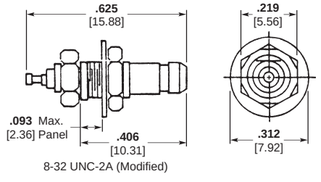
Straight Plug
Part Number 144-0001-0001



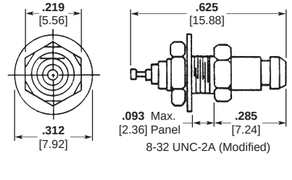
Bulkhead Jack, Rear Mount
Part Number 145-0001-0001



"D" Hole Dimensions
For Panel Mounting



Receptacle, Rear Mount
Part Number 145-0003-0001



Receptacle, Front Mount
Part Number 145-0002-0001

Connector/Cable Assembly Crimp Tools — Center Contact and Shield

Tool	Part No.
SKT & Pin Crimp	010-1004-0000
Housing Crimp	010-0081-0000

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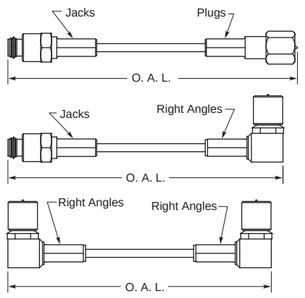
Cable Assemblies

Capability

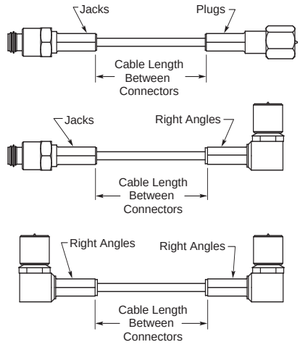
The experience Tyco Electronics has gained through years of pioneering efforts in the development of MICRODOT miniaturized cable and connectors is available to customers in the assembly of complex cable/connector combinations. This experience offers the customer low cost and no tooling charges, precision construction, thorough inspection and prompt delivery. The capability also makes it possible for the designer to specify a complete assembly or harness with the understanding that Tyco Electronics will deliver a custom fabrication equal in quality to the MICRODOT components it contains. These assemblies are made to the customer's specifications or are designed by the Company's experienced engineers to fit particular requirements. Special features are light weight, reduced size, high operating temperatures and comprehensive layouts.

How To Order

1. Specify MICRODOT part numbers
   A. Connector, one end
   B. Connector, other end
   C. Cable
2. Specify normal length
   A. Overall length



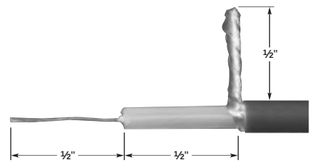
   B. Or length between connectors



3. Specify length tolerance
   A. Standard tolerance

Assembly Length	Tolerance
0 thru 12-1/2"	±1/8"
Over 12-1/2" thru 1000"	±1% rounded to nearest 1/4"
Over 1000"	±1% rounded to nearest 1"

   B. Special tolerance
   Tolerances as close as ±.5% are available for most cable assemblies at a premium rate. Consult Tyco Electronics for details.
4. Specify cable strip (Applies to cable assemblies with only one connector)
   A. Not stripped
   B. Standard strip



Standard Strip

   C. Special strip - specify style

Example:

Connector:
142-1000-0001 one end
142-1002-0001 other end

Length:
36" overall, standard tolerance

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Cable Assemblies (Continued)

Mating Interface Chart

Plugs				Jacks and Receptacles		
Series	Description	Page		Series	Description	Page
S50	Standard	2-104, 2-105		S50	Standard	2-106, 2-107
50 Ohm	Gold Plated Crimp Style	2-123, 2-124		50 Ohm	Gold Plated Crimp Style	2-125, 2-126
50 Ohm	Cap	2-119		50 Ohm	Feed Thru Adapter	2-120, 2-121
S70	Standard	2-104, 2-105		S70	Standard	2-106, 2-107
70 Ohm	Gold Plated Crimp Style	2-123, 2-124		70 Ohm	Gold Plated Crimp Style	2-125, 2-126
70 Ohm	Cap	2-119		70 Ohm	Feed Thru Adapter	2-120, 2-121
S93	Standard	2-104, 2-105		S93	Standard	2-106, 2-108
93 Ohm	Gold Plated Crimp Style	2-124		93 Ohm	Gold Plated Crimp Style	2-125, 2-126
93 Ohm	Cap	2-119		93 Ohm	Feed Thru Adapter	2-120, 2-121
SOS 50	Standard	2-109, 2-110		SOS 50	Standard	2-109, 2-112
SOS 70	Standard	2-110, 2-111		SOS 70	Standard	2-111, 2-112
SOS 93	Standard	2-110, 2-111		SOS 93	Standard	2-111, 2-112
QC 50	Standard	2-113, 2-114		QC 50	Standard	2-113
QC 70	Standard	2-114		QC 70	Standard	2-113
QC 93	Standard	2-114		QC 93	Standard	2-113
Screw-On	Twinax	2-116		Screw-On	Twinax	2-116
Slide-On	Twinax	2-116		Slide-On	Twinax	2-116
Screw-On	Triax	2-117		Screw-On	Triax	2-117
Screw-On	LEPRA/CON Connector	2-128		Screw-On	LEPRA/CON Connector	2-128, 2-129
Screw-On	LEPRA/CON Connector Interlocking Interface	2-130		Screw-On	LEPRA/CON Connector Interlocking Interface	2-131
Slide-On	LEPRA/CON Connector	2-132		Slide-On	LEPRA/CON Connector	2-132, 2-133

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Cable Acceptance Dimensions

Connector Part No.	Max. Jacket	Max. Shield	Max. Dielectric	Max. Inner Conductor
S-50				
032-0021-0001	**.087** 2.21	**.061** 1.55	**.050** 1.27	**.013** .330
032-0023-0001	**.087** 2.21	**.061** 1.55	**.041** 1.04	**.015** .381
032-0025-0001	**.093** 2.36	**.068** 1.73	**.050** 1.27	**.013** .330
032-0033-0001	**.093** 2.36	**.077** 1.96	**.047** 1.00	**.015** .381
032-0097-0001	**.087** 2.21	**.061** 1.55	**.050** 1.27	**.015** .381
032-0098-0001	**.087** 2.21	**.061** 1.55	**.041** 1.04	**.015** .381
032-0155-0001	**.088** 2.24	**.061** 1.55	**.041** 1.04	**.015** .381
032-0156-0001	**.088** 2.24	**.061** 1.55	**.041** 1.04	**.015** .381
052-0213-0001	**.087** 2.21	**.061** 1.55	**.050** 1.27	**.013** .330
052-0235-0001	**.087** 2.21	**.061** 1.55	**.041** 1.04	**.015** .381
052-0235-0003	**.087** 2.21	**.061** 1.55	**.041** 1.04	**.015** .381
052-0370-0001	**.093** 2.36	**.068** 1.73	**.041** 1.04	**.015** .381
052-0542-0001	**.087** 2.21	**.061** 1.55	**.041** 1.04	**.015** .381
S-70				
032-0010-0001	**.093** 2.36	**.075** 1.91	**.061** 1.55	**.013** .330
032-0022-0001	**.093** 2.36	**.075** 1.91	**.059** 1.50	**.015** .381
032-0067-0001	**.108** 2.74	**.079** 2.01	**.059** 1.50	**.015** .381
032-0078-0001	**.108** 2.74	**.079** 2.01	**.061** 1.55	**.013** .330
032-0222-0001	**.093** 2.36	**.075** 1.91	**.059** 1.50	**.015** .381
052-0092-0001	**.093** 2.36	**.075** 1.91	**.059** 1.50	**.015** .381
S-93				
032-0011-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.013** .330
032-0017-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.015** .381
032-0066-0001	**.154** 3.91	**.118** 2.99	**.101** 2.67	**.015** .381
032-0071-0001	**.134** 3.40	**.118** 2.99	**.097** 2.446	**.031** .787
032-0092-0001	**.155** 3.94	**.125** 3.18	**.107** 2.72	**.015** .381
032-0099-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.015** .381
052-0200-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.015** .381

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Cable Acceptance Dimensions (Continued)

Screw-On Series (Continued)

Right-Angle Plugs — Page 2-105

Connector Part No.	Max. Jacket	Max. Shield	Max. Dielectric	Nom. Inner Conductor
S-50				
032-0015-0001	**.092** 2.34	**.060** 1.52	Any	**.012** .305
052-0204-0001	**.092** 2.34	**.060** 1.52	Any	**.012** .305
052-0215-0001	**.092** 2.34	**.060** 1.52	Any	**.012** .305
052-0337-0001	**.111** 2.81	**.074** 1.88	Any	**.012** .305
S-70				
032-0013-0001	**.111** 2.81	**.074** 1.88	Any	**.012** .305
052-0299-0001	**.111** 2.81	**.074** 1.88	Any	**.012** .305
052-0379-0001	**.111** 2.81	**.074** 1.88	Any	**.012** .305
S-93				
032-0014-0001	**.134** 3.40	**.123** 3.12	Any	**.012** .305
032-0068-0001	**.155** 3.94	**.118** 2.99	Any	**.012** .305
032-0153-0001	**.155** 3.94	**.118** 2.99	Any	**.012** .305
052-0207-0001	**.134** 3.40	**.123** 3.12	Any	**.012** .305
052-0298-0001	**.134** 3.40	**.123** 3.12	Any	**.012** .305
052-0304-0022	**.155** 3.94	**.118** 2.99	Any	**.012** .305

Jacks — Page 2-106

Connector Part No.	Max. Jacket	Max. Shield	Max. Dielectric	Max. Inner Conductor
S-50				
031-0033-0001	**.088** 2.24	**.061** 1.55	**.041** 1.04	**.021** .533
031-0034-0001	**.087** 2.21	**.061** 1.55	**.041** 1.04	**.021** .533
051-0467-0001	**.079** 2.01	**.061** 1.55	**.041** 1.04	**.021** .533
S-70				
031-0036-0001	**.093** 2.36	**.075** 1.91	**.059** 1.50	**.021** .533
031-0048-0001	**.093** 2.36	**.075** 1.91	**.059** 1.50	**.021** .533
031-0090-0001	**.109** 2.77	**.079** 2.01	**.059** 1.50	**.021** .533
S-93				
031-0032-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.021** .533
031-0037-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.021** .533
031-0088-0001	**.154** 3.91	**.118** 2.99	**.101** 2.57	**.021** .533
031-0089-0001	**.154** 3.91	**.118** 2.99	**.101** 2.57	**.021** .533

Cable Acceptance Dimensions (Continued)

2 RF Connectors

Slide-On Series

Straight Plugs — Page 2-110

Connector Part No.	Max. Jacket	Max. Shield	Max. Dielectric	Max. Inner Conductor
SOS-50				
032-0055-0001	**.088** 2.24	**.058** 1.47	**.041** 1.04	**.015** .381
032-0056-0001	**.088** 2.24	**.058** 1.47	**.041** 1.04	**.015** .381
SOS-70				
032-0060-0001	**.093** 2.36	**.075** 1.71	**.059** 1.50	**.015** .381
032-0061-0001	**.093** 2.36	**.075** 1.71	**.059** 1.50	**.015** .381
032-0087-0001	**.108** 2.74	**.079** 2.01	**.059** 1.50	**.015** .381
SOS-93				
032-0058-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.015** .381
032-0077-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.015** .381
032-0084-0001	**.154** 3.91	**.118** 2.99	**.101** 2.57	**.015** .381

Right-Angle Plugs — Page 2-111

Connector Part No.	Max. Jacket	Max. Shield	Max. Dielectric	Nom. Inner Conductor
SOS-50				
032-0063-0001	**.092** 2.34	**.060** 1.52	Any	**.012** .305
SOS-70				
032-0062-0001	**.111** 2.82	**.074** 1.88	Any	**.012** .305
SOS-93				
032-0059-0001	**.134** 3.40	**.123** 3.12	Any	**.012** .305
032-0083-0001	**.155** 3.94	**.118** 2.99	Any	**.012** .305

Jacks — Page 2-111

Connector Part No.	Max. Jacket	Max. Shield	Max. Dielectric	Max. Inner Conductor
SOS-50				
031-0053-0001	**.088** 2.24	**.061** 1.55	**.041** 1.04	**.021** .533
031-0054-0001	**.088** 2.24	**.061** 1.55	**.041** 1.04	**.021** .533
SOS-70				
031-0095-0001	**.108** 2.74	**.079** 2.01	**.059** 1.50	**.021** .533
SOS-93				
031-0063-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.021** .533
031-0064-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.021** .533
031-0093-0001	**.154** 3.91	**.118** 2.99	**.101** 2.57	**.021** .533
031-0094-0001	**.154** 3.91	**.118** 2.99	**.101** 2.57	**.021** .533

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Cable Acceptance Dimensions (Continued)

Quick-Connect Series

Straight Plugs — Page 2-114

Connector Part No.	Max. Jacket	Max. Shield	Max. Dielectric	Max. Inner Conductor
QC-50				
032-0002-0001	**.093** 2.36	**.058** 1.47	Any	**.013** .330
032-0030-0001	**.093** 2.36	**.058** 1.47	**.041** 1.04	**.015** .381
QC-70				
032-0016-0001	**.093** 2.36	**.075** 1.91	**.061** 1.55	**.013** .330
032-0031-0001	**.093** 2.36	**.075** 1.71	**.059** 1.50	**.015** .381
032-0079-0001	**.108** 2.74	**.079** 2.01	**.059** 1.50	**.015** .381
QC-93				
032-0012-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.013** .330
032-0032-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.015** .381
032-0072-0001	**.154** 3.91	**.118** 2.99	**.101** 2.57	**.015** .381

Right-Angle Plugs — Page 2-114

Connector Part No.	Max. Jacket	Max. Shield	Max. Dielectric	Nom. Inner Conductor
QC-50				
032-0026-0001	**.092** 2.34	**.060** 1.52	Any	**.012** .305
QC-70				
032-0027-0001	**.111** 2.82	**.074** 1.88	Any	**.012** .305
QC-93				
032-0020-0001	**.134** 5.40	**.123** 3.12	Any	**.012** .305
052-0228-0001	**.155** 3.94	**.118** 2.99	Any	**.012** .305

Jacks — Page 2-115

Connector Part No.	Max. Jacket	Max. Shield	Max. Dielectric	Max. Inner Conductor
QC-50				
031-0038-0001	**.093** 2.36	**.061** 1.55	**.041** 1.04	**.021** .533
QC-93				
031-0040-0001	**.134** 3.40	**.118** 2.99	**.100** 2.54	**.021** .533

Twinax

Plugs — Page 2-116

Connector Part No.	Max. Jacket	Max. Shield	Max. Dielectric	Max. Inner Conductor
032-0088-0001	**.167** 4.24	**.142** 3.60	**.061** 1.55	**.014** .356
032-0093-0001	**.123** 3.12	**.092** 2.34	**.042** 1.07	**.014** .356
052-0229-0001	**.123** 3.12	**.092** 2.34	**.042** 1.07	**.014** .356
052-0324-0001	**.167** 4.24	**.142** 3.61	**.061** 1.55	**.014** .356

Jacks — Page 2-116

Connector Part No.	Max. Jacket	Max. Shield	Max. Dielectric	Max. Inner Conductor
051-0358-0001	**.167** 4.24	**.142** 3.60	**.061** 1.55	**.020** .508
051-0389-0001	**.167** 4.24	**.142** 3.61	**.061** 1.55	**.020** .508

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Cable Acceptance Dimensions (Continued)

Triax

Plugs — Page 2-117

Connector Part No.	Max. Jacket	Max. Outer Shield	Max. Outer Dielectric	Max. Inner Shield	Max. Inner Dielectric	Max. Inner Conductor
052-0130-0001	**.124** 3.15	Single Shield	**.085** 2.26	Single Shield	**.041** 1.04	**.014** .356
052-0138-0001	**.183** 4.65	Single Shield	**.146** 3.71	**.118** 2.99	**.107** 2.72	**.014** .356
052-0593-0001	**.214** 5.44	Single Shield	**.166** 4.22	**.161** 4.09	**.131** 3.33	**.020** .508

Gold Plated Crimp Style Coaxial Connectors

Straight Plugs — Pages 2-123, 2-124

Connector Part No.	Max. Jacket	Max. Dielectric	Nom. Inner Conductor
50 Ohm Series			
132-0112-000*	**.088** 2.24	**.039** .991	**.012** .305
132-0113-000*	**.088** 2.24	**.039** .991	**.012** .305
132-0114-000*	**.110** 2.79	**.070** 1.78	**.012** .305
132-0115-000*	**.110** 2.79	**.070** 1.78	**.012** .305
132-0509-0002	**.116** 2.95	**.070** 1.78	**.012** .305
70 Ohm Series			
132-0200-000*	**.110** 2.79	**.070** 1.78	**.012** .305
132-0201-000*	**.110** 2.79	**.070** 1.78	**.012** .305
93 Ohm Series			
132-0300-000*	**.155** 3.94	**.107** 2.72	**.012** .305
132-0301-000*	**.155** 3.94	**.107** 2.72	**.012** .305

Right-Angle Plugs — Page 2-124

Connector Part No.	Max. Jacket	Max. Dielectric	Nom. Inner Conductor
50 Ohm Series			
132-0116-0002	**.088** 2.24	**.039** .991	**.012** .305
132-0117-0002	**.088** 2.24	**.039** .991	**.012** .305
132-0118-0002	**.110** 2.79	**.074** 1.88	**.012** .305
132-0119-0002	**.110** 2.79	**.074** 1.88	**.012** .305
70 Ohm Series			
132-0202-0002	**.110** 2.79	**.074** 1.88	**.012** .305
132-0203-0002	**.110** 2.79	**.074** 1.88	**.012** .305
93 Ohm Series			
132-0302-0002	**.155** 3.94	**.107** 2.72	**.012** .305
132-0303-0002	**.155** 3.94	**.107** 2.72	**.012** .305

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Cable Acceptance Dimensions (Continued)

Gold Plated Crimp Style Coaxial Connectors (Continued)

Jacks — Page 2-125

Connector Part No.	Max. Jacket	Max. Dielectric	Nom. Inner Conductor
50 Ohm Series			
131-0134-0001	**.088** 2.24	**.039** .991	**.012** .305
131-0135-0001	**.088** 2.24	**.039** .991	**.012** .305
131-0136-0001	**.110** 2.79	**.070** 1.78	**.012** .305
131-0137-0001	**.110** 2.79	**.070** 1.78	**.012** .305
70 Ohm Series			
131-0200-0001	**.110** 2.79	**.070** 1.78	**.012** .305
131-0201-0001	**.110** 2.79	**.070** 1.78	**.012** .305
93 Ohm Series			
131-0300-0001	**.155** 3.94	**.107** 2.72	**.012** .305
131-0301-0001	**.155** 3.94	**.107** 2.72	**.012** .305

LEPRA/CON Connectors

All — Pages 2-128 to 2-136

Connector Part No.	Max. Jacket	Max. Dielectric	Nom. Inner Conductor
All	**.081** 2.06	**.040** 1.02	**.012** .305

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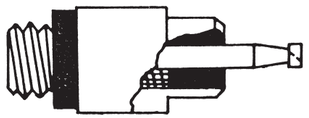
Coaxial Screw-On, Slide-On Series



Material and Finish

50 Connector uses 10-32 thread.

70 Connector uses 12-32 thread.

93 Connector uses 1/4-32 thread.

Housing (1) — Cold rolled steel silver plate.

Gasket (2) — Neoprene or silicone rubber.

Insulator (3) — TEFLON.

Glass Seal (4)

Center Contact (5) — Nickel Iron alloy contact with slotted turret type solder pot (other terminations available).

Service and Performance Data

Temperature Range — -65°F to 450°F [–54°C to 232°C] .

Electrical — 750 VAC working voltage.

Performance — 1200 VAC test at sea level.

Insulation Resistance — 5000 megohms at 500 VDC (room temperature).

Shock — 100 G's minimum.

Pressure — 100 PSI minimum.

Leak Rate Per Seal — Less than 1.04×10^{-8} cc/sec. (.001 Micron cubic ft/hr) of 100% helium tested at one atmosphere pressure differential far exceeding requirements of MIL-C-26500 and MIL-C-26482.

Plating — Silver unless otherwise specified.

2 RF Connectors

Bulkhead Solder Mount

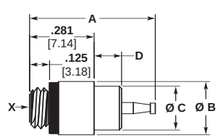


Fig. 1

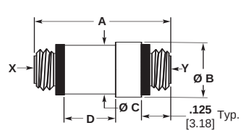


Fig. 2

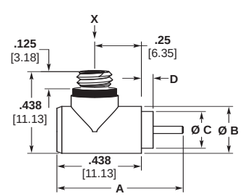


Fig. 3

Part No.	Fig.	A	B Dia.	C Dia. ±.015	D	X*	Y*
051-0049-0001	1	**.563** 14.30	**.25** 6.35	**.200** 5.08	**.125** 3.18	S-50	—
051-0056-0001	1	**.563** 14.30	**.313** 7.95	**.251** 6.38	**.125** 3.18	S-93	—
053-0228-0001	2	**.594** 15.09	**.25** 6.35	**.227** 5.77	**.234** 5.94	S-50	S-50
051-0315-0001	3	**.656** 16.66	**.25** 6.35	**.195** 4.95	**.063** 1.60	S-50	—

* "S" indicates Screw-On Series
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Bulkhead Solder Mount, Panel Insulated

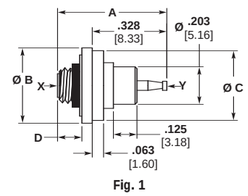

Fig. 1

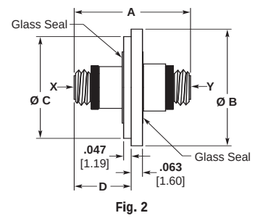

Fig. 2

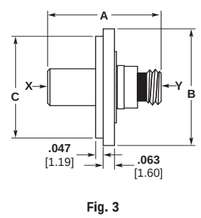

Fig. 3

Part No.	Fig.	A	B Dia.	C Dia.	D	X*	Y*
051-0232-0001	1	**.563** 14.30	**.406** 10.31	**.370** 9.40	**.172** 4.37	S-50	
053-0227-0001	2	**.609** 15.47	**.625** 15.88	**.540** 13.72	**.297** 7.54	S-50	S-50
053-0412-0001	2	**.609** 15.47	**.625** 15.88	**.540** 13.72	**.297** 7.54	S-93	S-93
053-0028-0001	3	**.609** 15.47	**.625** 15.88	**.540** 13.72	**.297** 7.54	SOS-50	S-50

* "S" indicates Screw-On Series; "SOS" indicates Slide-On Series
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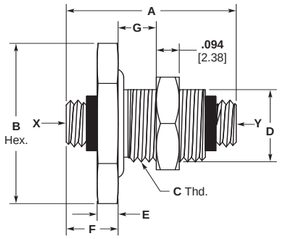
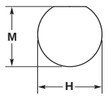
Coaxial Screw-On, Slide-On Series

(Continued)

Microminiature Coaxial Receptacles



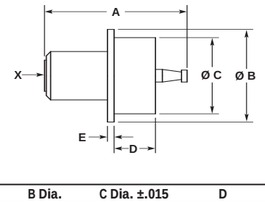


Mounting Hole

Part No.	A	B Hex.	C Thd.	D	E	F	G	H	M	X*	Y*
053-0455-0001	**.688** 17.46	**.563** 14.29	5/16-32 UNEF-2A	**.297** 7.54	**.094** 2.38	**.203** 5.16	**.25** 6.35	**.312** 7.92	**.291** 7.39	S-50	S-50
053-0636-0001	**.922** 23.42	**.625** 15.88	3/8-32 UNEF-2A	**.344** 8.73	**.078** 1.98	**.203** 5.16	**.438** 11.11	**.375** 9.53	**.347** 8.81	S-93	S-93

* "S" indicates Screw-On Series
Dimensions are subject to change without notice.

Solder Mount Slide-On Series Receptacles



Part No.	A	B Dia.	C Dia. ±.015	D	E	X*
051-0134-0001	**.563** 14.29	**.375** 9.53	**.309** 7.85	**.172** 4.37	**.031** .794	SOS-50, 70, 93
051-0158-0001	**.563** 14.29	**.25** 6.35	**.200** 5.08	**.125** 3.18	**.047** 1.19	SOS-50, 70, 93

* "SOS" indicates Slide-On Series
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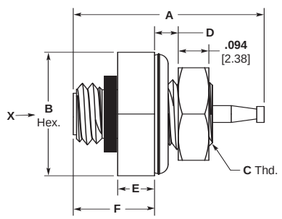
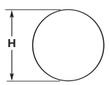
Single Hole Mount Receptacles





Mounting Hole

Part No.	A	B Hex.	C Thd.	D	E	F	H	X*
051-0249-0001	**.563** 14.29	**.375** 9.53	12-32 UNEF-2A	**.078** 1.98	**.109** 2.78	**.234** 5.95	**.218** 5.54	S-50
051-0154-0001	**.656** 16.67	**.625** 15.88	3/8-32 UNEF-2A	**.156** 3.97	**.078** 1.98	**.203** 5.16	**.375** 9.53	S-93

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Theory and Application

As a leading manufacturer of RF products, Tyco Electronics produces a large variety of coaxial connectors. The proper selection and application of these connectors requires a knowledge of factors not involved in other types of connectors and terminals. The following paragraphs have been prepared to improve understanding of the theory behind RF connectors:

Basic RF Theory[1]

RF energy travels by electromagnetic waves, and it is primarily the frequency of these waves that we are interested in. Briefly, if an oscillating voltage source is connected to a cable, a continuous electromagnetic wave will propagate along the cable. A sensor placed at some point on the cable would indicate a varying voltage (E field) as well as a current and magnetic field (H field) as the wave travels past it. This is called an electromagnetic wave because both electric and magnetic fields are varying. The wave shape is initially determined by the variation of the source with time.

Figure 7 shows the radiant energy spectrum. Visible light, radio, television, x-rays and Gamma rays are all phenomenon of electromagnetic waves at different frequencies. This introduction will treat only those that are generated by an electrical source and propagated along a physical cable or other transmission media. That is, frequencies above zero and up to about 50 gigahertz.

[1]The majority of the technical terms, relative to RF and coaxial cable and connectors, used here-in and throughout this catalog are defined in the Glossary of Terms in Section 19.

Frequency or Wavelengths	Designation	Applications
0 - 29.9 KHz	VLF (Very Low Frequency)	Commercial AC electricity, deep depth sounders, ultrasonic grinders, sonic oscillators
30 - 299.9 KHz	LF (Low sonar Frequency)	Shallow-to-medium depth sounders
300 - 2999.9 KHz	MF (Medium Frequency)	Commercial AM radio broadcasting, marine radio telephone, direction finders
3 - 29.9 MHz	HF (High Frequency)	Citizen band radio, amateur radio, international broadcasting
30 - 299.9 MHz	VHF (Very High Frequency)	VHF television (Channels 2 thru 13), commercial FM radio broadcasting, amateur radio, fire and police radio
300 - 2999.9 MHz	UHF (Ultra-high Frequency)	UHF television (Channels 14 thru 83), microwave ovens, aeronautical radionavigation
3 - 29.9 GHz	SHF (Super High Frequency)	Microwave communications, marine radar, aircraft tracking and airborne radars
30 - 299.9 GHz	EHF (Extremely High Frequency)	Space communications, radio astronomy

Notes:
1. KHz = Kilohertz (1 thousand cycles per second)
2. MHz = Megahertz (1 million cycles per second)
3. GHz = Gigahertz (1 billion cycles per second)

Figure 7

Radiant Energy Spectrum

In the following paragraphs we will discuss waves in greater detail, including the relationship of frequency and wave length, how pulses are formed and used, how each differs from the other and the problems involved in their transmission.

Sine Waves

An RF wave is a sine wave, meaning that it smoothly swings from zero to a positive peak value, then back down past zero to a negative peak value, then back to zero to complete a 360 electrical degree cycle. The positive and negative peaks are always equal in amplitude. The two qualities which characterize this type of wave are amplitude and frequency (f). Figure 8 shows these two characteristics. Amplitude refers to the peak value attained by the wave and corresponds to voltage. Frequency refers to the number of oscillations per second. For example, the sign wave in Figure 8(B) has completed 12 cycles in one second. Therefore, we would say that this wave has a frequency of 12 cycles per second or 12 Hertz. The time for one complete cycle is defined as the period (T). The relationship between the period and frequency is given by the equation:

$$f = 1 / T \text{ in Hertz}$$

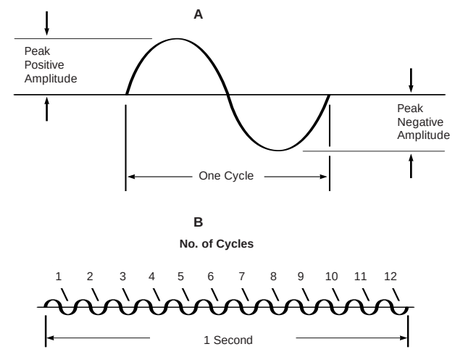

Figure 8

Typical Sine Wave Characteristics

The wave travels away from the generator at speeds approaching the speed of light. When an electromagnetic wave travels in a medium other than air or vacuum, the speed for the wave is reduced by a factor of the square root of the dielectric constant (ε. The velocity (v) of the propagation of a signal is given by:

$$v = \frac{c}{\sqrt{\varepsilon}}$$

Where c is the speed of light, 3×10^8 m/sec or 1.18×10^{10} in/sec, and ε is the dielectric constant of the medium. (See Table 1 for dielectric constants of various materials)

The wavelength of a signal is given by the formula

$$\lambda = v/f = \frac{c}{\sqrt{\varepsilon} \times f\,(GHz)} \quad \frac{1.18 \times 10^{10}}{\sqrt{\varepsilon} \times f\,(GHz)} \text{ inches}$$

See Figure 9

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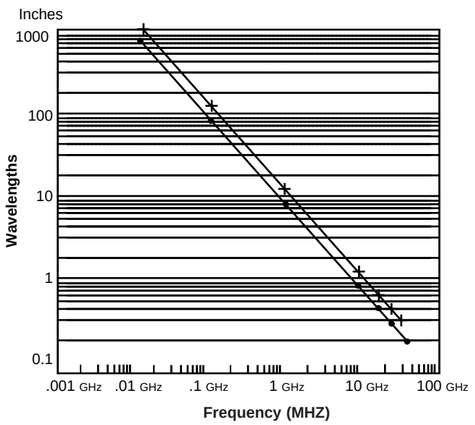

Figure 9

Table 1.

Properties of Insulating Materials

Dielectric Material	Dielectric Constant	Operating Temperature Range
TFE	2.03	-70 +250°C
Polyethylene	2.3	-60 +80°C
Nylon	4.6-4.0	-40 +120°C
TPX	2.12	-65 +85°C
Polypropylene	2.25	-40 +105°C
Acetal	3.7	-65 +85°C

Pulses

The sine wave is most often used for communication purposes where intelligence is imposed on the wave by a variation in amplitude (amplitude modulation, AM) or by a variation in frequency (frequency modulation, FM).

Pulses, on the other hand, are primarily used in computers and digital instrumentation. Since pulses are generally used for triggering purposes, the pulse rise/fall time, amplitude and width are the most important. Figure 10 shows a pulse and identifies these characteristics.

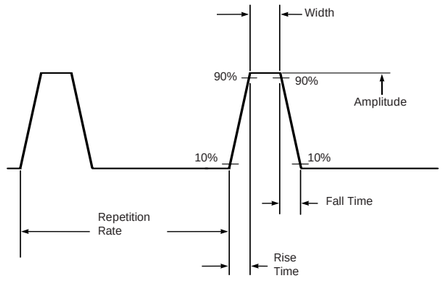

Figure 10

Pulse Characteristics

Notice that rise time is the time required for the pulse to rise from 10% to 90% of its amplitude — not from zero to maximum. Rise and fall time is perhaps the single most important characteristic of a pulse in today's high-speed digital equipment. Figure 11 shows that the faster the rise and fall time, the more pulses will fit in a given time frame.

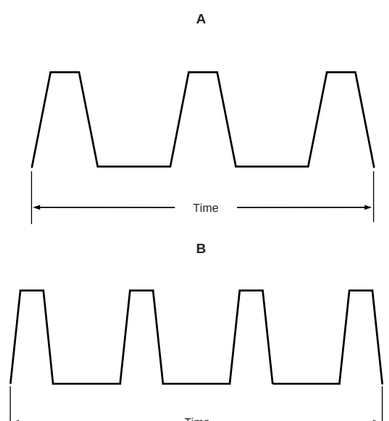

Figure 11

Pulse Rise and Fall Time

The bit rate for a system is the maximum rate of pulses per second that a system can process without causing data errors. The maximum performance can also be specified in terms of baud rate. The baud rate is defined as the number of characters (bytes) that are transmitted per second. Generally a character represents 10 bits (7 bits for the information, one parity bit, and two for start and stop, totalling 10).

Now that we know why fast pulses are required, the next problem is how to obtain faster rise times. A pulse is made up of a great number of different frequencies, and the more high frequencies a pulse contains, the faster will be its rise time and the flatter will be its peak. To better understand this, refer to Figure 12. At A, you will see a fundamental frequency (1), its third harmonic (3), and the resultant waveform (S3), which is a combination of 1 and 3. Although this does not yet resemble a square wave, you will note that the rise time is decreased, and a dip appears at the peak. At B of Figure 12, we have added the fifth harmonic. Rise time is further decreased, and the peak is beginning to flatten out. At C the seventh harmonic has been included, and the resultant wave S7 begins to resemble a square wave. As more high frequency harmonics are added to the waveform, it will more closely resemble a square wave, and the squarer it becomes, the faster will be the rise time.

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Fast rise times and short pulse widths require high frequency components.

Two frequent causes of digital signal degradation can be (1) high capacitance of the transmission line and (2) impedance mismatches of connector transmission line or I/0 devices. Selection of an impedance-matched connector on a digital line, especially if short cable assemblies are used, can be as important as connector selection for an RF modulated line. Reflected pulses out of phase with the original pulse can cause false signals or high error rates in a digital system.

Since pulses with fast rise times are necessary in high-speed computers, any circuit element which could reduce or attenuate high frequency response is undesirable.

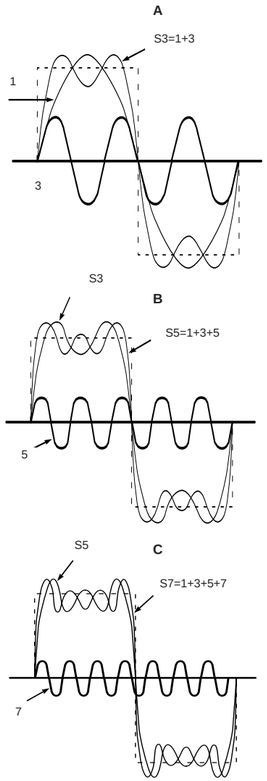

Figure 12

Development of a Square Wave

Signal Integrity and Propagation

To explain how to maintain signal integrity, it is necessary to review how the signal is configured in a cable and how it propagates. Ignoring digital signals for this discussion we will identify the issues that deal with the integrity of a sine wave. Consider a coaxial cable consisting of an inner conductor surrounded by a dielectric material and then an outer conductor (See Figure 13). The outer conductor may be a braid, a foil, or a solid metal.

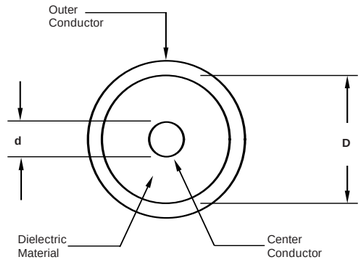

Figure 13

Diagram of a Cable

An electromagnetic wave traveling in a coaxial cable produces an electric and a magnetic field between the inner conductor and the outer conductor (Figure 14). The electric (E field) is radial and varies in time. An alternating current flows along the inner conductor and the outer conductor. An oscillating magnetic field (H field) circles the inner conductor.

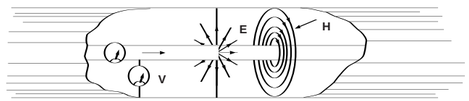

Figure 14

Electric field (E) and magnetic field (H) belonging to the principal mode in a coaxial line.

The alternating current on a conductor is not spread throughout the conductor but is strongest at the surface and decays exponentially at points further into the conductor. This is called the skin effect. At a frequency of 1MHz, three skin depths is 0.0078" (95% of the current is within three skin depths of the surface) and at 10GHz three skin depths is 0.00078". As a result, the current is on the outer surface of the inner conductor and the inner surface of the outer conductor over the entire range of interest for most RF systems. The dimensions and material beyond several skin depths have no effect on the wave; gold plated plastic will propagate as well as gold plated copper at sufficiently high frequencies.

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Attenuation

A wave loses energy (attenuates) in several ways: (1) The resistance of the inner and outer conductors is small but can be significant over long lengths and will produce some heat. (2) The dielectric may be lossy; its resistance is high but not infinite, and some energy is lost. (3) Electromagnetic energy radiates at high frequencies; significant energy losses are caused by radiation of electromagnetic energy (the cable acts like an antenna). (4) Energy is reflected due to impedance mismatches. The combination of these four types of losses are referred to as the insertion loss of a transmission line system. Connectors have similar losses.

Characteristic Impedance

A parameter which defines the behavior of a cable, connector, or any propagating system is Characteristic Impedance, Zo. The characteristic impedance of a lossless cable is related to the inductance per unit length, L, and the capacitance per unit length, C, as follows:

$$Zo = \sqrt{L/C} \text{ in ohms}$$

The equivalent circuit of a transmission line is shown in Figure 15. R represents the conductor resistance for a unit length.

For a coaxial cable the characteristic impedance is given by:

$$Zo = \frac{138}{\sqrt{\varepsilon}} \times \text{Log}_{10} \frac{D}{d} \text{ in ohms}$$

where D is the inner diameter of the outer conductor and d is the outer diameter of the inner conductor, respectively. Similar equations apply for other geometries such as two parallel wires.

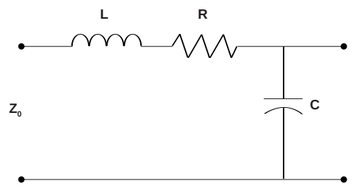

Figure 15

Typical Transmission Line Schematic

The maximum power is transferred between two systems if they have the same impedance. This is called impedance matching. However, impedance variations that are short compared to a wavelength can have a negligible effect on signal loss.

Standard impedances are 50 ohm, 75 ohm and 93-125 ohm. Most systems use 50 ohm because it is a compromise between maximum power transmission and minimum line loss. The telephone industry and the broadcast industry use 75 ohm for minimum line attenuation. The need for low capacitance instrumentation cable has produced the 93-125 ohm systems. The higher impedances are generally achieved by changing the conductor diameters and by modifying the dielectric material to add air.

Reflections

When the characteristic impedance changes in a transmission line system, part of an incident wave is reflected. The reflection coefficient can be calculated as:

$$\text{Reflection Coefficient} = \rho = \frac{V_i}{V_R} = \frac{Z_R - Z_O}{Z_R + Z_O}$$

Where Vi and ZO are the incident voltage and impedance of the first media. V_R and Z_R represent the reflected voltage and impedance of the media that caused the reflection. The decibel loss due to reflection is given by:

$$\text{Return Loss} = 10 \text{ Log}_{10} \left(\frac{1}{1-\rho^2} \right) \text{ dB}$$

VSWR

The traditional way to determine the reflection coefficient is to measure the standing wave caused by the superposition of the incident wave and the reflected wave. Traditionally the voltage is measured at a series of points using a slotted line. The ratio of the maximum divided by the minimum is the Voltage Standing Wave Ratio (VSWR). The VSWR is infinite for total reflections because the minimum voltage is zero. If no reflection occurs the VSWR is 1.0. VSWR and reflection coefficient are related as follows:

$$VSWR = (1 + \rho)/(1 - \rho)$$

Most present instrumentation measures the reflection coefficient and calculates the VSWR.

Figure 16 represents the direct relationship between VSWR and its equivalent in return loss (expressed in dB).

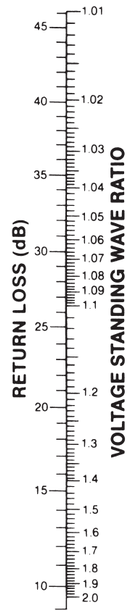

Figure 16

VSWR vs. Return Loss

Multiple Reflections

If there is a series of impedance changes, each one will have a reflection coefficient. The total reflection coefficient is the vector addition of each of the individual coefficients accounting for the distance between reflections and the reflection of any reflected waves. Even though the calculations are difficult, a total VSWR can still be measured.

Multiple reflections can produce a resonance phenomenon that is unique to wave theory. Properly understood some serious difficulties can be avoided. An example will make the point clear. Consider an electromagnetic wave with a wave-

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length of 4 inches traveling on a cable that changes from 50 ohms to 25 ohms. The reflection coefficient is -.33, which means that one third of the incident voltage is reflected toward the source. Assume that one inch (one quarter wavelength) down the cable the impedance changes back to 50 ohm. Again, one third of the wave is reflected, but without any phase shift. It travels back to the first interface where one third of this reflected wave is reflected back toward the second interface. Two thirds of the wave is transmitted through the interface and travels back to the source. Since the first (reflected) wave is shifted 180 degrees at the reflection, and the second (transmitted-reflected-transmitted) wave is shifted 180 degrees because it traveled the one inch separation twice, the two waves are in phase. The net result is that the VSWR is much larger because the length of the 25 ohm section was just the right length to cause a resonance. If the length of the 25 ohm section had been one half wavelength, the two waves would have interfered and the VSWR would be at a minimum.

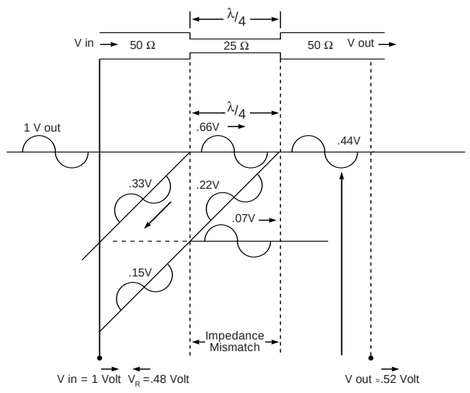

Figure 17

Multiple Wave Reflections
(Caused by Impedance Mismatch)

In summary, avoid cable lengths, printed circuit board paths, or connectors that are multiple of one quarter ($\lambda/4$, $3\lambda/4$, etc.) of the intended signal transmission wavelength. Coaxial cables, when manufactured, also have periodic variations in diameter that result in periodic changes in impedance (Zo), that can cause significant levels of reflected signal (high return loss) at specific frequencies.

Reflections of Digital Signals

The previous discussions dealing with attenuation, reflections and standing waves can apply to digital signals with some extra thought.

A single pulse can be thought of as a combination of high frequency sine waves. The maximum frequency component in a square wave pulse can be calculated by this equation:

f = 0.35/rise time
where
f = GHz when “t” is in nanoseconds

Attenuation of the frequencies necessary to support the short risetime will produce a slower rise and possibly prohibit the pulse from ever reaching the detector. This ‘slurring’ of the pulse is similar to the behavior of an RC circuit and the attenuation is sometimes called capacitive attenuation.

A series of pulses can demonstrate resonance. If a portion of a pulse is reflected at each interface, it is possible for them to come together and add up to form a new phantom pulse.

The critical frequency here is the bit rate. Think of a sine wave with a frequency the same as the bit rate; if it will resonate in the cable, the pulses will also. Extra pulses caused by resonance might easily result in an error signal from the receiving system requesting a retransmittal. The final result would be a communication system that is much slower than intended.

Cut-off Frequency

The cut-off frequency of a coaxial transmission line is the frequency at which modes of energy transmission, other than the “TEM” mode, can be generated.

$$fco = \frac{7.5}{\sqrt{\varepsilon}\,(D+d)} \text{ (in GHz)}$$

(D and d are measured in inches)

Types of Transmission Lines

Twin Lead transmission cable is generally used where impedance matching alone is important, since it provides only minimal shielding. Impedance values of 300 ohms and 600 ohms are common. Lower impedance values require closer spacing of the conductors and are not normally available in this type of cable. A typical application for twin lead cable is in antenna lead wire for television sets.

Twisted Pair is a variation of the twin lead type. It consists of two lengths of ordinary hookup wire twisted together. A twisted pair provides relatively constant impedance plus better magnetic shielding than twin lead cables. It is flexible, inexpensive, easy to terminate and is used extensively by the computer industry. However, it should not be used when maximum shielding is required.

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Shielded Twisted Pair Cable is used to eliminate inductive and capacitive coupling. Twisting cancels out inductive coupling, while the shield eliminates capacitive coupling. Most applications for this cable are between equipment, racks and buildings.

Flexible (Braided) Coaxial Cable is by far the most common type of closed transmission line because of its flexibility. It is a coaxial cable, meaning that both the signal and the ground conductors are on the same center axis. The outer conductor is made from fine braided wire, hence the name “braided coaxial cable”. This type of cable is used in practically all applications requiring complete shielding of the center conductor. The effectiveness of the shielding depends upon the weave of the braid and the number of braid layers. Tyco Electronics manufacturers connectors for cable sizes ranging from less than 1/8 in. diameter, for low power applications of around 50 watts, to over 1/2 in. diameter for power of 850 watts at 100 MHz and voltages up to 5000. In addition to power handling capabilities, cables are available for high frequency applications, high and low temperature applications, severe environmental applications and many other specialized uses.

Triaxial Cable is used when higher “shielding” efficiency characteristics are required in applications similar to those using shielded twisted pair cable.

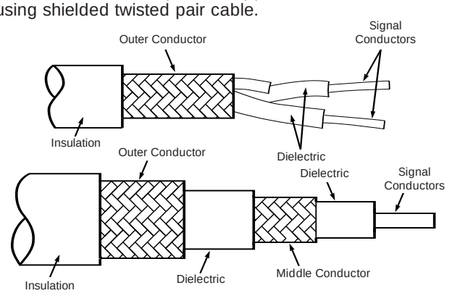

Figure 18

Twin Conductor and Triaxial Cable

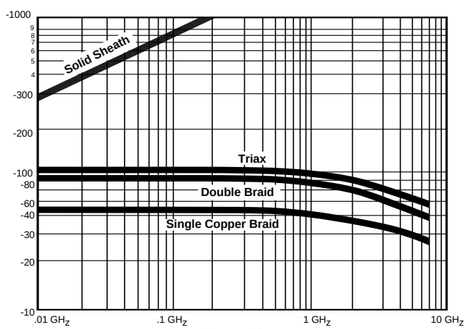

Figure 19

Shielding Efficiencies

Often you will hear the term “shielded cable”. This is very similar to coaxial cable except the spacing between center conductor and shield is not carefully controlled during manufacture, resulting in non-constant impedance.

Semi-rigid Coaxial Cable uses a solid tubular outer conductor rather than the braided type, so that all the RF energy is contained within the cable. One of the drawbacks of braided cable is that the shielding is not 100% effective, especially at higher frequencies. This is because the braided construction can permit small amounts of short wavelength (high frequency) energy to radiate. Normally this does not present a problem; however, if a higher degree of shielding is required, semi-rigid coaxial cable is recommended. For applications using frequencies higher than 30 GHz a miniature semi-rigid cable is recommended. Various connectors are available from Tyco Electronics to terminate these cables.

Ribbon Coaxial Cable is a relatively recent Tyco Electronics innovation which combines the advantages of both ribbon cable and coaxial cable. Tyco Electronics currently provides both the cable and the insulation displacing coaxial connector to terminate the cable. Each individual coaxial cable consists of the signal conductor, dielectric, a foil shield and a drain wire which is in continuous contact with the foil. The entire assembly is then covered with an outer insulating jacket. The unique manufacturing feature of this cable is the precise placement of the drain wires to permit gang stripping of the outer jacket and foil. The major advantage of this cable is the speed and ease with which it can be mass terminated with the Tyco Electronics insulation displacement technique. They can also be separated into individual coaxial lines and terminated with standard coaxial connectors as required.

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Appendix B - Typical Coaxial Cable Specifications

Abbreviations

Dielectric

PE .....Solid polyethylene
PTEE .....Solid polytetrafluoroethylene
PIB .....Polyisobutylene, Type B, per MIL-C-17
Rubber .....Per MIL-C-17D
Sil .....Silicone rubber
PS .....Polystyrene

Conductors and Braid Materials

AL .....Aluminum
SCAAI .....Silver covered copper covered aluminum
BC .....Bare copper
SC .....Silver covered copper
CCS .....Copper covered steel
TC .....Tinned copper
SCCS .....Silver covered copper covered steel
SCCad Br .....Silver covered cadmium bronze
GS .....Galvanized steel
TCCS .....Tin copper covered steel
SSC .....Silver covered strip
HR .....High resistance wire
SA .....Silver covered alloy

Jacket Material

PVC-I .....Black polyvinylchloride, contaminating, Type I, per MIL-C-17D
PVC-II .....Gray polyvinylchloride, noncontaminating, Type II, per MIL-C-17D
PVC-IIA .....Black polyvinylchloride, noncontaminating, Type IIA, per MIL-C-17D
PE-III .....Clear polyethylene
PE-IIIA .....High molecular weight, black polyethylene, Type IIIA, per MIL-C-17D
FG Braid V ....Fiberglass, impregnated, Type V, per MIL-C-17D
FEP-IX .....Fluorinated ethylene propylene, Type IX, per MIL-C-17D
PUR .....Polyurethane, black specific compounds
SIL/DAC-VI ...Dacron braid over silicone rubber, Type VI, per MIL-C-17D
Rubber .....Per MIL-C-17D

RG/U Type Cable	Inner Conductor	Dielectric Material	DOD	Number/Type of Shielding Braids	Jacket Material	O.D.	Weight (lb/ft)	Nom. Imped. (Ohms)	Nom. Cap pf/ft	Max. Operating Temp. (C°)	Max. Operating Voltage (Volts RMS)	Comments
8	**2.17** .0855 7/**0.72** BC .0285	PE	**7.24** .285	1/BC	PVC-I	**10.29** .405	.106	52	29.5	−40 +80	4000	Use RG213
8A	**2.17** .0855 7/**0.72** BC .0285	PE	**7.24** .285	**.285** 1/BC	PVC-IIA	**10.29** .405	.106	52	29.5	−40 +80	5000	Use RG213
9	**2.17** .0855 7/**0.72** SC .0285	PE	**7.11** .280	2/Inner SC Outer BC	PVC-II	**10.67** .420	.140	51	30.0	−40 +80	4000	Use RG214
9A	**2.17** .0855 7/**0.72** SC .0285	PE	**7.11** .280	2/SC	PVC-IIA	**10.67** .420	.150	50	30.8	−40 +80	5000	Use RG214
9B	**1.21** .0477 7/**0.4** TC .0159	PE	**7.24** .285	1/BC	PVC-I	**10.29** .405	.096	75	20.6	−40 +80	4000	Use up to 100 MHz
11	**1.21** .0477 7/**0.4** TC .0159	PE	**7.24** .285	1/BC	PVC-IIA	**10.29** .405	.096	75	20.6	−40 +80	5000	Use up to 1000 Mhz
11A	**0.81** BC .0320	PE	**2.95** .116	2/TC	PE-III	**5.08** .200	.032	53.5	28.5	−55 +80	1900	Use RG55B
55	**.0.89** SC .0350	PE	**2.95** .116	2/SC	PVC-IIA	**5.08** .200	.034	50	30.8	−40 +80	1900	Use RG223
55A	**0.81** SC .0320	PE	**2.95** .116	2/TC	PE-IIIA	**5.08** .200	.033	53.5	28.5	−55 +80	1900	Use up to 1000 MHz
55B	**0.81** BC .0320	PE	**2.95** .116	1/TC	PVC-I	**4.95** .195	.029	53.5	28.5	−40 +80	1900	Use RG58B
58	**0.9** .0355	PE	**2.95** .116	1/TC	PVC-I	**4.95** .195	.029	52	28.5	−40 +80	1900	Use RG58C
58A	**0.81** BC .0320	PE	**2.95** .116	1/TC	PVC-IIA	**4.95** .195	.029	53.5	28.5	−40 +80	1900	Use up to 1000 MHz
58B	**0.9** .0355 19/**0.8** TC .0071	PE	**2.95** .116	1/TC	PVC-IIA	**4.95** .195	.029	50	30.8	−40 +80	1900	Extra Flexible Version RG58B
58C	**0.64** CCS .0253	PE	**3.71** .146	1/BC	PVC-I	**6.15** .242	.032	73	21.0	−40 +80	2300	Use RG59B
59	**0.64** CCS .0253	PE	**3.71** .146	1/BC	PVC-IIA	**6.15** .242	.032	73	21.0	−40 +80	2300	Use RG59B
59A	**0.58** CCS .0230	PE	**3.71** .146	1/BC	PVC-IIA	**6.15** .242	.032	75	20.6	−40 +80	2300	Use up to 1000 MHz
59B												

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Appendix B - Typical Coaxial Cable Specifications (Continued)

RG/U Type Cable	Inner Conductor	Dielectric Material	DOD	Number/Type of Shielding Braids	Jacket Material	O.D.	Weight (lb/ft)	Nom. Imped. (Ohms)	Nom. Cap pf/ft	Max. Operating Temp. (C°)	Max. Operating Voltage (Volts RMS)	Comments
62A	**0.64** CCS .0253	Air-space PE	**3.71** .146	1/BC	PVC-IIA	**6.15** .242	.038	93	13.5	−40 +80	750	Low Capacitance
62B	**0.61** .0240 7/**0.2** CCS .0080	Air-space PE	**3.71** .146	1/BC	PVC-IIA	**6.15** .242	.038	93	13.5	−40 +80	750	Extra Flexible RG62A
71	**0.64** CCS .0253	Air-space PE	**3.71** .146	2/TC	PVC-I	**6.22** .245	.046	93	13.5	−40 +80	750	Use RG71B
71A	**0.64** CCS .0253	Air-space PE	**3.71** .146	2/TC	PE-III	**6.22** .245	.046	93	13.5	−55 +80	750	Use RG71B
71B	**0.64** CCS .0253	Air-space PE	**3.71** .146	2/TC	PE-IIIA	**6.22** .245	.046	93	13.5	−55 +80	750	Low Capacitance
122	**0.76** .0300 7/**0.13** TC .0050	PE	**2.44** .096	1/TC	PVC-IIA	**4.06** .160	.016	50	29.4	−40 +80	1900	Use up to 1000 MHz
124	**0.64** TCCS .0253	Taped PTFE	**3.43** .135	1/TC	FG Braid-V	**6.1** .240	.210	73	20.3	−55 +250	2300	Use RG140
140	**0.64** SCCS .0250	PTFE	**3.71** 1.46	1/SC	FG Braid-V	**5.92** .233	.056	75	19.5	−55 +250	2300	See RG302 for FEP Jacket
141	**0.91** SCCS .0359	PTFE	**2.95** .116	1/SC	FG Braid-V	**4.83** .190	.036	50	29.4	−55 +250	1900	Use RG141A
141A	**0.99** SCCS .0390	PTFE	**2.95** .116	1/SC	FG Braid-V	**4.83** .190	.036	50	29.4	−55 +250	1900	See RG303 for FEP Jacket
142	**0.91** SCCS .0359	PTFE	**2.95** .116	2/SC	FG Braid-V	**4.95** .195	.047	50	29.4	−55 +250	1900	Use RG142A
142A	**0.99** SCCS .0390	PTFE	**2.95** .116	2/SC	FG	**4.95** .195	.047	50	29.4	−50 +250	1900	See RG142B for FEP Jacket
142B	**0.99** SCCS .0390	PTFE	**2.95** .116	2/SC	FEP	**4.95** .195	.047	50	29.4	−55 +250	1900	Standard Center Cond. Available
174	**0.48** .0189 7/**0.16** CCS .0063	PE	**1.52** .060	1/TC	PVC	**2.54** .100	.008	50	30.8	−40 +80	1500	Miniature Data Transmission
178	**0.3** .0120 7/**0.1** SCCS .0040	PTFE	**0.91** .036	1/SC	KEL-F	**1.83** .072	.0054	50	29.4	−40 +150	1000	Use RG178B
178B	**0.3** .0120 7/**0.1** SCCS .0040	PTFE	**0.86** .034	1/SC	FEP-IX	**1.83** .072	.0054	50	29.4	−55 +200	1000	High Strength Cond. Available
179	**0.3** .0120 7/**0.1** SCCS .0040	PTFE	**1.45** .057	1/SC	KEL-F	**2.54** .100	.010	70	20.4	−55 +150	1200	Use RG179B
180B	**0.3** .0120 7/**0.1** SCCS .0040	PTFE	**2.59** .102	1/SC	KEP-IX	**3.56** .140	.019	95	15.4	−55 +200	1500	High Strength Cond. Available
188	**0.51** .0201 7/**0.17** SCCS .0067	PTFE	**1.52** .060	1/SC	PTFE	**2.67** .105	.011	50	29.4	−55 +250	1200	Use RG316
188A	**0.51** .0201 7/**0.17** SCCS .0067	PTFE	**1.52** .060	1/SC	PTFE	**2.67** .105	.011	50	29.4	−55 +250	1200	Use RG316
195A	**0.3** .0120 7/**0.1** SCCS .004	PTFE	**2.59** .102	1/SC	PTFE	**3.68** .145	.020	95	15.4	−55 +250	1500	Use RG180B
210	**0.64** SCCS .0253	Air-Space PTFE	**3.71** .146	1/SC	FG Braid-V	**6.15** .242	.040	93	13.5	−55 +250	750	High Temp. Low Capacitance
213	**2.26** .0888 7/**0.75** BC .0296	PE	**7.24** .285	1/BC	PVC-IIA	**10.29** .405	.099	50	30.8	−40 +80	5000	Use up to 1000 MHz
214	**2.26** .0888 7/**0.75** SC .0296	PE	**7.24** .285	2/SC	PVC-IIA	**10.0** .425	.126	50	30.8	−40 +80	5000	Use up to 10,000 MHz

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216	**1.21** .0477 7/**0.75** BC .0159	PE	**7.24** .285	2/BC	PVC-IIA	**10.8** .425	.114	75	20.6	−40 +80	5000	Use up to 1000 MHz
223	**0.89** SC .035	PE	**2.95** .116	2/SC	PVC-IIA	**5.36** .211	.034	50	30.8	−40 +80	1900	Use up to 10,000 MHz
225	**2.38** .0936 7/**0.79** SC .0312	PTFE	**7.24** .285	2/SC	FG Braid-V	**10.92** .430	.180	50	29.4	−55 +250	5000	See RG393 for FEP Jacket
302	**0.64** SCCS .0250	PTFE	**3.71** .146	1/SC	FEP-IX	**5.11** .201	.030	75	19.5	−55 +200	2300	FEP Jacketed RG140
303	**0.99** SCCS .0390	PTFE	**2.95** .116	1/SC	FEP-IX	**4.32** .170	.088	50	29.4	−55 +200	1900	FEP Jacketed RG141A
316	**0.51** .0201 7/**0.17** SCCS .0067	PTFE	**1.52** .060	1/SC	FEDP-IX	**2.59** .102	.012	50	29.4	−55 +200	1200	FEP Jacketed RG188A
400	**0.98** .0385 19/**0.2** SPC .0077	PTFE	**2.95** .116	2/SC	FEP-IX	**4.95** .195	.050	50	29.3	−55 +200	1900	—
402	**0.91** SCCS .0360	PTFE	**3.02** .119	**3.58** OD .141 Copper Tube	None	**3.58** .141	.032	50	29.3	−40 +125	2500	Semi-rigid
405	**0.51** SCCS .0201	PTFE	**1.68** .066	**2.18** OD .086 Copper Tube	None	**2.19** .0865	.015	50	29.4	−40 +125	1500	Semi-rigid

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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Appendix C - Maximum Power Handling Capabilities for Cables

Average Input Power in Watts

RG/U Type Cable	Frequency in MHz								
	10	50	100	200	400	1,000	3,000	5,000	10,000
5, 5A, 5B	2,000	800	550	350	230	125	60	40	22
8, 8A, 10A, 213, 215	3,700	1,300	850	540	350	190	95	65	37
9, 9A, 9B, 214	3,700	1,300	850	540	350	190	95	65	37
11, 11A, 12, 12A, 13, 13A, 216	2,500	1,000	650	400	260	150	70	50	26
217	6,000	2,000	1,200	800	480	260	120	85	50
22, 22B	1,700	650	430	280	190	110	50	38	20
55, 55A, 55B, 223	800	310	205	137	90	53	28	20	10
58, 58B	730	280	180	125	85	50	25	17	—
58A, 58C	650	225	170	110	75	44	22	15	—
59, 59A, 59B	1,300	480	310	200	135	77	40	27	15
62, 62A, 71, 71A, 71B	1,300	480	310	200	135	77	40	27	15
62B	1,150	420	280	180	120	69	35	25	14
115, 115A, 165, 225, 393	25,000	9,500	6,300	4,300	2,800	1,700	880	620	350
108, 108A	340	145	100	70	50	30	15	—	—
122	540	205	140	90	60	35	18	12	—
140, 141, 141A, 142, 142B, 302, 303, 400, 402	9,000	3,500	2,400	1,600	1,100	650	350	245	140
143, 143A	11,500	4,600	3,200	2,100	1,450	850	460	330	190
144	25,000	9,500	6,300	4,300	2,800	1,700	880	620	350
161, 179, 179A, 179B, 187, 187A	1,600	780	570	420	310	200	110	76	41
174, 174A	170	72	50	36	25	16	—	—	—
178, 178A, 178B, 196, 196A	710	340	240	170	123	78	41	28	14
180, 180A, 180B, 195, 195A	2,500	1,100	800	570	400	250	135	93	50
188, 188A, 316	1,250	600	450	330	240	160	80	57	30
210	8,500	3,300	2,300	1,600	1,100	620	310	220	140

Note: Values above 3 GHz vary considerably depending on construction.
Conditions:
Ambient — 104°F [40°C]
Altitude — Sea level
Center Conductor Temperature — 176°F [80°C] for polyethylene, 392°F [200°C] for PTFE

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Appendix D - Nominal Loss Characteristics for Cables

Decibels per Hundred Feet

RG/U Type Cable	Frequency in MHz								
	10	50	100	200	400	1,000	3,000	5,000	10,000
5, 5A, 5B	.80	1.40	2.90	4.30	6.40	11.00	22.00	30.00	52.00
8, 8A, 10A, 213, 215	.66	1.50	2.20	3.20	4.60	9.00	19.00	28.00	47.00
9, 9A, 9B, 214	.66	1.50	2.20	3.20	4.60	9.00	19.00	28.00	47.00
11, 11A, 12, 12A, 13, 13A, 216	.66	1.50	2.20	3.20	4.60	9.00	19.00	28.00	—
217	.41	1.00	1.40	2.10	3.10	5.80	13.00	19.00	31.00
22, 22B	1.20	2.80	4.20	6.30	9.50	—	—	—	—
55, 55A, 55B, 223	1.35	3.00	4.30	6.00	8.80	16.50	36.00	51.00	85.00
58, 58B	1.20	3.10	4.60	7.00	10.00	17.50	38.00	—	—
58A, 58C	1.40	3.30	4.90	7.30	11.00	20.00	41.00	—	—
59, 59A, 59B	1.10	2.30	3.30	4.70	6.70	11.50	25.50	41.00	—
62, 62A, 71, 71A, 71B	.90	1.90	2.80	3.70	5.20	8.50	18.40	29.50	—
62B	.90	2.10	3.00	4.30	6.10	10.50	23.50	36.00	—
115, 115A, 165, 225, 393	.60	1.40	2.10	3.10	4.50	7.50	14.00	21.00	35.00
108, 108A	2.30	5.20	7.50	11.00	16.00	26.20	54.00	—	—
122	1.60	4.40	6.90	11.00	16.60	29.20	57.20	89.00	—
140, 141, 141A, 142, 142B, 302, 303, 400, 402	1.20	2.70	3.90	5.50	8.00	13.00	26.00	36.00	62.00
143, 143A	.85	1.80	2.50	3.80	5.70	9.70	18.10	26.10	40.70
144	.38	1.00	1.60	2.30	3.80	7.00	15.10	—	—
161, 179, 179A, 179B, 187, 187A	5.00	7.90	9.80	12.70	15.80	25.00	43.00	62.50	135.00
174, 174A	3.80	6.50	8.90	12.00	17.50	31.00	64.30	97.00	185.00
178, 178A, 178B, 196, 196A	5.30	10.00	13.30	20.00	27.50	45.00	78.00	115.00	172.00
180, 180A, 180B, 195, 195A	3.10	4.20	5.10	7.30	10.40	16.50	36.00	49.50	89.00
188, 188A, 316	3.80	7.90	11.50	15.00	20.00	30.00	58.00	79.00	133.00
210	.23	.58	.85	1.30	1.90	3.10	6.50	9.00	15.00

Note: Values above 3 GHz vary considerably depending on construction.

Conditions
Ambient —68°F [20°C]

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3

Fiber Optic Connectors

METRIC

Dimensions in this Fiber Optic Connectors section are millimeters over inches. All other pages are inches over millimeters.

RoHS Ready

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Rugged Fiber Optic Products

Introduction

Product Facts

- Expanded Beam
  - PRO BEAM Sr.Connectors
  - PRO BEAM Jr.Connectors
  - PRO BEAM Mini Connectors
  - Mini 38999
  - Mini ARINC
  - Mini GPRC
- LuxCis Optical Termini
  - One common terminus for GPRC, 38999, ARINC, Quadrax Cavity Reducers
- Sealed Circular LC ODVA

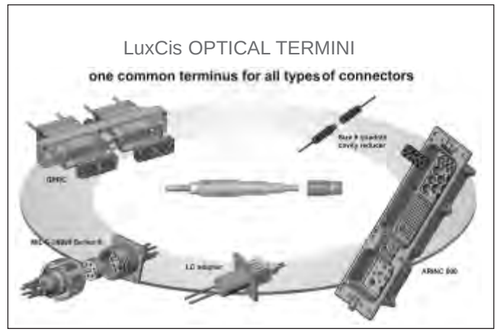
Expanded Beam Products

PRO BEAM Sr., Jr. & Mini Connectors

Tyco Electronics is proud to offer a full rugged fiberoptic product family.

With Tyco Electronics' Expanded Beam, HD 1.25mm Optical Terminus, and the Sealed Circular LC ODVA, the end user is guaranteed a complete choice that meets their cost and optical performance needs in multiple industries.

For specific information, please contact your local Tyco Electronics Sales Representative.



LuxCis Optical Termini

LuxCis is a trademark of Radiall, S.A. Product is manufactured under license from Radiall, S.A.

ASSEMBLY CAPABILITIES

Tyco Electronics has extensive Rugged Optic Harness capabilities. Please consult your local Tyco Electronics Sales Representative for assistance.

Sealed Circular LC ODVA

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Rugged Fiber Optic Products (Continued)

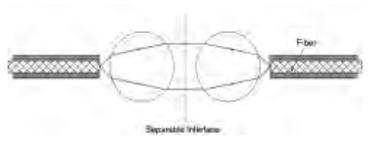
Expanded Beam Products

Product Facts

- PRO BEAM Sr., PRO BEAM Jr. and PRO BEAM Mini Connector field deployable interconnects
- ARINC 600 connectors, with inserts/holder blocks designed for Mini-Expanded Beam — up to 128 channels on size 3 ARINC 600
- MIL-C-38999 Series III shell size 11 style circular connectors — Cable assemblies up to 4 fibers
- Common insert for 1- through 4-channels
- Unique Modular Design, for use with multimode and singlemode fiber
- Tactical cables, cable reels, backpacks
- Cable assembly and termination services
- Ball lens expands cross-sectional area of light over 200 times for multimode and over 2000 times for singlemode
- Rugged hermaphroditic construction (i.e., same insert mates to each other)
- Physically non-contacting mating conditions; no wear, installed fiber ferrule protected by ball lens

Expanded Beam Technology

From left to right: PRO BEAM Sr., PRO BEAM Jr. & Mini Expanded Beam inserts.



Expanded Beam Principle

Fiber Optic Interconnect/ Cable System using Expanded Beam technology, which physically expands and collimates the transmission signal into an optical beam over 14 times its original diameter (the cross sectional area of the light beam increases over 200 times for multimode optical signals. For singlemode signals, the collimated beam is over 45 times its original diameter (the cross-sectional area of the light beam increases over 2,000 times.). It is then refocused back down onto the core of the receiving fiber. This approach provides ease of alignment and low sensitivity to thermal changes and contamination. High strength, precision connector housings enhance a durable connection, optimizing low loss and repeatable performance.

Suitable for aerospace, avionics, field-deployable communications, marine ship-to-shore applications, security systems, mobile diagnostic units, oil and gas exploration and other harsh environment applications demanding strength, durability and reliable performance in conditions of multiple coupling/ decouplings, blindmate situations, and high vibration.

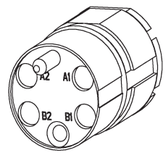
Product Facts

- No wear on fiber optic interface; Very vibration resistant
- Easy to handle, easy to clean. Durable connection that is highly resistant to dirt/debris
- Singlemode or multimode
- Common 850/1300 Dual Wavelength, 1310, or 1550 nm wavelengths
- Easy alignment for low-loss, repeatable performance
- Consistent overall optical “link budget” assured
- Low sensitivity to thermal fluctuations and interface contamination
- Repeatable low-loss performance in harsh environments

ASSEMBLY CAPABILITIES

Tyco Electronics has extensive Rugged Optic Harness capabilities. Please consult your local Tyco Electronics Sales Representative for assistance.

Expanded Beam Inserts



- PRO BEAM Sr. — the original, larger format, Field Tactical, hermaphroditic Connector System
- PRO BEAM Jr. — the second generation, reduced size, Field Tactical Connector System
- Mini-Expanded Beam insert for multi-channel small form factor — the smallest expanded beam multi-channel insert in the industry, a Tyco Electronics exclusive

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Rugged Fiber Optic Products (Continued)

PRO BEAM Jr. Connectors

Performance Specifications

Optical, Multimode

Insertion Loss, Typical —
0.7 - 1.0 dB @ 1300 nm*

Optical, Singlemode Version

Insertion Loss, Typical —
0.8 - 1.0 dB @ 1310 nm*

Return Loss — > 34 dB @ 1310 nm or 1550 nm

*Against referenced lead

Mechanical

Vibration, Sinusoidal —
10 - 500 Hz, 3 directions;
0.75 mm amplitude @ 10g acceleration

Bump — 4,000 Bumps, 6 directions @ 50g acceleration

Free Fall — 500 falls on concrete; Severity 1.2 m

Coupling Endurance —
3,000 couplings

Weight —
Plug — 123 grams, typical
D-Hole bulkhead — 102 grams, typical

Temperature

Operational Temperature —
-40°C/+85°C

Storage Temperature —
-55°C/+85°C

Temperature, Cyclic —
-55°C/+85°C

Humidity (Damp Heat) —95% RH

Immersion

Water — 5 m depth (plug) -
2 m (Bulkhead)

Material and Finish

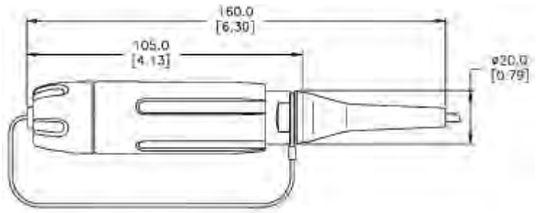
Shell Alloy — Aluminum; or nickel aluminum bronze (high saline environment)

Plating (For Aluminum Shells Only) — clear hard anodized; or green chromate conversion zinc (PRO BEAM Jr. Bulkheads only)

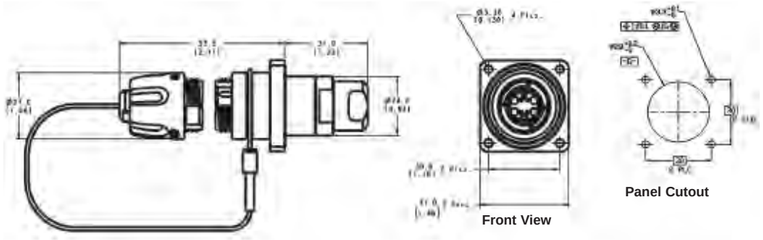
Bulkhead Connector Panel Thicknesses

PRO BEAM Jr. Bulkhead Connector D-Hole — 4 mm max.

PRO BEAM Jr. Bulkhead Connector Square Flange — 6 mm max.



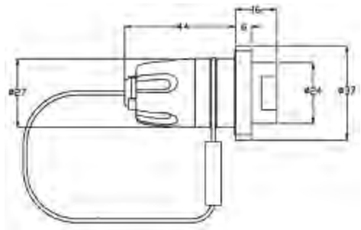
PRO BEAM Jr. Cable Connector, Plug



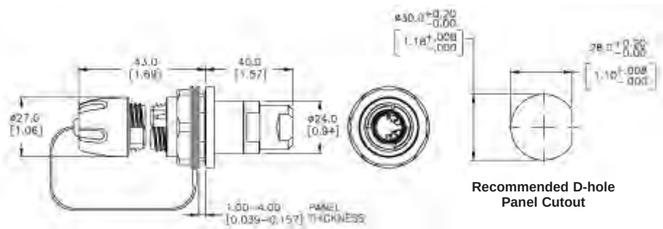
Front View

Panel Cutout

PRO BEAM Jr. Square Flange Mount Bulkhead

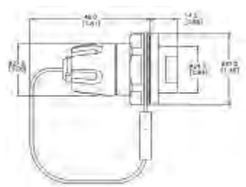


PRO BEAM Jr., Low Profile, Square Flange Mount Bulkhead



PRO BEAM Jr. D-Hole Bulkhead, Standard Cable Adapter

Recommended D-hole Panel Cutout



PRO BEAM Jr. Low Profile D-Hole Bulkhead

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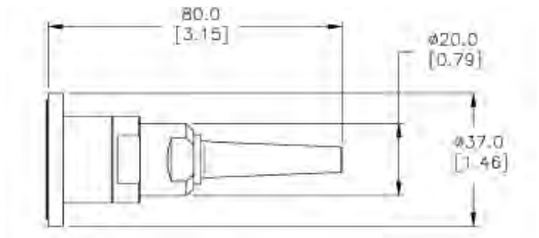
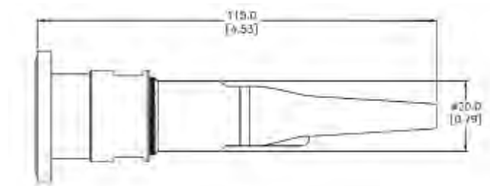
Rugged Fiber Optic Products (Continued)

PRO BEAM Jr. Connectors
(Continued)



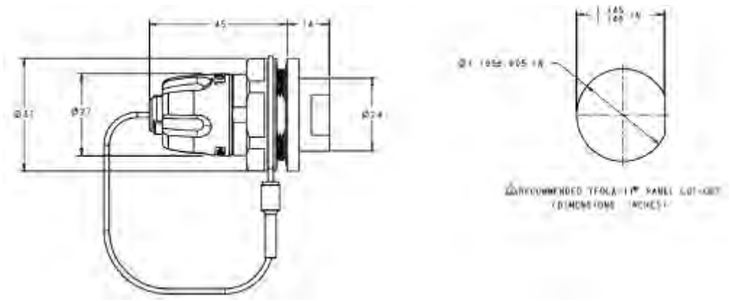
Standard Bulkhead Cable Adapter, with Boot



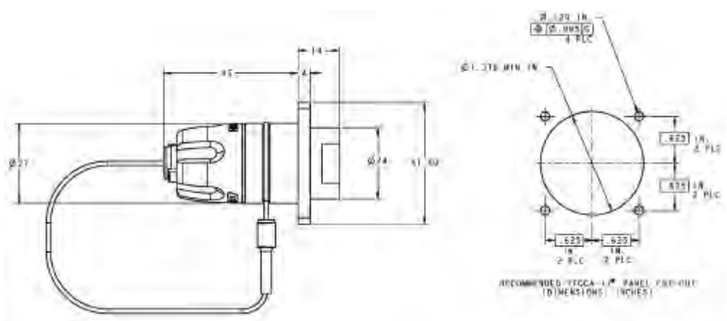
Environmentally Sealed Bulkhead Cable Adapter, with Boot

PRO BEAM Jr. Replacement Receptacles for TFOCA-II Panel Mount Connector Applications
(see page 3-6 for Part Numbers)

Panel Cutout Dimensions



PRO BEAM Jr. D-Hole Low Profile Buffered Fiber Bulkhead Replacement Connector for TFOCA-II Product



PRO BEAM Jr. Square Flange, Low Profile, Buffered Fiber Bulkhead Replacement for TFOCA-II Product

TFOCA-II is a registered trademark of Amphenol Fiber Systems International.

3 Fiber Optic Connectors

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Rugged Fiber Optic Products (Continued)

PRO BEAM Jr. Connectors
(Continued)

Connector Assembly
1 Shell Kit
1 Insert Kit
1 Cable Adapter Kit*
X Ferrule Kits (X = No. of optical channels)

Part Numbers listed are Shell alloy = aluminum Plating = hard anodized. Consult Tyco Electronics for other plating/material options such as NiAlBz for Naval applications.

PRO BEAM Jr. Connector Shell Kits

Description	Part Number
PRO BEAM Jr. Plug w/EPDM rubber	1754436-1
PRO BEAM Jr. Plug w/Fluorosilicone rubber	1754436-2
PRO BEAM Jr. D-Hole Low Profile, Buffered Fiber Bulkhead	1693741-1
PRO BEAM Jr. D-Hole Standard Bulkhead	1754437-1
PRO BEAM Jr. D-Hole Sealed Bulkhead	1754438-1
PRO BEAM Jr. Square Flange Low Profile Buffered Fiber Bulkhead	1754439-1
PRO BEAM Jr. Square Flange Standard Bulkhead	1754440-1
PRO BEAM Jr. Square Flange Sealed Bulkhead	1754441-1

PRO BEAM Jr. Replacement Receptacles for TFOCA-II Panel Mount Connector Applications

Description	Part Number
PRO BEAM Jr. TFOCA-II Replacement D-Hole Low-Profile Buffered Fiber Bulkhead	1754445-1♦
PRO BEAM Jr. TFOCA-II Replacement D-Hole Sealed Bulkhead	1754446-1♦
PRO BEAM Jr. TFOCA-II Replacement Square Flange Low-Profile Buffered Fiber Bulkhead	1754447-1♦
PRO BEAM Jr. TFOCA-II Replacement Square Flange Sealed Bulkhead	1754448-1♦

PRO BEAM Jr. Insert Kits

Description	Part Number
2 x 850 / 1300nm Multimode	1515743-1
2 x 1310nm Singlemode	1515739-1
2 x 1550nm Singlemode	1516040-1
4 x 850 / 1300nm Multimode	1515747-1
4 x 1310nm Singlemode	1515740-1
4 x 1550nm Singlemode	1516041-1

Ferrule Kits

Fiber Hole Size	Mode	PRO BEAM	Part Number
125 µm	SM	Jr.	1588908-2
126 µm	SM	Jr.	1588908-1
126 µm	MM	Jr.	1588700-1

ASSEMBLY CAPABILITIES
Tyco Electronics has extensive Rugged Optic Harness capabilities. Please consult your local Tyco Electronics Sales Representative for assistance.

PRO BEAM Jr. Connector Plug & Sealed Bulkhead Cable Adapter Kits

Cable Dia. (Max.)	Part Number
3.10 .122	1515814-1
3.60 .142	1515781-3
4.10 .161	1515848-2
4.60 .181	1516147-1
5.10 .201	1515834-2
5.65 .222	1515827-2
6.10 .240	1515859-3
6.70 .264	1588116-1
7.50 .295	1828168-1

PRO BEAM Jr. Connector Standard Bulkhead Cable Adapter Kits*

Cable Dia. Max.	Part Number
3.10 [.122]	1515791-2
3.60 [.142]	1515808-1
5.10 [.201]	1515835-1
5.65 [.222]	1515829-1
6.10 [.240]	1515796-2
4 x 3.00 [4 x .118]	1515749-1

* Standard Cable Adapter. Not applicable for Low Profile.

Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

Technical Documents

Product Specification
108-2177 Design Objectives

Application Specification
114-13099

Instruction Sheets
408-8791 Grounding D-Hole Bulkhead
408-8797 Plug
408-8798 Standard D-Hole Bulkhead
408-8811 Sealed D-Hole Bulkhead
408-8834 Low Profile Square Flange Bulkhead
408-8840 Low Profile D-Hole Bulkhead
408-8841 Standard Square Flange Bulkhead

Catalog 1308940
Revised 8-06

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Rugged Fiber Optic Products (Continued)

PRO BEAM Jr. Connectors
(Continued)

Spare Parts & Tools

Technical Documents

Product Specifications
408-8857 Curing Fixtures for PRO BEAM Jr. and Sr.
408-8828 Cleaning Procedure for EB C/A's

Tooling Specifications
408-8795 Crimp Tool with Die Set for PRO BEAM Jr. and Sr.
408-10022 Die Assembly for Mini and Jr. Circular Crimps

Curing Fixtures

Connector	Part Number
PRO BEAM Jr. Cable Plug (having cable with KEVLAR strength member fiber)	1693797-1
PRO BEAM Jr. Sealed D-Hole Bulkhead	
PRO BEAM Jr. Standard D-Hole and Square Flange Bulkhead	1693800-1
PRO BEAM Jr. Low Profile Buffered Fiber Bulkhead	1754122-1

Instruction Sheet 408-8857. Available at www.tycoelectronics.com

Cable Crimp Components

Description	Part Number
Crimp Sleeve (use with all PRO BEAM Jr. Connector Crimp Support sizes)	1515269-2
2.2 mm Crimp Support	1515567-1
3.1 mm Crimp Support	1515568-1
3.6 mm Crimp Support	1515569-1
3.8 mm Crimp Support	1515570-1
4.1 mm Crimp Support	2-1515270-0
4.6 mm Crimp Support	1516142-1
5.1 mm Crimp Support	1515571-1
5.65 mm Crimp Support	1515572-1
6.1 mm Crimp Support	1515573-1
6.5 mm Crimp Support	1515574-1
6.7 mm Crimp Support	1515575-1
Square Crimp Support for (4) 3 mm Cables	1515632-1

Ferrule Kits

Fiber Hole Size	Mode	PRO BEAM	Part Number
125 µm	SM	Jr.	1588908-2
126 µm	SM	Jr.	1588908-1
126 µm	MM	Jr.	1588700-1

Protective Caps

Description	PRO BEAM	Part Number
Standard cap, for D-Hole Bulkhead	Jr.	1515868-1
Standard cap, for Flange Mount Bulkhead	Jr.	1515787-2
Standard cap, for connector plug	Jr.	1515867-1

Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

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Rugged Fiber Optic Products (Continued)

PRO BEAM Mini Connectors

Tyco Electronics is pleased to announce the natural extension from our PRO BEAM Sr. and Jr. Connector product lines.

The PRO BEAM Mini Connector saves space and weight and is perfect for high density applications. The product offers the same durability as its larger counterparts.

PRO BEAM Sr., Jr. & Mini Connectors

PRO BEAM Mini Plug Connector

Connector Assembly
1 Shell Kit
1 Insert Kit
1 Cable Adapter Kit*
X Ferrule Kits (X = No. of optical channels)

*Not applicable for Low Profile

PRO BEAM Mini Connector Shell Kits

Type	Mount Style	Attributes	P/N (HA Alum)	P/N (OD Alum)	P/N (NiAlBz)
Plug			1828698-1	*	1828698-2
Bulkhead	D-Hole	Low Profile - Buffered Fiber	1828699-1	1828699-2♦	1828699-3
		Low Profile - 1.8mm Jacketed	*	*	*
		Sealed	1918185-1	*	1918185-2
	Sq-Flg	Low Profile - Buffered Fiber	1828826-1	*	*
		Low Profile - 1.8mm Jacketed	*	*	*
		Sealed	*	*	*

*Contact Tyco Electronics for availability.

PRO BEAM Mini Insert Kits

Description	Part Number
2 x 850 / 1300nm Dual Multimode	1754888-1
2 x 1310nm Singlemode	1588129-2
2 x 1550nm Singlemode	1588128-2
4 x 850 / 1300nm Dual Multimode	1754888-2
4 x 1310nm Singlemode	1588129-3
4 x 1550nm Singlemode	1588128-3

Ferrule Kits

Fiber Hole Size	Mode	PRO BEAM	Part Number
125 µm	SM	Mini	1754700-1
126 µm	SM	Mini	1754700-2
126 µm	MM	Mini	1754699-1

ASSEMBLY CAPABILITIES
Tyco Electronics has extensive Rugged Optic Harness capabilities. Please consult your local Tyco Electronics Sales Representative for assistance.

PRO BEAM Mini Cable Adapter Kits For Plug

Cable Diameter	Part Number
5 mm	1828700-1
5.5 mm	1828700-2
6 mm	1828700-3

Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

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Rugged Fiber Optic Products (Continued)

PRO BEAM Mini Connectors (Continued)

Performance Specifications

Optical, Multimode

Insertion Loss, Typical — 0.5 - 1.0 dB @ 1300 nm*

Optical, Singlemode Version

Insertion Loss, Typical — 0.5 - 1.0 dB @ 1310 nm*

Return Loss — > 34 dB @ 1310 nm or 1550 nm

*Against referenced lead

Mechanical

Vibration, Sinusoidal — 10 - 500 Hz, 3 directions; 0.75 mm amplitude @ 10g acceleration

Bump — 4,000 Bumps, 3 directions @ 40g acceleration

Free Fall — 500 falls on concrete; Severity 1.2 m

Coupling Endurance — 3,000 couplings

Weight — Plug — 123 grams, typical D-Hole bulkhead — 102 grams, typical

Temperature

Operational Temperature — -40°C/+85°C

Storage Temperature — -55°C/+85°C

Temperature, Cyclic — -55°C/+85°C

Humidity (Damp Heat) —95% RH

Immersion

Water — 5 m depth (plug) - 2 m (Bulkhead)

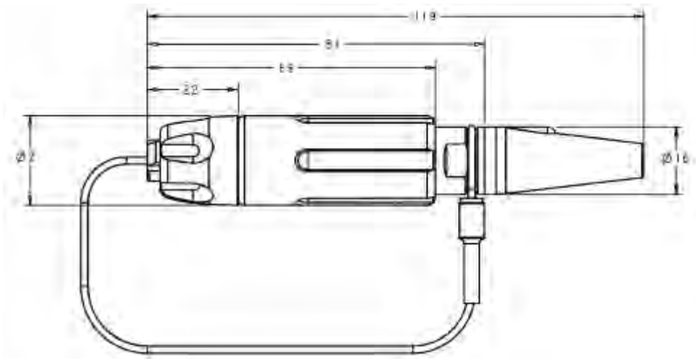
Pressure

Low Pressure — 25 kPa @ -55°C

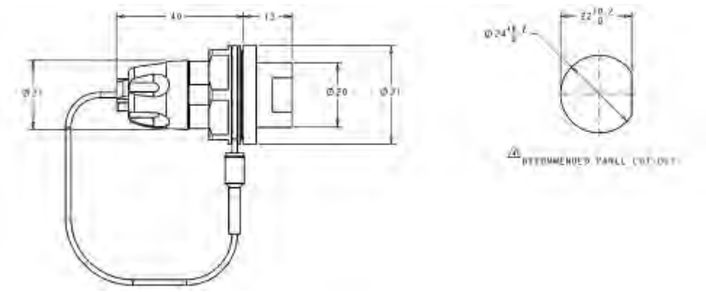
Material and Finish

Shell Alloy — Aluminum; or nickel aluminum bronze (high saline environment)

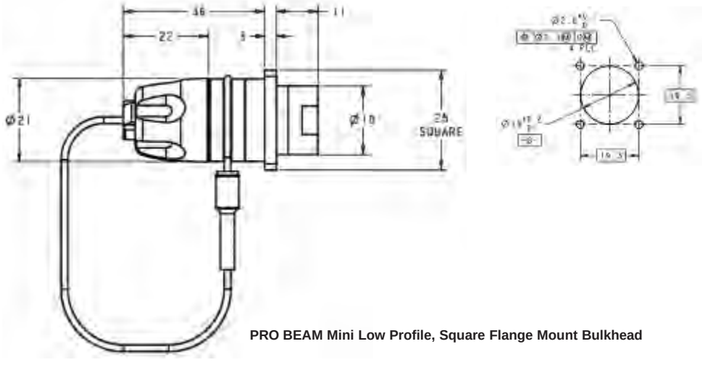
Plating (For Aluminum Shells Only) — clear hard anodized; or green chromate conversion zinc (PRO BEAM Jr. Bulkheads only)



PRO BEAM Mini Cable Connector, Plug



PRO BEAM Mini D-Hole Bulkhead



PRO BEAM Mini Low Profile, Square Flange Mount Bulkhead

3 Fiber Optic Connectors

Catalog 1308940
Revised 8-06

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Rugged Fiber Optic Products (Continued)

PRO BEAM Sr. Connectors

Performance Specifications

Optical, Multimode

Insertion Loss, Typical — 0.7 - 1.0 dB @ 1300 nm*

Optical, Singlemode

Insertion Loss, Typical — 0.8 - 1.0 dB @ 1310 nm*

Return Loss — > 34 dB @ 1310 nm or 1550 nm

*When tested with reference quality launch/receive cable assemblies.

Mechanical

Vibration, Sinusoidal — 10 - 500 Hz, 3 directions; 0.75 mm amplitude @ 10g acceleration

Bump — 4,000 Bumps, 6 directions, @ 50g acceleration

Free Fall — 500 falls on concrete; Severity 1.2 m

Coupling Endurance — 3,000 couplings

Weight — Plug — 290 grams, typical Chassis bulkhead — 150 grams, typical

Temperature

Operational Temperature — -40°C/+85°C

Storage Temperature — -55°C/+85°C

Temperature, Cyclic — -55°C/+85°C

Humidity (Damp Heat) —95% RH

Immersion

Water — 5 m depth (plug), 2 m (Bulkhead)

Material and Finish

Shell Alloy — Aluminum; or nickel aluminum bronze (high saline environment)

Plating (For Aluminum Shells Only) — clear hard anodized

Bulkhead Connector Panel Thicknesses

PRO BEAM Sr. D-Hole — 6.5 mm max.

PRO BEAM Sr. Square Flange — 8.5 mm max.

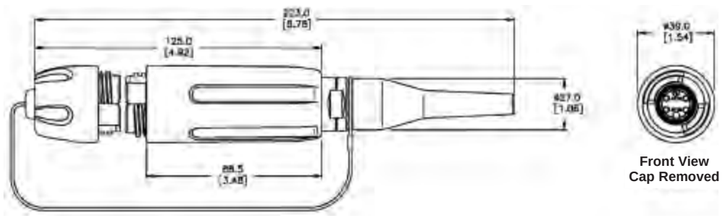
Technical Documents

Product Specifications

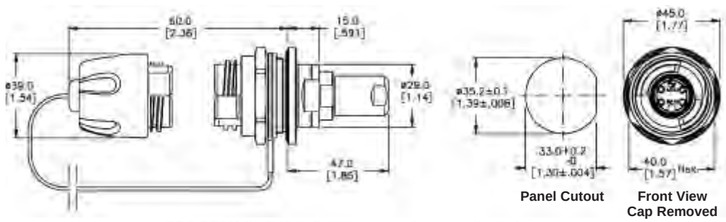
408-8799 Plug
408-8800 D-Hole Bulkhead
408-8877 Square Flange Bulkhead

Application Specification

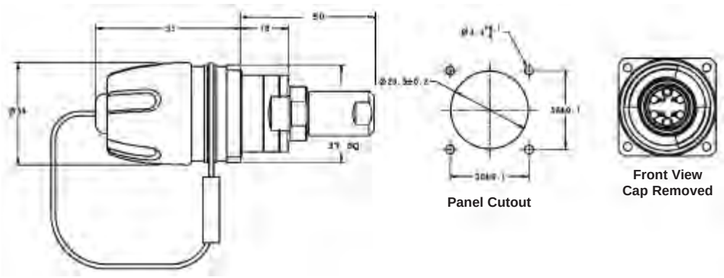
114-13122



PRO BEAM Sr. Cable Connector, Plug



PRO BEAM Sr. D-Hole Bulkhead with Standard Cable Adapter



PRO BEAM Sr. Square Flange Mount Bulkhead with Standard Cable Adapter

Please contact your local Tyco Electronics Sales Representative for Part Numbers and availability.

Catalog 1308940
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Rugged Fiber Optic Products (Continued)

PRO BEAM Sr. Connectors
(Continued)

Connector Assembly
1 Shell Kit
1 Insert Kit
1 Cable Adapter Kit*
X Ferrule Kits (X = No. of optical channels)

*Not applicable for Low Profile

Part numbers listed are Shell alloy = aluminum Plating = hard anodized. Consult Tyco Electronics for other plating/material options such as NiAlBz for Naval applications.

ASSEMBLY CAPABILITIES
Tyco Electronics has extensive Rugged Optic Harness capabilities. Please consult your local Tyco Electronics Sales Representative for assistance.

PRO BEAM Sr. Connector Shell Kits	Part Number
PRO BEAM Sr. Plug w/EPDM rubber	1754842-1
PRO BEAM Sr. D-Hole Standard Bulkhead	1754843-1
PRO BEAM Sr. Square Flange Standard Bulkhead	1754844-1

PRO BEAM Sr. Insert Kits	Part Number
2 x 850 / 1300nm Multimode	1693001-1
2 x 1310nm Singlemode	1515734-2
4 x 850 / 1300nm Multimode	1693001-2
4 x 1310nm Singlemode	1515735-1

Ferrule Kits

Fiber Hole Size	Mode	PRO BEAM	Part Number
125 µm	SM	Sr.	1515941-1
126 µm	SM	Sr.	1515941-2
126 µm	MM	Sr.	1588801-1

PRO BEAM Sr. Connector Plug & Sealed Bulkhead Cable Adapter Kits

Cable Dia. (Max.)	Part Number
5.10 .201	1515940-1
5.65 .222	1515940-3
6.20 .244	1515940-5

PRO BEAM Sr. Connector Standard Bulkhead Cable Adapter Kits*

Cable Dia. (Max.)	Style	Part Number
5.10 .201	Standard Cable Adapter	1515847-1
5.65 .222	Standard Cable Adapter	1515724-2

*Not applicable for Low Profile

Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

Technical Documents

Product Specifications
408-8857 Curing Fixtures for PRO BEAM Jr. and Sr.
408-8828 Cleaning Procedure for EB C/A's

Tooling Specifications
408-8795 Crimp Tool with Die Set for PRO BEAM Jr. and Sr.
408-10022 Die Assembly for Mini and Jr. Circular Crimps

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Rugged Fiber Optic Products (Continued)

Cable Assemblies and Accessories

Product Facts

- Ruggedized cable assemblies custom tailored for field use in harsh environments
- Heavy-duty light-weight cable reel organizes and protects connectors and cable for easy pay-out and safe storage
- Reels available up to 2000 meters
- Options for 500 meter reels include special backpack harnesses, a separate reel stand, or a combination reel and reel stand

NEW

PRO BEAM Jr. Termination Kit 1828650-1

Cleaning Kit 1828335-2

Featured Cable Assemblies

TFOCA to PRO BEAM Jr. Cable Assy
1828536-1 ♦

LPBHD w/1.8mm cable
1828454-1 ♦

Plug to Plug (100 meters)
6754475-2

Typical Reels and Reel Stands for Field-Deployable Cable Assemblies

1515900-1

Tactical Reel/Drum Options

Cable Reels

Reel Capacity (Random Lay)

Cable Diameter 5.0mm	Cable Diameter 5.5mm	Notes/Description	Part Number
225 M	186 M	Reel & Reel Stand Combination Reel can be detached from stand without tools	1515900-1
297 M	247 M	Reel*	1754515-1
570 M	462M	Reel*	1754515-2
998M	816M	Reel*	1754515-3
1271 M	1052 M	Reel*	1754515-4

* See Accessories options below

ASSEMBLY CAPABILITIES
Tyco Electronics has extensive Rugged Optic Harness capabilities. Please consult your local Tyco Electronics Sales Representative for assistance.

Backpack with Reel

Reel with Stand "Static Frame"

Backpack Harness

Accessories

Description	Reel Diameter	Part Number
Backpack	370mm Dia. Reel	1754516-1*
Backpack	460mm Dia. Reel	1754516-2*
Backpack	510mm Dia. Reel	1754516-3*
Static Frame	500mm Dia. Max	1754517-1*
Static Frame	700mm Dia. Max	1754517-2*

* Reel must be ordered separately.

Note: For lower cost alternative options. Please contact your local Tyco Electronics' Sales Representative or Tyco Electronics Product Information Center at 1-800-522-6752.

Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

TFOCA-II is a registered trademark of Amphenol Fiber Systems International.

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Rugged Fiber Optic Products (Continued)

Optical Test Set for Fiber Optic Cables — Designed for harsh environments

Product Facts

- Especially designed to support the installation of optical links in the field
- Able to test both cable drums and entire links
- Powered by batteries with high autonomy
- Suitable for diagnostics and construction teams
- Easy to use, ergonomic, rugged design
- Suitable for cable length up to 10 km
- Supports up to 4 fibers per cable with various types of connectors

Diagnostic Features

Power Meter

The optical power from any source can easily be measured with the power meter function.

Optical Source

A continuous optical signal is generated and transmitted with selectable output power.

Drum Test / Cable Test

Test of an entire cable drum with automatic good/bad indication. The test of an entire cable is realized with a 2nd KPG-opt or a loop connector.

Test Frames (optional)

The KPG-opt can generate specific test frames as used in optical networks and LOS systems.

Optical Tester

Description	Part Number
850nm 38999 III Size 11 Optical Test Kit	1918016-1
850/1300nm PRO BEAM Jr. Optical Test Kit	1918016-2

For Singlemode and additional wavelength testers, contact your local Tyco Electronics Sales Representative.

Protective Case
1918082-1

Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

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Rugged Fiber Optic Products (Continued)

Tactical Field Deployable Fiber Optic Cable for Extreme Environments (Metallic for Rodent Proof)

The Rochester Corporation

1- 4 Fiber Singlemode

Technical Data:

Attenuation	≤ 0.4 dB/km @ 1310 nm / ≤ 0.25 dB/km @ 1550 nm
Diameter	3.76 mm
Weight	24 kg/km
Recommended Bend Radius	13.2 cm
Breaking Strength	3.1 kN

1- 4 Fiber Multimode – 50 µm

Technical Data:

Attenuation	≤ 3.2 dB/km @ 850 nm / ≤ 1.0 dB/km @ 1300 nm
Diameter	3.76 mm
Weight	26 kg/km
Recommended Bend Radius	13.2 cm
Breaking Strength	3.3 kN

1- 4 Fiber Multimode – 62.5 µm

Technical Data:

Attenuation	≤ 3.0 dB/km @ 850 nm / ≤ 1.0 dB/km @ 1300 nm
Diameter	3.76 mm
Weight	26 kg/km
Recommended Bend Radius	13.2 cm
Breaking Strength	3.3 kN

Non-Metallic Tactical Field Deployable Fiber Optic Cable

Product Facts

- **All terrain field deployable cable, up to 4 fibers, singlemode or multimode**
- **Developed for deployment under the most demanding conditions**
- **Tight buffered fibers are protected by Aramid yarns and a tough ruggedized polyurethane sheath**
- **Tested in accordance with DEF STAN 60-1 (PART 0) and MILPRF 85045**
- **Flexible, water resistant, high crush resistant, and lightweight,**
- **Designs available to be resilient against radiation exposure**

Other fibers (i.e. Polyimide, Silicon buffer, Carbon coated, radiation hardened, etc.) are available upon request.

Contact Tyco Electronics or your local Tyco Electronics Sales Representative for part numbers, pricing, and availability.

Mil-Standard Distribution Cable - 1 Fiber Singlemode and Multimode

Technical Data:

Attenuation	≤ 0.5 dB/km @ 1310nm / ≤ 0.5 dB/km @ 1550nm
Diameter	43.0mm - 4.0mm
Weight	15 kg/km
Minimum Bending Radius	32mm
Crush Resistance	440N/cm
Operating Temperature	-55° C to +85° C

Mil-Standard Distribution Cable - 2 Fiber Singlemode

Technical Data:

Attenuation	≤ 0.5 dB/km @ 1310nm / ≤ 0.5 dB/km @ 1550nm
Diameter	5.0mm
Weight	31 kg/km
Minimum Bending Radius	40mm
Crush Resistance	440N/cm
Operating Temperature	-55° C to +85° C

Mil-Standard Distribution Cable - 4 Fiber Singlemode

Technical Data:

Attenuation	≤ 0.5 dB/km @ 1310nm / ≤ 0.5 dB/km @ 1550nm
Diameter	5.5mm
Weight	42 kg/km
Minimum Bending Radius	44mm
Crush Resistance	440N/cm
Operating Temperature	-55° C to +85° C

Mil-Standard Distribution Cable - 2 Fiber Multimode

Fiber Type	50µm/125µm and 62.5/125
Attenuation	≤ 3.0 dB/km @ 850nm / ≤ 1.0 dB/km @ 1300

Mil-Standard Distribution Cable - 4 Fiber Multimode

Fiber Type	50µm/125µm and 62.5/125
Attenuation	≤ 3.0 dB/km @ 850nm / ≤ 1.0 dB/km @ 1300

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Rugged Fiber Optic Products (Continued)

"Mini" Expanded Beam for Harsh Environments

Product Facts

- **Available in shell size 11, housed on D38999 Series III style shells for harness applications**
- **Multiple options available for backshells. Consult your local Tyco Electronics Sales Representative**

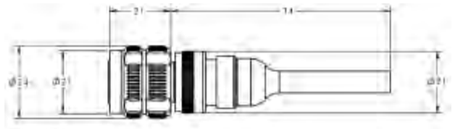
Standard Material and Finish

Shell Alloy — Aluminum

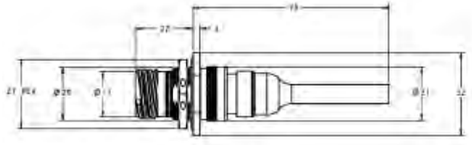
Plating — Nickel & green chromate

*Refer to customer drawing for dash number designation

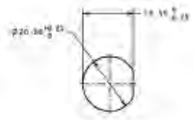
For part number details and plating options, contact your local Tyco Electronics Sales Representative.



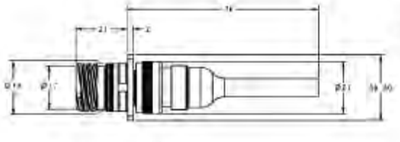
Plug Shell Kit



D-Hole Receptacle Shell Kit



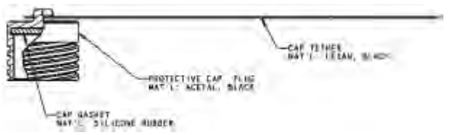
Receptacle Panel Cut-Out (shell size 11) per MIL-DTL-38999K, figure 11



Square Flange Receptacle Shell Kit

ASSEMBLY CAPABILITIES

Tyco Electronics has extensive Rugged Optic Harness capabilities. Please consult your local Tyco Electronics Sales Representative for assistance.



38999 Plug Cap
1918024-1

38999 Receptacle Cap
1918025-1 = Jam Nut Receptacle
1918025-2 = Square Flange Receptacle

Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

Catalog 1308940
Revised 8-06

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Rugged Fiber Optic Products (Continued)

Expanded Beam Avionics-Related Standards and Specifications for ARINC 600, 664, 763 and 801

ARINC 664 — Aircraft Data Network

Tyco Electronics' ARINC Connectors with Mini-Expanded Beam inserts will meet/exceed all 100 Base-FX Ethernet LAN applications

ARINC 763 — Avionics Network Server System — Tyco Electronics' ARINC 600 Connectors are designed to meet/exceed 100 Base-FX Ethernet LAN applications.

Network Server Unit (NSU) — can use ARINC 600 Size 1 connector with up to 8 Expanded Beam fiber optic channels (two Mini-Expanded Beam inserts in cavity C)

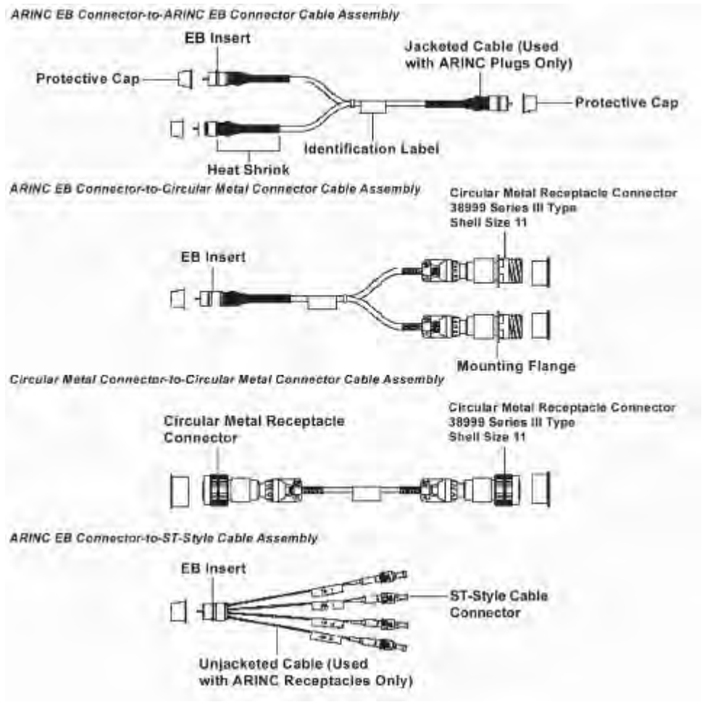
Server Interface Unit (SIU) — can use ARINC 600 Size 3 connector with up to 16 Expanded Beam fiber optic channels (four Mini-Expanded Beam inserts in cavity F)

Integrated Network Server Unit (INSU) — can use ARINC 600 Size 3 connector with up to 16 Expanded Beam fiber optic channels (four Mini Expanded Beam inserts in cavity F)

ARINC 801 — Fiber Optics Working Group

Tyco Electronics provides a single reference point for Flight Level Optics that are multi-sourced.

Typical Assemblies for In-Flight Network Applications



Typical Assemblies

ASSEMBLY CAPABILITIES

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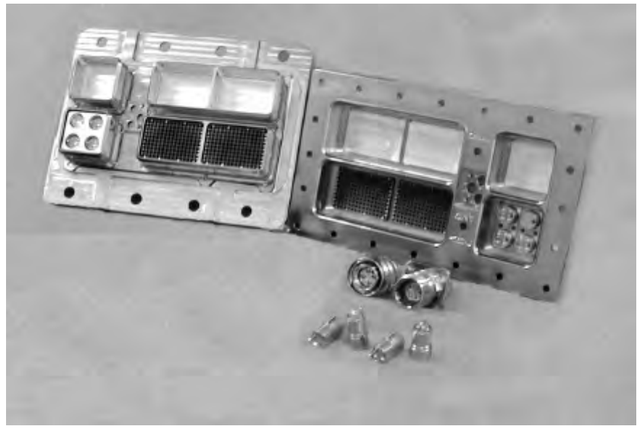
Rugged Fiber Optic Products (Continued)



ARINC 600 Insert Holders for Mini-Expanded Beam Contacts

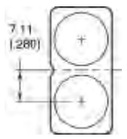
ARINC 600 AND 404

Product Facts

- For use in 100 base-FX Ethernet LAN applications per ARINC 664 and ARINC 763
- Insert holders designed to ARINC 600, Supplement 13 or to specific customer needs for Mini Expanded Beam inserts
- Drop-In Insert Holders utilize Standard ARINC 600 Retainers
  - Hard Stop on Plug Side
  - Spring-Loaded Stop on Receptacle Side
  - Captive Hardware
- Facial Sealing — Optional
  - Bonded to Receptacle Block Mating Face
  - Raised Collar Seal around Optics Insert compresses against Chamfer on Plug Block Mating Face

Size 1
Power Cavities

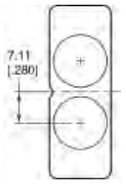
ARINC 600, 1 Position
1MP



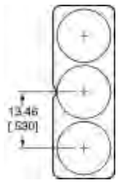
ARINC 600, 2 Position
2MP

Size 1
Signal Cavities

ARINC 600, 1 Position
1MS



ARINC 600, 2 Position
2MS



ARINC 600, 3 Position

ASSEMBLY CAPABILITIES
Tyco Electronics has extensive Rugged Optic Harness capabilities. Please consult your local Tyco Electronics Sales Representative for assistance.

See next page (3-18) for Size 2 / 3 Power and Signal Cavities

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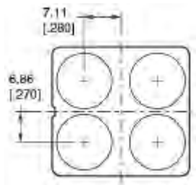
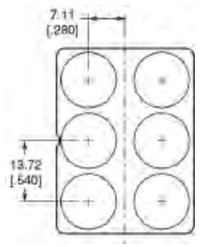
Rugged Fiber Optic Products (Continued)

Size 2 / 3
Power and Signal Cavities

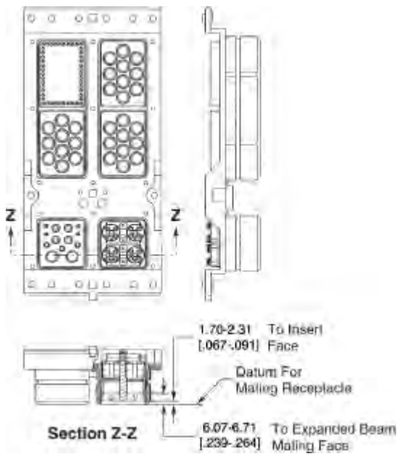


ARINC 600, 4 Position
4MP

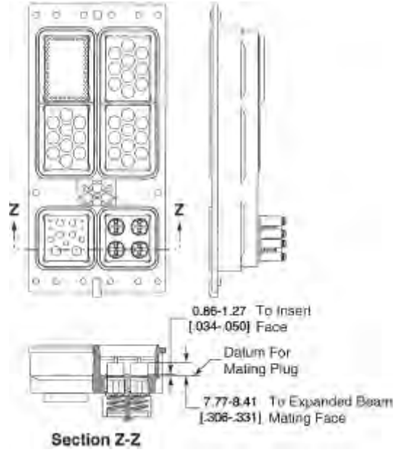


ARINC 600, 6 Position
6MS

ARINC 600 Insert Holders for Mini-Expanded Beam Contacts



Typical Layout for Plug



Typical Layout for Receptacle

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Rugged Fiber Optic Products (Continued)

Comparative on Expanded Beam Inserts

Comparative on Expanded Beam Inserts' weight and Insertion Forces when applied to an ARINC housing

- ARINC 600 connector mated pair size 2 = 440 grams (without copper contacts)
- ARINC style Mini and Junior size Expanded Beam inserts = 5 pounds insertion force each when applied to the Rack and Panel ARINC Connector inserts
- Signal Cavity Optical Holder insert (i.e.: holds up to six mini inserts with four fiber ball lenses each or up to 24 fibers each insert set) = @ 30 grams
- Power Cavity Optical Holder insert (i.e.: holds up to four mini inserts with four fiber ball lenses each or up to 16 fibers each insert set) = @ 20 grams
- Insert mated pair PRO BEAM Jr. Connector insert set = @ 41.79 grams
- Insert mated pair PRO BEAM mini Connector insert set = @ 16.17 grams
- Fiber = single fiber ≤ 4 kg / km
- Fiber = four fiber jacketed with a support member ≤ 24 kg / km
- Static spring force per mated Expanded Beam insert pair = 5 lbs.

LuxCis Optical Termini Notes

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Sealed Circular LC ODVA Notes

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Rugged Fiber Optic Products (Continued)

LuxCis Optical Termini

Product Facts

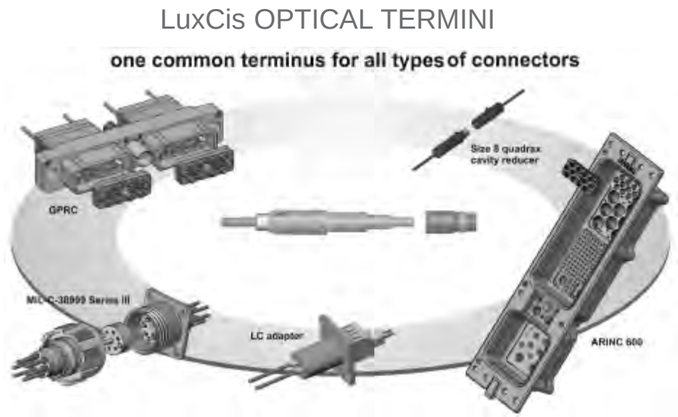
- **Optical termini for use with GPR, ARINC 600, circular MIL-DTL-38999 connectors**
- **Industry Standard 1.25mm ceramic ferrule**
- **Compatible with 1.5-2.2mm Tight jacket and loose tube cable construction:**
  - **MT - Tight jacket cable**
  - **ML - Loose tube cable**
- **SM / MM versions**

Materials

Housings — Nickel Plated Copper
Ferrule — Zirconia
Spring — Stainless Steel
Crimp Sleeve — Nickel Plated Copper
Protective Cover — Silicone

Optical Performance

Singlemode, 1310nm/1550nm (UPC):
Attenuation, Mean — 0.15dB
Return Loss — > 50dB
Multimode, 850nm/1310nm:
Attenuation, Mean — 0.10dB
Return Loss — > 20dB



Mechanical / Environmental Performance

Test Description	Standard	LuxCis Optical Termini in GPR A & B Connector	LuxCis Optical Termini in 38999 Connector	LuxCis Optical Termini in ARINC 600 Connector
Thermal Shock	SAE-AS-13441 met 1003.1	-55C /+100C	-55C /+100C	-55C /+100C
Temperature Life	TIA/EIA 455-20A	500h @ +100C	500h @ +100C	500h @ +100C
Vibration	TIA/EIA 455-11	8h/axis 3.8g²/Hz 43 G rms	8h/axis 3.8g²/Hz 43 G rms	8h/axis 0.2g²/Hz 16.4 G rms
Shock	TIA/EIA 455-14A	300 G - 3ms	300 G - 3ms	50G - 11ms
Mate/Unmate (GPR/ARINC 600)	SAE-AS-13441 met 2016	100 Cycles	N/A	100 Cycles
Mate/Unmate (38999)	TIA/EIA 455-21A	N/A	500 Cycles	N/A
Maint. Aging	SAE-AS-13441 met 2002-1	10 Cycles	10 Cycles	10 Cycles
Salt Spray	SAE-AS-13441 met 1001.1 cond C	96 hr	500 hr	48 hr
Cable Ret. (1.8mm)	SAE-AS-13441 met 2009-1	68N	68N	68N
Humidity (GPR/38999)	TIA/EIA 455-5 met B7A	10 cycles / 24h 90% RH -25C/+65C	10 cycles / 24h 90% RH -25C/+65C	N/A
Humidity (ARINC 600)	TIA/EIA 455-5 met B	N/A	N/A	10 cycles / 24h 90% RH -25C/+65C
Altitude Imm.	TIA/EIA 455-15	10,000 ft (69.6kPa)	10,000 ft (69.6kPa)	10,000 ft (69.6kPa)

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Rugged Fiber Optic Products (Continued)

LuxCis Optical Termini
(Continued)

There are three types of LuxCis Optical Termini available dependent upon cable structure.

Tyco Electronics has multiple connector types/families available for the LuxCis Optical Termini System.

These are:

- **General Purpose Rectangular Connectors**
  - **F5 & F12 Inserts**
- **MIL-DTL-38999 connectors**
  - **13-04, 15-06, 21-16**
- **ARINC 600**
  - **F12 combinations and F36**
- **Quadrax Cavity Reducers (see chart at right)**
- **Motherboard & Daughtercard Solutions**

Connector Options:

For part numbers, details, and / or additional connector types and arrangements, contact your local Tyco Electronics Sales Representative.

ASSEMBLY CAPABILITIES

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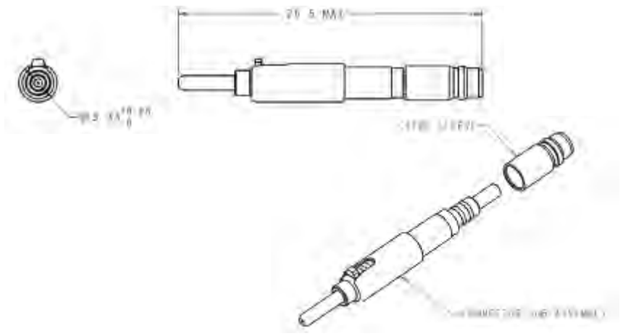

LuxCis Optical Termini Part Numbers

Cable Dia.	Cable Structure ML (loose & tight) MT (ultra tight)	S/M Fiber 125,3 µm PC/UPC	S/M Fiber 125,3 µm APC	M/M Fiber 128 µm PC
0.9mm Buffer	—	*	*	*
1.5 - 2.2mm	ML	1918614-1	1918616-1	1828199-1
1.5 - 2.2mm	MT	1918615-1	1918617-1	1828200-1

Consult your local Tyco Electronics Sales Representative for additional options.
* Contact Tyco Electronics for availability.

Accessories	Part Number
Dust Cap (bag of 10)	1828221-1

Size 8 Quadrax	Part Number	LuxCis Cavity Reducer
Pin Quadrax adapter for LuxCis™ termini in Quadrax FR type cavity	1757727-1	Quadrax cavity reducer (FR/FR) for receptacle shell
Pin Quadrax adapter for LuxCis™ termini in Quadrax RR type cavity	1757710-1	Quadrax cavity reducer (RR/RR) for receptacle shell
Socket Quadrax adapter for LuxCis™ termini in Quadrax RR type cavity	1757711-1	Quadrax cavity reducer (RR/RR) for plug shell

Cable Structure

	Loose Structure	Tight Structure	Ultra Tight Structure
Movement between fiber & 900 µm buffer	Yes	No	No
Movement between 900 µm & cable jacket	Yes	Yes	No

Adapters

Type	Version	Alignment Sleeve	Part Number	Dim.
LuxCis Optical Termini to LuxCis Optical Termini	Simplex Bulkhead Feedthrough Type	Ceramic Zirconia	1828996-1	Fig. 1
LuxCis Optical Termini to LuxCis Optical Termini	Simplex Straight	Ceramic Zirconia	1828997-1	Fig. 2
LuxCis Optical Termini to LC	Simplex LC Panel Cutout	Ceramic Zirconia	1828979-1	Fig. 3
LuxCis Optical Termini to LC	Duplex LC Panel Cutout	Ceramic Zirconia	1828980-1	Fig. 4
LuxCis Optical Termini to LC	Duplex MIL-DTL-38999 Panel Cutout	Ceramic Zirconia	1828995-1	Fig. 5

Tools

Description/Function	Part Number
Metal Extraction Tool (M81 969/1-03)	91066-3
Plastic Extraction Tool (M81 969/1403)	M81969/14-03
Daniels Right Angle Insertion Tool	DAK83-16*
Daniels Right Angle Removal Tool	DRK83-16*

* Contact Daniels Manufacturing

Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

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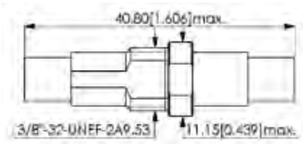
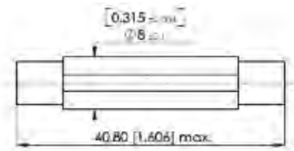
Rugged Fiber Optic Products (Continued)

NEW

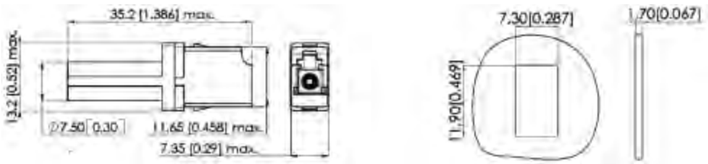
LuxCis Optical Termini Adapter Dimensions



Terminus to Terminus Bulkhead Feedthrough



Terminus to Terminus Straight



Terminus to LC Simplex

Terminus to LC Duplex, LC Panel

Terminus to LC Duplex, MIL-DTL-38999 Panel Cutout

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Rugged Fiber Optic Products (Continued)

NEW

LuxCis Optical Termini Termination Kit

1828644-1

Most of the tools included in the Termination Kit are commonly used in the fiberoptic industry (strippers, cutting pliers and all accessories for fiber and cable preparation). The items in the table below are specially made for the LuxCis Optical Termini System. Their use is highly recommended to achieve mechanical and optical performances.

Description	Qty
Ceramic scissors	1
Cutting pliers for aramid members (HS 6000)	1
T-stripper outer jacket stripper	1
Miller primary stripper (for coating 900µm)	1
Waste container	1
Inner ferrule insertion and shaping tool	1
Alcohol dispenser	1
Bag of 6 353 ND epoxy resin	1
Resin injector	1
Pack for resin injector (capillaries)	1
Crimping tool	1
Curing oven	1
Scoring blade	1
Bag of 10 abrasive strips 12µm	1
Bag of 10 cleaning pipes 1.25 mm	1
Bag of 10 cleaning sticks 1.25 mm	1
Manual Polishing tool (standard LC)	1
Soft rubber polishing base	1
Bag of 10 polishing 3 µm films (Alumina)	1
Bag of 10 polishing 1 µm films (Alumina)	1
Bag of 10 polishing 0.3 µm films (Alumina)	1
Bag of 6 pockets cleaning papers	1
Microscope X100	1
Resin applicator	1
Metal insertion and extraction tool ((Mil M81 969/1 -03)	1
Plastic insertion and extraction tool (Mil M81 969/14-03	1
Hexagonal key 5/64 inch(2mm) / flats	1

Other accessories available include ruler, tweezers, cleaning tips, roller adhesive tape, moss cable support, goggles, thermometer, permanent ink markers. Necessary material not included in the kit: Alcohol, canned air, and clean cloth.

NEW

LuxCis Optical Termini Service Tool Kit (Inspection, testing & cleaning) 1828335-1

LuxCis Optical Termini Service Tool Kit (Cleaning only) 1828335-2

LuxCis Optical Termini Service Tool Kit (Testing only) 1828335-3

LuxCis Optical Termini Service Tool Kit (Hand Held Digital Probe Kit) 1828335-4

Tool Kit Contents

Item #	Comp Part Number	Description	-1	-2	-3	-4
1	1278540-1	Soft Carry Bag	1	—	—	—
2	1754767-1	200x Microscope	1	—	—	—
3	1754765-1	LC Microscope adapter	1	—	—	—
4	6374613-5	LC - SC 50/125 cable assembly	2	—	—	—
5	6374615-5	LC - SC 62.5/125 cable assembly	2	—	—	—
6	1828355-1	1.25mm swab	2	2	—	—
7	1828354-1	Connector Cleaning Pad	2	5	—	—
8	1828349-1	Optical Loss Test Set	1	—	1	—
9	1828350-1	OLTS 1.25 mm detector cap	1	—	1	—
10	1828352-1	Visual Fault Locator	1	—	1	—
11	1828353-1	VFL 1.25 mm Adapter	1	—	1	—
12	1828465-1	Label, Service Kit	1	—	1	—
13	1918222-1	Inspection, Hand Held Digital Probe Kit	—	—	—	1
14	1918223-1	1.25 mm Adapter, Digital Probe	—	—	—	1

-1 inspection, cleaning & testing
-2 cleaning
-3 testing
-4 Hand Held Digital Probe Kit

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Rugged Fiber Optic Products (Continued)

Sealed Circular LC ODVA

Product Facts

- IP67 rated to ensure protection from dust and water immersion
- LC connector qualified to Telcordia GR-326 and TIA/EIA 568B.3
- Temperature range of –408C to 858C
- Bayonet-style mechanical lock
- Flame retardant materials per UL 94 V-0
- Dual mounting bulkhead design
- Singlemode and multimode fiber
- LC to LC internal to the box Jumpers
- ODVA Compliant Plug to X interface on tactical with break out
- ODVA Compliant Plug to Plug on tactical cable
- Build to customer need

Applications

The LC ODVA Compliant is ideal for:

- Harsh environments where chemicals, corrosive gases and liquids are commonplace
- Inside and outside industrial plant and equipment that interface with industrial Ethernet networks
- Remote interface applications such as towers and antennae as well as FTTX in PON and at the home applications
- Mobile routers and internet hardware

ASSEMBLY CAPABILITIES
Tyco Electronics has extensive Rugged Optic Harness capabilities. Please consult your local Tyco Electronics Sales Representative for assistance.

Plug Part Numbers:
1828618-1 (Multimode)
1828618-2 (Singlemode)

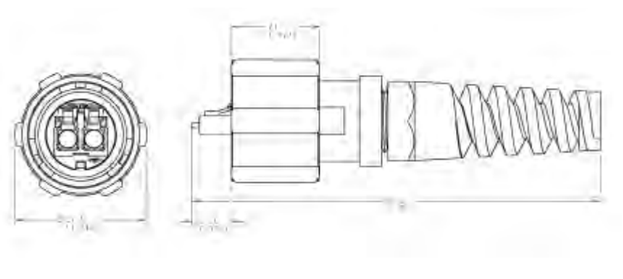
Receptacle Part Numbers:
1828619-1 (Multimode)
1828619-2 (Singlemode)

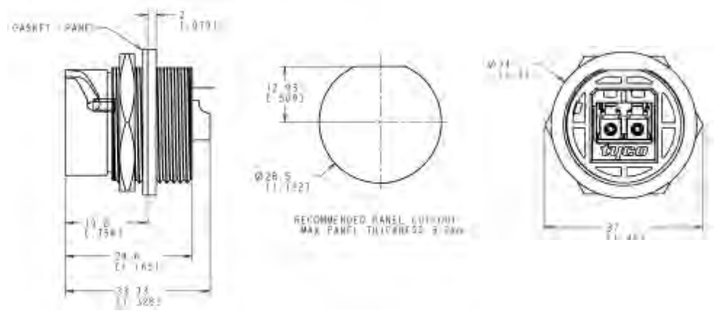
Featured Assembly Base Part Numbers:

1828708 ♦	1828709 ♦
1828710 ♦	1878711 ♦

Plug & Receptacle Cap Part Numbers:

Plug Cap	1828740-1
Receptacle Cap	1918177-1





Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

Catalog 1308940
Revised 8-06

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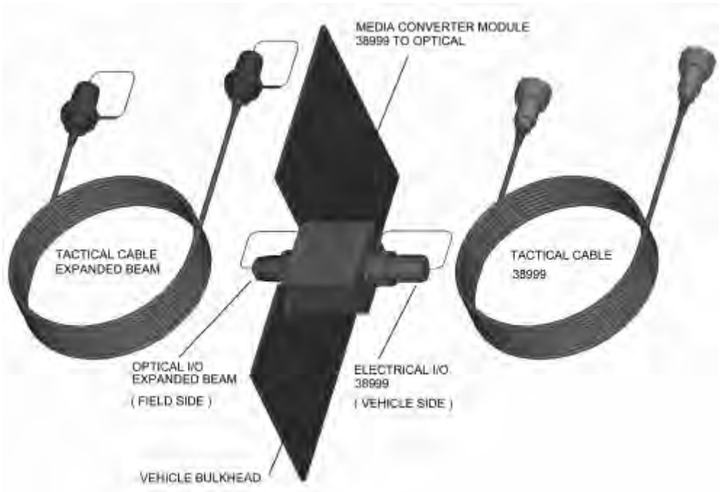
Rugged Fiber Optic Products (Continued)

Rugged Media Converter & Ethernet Link Extender Solutions



Harsh Environment Optical Media Converter Assemblies allowing blind mate field applications over one, two, or four fibers

Tyco Electronics offers solutions for Harsh Environment applications of Ethernet Media Converters.

This page demonstrates Tyco Electronics' capabilities for Advanced Optical Modules. These include Fast, Gigabit, and Ethernet Link Extenders.

For additional Advanced Optical Modules, see Fiber Management & Packaged Solutions, Catalog 1307895, Section 3.

Contact your local Tyco Electronics Sales Representative with your specific design needs.

Design Objectives

Specifications	Results
Standard	IEEE802.3, IEEE802.3u Ethernet @ 10/100 Mb/s
Data Rates	10 and 100 Mb/s auto negotiation (option to force 10 Mb/s for legacy systems
Duplex Mode	Full or half-duplex auto-negotiation and N-Way support
Max. Forward Rate	14,880 packets per second (pps) @ 10 Mb/s, 148,800 pps @ 100 Mb/s
Fiber Connector	Multimode
Fiber Working Range	TBD
Optical Budget	TBD
Optical Wavelength	Multimode
Emissions	Complies with FCC Class A and CE Class A
Safety	UL, CE
Temperature Range	-40° - 85°C with humidity 10% to 90% non-condensing
Dimensions	Ø 51mm [2.0"] x 195mm [7.7"] from cap to cap Ø 51mm [2.0"] x 168mm [6.6"] x 194mm [7.6"] for 90 assembly
Power Consumption	TBD
Power	5VDC
Qualification	Complies with MIL-STD-810D environmental requirements

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Wavelength Division Multiplexer and Demultiplexer Products

Singlemode and Multimode Lensed WDM's

Features

- High isolation
- Wide bandpass
- Excellent reflectance
- Small footprint

Applications

- Two-way, single-fiber video links
- Instrumentation

Available Collateral

- Customer Drawings

Customizable Features

- Lead Lengths
- Connector Type
- Labels
- Optical Specifications

Tyco Electronics' Multiplexers allow use of a single fiber for simultaneous transmission of two signals of different wavelengths.

Tyco Electronics' Demultiplexers separate the combined wavelengths from the single fiber into individual fibers. The universal MUX/DEMUX's are available for multimode as well as singlemode applications.

Through the use of high-quality dichroic coatings, which act as bandpass filters, numerous wavelength combinations from 800-1600 nm can be accommodated.

Unlike the narrow bandpass of fused multiplexers, the minimum bandpass of these devices around the central wavelength is ±50 nm. This feature makes these multiplexers ideal for use in broadband communication applications.

These devices are unique in that their optical performance is independent of polarization effects of the light source.

The 11.9 mm [7/16 inch] thick encapsulated devices with monolithic lens structures tolerate vibration and shock; their low profile permits easy printed circuit board mounting.

Specifications — Multimode

Insertion Loss (per FOTP-180) —

	Maximum
Without connectors	1.3 dB
With 2 connectors	2.3 dB

Change in Transmission over operating temperatures +/- 0.5dB

Directivity (50/125, 62.5/125 only) —
Minimum: >45 dB

Wavelength Bandpass (nm) —
Minimum: 100 nm

Isolation —
35 dB Minimum

Fiber Types — 50/125 and 62.5/125

Specifications — Singlemode

Insertion Loss (per FOTP-180) —

	Maximum
Without connectors	1.3 dB
With 2 connectors	2.3 dB

Change in Transmission over operating temperatures +/- 0.5dB

Directivity —
Minimum: >55 dB

Wavelength Bandpass (nm) —
Minimum: 100 nm

Return Loss (Reflectance) —

Port 1	≤ –40 dB
Port 2	≤ –55 dB
Port 3	≤ –55 dB

Without connectors

Isolation —
35 dB Minimum

Polarization Sensitivity — <0.1 dB

Fiber Types — (Corning SMF-28)

Temperature

Multimode —
–40°C to +65°C (Operating)
–40°C to +75°C (Storage)

Singlemode —
–20°C to +60°C (Operating)
–20°C to +60°C (Storage)

Weight — 42 grams [1.5 oz.]

Pigtail — 0.5 meter, [3mm] OD cable, 900 µm OD cable.

Terminations and connectors available on request.

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Singlemode and Multimode Lensed WDM's (Continued)

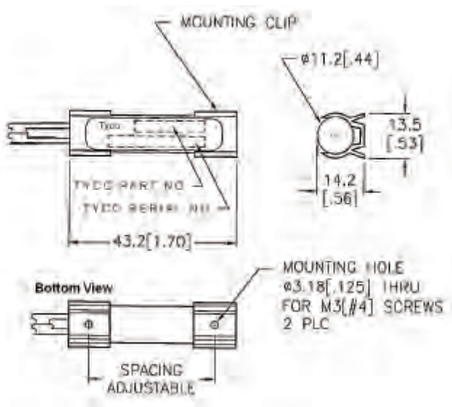
Part Numbers

Fiber	.5m Cable Length	Connector	850/1310 nm	1310/1550 nm
	3mm	ST	5099102-2	5099105-2
50/125 Multimode	3mm	None	5099108-1	—
	900µm	ST	9-5099102-2	—
	900µm	None	9-5099108-1	9-5099111-1
62.5/125 Multimode	3mm	ST	5099102-3	5099105-3
	3mm	None	5099108-2	—
	900µm	ST	9-5099102-3	9-5099105-3
	900µm	None	9-5099108-2	9-5099111-2
Singlemode	3mm	FC/APC	—	5099717-4
	3mm	None	—	5099717-5
	3mm	FC/UPC	—	5099717-6
	3mm	ST/UPC	—	5099717-7
	3mm	SC/UPC	—	5099717-8
	900µm	FC/APC	—	9-5099717-4
	900µm	None	—	9-5099717-5
	900µm	FC/UPC	—	9-5099717-6
	900µm	ST/UPC	—	9-5099717-7
	900µm	SC/UPC	—	9-5099717-8

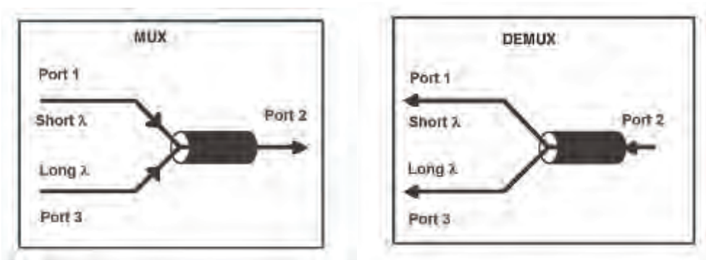
Note: Mux specific versions available when higher return loss required. Contact your local Tyco Electronics Sales Office.

Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

For custom mounting options, please contact your local Tyco Electronics' Sales Representative.



Application



3

Fiber Optic Connectors

Catalog 1308940
Revised 8-06

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Switches

Ruggedized Multimode Switches

Refractive Plate Switch 2x2 By-pass Configuration

Part Number 6588871-1

Product Facts:

- **No optical path interruption @200 G's for 8 ms**
- **Successfully passed MIL-S-901D (Navy) Heavyweight Shock Test (Barge Test)**
- **Fiber type 62.5/125um multimode**

Tyco Electronics' "Ruggedized" Refractive Plate Switch is a multimode optical switch that is capable of withstanding a 200 G shock with a duration of >8ms without interruption of the signal path.

This switch is designed for extreme environments that require absolute product quality on optical installations and optical signal integrity.

Specifications

Operating Temperature Range — -30° to +85° C

Storage Temperature Range — -40° to +85° C

Durability — >1,000,000 cycles

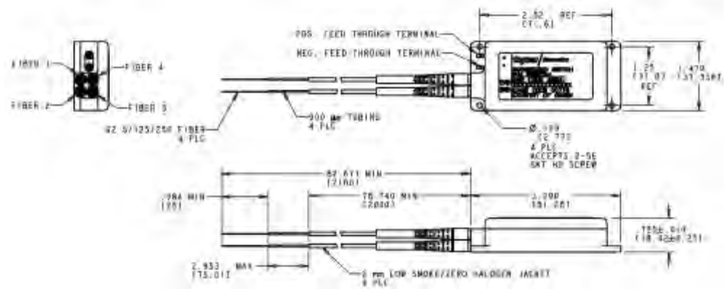
Minimum Actuation Voltage — 4.75 V

Maximum Actuation Voltage — 5.25 V

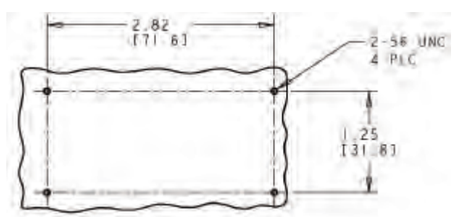
Actuation Current at Typical — 5.0 V

Actuation Voltage — 100mA (maximum)

Product Dimensions:



NOTE
Dimensions are Inches over millimeters



Recommended Mounting Layout

Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

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Switches (Continued)

Multimode
1 x 2 SPDT Switch
Dual 1 x 2 DPDT Switch
2 x 2 Bypass Switch

Product Facts

- **Low profile**
- **Utilizes pivoting mirror**
- **Wide wavelength range**
- **Low insertion loss**
- **Excellent repeatability**
- **Environmentally stable**
- **Shock and vibration resistant**
- **Board or chassis mounting**
- **Optical & electrical leads exit from one end for easy cable routing**

Tyco Electronics Low Profile Fiber Optic Switches are miniature, board mountable devices that permit the switching of an optical signal from one fiber to another. Switching is accomplished by a slight pivoting motion of a spherical mirror which reflects the optical signal to the appropriate fiber. This patented imaging technology provides very low optical loss.

Tyco Electronics' Fiber Optic Switches can be terminated with any Tyco fiber optic connector, and they are available in the following configurations:

- **1 x 2 SPDT Switch**
- **Dual 1 x 2 DPDT Switch**

Tyco Electronics' SPDT and DPDT Switches permit the transfer of optic signals from an input fiber to either of two output fibers. Switches are applied to the positive terminal. The switch reverts to its original state when power is removed.

- **2 x 2 Bypass Switch**

Tyco Electronics' Bypass Switches provide bypass protection for fiber optic ring networks. They also provide bypass protection for fiber optic ring networks per IEEE 802.5 and ANSI FDDI standards.

A self-test path permits testing the node's transmitter against its receiver when the switch is in the bypass mode. This transmitter - receiver path is attenuated to prevent saturation of the receiver, while maintaining minimal light loss in the bypass path.

Specifications		
Configuration	**1 x 2 and Dual 1 x 2**	**2 x 2 Fully Reversing Bypass**
Switching speed	10 milliseconds maximum	10 milliseconds maximum
Operating wavelength	750–1450 nanometers	750–1450 nanometers
Insertion loss at 1300nm	0.8 dB max. per FOTP-34, Method A2	0.8 dB max. per FOTP-34, Method A2
		5 dB on loopback path max
Crosstalk	≤45 dB per FOTP-42	≤45 dB per FOTP-42
Switch driver	5 V at 80mA max.	5 V at 80mA max.
Drop In/Drop Out	Drop In: 4.0 V minimum	Drop In: 4.0 V minimum
Voltage	Drop Out: 0.5 V minimum	Drop Out: 0.5 V minimum
Fiber types	Graded index 50/125, 62.5/125	Graded index 50/125, 62.5/125
	(others available upon request)	(others available upon request)
Lead length	1 meter	1 meter
Temperature range	Operating –10°C to +65°C per FOTP-3, C2	Operating –10°C to +65°C per FOTP-3, C2
	Storage –30°C to +70°C per FOTP-188, 4	Storage –30°C to +70°C per FOTP-188, 4
Connector styles	ST Style	ST Style
	(others available upon request)	(others available upon request)
Electrical interface	Bent pins for PCB soldering,	Bent pins for PCB soldering,
	straight pins for soldering,	or straight pins for soldering, or
	AMP modular connector	AMP modular connector
Durability	>1 million cycles	>1 million cycles
Weight (unconnectorized)	<1 oz.	<1 oz.

Note: IL is for unconnectorized product

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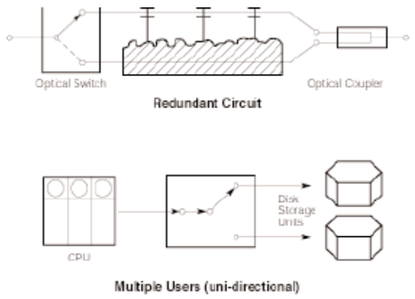
Switches (Continued)

Multimode
1 x 2 SPDT Switch
Dual 1 x 2 DPDT Switch
2 x 2 Bypass Switch (Continued)

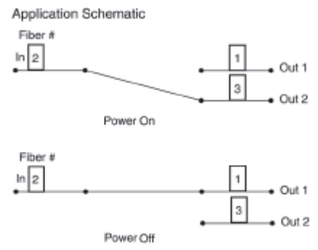
Application Information

1 x 2 SPDT

Possible Application

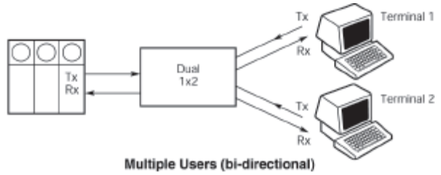


Schematic



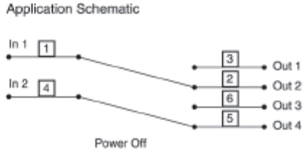
Dual 1 x 2 DPDT

Possible Application

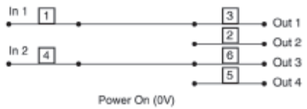


Schematic

Position 1

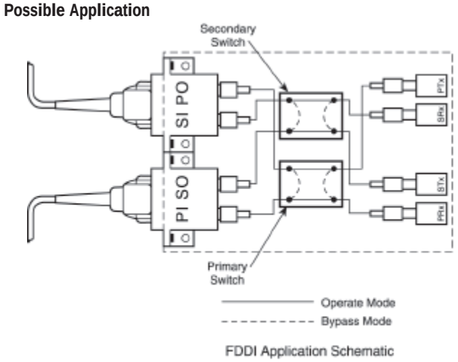


Position 2

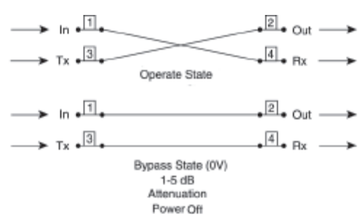


2 X 2 Bypass Fully Reversing

Possible Application



Schematic



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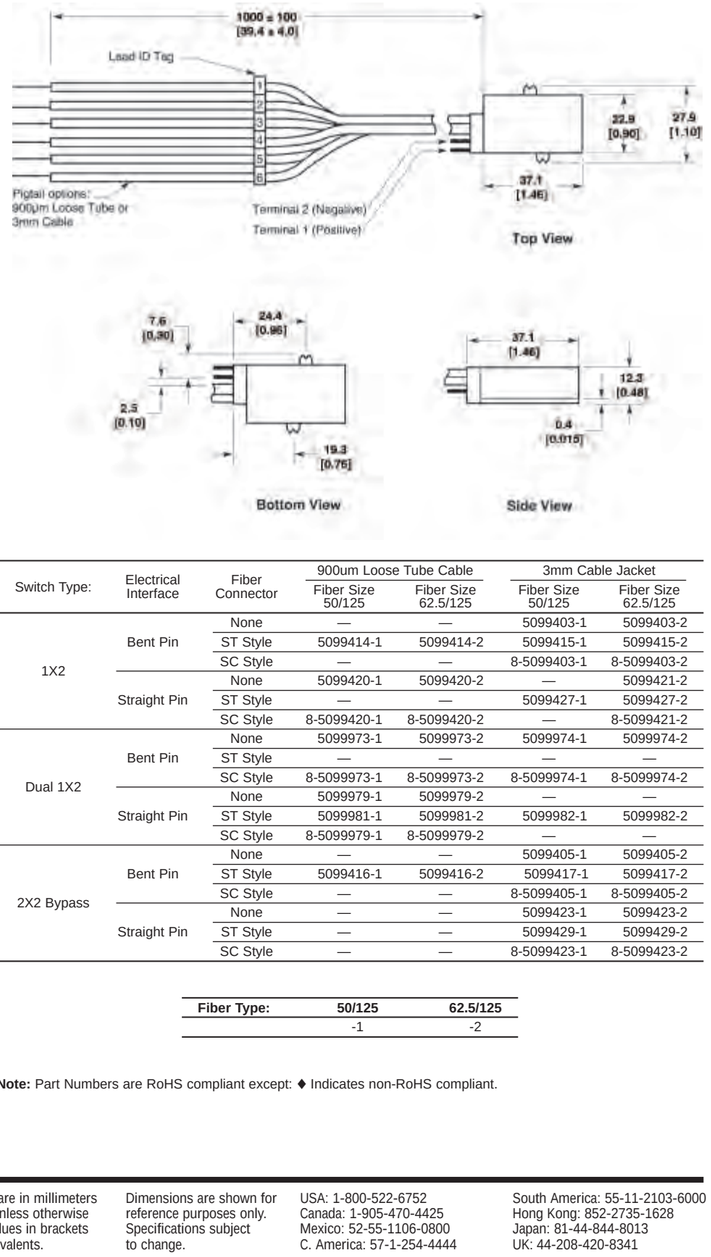
Switches (Continued)

Multimode
1 x 2 SPDT Switch
Dual 1 x 2 DPDT Switch
2 x 2 Bypass Switch (Continued)

Dimensions

Switch	Fiber Leads Used
1x2 SPDT	1,2,3
Dual 1x2 DPDT	1,2,3,4,5,6
2x2 Bypass	1,2,3,4



Part Number Information

Switch Type:	Electrical Interface	Fiber Connector	900um Loose Tube Cable		3mm Cable Jacket	
			Fiber Size 50/125	Fiber Size 62.5/125	Fiber Size 50/125	Fiber Size 62.5/125
1X2	Bent Pin	None	—	—	5099403-1	5099403-2
		ST Style	5099414-1	5099414-2	5099415-1	5099415-2
		SC Style	—	—	8-5099403-1	8-5099403-2
	Straight Pin	None	5099420-1	5099420-2	—	5099421-2
		ST Style	—	—	5099427-1	5099427-2
		SC Style	8-5099420-1	8-5099420-2	—	8-5099421-2
Dual 1X2	Bent Pin	None	5099973-1	5099973-2	5099974-1	5099974-2
		ST Style	—	—	—	—
		SC Style	8-5099973-1	8-5099973-2	8-5099974-1	8-5099974-2
	Straight Pin	None	5099979-1	5099979-2	—	—
		ST Style	5099981-1	5099981-2	5099982-1	5099982-2
		SC Style	8-5099979-1	8-5099979-2	—	—
2X2 Bypass	Bent Pin	None	—	—	5099405-1	5099405-2
		ST Style	5099416-1	5099416-2	5099417-1	5099417-2
		SC Style	—	—	8-5099405-1	8-5099405-2
	Straight Pin	None	—	—	5099423-1	5099423-2
		ST Style	—	—	5099429-1	5099429-2
		SC Style	—	—	8-5099423-1	8-5099423-2

Fiber Type:	50/125	62.5/125
	-1	-2

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Switches (Continued)

Multimode Bypass Switches

Product Facts

- Increases reliability of mission-critical network applications
- Low insertion loss — 1.8 dB typical, including connectors
- Meets ANSI FDDI power output specification of -20 dBm
- Choice of 62.5/125 µm, 50/125 µm
- Choice of FSD MIC, ST-style, or duplex SC connectors and ports
- Rack or panel-mount versions
- Compact size with all front-mounted connections to conserve space
- High-speed optical switching
- Simple to install

Tyco Electronics' Bypass Switch is a second-generation device that allows a dual-attach station to be bypassed without loss of ring integrity. The switch module contains two fully reversing optical bypass switches that direct the optical signals to the appropriate fiber according to signals on the device's electrical interface.

A spherical mirror, which is pivoted at high speeds between two stable positions, reflects light into specific fibers in either the operate or bypass state. Signal attenuation is very low on the network path. In the bypass state, the path from transmitter to receiver is attenuated to prevent receiver saturation. Holding the switches in the operating (non-bypass) state requires a 5-VDC, 160-mA power. Both switches return to the bypass state if the power is removed. Switching occurs in less than 10 ms.

The modules are easy to install between a dual-attached station and the ring. Pigtailed optical-fiber cables connect the switch module to the node, while the primary and secondary ring cables connect to the switch's A and B ports.

The electrical connection is supplied by one of three standard electrical interfaces. A status LED lights when the switch is in the operate state. The bypass switch can be either booth panel or rack mounted.

Singlemode Bypass Modules

Tyco Electronics offers Singlemode Bypass Modules designed to meet your optical path protection needs. For more information, please consult your local Tyco Electronics Sales Representative or call Tyco Electronics Product Information Center at 1-800-522-6752.

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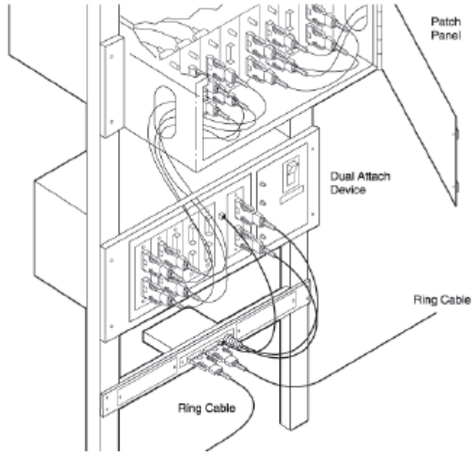
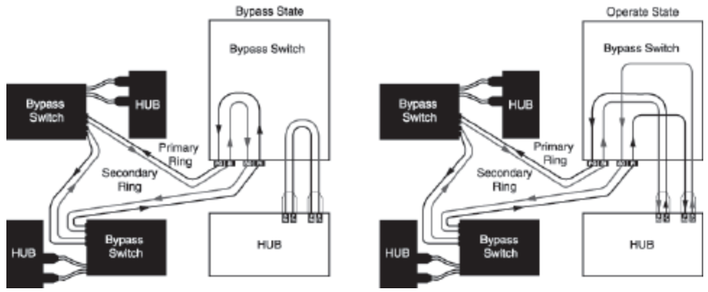
Switches (Continued)

Multimode Bypass Switches (Continued)



Switch Operation: Bypass and Operate States



Insertion Loss

Operate Mode Power On	Short Launch
PI to PRx	1.8 dB Max.
SI to SRx	1.8 dB Max.
PTx to PO	1.8 db Max.
STx to SO	1.8 dB Max.
Operate Mode Not Powered	**Short Launch**
PI to PO	1.8 dB Max.
SI to SO	1.8 dB Max.
PTx to PRx	5.0 dB Max.
STx to SRx	5.0 dB Max.

Note: FOTP-34, Method A2. IL values given for ST/SC options.

Specifications

Item	Value
Switching Speed	10 ms max.
Operating Wavelength	750 - 1450 nm
Crosstalk	≤45 dB (FOTP-42)
Switch Driver	5 V at 160 mA
Fiber Type	62.5/125-µm or 50/125-µm graded index
Operating Temperature	-10ºC to +65ºC (FOTP-3, Condition C2)
Storage Temperature	-30ºC to +70ºC (FOTP-3, Condition C2)
Durability	>1 million cycles
Weight	12 oz [340 g]

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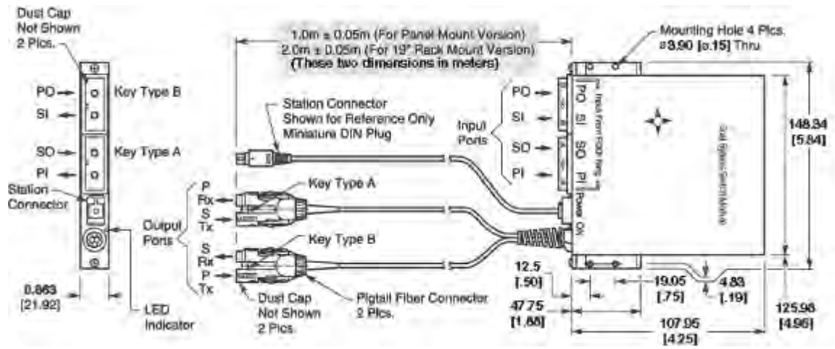
Multimode Bypass Switches (Continued)



Switch Module Base Part Numbers

Input Port Interface	Mounting	Part Numbers				
		Optical Fiber Pigtails				
		62.5/125-µm Fiber			50/125-µm Fiber	
		FSD MIC	ST-style	SC	FSD MIC	SC
FSD MIC	Panel	5209161	5209162	5209163	5209167	—
	Rack	5209164	5209165	5209166	5209170	—
ST	Panel	—	5209174	5209175	—	—
	Rack	—	5209177	—	—	—
Duplex SC	Panel	—	—	5209187	—	5209193
	Rack	5209188	—	5209190	—	5209196

Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

Switch Module Dash Numbers: Electrical Interface

Dash Number	Station Connector
-3	6-pos. Shielded Modular Plug
-4	6-pos. Shielded Miniature Circular DIN Plug
-6	4-pos. Modular Plug

Note: The electrical cable consists of an 8-position modular plug at one end for connecting to the switch and one of the connectors listed at the other end.

Ordering Information

Select the required switch module. To the base part number for the module, add the dash number for the electrical interface you require for the station connector. Example: 209163-3 is a switch with FSD MIC receptacles on ring ports, duplex SC connectors on the fiber pigtails, and a 6-position modular plug on the electrical cable.

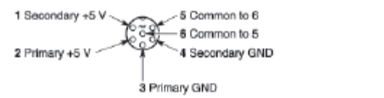
For other connector interfaces, contact your local Tyco Electronics Sales Representative

Switches (Continued)

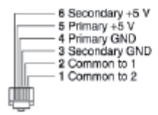
Multimode Bypass Switches (Continued)

Station Connector and Pinouts

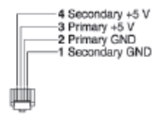
Contact ID Shown from Mating End of Station Connector



6 Position Miniature DIN



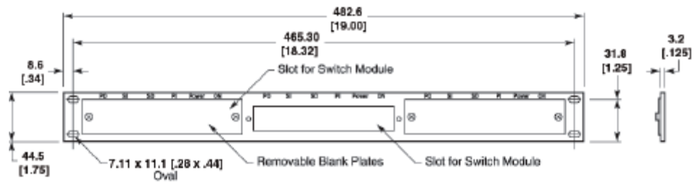
6 Postion Shielded Modular Plug



4 Postion Modular Plug

To Order the Electrical Interface Powercord Separately:

Part Number	Station Connector
5209503-1	6-pos. Modular Plug
5209504-1	6-pos. Shielded Miniature DIN Plug
5209506-1	4-pos. Modular Plug



Rack-Mount Panel

Part Number: 209197-1 Mounts in a 19-inch rack and accepts up to three switch modules.

Note: Part Numbers are RoHS compliant except: ♦ Indicates non-RoHS compliant.

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Introduction

Product Facts

- **Designed to meet relevant ARINC 600 Connector specifications**
- **Available in three sizes**
- **Low mating-force contacts — suitable for ARINC 404 Connectors**
- **Full range of contact inserts**
- **Custom backshells available in configurations to suit any application. Contact Tyco Electronics for detailed information.**

Specifications

Temperature Range — -85°F to 257°F [-65°C to 125°C]

Mating and Unmating Forces — (Max. after 3 cycles)
Size 1 — 27 pounds [120 N]
Size 2 — 60 pounds [267 N]
Size 3 — 105 pounds [467 N]

Contact Retention against axial load —
Size 22 — 12 pounds [53 N]
Size 20 — 20 pounds [89 N]
Size 16 — 25 pounds [111 N]
Size 12 — 30 pounds [133 N]
Coaxial — 35 pounds [156 N]
(In testing, exposure to rated loads produced no contact damage and resulted in displacement less than .015 [0.38])

Voltage/Current Ratings —

Contact	AWG	Max. Current (A)
Size 22	22	5.0
Size 20	20	7.5
Size 16	16	13.0
Size 12	12	23.0

Durability — 500 cycles min. — mating and unmating (In testing, wired mated connectors cycled at a rate slower than 300 cycles per hour, showed no apparent damage or contact resistance greater than rated values)

High Temperature Tolerance — 1000 hours min. at 257°F [125°C] (Wired, mated connectors)

Salt Spray Tolerance — As specified by MIL-STD-1344, method 1001, Condition B

Fluid Imperviousness — MIL-L-23699; MIL-H-5606: 1:3 mix isopropyl alcohol and mineral spirits (Test immersions of mated connectors in these fluids caused no evident deterioration)

Vibration and Shock Tolerance — Per MIL-STD-1344, methods 2004-1 and 2005-1 (Testing to these conditions, including vibration for 8 hours in each of 3 mutually perpendicular axes, caused no visible cracking, breaking or loosening of parts, and no discontinuities exceeding 1 microsecond)

Humidity Tolerance — Insulation resistance 1 megohm min., 1-2 hours after exposure to humidity per MIL-STD-1344, Method 1002-1, Type II; 5000 megohm min. after 24 hours at 77°F [25°C].

Dielectric Withstanding Voltage — (Min.) 1500 VAC, RMS 60 Hz at sea level; 500 VAC, RMS 60 Hz at 50,000 ft. [15240 M] (Testing at rated voltages for 60 seconds produced no flash over and 1 mA leakage, max.)

Insulation Resistance — 1000 megohms min. (Test conducted on unmated connector after 30 min. exposure to 248°F–257°F [120°C–125°C])

Contact Resistance — Mated pairs tested per MIL-STD-1344, Method 3004-1

Technical Document — ARINC 600 Product Specification 108-10050

ARINC 600 Connectors are used in virtually all airframes and today's state-of-the-art avionics equipment. From collision avoidance (TCAS, TAWS) to in-flight entertainment/networking, new avionics equipment demands higher data transmission rates. Whether it's Fibre Channel, or 100-Base-T or 100-Base-FX Ethernet and beyond, Tyco Electronics has the insert configurations and copper and fiber hardware (Quadrax contacts, RF, LuxCis inserts and Mini-Expanded Beam Fiber Optics) to meet the need. Standard industry configurations are available. For designs that require custom configurations, Tyco Electronics will work with you to provide the connector solution required.

ARINC 600 Connectors represent a new generation of standardized rack and panel connectors for aircraft applications. Compared to the preceding ARINC 404 standard, the new avionics connectors feature significantly reduced mating forces; increased numbers of contacts in housings proportioned to thinner black-box shapes; and floating, front-release keying.

ARINC 600 Connectors capitalize on the new design by adding unique features while maintaining intermateability. For instance, Tyco Electronics contact inserts are field replaceable and manufactured to precise tolerances.

Tyco Electronics contacts for ARINC 600 Connectors are applied with standard crimping tools—the same ones used for ARINC 404 contacts. Automatic crimping equipment is available for higher productivity and lower applied costs. The benefits of ARINC 600 reduced engagement force contacts (for example: size 22 contacts averaging 1.5 ounces [0.42 N]) can be realized in ARINC 404 connectors through the use of the interchangeable ARINC 600 contacts. ARINC 600 coaxial contacts also are crimp applied for reliable, solder-free installation.

It is easy to specify ARINC 600 Connectors by descriptive part numbers. An example of a descriptive part number is shown on page 4-3, with an explanation of each component of the part number and page references for complete information.

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UK: 44-208-420-8341

Ordering Information

Descriptive Part Numbering System

Use this guide to construct descriptive part numbers for ARINC 600 Connectors. Consult the referenced pages for additional information.

Materials

Shell — Die cast aluminum or machined aluminum per ASTM-B-85

Insert Retention Plates — Aluminum alloy

Finish — Chemical conversion coating per MIL-C-5541, Class 1A or electroless nickel per MIL-C-26074, Class 3 or 4, Grade B

Screws and Lockwashers — Steel with chromate over zinc or stainless steel

Polarizing Keyways — Zinc alloy

Polarizing Posts — Aluminum alloy or stainless steel

Insulators — Thermoset or Thermoplastic

Sample Descriptive Part Number

NIC66 E 11 A 01 AA 1

Series Designation
All ARINC 600 Connectors (For “Single Mod” ARINC Connectors, see page 4-25.)

Shell Size/Plating
(See pages 4-4 through 4-7)

Shells With Chromate Conversion Coating
E—Size 1 Receptacle
F—Size 1 Plug
G—Size 2 Receptacle
H—Size 2 Plug
J—Size 3 Receptacle
K—Size 3 Plug

Shells With Electroless Nickel Plating
EN—Size 1 Receptacle
FN—Size 1 Plug
GN—Size 2 Receptacle
HN—Size 2 Plug
JN—Size 3 Receptacle
KN—Size 3 Plug

Contact Inserts & Arrangement Codes
(See pages 4-8 through 4-10) Describes size, number of contacts, style of contacts and arrangement of inserts. Insert styles are further defined by both Class and Contact Style/Shell Modifications below. Insert arrangement codes are not defined for connectors using either Quadrax or Expanded Beam Fiber Optic inserts. Contact Tyco Electronics for specific part numbers.

Class
A—Nonenvironmental, rear release (unsealed inserts)
B—Environmental, rear release (sealed inserts)
C—Environmental, rear release without O-ring or sealant around inserts (sealed inserts)
F—Class C with cantilever style EMI/grounding spring (plug connectors only)
G—Class A with cantilever style EMI/grounding spring (plug connectors only)
H—Class C with canted coil style EMI/grounding spring (plug connectors only)
J—Class A with canted coil style EMI/grounding spring (plug connectors only)
FA—Nonenvironmental, front release/remove size 22 contacts (other contact sizes rear release/remove)
FF—Nonenvironmental, all contact sizes front release/remove except size 1 COAX remains rear removal

Keying
(See pages 4-12 and 4-13) Describes arrangement of keys

Contact Style/Shell Modifications
(See pages 4-14 and 4-15) Describes connector mounting configuration and contact style. The insert style is further modified by the contact style specified. Even when the connectors are ordered unloaded, the appropriate code must be used so that contacts fit properly.

Contact Loading
0—Contacts included with connector, as indicated in contact style code above (no digit in this space also indicates connector includes contacts). COAXICON contacts must always be ordered separately.
1—Contacts not included with connector; must be ordered separately by Tyco Electronics Part Number.

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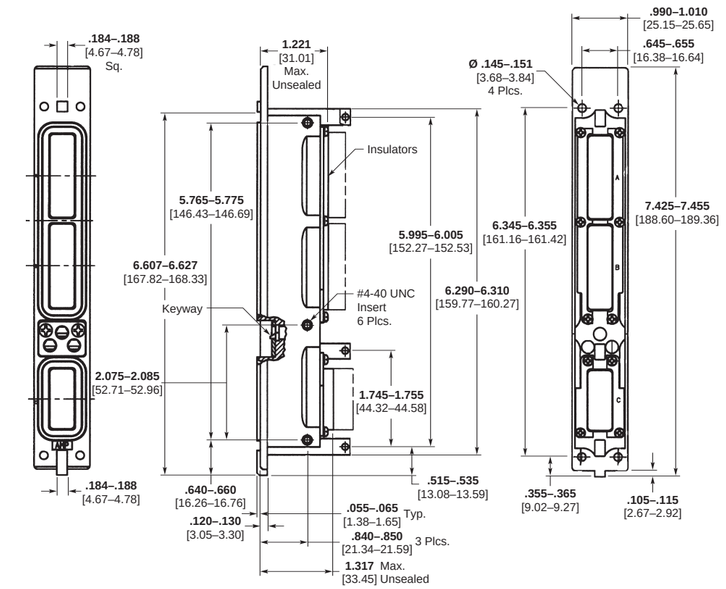
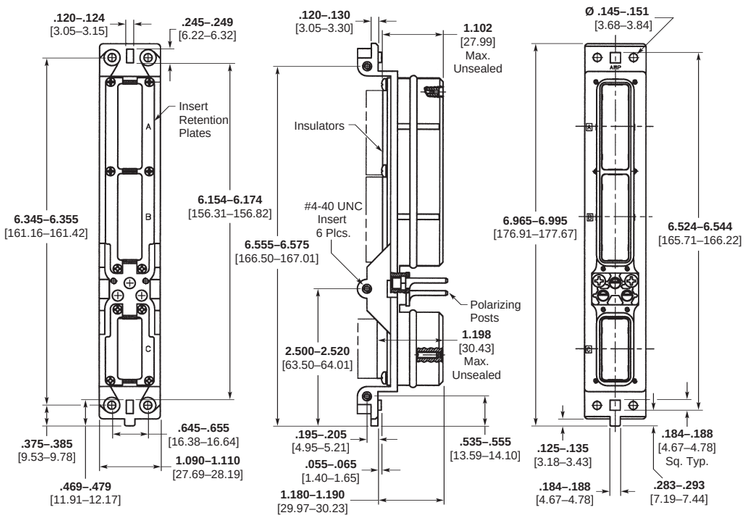
Shell Size 1

Receptacle



Plug



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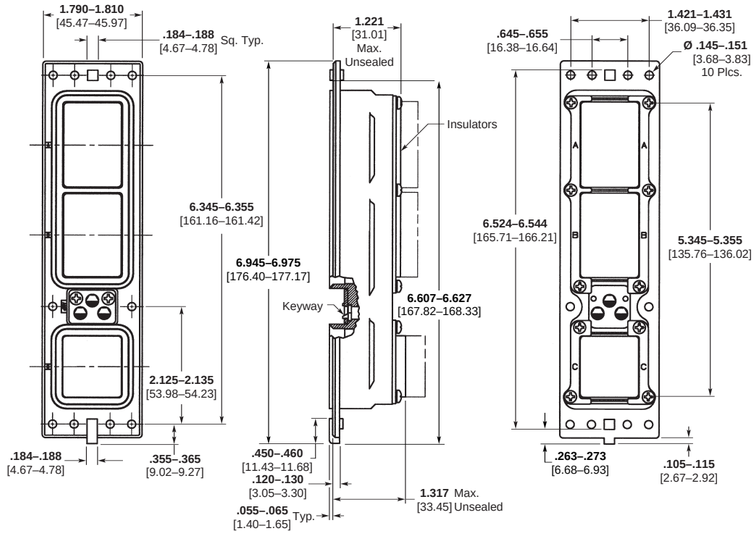
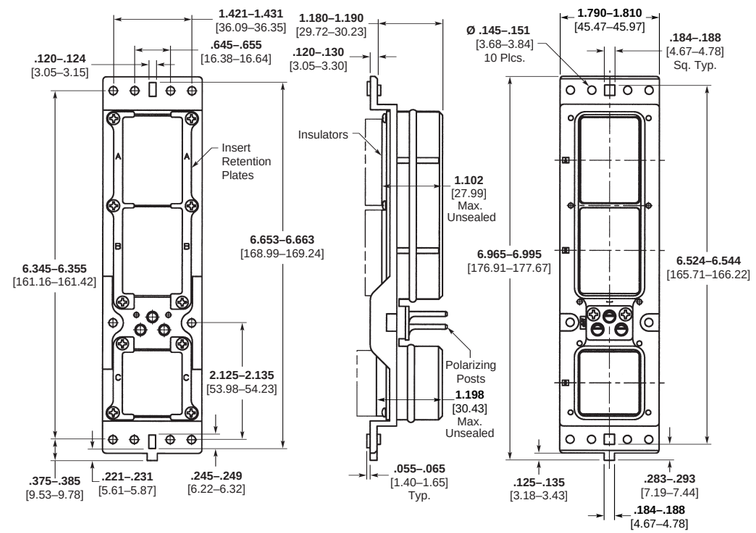
Shell Size 2

Receptacle



Plug



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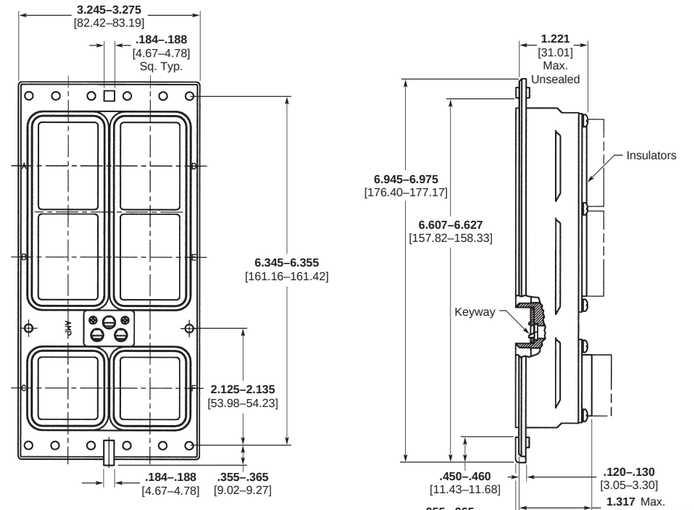
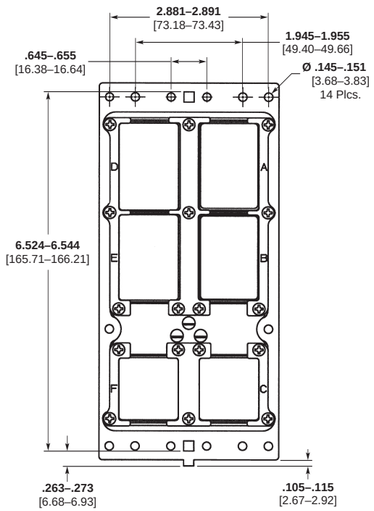
Shell Size 3

Receptacle





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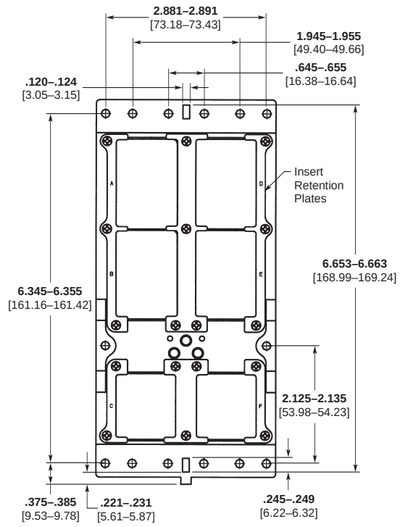
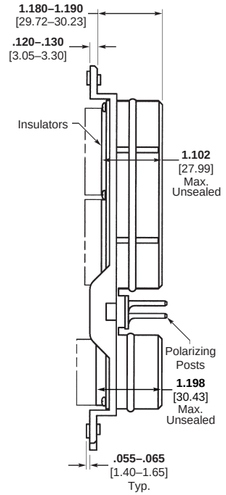
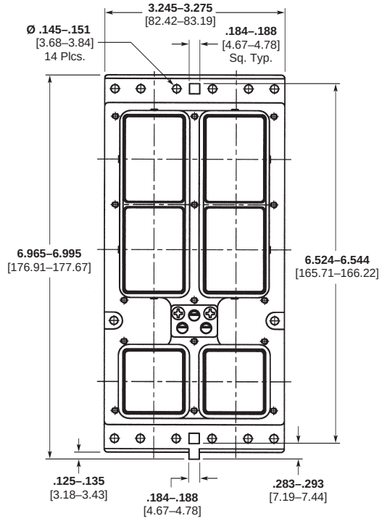
Shell Size 3 (Continued)

Plug







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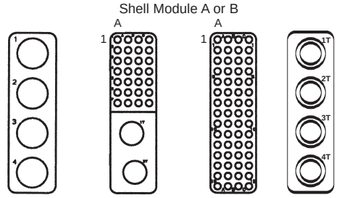
Shell Size 1

Note: For Expanded Beam Fiber Optic Inserts, see page 4-11.

Contact Inserts and Arrangement Codes

Shell Module A or B



4C4
4 Size 5
Metal

30T2
28 Size 22
2 Size 8

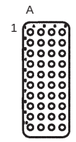
60
60 Size 22

4T4
4 Size 8
Metal

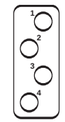
(Size 8 Grounded to Shell)

Shell Module C

5C2
2 Size 16
1 Size 12
2 Size 5



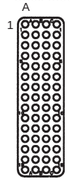
40
40 Size 22



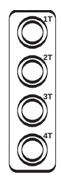
4
4 Size 12

Shell Size 1 Plug
Rear Release/Remove Contacts

Shell Module A or B

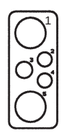


60
60 Size 22
Metal

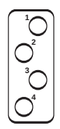


4T4
4 Size 8
Metal

Shell Module C



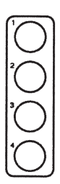
5C2
2 Size 16
1 Size 12
2 Size 5
(Also Available with Ground for Size 5's)



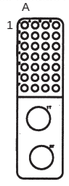
4
4 Size 12

Shell Size 1 Receptacle
Rear Release/Remove Contacts

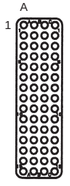
Shell Module A or B



4C4
4 Size 5



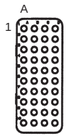
30T2
28 Size 22
2 Size 8



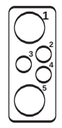
60
60 Size 22

(Size 8 Grounded to Shell)

Shell Module C



40
40 Size 22



5C2
All FR/FR

Shell Size 1 Receptacle
Front Release/Remove Size 22 Contacts (Other Size Contacts are Rear Release/Remove)

Shell Size	Arrangement Code	Module A	Module B	Module C
1	11	60	60	5C2
1	12	60	BLANK	BLANK
1	13	BLANK	60	BLANK
1	14	BLANK	60	5C2
1	15	60	60	40
1	16	OPEN	60	5C2
1	71	30T2	30T2	40
1	102	60	60	OPEN
1	104	60	OPEN	5C2
1	105	OPEN	OPEN	5C2
1	106	60	4C4	40
1	107	30T2	30T2	40
1	110	60	60	4
1	111	OPEN	30T2	40
1	112	60	4C4	5C2
1	113	60	OPEN	OPEN

Arrangement codes not shown are available upon request. Contact Tyco Electronics.

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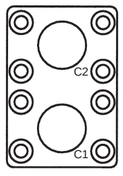
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Contact Inserts and Arrangement Codes (Continued)

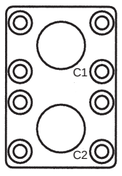
Shell Size 2 or 3

Note: For LuxCis Inserts and Expanded Beam Fiber Optic Inserts, see page 4-11.

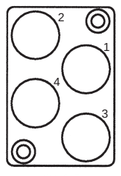
Shell Module A, B, D or E



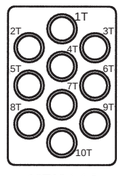
C2 [2, 5]
2 Size 1



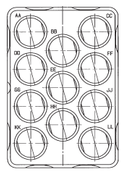
C2A [2, 5]
2 Size 1



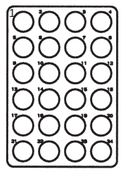
C4 [1, 5]
4 Modified Size 1 Metal



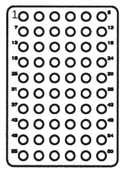
10T10 [1, 4, 5]
10 Size 8 Metal



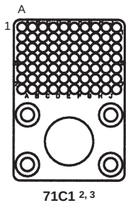
Q11 [1, 4, 6]
11 Size 8 Quadrax
Metal



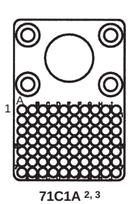
24 [1]
24 Size 12



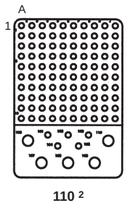
60 [2]
60 Size 20



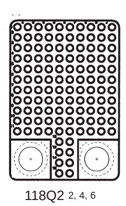
71C1 [2, 3]
70 Size 22
1 Size 1



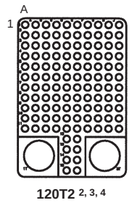
71C1A [2, 3]
70 Size 22
1 Size 1



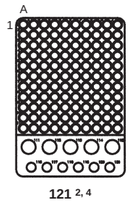
110 [2]
100 Size 22
5 Size 20
5 Size 12



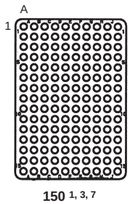
118Q2 [2, 4, 6]
118 Size 22
2 Size 8 Quadrax



120T2 [2, 3, 4]
118 Size 22
2 Size 8
(Size 8 Grounded to Shell)

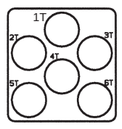


121 [2, 4]
110 Size 22
6 Size 20
5 Size 16 [4]

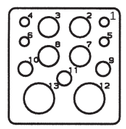


150 [1, 3, 7]
150 Size 22

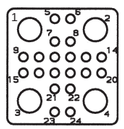
Shell Module C or F



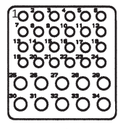
6T6 [2, 4, 5, 6]
6 Size 8
Metal



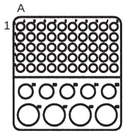
13C2 [1, 4, 8]
4 Size 20
3 Size 16
4 Size 12
2 Size 5



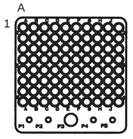
24T4 [2, 6]
20 Size 20
4 Size 8



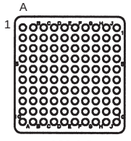
34 [2, 4]
24 Size 20
10 Size 16



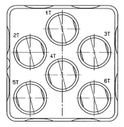
59 [2, 4]
50 Size 22
5 Size 16
4 Size 12



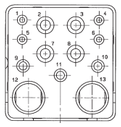
85 [2, 3, 4]
80 Size 22
4 Size 20
1 Size 16



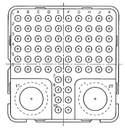
100 [1, 3]
100 Size 22



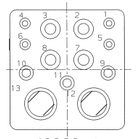
Q6 [1, 4, 6]
6 Size 8 Quadrax
Metal



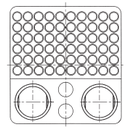
11Q2 [1, 4, 6]
4 Size 20
4 Size 12
3 Size 16
2 Size 8 Quadrax



68Q2 [1, 4, 6]
68 Size 22
2 Size 8 Quadrax



13CQ2 [4, 6]
4 Size 20
3 Size 16
4 Size 12
2 Size 8 Quadrax



62Q2 [2, 4, 6]
60 Size 22
2 Size 16
2 Size 8 Quadrax

Notes:
1. Available for plug or receptacle with rear release/remove contacts.
2. Available for plug only with rear release/remove contacts.
3. Available for receptacle only with front release/remove size 22 contacts and rear release/remove other size contacts.
4. Available for receptacle only with all contacts front release/remove.
5. Available for receptacle only with all contacts front release/rear remove.
6. Standard size 8 contacts will not fit in Quadrax size 8 inserts. Also, Quadrax size 8 contacts will not fit into standard size 8 inserts.
7. Available for plug with front release/remove contacts.
8. Available with grounding for size 5's.

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Note: Engaging faces of receptacle inserts are shown

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Contact Inserts and Arrangement Codes (Continued)

Shell Size 2 or 3 (Continued)

Shell Size	Arrangement Code	Module A	Module B	Module C
2	20	71C1A	71C1	13C2
2	21	150	150	13C2
2	22	71C1	150	13C2
2	23	71C1	71C1	13C2
2	25	150	71C1	13C2
2	26	150	150	100
2	27	C2	71C1	13C2
2	28	C2	71C1A	85
2	29	150	150	BLANK
2	30	71C1A	71C1A	13C2
2	50	71C1	71C1A	13C2
2	51	BLANK	150	13C2
2	52	150	150	85
2	53	C4	150	13C2
2	54	150	73C3	13C2
2	55	150	BLANK	13C2
2	56	150	C2	13C2
2	57	24	150	13C2
2	58	24	24	6T6
2	59	C4	C4	13C2
2	72	120T2	120T2	100
2	74	121	121	6T6
2	75	121	10T10	6T6
2	80	120T2	150	100
2	81	120T2	120T2	6T6
2	82	71C1A	150	13C2
2	83	150	C4	34
2	84	C4	C4	34
2	85	150	150	34
2	86	150	121	100
2	207	71C1	150	100
2	208	150	71C1	100
2	209	71C1	71C1	100
2	212	71C1	71C1	OPEN
2	216	C2A	71C1A	85
2	220	71C1	C2A	85
2	234	60	60	13C2
2	237	150	120T2	100
2	240	120T2	10T10	13C2
2	241	150	150	6T6
2	242	150	10T10	13C2
2	245	71C1	71C1	85
2	253	C2A	150	13C2
2	254	C2A	71C1A	100
2	255	C2A	71C1A	13C2
2	256	C2A	71C1	13C2
2	257	C2A	C2A	13C2
2	259	C4	C4	85
2	262	150	60	34
2	266	121	121	85
2	268	60	121	59
2	269	10T10	150	13C2
2	270	150	150	59
2	271	C4	120T2	13C2
2	272	10T10	10T10	85
2	273	121	60	6T6
2	275	121	60	34
2	279	150	121	13C2
2	284	120T2	120T2	13C2
2	286	60	60	34

Shell Size	Arrangement Code	Module A	Module B	Module C	Module D	Module E	Module F
3	31	150	150	13C2	150	150	13C2
3	32	150	150	100	150	150	13C2
3	33	150	150	13C2	150	150	100
3	34	150	150	100	150	150	100
3	36	C4	C4	13C2	BLANK	150	100
3	37	150	150	85	150	150	85
3	76	120T2	150	34	120T2	150	34
3	77	121	121	6T6	121	121	6T6
3	306	150	71C1	13C2	150	71C1	13C2
3	307	71C1	71C1	13C2	71C1	71C1	13C2
3	308	C2A	C2A	13C2	C2A	150	100
3	309	150	150	13C2	150	71C1	100
3	319	121	120T2	6T6	121	120T2	6T6
3	320	150	60	100	150	60	100
3	322	150	150	100	150	150	34
3	323	150	150	100	71C1	71C1	100
3	325	150	150	13C2	C2A	C2A	13C2
3	326	150	71C1	100	150	150	100
3	327	150	71C1	100	150	150	13C2
3	328	C2A	C2A	13C2	150	150	13C2
3	331	71C1	150	100	150	150	100
3	332	C4	C4	13C2	C4	C4	85
3	333	71C1	71C1	100	71C1	71C1	100
3	335	71C1	C4	100	71C1	C4	100
3	338	C2A	150	100	150	150	100
3	339	C2A	C2A	100	C2A	C2A	100
3	340	C2A	C2A	13C2	C2A	C2A	13C2
3	341	C4	C4	100	C4	C4	100
3	342	C4	C4	13C2	C4	C4	13C2
3	344	24	150	13C2	24	150	13C2
3	346	150	24	100	150	150	34
3	347	150	150	6T6	121	10T10	13C2
3	348	150	150	11Q2	150	150	11Q2
3	349	150	150	13C2	120T2	120T2	100
3	350	C4	C4	13C2	150	150	100
3	351	150	150	13C2	150	6MS	BLANK
3	352	150	150	59	150	6MS	BLANK
3	353	150	150	59	150	6MS	100
3	354	150	150	59	150	150	59
3	355	150	150	59	150	150	100
3	356	150	150	34	150	150	34

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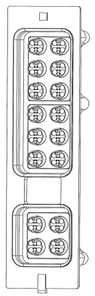
Japan: 81-44-844-8013
UK: 44-208-420-8341

Fiber Optic Inserts and Cavity Reducers



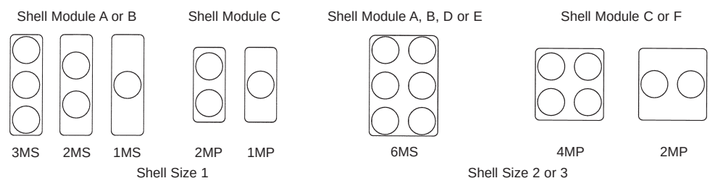
Inserts available to accept Tyco Electronics Mini-Expanded Beam Fiber Optic Cable Assemblies and LuxCis® 1.25mm Optical Termini. Custom design configurations can be provided.

Contact Tyco Electronics for more information about Fiber Optic Connectors and Cable Assemblies, see Section 3, on pages 3-1 to 3-26.

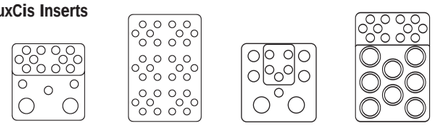
Product Facts

- **For Mini-Expanded Beam inserts**
- **Insert holders designed to ARINC 600, Supplement 13 or to specific customer needs**
- **For use in 100 base-FX Ethernet LAN applications per ARINC 664 and 763**
- **Drop-in insert holders utilize standard ARINC 600 retainers**
- **Sealing available**

Mini-Expanded Beam



LuxCis Inserts



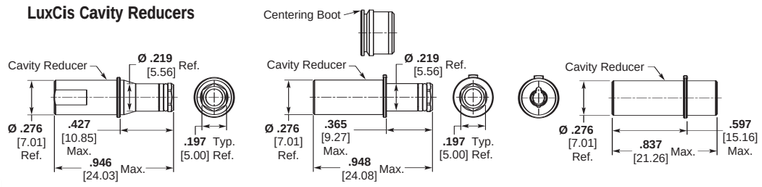
LuxCis Inserts and Cavity Reducers accept LuxCis Fiber Optic Termini.

LuxCis Optical Termini

Product Facts

- **Optical termini for use with GPR, ARINC 600, circular MIL-DTL-38999 connectors**
- **Industry Standard 1.25mm ceramic ferrule**
- **Compatible with 1.5-2.2mm Tight jacket and loose tube cable construction:**
  - **MT - Tight jacket cable**
  - **ML - Loose tube cable**
- **SM / MM versions**

LuxCis Cavity Reducers



Part Number 1757727-1 | Part Number 1757710-1 | Part Number 1757711-1

Size 8 Quadrax	Part Number	LuxCis Cavity Reducer
Pin Quadrax adapter for LuxCis™ termini in Quadrax FR type cavity	1757727-1	Quadrax cavity reducer (FR/FR) for receptacle shell
Pin Quadrax adapter for LuxCis™ termini in Quadrax RR type cavity	1757710-1	Quadrax cavity reducer (RR/RR) for receptacle shell
Socket Quadrax adapter for LuxCis™ termini in Quadrax RR type cavity	1757711-1	Quadrax cavity reducer (RR/RR) for plug shell

LuxCis Optical Termini Part Numbers

Cable Dia.	Cable Structure ML (loose & tight) MT (ultra tight)	S/M Fiber 125,3 µm PC/UPC	S/M Fiber 125,3 µm APC	M/M Fiber 128 µm PC
0.9mm Buffer	—	*	*	*
1.5 - 2.2mm	ML	1918614-1	1918616-1	1828199-1
1.5 - 2.2mm	MT	1918615-1	1918617-1	1828200-1

Consult your local Tyco Electronics Sales Representative for additional options.
* Contact Tyco Electronics for availability.

LuxCis is a trademark of Radiall, S.A.

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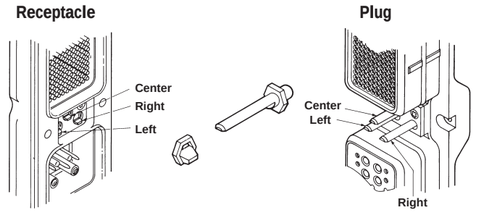
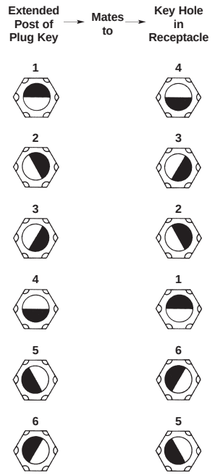
UK: 44-208-420-8341

Keying

Notes:
1. Darkened portion of diagram indicates extended post of plug key; light portion indicates key hole in receptacle keyway.
2. If the keying code is omitted, keying is assembled in the **01** arrangement; the keying code is not stamped on the connector.
3. If the keying code is **00**, keying is supplied unassembled.
4. Diagrams show mating face of connector, “Top” up.





Keying Components	Quantity Required Per Connector	Part Numbers	
		Receptacle	Plug
Male Key Post	3	—	1218693-2
Female Keyway	3	208019-1	—
Plate	1	1218692-1	1218692-1
Screw	2	208021-1	208021-1
Kit Containing Above	1	448013-1	448012-1

Keying Code	Plug			Receptacle		
	Left Post	Center Post	Right Post	Left Keyway	Center Keyway	Right Keyway
00	—	—	—	—	—	—
01	1	1	1	4	4	4
02	2	1	1	4	4	3
03	3	1	1	4	4	2
04	4	1	1	4	4	1
05	5	1	1	4	4	6
06	6	1	1	4	4	5
07	1	1	6	5	4	4
08	2	1	6	5	4	3
09	3	1	6	5	4	2
10	4	1	6	5	4	1
11	5	1	6	5	4	6
12	6	1	6	5	4	5
13	1	1	5	6	4	4
14	2	1	5	6	4	3
15	3	1	5	6	4	2
16	4	1	5	6	4	1
17	5	1	5	6	4	6
18	6	1	5	6	4	5
19	1	1	4	1	4	4
20	2	1	4	1	4	3
21	3	1	4	1	4	2
22	4	1	4	1	4	1
23	5	1	4	1	4	6
24	6	1	4	1	4	5
25	1	1	3	2	4	4
26	2	1	3	2	4	3
27	3	1	3	2	4	2
28	4	1	3	2	4	1
29	5	1	3	2	4	6
30	6	1	3	2	4	5
31	1	1	2	3	4	4
32	2	1	2	3	4	3
33	3	1	2	3	4	2
34	4	1	2	3	4	1
35	5	1	2	3	4	6
36	6	1	2	3	4	5
37	1	2	1	4	3	4
38	2	2	1	4	3	3

Keying Code	Plug			Receptacle		
	Left Post	Center Post	Right Post	Left Keyway	Center Keyway	Right Keyway
39	3	2	1	4	3	2
40	4	2	1	4	3	1
41	5	2	1	4	3	6
42	6	2	1	4	3	5
43	1	2	6	5	3	4
44	2	2	6	5	3	3
45	3	2	6	5	3	2
46	4	2	6	5	3	1
47	5	2	6	5	3	6
48	6	2	6	5	3	5
49	1	2	5	6	3	4
50	2	2	5	6	3	3
51	3	2	5	6	3	2
52	4	2	5	6	3	1
53	5	2	5	6	3	6
54	6	2	5	6	3	5
55	1	2	4	1	3	4
56	2	2	4	1	3	3
57	3	2	4	1	3	2
58	4	2	4	1	3	1
59	5	2	4	1	3	6
60	6	2	4	1	3	5
61	1	2	3	2	3	4
62	2	2	3	2	3	3
63	3	2	3	2	3	2
64	4	2	3	2	3	1
65	5	2	3	2	3	6
66	6	2	3	2	3	5
67	1	2	2	3	3	4
68	2	2	2	3	3	3
69	3	2	2	3	3	2
70	4	2	2	3	3	1
71	5	2	2	3	3	6
72	6	2	2	3	3	5
73	1	3	1	4	2	4
74	2	3	1	4	2	3
75	3	3	1	4	2	2
76	4	3	1	4	2	1
77	5	3	1	4	2	6

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Keying (Continued)

Keying Code	Plug			Receptacle		
	Left Post	Center Post	Right Post	Left Keyway	Center Keyway	Right Keyway
78	6	3	1	4	2	5
79	1	3	6	5	2	4
80	2	3	6	5	2	3
81	3	3	6	5	2	2
82	4	3	6	5	2	1
83	5	3	6	5	2	6
84	6	3	6	5	2	5
85	1	3	5	6	2	4
86	2	3	5	6	2	3
87	3	3	5	6	2	2
88	4	3	5	6	2	1
89	5	3	5	6	2	6
90	6	3	5	6	2	5
91	1	3	4	1	2	4
92	2	3	4	1	2	3
93	3	3	4	1	2	2
94	4	3	4	1	2	1
95	5	3	4	1	2	6
96	6	3	4	1	2	5
97	1	3	3	2	2	4
98	2	3	3	2	2	3
99	3	3	3	2	2	2
100	4	3	3	2	2	1
101	5	3	3	2	2	6
102	6	3	3	2	2	5
103	1	3	2	3	2	4
104	2	3	2	3	2	3
105	3	3	2	3	2	2
106	4	3	2	3	2	1
107	5	3	2	3	2	6
108	6	3	2	3	2	5
109	1	4	1	4	1	4
110	2	4	1	4	1	3
111	3	4	1	4	1	2
112	4	4	1	4	1	1
113	5	4	1	4	1	6
114	6	4	1	4	1	5
115	1	4	6	5	1	4
116	2	4	6	5	1	3
117	3	4	6	5	1	2
118	4	4	6	5	1	1
119	5	4	6	5	1	6
120	6	4	6	5	1	5
121	1	4	5	6	1	4
122	2	4	5	6	1	3
123	3	4	5	6	1	2
124	4	4	5	6	1	1
125	5	4	5	6	1	6
126	6	4	5	6	1	5
127	1	4	4	1	1	4
128	2	4	4	1	1	3
129	3	4	4	1	1	2
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132	6	4	4	1	1	5
133	1	4	3	2	1	4
134	2	4	3	2	1	3
135	3	4	3	2	1	2
136	4	4	3	2	1	1
137	5	4	3	2	1	6
138	6	4	3	2	1	5
139	1	4	2	3	1	4
140	2	4	2	3	1	3
141	3	4	2	3	1	2
142	4	4	2	3	1	1
143	5	4	2	3	1	6
144	6	4	2	3	1	5
145	1	5	1	4	6	4
146	2	5	1	4	6	3
147	3	5	1	4	6	2
148	4	5	1	4	6	1
149	5	5	1	4	6	6
150	6	5	1	4	6	5
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153	3	5	6	5	6	2
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155	5	5	6	5	6	6
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167	5	5	4	1	6	6
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169	1	5	3	2	6	4
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171	3	5	3	2	6	2
172	4	5	3	2	6	1
173	5	5	3	2	6	6
174	6	5	3	2	6	5
175	1	5	2	3	6	4
176	2	5	2	3	6	3
177	3	5	2	3	6	2
178	4	5	2	3	6	1
179	5	5	2	3	6	6
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182	2	6	1	4	5	3
183	3	6	1	4	5	2
184	4	6	1	4	5	1
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186	6	6	1	4	5	5
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205	1	6	3	2	5	4
206	2	6	3	2	5	3
207	3	6	3	2	5	2
208	4	6	3	2	5	1
209	5	6	3	2	5	6
210	6	6	3	2	5	5
211	1	6	2	3	5	4
212	2	6	2	3	5	3
213	3	6	2	3	5	2
214	4	6	2	3	5	1
215	5	6	2	3	5	6
216	6	6	2	3	5	5

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Contact Style/Shell Modification Codes

AA Crimp, Snap-In Contacts, Rear Release, Standard Mounting

AB .025 [0.64] Square Post — 208215-1 Contacts, 1-Wrap High, Snap-In, Standard Mounting

AC .025 [0.64] Square Post — 208215-2 Contacts, 2-Wrap High, Snap-In, Standard Mounting

AD .025 [0.64] Square Post — 208215-3 Contacts, 3-Wrap High, Snap-In, Standard Mounting

BA (4) Floating Bushings

#6-32 Clinch Nuts, see Table 1 on page 4-15 for clinch nut locations

CA (10) #6-32 Clinch Nuts

CB (4) #6-32 Clinch Nuts

CC (6) #6-32 Clinch Nuts

CD (8) #6-32 Clinch Nuts

CE (14) #6-32 Clinch Nuts

Captivated Contact Codes

DA Captivated Inserts — No Contacts

DF 208275-7 (.150 [3.81] Extension), Standard Mounting

DG 208275-3 (.190 [4.83] Extension), Standard Mounting

DH 208275-4 (.250 [6.35] Extension), Standard Mounting

Clinch Nuts with Captivated Contacts, see Table 1 on page 4-15 for clinch nut locations

EA (4) #6-32 Clinch Nuts, and 208275-7 Signal Contacts

EB (4) #6-32 Clinch Nuts, and 208275-3 Signal Contacts

EC (4) #6-32 Clinch Nuts, and 208275-4 Signal Contacts

Front Release, standard mounting

FA Indicates Front Release Inserts without Contacts

FB Standard Mounting, 211245-2 Contacts

FC Standard Mounting, 211245-4 Contacts

FD Standard Mounting, 211245-6 Contacts

FE Standard Mounting, 211431-2 Contacts

FF Standard Mounting, 211431-4 Contacts

FG Standard Mounting, 211431-6 Contacts

FH Standard Mounting, 211431-8 Contacts

Front Release Contacts and Clinch Nuts, see Table 1 on page 4-15 for clinch nut locations

GA (4) #4-40 Clinch Nuts, 211431-4 Contacts

GB (6) #4-40 Clinch Nuts, 211431-4 Contacts

GC (6) #4-40 Clinch Nuts, 211431-6 Contacts

GD (6) #6-32 Clinch Nuts, 211431-4 Contacts

GE (10) #4-40 Clinch Nuts, 211431-8 Contacts

GF (6) #6-32 Clinch Nuts, 211431-2 Contacts

GG (4) #4-40 Clinch Nuts, 211431-2 Contacts

GH (4) #6-32 Clinch Nuts, 211431-2 Contacts

GJ (6) #6-32 Clinch Nuts, 211431-8 Contacts

GK (4) #6-32 Clinch Nuts, 211431-8 Contacts

GL (10) #6-32 Clinch Nuts, 211431-4 Contacts

GM (4) #6-32 Clinch Nuts, 211431-4 Contacts

GN (4) #6-32 Clinch Nuts, 211245-2 Contacts

FJ (10) #6-32 Clinch Nuts, 211245-4 Contacts

FK (6) #6-32 Clinch Nuts, 211245-4 Contacts

#4-40 Clinch Nuts, see Table 1 on page 4-15 for clinch nut locations

SA (4) #4-40 Clinch Nuts

SB (6) #4-40 Clinch Nuts

SC (10) #4-40 Clinch Nuts

SD (8) #4-40 Clinch Nuts

SE (14) #4-40 Clinch Nuts

SF (6) #4-40 Clinch Nuts (Special)

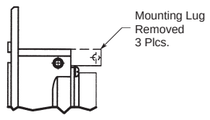
Size 1 Receptacle Shell with Lugs Removed, see drawing below. See Table 1 on page 4-15 for clinch nut locations.

HA Size 1 Receptacle Shell

HB Size 1 Receptacle Shell — (4) #4-40 Clinch Nuts

HC Size 1 Receptacle Shell — with 211431-4 contacts, standard mounting

Size 1 Receptacle



Modification Code
HA, HB, and HC only

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Contact Style/Shell Modification Codes (Continued)

Table 1

Clinch Nut Locations on Mounting Flange (Unless otherwise noted with modification code)			
Quantity	Shell Size		
	1	2	3
4	All	4 corners	4 corners
6	N/A	4 corners and 2 at polarizing keys	4 corners and 2 at polarizing keys
6 code SF only	N/A	See Figure 3	N/A
8	N/A	See Figure 4	See Figure 1
10	N/A	All	See Figure 2
14	N/A	N/A	All

Size 3 Receptacle

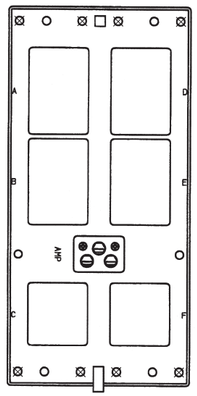

Figure 1
x = Clinch Nut Installed
in These Holes

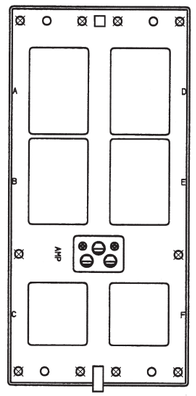

Figure 2
x = Clinch Nut Installed
in These Holes

Size 2 Receptacle

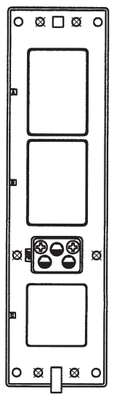

Figure 3
Modification Code SF Only
x = Clinch Nut Installed
in These Holes

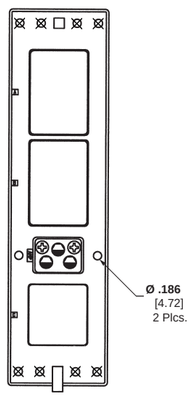

Figure 4
x = Clinch Nut Installed
in These Holes

4

Rack and Panel Connectors

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

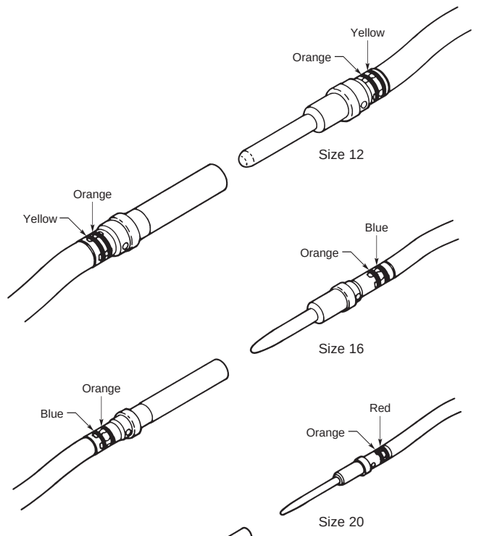
Crimp, Snap-In Contacts

Contact Loading Codes

0 (or blank) — Contacts included

1 — Contacts not included; must be ordered separately by Tyco Electronics Part Number.

Note: When connectors are ordered with contacts, the contact style section (AA in the example code at the top of this page) must be specified so that the proper, unloaded inserts are included. COAXICON contacts are not supplied in connector kits and must be ordered separately.



Insertion and Extraction

Typical Tool

Crimp, Snap-In, Rear-Release Contacts (also suitable for ARINC 404)

Average Contact Size	Wire Size		Color Code	Average Engagement Force	Part Numbers		Tooling Part Numbers			Color Code
	AWG	mm²			Pin Contact	Socket Contact	Crimp Tool	Positioner	Insertion/ Extraction Tool	
22	26-22	0.12-0.4	Green	1.5 oz. [.42 N]	208262-3	208264-2	M22520/2-01	M22520/2-23	91066-1	Green
20	24-20	0.2-0.6	Red	2.0 oz. [.56 N]	208265-3	208267-2	M22520/2-01	M22520/2-08	91066-4	Red
16	20-16	0.5-1.4	Blue	3.0 oz. [.83 N]	208268-3	208270-2	M22520/1-01	M22520/1-02	91066-3	Blue
12	14-12	2-3	Yellow	12.0 oz. [3.34 N]	208271-3	208273-2	M22520/1-01	M22520/1-11	445147-1	—

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

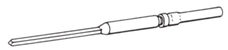
Posted Contacts

Size 22 Posted Contacts

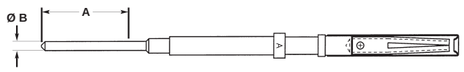
Contact Loading

0 (or blank) — Contacts included

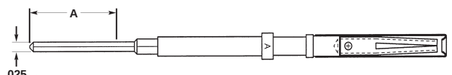
1 — Contacts not included; must be ordered separately.



Square or Rounded Posts



Round Post



Square Post

Size 22, Snap-In, Rear Release Socket Contacts

Use Insertion/Extraction Tool Part Number 91066-1

with .025 [0.64] Square Posts

Number of Wraps	Post Extension from Rear of Insert (Dim. A)	Part Number
1	**0.275** 6.98	208215-1
2	**0.390** 9.91	208215-2
3	**0.520** 13.21	208215-3

with Round Posts

Minimum Post Extension from Rear (Dim. A)	Post Diameter (Dim. B)	Part Number
0.190 4.82	**0.025** 0.64	445814-1
0.230 5.84	**0.025** 0.64	445814-2
0.180 4.57	**0.020** 0.51	445814-3

Size 22, Snap-In, Front Release Socket Contacts

Use Insertion/Extraction Tool Part Number 445815-1

with Round Posts

Minimum Post Extension from Rear of Insert (Dim. A)	Post Diameter (Dim. B)	Part Number	Solder Dipped
0.150 3.81	**0.025** 0.64	211431-2	No
0.250 6.35	**0.025** 0.64	211431-4	No
0.375 9.52	**0.025** 0.64	211431-6	No
0.500 12.70	**0.025** 0.64	211431-8	No
0.150 3.81	**0.0195** 0.50	1-211431-0	No
0.250 6.35	**0.0195** 0.50	1-211431-2	No
0.150 3.81	**0.030** 0.76	1-211431-3	Yes
0.375 9.52	**0.030** 0.76	1-211431-4	Yes
0.250 6.35	**0.025** 0.64	1-211431-5	Yes

with .025 [0.64] Square Posts

Number of Wraps	Post Extension from Rear of Insert (Dim. A)	Part Number
1	**0.250** 6.35	211245-2
2	**0.375** 9.52	211245-4
3	**0.500** 12.70	211245-6

Catalog 1308940
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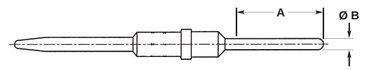
Posted Contacts (Continued)



Size 16
Part Number 448139

Front Release/Remove Size 12, Posted Pin Contacts

Use Insertion/Extraction Tool Part Number 445147-1

Minimum Post Extension from Rear of Insert (Dim. A)	Post Diameter (Dim. B)	Part Number	Solder Dipped
0.264 6.70	**.079–.083** 2.01–2.11	448140-3	No
0.379 9.62	**.079–.083** 2.01–2.11	448140-6	No
0.264 6.70	**.079–.083** 2.01–2.11	448140-9	Yes
0.143 3.63	**.079–.083** 2.01–2.11	448140-8	No

Front Release/Remove Size 16, Posted Pin Contacts

Use Insertion/Extraction Tool Part Number 91066-3

Minimum Post Extension from Rear of Insert (Dim. A)	Post Diameter (Dim. B)	Part Number	Solder Dipped
0.379 9.62	**.048–.052** 1.22–1.32	448139-6	No
0.264 6.70	**.048–.052** 1.22–1.32	1-448139-1	No
0.233 5.91	**.048–.052** 1.22–1.32	1-448139-4	No
0.264 6.70	**.048–.052** 1.22–1.32	1-448139-5	Yes
0.143 3.63	**.061–.064** 1.55–1.63	448139-8	No

Front Release/Remove Size 20, Posted Pin Contacts

Use Insertion/Extraction Tool Part Number 91066-4

Minimum Post Extension from Rear of Insert (Dim. A)	Post Diameter (Dim. B)	Part Number	Solder Dipped
0.236 5.99	**.030–.034** 0.76–0.86	1-448138-2	No
0.272 6.90	**.030–.034** 0.76–0.86	1-448138-5	No
0.272 6.90	**.030–.034** 0.76–0.86	1-448138-6	Yes
0.236 5.99	**.030–.034** 0.76–0.86	1-448138-7	Yes

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Japan: 81-44-844-8013
UK: 44-208-420-8341

COAXICON Contacts

COAXICON Contacts are not supplied in connector kits; they must be ordered separately.

Size 1

Size 5

Size 1 Contacts

Performance Characteristics

Nominal Impedance — 50 ohms

Frequency Range — 0 to 5 GHz

Operating Temperature — -85°F to +329°F [-65°C to +165°C]

Operating Voltage (Rated) — 1000 VAC rms, 60 Hz at Sea Level

Contact Resistance (Milliohms) — 1.0 max. — Center Contact
0.2 max. — Outer Contact

Insulation Resistance — 5,000 megohms min. @ 500 vdc per MIL-STD-1344, Method 3003 or MIL-STD-202, Method 302, Cond. B

Dielectric Withstanding Voltage (60 Hz, rms) —
RG 214/U
2500 at Sea Level
RG 142/U
1900 at Sea Level

VSWR — 1.35 to 1.00 at 5 GHz

Insertion/Withdrawal Force —
Insertion (max.) 15 lb [66.72 N]
Withdrawal (min.) 1 lb [4.45 N]

Cable Retention —
RG 214/U
125 lb [556 N] min.
RG 142/U
60 lb [266.9 N] min.

Thermal Shock — per MIL-STD-1344, Method 1003, Cond. A or MIL-STD-202, Method 107, Cond. A

Physical Shock — per MIL-STD-1344, Method 2004, Cond. D or MIL-STD-202, Method 213, Cond. D except 300 G max.

Vibration — per MIL-STD-1344, Method 2005, Cond. VI, Letter J or MIL-STD-202, Method 204, Cond. E except 42 G max.

Humidity Temperature Cycling — per MIL-STD-1344, Method 1002, Type II, Cond. A or MIL-STD-202, Method 106

Salt Spray — per MIL-STD-1344, Method 1001, Cond. B or MIL-STD-202, Method 101, Cond. B

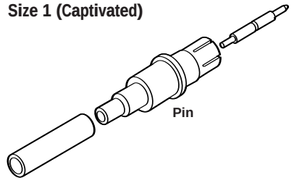
Temperature Life — per MIL-STD-1344, Method 1005, Cond. D or MIL-STD-202, Method 108, Cond. D

Material and Finish

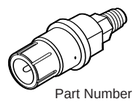
Contact — Beryllium Copper per ASTM-B-196/ASTM-B-197, Brass per ASTM-B-16, TEFLON per ASTM-D-1710, Silicon Rubber per ZZ-R-765, Gold plate per MIL-G-45204, Nickel plate per QQ-N-290

Ferrule — Copper per ASTM-B-188, Tin plate per ASTM-B-545

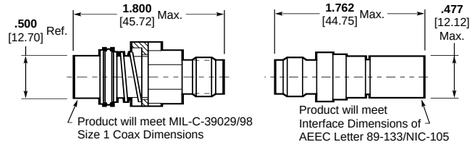
Size 1 (Captivated)



Adapter — Size 1 Pin to SMA Jack



Part Number
221597-1



Adapter Standard Size 1
Socket to TNC
Part Number 449908-1

TCAS Size 1
Socket to TNC Adapter
Part Number 447346-1

4

Rack and Panel Connectors

Catalog 1308940
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UK: 44-208-420-8341

COAXICON Contacts (Continued)

Contact Size	RG/U Cable	Contact Part No.		"O" Crimp Tooling			Military Hex Crimp Tooling				Compression Crimp Tooling		
				Center Contact			Center Contact		Ferrule				
		Pin	Socket	Tool (M22520/)	Positioner/ Die	Ferrule	Tool (M22520/)	Die (M22520/)	Tool (M22520/)	Die (M22520/)	Tool (M22520/)	Locator (M22520/)	Dies (M22520/)
O Crimp													
Size 1 (for use with 71C1, 71C1A, C2 and C2A inserts)	402 Semi-Rigid .141 [3.58]	225837-1	—	601966-1 (2-01)	1-601966-9	91905-1[1] or 91904-1[1]	—	—	—	—	—	—	—
	402 Semi-Rigid .141 [3.58]	222018-1	—	—	—	—	—	—	—	—	59980-1 (36-01)	220220-2 (36-06)	312253-1 (36-03)
	405 Semi-Rigid .086 [2.18]	222018-2	—	—	—	—	—	—	—	—	59980-1 (36-01)	220220-2 (36-06)	312253-2 (36-02)
	214	—	225831-1 211229-1*	220015-1	—	220015-1	—	—	—	—	—	—	—
	142, 142A, 142B	—	225831-3 446709-1*	91902-1[1]	—	91902-1[1]	—	—	—	—	—	—	—
	393	—	225831-6 446709-3*	220015-1	—	220015-1	—	—	—	—	—	—	—
	Tflex 402	—	1757492-1	—	—	—	—	—	—	—	—	—	—
Military Hex Crimp													
Size 1 (for use with 71C1, 71C1A, C2 and C2A inserts)	214	447095-1	447087-1	—	—	—	608650-1 (5-01)	(5-25)	608650-1 (5-01)	(5-25)	—	—	—
	213	447095-2	447087-2 446709-5*	—	—	—	608650-1 (5-01)	(5-25)	608650-1 (5-01)	(5-25)	—	—	—
	142, 142A, 142B	447095-3	447087-3 446709-6*	—	—	—	608650-1 (5-01)	(5-11)	608650-1 (5-01)	(5-11)	—	—	—
	393	447095-4	447087-4 446709-7* 5-447087-4***	—	—	—	608650-1 (5-01)	(5-25)	608650-1 (5-01)	(5-25)	—	—	—
	ECS 311201	—	447087-5 446709-2*	—	—	—	608650-1 (5-01)	(5-29)	608650-1 (5-01)	(5-29)	—	—	—
	SMA Adapter	1757180-1	—	—	—	—	—	—	—	—	—	—	—
Modified Size 1 Straight Exit (for use with C4 inserts)	214	—	446549-3*	—	—	—	M22520/5-01**	—	—	M22520/5-25	—	—	M22520/5-25
	142	—	446549-1 5-446549-1***	—	—	—	M22520/5-01**	—	—	M22520/5-11	—	—	M22520/5-11
	393	—	446549-5*	—	—	—	M22520/5-01**	—	—	M22520/5-25	—	—	M22520/5-25
	Times AA5886	—	446549-6*	—	—	—	M22520/5-01**	—	—	M22520/5-25	—	—	M22520/5-04
	Times AA5887	—	446549-2*	—	—	—	M22520/5-01**	—	—	M22520/5-29	—	—	M22520/5-29
	ESC 311201	—	446549-4*	—	—	—	M22520/5-01**	—	—	M22520/5-29	—	—	M22520/5-29
	SMA Adapter	446748-1	—	—	—	—	—	—	—	—	—	—	—
	OSP Adapter	1218713-1	—	—	—	—	—	—	—	—	—	—	—
	QMA Adapter	1757859-1	—	—	—	—	—	—	—	—	—	—	—
	Posted Contact	1757669-1	—	—	—	—	—	—	—	—	—	—	—

*Socket with mounting hardware. Mounting hardware for Size 1 Straight Exit Contacts includes: backup plate, spring, retaining ring, O-ring, washers and screws.
**Tyco Electronics does not sell Hand Tool M22520/5-01. However, it can be purchased from: Daniels Manufacturing Corp, 6103 Anno Ave., Orlando, FL 32809, 800-327-2432.
***RoHS compliant Part Number.
Notes: 1. SDE die used with hand tool frame 354940-1.
2. Hardware kit for Size 1 COAXICON Socket Contacts (used on 71C1 or C2 inserts) includes all mounting hardware required (retention plate, washers, O-ring, spring, screws and retention clip). Kit Number 447118-1 (5-447118-1 RoHS Kit Number).
3. Size 1 COAXICON Pin Contacts require retention plate 211216-2 and four screws 211558-1.
4. Size 1 COAXICON Pin Contacts with SMA adapter require retention plate 1757203-2 and four screens 211558-1.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

COAXICON Contacts (Continued)

Size 5 and 8 Contacts

Performance Characteristics for size 5 contacts

Nominal Impedance — 50 ohms

Frequency Range — 0 to 500 MHz

Operating Temperature — -85°F to +329°F [-65°C to +165°C]

Operating Voltage (Rated) — 325 VAC rms, 60 Hz

Contact Resistance (Milliohms) — Size 5 with RG 58/U cable:
Center Contact — 10
Outer Contact — 1.5

Insulation Resistance — 5,000 megohms min. @ 500 vdc per MIL-STD-1344, Method 3003 or MIL-STD-202, Method 302, Cond. B

Dielectric Withstanding Voltage (60 Hz, rms) — Sizes 5 with RG 58/U and 316/U cable:
750 - Sea Level
350 - 50,000 ft [15 240 m]

VSWR — 1.3 to 1.0 @ 500 MHz

Insertion/Withdrawal Force — Size 5:

Insertion Force Maximum		Withdrawal Force Minimum	
lb	[N]	lb	[N]
5	22.24	1	4.45

Cable Retention — Sizes 5:
60 lb [266.9 N]

Durability — 500 cycles

Thermal Shock — per MIL-STD-1344, Method 1003, Cond. A or MIL-STD-202, Method 107, Cond. A

Physical Shock — per MIL-STD-1344, Method 2004, Cond. A or MIL-STD-202, Method 213, Cond. A

Vibration — per MIL-STD-1344, Method 2005, Cond. IV or MIL-STD-202, Method 204, Cond. D

Moisture Resistance — per MIL-STD-202, Method 106, omit steps 7a and 7b

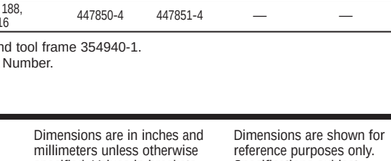
Salt Spray — 48 hours per MIL-STD-1344, Method 1001, Cond. B or MIL-STD-202, Method 101, Cond. B

Material and Finish

Contact — Beryllium copper per ASTM-B-196/ASTM-B-197, Brass per ASTM-B-16, TEFLON per ASTM-D-1710, Gold plate per MIL-G-45204, Nickel plate per QQ-N-290

Ferrule — Copper per ASTM-B-188, tin plate per ASTM-B-545

Size 5



Size 5
Extraction Tool
Part Number 91074-1

Contact Size	RG/U Cable	Contact Part No.		"O" Crimp Tooling			Military Hex Crimp Tooling			
				Center Contact			Center Contact		Ferrule	
		Pin	Socket	Tool (M22520/)	Positioner/ Die	Ferrule	Tool (M22520/)	Die (M22520/)	Tool (M22520/)	Die (M22520/)
O Crimp										
5	58C	225790-1	225791-1	601966-1 (2-01)	1-601966-6 K345	91905-1*	—	—	—	—
	400, 142, 142A, 142B	225790-2	225791-2	91904-1*	—	91905-1*	—	—	—	—
	141A	225790-1	225791-1	91904-1*	—	91905-1*	—	—	—	—
	402 Semi-Rigid .141 [3.58]	225790-3	225791-6	91904-1*	—	91905-1*	—	—	—	—
	174, 188, 316	225790-5	225791-3	601966-1 (2-01)	1-601966-6 K345	91905-1*	—	—	—	—
	180, 195	225790-4	225791-8	601966-1 (2-01)	1-601966-6 K345	91905-1*	—	—	—	—
	179, 187	225790-6 5-225790-6**	225791-4 5-225791-4**	601966-1 (2-01)	1-601966-6 K345	91905-1*	—	—	—	—
	178, 196	225790-7	225791-5	601966-1 (2-01)	1-601966-6 K345	220020-1	—	—	—	—
	223	225790-2	225791-2	601966-1 (2-01)	1-601966-6 K345	91905-1*	—	—	—	—
	BMS 13-65-OF	—	1757892-1	—	—	—	—	—	—	—
Military Hex Crimp										
5	316 Double Shield 188 Double Shield	225790-8 5-225790-8**	1-225791-0	—	—	—	601966-1 (2-01)	1-601966-6 K345	608650-1 (5-01)	(Y159)
	58C, 141A	447850-1	447851-1	—	—	—	601966-1 (2-01)	1-601966-6 K345	608650-1 (5-01)	(5-45B)
	142, 142A, 142B	447850-2	447851-2	—	—	—	601966-1 (2-01)	1-601966-6 K345	608650-1 (5-01)	(5-45B)
	402 Semi-Rigid .141 [3.58]	447850-3	447851-3	—	—	—	601966-1 (2-01)	1-601966-6 K345	608650-1 (5-01)	(5-45A)
	174, 188, 316	447850-4	447851-4	—	—	—	601966-1 (2-01)	1-601966-6 K345	608650-1 (5-01)	(5-37B)

*SDE die used with hand tool frame 354940-1.
**RoHS compliant Part Number.

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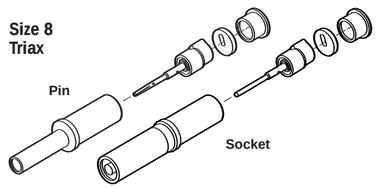
COAXICON Contacts (Continued)

Size 8 TWINAX/TRIAX/COAX Contacts

Size 8 Triax

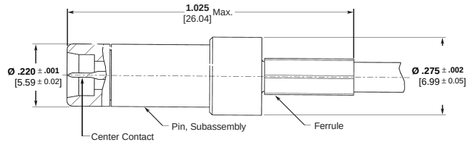


Size 8 Contact Extraction Tooling

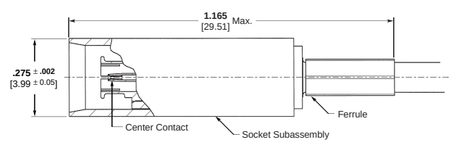
Contact Style	Tool Part Number
Rear Release/Rear Remove	58284-1
Front Release/Front Remove	58284-1
Front Release/Rear Remove	448703-1

Contact Size	Style	Cable	Contact Part No.		Crimp Tooling	Crimp Tooling	
			Pin	Socket		Center Contact	Ferrule
8 TWINAX	RR/RR	M17/176-00002	—	222191-4	Hand Tool Frame M22520/5-01 (Tyco Electronics 608650-1) Crimping Die Tyco Electronics 58316-1 or Daniels Y793 or Y793A or Tyco Electronics Hand Crimping Tool 91907-1*	—	—
	RR/RR	Tensolite 24463/9P025X-2(LD) or 24463/9B017X-2 (LD)	—	222191-5		—	—
	RR/RR	M17/176-00002	222190-4 (short engagement)	—		—	—
	RR/RR	Tensolite 24463/9P025X-2(LD) or 24463/9B017X-2 (LD)	222190-3 (short engagement)	—		—	—
	RR/RR	Tensolite 24463/9P025X-2(LD) or 24463/9B017X-2(LD)	448313-2 (long engagement)	—		—	—
	FR/RR	Tensolite 24463/9P025X-2(LD) or 24463/9B017X-2(LD)	448312-2 (long engagement)	—		—	—
8 TRIAX	FR/FR	Posted (**.250** [6.35] min. post extension)	448541-1 (long engagement)	—	—	—	—
8 Coax	RR/RR	M/A-COM FC11Z	—	448543-1	—	M22520/2-01 (Tyco Electronics 601966-1)	91907-1*
	RR/RR	M/A-COM FC14Z	—	448543-2	—		91907-1*
	RR/RR	RG/U-316, 188	1218687-3 (long engagement)	1218820-1	—		91907-1*
	RR/RR	RG/U-142	1218689-1 (long engagement)	1218821-1	—		91907-1*
	RR/RR	BMS 13-65-OF	—	1757891-1	—	—	—
	RR/RR	Adams Russell FC14Z, BMS 13-65-OF	—	448543-2	—	—	—
	RR/RR	DMS2345-62AU	—	448543-3	—	—	—
	RR/RR	BMS 13-65-OF (**.218** [5.54] hex crimp)	1757624-1**	—	—	—	—
	FR/RR	M/A-COM FC11Z	448542-1 (long engagement)	—	—	M22520/2-01 (Tyco Electronics 601966-1)	91907-1*
	FR/RR	M/A-COM FC14Z	448542-2 (long engagement)	—	—		91907-1*
	FR/FR	Posted (**.250** [6.35] min. post extension)	448540-2 (long engagement)	—	—	—	—

*SDE die used with hand tool frame 354940-1.
**Designed for Quadrax cavity, no key on contact.
Note: Size 8 QUADRAX Contacts shown on pages 4-42 to 4-48 (or 4-49).



Pin



Socket

Size 5 Coax Contacts, Spring Loaded 75 Ohm

Style	Cable	Contact Part No.		Crimp Tooling	
		Pin	Socket	Center Contact	Braid
Rear Release/ Rear Remove	RG/U-179	443971-1	443972-1	Daniels HMR Tool AFM8 or Tyco Electronics 601966-1 with Daniels positioner K1289 (socket) or K1288S (pin)	Daniels HX4 with Die-set Y196 cavity A or Tyco Electronics 35940-1 with Die-set 58483-1 Cavity B

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Traffic Alert and Collision Avoidance System (TCAS) Connectors and Mode S Transponder Connectors

Connector	Description	Part Numbers	Descriptive Part Number
TCAS Plug	Semi-environmental w/o contacts	445717-1	NIC66 K 36 C 40 AA 1
	Semi-environmental w/contacts, w/o coaxial contacts	445717-2	NIC66 K 36 C 40 AA 0
	Non-environmental w/o contacts	445717-3 5-445717-3*	NIC66 K 36 A 40 AA 1
	Non-environmental w/contacts, w/o coaxial contacts	445717-4	NIC66 K 36 A 40 AA 0
	Non-environmental w/o contacts, (8) #6-32 clinch nuts	445717-5	NIC66 K 36 A 40 CD 1
	Semi-environmental w/o contacts, (10) #4-40 clinch nuts	445717-6	NIC66 K 36 A 40 SC 1
TCAS Receptacle	Front release w/o contacts	445718-1	NIC66 J 36 FA 40 FA 1
Mode S Plug	Non-environmental w/contacts, w/o coaxial contacts	208972-5	NIC66 H 23 A 01 AA 0
	Non-environmental w/o contacts	208972-7	NIC66 H 23 A 01 AA 1
	Environmental w/contacts, w/o coaxial contacts	208973-5	NIC66 H 23 B 01 AA 0
	Semi-environmental w/o contacts	208973-6	NIC66 H 23 C 01 AA 1
Mode S Receptacle	Front release w/o contacts	211991-1	NIC66 G 23 FA 01 FA 1

Note: All standard ARINC 600 shell modifications are available.

* RoHS compliant Part Number.

Product Facts

Plug Connector

- **Tyco Electronics modified Size 1 coaxial contacts use standard military crimp tooling for reliable connections without the need for special tooling**
- **Tyco Electronics plug allows repair or replacement of the coaxial contacts without connector disassembly. Two front-release captivated screws release the backup plate**
- **Tyco Electronics connector conforms to the ARINC 600 specification, for connector intermateability and contact interchangeability**

Receptacle Connector

- **Tyco Electronics modified Size 1 coaxial contact incorporates a SMA jack for easy assembly**
- **Tyco Electronics connector conforms to the ARINC 600 specification, for connector intermateability and contact interchangeability**

The TCAS System includes one mated pair of Size 3 ARINC 600 connectors, called TCAS Connectors. The plug connector is mounted in the rack, and the receptacle connector is in the avionics box.

The TCAS System also includes one or two mated pairs of Size 2 ARINC 600 Connectors, called Mode S Transponder Connectors. The plug connectors are mounted in the rack, and the receptacle connectors are in the avionics box.

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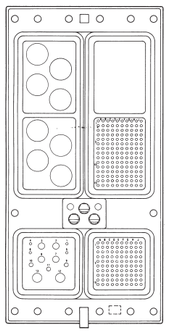
Traffic Alert and Collision Avoidance System (TCAS) Connectors and Mode S Transponder Connectors (Continued)

Contact Requirements



TCAS Connector Insert Arrangement (Receptacle Mating Face Shown)

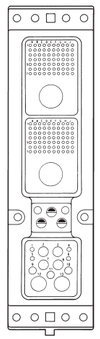
Plug Contacts

No. of Contacts	Contact Size	Contact Sex	Part Number
250	22	pin	208262-3
4	20	socket	208267-2
3	16	socket	208270-2
4	12	socket	208273-2
2	5 coax	socket	***
8	1 coax-Mod.	socket	**

Receptacle Contacts

No. of Contacts	Contact Size	Contact Sex	Part Number
250	22	socket	*
4	20	pin	208265-3
3	16	pin	208268-3
4	12	pin	208271-3
2	5 coax	pin	***
8	1 coax-Mod.	pin	**

* See page 4-17 for part numbers.
** See page 4-20 for part numbers.
*** See page 4-21 for part numbers.



Mode S Transponder Insert Arrangement

Plug Contacts

No. of Contacts	Contact Size	Contact Sex	Part Number
140	22	pin	208262-3
4	20	socket	208267-2
3	16	socket	208270-2
4	12	socket	208273-2
2	5 coax	socket	***
2	1 coax	socket	**

Receptacle Contacts

No. of Contacts	Contact Size	Contact Sex	Part Number
140	22	socket	*
4	20	pin	208265-3
3	16	pin	208268-3
4	12	pin	208271-3
2	5 coax	pin	***
2	1 coax	pin	**

* See page 4-17 for part numbers.
** See page 4-20 for part numbers.
*** See page 4-21 for part numbers.

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Single Mod ARINC 600

Descriptive Numbering

NIC66S P A 150 A 01 A

Series Designation

Shell Style/Plating
P—Plug with Chromate Conversion Coating
PN—Plug with Electroless Nickel Plating
R—Receptacle with Chromate Conversion Coating
RN—Receptacle with Electroless Nickel Plating

Class
A—Nonenvironmental, rear release
B—Environmental, rear release
C—Environmental, rear release without O-Ring or sealant around inserts
FA—Nonenvironmental, front release size 22 contacts (other contact sizes rear release)
FF—Nonenvironmental, all contact sizes front release except size 1 coax remains rear removal

Insert*
See inserts on pages 4-9 and 4-11
Use size 2 or 3 Module A, B, D and E inserts

Mounting Modifier
A—Standard Mounting, **.146–.156** [3.71–3.96] dia. holes
B—(4) #4-40 Clinch Nuts
C—(4) #6-32 Clinch Nuts

Keying
01-36, see keying codes on page 4-27

Contact Loading
X—Contacts Not Included With Connector (used also for Expanded Beam Fiber Optic Inserts)
A—Rear release crimp contacts included
B—Front release **.025** [.64] dia. x **.150** [3.81] solder post size 22 sockets loaded
C—Front release **.025** [.64] dia. x **.250** [6.35] solder post size 22 sockets loaded
D—Front release **.025** [.64] dia. x **.375** [9.53] solder post size 22 sockets loaded
E—Front release **.025** [.64] dia. x **.500** [12.70] solder post size 22 sockets loaded
F—Front release **.025** [.64] square x **.250** [6.35] (1 wrap) size 22 sockets loaded
G—Front release **.025** [.64] square x **.375** [9.52] (2 wrap) size 22 sockets loaded
H—Front release **.025** [.64] square x **.500** [12.70] (3 wrap) size 22 sockets loaded

See Contacts on pages 4-16 to 4-22, and 4-42 to 4-47

* Expanded Beam Fiber Optic inserts can also be used — must use signal cavity inserts identified as 1JS, 2JS, 3JS, or 6MS. See page 4-11 or contact Tyco Electronics for more information.

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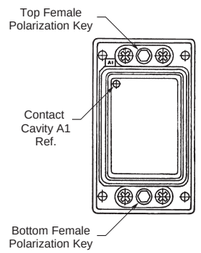
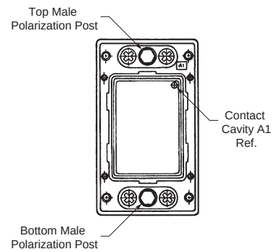
Single Mod ARINC 600 (Continued)

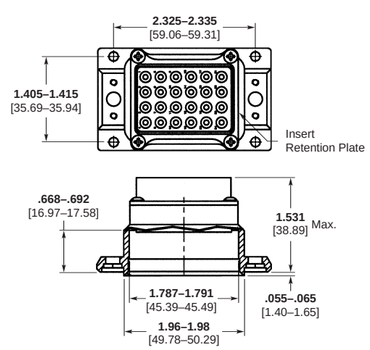
Keying and Polarization



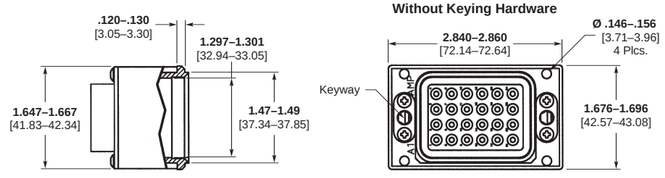
Receptacle (Box Side)



Plug (Rack Side)



View Shown
Without Keying Hardware



Single Mod Receptacle

Catalog 1308940
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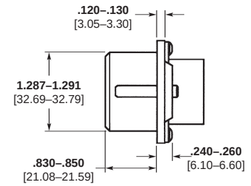
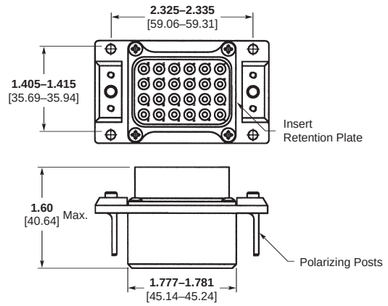
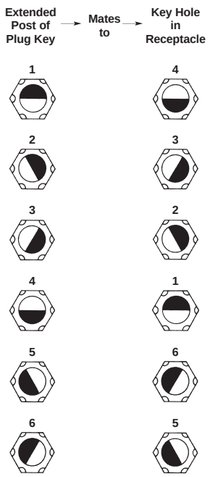
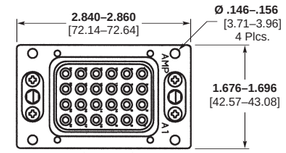
Single Mod ARINC 600 (Continued)

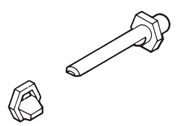


Single Mod Plug









Keying Code	Receptacle		Plug	
	Top Key	Bottom Key	Top Post	Bottom Post
01	1	1	4	4
02	3	4	2	1
03	2	4	3	1
04	1	4	4	1
05	6	4	5	1
06	5	4	6	1
07	4	5	1	6
08	3	5	2	6
09	2	5	3	6
10	1	5	4	6
11	6	5	5	6
12	5	5	6	6
13	4	6	1	5
14	3	6	2	5
15	2	6	3	5
16	1	6	4	5
17	6	6	5	5
18	5	6	6	5

Keying Code	Receptacle		Plug	
	Top Key	Bottom Key	Top Post	Bottom Post
19	4	1	1	4
20	3	1	2	4
21	2	1	3	4
22	4	4	1	1
23	6	1	5	4
24	5	1	6	4
25	4	2	1	3
26	3	2	2	3
27	2	2	3	3
28	1	2	4	3
29	6	2	5	3
30	5	2	6	3
31	4	3	1	2
32	3	3	2	2
33	2	3	3	2
34	1	3	4	2
35	6	3	5	2
36	5	3	6	2

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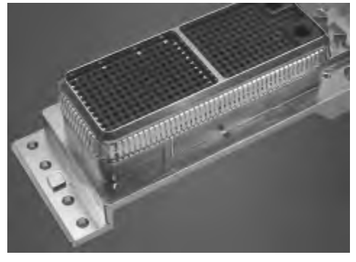
EMI/Ground Spring

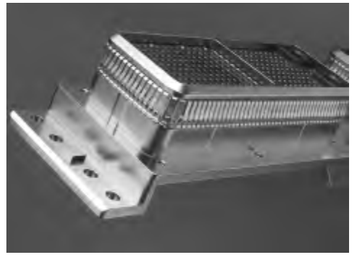
EMI/Ground Spring Performance Data Comparison

	Cantilever Style	Canted Coil Style
Mating/Un-mating Force Results Design Objective = < 15 lbs for size 2 shell	6 lbs/3 lbs	14 lbs/6 lbs
Durability	500 min. mating/un-mating cycles	
EMI Test Results (Size 2 Shell) 100 to 1,000 MHz Design Objective = 65 dB @ 100 MHz and 60 dB @ 1,000 MHz	89 dB min. 93 dB average	88 db min. 92 dB average
Field Repairable	No	Yes

Canted Coil Spring Design

Cantilever Spring Design





Note: ARINC 600 connectors can be supplied with either canted coil spring or cantilever spring design, contact Tyco Electronics.

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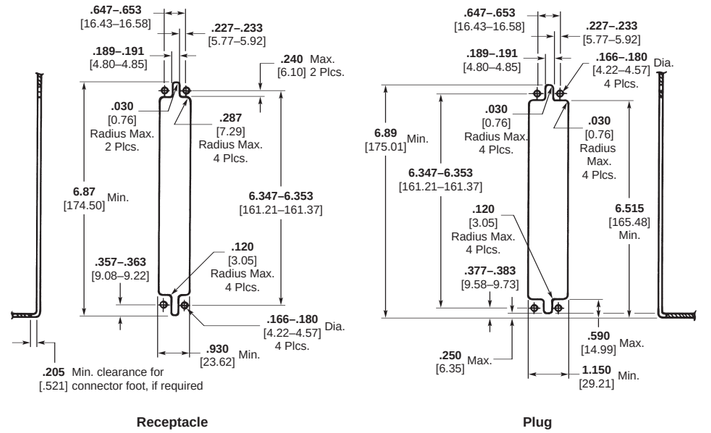
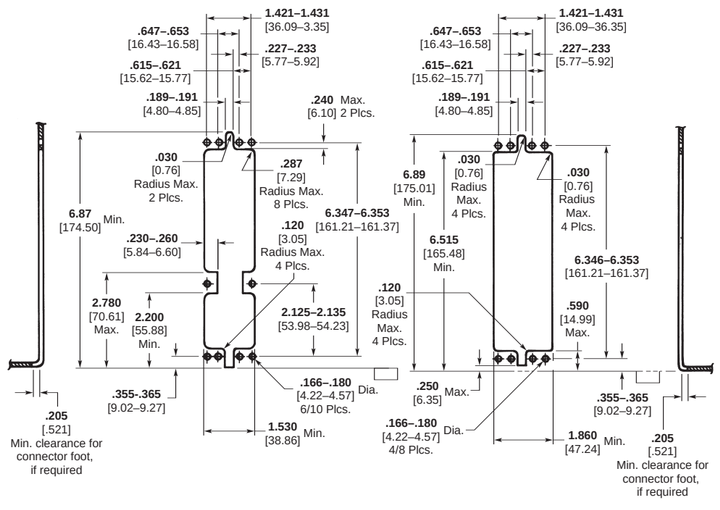
Recommended Panel Cutouts

Shell Size 1



Receptacle **Plug**

Shell Size 2



Receptacle **Plug**

Note: These drawings are for reference only. For detailed mounting instructions, see the ARINC 600 specification.

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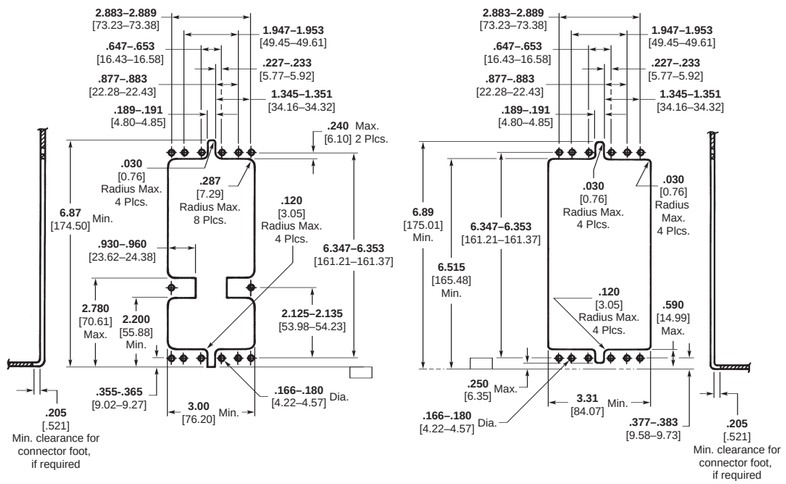
Recommended Panel Cutouts (Continued)

Shell Size 3



Accessories

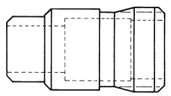
Materials and Finish

Body — Copper alloy, .000015 [0.000381] min. gold per MIL-G-45204 over .000040 [0.00102 min. nickel per QQ-N-290

End Cap — TEFLON

Cavity Reducer Pin

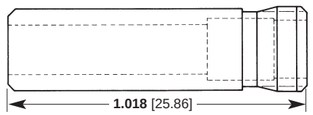
Part Number 446743-1



Size 5 coax to size 12 contact cavity reducer. Insert into size 5 coax cavity to convert to a size 12 power contact cavity.

Cavity Reducer Socket

Part Number 446744-1



Coaxial Sealing Plug and Boot

Material — Silicone Rubber

Size 5

Plug—Part Number 205975-1

Boot for RG-58C cable—Part Number 205402-2
Boot for RG-180, -190 cable—Part Number 205402-3

Dust Covers, Conductive

Connector Size(s)	Part Number
1	211600-1
2 & 3	211600-2

Sealing Plugs

Size 22

Part Number 204760-1
White TEFLON

Size 20

Part Number 203839-1
Red thermoplastic

Size 16

Part Number 203839-2
Blue thermoplastic

Size 12

Part Number 205574-1
Yellow thermoplastic

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Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Application Tooling and Insertion/Extraction Tooling

Hand Crimping Tools

These standard military-type hand tools terminate screw-machined pins and sockets to wire with an 8-indent crimp per MIL-C-22520. They are ideal for prototype, field maintenance and other applications where volume is not a factor.

Tool Number 601967-1 is suitable for crimping wire range 26 AWG [0.12–0.15 mm^2] to 12 AWG [3 mm^2]. Tool Number 601966-1 is suitable for crimping wire range 32 AWG [0.03 mm^2] to 20 AWG [0.5-0.6 mm^2].

Part Number 601966-1
MIL Number M22520/2-01

AMP-TAPEMATIC 4/8 Indent Stripper-Crimper Machine, 599406-7

Portable bench machine that strips wire and crimps tape-mounted, closed-barrel pin and socket contacts for AMPLIMITE Military, ARINC and CPC connectors. The stripping and crimping heads are accessible through separate openings in the front of the machine. Wire strip length and crimp height are adjustable. The stripping head is pre-set to the proper cutting depth of four standard wire sizes.

Specifications

Width — 12.5 [317]
Depth — 12.5 [317]
Height — 10 [254] without reel
Weight — 45 lb [20 kg]
Electrical — 120 VAC, 60 Hz, 1.3 A
Wire Range — 28-20 AWG [0.08-0.5 mm^2]

Application Tooling Instruction Sheet Cross Reference

Tool Number	Instruction Sheet
601966-1	408-7516
601967-1	408-7516
599406-7	408-7516

Insertion/Extraction Tools, ARINC 600

Tool Part Number	Product Line	Contact Size	Contact Type	Color Code	Style
91066-1	ARINC 600	22	Signal	Green	Rear Release/Rear Remove
91066-4	ARINC 600	20	Signal	Red	Rear Release/Rear Remove and Front Release/Front Remove
91066-3	ARINC 600	16	Signal	Blue	Rear Release/Rear Remove and Front Release/Front Remove
445147-1	ARINC 600	12	Signal	—	Rear Release/Rear Remove and Front Release/Front Remove
445815-1	ARINC 600	22	Signal	—	Front Release/Front Remove
58284-1	ARINC 600	8	Twinax/Triax/ Coax/Quadrax	—	Rear Release/Rear Remove and Front Release/Front Remove
448703-1	ARINC 600	8	Twinax/Triax/Coax	—	Front Release/Rear Remove
91074-1	ARINC 600	5	Twinax/Triax/Coax	—	Rear Release/Rear Remove and Front Release/Front Remove

Catalog 1308940
Revised 8-06

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Cross Reference

For convenience, certain connectors have been assigned conventional Tyco Electronics production part numbers, as shown in this table. These parts may be ordered using the Tyco Electronics numbers or by using descriptive part numbers.

Description	Tyco Electronics Designation	Part Number	RoHS Part Number
Size 1 Receptacle, Unsealed	NIC66E11A00AA0	1-208599-1	—
	NIC66E11A00AA1	1-208599-5	—
	NIC66E11A01AA0	208599-1	5-208599-1
	NIC66E11A01AA1	208599-2	—
	NIC66E11A03AA1	208599-7	5-208599-7
	NIC66E11A11AA0	1-208599-0	—
	NIC66E11A12AA0	1-208599-3	—
	NIC66E11A12CB0	208599-4	—
	NIC66E11A16AA0	208599-9	—
	NIC66E11A19CB1	208599-3	—
	NIC66E11A22AA1	208599-5	—
	NIC66E11A23AA0	208599-8	—
	NIC66E11A50AA0	208599-6	—
Size 1 Receptacle, Sealed	NIC66E11B01AA0	208600-1	—
	NIC66E11B01AA1	208600-2	—
	NIC66E11B54AA0	208600-3	—
Size 1 Receptacle, Front Release	NIC66E11FA01FA1	448482-1	—
	NIC66E11FA01FF0	448482-2	—
Size 1 Plug, Unsealed	NIC66F11A00AA0	208597-7	—
	NIC66F11A01AA0	208597-1	—
	NIC66F11A01AA1	208597-2	—
	NIC66F11A03AA0	208597-4	—
	NIC66F11A03CB1	208597-9	—
	NIC66F11A06CB1	1-208597-3	—
	NIC66F11A08AA1	1-208597-2	6-208597-2
	NIC66F11A08CB0	1-208597-5	—
	NIC66F11A10AA1	1-208597-6	6-208597-6
	NIC66F11A13AA0	208597-5	—
	NIC66F11A13AA1	208597-6	—
	NIC66F12A02AA0	208597-8	—
	NIC66F12A02CB0	1-208597-4	—
	NIC66F14A01AA0	1-208597-0	—
Size 1 Plug, Sealed	NIC66F11B01AA0	208598-1	—
	NIC66F11B01AA1	208598-2	5-208598-2
	NIC66F11B22AA1	208598-4	—
	NIC66F11C00AA1	1-208598-2	—
	NIC66F11C01AA1	208598-3	—
Size 2 Receptacle, Unsealed	NIC66G21A00AA0	1-208970-4	—
	NIC66G21A01AA0	208970-1	—
	NIC66G21A01AA1	208970-4	—
	NIC66G21A01AC0	208970-2	—
	NIC66G21A01BA1	208970-5	—
	NIC66G21A01CA0	1-208970-1	—
	NIC66G21A01CC0	2-208970-3	—
	NIC66G21A01CC1	208970-6	5-208970-6
	NIC66G21A01SB1	208970-3	5-208970-3
	NIC66G21A01SC1	1-208970-8	—
	NIC66G21A02AA0	1-208970-3	—
	NIC66G21A02AA1	1-208970-2	—
	NIC66G21A02CC0	2-208970-2	—
	NIC66G21A05CC0	2-208970-4	—
	NIC66G21A09CC0	1-208970-0	—
	NIC66G21A19AA0	1-208970-7	—
	NIC66G26A01AA0	1-208970-6	—
Size 2 Receptacle, Sealed	NIC66G21B01AA0	208971-1	—
	NIC66G21B01AA1	208971-2	—
	NIC66G21B04AA0	208971-4	—
	NIC66G21B05AA0	208971-3	—

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Cross Reference (Continued)

Description	Tyco Electronics Designation	Part Number	RoHS Part Number
Size 2 Receptacle, Front Release	NIC66G20FA00FA1	3-211991-3	—
	NIC66G20FA01FA1	3-211991-4	—
	NIC66G20FA03FB0	2-211991-0	—
	NIC66G20FA08FB0	2-211991-1	—
	NIC66G21FA FA1	211991-2	—
	NIC66G21FA00CC1	211991-9	—
	NIC66G21FA01CC1	1-211991-0	—
	NIC66G25FA01FA1	211991-3	—
	NIC66G21FA01FC0	1-211991-1	—
	NIC66G21FA01GD0	211991-5	—
	NIC66G21FA01GJ0	3-211991-5	—
	NIC66G21FA01SB1	211991-6	—
	NIC66G21FA02FF0	1-211991-4	—
	NIC66G21FA04FF0	3-211991-0	—
	NIC66G21FA06GF0	2-211991-7	—
	NIC66G21FA07GD0	3-211991-7	—
	NIC66G21FA09GD0	1-211991-6	—
	NIC66G22FA00CC1	2-211991-4	—
	NIC66G23FA00CC1	2-211991-2	—
	NIC66G23FA01FA1	211991-1	—
	NIC66G23FA02FA1	1-211991-7	—
	NIC66G23FA91FA1	211991-4	—
	NIC66G25FA00CC1	2-211991-3	—
	NIC66G26FA01FA1	211991-8	—
	NIC66G26FA68GD0	1-211991-2	—
	NIC66G29FA01FA1	1-211991-8	—
	NIC66G29FA02FA1	3-211991-6	—
Size 2 Plug, Unsealed	NIC66H20A AA0	2-208972-8	—
	NIC66H20A00AA0	3-208972-5	8-208972-5
	NIC66H20A08AA1	4-208972-0	9-208972-0
	NIC66H21A00AA0	1-208972-6	—
	NIC66H21A01AA0	208972-1	5-208972-1
	NIC66H21A01AA1	208972-2	—
	NIC66H21A02AA0	1-208972-4	—
	NIC66H21A02AA1	1-208972-2	—
	NIC66H21A03AA0	3-208972-6	—
	NIC66H21A06AA0	3-208972-7	—
	NIC66H21A14AA0	1-208972-1	—
	NIC66H22A01AA1	208972-8	—
	NIC66H22A13AA0	2-208972-0	—
	NIC66H23A00CB1	3-208972-2	—
	NIC66H23A01AA0	208972-5	—
	NIC66H23A01AA1	208972-7	5-208972-7
	NIC66H23A01CB1	1-208972-8	—
	NIC66H23A02AA0	2-208972-3	—
	NIC66H23A05AA0	2-208972-1	—
	NIC66H25A01AA0	208972-9	—
	NIC66H25A01AA1	1-208972-0	—
	NIC66H26A00AA1	3-208972-4	—
	NIC66H26A01AA0	1-208972-5	—
	NIC66H26A01AA1	1-208972-3	—
	NIC66H26A01SA1	2-208972-2	—
	NIC66H51A00AA0	2-208972-4	—
	NIC66H52A00AA0	3-208972-0	8-208972-0
	NIC66H52A03AA0	3-208972-9	8-208972-9
	NIC66H53A01AA0	2-208972-5	—
	NIC66H53A08AA0	449836-1	—
	NIC66H54A01AA1	2-208972-9	—
	NIC66H56A09AA0	449837-1	—
	NIC66H272A00AA0	1218867-2	—

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Cross Reference (Continued)

Description	Tyco Electronics Designation	Part Number	RoHS Part Number
Size 2 Plug, Sealed	NIC66H20B03AA0	2-208973-8	—
	NIC66H20B08AA0	2-208973-9	—
	NIC66H20B40AA1	3-208973-8	—
	NIC66H20C00AA0	3-208973-1	—
	NIC66H21B01AA0	208973-1	—
	NIC66H21B01AA1	1-208973-0	—
	NIC66H21B04AA0	1-208973-3	—
	NIC66H21B05AA0	1-208973-2	—
	NIC66H21B06CD0	3-208973-3	—
	NIC66H21B06CD1	3-208973-4	—
	NIC66H21B40AA1	3-208973-9	—
	NIC66H21C00AA0	3-208973-0	—
	NIC66H21C01AA0	208973-3	—
	NIC66H21C06CD0	3-208973-5	8-208973-5
	NIC66H21C09AA0	3-208973-2	—
	NIC66H21C29AA0	2-208973-0	—
	NIC66H23B01AA0	208973-5	—
	NIC66H23B08AA0	1-208973-4	—
	NIC66H23C01AA1	208973-6	—
	NIC66H25C01AA0	208973-7	—
	NIC66H25C01AA1	208973-8	—
	NIC66H26B01AA1	2-208973-2	—
	NIC66H26B02AA1	1-208973-1	—
	NIC66H52B03AA0	4-208973-0	9-208973-0
Size 3 Receptacle, Unsealed	NIC66J31A00AA0	208974-4	—
	NIC66J31A01AA0	208974-1	—
	NIC66J31A01AA1	208974-3	—
	NIC66J34A01AA0	208974-5	—
Size 3 Receptacle, Sealed	NIC66J31B01AA0	208975-1	—
	NIC66J31B01AA1	208975-3	—
Size 3 Receptacle, Front Release	NIC66J31FA00CA1	1-211992-1	—
	NIC66J31FA01FA1	211992-1	—
	NIC66J31FA01FF0	211992-4	—
	NIC66J31FA01FH0	211992-5	—
	NIC66J31FA03FA1	211992-6	—
	NIC66J31FA27FA1	211992-7	—
	NIC66J32FA00FA1	211992-3	—
Size 3 Plug, Unsealed	NIC66K31A00AA0	208976-5	—
	NIC66K31A01AA0	208976-1	—
	NIC66K31A01AA1	208976-3	—
	NIC66K32A01AA0	208976-7	—
	NIC66K33A01AA0	208976-6	5-208976-6
	NIC66K33A01AA1	208976-2	—
	NIC66K34A01AA0	208976-8	—
	NIC66K36A40CD1	445717-5	—
Size 3 Plug, Sealed	NIC66K31B01AA0	208977-1	—
	NIC66K31B01AA1	208977-3	—
	NIC66K31B01BA0	208977-8	—
	NIC66K31C01AA1	208977-5	—
	NIC66K33B01AA1	208977-2	—
	NIC66K33C01AA1	208977-4	—
	NIC66K34C01AA1	208977-7	—
	NIC66K36C40CD1	1-445717-7	6-445717-7

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MIL 600 Style Connectors

Product Facts

- **Conforms to MIL-DTL-83527**
- **Sizes: 2, 3, 4**
- **Variety of contact inserts available**
- **Sealing features include grommets, interfacial seals, and wedge stabilizers**
- **Provides EMI shielding**

Material and Finish

Shell — Aluminum 2024 T4

Retainer Plates — Aluminum alloy

Finish — Chemical chromate conversion over cadmium plate per QQ-P-416

Polarizing Posts — Zinc alloy per ASTM B-86 with electroless nickel plating

Polarizing Keys — Stainless steel 303, passivated

Inserts — Thermoset or Thermoplastic

Grommets, Seals — Fluorosilicone rubber

Specifications

Temperature Range — -65°C to +125°C

Mating and Unmating Forces — Max after 10 cycles; connectors have a full complement of contacts

Size 2 — 325 lbs

Size 3 — 400 lbs

Size 4 — 475 lbs

Contact Retention against axial load — Per MIL-STD-1344, Method 2007

Size 22 — 12.0 lbs

Size 20 — 20.0 lbs

Size 16 — 25.0 lbs

Size 12 — 30.0 lbs

Size 8 — 25.0 lbs (twinax)

Size 5 — 25.0 lbs (coax)

Voltage/Current Ratings —

Contact	AWG	Max Current (A)
Size 22	22	5.0
Size 20	20	7.5
Size 16	16	13.0
Size 12	12	23.0

Dielectric Withstanding Voltage — Per MIL-STD-1344, Method 3001

Altitude	AC Volts Mated	60 Hz rms Unmated
Sea level	—	1300 (size 22)
Sea level	—	1500 (others)
50,000 ft	800	550
70,000 ft	800	350
100,000 ft	800	200

Insulation Resistance — Per MIL-STD-1344, Method 3003 1000 megohms min. at ambient and at 150°C

Contact Resistance — Per MIL-STD-1344, Method 3004 and 3002

Durability — Per MIL-STD-1344, Method 2016; 500 cycles minimum

Salt Spray Tolerance — Per MIL-STD-1344, Method 1001, test condition A; no evidence of exposure of base metal or build-up of corrosion that affects connector testing

Humidity Tolerance — Per MIL-STD-1344, Method 1002, Type II Insulation Resistance greater than 1000 megohms before, during and after test

Fluid Immersion — Per MIL-STD-1344, Method 1016, fluids tested: i) isopropyl alcohol, j) 1-1-1 trichloroethane, k) Freon TMC; no evidence of deterioration, distortion or material reversion

Temperature Cycling — Per MIL-STD-1344, Method 1003 except steps 2 and 4 are 2 minutes maximum duration; step 1 is -65°C; step 3 is +150°C

High Temperature Tolerance — 1000 hours min. at 150°C for wired, mated connectors

Vibration Testing — Per MIL-STD-1344, Method 2005 (Functional Test Curve: 2 hrs in each of 3 axes; Endurance Test Curve: 2.5 hrs in each of 3 axes); no discontinuity exceeding 1 microsecond, no visible evidence of cracking, breaking or loosening of parts

Shock Testing — Per MIL-STD-1344, Method 2004 (Test condition H: 30G, 11 ms, half sine); no discontinuity exceeding 1 microsecond, no visible evidence of cracking, breaking or loosening of parts

EMI Shielding — Per DOD-83527 (for a Size 2 shell)

EMI Shielding Eff. Frequency (MHz)	Leakage Attenuation (dB)
100	65
200	63
300	63
400	62
800	60
1000	60

Shell-to-Shell Conductivity — Per MIL-STD-1344, Method 3007; Potential drop does not exceed 2.5 millivolts

MIL-DTL-83527 Style Connectors

Descriptive Number	Tyco Electronics Part Number
M6E2RC150-34WAA01A	1218044-1
M6E2PC150-34WAA01A	443965-1
M6E2PC150-34WAA01A	443102-1
M6E2RC150-100WAA01A	447142-1
M6E2PC24-34WAA01Z	447280-1
M6E2PC150-34WAA01A	443102-1
M6E2PC150-34WAA01A	443965-1
M6E2PC150-100WAA01A	447141-1
M6E3PC150-100-150-100WAA01A	447143-1
M6E3RC150-100-150-100WAA01A	447144-1

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MIL 600 Style Connectors (Continued)

MIL-DTL-83527 Connector Sample Descriptive Part Number

M6 E 4RC 150-100-24-34-60-100 W AA 001 A

MIL 600 connector in accordance with MIL-DTL-83527

Sealing
E = Sealed per M83527: rear grommet, interfacial seal [rcpt only], o-ring around insert
F = Interfacial seal [rcpt only], o-ring around insert (no grommet)
G = O-ring around insert (no interfacial seal or grommet)
U = unsealed

Shell size & plating (see pages 4-39 to 4-41)
2 = shell size 2 with two insert cavities (A, B)
3 = shell size 3 with four insert cavities (A, B, C, D)
4 = shell size 4 with six insert cavities (A, B, C, D, E, F)

Shell Type
R = receptacle (for box)
P = plug (for rack or chassis)

Shell Plating
C = Cadmium plating (MIL-DTL-83527 standard plating)
N = Nickel plating

Insert Arrangement
Indicates the insert arrangements used within the shell. See available M83527 inserts below. If the shell has six inserts (as in this example) then six insert arrangements are identified. In this example, 150 is for the A cavity, 100 is for B cavity, 24 is for C cavity and so on.

Insert style (rear release/remove only)
W = All contacts rear release/rear remove, Military contacts per MIL-DTL-83527

Shell Modifications
AA = standard .151 inch [3.8 mm] diameter mounting holes

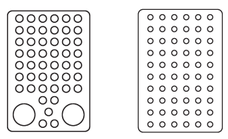
Keying (see page 4-12 for keying codes)

Contact Order Code (Contact part numbers listed on page 4-37)
Z = no contacts provided
A = rear release crimp signal & power contacts (size 22 through size 12) included; coax/triax/quadrax contacts ordered separately

Custom designs can be configured. Contact Tyco Electronics for custom versions not defined above.

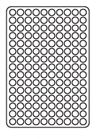
MIL-DTL-83527 Inserts

Available Insert Arrangements for Cavities A, C & E

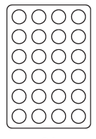


47T2
(47) #20
(2) #8 Twinax

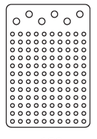
60
(60) #20



150
(150) #22

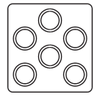


24
(24) #12

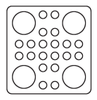


126
(120) #22
(6) #16

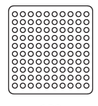
Available Insert Arrangements for Cavities B, D & F



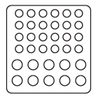
T6
(6) #8 Twinax



20T4
(20) #20
(4) #8 Twinax



100
(100) #22



34
(24) #20
(10) #16

Catalog 1308940
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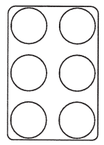
Japan: 81-44-844-8013
UK: 44-208-420-8341

MIL 600 Style Connectors (Continued)

Insert Arrangements — Fiber Optics

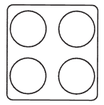
Mini-Expanded Beam

Shell Module A, B, D or E

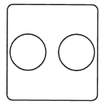


6MS

Shell Module C or F



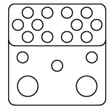
4MP



2MP

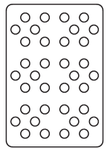
For LuxCis Optical Termini details, see page 4-11

Contact Arrangement



17F12Q2

Contact Arrangement



36F36

For Mini Expanded Beam insert details, see pages 3-15 to 3-17

Military 600 Connector Contact Selection Guide Crimp, Snap-In, Rear-Release Contacts

Pin Contacts

Contact Size	Wire Size AWG	Color Code	Contact Part Number	MIL Part Number (Reference)	Ins/Ext Tool Part Number
22	22-26	Gm/Wh/Violet	211901-5	MIL-C-39029/93-597	91066-1
20	20-24	Grn/Wh/Gray	208265-5	MIL-C-39029/93-598	91066-4
16	16-20	Grn/Or/Wh	213122-5	MIL-C-39029/93-539	91066-3
12	12-14	Grn/Ye1/Blk	213123-5	MIL-C-39029/93-540	445147-1

Socket Contacts

Contact Size	Wire Size AWG	Color Code	Contact Part Number	MIL Part Number (Reference)	Ins/Ext Tool Part Number
22	22-26	Blu/Blk/Brn	208264-4	MIL-C-39029/94-601	91066-1
20	20-24	Blu/Blk/Red	208267-4	MIL-C-39029/94-602	91066-4
16	16-20	Blu/Blk/Or	208270-4	MIL-C-39029/94-603	91066-3
12	14-Dec	Blu/Blk/Yel	208273-4	MIL-C-39029/94-604	445147-1

Size 8 Concentric Twinax Contacts

Contact Style	For Cable	Contact Part Number	Ins/Ext Tool Part Number
Pin	M17-176-00002	222190-4	58284-1
Socket	M17-176-00002	222191-4	58584-1

Size 12 Shielded Contacts

Contact Style	For Cable	Contact Part Number	MIL Part Number (Reference)	Ins/Ext Tool Part Number
Pin	M17-176-00002	213156-1	M39029/74-400	445147-1
Socket	M17-176-00002	213157-1	M39029/73-397 (with exceptions)	445147-1

LuxCis is a trademark of Radiall, S.A.

MIL 600 Style Connectors (Continued)

MIL-DTL-83527 Shell Configurations with ARINC 600 Style Inserts and Contacts Sample Descriptive Part Number

Note: These connectors do not meet the performance requirements of MIL-DTL-83527.

A6 P 4RN 150-13C2-Q11-24-6MP-100 W AA 01 A

MIL-DTL-83527 shell with ARINC 600 inserts and contacts

Sealing (no interfacial seals available)
P = Rear grommet only, no RTV sealant between insert & shell
R = Rear grommet, RTV sealant between insert & shell
S = RTV sealant between insert & shell, no grommet
U = unsealed

Shell size & plating (see pages 4-39 to 4-41)
2 = shell size 2 with two insert cavities (A, B)
3 = shell size 3with four insert cavities (A, B, C, D)
4 = shell size 4 with six insert cavities (A, B, C, D, E, F)

Shell Type
R = receptacle (for box)
P = plug (for rack or chassis)

Shell Plating
C = Cadmium plating (MIL-DTL-83527 standard plating)
N = Nickel plating

Insert Arrangement (See available ARINC 600 style inserts on pages 4-9 and 4-11)
Indicates the insert arrangements used within the shell.
If the shell has six inserts (as in this example) then six insert arrangements are identified.
In this example, 150 is for the A cavity, 13C2 is for B cavity, Q11is for C cavity and so on.
Note: ARINC 600 style inserts do not include interfacial seals or o-rings and do not meet the MIL-DTL-83527 contact locations.

Insert style (front release/remove or rear release/remove); all contacts are ARINC 600 style contacts
W = All contacts rear release/rear remove (plug or receptacle)
X = All contacts front release/front remove (receptacle only)
Y = All signal (size 22) front release/front remove; all other sizes rear release/rear remove (receptacle only)
Note: ARINC 600 contacts are not Military qualified contacts and do not meet the MIL-DTL-83527 contact locations.

Shell Modifications
AA = standard .151 inch [3.8 mm] diameter mounting holes

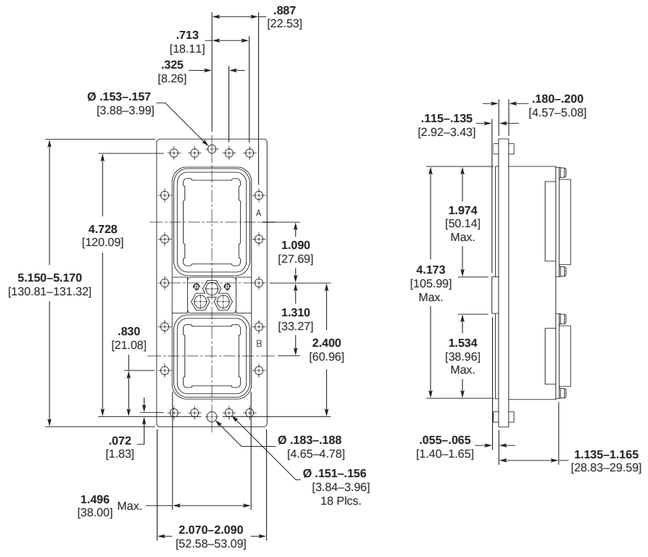
Keying (see page 4-12 for keying codes)

Contact Order Code (see pages 4-16 to 4-22 and 4-42 to 4-47 for ARINC 600 style contacts)
Z = no contacts provided
A = rear release crimp signal & power contacts (size 22 through size 12) included; coax/triax/quadrax contacts ordered separately.
B = .250 post extension front release contacts loaded into connector; all other contacts are ordered separately.
C = .250 post extension front release contacts loaded into connector; rear release crimp contacts (size 20 through size 12) included with connector kit; rear release crimp coax/triax/quadrax contacts ordered separately.
D = same as B except .150 post extension.
E = same as C except .150 post extension.
F = same as B except .375 post extension.
G = same as C except .375 post extension.
H = same as B except .500 post extension.
J = same as C except .500 post extension.

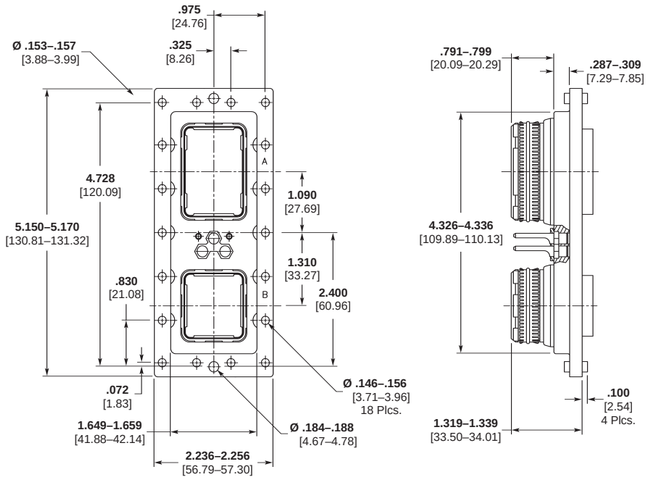
Custom designs can be configured. Contact Tyco Electronics for custom versions not defined above.

MIL 600 Style Connectors (Continued)

Receptacle Size 2



Plug Size 2



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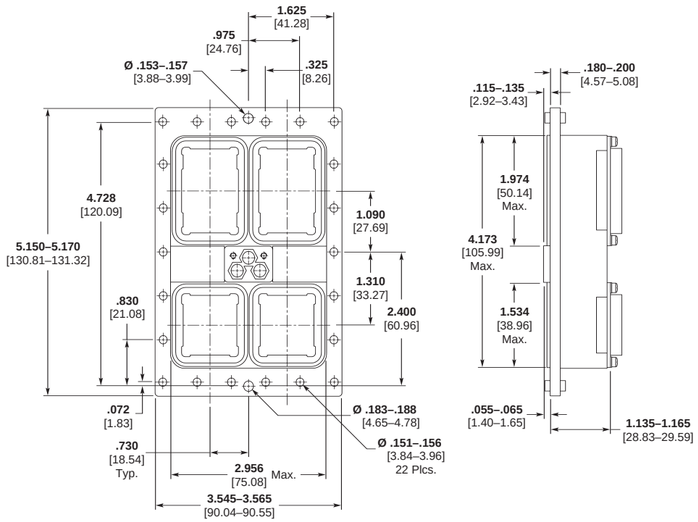
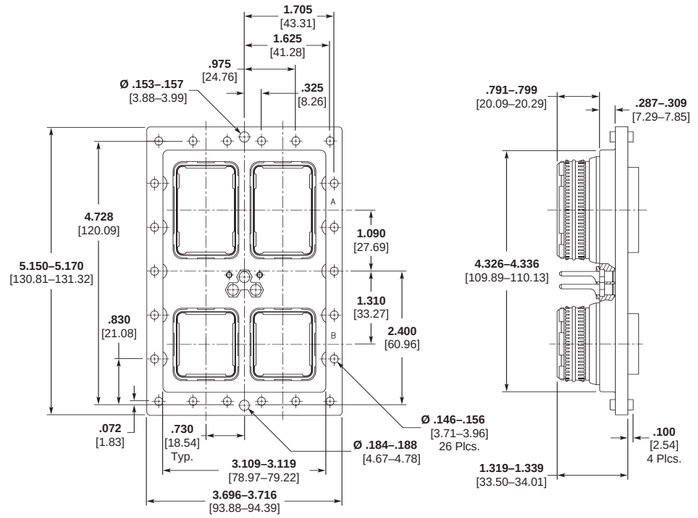
MIL 600 Style Connectors (Continued)

Receptacle Size 3



Plug Size 3



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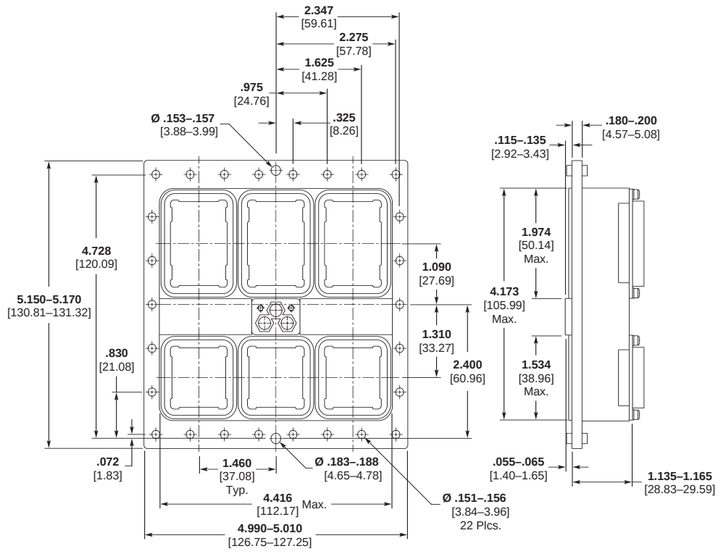
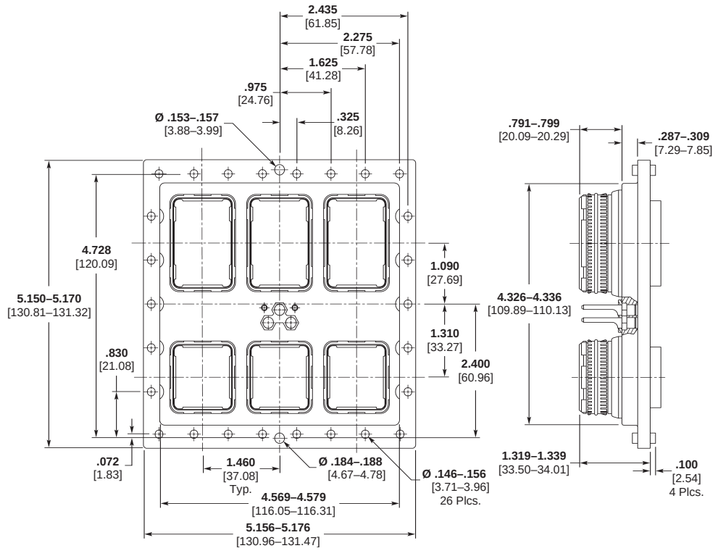
MIL 600 Style Connectors (Continued)

Receptacle Size 4



Plug Size 4



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Introduction

A multi-signal contact system consisting of two differential pairs (matched impedance) used with quadaxial Ethernet and Fiber Channel cables. Available in shell size 8 (keyed); 24 AWG pin and socket contacts, Hex Crimp version as well as pin PCB tail solderable versions. Adaptable to a variety of connectors (ARINC 600, 404, D-Subminiature connectors, MIL-DTL-38999 style, etc.).

Designed for use in high speed applications such as Gigabit Ethernet, IEEE 802.3Z and Fiber Channel X3T11.2 for use on Commercial Avionics Systems, Aircraft Data Networks, Military Communications and In-Flight Entertainment Systems.

Product Facts

- **2 mm centerlines**
- **Designed per ARINC 600 — Supplement 14**
- **Fits into keyed connector inserts for connectors such as: ARINC 404 & 600, General Purpose Rectangular (GPR), MIL-DTL-38999 style, BACC65/EPXB, and custom interconnects**
- **Single-piece dielectric design simplifies termination and improves reliability**
- **Size 8 shells are designed for standard hex crimp per M2252/5-01 and M22520/5-45**
- **24 AWG contacts are designed for crimp tooling M22520/2-01 and Daniels K-709**
- **Shells are keyed for proper orientation inside connector insert blocks**
- **Rear Release/Rear Remove cable versions and Front Release/Front Remove PCB versions**
- **Utilizes standard insertion/extraction tool**

Material and Finish

Contacts, Shells, and Ferrules — Copper alloy with gold over nickel finish; one-piece thermoplastic dielectric

Technical Documents

Product Specification
108-2131

Application Specification
114-13123

Test Report
502-1182 (Quadrax Rectangular Connector)

Performance Characteristics

Maximum Mating Force per Contact Assembly — 2.75 lbf.

Minimum Un-mating Force per Contact Assembly — 1.25 lbf.

Durability — 500 mating/unmating cycles

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Electrical Characteristics

- **Designed for use with 100 Ohm and 150 Ohm characteristic impedance star quad cable. Reference contact chart on page 4-46.**
- **Signal integrity testing was completed per SFF-8410 (see engineering test report 502-1182)**
- **Characteristic impedance: 100 Ohm ± 10 Ohm nominal (measured 102.85 Ohms)**
- **Near end cross talk (NEXT) in the time domain: 0.89% measured on Tek 11801C Digital Sampling Oscilloscope**
- **Eye Patterns (Differential Mode, 1 meter and 11.2 meter cable test lengths). The minimum output eye opening for a 1V launch voltage measured at 50% of the period is:**
  1 meter, 100 MHz Eye Opening 928.53 mV
  1 meter, 1.25 GHz Eye Opening 839.77 mV
  11.2 meter, 100 MHz Eye Opening 761.60 mV
  11.2 meter, 1.25 GHz Eye Opening 315.20 mV

Return Loss

1 Meter Cable Length

Frequency MHz	dB	VSWR*
50	34.33	1.039
62	36.03	1.032
102	40.21	1.02
502	21.21	1.191
1002	13.34	1.549
1954	9.32	2.039
2950	10.27	1.884

11.2 Meter Cable Length

Frequency MHz	dB	VSWR*
50	35.26	1.035
62	36.87	1.029
102	38.90	1.023
502	26.02	1.105
1002	14.62	1.456
1798	11.74	1.698
2502	13.34	1.549
3702	6.54	2.781

*calculated

Insertion Loss

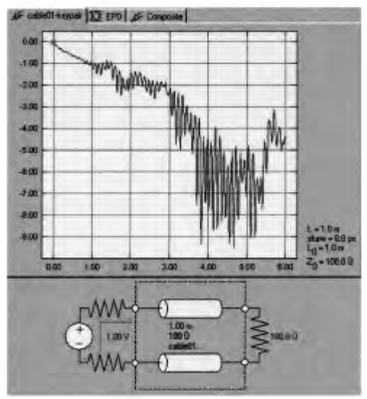
1 Meter Cable Length

Frequency MHz	dB
50	0.13
62	0.19
102	0.27
502	0.87
1002	1.39
2002	2.48
3002	3.29

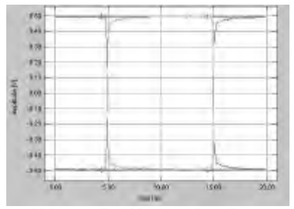
11.2 Meter Cable Length

Frequency MHz	dB
50	1.87
62	2.13
102	2.72
502	6.38
1002	10.06
1798	15.69
2502	19.47
3702	28.20

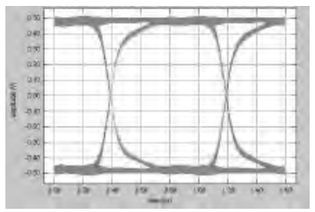
Typical Insertion Loss



Eye Pattern (Time Domain Measurement of Voltage vs. Time)



100 base-T (100 Mbps Data Rate)



1000 base-T (1 Gbps Data Rate)

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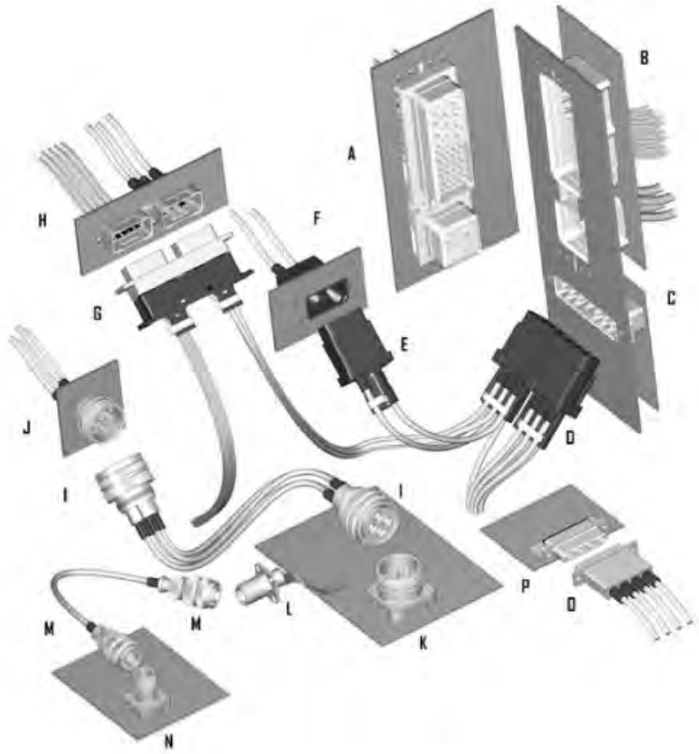

LEGEND

ARINC 600 Connectors:

A Size 2 Plug Assembly with Q11 Quadrax Insert

B Size 2 Receptacle Assembly with Q11 PCB Tail Quadrax

Quadrax Rectangular Connectors:

C 12 Position Receptacle

D 12 Position Plug Assembly with Strain Relief and Seal Boots

E 2 Position Plug Assembly with Strain Relief and Seal Boots

F 2 Position Panel Mount Receptacle with Strain Relief and Seal Boots

General Purpose Rectangular Connectors:

G GPRB2 Plug, Dual Insert Configuration w/3 Pos. Quadrax Insert

H GPRB2 Receptacle, Dual Insert Configuration w/3 Pos. Quadrax insert

38999 Style Circular Connectors:

I Size 19 Plug, 4Q4 Quadrax arrangement with Seal Boots

J Size 19 Receptacle, 4Q4 Quadrax arrangement, Panel Mount Configuration w/Seal Boots

K Size 19 Receptacle, 4Q4 Quadrax arrangement, PCB Mount

L Size 9 Receptacle, 1Q1 Quadrax arrangement, Panel Mount w/Custom Flex Circuit Assembly for direct attachment to printed circuit board

M Size 9 Plug, 1Q1 Quadrax arrangement with Seal Boot

N Size 9 Receptacle, 1Q1 Quadrax arrangement, PCB Mount

D-Sub Style Quadrax Rectangular Connectors:

O Plug with Seal Boots (In Development - Contact Tyco Electronics)

P Receptacle, Blind Mate Shell, for right-angle PCB mount (In Development - Contact Tyco Electronics)

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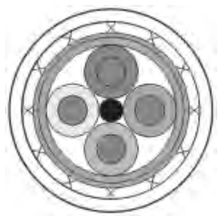
QUADLITE Quadaxial Cables

Product Facts

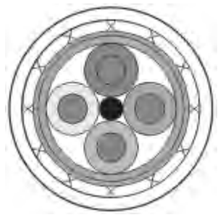
- 100 Ohm and 150 Ohm cables
- Materials rated from -85°F to + 392°F [-65°C to +200°C]
- Low outgassing materials (PTFE, FEP)
- Custom design capabilities
- Proven technologies and materials

	100 Ohms - 200°C	100 Ohms - 150°C
Raychem Part Number	**CEC-RWC-18687**	**CEC-RWC-18664**
Conductor AWG Size (19 Strand)	24	24
Conductor Material:	SCCA	SCCA
Nom. Conductor Diameter (in.):	0.0235	0.0235
Insulation Material:	FEP	FEP
Nom. Insulation OD± 0.002 (in.):	0.042	0.042
Nom. Cable OD (in.):	0.166	0.167
Nom. Cable Weight (lbs/1 kft):	24.7	22.9
Shield Material:	Flat SCC/Round SCC	Alum. MYLAR/Round TCC
Jacket Material:	FEP	FEP
Impedance ± 10% (Ω):	100 Ohms	100 Ohms
Temp. Rating:	200°C	150°C
Nom. Capacitance (pF/ft):	13.0	13.0
	10 MHz 100 MHz	10 MHz 100 MHz
Nom./Max. Attenuation (dB/100 Ft).	2.3/2.7 8.0/9.2	2.3/2.7 8.0/9.2
Min. NEXT (dB)	47 32	47 32
Min. SR (dB)	23 16	23 16



100BASE-T Ethernet

	150 Ohms - 200°C	150 Ohms - 150°C
Raychem Part Number	**CEC-RWC-18684**	**CEC-RWC-18680**
Conductor AWG Size (19 Strand)	26	26
Conductor Material:	SCCA	SCCA
Nom. Conductor Diameter (in.):	0.0235	0.0235
Insulation Material:	FEP	FEP
Nom. Insulation OD± 0.005 (in.):	0.058	0.058
Nom. Cable OD (in.):	0.200	0.201
Nom. Cable Weight (lbs/1 kft):	30.6	30.9
Shield Material:	Flat SCC/Round SCC	Alum. MYLAR/Round SCC
Jacket Material:	FEP	FEP
Impedance ± 10% (Ω):	150 Ohms	150 Ohms
Temp. Rating:	200°C	150°C
Nom. Capacitance (pF/ft):	9.0	9.0
Nom./Max. Attenuation (dB/100 Ft).		
531 MHz	13	13
1062 MHz	21	21
Nom. Delay Skew (ps/ft)	3	3



Fiber Channel

MYLAR is a registered trademark of DuPont Teijin Films U.S.

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Crimp Contacts

Product Facts

- One-piece dielectric inserts for easy assembly and lowest applied cost
- Available with silicone seal boots rated for 50,000 ft. altitude immersion
- Crimp type, screw machined, 24 AWG contacts
- Quadrax size 8 shells are keyed per ARINC 600 for correct orientation inside connector inserts

Contacts (1)

Part Number	Description	Dim. A
1445626-1	Contact, Pin, Solder Tail	.228 [5.79]
1445626-2	Contact, Pin, Solder Tail	.422 [10.72]
1445626-3	Contact, Pin, Solder Tail	.181 [4.60]
1445626-4	Contact, Pin, Solder Tail	.297 [7.54]
1445626-5*	Contact, Pin, Solder Tail	.297 [7.54]

		Hex Crimp
1445692-1	Contact Kit, Pin, Crimp	0.218
1445692-3**	Contact Kit, Pin, Crimp, (with wire seal boot)	0.218
1445693-1	Contact Kit, Socket, Crimp	0.218
1445693-3**	Contact Kit, Socket, Crimp, (with wire seal boot)	0.218

Reference cables: Tensolite NF24Q100, NF26Q100, 24443/03130X-4(LD), 2443/9P025X-4(LD); Raychem CEC-RWC-18687, Raychem CEC-RWC-18664

		Hex Crimp
1445692-5**	Contact Kit, Pin, Crimp (with wire seal boot)	0.218
1445692-6	Contact Kit, Pin, Crimp	0.218
1445693-5**	Contact Kit, Socket, Crimp (with wire seal boot)	0.218
1445693-6	Contact Kit, Socket, Crimp	0.218

Reference cables: DRAKA F4703-3, F4704-4

		Hex Crimp
1877039-1	Contact Kit, Pin, Crimp	0.231
1877039-2**	Contact Kit, Pin, Crimp (with wire seal boot)	0.231
1877040-1	Contact Kit, Socket, Crimp	0.231
1877040-2**	Contact Kit, Socket, Crimp (with wire seal boot)	0.231

Reference cables: Tensolite 26473/02006X-4(LD); Raychem CEC-RWC-18684, Raychem CEC-RWC-18680

1811010-1	Socket kit with heat-shrink tubing
1811269-1	Pin kit with heat-shrink tubing

*Tails are solder dipped
**Used with Quadrax rectangular and circular connectors
(1) For other cables, contact Tyco Electronics.

Catalog 1308940
Revised 8-06

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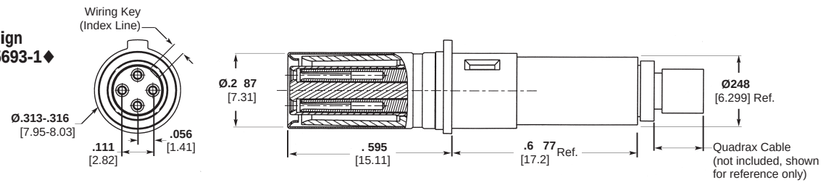
Crimp Contacts (Continued)

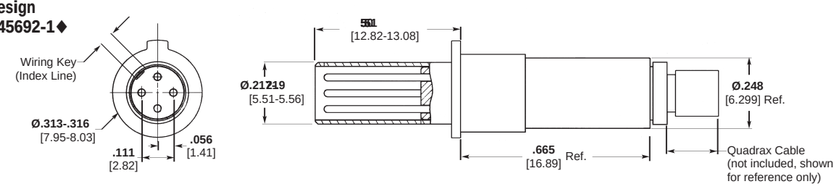
Size 8 Quadrax Socket Contact
Crimp Style
Rear Release/
Rear Remove Design
Part Number 1445693-1♦

♦ -3 w/boot



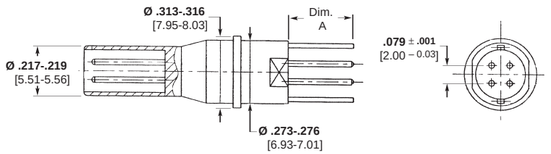
Size 8 Quadrax Pin Contact
Crimp Style
Rear Release/
Rear Remove Design
Part Number 1445692-1♦

♦ -3 w/boot

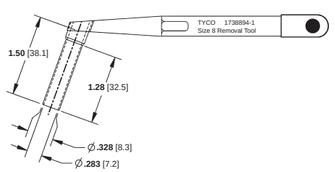


Size 8 Quadrax PCB Pin Contact
Front Release/
Front Remove Design
Part Number 1445626-1♦♦

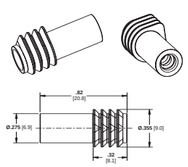
♦♦ various tail lengths



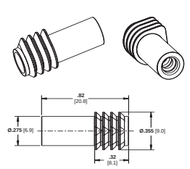
Size 8 Quadrax Extraction Tool
Part Number 1738894-1



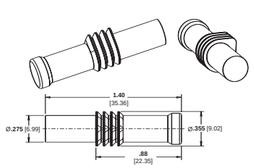
Seal Boots



Wire Seal Boot
P/N 1811481-1
Cable O.D. .140/.176



Wire Seal Boot
P/N 1811943-1
Cable O.D. .170/.210



Solid Seal Boot
P/N 1811633-1

Catalog 1308940
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ARINC Size 8 Quadrax Connectors

Product Facts

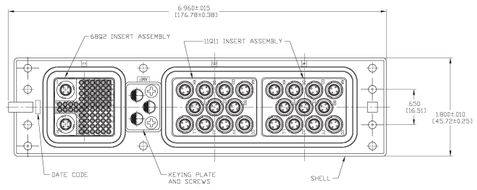
- Utilizes four size 24 screw-machined contacts with standard crimp tooling per M22520/2-01 and M22520/5-01 for ease of termination
- Front release/front removable PCB mount contact design for use in ARINC 600 receptacle connectors
- Rear release/rear remove crimp contact design for use in ARINC 600 plug connectors & receptacles
- Quadrax housing is keyed to assure mating alignment
- Contacts are on 2 mm centerline per ARINC 600 specification
- To extract Quadrax contact from connector insert, use Extraction Tool Part Number 58284-1
- Per Supplement 14 to ARINC Specification 600

ARINC Size 2 Connectors

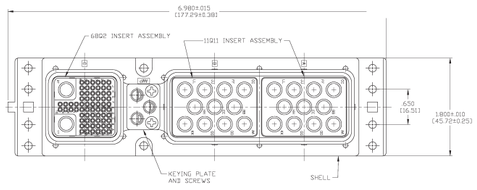
Part Number	Type	Insert Arrangement A	B	C	Style	Shell Features	Contacts
1484406-2	Receptacle	Q11	Q11	68Q2	Front Release Front Remove	Electroless Nickel Plated, no clinch nuts	Size 22 signal & Quadrax contacts supplied loaded in inserts; post extension = .25 [6.35]
1484407-2	Plug	Q11	Q11	68Q2	Rear Release Rear Remove	Electroless Nickel Plated, no clinch nuts	Crimp style size 22 signal and Quadrax contacts supplied unloaded
1663032-1	Receptacle	150	150	11Q2	Front Release Front Remove	Chromate with six 4-40 clinch nuts	Signal, Power and Quadrax contacts supplied loaded in inserts; post extension = .25 [6.35]
1663900-1	Receptacle	Q11	Q11	85	Front Release Front Remove	Chromate, no clinch nuts	Signal, Power and Quadrax contacts supplied loaded in inserts; post extension = .25 [6.35]
1484620-1	Receptacle	Q11	Q11	85	Front Release Front Remove	Electroless Nickel Plated, with ten 4-40 clinch nuts	Signal, Power and Quadrax contacts supplied loaded in inserts; post extension = .15 [3.81]
1484621-1	Plug	Q11	Q11	85	Rear Release Rear Remove	Electroless Nickel Plated, no clinch nuts	Crimp contacts

ARINC Size 3 Connectors

Part Number	Type	Insert Arrangement A D	B E	C F	Style	Shell Features	Contacts
1663018-1	Receptacle	150 150	150 150	11Q2 11Q2	Front Release/ Front Remove	Electroless Nickel Plated	No contacts
1663018-2	Receptacle	150 150	150 150	11Q2 11Q2	Front Release/ Front Remove	Electroless Nickel Plated	Signal, Power and Quadrax contacts supplied loaded in inserts; post extension signal and power = .25 [6.35]; Quadrax = .200 [5.08]
1663018-3	Receptacle	150 150	150 150	11Q2 11Q2	Front Release Front Remove	Chromate with fourteen 6-32 clinch nuts	Signal, Power and Quadrax contacts supplied loaded in inserts, post extension = .25 [6.35]
1663019-1	Plug	150 150	150 150	11Q2 11Q2	Rear Release Rear Remove	Electroless Nickel Plated	No contacts
1663019-2	Plug	150 150	150 150	11Q2 11Q2	Rear Release Rear Remove	Electroless Nickel Plated	Crimp contacts
1663019-3	Plug	150 150	150 150	11Q2 11Q2	Rear Release Rear Remove	Chromate	Crimp contacts



Receptacle, Assembly Size 2
Front Release/Front Remove
Part Number 1484406-2 shown



Plug, Assembly Size 2
Rear Release/Rear Remove
Part Number 1484407-2 shown

Catalog 1308940
Revised 8-06

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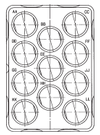
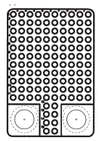
ARINC Size 8 Quadrax Connectors (Continued)

Contact Inserts & Arrangement Codes — Shell Size 2 or 3

Shell Module A, B, D or E



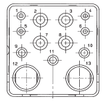
Q11 [1, 2, 3]
11 Size 8 Quadrax
Metal



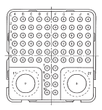
118Q2 [2, 3, 4]
118 Size 22
2 Size 8 Quadrax

Shell Module C or F

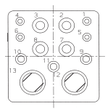
Q6 [1, 2, 3]
6 Size 8 Quadrax
Metal



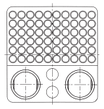
11Q2 [1, 2, 3]
4 Size 20
4 Size 12
3 Size 16
2 Size 8 Quadrax



68Q2 [2, 3, 4]
68 Size 22
2 Size 8 Quadrax



13CQ2 [2, 3]
4 Size 20
3 Size 16
4 Size 12
2 Size 8 Quadrax



62Q2 [2, 3, 4]
60 Size 22
2 Size 16
2 Size 8 Quadrax

Notes:

1. Available for plug or receptacle with rear release/remove contacts.
2. Available for receptacle only with all contacts front release/remove.
3. Standard size 8 contacts will not fit in Quadrax size 8 inserts. Also, Quadrax size 8 contacts will not fit into standard size 8 inserts.
4. Available for plug only with all contacts rear release/remove.

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Rectangular Connectors

Product Facts

- High performance rectangular connector
- Available in 2, 4, and 12 positions
- Designed for use with wire seal boots and rated for use up to 50,000 ft. altitude
- Center jackscrew design for fast, reliable mating
- Aluminum shells are keyed

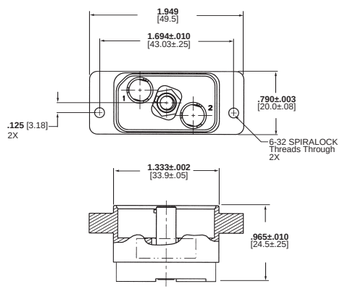
and polarized, and are available with lightweight plastic backshell strain reliefs

- Provides excellent density in a rectangular profile for packaging flexibility.
- Qualified to Boeing Part Standard BPS-C-193

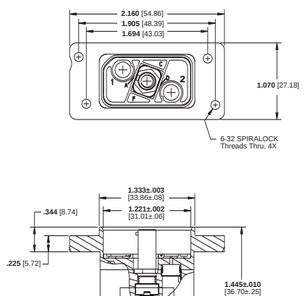
Position	Part Number	Type	Mounting Style	Style	Polarization	Note:
2	1604896-2	Receptacle	PCB	Front Release/Front Remove	Flat	
	1604897-5*	Receptacle	Panel Mount	Rear Release/Rear Remove	Flat	
	1604898-5*	Plug	Free-Hanging	Rear Release/Rear Remove	Flat	
	1604905-1	Backshell - (1 pc)	—	—	—	Use w/1604897-5 or 1604898-5
4	1738949-2	Receptacle	PCB	Front Release/Front Remove	Flat	
	1738950-2*	Receptacle	Panel Mount	Rear Release/Rear Remove	Flat	
	1738951-2*	Plug	Free-Hanging	Rear Release/Rear Remove	Flat	
	1738955-1	Backshell - (1 pc)	—	—	—	Use w/1738950-2 or 1738951-2
12	1604798-2	Receptacle	PCB	Front Release/Front Remove	Flat	
	1604799-5*	Receptacle	Panel Mount	Rear Release/Rear Remove	Flat	
	1604800-5*	Plug	Free-Hanging	Rear Release/Rear Remove	Flat	
	1604874-1	Backshell - Receptacle (2 pc)	—	—	—	Use w/1604799-5
	1604874-2	Backshell - Plug (2 pc)	—	—	—	Use w/1604800-5

*Jackscrew/Jackpost hardware included but not installed.

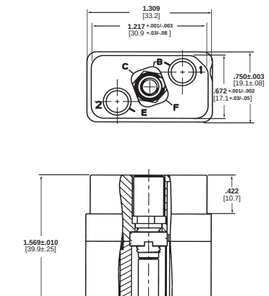
2 Position



PCB Mount Receptacle (Part Number 1604896)



Panel Mount Receptacle (Part Number 1604897)



Free-Hanging Plug (Part Number 1604898)

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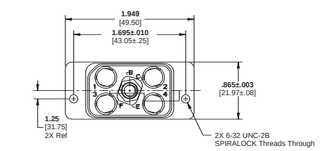
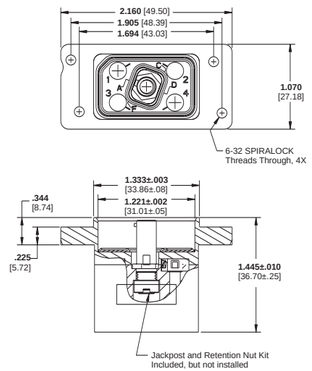
Rectangular Connectors (Continued)

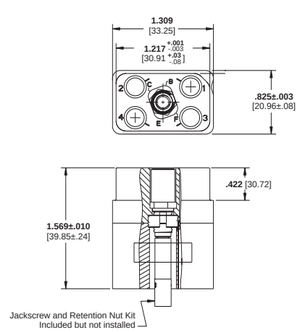
4 Position



PCB Mount Receptacle (Part Number 1738949)

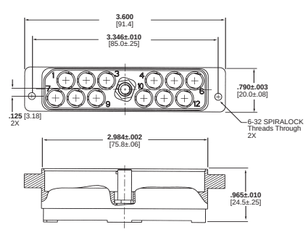


Panel Mount Receptacle (Part Number 1738950)

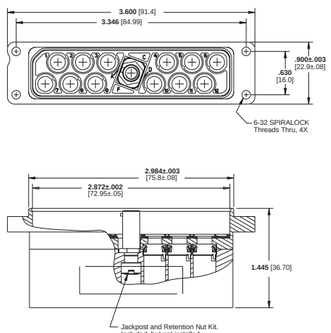


Free-Hanging Plug (Part Number 1738951)

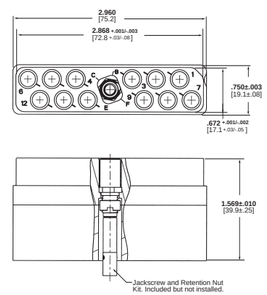
12 Position



PCB Mount Receptacle (Part Number 1604798)



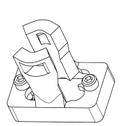
Panel Mount Receptacle (Part Number 1604799)



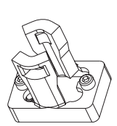
Free-Hanging Plug (Part Number 1604800)

Accessories

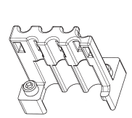
2 Position Backshell/ Strain Relief Kit
Part Number 1604905-1
(for plug & receptacle)



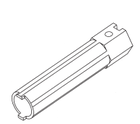
4 Position Backshell/ Strain Relief Kit
Part Number 1738955-1
(for plug and receptacle)



12 Position Backshell/ Strain Relief Kit
Part Number 1604874-1 for receptacle;
Part Number 1604874-2 for plug



Wrench, Retention Nut, Jackscrew and Jackpost, Quadrax Rectangular Connector
Part Number 1604972-1



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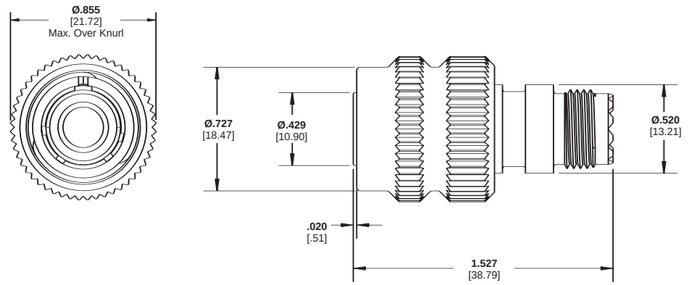
Custom MIL-DTL-38999 Series III Style Circular Connectors

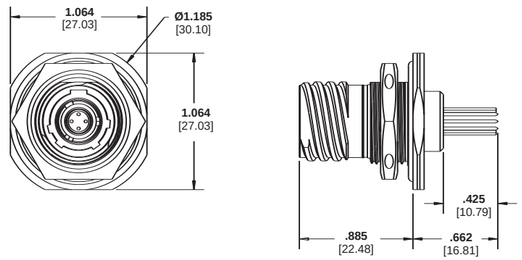
Product Facts

- Available in various shell sizes: 9 (1Q1), 17 (2Q2), 19 (4Q4) and 25 (8Q8)
- Designed for use with wire seal boots for sealing and optimized alignment
- Front metal-shell design provides a full ground plane
- Lightweight composite rear shell available in size 19 for reduced weight
- Accepts standard backshells

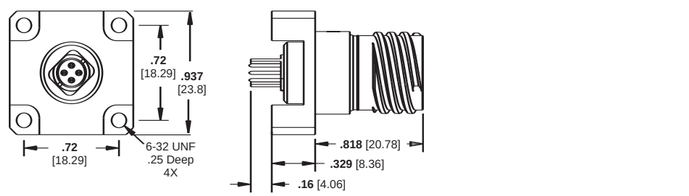
Plug, Shell Size 9
Single Quadrax, RR-RR
Part Number 1877384



Receptacle, Shell Size 9
38999 Style
Single Quadrax, FR-FR
Jam Nut Style
Part Number 1738916



Receptacle, Shell Size 9
38999 Style
Single Quadrax, FR-FR
PCB Mount with Stand-offs
(Contacts shown for reference only)
Part Number 1811184



Contacts sold separately, see page 4-46.

Catalog 1308940
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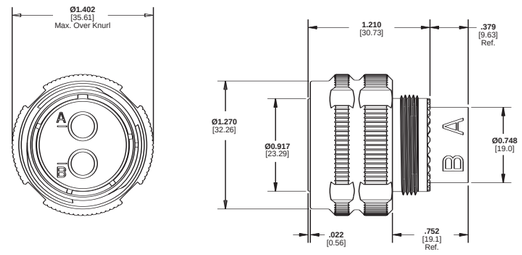
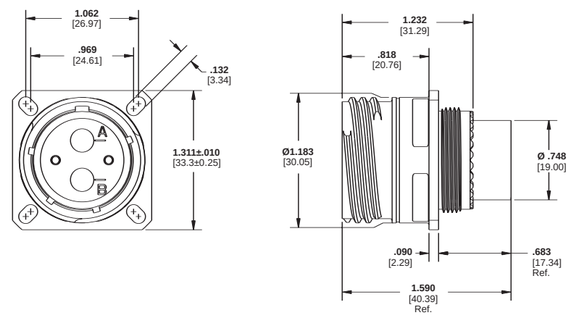
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Custom MIL-DTL-38999 Series III Style Circular Connectors (Continued)

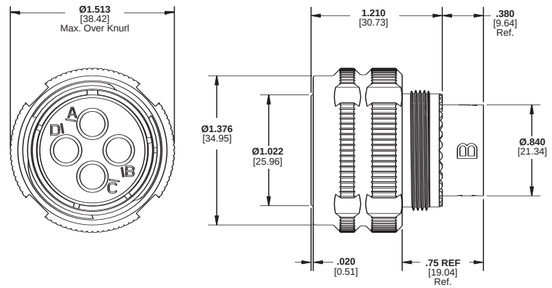
Plug, Shell Size 17
38999 Style
Arrangement 2Q2, RR-RR
Part Number 1877775



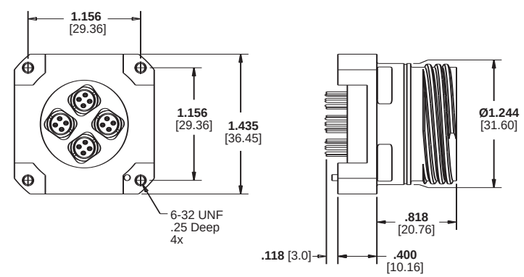
Receptacle, Shell Size 17
38999 Style
Arrangement 2Q2, RR-RR
Part Number 1877774



Plug, Shell Size 19
38999 Style
Arrangement 4Q4, RR-RR
Part Number 1811902



Receptacle, Shell Size 19
38999 Style, w/4 Quadrax
Contacts, FR-FR (Contacts
shown for reference only)
Part Number 1738974



Contacts sold separately, see page 4-46.

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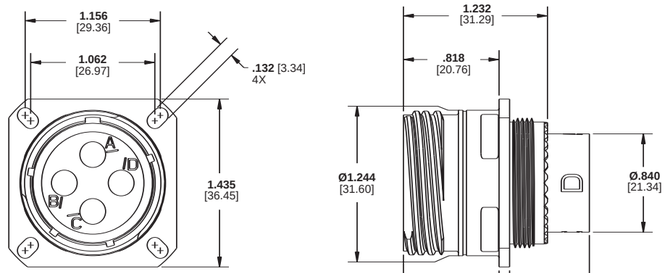
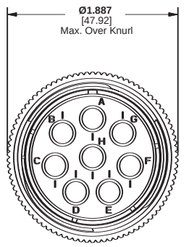
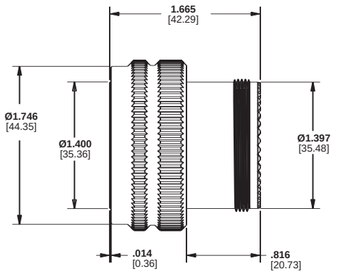
Custom MIL-DTL-38999 Series III Style Circular Connectors (Continued)

Receptacle, Shell Size 19
38999 Style
Arrangement 4Q4, RR-RR
Part Number 1811901

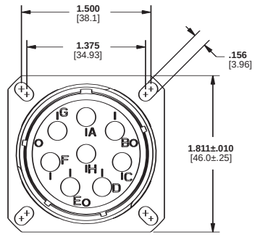


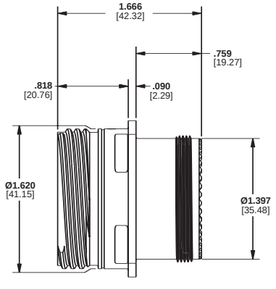
Plug, Shell Size 25
38999 Style
Arrangement 8Q8, RR-RR
Part Number 1811928





Receptacle, Shell Size 25
38999 Style
Arrangement 8Q8, RR-RR
Part Number 1811927





Contacts sold separately, see page 4-46.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Custom Solutions and Assemblies

100 Ohm Differential Pair twin-axial Contact

Product Facts

- Designed to meet the requirements of ARINC Specification 810 for 100 Ohm size 8 non-concentric twin-axial contacts
- Works in all connectors accepting ARINC 600 style Quadrax contacts

Custom Cable and Flex Assemblies

Product Facts

- Quadrax contacts and connectors can be provided as custom cable and flex assemblies for customer specific applications

D-Subminiature Connector Assemblies

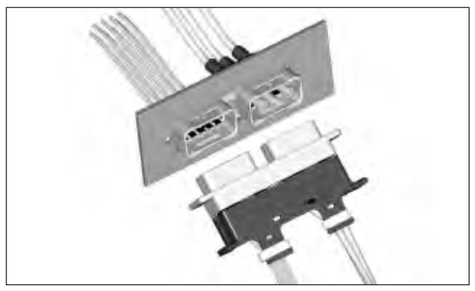
Product Facts

- Designed to provide a ruggedized in-line solution for Quadrax cable to printed circuit board mount applications, in a blind-mateable D-subminiature configuration
- Quadrax contacts ground directly to connector shell

General Purpose Rectangular (GPR) Connector Assemblies

Product Facts

- Quadrax inserts are available for the rugged, modular General Purpose Rectangular connector, facilitating the mix of high speed signals with a variety of other power, fiber optic, signal, and coax insert configurations in a single connector system



Contact Tyco Electronics for additional information on any of these custom solutions.

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Introduction

Connectors with wide range of shell configurations/ modifications, contact arrangements and contacts to meet ARINC 404 Specification and MIL-C-81659. The descriptive part numbering scheme described on the following pages can be used for ordering.

Commercial Series

R — Unsealed

RM — Interface seal on pin insert

RME — Environmentally sealed

Unkeyed Single-Insert Series

RMA — Standard size, unkeyed single-insert connectors, unsealed

RMAE — same as RMA, except sealed

Military Series

M — MIL qualified, unsealed

MM — MIL qualified, interface seal on pin inserts

MME — MIL qualified, environmentally sealed

Miniature Series

RA — Unsealed

RE — Sealed

Special connectors are also available — including connectors for flexible flat cable, for wire wrap-type terminations, and with contacts for board-mount applications.

Screw-machined pin and socket contacts for connector inserts — signal contact sizes 22, 20, 16 and 12 for terminating wire range of 30 through 12 AWG [0.05–3 mm]. Crimp snap styles for rear-remove, rear-release applications are most common. They can be supplied both in loose-piece form, or can be tape-mounted for high-speed application.

Coax contact sizes 1, 3, 5, 7, 10 and 15 are available.

Material Specifications

Shell — Die-cast aluminum alloy per QQ-A-591; cadmium plated with yellow chromate conversion, or electroless nickel plated per QQ-P-416

Insert Retention Plates — (M, MM, R, RM, RME series) Aluminum alloy, blue anodized per MIL-A-8625 or electroless nickel plated per QQ-P-416; (MME series) Aluminum alloy, powder coat blue epoxy; (RA, RE series) Stainless steel, passivated

Screws and Washers — Stainless steel, passivated

Dielectric Hard — Epoxy

Dielectric, Interface Seal (Receptacle only) and Wire Sealing Grommets — Silicone rubber

Keying Posts and Nuts (Plug Only) — Stainless steel, passivated

Keyways (Receptacle Only) — Commercial — Aluminum
Military — Stainless steel

Performance Specifications

Environmentally sealed RME series connectors are designed per Military Specification MIL-C-81659 and all signal pin and socket contacts per MIL-C-39029. M, MM and MME series connectors are qualified and 100 percent inspected for conformation to MIL-C-81659.

Insulation Resistance — 5000 megohms

Dielectric Withstanding Voltage (Unmated at Sea Level) —

Test (contact arrangements 32C2, 33C4, 67 & 106)	1000 volts rms
(all other contact arrangements, except C2 & C3)	1500 volts rms
Operate (contact arrangements 33C4, 67 & 106)	400 volts rms
(all other contact arrangements, except C2 & C3)	500 volts rms

Temperature Range — -85°F to 257°F [-65°C to +125°C]

Contact Current Rating (tested in free air per MIL-C-34029) — (See pages 4-67 to 4-69 for information on coaxial contacts)

Size 22 (22 AWG wire) [0.3-0.4 mm^2]	5.0 amps
Size 20 (20 AWG wire) [0.5-0.6 mm^2]	7.5 amps
Size 16 (16 AWG wire) [1.25-1.4 mm^2]	13.0 amps
Size 12 (12 AWG wire) [3 mm^2]	23.0 amps

Contact Retention —

Size 22	15 lb. (min.) [67 N]
Size 20	20 lb. (min.) [89 N]
Size 16	25 lb. (min.) [92 N]
Size 12	30 lb. (min.) [134 N]

Durability (Mating and Unmating) — 500 cycles

Salt Spray — MIL-STD-1344, Method 1001, Condition B

Vibration — MIL-STD-1344, Method 2005, Condition IV

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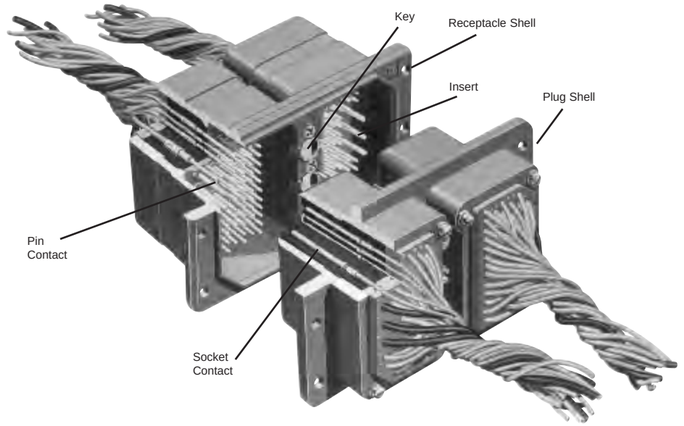
Ordering Information

Descriptive Part Numbering System

Use this page as a guide to construct part numbers for complete connector packages. Contacts must be ordered separately, except as specified in the Custom Order Code.



Note: Two-Insert Recept. Shell DIm. (Typ.)—3.075 [78.11] L x 2.000 [50.8] W x 1.665 [42.29] Depth

Single-insert receptacle connector shown
RM 1 R 106S-00 01 (200)

Three-insert plug connector shown
RM 3 P 106S 57P 106-00 00 (200)

Four-insert plug connector shown
RME 4 P 106P 106P 106 106S 00 00 (250)

Sample Descriptive Part Number

RME 2 P 57 S 57 S — 00 01 (201)

Shell
Series designator:
R, M—no seals
RM, MM—interface seal on pin inserts
RME, MME—environmentally sealed
RMA—standard insert size, no keying, unsealed
RMAE—standard interface, no keying, environmentally sealed
RA—miniature, unsealed
RE—miniature, environmentally sealed

Shell size
1, 2, 3 or 4 inserts, modules A, B, C, D

Shell configuration
P—Plug
R—Receptacle

Contact inserts

Contact arrangement (Module A) (see page 4-58)

Contact type (Module A)
P—Pin
S—Socket

Contact arrangement (Module B) (see page 4-58)

Contact type (Module B)

Modifications to shell mounting (see pages 4-61 and 4-62)

Keying (see page 4-63)

Custom order instructions (see page 4-63)

Contacts (see pages 4-64 and 4-65 for ordering details)

Sealing boots

SPECIAL CONNECTORS
- Wrap-type assemblies
- Assemblies for flexible flat cable
- RA, RE shells and inserts
- RMA shell

Note: RMA/RMAE are only available in single-insert unkeyed shells.

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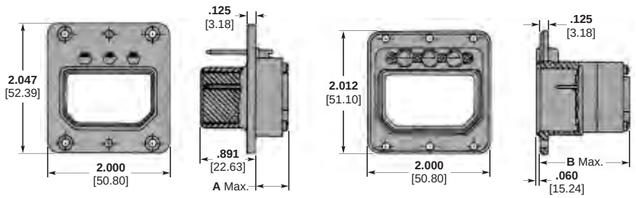
UK: 44-208-420-8341

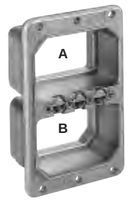
One- and Two-Insert Shells

One-Insert Shells (Receptacle Shown)

Example: RME 1 P 57S — 00 01 (200)

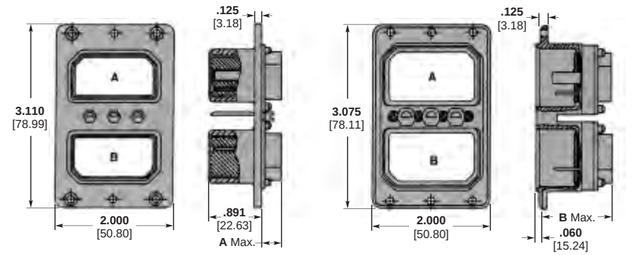


Plug **Receptacle**



Two-Insert Shells (Receptacle Shown)

Example: RM 2 P 57S 57S — 00 01 (200)



Plug **Receptacle**

Maximum extension of connector behind flange, with insert.

Contact Arrangement	Dimensions			
	A Max. (Plug)		B Max. (Receptacle)	
	R, M, RM, MM	RME, MME	R, M, RM, MM	RME, MME
C2	**.075** 1.91	**.075** 1.91	**1.016** 25.81	**1.016** 25.81
C3	**.075** 1.91	**.075** 1.91	**1.016** 25.81	**1.016** 25.81
8	**.314** 7.98	**.534** 13.56	**1.253** 31.83	**1.465** 37.21
C8	**.512** 13.00	—	**1.452** 36.88	—
D8	**.314** 7.98	**.534** 13.56	**1.253** 31.83	**1.465** 37.21
26	**.314** 7.98	**.534** 13.56	**1.253** 31.83	**1.465** 37.21
32C2	**.529** 13.44	**.734** 18.64	**1.465** 37.21	**1.665** 42.29
32C4	**.410** 10.41	**.615** 15.62	**1.350** 33.86	**1.555** 39.50
33C4	**.529** 13.44	**.734** 18.64	**1.465** 37.21	**1.665** 42.29
40	**.314** 7.98	**.534** 13.56	**1.253** 31.83	**1.465** 37.21
40C1	**.529** 13.44	**.734** 18.64	**1.465** 37.21	**1.665** 42.29
45	**.314** 7.98	**.534** 13.56	**1.253** 31.83	**1.465** 37.21
57	**.314** 7.98	**.534** 13.56	**1.253** 31.83	**1.465** 37.21
67	**.314** 7.98	**.534** 13.56	**1.253** 31.83	**1.465** 37.21
106	**.075** 1.91	**.279** 7.09	**1.016** 25.81	**1.219** 30.96

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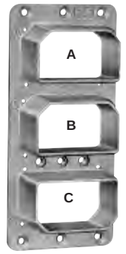
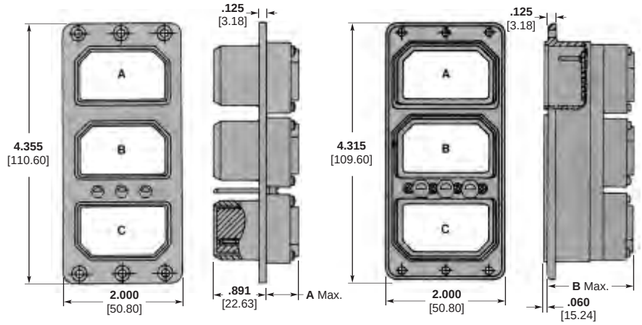
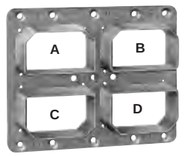
Three- and Four-Insert Shells



Three-Insert Shells (Plug Shown)

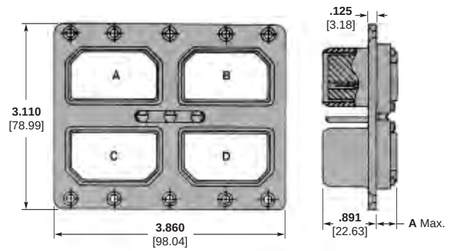
Example: RME 3 P 57S 57S 57S — 00 01 (200)





Four-Insert Shells (Plug Shown)

Example: RME 4 P 57S 57S 57S 57S — 00 01 (200)



Note: Dimensions A and B refer to maximum connector depth with contact inserts installed. These dimensions are tabulated on page 4-58.

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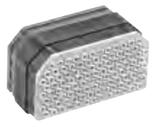
Contact Inserts

Example: RME 2 P 57S 67S — 00 01 (201)

Inserts for Series R, RM, RME; M, MM, MME, and RMA



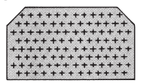
Arrangement 106,
environmental version shown

Legend

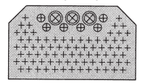
- Size 22 contact cavity
- Size 20 contact cavity
- Size 16 contact or Size 15 COAXICON contact cavity
- Size 12 contact cavity
- COAXICON contact cavity, except Size 15

Notes: 1. Size 22 socket contacts extend beyond the mating face of inserts; size 22 pin contacts are recessed. Size 20, 16 and 12 pins are exposed; size 20, 16 and 12 sockets are recessed.
2. Mating face of pin-contact insert is shown. Socket-contact insert face is mirror image.

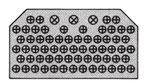
Arrangement 33C4 shown



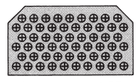
Arrangement 106
106 Size 22 contacts



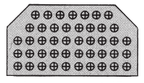
Arrangement 88
79 Size 22 contacts,
6 Size 20 contacts,
3 Size 16 contacts or
3 Size 15 COAXICON contacts



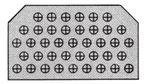
Arrangement 67
64 Size 20 contacts,
3 Size 16 contacts or
3 Size 15 COAXICON contacts



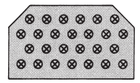
Arrangement 57
57 Size 20 contacts



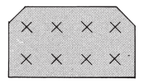
Arrangement 45
45 Size 20 contacts



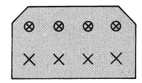
Arrangement 40
40 Size 20 contacts



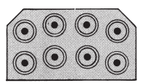
Arrangement 26
26 Size 16 contacts or
26 Size 15 COAXICON contacts



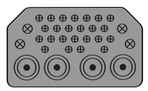
Arrangement 8
8 Size 12 contacts



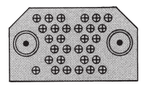
Arrangement D8
4 Size 12 contacts,
4 Size 16 contacts or
4 Size 15 COAXICON contacts



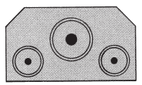
Arrangement C8
8 Size 9 COAXICON contacts
For unsealed connectors only



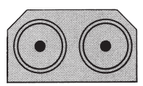
Arrangement 32C4
4 Size 16 contacts,
24 Size 20 contacts and
4 Size 9 COAXICON contacts



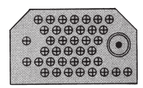
Arrangement 32C2
30 Size 20 contacts,
2 Size 5 COAXICON contacts



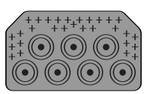
Arrangement C3
1 Size 3 COAXICON contact,
2 Size 7 COAXICON contacts
For unsealed connectors only
(Consult Tyco Electronics
for availability.)



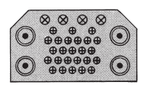
Arrangement C2
2 Size 1 COAXICON contacts
For unsealed connectors only
(Consult Tyco Electronics
for availability.)



Arrangement 40C1
39 Size 20 contacts,
1 Size 5 COAXICON contact



Arrangement 36C7
7 Size 5 COAXICON contacts,
29 Size 22 contacts



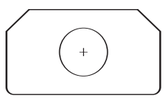
Arrangement 33C4
25 Size 20 contacts
4 Size 16 contacts or
4 Size 15 COAXICON contacts,
4 Size 5 COAXICON contacts

Inserts for Fiber Optic Connectors

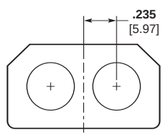
Inserts available to accept Mini-Expanded Beam Fiber Optic Cable Assemblies. Custom design configurations can be provided.

Contact Tyco Electronics for additional information, or see page 4-11 in ARINC 600 section, and pages 3-18 and 3-19 in Expanded Beam Fiber Optics section.

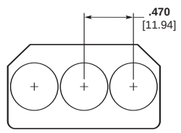
ARINC 404 Insert Holders for Mini Expanded Beam Contacts



ARINC 404, 1 Position, M1



ARINC 404, 2 Position, M2



ARINC 404, 3 Position, M3

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
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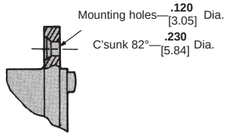
C. America: 57-1-254-4444

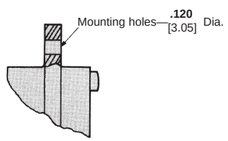
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Modifications

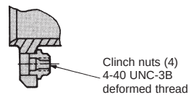
Example: RME 2 P 57S 57S — 00 01 (201)



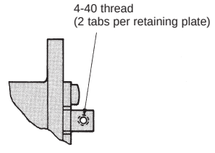
Modification 00
(no modification, plug)



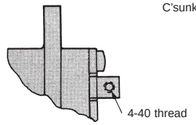
Modification 00
(no modification, receptacle)



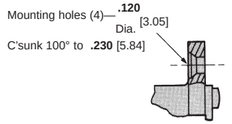
Modification 01



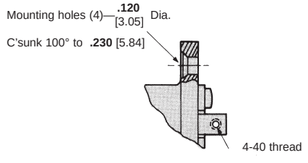
Modification 02
(R, RM, M, MM—attaching tabs)



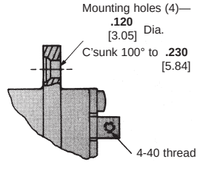
Modification 02, 70
(RME, MME—threaded holes)



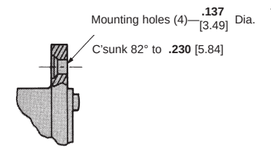
Modification 03



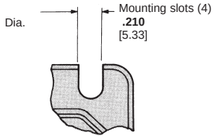
Modification 04
(R, RM, M, MM—attaching tabs)



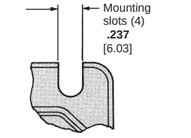
Modification 04
(RME, MME—threaded holes)



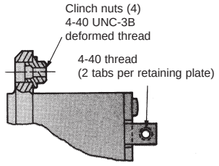
Modification 08



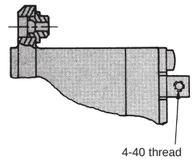
Modification 12



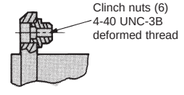
Modification 13



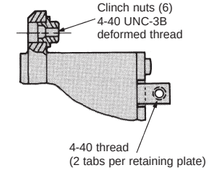
Modification 17
(R, RM, M, MM—attaching tabs)



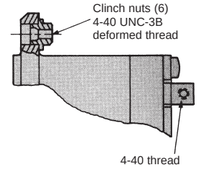
Modification 17
(RME, MME—threaded holes



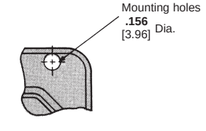
Modification 18



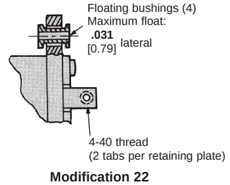
Modification 19
(R, RM, M, MM—attaching tabs)



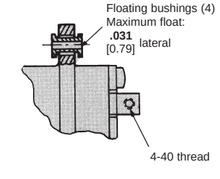
Modification 19
(RME, MME—threaded holes)



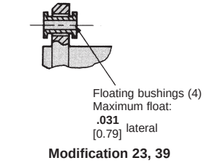
Modification 20



Modification 22
(R, RM, M, MM—attaching tabs)



Modification 22, 71
(RME, MME—threaded holes)



Modification 23, 39

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

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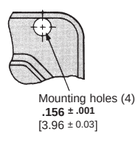
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

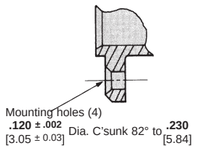
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Modifications (Continued)

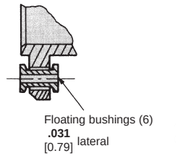
Example: RME 2 P 57S 57S — 39 01 (201)



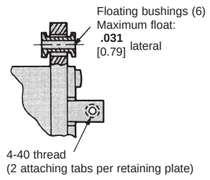
Modification 25



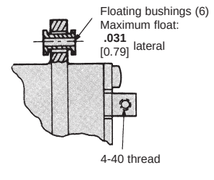
Modification 26



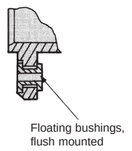
Modification 29



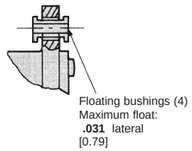
Modification 30
(R, RM, M, MM—attaching tabs)



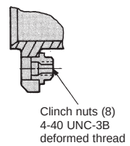
Modification 30
(RME, MME—threaded holes)



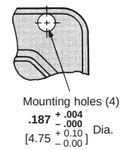
Modification 33



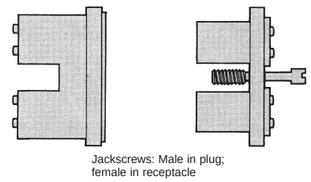
Modification 39



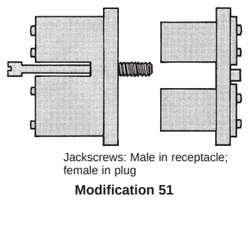
Modification 42
(4-Insert Shells)



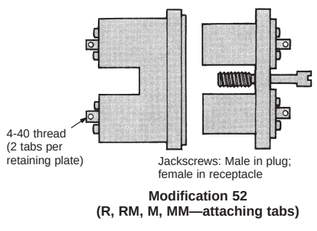
Modification 46



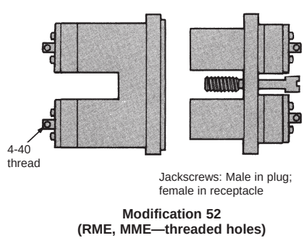
Modification 50



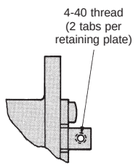
Modification 51



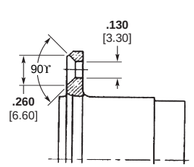
Modification 52
(R, RM, M, MM—attaching tabs)



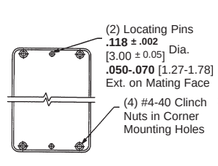
Modification 52
(RME, MME—threaded holes)



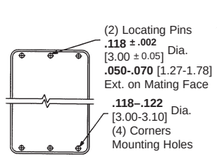
Modification 72
modification 46, plus tabs above



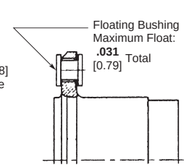
Modification 73 (without tabs)
Modification 74 (with tabs)
Size 1, 2, 3 shells — 4 c'sunk holes



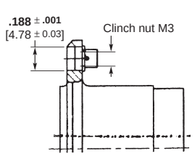
Modification 76



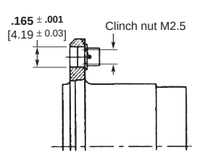
Modification 77



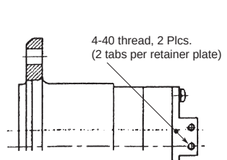
Modification 78



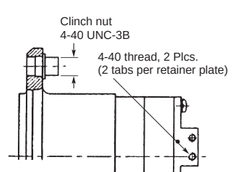
Modification 79



Modification 80



Modification 88



Modification 89

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

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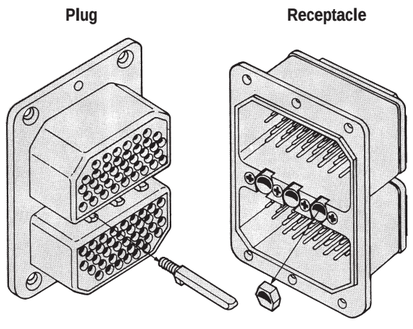
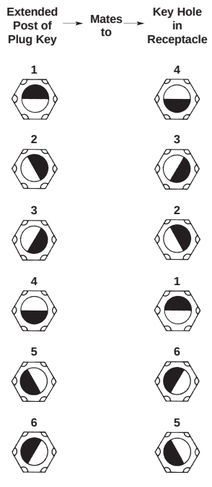
Japan: 81-44-844-8013
UK: 44-208-420-8341

Keying

Example: RME 2 P 57 S 57 S — 00 01 (201)





Notes:
1. Darkened portion of diagram indicates extended post of plug key, light portion indicates key hole in receptacle insert.
2. Keying code stamped on housing.
3. If keying code is not specified, key inserts are supplied in 01 position; code is not stamped on housing.
4. If code 00 is specified, keys are omitted and must be ordered separately; code is not stamped on housing.
5. Key diagrams show mating face of connector "TOP" up.

Refer to ARINC 600 pages 4-12 and 4-13 for keying codes.

Custom Order Code

Example: RME 2 P 57 S 57 S — 00 01 (201)

Code	Description
200	Standard connector kit, **including signal contacts;** order coaxial contacts separately. See pages 4-67 and 4-68. Shell finish: cadmium plated per QQ-P-416 with yellow chromate conversion.
201	200 Custom Order Code **without contacts,** contacts must be ordered separately by part number. See pages 4-64, 4-65 and pages 4-67, 4-68.
202	201 Custom Order Code with assembled connector, keying unassembled and packaged in a separate container, contacts must be ordered separately by part number. See pages 4-64, 4-65 and pages 4-67, 4-68.
203	200 Custom Order Code with inserts and retainer plates unassembled.
204	200 Custom Order Code with spare contacts—3% of contact population per connector per contact size.
206	200 Custom Order Code with keying unassembled and packaged in a separate container.
250	200 Custom Order Code, except shell and retainer plates plated electroless nickel.
400	200 Custom Order Code, except contacts are low insertion force, ARINC 600.

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Size 22 Contacts — Pin Diameter .030 [0.76]

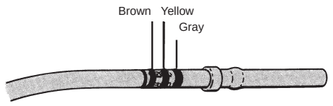
Standard Contacts

Materials

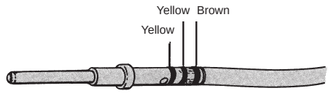
Pin and Socket Body — Copper alloy, plated gold over nickel

Socket Sleeve — Passivated stainless steel

Application Tooling — See page 4-66



Socket
M39029/12-148



Pin
M39029/11-144

Contact Type	Wire Size AWG mm²	Insulation Diameter (Max.)	Tape Mounted Contacts		Loose Piece Contacts		Hand Crimping Tool		AMP-TAPETRONIC Stripper-Crimper	
			Pin	Socket	Pin	Socket	Tool	Positioner	Machine	Funnel
MIL-C-39029	**26-22** 0.12-0.4	**.054** 1.37	204873-3	—	204873-4	205103-3	M22520/2-01	M22520/2-23	599406-7	1-125905-2
Low Force, ARINC 600 connector contacts, suitable for use in ARINC 404 connectors (see page 4-16)										
Low Force ARINC 600*	**26-22** 0.12-0.4	**.054** 1.37	—	—	208262-3	208264-2	M22520/2-01	M22520/2-23	—	—

*Color coding, two bands: orange and green.

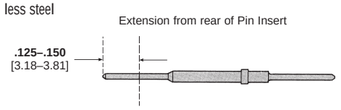
Round Solder-Post Contacts, Solder Post Diameter .031 [0.79]

Note: Round solder-post contacts are for use in RM series connectors.

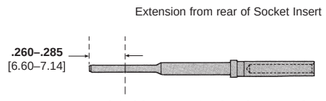
Materials

Pin and Socket Body — Copper alloy, plated gold over copper

Socket Sleeve — Passivated stainless steel



Round Solder-Post Pin
Part Number 205753-2 (Loose Piece)



Round Solder-Post Socket (Loose Piece)
Part Number 205544-1 — .031 [0.79] Dia. Tail
Part Number 205544-2 — .023 [0.58] Dia. Tail

Insertion and extraction tool for all ARINC 404 size 22 contacts:
MS81969/1-01
Part Number 91066-1

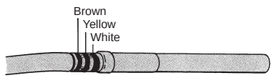
Size 20 Contacts — Pin Diameter .040 [1.02]

Standard Contacts

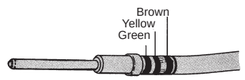
Materials

Pin and Socket Body — Copper alloy, plated gold over nickel

Socket Sleeve — Passivated stainless steel



Socket
M39029/12-149

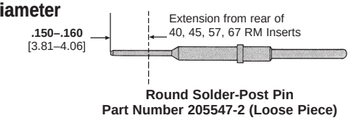


Pin
M39029/11-145

Contact Type	Wire Size AWG mm²	Insulation Diameter (Max.)	Tape Mounted Contacts		Loose Piece Contacts		Hand Crimping Tool		AMP-TAPETRONIC Stripper-Crimper	
			Pin	Socket	Pin	Socket	Tool	Positioner	Machine	Funnel
MIL-C-39029	**24-20** 0.2-.06	**.071** 1.80	204938-4	205116-2	204938-3	205116-1	M22520/2-01	M22520/2-08	599406-7	125905-1
Type XVII	**30-26** 0.05-0.15	**.071** 1.80	205791-4	—	205791-3	205116-5	M22520/2-01	M22520/2-08	599406-7	2-125905-4
Low Force, ARINC 600 connector contacts, suitable for use in ARINC 404 connectors (see page 4-16)										
Low Force ARINC 600*	**24-20** 0.2-0.6	**.071** 1.80	208265-4	—	208265-3	208267-2	M22520/2-01	M22520/2-08	599406-7	125905-1

*Color coding, two bands: orange and red.

Round Solder-Post Contact, Solder Post Diameter .031 [0.79]

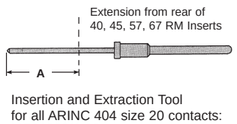


Round Solder-Post Pin
Part Number 205547-2 (Loose Piece)

Material — Copper alloy, plated gold over nickel

Wrap-Type Posted Pin, .025 [0.64] Square Post

A	Part Number
.430 10.92	206210-2
.685 17.4	206210-4
.185 4.7	206210-6



Insertion and Extraction Tool for all ARINC 404 size 20 contacts:
MS81969/1-02
Part Number 91067-2

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

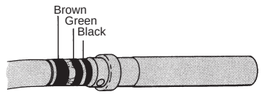
Size 16 Contacts — Pin Diameter .062 [1.58]

Standard Contacts

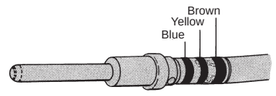
Materials

Pin and Socket Body — Copper alloy, plated gold over nickel

Socket Sleeve — Passivated stainless steel



Socket
M39029/12-150



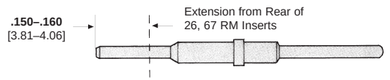
Pin
M39029/11-146

Contact Type	Wire Size AWG mm²	Insulation Diameter (Max.)	Tape Mounted Contacts		Loose Piece Contacts		Hand Crimping Tool		AMP-TAPETRONIC Stripper-Crimper	
			Pin	Socket	Pin	Socket	Tool	Positioner	Machine	Funnel
MIL-C-39029	**20-16** 0.5-1.4	**.103** 2.62	—	205117-2	204978-3	205117-1	M22520/1-01	M22520/1-02	599406-5	125905-6
Low Force, ARINC 600 connector contacts, suitable for use in ARINC 404 connectors (see page 4-16)										
Low Force ARINC 600*	**20-16** 0.5-1.4	**.103** 2.62	—	—	208268-3	208270-2	M22520/1-01	M22520/1-02	—	—

*Color coding, two bands: orange and blue.

Round Solder-Post Contact Solder Post Diameter .062 [15.75]

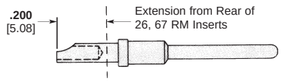
Material — Copper alloy, plated gold over nickel



Round Solder-Post Pin
Part Number 205548-2 (Loose Piece)

Solder Cup Pin

Material — Copper alloy, plated gold over nickel



Solder Cup Pin
Part Number 206211-2

Insertion and Extraction Tool for all size 16 contacts: MS81969/1-03, Part Number 91066-3

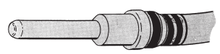
Size 12 Contacts — Pin Diameter .096 [2.39]

Materials

Pin and Socket Body — Copper alloy, plated gold over nickel

Socket Sleeve — Passivated stainless steel

Socket



Pin

Contact Type	Wire Size AWG mm²	Insulation Diameter (Max.)	Part Numbers			
			Loose Piece Contacts		Hand Crimping Tool	
			Pin	Socket	Tool	Positioner
MIL-C-39029	**14-12** 2-3	**.190** 4.83	205763-5	205851-2	M22520/1-01	M22520/1-11
Low Force, ARINC 600 connector contacts, suitable for use in ARINC 404 connectors (see page 4-16)						
Low Force ARINC 600*	**14-12** 2-3	**.190** 4.83	208271-3	208273-2	M22520/1-01	M22520/1-11

*Color coding, two bands: orange and yellow.

Insertion and Extraction Tool for all size 12 contacts: Part Number 445147-1

Catalog 1308940
Revised 8-06

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Application Tooling

AMP-TAPEMATIC Stripper/Crimper Machine Part Number 599406-7

Portable bench machine that strips wire and crimps tape-mounted, closed-barrel pin and socket contacts for AMPLIMITE Military, ARINC and CPC connectors. The stripping and crimping heads are accessible through separate openings in the front of the machine. Wire strip length and crimp height are adjustable. The stripping head is pre-set to the proper cutting depth of four standard wire sizes.

Specifications

Width — 12.5 [317]
Depth — 12.5 [317]
Height — 10 [254] without reel
Weight — 45 lb [20 kg]
Electrical — 120 VAC, 60 Hz, 1.3 A
Wire Range — 28-20 AWG [0.08-0.5 mm²]

Hand Crimping Tool (Tool Number 601966-1) Part Number M22520/2-01

This standard military-type hand tool terminates screw-machined pins and sockets to wire with an 8-indent, M22520/2 crimp. It is ideally suited for prototype, field maintenance and other applications where volume production is not a factor.

Application Tooling Instruction Sheet Cross Reference

Tool Number	Instruction Sheet
601966-1	408-7516
601967-1	408-7516
599406-7	408-7516

Insertion/Extraction Tools, ARINC 404

Tool Part Number	Product Line	Contact Size	Contact Type	Color Code	Style
91066-1	ARINC 404	22	Signal	Green	Rear Release/Rear Remove
91067-2	ARINC 404	20	Signal	Red	Rear Release/Rear Remove
91066-3	ARINC 404	16	Signal	Blue	Rear Release/Rear Remove
445147-1	ARINC 404	12	Signal	—	Rear Release/Rear Remove
91066-3	ARINC 404	15	Coax	Blue	Rear Release/Rear Remove
91074-1	ARINC 404	9	Coax	—	Rear Release/Rear Remove
N/A captivated	ARINC 404	7	Coax	—	Rear Release/Rear Remove
91074-1	ARINC 404	5	Coax	—	Rear Release/Rear Remove
N/A captivated	ARINC 404	3	Coax	—	Rear Release/Rear Remove
N/A captivated	ARINC 404	1	Coax	—	Rear Release/Rear Remove

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UK: 44-208-420-8341

COAXICON Contacts

Size 1 Contacts

(For use in ARINC 404 and ARINC 600 Connectors)

Performance Characteristics

Nominal Impedance — 50 ohms

Frequency Range — 0 to 5 GHz

Operating Temperature — -85°F to 329°F [-65°C to +165°C]

Operating Voltage (Rated) — 1000 VAC rms, 60 Hz at Sea Level

Contact Resistance (Milliohms) — 1.0 max. — Center Contact
0.2 max. — Outer Contact

Insulation Resistance — 5,000 megohms min. @500 vdc per MIL-STD-1344, Method 3003 or MIL-STD-202, Method 302, Cond. B

Dielectric Withstanding Voltage (60 Hz, rms) —
RG 214/U
2500 at Sea Level
RG 142/U
1900 at Sea Level

VSWR — 1.35 to 1.00 at 5 GHz

Insertion/Withdrawal Force —
Insertion (max.) 15 lb [66.72 N]
Withdrawal (min.) 1 lb [4.45 N]

Cable Retention —
RG 214/U
125 lb [556 N] min.
RG 142/U
60 lb [266.9 N] min.

Thermal Shock — per MIL-STD-1344, Method 1003, Cond. A or MIL-STD-202, Method 107, Cond. A

Physical Shock — per MIL-STD-1344, Method 2004, Cond. D or MIL-STD-202, Method 213, Cond. D except 300 G max.

Vibration — per MIL-STD-1344, Method 2005, Cond. VI, Letter J or MIL-STD-202, Method 204, Cond. E except 42 G max.

Humidity Temperature Cycling — per MIL-STD-1344, Method 1002, Type II, Cond. A or MIL-STD-202, Method 106

Salt Spray — per MIL-STD-1344, Method 1001, Cond. B or MIL-STD-202, Method 101, Cond. B

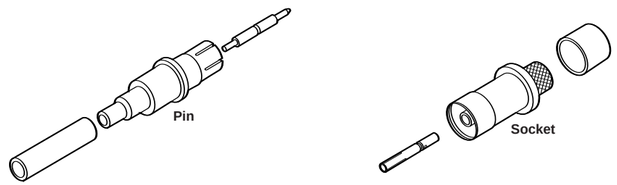
Temperature Life — per MIL-STD-1344, Method 1005, Cond. D or MIL-STD-202, Method 108, Cond. D

Material and Finish

Contact — Beryllium Copper per ASTM-B-196/ASTM-B-197, Brass per ASTM-B-16, TEFLON per ASTM-D-1710, Silicon Rubber per ZZ-R-765, Gold plate per MIL-G-45204, Nickel plate per QQ-N-290

Ferrule — Copper per ASTM-B-188, Tin plate per ASTM-B-545

Size 1 (Captivated)



Contact Size	RG/U Cable	Contact Part No.		"O" Crimp Tooling			Compression Crimp Tooling		
				Center Contact					
		Pin	Socket	Tool (M22520/)	Positioner/ Die	Ferrule	Tool (M22520/)	Locator (M22520/)	Dies (M22520/)
1	402 Semi-Rigid **.141** [3.58]	225837-1	—	601966-1 (2-01)	1-601966-9	91905-1*	—	—	—
	402 Semi-Rigid **.141** [3.58]	222018-1	—	—	—	—	59980-1 (36-01)	220220-2 (36-06)	312253-1 (36-03)
	405 Semi-Rigid **.086** [2.18]	222018-2	—	—	—	—	59980-1 (36-01)	220220-2 (36-06)	312253-2 (36-02)
	214	—	225831-1	220015-1	—	220015-1	—	—	—
	142, 142A, 142B	—	225831-3	91902-1*	—	91902-1*	—	—	—
	393	—	225831-6	220015-1	—	220015-1	—	—	—

* SDE die used with tool frame 354940-1

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

COAXICON Contacts (Continued)

Size 3 Contacts

(For use in ARINC 404 Connectors)

Performance Characteristics

Nominal Impedance — 50 ohms

Frequency Range — 0 to 5 Ghz

Operating Temperature — -85°F to 329°F [-65°C to +165°C]

Operating Voltage (Rated) — 500 V rms, 60 Hz at Sea Level

Contact Resistance (Milliohms) — Center Contact — 2.1 max. Outer Contact — 0.2 max.

Insulation Resistance — 5,000 megohms min. @ 500 vdc per MIL-STD-1344, Method 3003 or MIL-STD-202, Method 302, Cond. B

Dielectric Withstanding Voltage (60 Hz, rms) — 1500 V rms at Sea Level

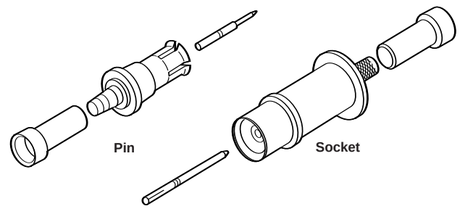
VSWR — 1.3 to 1.0 at 5 GHz

Material and Finish

Contact — Beryllium Copper per ASTM-B-196/ASTM-B-197, Brass per ASTM-B-16, TEFLON per ASTM-D-1710, Silicon Rubber per ZZ-R-765, Gold plate per MIL-G-45204, Nickel plate per QQ-N-290, Tin plate per MIL-L-46064A

Ferrule — Copper per ASTM-B-188, Tin plate per ASTM-B-545

Size 3 (Captivated)



Contact Size	RG/U Cable	Contact Part No.		"O" Crimp Tooling		
				Center Contact		
		Pin	Socket	Tool (M22520/)	Positioner/ Die	Ferrule
3	58C	226053-1	225792-3	601966-1 (2-01)	2-601966-4[1] 1-601966-8[2]	91905-1*
	225	—	225792-5	220015-1	—	220015-1
	214	—	225792-1	220015-1	—	220015-1
3 (Right-Angle)	142, 142A, 142B	228011-1	—	601966-1 (2-01)	1-601966-8	91905-1*

[1] Use with pin contact
[2] Use with socket contact
* SDE die used with tool frame 354940-1

Size 5, 9 and 15 Contacts

(For use in ARINC 404 Connectors)

Performance Characteristics for size 5, 9 and 15 contacts

Nominal Impedance — 50 ohms

Frequency Range — 0 to 500 MHz

Operating Temperature — -85°F to 329°F [-65°C to +165°C]

Operating Voltage (Rated) — 325 VAC rms, 60 Hz

Contact Resistance (Milliohms) — Sizes 5 and 9 with RG 58/U cable:
Center Contact — 10
Outer Contact — 1.5
Size 15 with RG 316/U cable:
Center Contact — 15
Outer Contact — 2

Insulation Resistance — 5,000 megohms min. @ 500 vdc per MIL-STD-1344, Method 3003 or MIL-STD-202, Method 302, Cond. B

Dielectric Withstanding Voltage (60 Hz, rms) — Sizes 5 and 9 with RG 58/U and 316/U cable:
750 at Sea Level
350 at 50,000 ft [15 240 m]
Size 15 with RG 316/U, 178/U and 196/U cable:
325 at Sea Level
150 at 50,000 ft [15 240 m]

VSWR — 1.3 to 1.0 @ 500 MHz

Insertion/Withdrawal Force — Sizes 5 and 9:

Insertion Force Maximum		Withdrawal Force Minimum	
lb	[N]	lb	[N]
5	22.24	1	4.45

Size 15:

Insertion Force Maximum		Withdrawal Force Minimum	
oz	[N]	oz	[N]
35	6.95	5	1.39

Cable Retention — Sizes 5 and 9:
60 lb [266.9 N]
Size 15:
10 lb [44.5 N]

Durability — 500 cycles

Thermal Shock — per MIL-STD-1344, Method 1003, Cond. A or MIL-STD-202, Method 107, Cond. A

Physical Shock — per MIL-STD-1344, Method 2004, Cond. A or MIL-STD-202, Method 213, Cond. A

Vibration — per MIL-STD-1344, Method 2005, Cond. IV or MIL-STD-202, Method 204, Cond. D

Moisture Resistance — per MIL-STD-202, Method 106, omit steps 7a and 7b

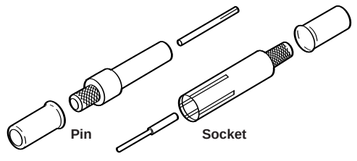
Salt Spray — 48 hours per MIL-STD-1344, Method 1001, Cond. B or MIL-STD-202, Method 101, Cond. B

Material and Finish

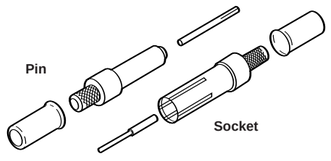
Contact — Beryllium copper per ASTM-B-196/ASTM-B-197, Brass per ASTM-B-16, TEFLON per ASTM-D-1710, Gold plate per MIL-G-45204, Nickel plate per QQ-N-290

Ferrule — Copper per ASTM-B-188, tin plate per ASTM-B-545

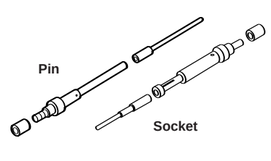
Size 5



Size 9



Size 15



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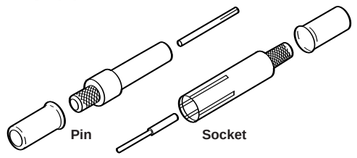
Japan: 81-44-844-8013
UK: 44-208-420-8341

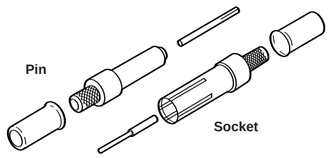
COAXICON Contacts (Continued)

Size 5, 9 and 15 Contacts
(Continued)

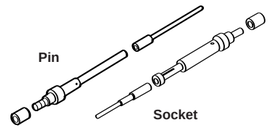
Size 5



Size 9



Size 15



Contact Size	RG/U Cable	Contact Part No.		"O" Crimp Tooling			Military Hex Crimp Tooling			
				Center Contact			Center Contact		Ferrule	
		Pin	Socket	Tool (M22520/)	Positioner/ Die	Ferrule	Tool (M22520/)	Die (M22520/)	Tool (M22520/)	Die (M22520/)
5	58C	225790-1	225791-1	601966-1 (2-01)	1-601966-6 K345	91905-1**	—	—	—	—
	400, 142, 142A, 142B	225790-2	225791-2	220066-2	—	91905-1**	—	—	—	—
	141A	225790-1	225791-1	220066-2	—	91905-1**	—	—	—	—
	402 Semi-Rigid .141 [3.58]	225790-3	225791-6	220066-2	—	91905-1**	—	—	—	—
	174, 188, 316	225790-5	225791-3	601966-1 (2-01)	1-601966-6 K345	91905-1**	—	—	—	—
	180, 195	225790-4	225791-8	601966-1 (2-01)	1-601966-6 K345	91905-1**	—	—	—	—
	179, 187	225790-6 5-225790-6*	225791-4 5-225791-4*	601966-1 (2-01)	1-601966-6 K345	91905-1**	—	—	—	—
	178, 196	225790-7	225791-5	601966-1 (2-01)	1-601966-6 K345	220020-1	—	—	—	—
	223	225790-2	225791-2	601966-1 (2-01)	1-601966-6 K345	91905-1**	—	—	—	—
	316 Double Shield 188 Double Shield	225790-8	1-225791-0	—	—	—	601966-1 (2-01)	1-601966-6 K345	608650-1 (5-01)	(Y159)
Military Hex Crimp 5	316 Double Shield 188 Double Shield	225790-8 5-225790-8*	1-225791-0	—	—	—	601966-1 (2-01)	1-601966-6 K345	608650-1 (5-01)	(Y159)
	58C, 141A	447850-1	447851-1	—	—	—	601966-1 (2-01)	1-601966-6 K345	608650-1 (5-01)	(5-45B)
	142, 142A, 142B	447850-2	447851-2	—	—	—	601966-1 (2-01)	1-601966-6 K345	608650-1 (5-01)	(5-45B)
	402 Semi-Rigid .141 [3.58]	447850-3	447851-3	—	—	—	601966-1 (2-01)	1-601966-6 K345	608650-1 (5-01)	(5-45A)
	174, 188, 316	447850-4	447851-4	—	—	—	601966-1 (2-01)	1-601966-6 K345	608650-1 (5-01)	(5-37B)
9	58C 141A	225935-1	225936-2	601966-1 (2-01)	1-601966-6 K345	91905-1**	—	—	—	—
	174, 188 316	225935-4 5-225935-4*	225936-3 5-225936-3*	601966-1 (2-01)	1-601966-6 K345	91905-1**	—	—	—	—
	142A, 142B	225935-5	225936-5	601966-1 (2-01)	1-601966-6 K345	91905-1**	—	—	—	—
	316 Double Shield 188 Double Shield	225935-6	225936-9	—	—	—	601966-1 (2-01)	1-601966-6 K345	608650-1 (5-01)	(Y159)
	179, 187	225935-7	225936-7	601966-1 (2-01)	1-601966-6 K345	91905-1**	—	—	—	—
15	188, 316	226782-1	226781-1	601966-1 (2-01)	2-601966-6	601963-2 (4-01)	—	—	—	—
	179, 187	226782-2	226781-2 5-226781-2*	601966-1 (2-01)	2-601966-6	601963-2 (4-01)	—	—	—	—
	178, 196	226782-3 5-226782-3*	226781-3	601966-1 (2-01)	2-601966-6	601963-2 (4-01)	—	—	—	—

* RoHS compliant Part Numbers.
** SDE die used with tool frame 354940-1.

Extraction tools:
Size 5 and 9 —
Part Number 91074-1
Size 15 —
Part Number 91066-3

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Plugs, Boots and Caps

Sealing Plugs

Size 22
Part Number 204760-1
White TEFLON

Size 20
Part Number 203839-1
Red thermoplastic

Size 16
Part Number 203839-2
Blue thermoplastic

Size 12
Part Number 205574-1
Yellow thermoplastic

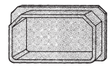
Coaxial Sealing Plug and Boot

Size 5
Plug—Part Number 205975-1

Boot for RG-58C cable—
Part Number 205402-2
Boot for RG-180, -190 cable—
Part Number 205402-3

Dust Covers

Conductive Receptacle Cap
Part Number 445918-1
Conductive Plug Cap
Part Number 447162-1



Plug Cap
Part Number 205282-1

Receptacle Cap
Part Number 205283-1

106-Contact Inserts for Flexible Flat Cable

These custom-made assemblies use Tyco Electronics Flexible Flat Conductor Cable which has .050 [1.27] wide conductors, .003 [0.08] thick, on .100 [2.54] centers (or similar, customer-specified cable). The inserts mate with 106-contact inserts, shown on page 4-60, with size 22 contacts.

The adaptability of flexible flat cable to many uses, the wide variety of contact styles available, and the high quality of Tyco Electronics assembled harnesses make these inserts particularly attractive. Among their outstanding features are that they require no soldering, welding or potting, and the inserts are repairable by replacement of individual cables.

Flexible Flat Conductor Cable

- **Recognized under the Component Program of Underwriters Laboratories Inc., File No. E53793**

Consult Tyco Electronics for additional information.

Specifications

Temperature Rating — -67°F to 221°F [-55°C to +105°C]

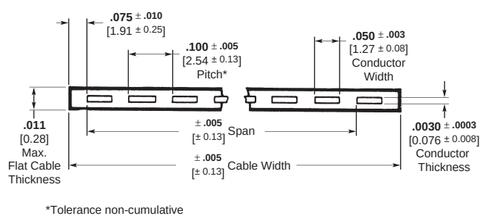
Voltage Rating — 300 volts per UL Style No. 2646

Current Rating — 3 amperes, equivalent 27 AWG [0.1 mm²]

Insulation Resistance — 5000 megohms (min.)

Insulation Material — Polyester

Flammability — Self-extinguishing per applicable UL requirement



*Tolerance non-cumulative

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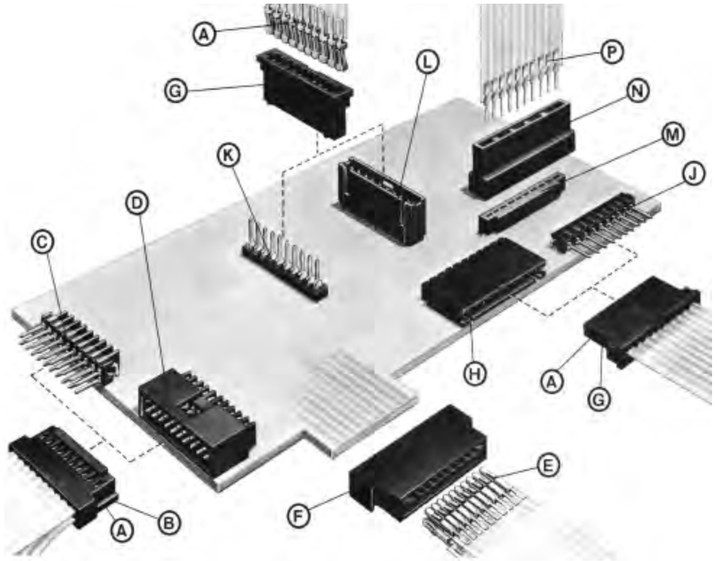
Flexible Flat Cable Applications

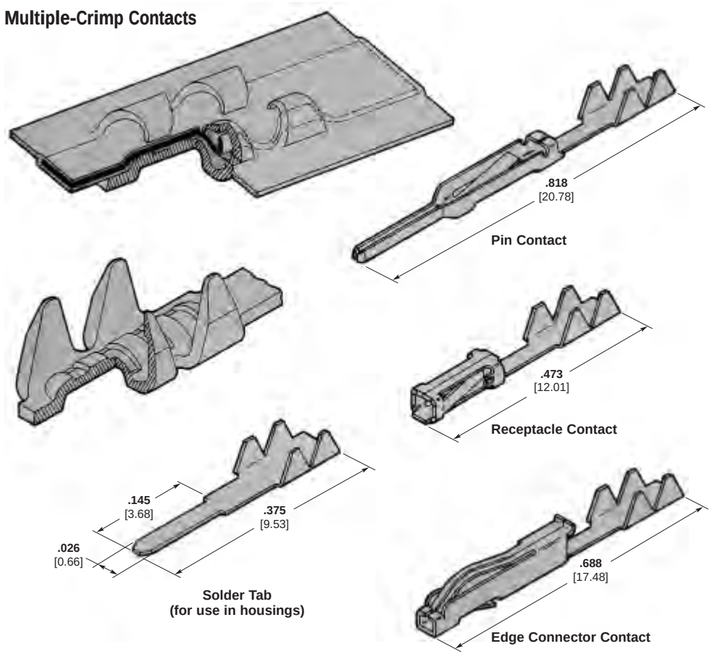
Design Options

Some of the many possible applications for flexible flat cable are illustrated here. Additionally, individual cables can be divided for termination with a mixture of various contact styles. For more information consult Tyco Electronics.

A Receptacle contacts
B Double row receptacle housing
C .025 [0.64] square post, double-row, right-angle header
D .025 [0.64] square post, double-row, right-angle header, shrouded
E PC edge connector contacts
F PC edge connector housing
G Receptacle housing
H .025 [0.64] square post, single-row, right-angle header, shrouded
J .025 [0.64] square post, single-row, right-angle header
K .025 [0.64] square post, single-row, straight header
L .025 [0.64] square post, single-row, straight header, shrouded
M Polarized SIP Socket
N Solder tab housing
P Solder tab contacts



Multiple-Crimp Contacts



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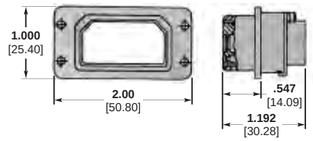
Special Shells and Inserts

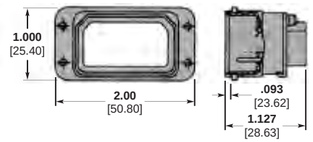
Example: RA 1 P 32S 00 200

Miniature Connectors

RA Series (unsealed)

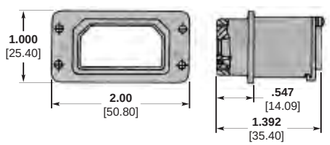


Plug (RA1P)

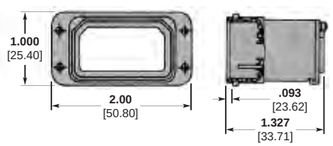


Receptacle (RA1R)

RE Series (environmentally sealed)



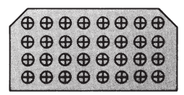
Plug (RE1P)



Receptacle (RE1R)

Contact Inserts for Miniature Connectors

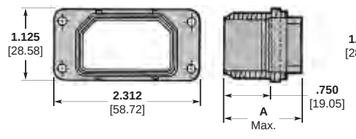
These inserts accept standard contacts shown on pages 4-64 and 4-65.



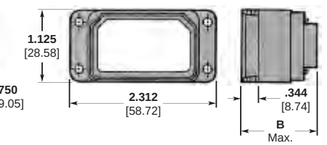
Arrangement 32
32 Size 20 Contacts

Standard Size, Unkeyed Connectors

RMA Series (unsealed)



Plug



Receptacle

RMAE Series (environmentally sealed)

These connectors use inserts shown on page 4-60. The shells are similar to standard series shells, except they are lighter weight and offer no keying provision.

Contact Arrangement	Dimensions			
	A Max. (Plug)		B Max. (Receptacle)	
	RMA	RMAE	RMA	RMAE
106	**1.120** 28.45	**1.320** 33.53	**1.250** 31.75	**1.450** 36.83
8, D8, 26, 40, 45, 57, 67	**1.220** 30.99	**1.420** 36.07	**1.350** 34.29	**1.550** 39.40
C8, 32C2, 32C4, 33C4, 40C1	**1.420** 36.07	**1.420** 36.07	**1.550** 39.37	**1.550** 39.37

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Cross Reference

Descriptive Part No.	Part No.	RoHS Part No.
M2P106P106P-2300(204)	0-1218229-1	—
M2R57P57P-0004(201)	0-1218368-1	—
M2RC8P106S-0104(200)	0-1218919-1	—
MM2R106S106S-0100(201)	0-1218476-1	—
MME1P106P-2301(204)	0-1484157-1	—
MME1P40S-0300(201)	0-1218230-1	—
MME1P57P-2301(204)	0-1218638-1	—
MME1R106S-0001(204)	0-1484158-1	—
MME1R57S-0001(204)	0-1218639-1	—
MME2P106PC8S-7101(201)	0-1218239-1	—
MME2P33C4S106P-29(204)	0-1218735-1	—
MME2P33C4SD8S-00(200)	0-1218720-1	—
MME2P57P57P-00(204)	0-1218814-1	5-1218814-1
MME2P57S57S-00(201)	0-1218706-1	5-1218706-1
MME2R33C4P106S-00(204)	0-1218745-1	—
MME2R33C4PD8P-00(200)	0-1218619-2	—
MME2R33C4PD8P-00(201)	0-1218619-1	5-1218619-1
MME2R40P40P-0001(204)	0-1218236-1	—
MME2R57S57S-00(200)	0-1484033-1	—
MME2R57S57S-00(201)	0-1484033-2	5-1484033-2
MME3R26P26P26P-1801(200)	0-1218155-1	—
R1P106S-2301(201)	0-0213431-1	—
R1P8S-0201(200)	0-1218133-1	—
R1R106P-0001(201)	0-0213432-1	—
R1R57P-0101(250)	0-1484148-1	—
R2P26S33C4S-0001(200)	0-1218637-1	5-1218637-1
R2P57S26S-0301(200)	0-1218361-1	—
R2P57S57S-0001(200)	0-0213433-1	—
R2P67S106P-3300(202)	2-0445564-0	—
R2P67S67S-0000(400)	0-1218101-1	—
R2R106S106S-0104(201)	0-0443098-1	—
R2R106S106S-2301(200)	0-0213434-6	—
R2R106S106S-2301(201)	0-0213434-7	—
R2R26P45P-0101(200)	0-0213434-1	—
R2R32C4P106S-0101(201)	0-1218404-1	—
R2R45P45P-0101(200)	0-0213434-2	—
R2R57P26P-0301(201)	0-1218205-1	—
R2R57P57P-0001(201)	0-1218146-1	—
R2R67P67P-0001(200)	0-0213434-3	—
R2R67P67P-0001(201)	0-0213434-4	—
R2R67P67P-0101(200)	0-0213434-5	5-0213434-5
RA1R32P-00(201)	0-1218080-1	—
RE1P32S-00(200)	0-1218176-1	—
RM1P106P-00(202)	0-1218314-1	—
RM1P26S-0001(200)	0-0213435-2	—
RM1P33C4S-0001(201)	0-0213435-3	—
RM1P33C4S-0001(200)	0-1218182-1	—
RM1P40C1P-0001(200)	0-0213435-5	—
RM1P40C1S-0001(200)	0-0213435-6	—
RM1P40S-0001(201)	0-0213435-4	—
RM1P40S-0001(200)	0-1218350-1	—
RM1P45S-00(200)	0-1218479-2	—
RM1P45S-0000(200)	0-1218479-1	5-1218479-1
RM1P57S-00(200)	0-0213435-7	—
RM1P57S-00(201)	0-0213435-8	—
RM1P57S-0001(200)	0-1218401-1	—
RM1P67S-00(200)	0-0213435-9	—
RM1P67S-0001(200)	0-1218042-1	—
RM1P67S-2366(200)	0-1218756-1	—

Descriptive Part No.	Part No.	RoHS Part No.
RM1P8S-0301(200)	0-1218237-1	—
RM1PD8P-0001(200)	0-0213435-1	5-0213435-1
RM1R106S-01(200)	0-1218724-1	—
RM1R32C4P-0101(200)	0-1218039-1	—
RM1R33C4P-0001(201)	0-0213436-2	—
RM1R33C4P-0101(200)	0-1218040-1	—
RM1R33C4P-0101(201)	0-1218040-2	—
RM1R40C1S-2301(200)	0-0213436-3	—
RM1R40P-0301(201)	0-1218363-1	—
RM1R67P-00(200)	0-0213436-4	—
RM1R67P-0101(200)	0-1218041-1	—
RM1R67P-0101(201)	0-1218041-2	—
RM1R67P-1848(200)*	0-1218656-1	—
RM1RD8S-0001(200)	0-0213436-1	5-0213436-1
RM2P106P106P-00(200)	0-0213437-9	—
RM2P106P106P-00(201)	1-0213437-0	—
RM2P106P106P-0000(201)	0-0445564-4	—
RM2P106P106P-00(202)	4-0445564-0	—
RM2P106P106P-0401(201)	1-0445564-4	—
RM2P106S106S-0201(200)	3-0445564-6	—
RM2P26PC8P-0001(200)	0-0213437-1	5-0213437-1
RM2P26S26S-0001(200)	0-0213437-2	5-0213437-2
RM2P26S26S-2301(201)	0-1218046-1	5-1218046-1
RM2P32C2P32C2P-0000(201)	0-0445564-0	—
RM2R32C2P40C1P-0001(200)	0-1218145-1	—
RM2P32C2S26S-0031(200)	0-1218876-1	5-1218876-1
RM2P33C4S33C4S-0001(200)	0-1218528-1	—
RM2P33C4S33C4S-0301(200)	0-0213437-4	—
RM2P33C4SC8S-0001(201)	0-0213437-3	—
RM2P33C4SD8S-0301(200)	0-1218228-1	—
RM2P40C1P40C1P-0000(201)	0-0445564-1	—
RM2P40S40S-02(206)	2-0445564-6	—
RM2P40S67S-0301(200)	0-1218226-1	—
RM2P45S45S-0001(200)	2-0445564-4	—
RM2P45S57S-00(200)	0-0206442-1	—
RM2P57P57P-0000(201)	0-0445564-2	—
RM2P57S57S-00(200)	0-0213437-5	—
RM2P67P67P-0000(201)	0-0445564-3	—
RM2P67S32C2S-0001(200)	0-0213437-6	5-0213437-6
RM2P67S32C2S-0001(201)	0-0213437-7	—
RM2P67S67S-00(202)	4-0445564-1	—
RM2P67S67S-0301(200)	0-0213437-8	—
RM1P67S67S-5001(200)	0-1218045-1	—
RM2PC8SC8S-0301(201)	1-0445564-7	—
RM2R106P106P-0001(201)	1-0213438-3	—
RM2R106S106S-00(200)	1-0213438-4	—
RM2R106S106S-00(202)	0-0446913-9	—
RM2R106S106S-0101(201)	0-1218934-1	—
RM2R106SD8P-0001(200)	1-0213438-2	—
RM2R26P26P-0001(200)	0-0213438-2	5-0213438-2
RM2R26SC8S-0001(200)	0-0213438-1	5-0213438-1
RM2R32C2P40C1P-0001(201)	0-0213438-3	—
RM2R33C4P33C4P-0101(200)	0-1218490-1	—
RM2R33C4P33C4P-2301(200)	0-0213438-6	—
RM2R33C4P57P-0101(400)	0-1218299-1	—
RM2R33C4S33C4S-0001(200)	0-0213438-5	—
RM2R33C4SC8S-0001(201)	0-0213438-4	—
RM2R40C1P67P-00(200)*	0-1218473-1	—
RM2R40P40P-0104(200)	0-1218342-1	—

*Assembly loaded with posted contacts

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USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Cross Reference (Continued)

Descriptive Part No.	Part No.	RoHS Part No.
RM2R40P67P-3301(200)	0-1218227-1	—
RM2R57P57P-0104(200)	0-1218348-1	—
RM2R67P26P-00(200)	0-0213438-7	—
RM2R67P32C2P-0001(200)	0-0213438-8	—
RM2R67P40C1P-0101(200)	0-0213438-9	—
RM2R67P57P-00(200)	1-0213438-0	—
RM2R67P67P-0000(200)	0-0446913-0	—
RM2R67P67P-00(202)	2-0445564-2	—
RM2R67P67P-0101(200)	1-0213438-1	—
RM2RC3P67P-0019(201)	0-1218206-1	—
RM2R67P32C2P-0101(200)	0-0448584-1	—
RM3P32C2S67S32C2S-0001(201)	0-1218349-1	—
RM3P40S32C2SC2S-0301(200)	0-1218224-1	—
RM3PC8S32C2S106P-0001(200)	0-0443969-1	—
RM3R40P32C2PC2P-3301(200)	0-1218225-1	—
RM2R40P40P-0104(200)	0-1218342-1	—
RM3RC8P32C2P106S-0001(200)*	0-0443970-1	—
RM4P106P106P106P88P-00(200)	0-0443174-1	—
RM4R88S106S106S106S-00(200)*	0-0443089-1	—
RMA1P26P-00(201)	0-1218202-1	—
RMA1P26S-00(201)	0-1218201-1	—
RMA1P45S-39(201)	0-1218959-1	—
RMA1P8S-39(201)	0-1218957-1	—
RMA1R26P00(201)	0-1218203-1	—
RMA1R45P-01(201)	0-1218960-1	—
RMA1R8P-01(201)	0-1218958-1	—
RME1P106P-0301(201)	0-1218354-1	—
RME1P33C4S-0001(200)	0-0213439-1	5-0213439-1
RME1P40C1S-01(250)	0-1484241-1	—
RME1P40C1S-01(251)	0-1484241-2	—
RME1P40S-0101(200)	0-1218352-1	—
RME1R106S-0201(201)	0-1218402-1	—
RME1R33C4P-0001(200)	0-0213440-2	—
RME1R40C1P-01(250)	0-1484240-1	—
RME1R40C1P-01(251)	0-1484240-2	—
RME1R40P-0001(200)	0-0213440-3	—
RME1R8P-0101(200)	0-0213440-1	—
RME2P106P106P-00(201)	0-0213441-6	—
RME2P106P106P-0001(200)	0-0213441-5	—
RME2P106P106P-0301(200)	0-0213441-7	—
RME2P106P106P-0399(254)	2-0445564-3	—
RME2P106P26P-0001(201)	1-0445564-3	—
RME2P106PD8S-5101(200)	2-0445564-1	—
RME2P106S106S-0001(200)	0-0213441-8	—
RME2P106S26P-0001(201)	1-0445564-5	—
RME2P106S26P-5001(201)	0-1218207-1	—
RME2P33C4S57S-0001(400)	0-1218300-1	—
RME2P40S40S-0015(200)	0-1218356-1	—
RME2P45S45S-0001(200)	0-0445564-5	—
RME2P45S8P-29 (204)	0-1218895-1	—
RME2P67S67S-0001(200)	0-0213441-2	5-0213441-2
RME2P67S67S-0101(200)	0-0213441-3	—
RME2P67S67S-0301(200)	0-0213441-4	—
RME2P67S67S-5001(200)	0-1218214-1	—
RME2P67SD8S-0001(200)	0-0213441-1	—
RME2P67SD8S-0001(201)	2-0445564-7	—
RME2P77C2P77C2P-0001(250)	0-0448235-1	—
RME2P8S77C2P-0001(250)	0-0448235-2	—
RME2PC8SC8S-0301(251)	0-0445564-6	—
RME2R106P106P-0001(201)	0-0446913-3	—
RME2R106P26S-2301(200)	0-0446913-1	—
RME2R106S106S-0001(201)	0-0446913-4	—
RME2R106S106S-2301(201)	0-0213442-5	—
RME2R106S33C4P-0001(201)	0-0213442-3	—
RME2R40P8P-0101(201)	0-0213442-1	—
RME2R45P8S-00(200)	0-1218894-1	—
RME2R67P26P-5002(200)	0-1484014-1	—
RME2R67P67P-3301(201)	0-1218343-1	5-1218343-1
RME2R67PD8P-0001(200)	0-0213442-2	—
RME2R77C2S77C2S-0001(250)	0-0448227-1	—
RME2R8P77C2S-0001(250)	0-0448227-2	—
RME2RC8S67S-00(200)	0-1218353-1	—
RME3P106P106P106S-0001(200)	0-1218297-1	—
RME3P57P26P26P-2600(201)	0-1218159-1	—
RME3P88S106S106S-0001(400)	0-1218358-1	—
RME3R57S26S26S-3300(201)	0-1218158-1	—
RME3R67P106S67P-7611(204)	0-1218723-1	—

*Assembly loaded with posted contacts

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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Military Cross Reference

The military connectors listed include contacts in quantities as specified by MIL-C-81659. Military connectors may be ordered without contacts by placing the (201) custom ordering code (page 4-63) behind the Tyco Electronics Descriptive Part Number. Military connectors with keying installed may also be ordered by specifying it in the Tyco Electronics Descriptive Part Number (page 4-57) or by placing the keying position directly behind the MIL-C-81659 part number.

In all cases described above, the MIL-C-81659 part number will be ink stamped on the connector shell, including keying if specified.

Note: To order commercial equivalent of QPL connectors, change the initial M of the Tyco Electronics Designation in column 2 to an R; see page 4-63 for keying code and custom order code, required to complete commercial designation.

Government Designation	Tyco Electronics Designation	ITT Cannon Designation
MIL-C-81659/29A2-0001	MME1P26P-00	
MIL-C-81659/29A2-0002	MME1P26S-00	DPXBNE-26M-33S-00
MIL-C-81659/29A2-0009	MME1P40P-00	
MIL-C-81659/29A2-0010	MME1P40S-00	DPXBNE-40M-33S-00
MIL-C-81659/29A2-0017	MME1P45P-00	
MIL-C-81659/29A2-0018	MME1P45S-00	DPXBNE-45M-33S-00
MIL-C-81659/29A2-0025	MME1P57P-00	
MIL-C-81659/29A2-0026	MME1P57S-00	DPXBNE-57M-33S-00
MIL-C-81659/29A2-0033	MME1P67P-00	
MIL-C-81659/29A2-0034	MME1P67S-00	DPXBNE-67M-33S-00
MIL-C-81659/29A2-0041	MME1P106P-00	DPXBNE-A106-33P-00
MIL-C-81659/29A2-0042	MME1P106S-00	
MIL-C-81659/29A2-0083	MME1PD8P-00	
MIL-C-81659/29A2-0084	MME1PD8S-00	DPXBNE-D8M-33S-00
MIL-C-81659/31A2-0001	MME1R26P-00	DPXBNE-26M-34P-00
MIL-C-81659/31A2-0002	MME1R26S-00	
MIL-C-81659/31A2-0009	MME1R40P-00	DPXBNE-40M-34P-00
MIL-C-81659/31A2-0010	MME1R40S-00	
MIL-C-81659/31A2-0017	MME1R45P-00	DPXBNE-45M-34P-00
MIL-C-81659/31A2-0018	MME1R45S-00	
MIL-C-81659/31A2-0025	MME1R57P-00	DPXBNE-57M-34P-00
MIL-C-81659/31A2-0026	MME1R57S-00	
MIL-C-81659/31A2-0033	MME1R67P-00	DPXBNE-67M-34P-00
MIL-C-81659/31A2-0034	MME1R67S-00	
MIL-C-81659/31A2-0041	MME1R106P-00	
MIL-C-81659/31A2-0042	MME1R106S-00	DPXBNE-A106-34S-00
MIL-C-81659/31A2-0083	MME1RD8P-00	DPXBNE-D8M-34P-00
MIL-C-81659/31A2-0084	MME1RD8S-00	
MIL-C-81659/33A2-0003	MME2P26P26P-00	
MIL-C-81659/33A2-0004	MME2P26S26S-00	DPX2NE-26MS26MS-33B-00
MIL-C-81659/33A2-0011	MME2P40P40P-00	
MIL-C-81659/33A2-0012	MME2P40S40S-00	DPX2NE-40MD40MD-33B-00
MIL-C-81659/33A2-0019	MME2P45P45P-00	
MIL-C-81659/33A2-0020	MME2P45S45S-00	DPX2NE-45MS45MS-33B-00
MIL-C-81659/33A2-0027	MME2P57P57P-00	
MIL-C-81659/33A2-0028	MME2P57S57S-00	DPX2NE-57MS57MS-33B-00
MIL-C-81659/33A2-0035	MME2P67P67P-00	
MIL-C-81659/33A2-0036	MME2P67S67S-00	DPX2NE-67MS67MS-33B-00
MIL-C-81659/33A2-0043	MME2P106P106P-00	DPX2NE-A106PA106P-33B-00
MIL-C-81659/33A2-0044	MME2P106S106S-00	
MIL-C-81659/33A2-0057	MME2P106S26P-00	
MIL-C-81659/33A2-0058	MME2P106P26S-00	DPX2NE-A106P26MS-33B-00
MIL-C-81659/33A2-0059	MME2P26P106S-00	
MIL-C-81659/33A2-0060	MME2P26S106P-00	DPX2NE-26MSA106P-33B-00
MIL-C-81659/33A2-0071	MME2P67P106S-00	
MIL-C-81659/33A2-0072	MME2P67S106P-00	DPX2NE-67MSA106P-33B-00
MIL-C-81659/33A2-0089	MME2P106S67P-00	
MIL-C-81659/33A2-0090	MME2P106P67S-00	DPX2NE-A106P67MS-33B-00
MIL-C-81659/33A2-0133	MME2P57P106S-00	DPX2NE-57MSA106P-33B-00
MIL-C-81659/33A2-0134	MME2P57S106P-00	
MIL-C-81659/33A2-0147	MME2P57P26P-00	
MIL-C-81659/33A2-0148	MME2P57S26S-00	DPX2NE-57MS26MS
MIL-C-81659/35A2-0003	MME2R26P26P-00	DPX2NE-26MP26MP-34B-00
MIL-C-81659/35A2-0004	MME2R26S26S-00	
MIL-C-81659/35A2-0011	MME2R40P40P-00	DPX2NE-40MP40MP
MIL-C-81659/35A2-0012	MME2R40S40S-00	
MIL-C-81659/35A2-0019	MME2R45P45P-00	DPX2NE-45MP45MP
MIL-C-81659/35A2-0020	MME2R45S45S-00	
MIL-C-81659/35A2-0027	MME2R57P57P-00	DPX2NE-57MP57MP
MIL-C-81659/35A2-0028	MME2R57S57S-00	

MIL-C-81659/35A2 Continued on page 4-76

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USA: 1-800-522-6752
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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Military Cross Reference (Continued)

Government Designation	Tyco Electronics Designation	ITT Cannon Designation
MIL-C-81659/35A2-0035	MME2R67P67P-00	DPX2NE-67MP67MP
MIL-C-81659/35A2-0036	MME2R67S67S-00	
MIL-C-81659/35A2-0043	MME2R106P106P-00	
MIL-C-81659/35A2-0044	MME2R106S106S-00	DPX2NE-A106SA106S
MIL-C-81659/35A2-0057	MME2R106S26P-00	DPX2NE-A106S26MP
MIL-C-81659/35A2-0058	MME2R106P26S-00	
MIL-C-81659/35A2-0059	MME2R26P106S-00	DPX2NE-26MPA106S
MIL-C-81659/35A2-0060	MME2R26S106P-00	
MIL-C-81659/35A2-0071	MME2R67P106S-00	DPX2NE-67MPA106S
MIL-C-81659/35A2-0072	MME2R67S106P-00	
MIL-C-81659/35A2-0089	MME2R106S67P-00	DPX2NE-A106S67MP
MIL-C-81659/35A2-0090	MME2R106P67S-00	
MIL-C-81659/35A2-0133	MME2R57P106S-00	DPX2NE-57MPA106S
MIL-C-81659/35A2-0134	MME2R57S106P-00	
MIL-C-81659/35A2-0147	MME2R57P26P-00	DPX2NE-57MP26MP
MIL-C-81659/35A2-0148	MME2R57S26S-00	
MIL-C-81659/37A2-0005	MME3P26P26P26P-00	
MIL-C-81659/37A2-0006	MME3P26S26S26S-00	DPX3NE-78M-33S-00
MIL-C-81659/37A2-0013	MME3P40P40P40P-00	DPX3NE-120M-33S-00
MIL-C-81659/37A2-0014	MME3P40S40S40S-00	
MIL-C-81659/37A2-0021	MME3P45P45P45P-00	
MIL-C-81659/37A2-0022	MME3P45S45S45S-00	DPX3NE-135M-33S-00
MIL-C-81659/37A2-0029	MME3P57P57P57P-00	DPX3NE-171M-33S-00
MIL-C-81659/37A2-0030	MME3P57S57S57S-00	
MIL-C-81659/37A2-0037	MME3P67P67P67P-00	
MIL-C-81659/37A2-0038	MME3P67S67S67S-00	DPX3NE-201M-33S-00
MIL-C-81659/37A2-0045	MME3P106P106P106P-00	DPX3NE-A318-33P-00
MIL-C-81659/37A2-0046	MME3P106S106S106S-00	
MIL-C-81659/37A2-0075	MME3P67P67P106S-00	
MIL-C-81659/37A2-0076	MME3P67S67S106P-00	DPX3NE-240M-33PS-00
MIL-C-81659/37A2-0079	MME3P67P106S67P-00	
MIL-C-81659/37A2-0080	MME3P67S106P67S-00	DPX3NE-A240M-33PS-00
MIL-C-81659/37A2-0091	MME3P106S106S67P-00	
MIL-C-81659/37A2-0092	MME3P106P106P67S-00	DPX3NE-279M-33PS-00
MIL-C-81659/39A2-0005	MME3R26P26P26P-00	DPX3NE-78M-34P-00
MIL-C-81659/39A2-0006	MME3R26S26S26S-00	
MIL-C-81659/39A2-0013	MME3R40P40P40P-00	DPX3NE-120M-34P-00
MIL-C-81659/39A2-0014	MME3R40S40S40S-00	
MIL-C-81659/39A2-0021	MME3R45P45P45P-00	DPX3NE-135M-34P-00
MIL-C-81659/39A2-0022	MME3R45S45S45S-00	
MIL-C-81659/39A2-0029	MME3R57P57P57P-00	DPX3NE-171M-34P-00
MIL-C-81659/39A2-0030	MME3R57S57S57S-00	
MIL-C-81659/39A2-0037	MME3R67P67P67P-00	DPX3NE-201M-34P-00
MIL-C-81659/39A2-0038	MME3R67S67S67S-00	
MIL-C-81659/39A2-0045	MME3R106P106P106P-00	
MIL-C-81659/39A2-0046	MME3R106S106S106S-00	DPX3NE-A318-34S-00
MIL-C-81659/39A2-0075	MME3R67P67P106S-00	DPX3NE-240M-34SP-00
MIL-C-81659/39A2-0076	MME3R67S67S106P-00	
MIL-C-81659/39A2-0079	MME3R67P106S67P-00	DPX3NE-A240M-34SP-00
MIL-C-81659/39A2-0080	MME3R67S106P67S-00	
MIL-C-81659/39A2-0091	MME3R106S106S67P-00	DPX3NE-279M-34SP-00
MIL-C-81659/39A2-0092	MME3R106P106P67S-00	
MIL-C-81659/41A2-0007	MME4P26P26P26P26P-00	
MIL-C-81659/41A2-0008	MME4P26S26S26S26S-00	DPX4NE-104M-33S-00
MIL-C-81659/41A2-0015	MME4P40P40P40P40P-00	
MIL-C-81659/41A2-0016	MME4P40S40S40S40S-00	DPX4NE-160M-33S-00
MIL-C-81659/41A2-0023	MME4P45P45P45P45P-00	
MIL-C-81659/41A2-0024	MME4P45S45S45S45S-00	DPX4NE-180M-33S-00
MIL-C-81659/41A2-0031	MME4P57P57P57P57P-00	
MIL-C-81659/41A2-0032	MME4P57S57S57S57S-00	DPX4NE-228M-33S-00

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UK: 44-208-420-8341

Military Cross Reference (Continued)

Government Designation	Tyco Electronics Designation	ITT Cannon Designation
MIL-C-81659/41A2-0039	MME4P67P67P67P67P-00	
MIL-C-81659/41A2-0040	MME4P67S67S67S67S-00	DPX4NE-268M-33S-00
MIL-C-81659/41A2-0047	MME4P106P106P106P106P-00	DPX4NE-A424-33S-00
MIL-C-81659/41A2-0048	MME4P106S106S106S106S-00	
MIL-C-81659/41A2-0061	MME4P26P26P26P26S-00	
MIL-C-81659/41A2-0062	MME4P26S26S26S26P-00	
MIL-C-81659/41A2-0101	MME4P106S106S67P67P-00	
MIL-C-81659/41A2-0102	MME4P106P106P67S67S-00	DPX4NE-346M-33PS-00
MIL-C-81659/43A2-0007	MME4R26P26P26P26P-00	DPX4NE-104M-34P-00
MIL-C-81659/43A2-0008	MME4R26S26S26S26S-00	
MIL-C-81659/43A2-0015	MME4R40P40P40P40P-00	DPX4NE-160M-34P-00
MIL-C-81659/43A2-0016	MME4R40S40S40S40S-00	
MIL-C-81659/43A2-0023	MME4R45P45P45P45P-00	DPX4NE-180M-34P-00
MIL-C-81659/43A2-0024	MME4R45S45S45S45S-00	
MIL-C-81659/43A2-0031	MME4R57P57P57P57P-00	DPX4NE-228M-34P-00
MIL-C-81659/43A2-0032	MME4R57S57S57S57S-00	
MIL-C-81659/43A2-0039	MME4R67P67P67P67P-00	DPX4NE-268M-34P-00
MIL-C-81659/43A2-0040	MME4R67S67S67S67S-00	
MIL-C-81659/43A2-0047	MME4R106P106P106P106P-00	
MIL-C-81659/43A2-0048	MME4R106S106S106S106S-00	DPX4NE-A42A-34P-00
MIL-C-81659/43A2-0061	MME4R26P26P26P26S-00	
MIL-C-81659/43A2-0062	MME4R26S26S26S26P-00	
MIL-C-81659/43A2-0101	MME4R106S106S67P67P-00	DPX4NE-346M-34SP-00
MIL-C-81659/43A2-0102	MME4R106P106P67S67S-00	
MIL-C-81659/61A2-0001	MM1R26P-00	DPXBNE-26M-34P-29
MIL-C-81659/61A2-0002	MM1R26S-00	
MIL-C-81659/61A2-0009	MM1R40P-00	DPXBNE-40M-34P-29
MIL-C-81659/61A2-0010	MM1R40S-00	
MIL-C-81659/61A2-0017	MM1R45P-00	DPXBNE-45M-34P-29
MIL-C-81659/61A2-0018	MM1R45S-00	
MIL-C-81659/61A2-0025	MM1R57P-00	DPXBNE-57M-34P-29
MIL-C-81659/61A2-0026	MM1R57S-00	
MIL-C-81659/61A2-0033	MM1R67P-00	DPXBNE-67M-34P-29
MIL-C-81659/61A2-0034	MM1R67S-00	
MIL-C-81659/61A2-0041	MM1R106P-00	
MIL-C-81659/61A2-0042	MM1R106S-00	DPXBNE-A106-34S-29
MIL-C-81659/61A2-0083	MM1RD8P-00	DPXBNE-D8M-34P-29
MIL-C-81659/61A2-0084	MM1RD8S-00	
MIL-C-81659/62A2-0003	MM2R26P26P-00	DPX2NE-26MP26MP-34B-29
MIL-C-81659/62A2-0004	MM2R26S26S-00	
MIL-C-81659/62A2-0011	MM2R40P40P-00	DPX2NE-40MP40MP-34B-29
MIL-C-81659/62A2-0012	MM2R40S40S-00	
MIL-C-81659/62A2-0019	MM2R45P45P-00	DPX2NE-45MP45MP-34B-29
MIL-C-81659/62A2-0020	MM2R45S45S-00	
MIL-C-81659/62A2-0027	MM2R57P57P-00	DPX2NE-57MP57MP-34B-29
MIL-C-81659/62A2-0028	MM2R57S57S-00	
MIL-C-81659/62A2-0035	MM2R67P67P-00	DPX2NE-67MP67MP-34B-29
MIL-C-81659/62A2-0036	MM2R67S67S-00	
MIL-C-81659/62A2-0043	MM2R106P106P-00	
MIL-C-81659/62A2-0044	MM2R106S106S-00	DPX2NE-A106SA106S-34B-29
MIL-C-81659/62A2-0057	MM2R106S26P-00	DPX2NE-A106S26MP-34B-29
MIL-C-81659/62A2-0058	MM2R106P26S-00	
MIL-C-81659/62A2-0059	MM2R26P106S-00	DPX2NE-26MPA106S-34B-29
MIL-C-81659/62A2-0060	MM2R26S106P-00	
MIL-C-81659/62A2-0071	MM2R67P106S-00	DPX2NE-67MPA106S-34B-29
MIL-C-81659/62A2-0072	MM2R67S106P-00	
MIL-C-81659/62A2-0089	MM2R106S67P-00	DPX2NE-A106S67MP-34B-29
MIL-C-81659/62A2-0090	MM2R106P67S-00	
MIL-C-81659/62A2-0133	MM2R57P106S-00	DPX2NE-57MPA106S-34B-29
MIL-C-81659/62A2-0134	MM2R57S106P-00	

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Military Cross Reference (Continued)

Government Designation	Tyco Electronics Designation	ITT Cannon Designation
MIL-C-81659/62A2-0147	MM2R57P26P-00	DPX2NE-57MP26MP-34B-29
MIL-C-81659/62A2-0148	MM2R57S26S-00	
MIL-C-81659/63A2-0005	MM3R26P26P26P-00	DPX3NE-78M-34P-29
MIL-C-81659/63A2-0006	MM3R26S26S26S-00	
MIL-C-81659/63A2-0013	MM3R40P40P40P-00	DPX3NE-120M-34P-29
MIL-C-81659/63A2-0014	MM3R40S40S40S-00	
MIL-C-81659/63A2-0021	MM3R45P45P45P-00	DPX3NE-135M-34P-29
MIL-C-81659/63A2-0022	MM3R45S45S45S-00	
MIL-C-81659/63A2-0029	MM3R57P57P57P-00	DPX3NE-171M-34P-29
MIL-C-81659/63A2-0030	MM3R57S57S57S-00	
MIL-C-81659/63A2-0037	MM3R67P67P67P-00	DPX3NE-201M-34P-29
MIL-C-81659/63A2-0038	MM3R67S67S67S-00	
MIL-C-81659/63A2-0045	MM3R106P106P106P-00	
MIL-C-81659/63A2-0046	MM3R106S106S106S-00	DPX3NE-A318-34S-39
MIL-C-81659/63A2-0075	MM3R67P67P106S-00	DPX3NE-240M-34SP-29
MIL-C-81659/63A2-0076	MM3R67S67S106P-00	
MIL-C-81659/63A2-0079	MM3R67P106S67P-00	DPX3NE-A240M-34P-29
MIL-C-81659/63A2-0080	MM3R67S106P67S-00	
MIL-C-81659/63A2-0091	MM3R106S106S67P-00	DPX3NE-279M-34P-29
MIL-C-81659/63A2-0092	MM3R106P106P67S-00	
MIL-C-81659/64A2-0007	MM4R26P26P26P26P-00	DPX4NE-104M-34P-29
MIL-C-81659/64A2-0008	MM4R26S26S26S26S-00	
MIL-C-81659/64A2-0015	MM4R40P40P40P40P-00	DPX4NE-160M-34P-29
MIL-C-81659/64A2-0016	MM4R40S40S40S40S-00	
MIL-C-81659/64A2-0023	MM4R45P45P45P45P-00	DPX4NE-180M-34P-29
MIL-C-81659/64A2-0024	MM4R45S45S45S45S-00	
MIL-C-81659/64A2-0031	MM4R57P57P57P57P-00	DPX4NE-228M-34P-29
MIL-C-81659/64A2-0032	MM4R57S57S57S57S-00	
MIL-C-81659/64A2-0039	MM4R67P67P67P67P-00	DPX4NE-268M-34P-29
MIL-C-81659/64A2-0040	MM4R67S67S67S67S-00	
MIL-C-81659/64A2-0047	MM4R106P106P106P106P-00	
MIL-C-81659/64A2-0048	MM4R106S106S106S106S-00	DPX4NE-A424-34S-39
MIL-C-81659/64A2-0061	MM4R26P26P26P26S-00	
MIL-C-81659/64A2-0062	MM4R26S26S26S26P-00	
MIL-C-81659/64A2-0101	MM4R106S106S67P67P-00	DPX4NE-346M-34SP-29
MIL-C-81659/64A2-0102	MM4R106P106P67S67S-00	
MIL-C-81659/65A2-0001	M1P26P-00	
MIL-C-81659/65A2-0002	M1P26S-00	DPXBNA-26M-33S-00
MIL-C-81659/65A2-0009	M1P40P-00	
MIL-C-81659/65A2-0010	M1P40S-00	DPXBNA-49M-33S-00
MIL-C-81659/65A2-0017	M1P45P-00	
MIL-C-81659/65A2-0018	M1P45S-00	DPXBNA-45M-33S-00
MIL-C-81659/65A2-0025	M1P57P-00	
MIL-C-81659/65A2-0026	M1P57S-00	DPXBNA-57M-33S-00
MIL-C-81659/65A2-0033	M1P67P-00	
MIL-C-81659/65A2-0034	M1P67S-00	DPXBNA-67M-33S-00
MIL-C-81659/65A2-0041	M1P106P-00	DPXBNA-A106-33P-00
MIL-C-81659/65A2-0042	M1P106S-00	
MIL-C-81659/65A2-0083	M1PD8P-00	
MIL-C-81659/65A2-0084	M1PD8S-00	DPXBNA-D8M-33S-00
MIL-C-81659/66A2-0001	M1R26P-00	DPXBNA-26M-34P-00
MIL-C-81659/66A2-0002	M1R26S-00	
MIL-C-81659/66A2-0009	M1R40P-00	DPXBNA-40M-34P-00
MIL-C-81659/66A2-0010	M1R40S-00	
MIL-C-81659/66A2-0017	M1R45P-00	DPXBNA-45M-34P-00
MIL-C-81659/66A2-0018	M1R45S-00	
MIL-C-81659/66A2-0025	M1R57P-00	DPXBNA-57M-34P-00
MIL-C-81659/66A2-0026	M1R57S-00	
MIL-C-81659/66A2-0033	M1R67P-00	
MIL-C-81659/66A2-0034	M1R67S-00	

MIL-C-81659/66A2 Continued on page 4-79

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MIL-C-81659/66A2-0042	M1R106S-00	DPXBNA-A106-34S-00
MIL-C-81659/66A2-0083	M1RD8P-00	DPXBNA-D8M-34P-00
MIL-C-81659/66A2-0084	M1RD8S-00	
MIL-C-81659/67A2-0001	M1R26P-01	DPXBNA-26M-34P-01
MIL-C-81659/67A2-0002	M1R26S-01	
MIL-C-81659/67A2-0009	M1R40P-01	DPXBNA-40M-34P-01
MIL-C-81659/67A2-0010	M1R40S-01	
MIL-C-81659/67A2-0017	M1R45P-01	DPXBNA-45M-34P-01
MIL-C-81659/67A2-0018	M1R45S-01	
MIL-C-81659/67A2-0025	M1R57P-01	DPXBNA-57M-34P-01
MIL-C-81659/67A2-0026	M1R57S-01	
MIL-C-81659/67A2-0033	M1R67P-01	DPXBNA-67M-34P-01
MIL-C-81659/67A2-0034	M1R67S-01	
MIL-C-81659/67A2-0041	M1R106P-01	
MIL-C-81659/67A2-0042	M1R106S-01	DPXBNA-A106-34S-01
MIL-C-81659/67A2-0083	M1RD8P-01	DPXBNA-D8M-34P-01
MIL-C-81659/67A2-0084	M1RD8S-01	
MIL-C-81659/68A2-0001	M1R26P-23	DPXBNA-26M-34P-23
MIL-C-81659/68A2-0002	M1R26S-23	
MIL-C-81659/68A2-0009	M1R40P-23	DPXBNA-40M-34P-23
MIL-C-81659/68A2-0010	M1R40S-23	
MIL-C-81659/68A2-0017	M1R45P-23	DPXBNA-45M-34P-23
MIL-C-81659/68A2-0018	M1R45S-23	
MIL-C-81659/68A2-0025	M1R57P-23	DPXBNA-57M-34P-23
MIL-C-81659/68A2-0026	M1R57S-23	
MIL-C-81659/68A2-0033	M1R67P-23	DPXBNA-67M-34P-23
MIL-C-81659/68A2-0034	M1R67S-23	
MIL-C-81659/68A2-0041	M1R106P-23	
MIL-C-81659/68A2-0042	M1R106S-23	DPXBNA-A106-34S-23
MIL-C-81659/68A2-0083	M1RD8P-23	DPXBNA-D8M-34P-23
MIL-C-81659/68A2-0084	M1RD8S-23	
MIL-C-81659/69A2-0003	M2P26P26P-00	
MIL-C-81659/69A2-0004	M2P26S26S-00	DPX2NA-26MS26MS-33B-00
MIL-C-81659/69A2-0011	M2P40P40P-00	
MIL-C-81659/69A2-0012	M2P40S40S-00	DPX2NA-40MS40MS-33B-00
MIL-C-81659/69A2-0019	M2P45P45P-00	
MIL-C-81659/69A2-0020	M2P45S45S-00	DPX2NA-45MS45MS-33B-00
MIL-C-81659/69A2-0027	M2P57P57P-00	
MIL-C-81659/69A2-0028	M2P57S57S-00	DPX2NA-57MS57MS-33B-00
MIL-C-81659/69A2-0035	M2P67P67P-00	
MIL-C-81659/69A2-0036	M2P67S67S-00	DPX2NA-67MS67MS-33B-00
MIL-C-81659/69A2-0043	M2P106P106P-00	DPX2NA-A106PA106P-33B-00
MIL-C-81659/69A2-0044	M2P106S106S-00	
MIL-C-81659/69A2-0057	M2P106S26P-00	
MIL-C-81659/69A2-0058	M2P106P26S-00	DPX2NA-A106P26MS-33B-00
MIL-C-81659/69A2-0059	M2P26P106S-00	
MIL-C-81659/69A2-0060	M2P26S106P-00	DPX2NA-26MSA106P-33B-00
MIL-C-81659/69A2-0071	M2P67P106S-00	
MIL-C-81659/69A2-0072	M2P67S106P-00	DPX2NA-67MSA106P-33B-00
MIL-C-81659/69A2-0089	M2P106S67P-00	
MIL-C-81659/69A2-0090	M2P106P67S-00	DPX2NA-A106P67MS-33B-00
MIL-C-81659/69A2-0133	M2P57P106S-00	
MIL-C-81659/69A2-0134	M2P57S106P-00	DPX2NA-57MSA106P-33B-00
MIL-C-81659/69A2-0147	M2P57P26P-00	
MIL-C-81659/69A2-0148	M2P57S26S-00	DPX2NA-57MS26MS-33B-00
MIL-C-81659/70A2-0003	M2R26P26P-00	DPX2NA-26MP26MP-34B-00
MIL-C-81659/70A2-0004	M2R26S26S-00	
MIL-C-81659/70A2-0011	M2R40P40P-00	DPX2NA-40MP40MP-34B-00
MIL-C-81659/70A2-0012	M2R40S40S-00	

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UK: 44-208-420-8341

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MIL-C-81659/70A2-0019	M2R45P45P-00	DPX2NA-45MP45MP-34B-00
MIL-C-81659/70A2-0020	M2R45S45S-00	
MIL-C-81659/70A2-0027	M2R57P57P-00	DPX2NA-57MP57MP-34B-00
MIL-C-81659/70A2-0028	M2R57S57S-00	
MIL-C-81659/70A2-0035	M2R67P67P-00	DPX2NA-67MP67MP-34B-00
MIL-C-81659/70A2-0036	M2R67S67S-00	
MIL-C-81659/70A2-0043	M2R106P106P-00	
MIL-C-81659/70A2-0044	M2R106S106S-00	DPX2NA-A106SA106S-34B-00
MIL-C-81659/70A2-0057	M2R106S26P-00	DPX2NA-A106S26MP-34B-00
MIL-C-81659/70A2-0058	M2R106P26S-00	
MIL-C-81659/70A2-0059	M2R26P106S-00	DPX2NA-26MPA106S-34B-00
MIL-C-81659/70A2-0060	M2R26S106P-00	
MIL-C-81659/70A2-0071	M2R67P106S-00	DPX2NA-67MPA106S-34B-00
MIL-C-81659/70A2-0072	M2R67S106P-00	
MIL-C-81659/70A2-0089	M2R106S67P-00	DPX2NA-A106S67MP-34B-00
MIL-C-81659/70A2-0090	M2R106P67S-00	
MIL-C-81659/70A2-0133	M2R57P106S-00	DPX2NA-57MPA106A-34B-00
MIL-C-81659/70A2-0134	M2R57S106P-00	
MIL-C-81659/70A2-0147	M2R57P26P-00	DPX2NA-57MP26MP-34B-00
MIL-C-81659/70A2-0148	M2R57S26S-00	
MIL-C-81659/71A2-0003	M2R26P26P-01	DPX2NA-26MP26MP-34B-01
MIL-C-81659/71A2-0004	M2R26S26S-01	
MIL-C-81659/71A2-0011	M2R40P40P-01	DPX2NA-40MP40MP-34B-01
MIL-C-81659/71A2-0012	M2R40S40S-01	
MIL-C-81659/71A2-0019	M2R45P45P-01	DPX2NA-45MP45MP-34B-01
MIL-C-81659/71A2-0020	M2R45S45S-01	
MIL-C-81659/71A2-0027	M2R57P57P-01	DPX2NA-57MP57MP-34B-01
MIL-C-81659/71A2-0028	M2R57S57S-01	
MIL-C-81659/71A2-0035	M2R67P67P-01	DPX2NA-67MP67MP-34B-01
MIL-C-81659/71A2-0036	M2R67S67S-01	
MIL-C-81659/71A2-0043	M2R106P106P-01	
MIL-C-81659/71A2-0044	M2R106S106S-01	DPX2NA-A106SA106A-34B-01
MIL-C-81659/71A2-0057	M2R106S26P-01	DPX2NA-A106S26MP-34B-01
MIL-C-81659/71A2-0058	M2R106P26S-01	
MIL-C-81659/71A2-0059	M2R26P106S-01	DPX2NA-26MPA106S-34B-01
MIL-C-81659/71A2-0060	M2R26S106P-01	
MIL-C-81659/71A2-0071	M2R67P106S-01	DPX2NA-67MPA106S-34B-01
MIL-C-81659/71A2-0072	M2R67S106P-01	
MIL-C-81659/71A2-0089	M2R106S67P-01	DPX2NA-A106S67MP-34B-01
MIL-C-81659/71A2-0090	M2R106P67S-01	
MIL-C-81659/71A2-0133	M2R57P106S-01	DPX2NA-57MPA106A-34B-01
MIL-C-81659/71A2-0134	M2R57S106P-01	
MIL-C-81659/71A2-0147	M2R57P26P-01	DPX2NA-57MP26MP-34B-01
MIL-C-81659/71A2-0148	M2R57S26S-01	
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MIL-C-81659/72A2-0004	M2R26S26S-23	
MIL-C-81659/72A2-0011	M2R40P40P-23	DPX2NA-40MP40MP-34B-23
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MIL-C-81659/72A2-0059	M2R26P106S-23	DPX2NA-26MPA106S-34B-23
MIL-C-81659/72A2-0060	M2R26S106P-23	

MIL-C-81659/72A2 Continued on page 4-81

Military Cross Reference (Continued)

Government Designation	Tyco Electronics Designation	ITT Cannon Designation
MIL-C-81659/72A2-0071	M2R67P106S-23	DPX2NA-67MPA106S-34B-23
MIL-C-81659/72A2-0072	M2R67S106P-23	
MIL-C-81659/72A2-0089	M2R106S67P-23	DPX2NA-A106S67MP-34B-23
MIL-C-81659/72A2-0090	M2R106P67S-23	
MIL-C-81659/72A2-0133	M2R57P106S-23	DPX2NA-57MPA106A-34B-23
MIL-C-81659/72A2-0134	M2R57S106P-23	
MIL-C-81659/72A2-0147	M2R57P26P-23	DPX2NA-57MP26MP-34B-23
MIL-C-81659/72A2-0148	M2R57S26S-23	

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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Introduction

Product Facts

- Superior EMC/EMI Shielding Performance
- Simple installation
- Easy reentry
- Simplified maintenance and repair
- Excellent mechanical and environmental resistance
- Efficient strain relief
- Flexibility
- Versatility

Applications

Tyco Electronics, a longtime leader in harnessing technology, has written a new chapter in EMC shielding with the introduction of the Raychem HexaShield EMC adapter.

Designed to provide EMC protection solutions for both commercial and military applications, HexaShield adapters represent a significant improvement over pigtail termination methods. By providing 360-degree EMC shielding on the termination area of each individual cable, HexaShield adapters provide outstanding shielding effectiveness.

HexaShield adapters are simple to install, easy to maintain, and dependably resistant to mechanical and environmental stresses.

Principal points and features

- Easy reentry: To insert or remove ferrules from the HexaShield adapter, simply loosen the back nut.
- Superior protection: No degradation of shielding performance.
- Up to four shielded cables accommodated by each ferrule.
- Mechanical and environmental protection equal to backshells complying with MIL-C-85049 Category 3B.
- Strain relief on each individual cable.
- Weight reduction, by possibly eliminating the need for overall shielding.
- Compact size — not exceeding outer diameter of connector.
- Available in straight, 45° and 90° angles, as well as swept and long bodies.

Simple assembly and installation

1. Solder cable or wire shield to a ferrule with a Raychem heat-shrinkable SolderShield terminator.
2. Clip ferrule into one of the grounding star cavities.
3. Secure the back nut of the HexaShield adapter so that the conic ring assembly automatically compresses the ferrules.

Designed to corresponding connector specifications

Two Platings Available	Raychem Product Specifications
Electroless nickel (MIL-DTL-26074)	RB-110 and RB-114
Olive drab cadmium (QQ-P-416 Type II Class 3)	—

*Contact Tyco Electronics for additional platings.

Installation Procedures

Installation procedure for HET-A-02X and HET-A-04X (RPIP-696-00)	Installation procedure for HET-03X (RPIP-696-03)	General procedure for cylindrical connectors, right-angle body (RPIP-696-07)
General procedure for ARINC 600 Size II connectors (RPIP-696-01)	General procedure for cylindrical connectors, straight body (RPIP-696-04)	—
General procedure for ARINC 600 Size III connectors (RPIP-696-02)	—	—

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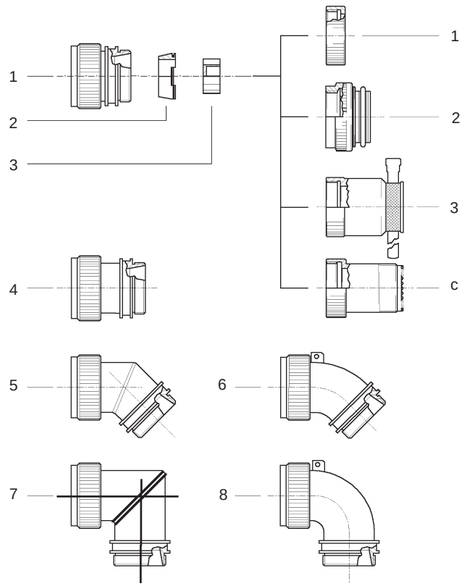
Kit Descriptions

Hexashield Adapters for Circular Connectors: Straight, 45°and 90° Assemblies

Item	Description
1	Straight adapter assembly
2	Conic ring assembly
3	Star Plain (Standard) Drilled (Option) Split (Option)
4	Straight adapter assembly - “L” version — nominally 0.5" [12.7] longer body
5	45° adapter assembly — welded
6	45° adapter assembly — swept
7	90° adapter assembly — welded
8	90° adapter assembly — swept Standard products shown. Variants available on request. Split star assemblies are shown on relevant S.C.D’s where applicable.

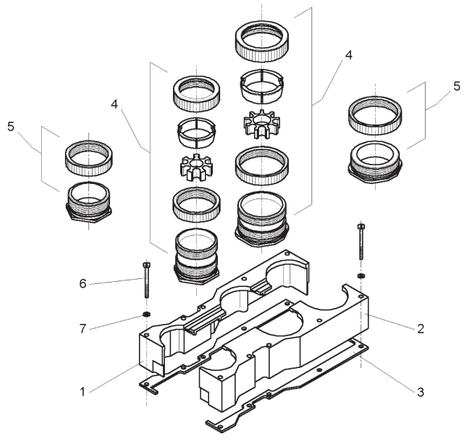
Item	HexaShield Version
-1	Back Nut
-2	Tinel adapter assembly Tinel-Lock ring for single braid
-3	Bandstrap adapter assembly
-C	Conduit adapter



HexaShield Adapters for ARINC 404/600 Connectors: Sizes 1, 2, 3 and 4 Assemblies

Item	Description
1	Left side support
2	Right side support
3	Retention bars
4	Body assemblies Body Holding nut Conic ring assembly Star Back nut
5	Cavity plug assemblies Plug Holding nut
6	Pan head screws — 4-40 UNC
7	Spring washers

ARINC 600 Size 2 shown
Stars are available as plain, drilled or split.
See relevant S.C.D’s for further information



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Ordering Information

Part Numbering for Standard Products

HexaShield Adapter for Circular Connectors

HEXYY L -AY -00 S -YY -AY -Y -DS

Drilled Star:
See applicable SCD for star options

Type of Back Nut:
1 = Standard back nut
2 = Clamping nut for tinel ring (for overbraid protection)
3 = Clamping nut with bandstrap
C = Clamping nut for conduit applicator

Max. number of ferrules that can be accommodated
See applicable SCD for options

HexaShield Size Code:
See applicable SCD for order number (shell size)

S = Swept version

Configuration:
00 = Straight body
45 = 45 degree angle body
90 = 90 degree angle body

Type of Plating:
B = Cadmium plated
C = Electroless nickel

L = Long body
See applicable SCD for availability

Connector Code Number:
21 = MIL-C-26482 Series 1
40 = MIL-DTL-38999 Series 3 and 4
41 = MIL-DTL-38999 Series 1 and 2
54 = MIL-DTL-38723 Series 1 and 3
MIL-C-25482 Series 2

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Ordering Information (Continued)

HexaShield Adapter for Collins Connectors

HEXDB-AC-00-A9-1

00 = Straight body
90 = Right-angle body

HexaShield Adapter for ARINC 600 Connectors

HEXA6-AY-00-YY-AY-Y

Clamping nut version:
1 = Clamping nut alone
2 = Clamping nut for tinel ring

Number of ferrules:
18 for ARINC 600 size II (A and B cavities)
25 for ARINC 600 size II (A, B and C cavities)
18 for ARINC 600 size III (A and B cavities)
See applicable SCD for options

ARINC Connector Size:
02 = ARINC 600 size II
03 = ARINC 600 size III

Configuration:
00 = Straight body
90 = Right-angle body

Plating:
B = Cadmium plated
C = Electroless nickel

Drilled Stars are standard on ARINC 600 adapters.

Part Numbering of Ferrule Kits*

HET-A-02X for small-size cable with SolderShield terminator
HET-A-03X for connection of unshielded cables
ferrules with heat-shrinkable tubing (no shield)
HET-A-04X for large-size cables with SolderShield terminator

Type of Plating:
B = Cadmium plated
C = Electroless nickel

HEX07-AX ferrule — solid blank for use when a HET-A is not needed

Type of Plating:
B = Cadmium plated
C = Electroless nickel

*Not all part numbers are standard; your local Tyco Electronics representative will assist you in selecting the appropriate standard product

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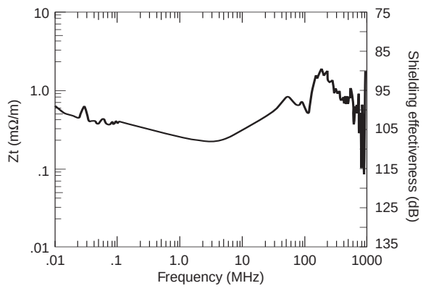
EMC Performance

Product Facts

- **Outperforms traditional pigtail termination, especially in HIRF performance**
- **Withstands 10-kA peak current lightning transients of SAE AE4L-87-3**

Transfer Impedance



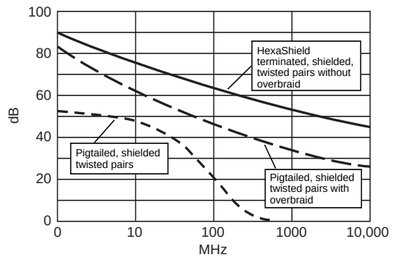
HexaShield size: 23

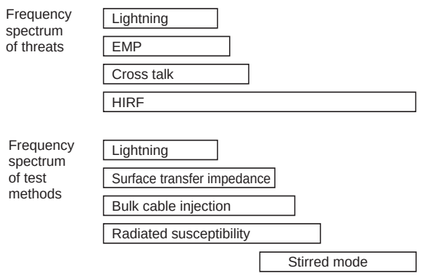
Cable: Raychem 5024H8424 (one cable installed)

Test method: CEI 96-1

Protection Level

Generalized system performance (Actual system performance in any one test method may differ.)





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EMC Performance (Continued)

Typical HexaShield Applications

Civilian and military aircraft
Avionics
Fighter aircraft
Missiles and launch support systems
Armored and military support vehicles
Navy ships (total shipboard hardening)
Military communications
Engines (FADEC harness hardening)

HexaShield Product Range

Accommodates the following connector types*:
MIL-C-26482 Series 1
MIL-DTL-38999 Series 1, 2, 3, and 4
MIL-C-26482 Series 2
MIL-DTL-83723 Series 1 and 3
DBAD
ARINC 600
ARINC 404

*Please contact Tyco Electronics for other connector types and special requests.

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NANONICS Strip Connectors
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- Surface Mount Connectors 5-304
- Thru-Hole Connectors 5-305, 5-306
- Part Number Cross Reference 5-307

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Environmentally Sealed Circular Connectors

NANONICS environmentally sealed circular offering represents one of the industry's smallest and most reliable connector designs. These connectors are ideally suited for applications where high density and reliability, and reduced size and weight are serious design parameters. Along with these attributes, they also meet the immersion requirements of IP67, more specifically, one meter of water for two hours. Utilizing the same contact system and materials as the DUALOBE rectangular series of connectors, the circular connectors are manufactured to the performance specifications of MIL-DTL-83513.

The plug connectors are offered in both a quick disconnect or threaded coupling configuration, and the receptacle connectors are offered in either a flush mount or panel mount configuration. The quick disconnect plug will mate with both the flush and panel mount receptacles, while the threaded coupling plug will only mate with the panel mount receptacle. These connectors are available in pin counts of 7, 19, and 44. Optional backshells are also available for the plug connectors and the panel mount receptacle. Ideal for cable-to-cable or cable-to-panel applications, Tyco Electronics can also accommodate harness assemblies and custom configurations.

Technical and Performance Data

Electrical

Contact Resistance — .003 - .008 ohms

Current Rating — 1 amp max. per contact

Dielectric Withstanding Voltage — Volts RMS 60 Hz at room ambient conditions. At sea level 500V. At 70,000 ft. 150V.

Insulation Resistance — 5000 megohms min. (@ 500 VDC) at room ambient conditions.

Magnetic Permeability — 2 mu max.

Temperature Range — –55°C to +200°C

Durability — 250 mates/demates

Jam Nut Torque–
7 Pos. - 6 in-lbs. max.
19 Pos. - 8 in-lbs. max.
44 Pos. - 10 in-lbs. max.

Coupling Nut Torque —
7 Pos. - 6 in-lbs. max.
19 Pos. - 8 in-lbs. max.
44 Pos. - 10 in-lbs. max.

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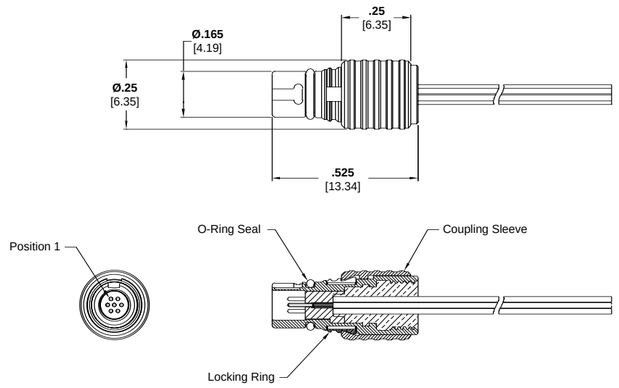
Environmentally Sealed Quick Disconnect — Plug Assemblies

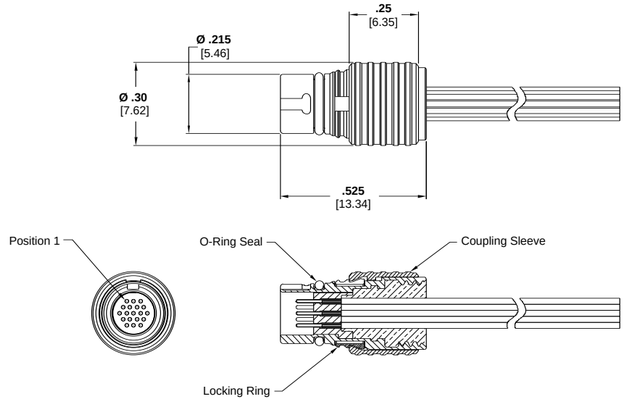
19 Position

Product Facts

- Metal Shell
- Positions: 7, 19 and 44
- Environmental O-ring seal
- Push-Pull quick-disconnect coupling
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations



7 Position
Drawing Number 1589055



19 Position
Drawing Number 1589057

Catalog 1308940
Revised 8-06

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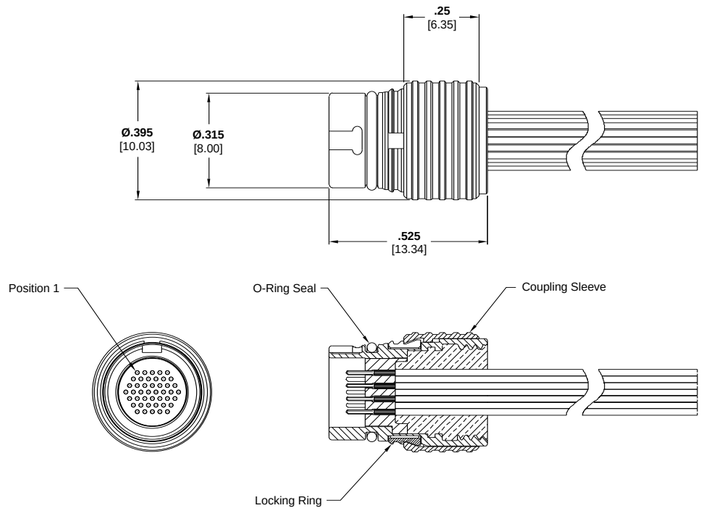
Japan: 81-44-844-8013
UK: 44-208-420-8341

Environmentally Sealed Quick Disconnect — Plug Assemblies (Continued)



44 Position
Drawing Number 1589059

Catalog 1308940
Revised 8-06

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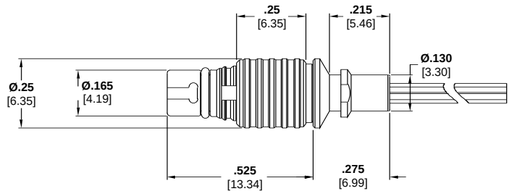
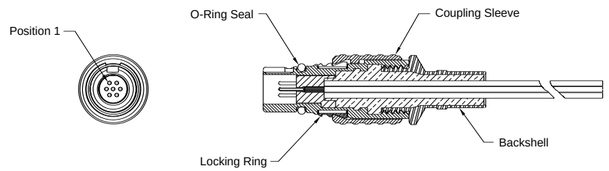
UK: 44-208-420-8341

Environmentally Sealed Quick Disconnect — Plug Assemblies with Backshells

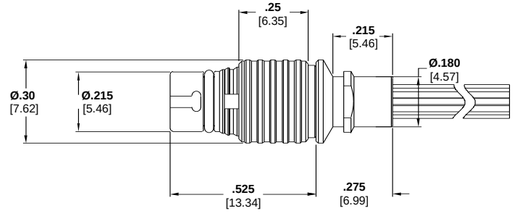
Product Facts

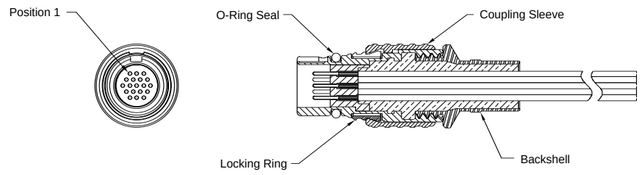
- Metal Shell
- Positions: 7, 19 and 44
- Environmental O-ring seal
- Factory wired to your specifications
- Backshell installed at factory
- Contact Tyco Electronics for custom configurations





7 Position
Drawing Number 1589691





19 Position
Drawing Number 1589692

Catalog 1308940
Revised 8-06

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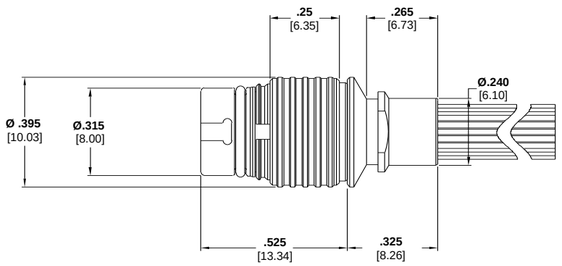
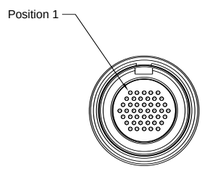
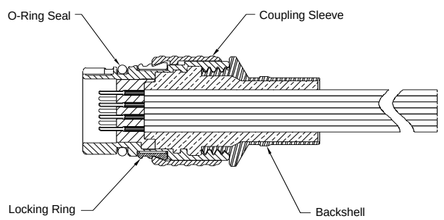
Environmentally Sealed Quick Disconnect — Plug Assemblies with Backshells (Continued)







44 Position

Drawing Number 1589693

Catalog 1308940
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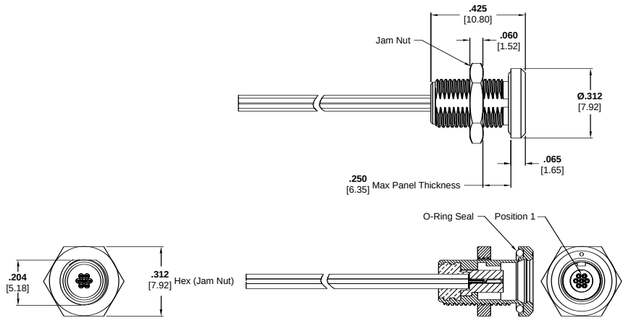
Environmentally Sealed Quick Disconnect — Receptacle Assemblies, Flush Mount

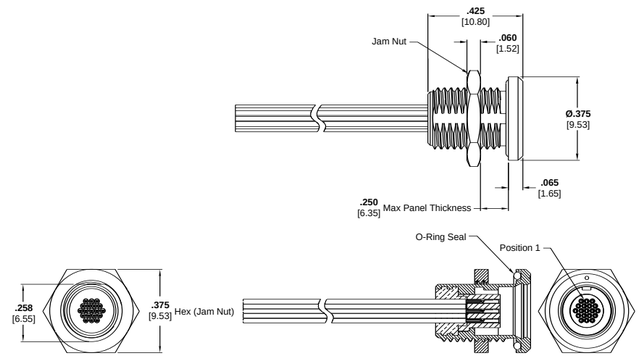
19 Position

Product Facts

- Metal Shell
- Positions: 7, 19 and 44
- Bulkhead O-ring seal
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations



7 Position
Drawing Number 1589056



19 Position
Drawing Number 1589058

Catalog 1308940
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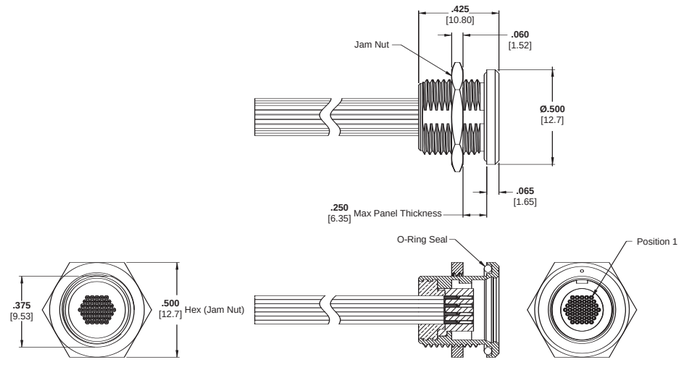
Environmentally Sealed Quick Disconnect — Receptacle Assemblies, Flush Mount (Continued)



44 Position
Drawing Number 1589690

Catalog 1308940
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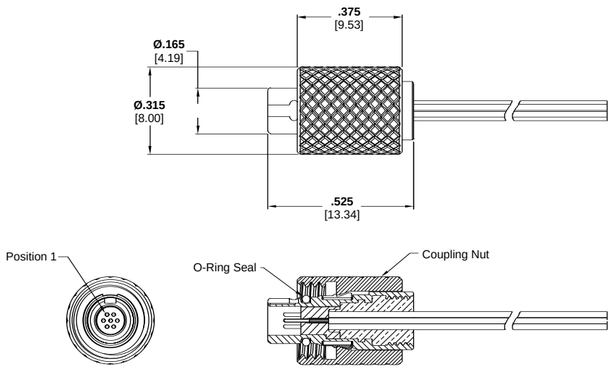
Environmentally Sealed Threaded Coupling — Plug Assemblies

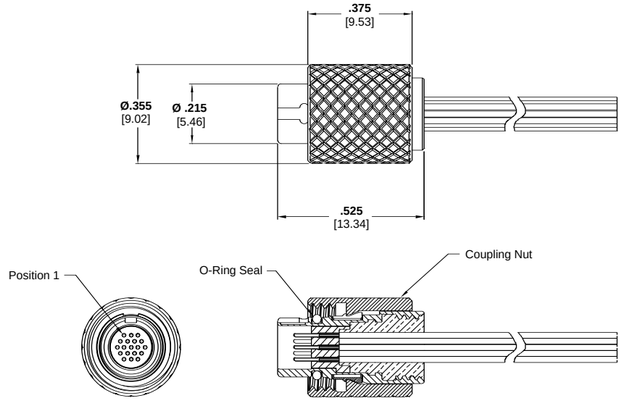
19 Position

Product Facts

- Metal Shell
- Positions: 7, 19 and 44
- Environmental O-ring seal
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations



7 Position
Drawing Number 1589063



19 Position
Drawing Number 1589064

Catalog 1308940
Revised 8-06

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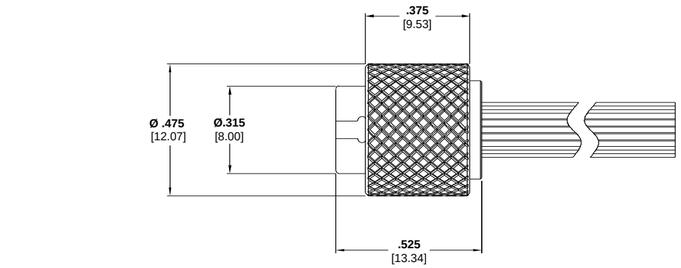
Environmentally Sealed Threaded Coupling — Plug Assemblies (Continued)



44 Position
Drawing Number 1589065

Catalog 1308940
Revised 8-06

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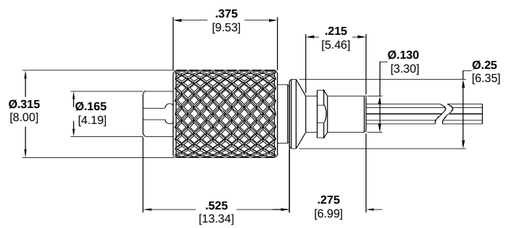
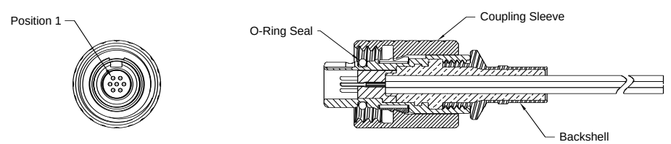
Environmentally Sealed Threaded Coupling — Plug Assemblies with Backshells

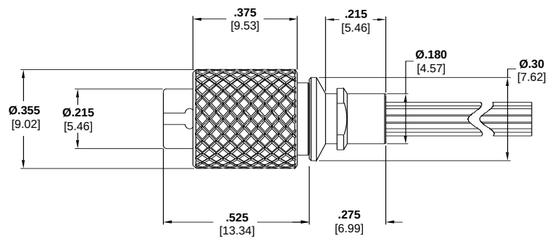
Product Facts

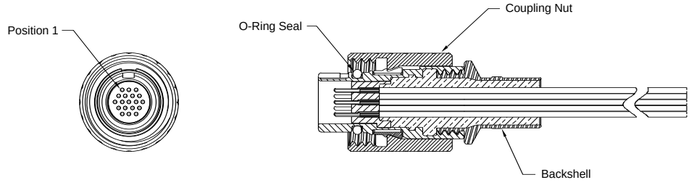
- Metal Shell
- Positions: 7, 19 and 44
- Environmental O-ring seal
- Factory wired to your specifications
- Backshell installed at factory
- Contact Tyco Electronics for custom configurations





7 Position
Drawing Number 1589686





19 Position
Drawing Number 1589688

Catalog 1308940
Revised 8-06

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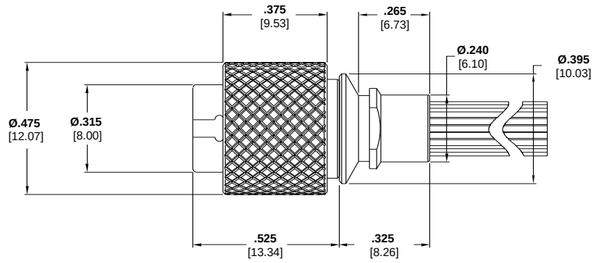
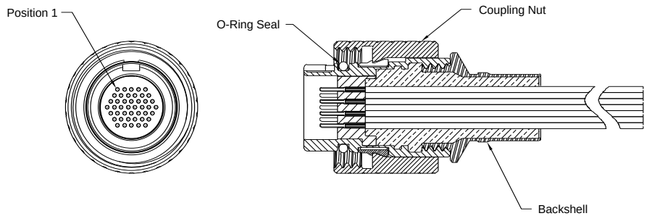
UK: 44-208-420-8341

Environmentally Sealed Threaded Coupling — Plug Assemblies with Backshells (Continued)





44 Position
Drawing Number 1589694

Catalog 1308940
Revised 8-06

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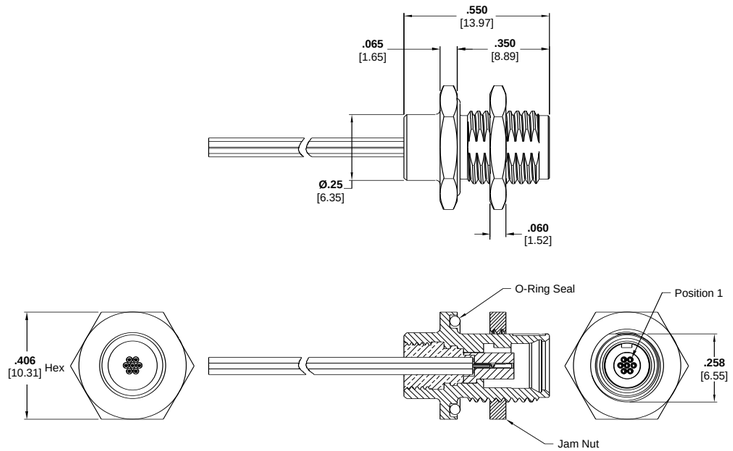
Environmentally Sealed Threaded Coupling/Quick Disconnect — Receptacle Assemblies, Panel Mount

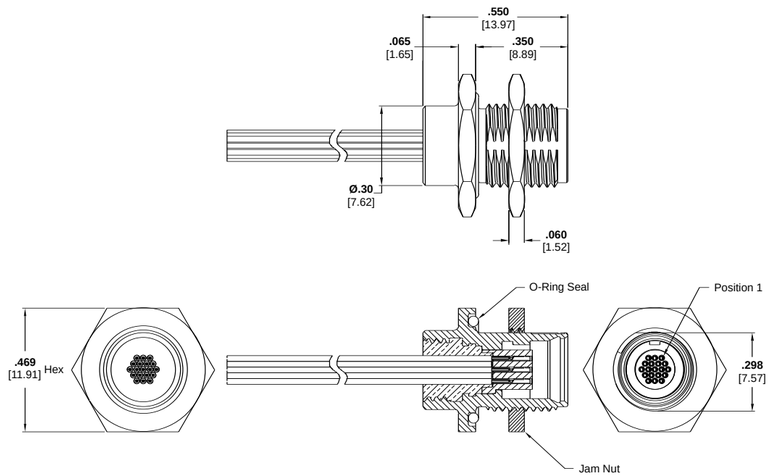
19 Position

Product Facts

- Metal Shell
- Positions: 7, 19 and 44
- Bulkhead O-ring seal
- Factory wired to your specifications
- Panel Mount receptacle mates with the Quick Disconnect Plug and the Threaded Coupling Plug
- Contact Tyco Electronics for custom configurations



7 Position
Drawing Number 1589060



19 Position
Drawing Number 1589061

Catalog 1308940
Revised 8-06

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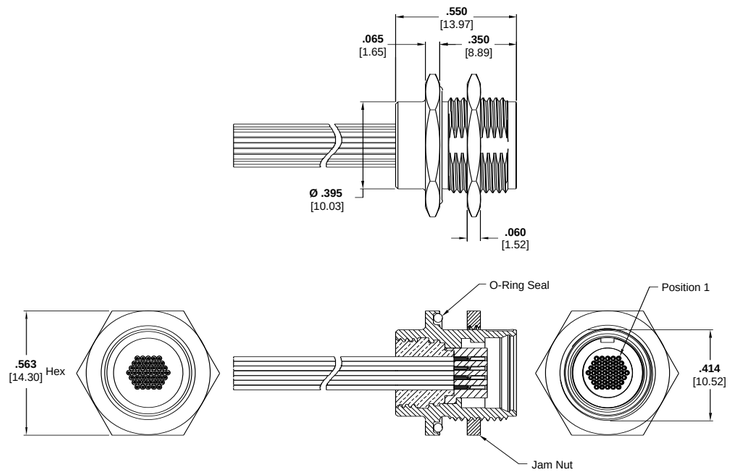
Environmentally Sealed Threaded Coupling/Quick Disconnect — Receptacle Assemblies, Panel Mount (Continued)



44 Position
Drawing Number 1589062

Catalog 1308940
Revised 8-06

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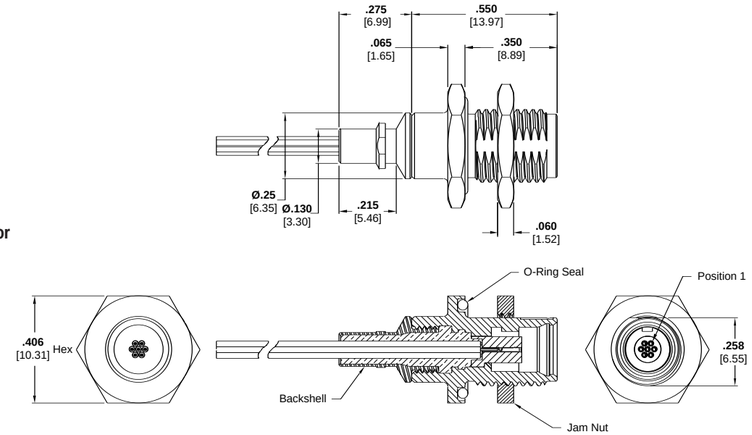
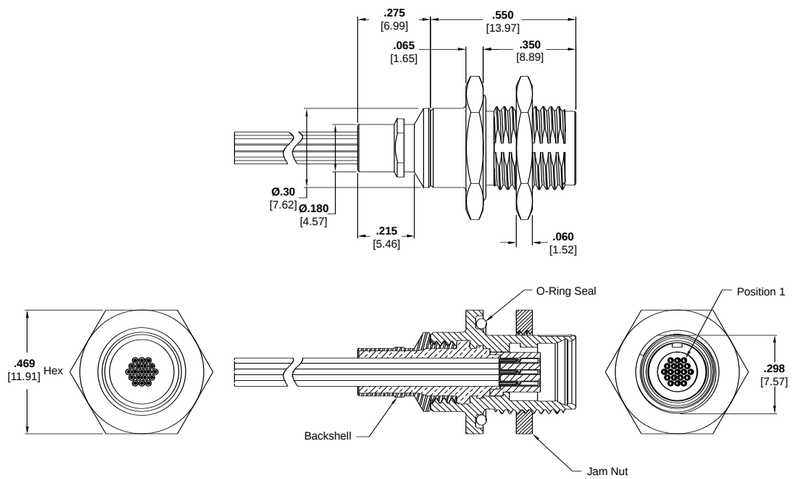
Environmentally Sealed Threaded Coupling/Quick Disconnect — Panel Mount Recp. Assemblies w/Backshells

Product Facts

- Metal Shell
- Positions: 7, 19 and 44
- Bulkhead O-ring seal
- Factory wired to your specifications
- Panel Mount receptacle mates with the Quick Disconnect Plug and the Threaded Coupling Plug
- Contact Tyco Electronics for custom configurations



Receptacle Assembly 7 Position
Drawing Number 1589685



Receptacle Assembly 19 Position
Drawing Number 1589687

Catalog 1308940
Revised 8-06

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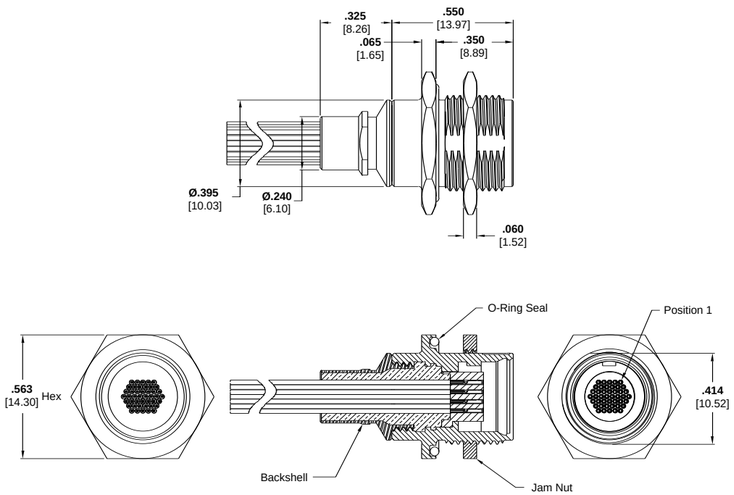
Environmentally Sealed Threaded Coupling/Quick Disconnect — Panel Mount Recp. Assemblies w/Backshells (Continued)



Receptacle Assembly 44 Position
Drawing Number 1589695

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Part Numbering Guideline for Environmentally Sealed Circular Connectors

Circular Connectors - Wire Terminations

XXX XXX XX X XX XXX X(X)

Class/Type
- **QCM** Quick Disconnect, Circular, Metal
- **TCM** Threaded Coupling, Circular, Metal (TCM leadoff for plug only)

Positions
- **007** 7 Position
- **019** 19 Position
- **044** 44 Position

Configuration
- **PC** Plug
- **SC** Receptacle

Conductor Size/Strands
- **0** 28 AWG Solid
- **1** 30 AWG Solid
- **2** 30 AWG 7 Strand
- **3** 32 AWG 7 Strand
- **4** 34 AWG 7 Strand

Conductor Type
- **DX** White Teflon
- **DY** White PTFE per M16878/6
- **DC** Color Coded Teflon
- **DM** Color Coded Teflon per MIL-STD-681
- **DT** White Tefzel per M22759/33

Conductor Length
- **XXX** Three numbers only, length is in inches (i.e. 012 = twelve inches)
- **CXX** A “C” follwed by two numbers, length is in centimeters (i.e. C06 = 6 centimeters)
- **MXX** An “M” followed by two numbers, length is in meters (i.e. M02 = 2 meters)

Circular Mounting/Features

Mounting (Receptacles Only)	Features (Optional)
P Panel Mount	**B** Backshell (cannot be used with flush mount)
F Flush Mount	

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Environmentally Sealed Circular Connectors Part Number Cross Reference

NANONICS Part Number	Tyco Electronics Part Number
Quick Disconnect	
QCM007PC2DC003	0-1589055-1
QCM007PC2DC006	0-1589055-2
QCM007PC2DC006B	0-1589691-5
QCM007PC2DC012	0-1589055-3
QCM007PC2DC012B	0-1589691-1
QCM007PC2DC018B	0-1589691-2
QCM007PC2DC020	0-1589055-6
QCM007PC2DC020B	0-1589691-9
QCM007PC2DC028	1-1589055-3
QCM007PC2DC036B	0-1589691-3
QCM007PC2DC040	0-1589055-8
QCM007PC2DC072	0-1589055-9
QCM007PC2DCC20B	0-1589691-6
QCM007PC2DCC30	1-1589055-0
QCM007PC2DCC50B	1-1589691-0
QCM007PC2DCM01	1-1589055-4
QCM007PC2DCM02	1-1589055-8
QCM007PC2DCM03	1-1589055-5
QCM007PC2DMC150	1-1589055-6
QCM007PC2DMC150B	0-1589691-7
QCM007PC2DMC46	1-1589055-1
QCM007PC2DMC50	1-1589055-7
QCM007PC2DMC50B	0-1589691-8
QCM007PC2DX006B	0-1589691-4
QCM007SC2DC003P	0-1589060-1
QCM007SC2DC004P	0-1589060-2
QCM007SC2DC006F	0-1589056-1
QCM007SC2DC006P	0-1589060-3
QCM007SC2DC012P	0-1589060-4
QCM007SC2DC012PB	0-1589685-2
QCM007SC2DC018PB	0-1589685-3
QCM007SC2DC020F	0-1589056-2
QCM007SC2DC020P	1-1589060-1
QCM007SC2DC036P	0-1589060-7
QCM007SC2DC036PB	0-1589685-4
QCM007SC2DCC15F	0-1589056-9
QCM007SC2DCC15P	1-1589060-4
QCM007SC2DCC20F	0-1589056-7
QCM007SC2DCC30F	0-1589056-3
QCM007SC2DCC30P	0-1589060-9
QCM007SC2DM003P	1-1589060-0
QCM007SC2DM006PB	0-1589685-5
QCM007SC2DM050PB	0-1589685-1
QCM007SC2DMC05F	0-1589056-8
QCM007SC2DMC16F	0-1589056-4
QCM007SC2DMC46F	0-1589056-5
QCM007SC2DX006F	0-1589056-6
QCM007SC2DYC15P	1-1589060-2
QCM007SC2DYM02P	1-1589060-5
QCM007SC2DYM1.5P	1-1589060-3
QCM019PC0DC012	0-1589057-1
QCM019PC0DM072B	0-1589692-1
QCM019PC2DC003	0-1589057-3
QCM019PC2DC006	0-1589057-4
QCM019PC2DC006B	0-1589692-3
QCM019PC2DC012	0-1589057-5
QCM019PC2DC020	0-1589057-6
QCM019PC2DC020B	0-1589692-5
QCM019PC2DC120B	0-1589692-2
QCM019PC2DCC10	1-1589057-1
QCM019PC2DMC150	1-1589057-2
QCM019PC2DMC150B	0-1589692-4
QCM019PC2DMC46	0-1589057-8
QCM019PC2DMM01	1-1589057-0
QCM019PC2DXC30	0-1589057-9
QCM019SC0DC012F	0-1589058-1
QCM019SC0DC036P	1-1589061-4
QCM019SC0DCC15P	0-1589061-1
QCM019SC0DM012F	1-1589058-7
QCM019SC0DM072F	0-1589058-2
QCM019SC0DMC30P	1-1589061-2
QCM019SC0DXC15P	0-1589061-2
QCM019SC2DC003F	1-1589058-8
QCM019SC2DC003P	0-1589061-3
QCM019SC2DC006F	0-1589058-3
QCM019SC2DC006P	0-1589061-4
QCM019SC2DC012F	1-1589058-6
QCM019SC2DC012P	0-1589061-5
QCM019SC2DC018F	0-1589058-4
QCM019SC2DC020F	0-1589058-5
QCM019SC2DC020P	0-1589061-6
QCM019SC2DC024P	1-1589061-5
QCM019SC2DC036P	0-1589061-7
QCM019SC2DC180F	1-1589058-4
QCM019SC2DCC30P	0-1589061-8
QCM019SC2DM006PB	0-1589687-2
QCM019SC2DM024P	1-1589061-6
QCM019SC2DM027PB	0-1589687-1
QCM019SC2DM036P	1-1589061-0
QCM019SC2DMC05F	1-1589058-5
QCM019SC2DMC16F	0-1589058-6
QCM019SC2DMC30P	1-1589061-3
QCM019SC2DMC46F	0-1589058-7
QCM019SC2DXC30F	0-1589058-8
QCM019SC2DXC30P	0-1589061-9
QCM019SC4DX006P	1-1589061-1
QCM044PC2DC003	0-1589059-1
QCM044PC2DC006	0-1589059-2
QCM044PC2DC006B	0-1589693-1
QCM044PC2DC012	0-1589059-4
QCM044PC2DC012B	0-1589693-2
QCM044PC2DC020	0-1589059-6
QCM044PC2DC030	0-1589059-7
QCM044PC2DC036	1-1589059-1
QCM044PC2DC040	1-1589059-2
QCM044PC2DC050	1-1589059-0
QCM044PC2DC060B	0-1589693-3
QCM044PC2DC120B	0-1589693-4
QCM044PC2DC180B	0-1589693-5
QCM044SC0DM036P	1-1589062-3
QCM044SC0DM048P	1-1589062-4
QCM044SC0DM060P	1-1589062-5
QCM044SC2DC003P	0-1589062-1
QCM044SC2DC006F	0-1589690-3
QCM044SC2DC006P	0-1589062-2
QCM044SC2DC012F	0-1589690-4
QCM044SC2DC012P	0-1589062-3
QCM044SC2DC018F	0-1589690-5
QCM044SC2DC018P	0-1589062-8
QCM044SC2DC019PB	0-1589695-1
QCM044SC2DC020F	0-1589690-1
QCM044SC2DC020P	1-1589062-2
QCM044SC2DC024F	0-1589690-8
QCM044SC2DC024P	1-1589062-6
QCM044SC2DC036P	0-1589062-5
QCM044SC2DC060F	0-1589690-6
QCM044SC2DC080P	1-1589062-1
QCM044SC2DC180F	0-1589690-2
QCM044SC2DM036P	0-1589062-9
QCM044SC2DM120P	1-1589062-0
QCM044SC2DMC16P	0-1589062-6
QCM044SC2DMC46P	0-1589062-7
QCM044SC2DMC50P	1-1589062-7
QCM044SC3DC012F	0-1589690-7
Threaded Coupling	
TCM007PC2DC003	0-1589063-1
TCM007PC2DC006	0-1589063-2
TCM007PC2DC006B	0-1589686-2
TCM007PC2DC012	0-1589063-4
TCM007PC2DC012B	0-1589686-3
TCM007PC2DC018B	0-1589686-4
TCM007PC2DC020	0-1589063-9
TCM007PC2DC036	0-1589063-7
TCM007PC2DCM02	1-1589063-0
TCM007PC2DM003	0-1589063-8
TCM007PC2DM006B	0-1589686-1
TCM007PC2DYC10B	0-1589686-5
TCM007PC2DYM01B	0-1589686-6
TCM019PC0DC036	1-1589064-5
TCM019PC0DCC10	0-1589064-1
TCM019PC0DXC10	0-1589064-2
TCM019PC2DC003	0-1589064-3
TCM019PC2DC006	0-1589064-4
TCM019PC2DC006B	0-1589688-2
TCM019PC2DC012	0-1589064-6
TCM019PC2DC012B	0-1589688-3
TCM019PC2DC020	1-1589064-4
TCM019PC2DC024	0-1589064-8
TCM019PC2DC036	0-1589064-9
TCM019PC2DC060B	0-1589688-4
TCM019PC2DC066	1-1589064-1
TCM019PC2DCC30	1-1589064-2
TCM019PC2DM006B	0-1589688-1
TCM019PC2DM024	1-1589064-6
TCM019PC2DM036	1-1589064-3
TCM044PC0DM036	1-1589065-3
TCM044PC0DM048	1-1589065-4
TCM044PC0DM060	1-1589065-5
TCM044PC2DC003	0-1589065-1
TCM044PC2DC006	0-1589065-2
TCM044PC2DC006B	0-1589694-1
TCM044PC2DC012	0-1589065-4
TCM044PC2DC012B	0-1589694-2
TCM044PC2DC018B	0-1589694-3
TCM044PC2DC019B	0-1589694-4
TCM044PC2DC020	1-1589065-2
TCM044PC2DC020B	0-1589694-8
TCM044PC2DC024	1-1589065-7
TCM044PC2DC036	0-1589065-8
TCM044PC2DC036B	0-1589694-5
TCM044PC2DC202B	0-1589694-7
TCM044PC2DM036	1-1589065-1
TCM044PC2DM120	1-1589065-6
TCM044PC2DM120B	0-1589694-6
TCM044PC2DMC46	1-1589065-0

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UK: 44-208-420-8341

Introduction

High Density Circular Connectors

Product Facts

- High density, light-weight Multi-Pin Circular Connectors feature a crimp contact retention method, requiring no insertion or removal tools
- Reverse gender available
- Ideal for harsh environment
- Sealed — Silicon rubber grommet/o-ring
- Unsealed — No grommet/ o-ring
- Meets MIL Standards (high quality) but is not QPL qualified
- Ideally suited to applications where many conductors must be accommodated in a minimum of space with minimum weight
- MARC Series Connectors are non-magnetic
- Contact rating 2.5A

Our high density, light-weight Multi-Pin Circular Connectors are the industry's most advanced and are ideally suited to applications where many conductors must be accommodated in a minimum of space with minimum weight.

All series of connectors feature a crimp contact retention method, requiring no insertion or removal tools.

The MARC 43 Series Connectors conform to applicable performance requirements of MIL-C-26482 and has seen extensive service on many leading aerospace and ground support equipment programs.

The MARC 53 Series Connectors, designed to conform to the USAF high reliability specification MIL-C-38300, as offers high density connector performance. The positive lock coupling mechanism, combined with our exclusive floating interfacial seal, offers outstanding performance under rigorous service conditions.

The MARC 63 Series Connectors, our Bayonet Coupling Series, accommodates all insert patterns and layouts available in the MARC 43 Series Connectors, MARC 53 Series Connectors, and RMD Series Connectors. All insert assemblies are completely interchangeable. Lighter in weight and smaller in size than any comparable connector on the market, it requires up to 50% less engagement/ separation force. Conversion to bayonet coupling shell from MARC 43 Series Connectors or MARC 53 Series Connectors is done without tools by merely transferring the contacts and insert assemblies into the MARC 63 Series Connectors shell.

The newest addition to the Multi-Pin product line is the MARC 73 Series Connectors. The twist pin Circular Connector combines the lightweight, bayonet

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Introduction (Continued)

coupling feature of the MARC 63 Series Connectors with the twist pin high density, center-to-center contact spacing of 0.065 [1.65] inch. The utilization of 22 AWG twist pin and socket contacts provide for 50% greater contact densities than presently offered in the MARC 43 Series Connectors, MARC 53 Series Connectors, or MARC 63 Series Connectors.

The MQR Series is a line of circular quick disconnect connectors for rugged environmental use. Consult Tyco Electronics for detailed information.

SHM Receptacle MARC 43 Series Connectors & MARC 53 Series Connectors

Mated MARC 53 Series Connectors

SHM Receptacle MARC 43 Series Connectors & MARC 53 Series Connectors

Mated MARC 63 Series Connectors

Mated MARC 43 Series Connectors

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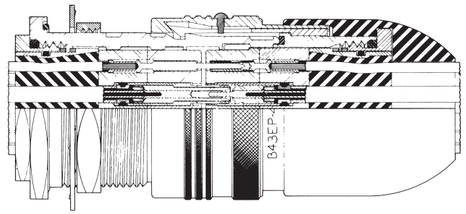
MARC 43 Series Connectors

General Information

A high density (.080 [2.03] contact centers), lightweight, subminiature, cylindrical connector series featuring crimp contacts and finger-tip, push-pull, quick disconnect coupling. This series conforms to the applicable performance requirements of MIL-C-26482 and is available in unsealed, environmentally sealed, and hermetic types.



A large assortment in insert arrangements — accommodating AWG 12 through 32 gauge wire and miniature coaxial cables — is available for the design engineer's choice. The contacts are retained by shoulder entrapment and can be crimped with the standard M22520 tools, using appropriate locators.

This proven series of connectors has a long history of outstanding performance on many military and aerospace programs. MARC 43 Series Connectors are ideal for applications where high performance must be achieved at low cost.

Materials and Finishes

MARC 43 Series Connector housings and quick disconnect couplings are machined from bar stock aluminum to combine maximum strength with minimum weight. Threaded couplings are machined from non-magnetic, stainless steel bar stock for durability of the coupling threads. Contacts are manufactured from high conductivity copper alloys which have been selected for low contact resistance over the operating range of the connectors. Inserts are molded from flame-resistant, glass-filled diallyl phthalate, meeting ASTM D5948 requirements. All resilient parts are made of high temperature, silicone rubbers. Fuel resistant compounds are used where swelling affects the performance of the connector. All materials are carefully selected for their non-magnetic properties.

The standard finish is clear, non-conductive anodize on connector housings and quick disconnect couplings. For threaded coupling applications, aluminum components are hard, black anodized, and stainless steel plug coupling is passivated with black oxide finish. Conductive finish modifications include gold, cadmium, and iridite finishes. Contacts are gold plated per MIL-G-45204 requirements. See page 5-29 for modification information.

Service and Performance Data

I. Electrical — Electrical Ratings

Current Rating		Dielectric Withstanding Voltage (RMS)	Working Voltage	
Contact Size	Amperes, Max., +27°C[1]		Sea Level	70,000 ft. [21,336 m] Alt.
22 AWG	5 amps	1000	750	300
16 AWG	20 amps	1000	750	300
12 AWG	50 amps	1000	750	300
50 ohm	3 amps	1000	750	300
75 ohm	3 amps	1250	1000	300
95 ohm	3 amps	1500	1250	300

[1] Consult nomograph.

II. Mechanical — Durability: 500 Cycles Mate/Unmate.
Coupling/Uncoupling Forces and Tightening Torques:

Shell Size	Coupling/ Uncoupling Force (In-Lbs.) Max.	Tightening Torque (In-Lbs.)	
		Retaining Nut	Mounting Nut
A	13 [57.8 N]	20, Max. [2.26 Nm]	30-45 [3.39 Nm – 5.08 Nm]
B	17 [75.6 N]	20, Max. [2.26 Nm]	40-55 [4.52 Nm – 6.21 Nm]
C	21 [93.4 N]	20, Max. [2.26 Nm]	55-70 [6.21 Nm – 7.91 Nm]

Operating Temperature: –85°F to 257°F [–65°C to +125°C].

Contact Size	Wire Size	Conductor Dia. (Stranded)[1]	Dielectric Dia. (Teflon)	Shield Dia.	Jacket Dia.[2]
22	22, 24, 26	**.019-.032** .482-.813	—	—	**.039-.054** .990-1.37
16[3]	16, 18, 20	**.038-.061** .965-1.55	—	—	**.065-.081** 1.65-2.06
12	12 AWG	**.071-.093** 1.80-2.36	—	—	**.096-.120** 2.44-3.05
50 ohm	50 ohm	**.013** .330 Max.	**.032-.036** .813-.914	**.048-.054** 1.22-1.37	**.065-.087** 1.65-2.21
75 ohm	75 ohm	**.013** .330 Max.	**.060-.066** 1.52-1.68	**.078-.084** 1.98-2.13	**.096-.109** 2.44-2.77
95 ohm	95 ohm	**.013** .330 Max.	**.100-.104** 2.54-2.64	**.115-.123** 2.92-3.12	**.137-.154** 3.48-3.91

[1] Tolerance of conductor diameters required for a reliable crimp. Smaller sizes readily accommodated — consult Tyco Electronics.
[2] Smaller jacketed cable can be accommodated but environmental seal may be impaired. Smooth extruded jacket should be used for consistent wire sealing.
[3] Size 16 AWG Contact for size 20 AWG Wire – Use Tool 010-0080-0000.

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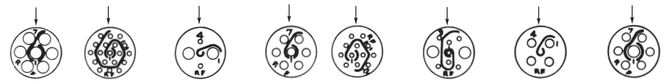
Test Data

MARC 43 Series Connectors meet the applicable performance requirements of specification MIL-C-26482 (Navy) to include the following selected test parameters listed below:

DESCRIPTION MIL-C-26482 Test Para	TEST REQUIREMENTS
Insulation Resistance, Room and High Temp., Para. 4.7.3	Insulation resistance of unmated connectors shall be 5000 megohms, minimum at room temperature and 2000 megohms, minimum, at 257°F [+125°C] when measured per MIL-STD-202, Method 302, Test Condition B.
Dielectric Withstanding Voltage, Para. 4.7.4	No evidence of dielectric breakdown or flashover when mated and unmated plugs are subjected to 1000 volts, rms, per MIL-STD-202, Method 301.
Durability, Para. 4.7.9	Plugs and receptacles designed to withstand up to 500 cycles of engagement and separation without detrimental electrical or mechanical damage to the connectors.
Corrosion, Para. 4.7.10	Unmated plugs and receptacles shall show no exposure of basis metal due to corrosion which would affect electrical or mechanical performance of the connectors after subjection to 24 hours exposure to salt spray atmosphere per MIL-STD 202, Method 101.
Sweep Vibration, Mated, Para. 4.7.11	Mated connectors shall show no circuit interruptions greater than 10 micro-seconds during 12 hours vibration to include six sweeps in two axes at –67°F [–55°C], room temperature, and 257°F [+125°C] per MIL-STD-202, Method 204, Test Condition B. Post inspection shall show no detrimental cracking, breaking, or loosening of parts.
Moisture Resistance, Para. 4.7.13 and 4.7.13.1	The insulation resistance of mated connectors shall exceed 100 megohms after subjection to moisture resistance testing per MIL-STD-202, Method 106.
Contact Retention, Para. 4.7.16	Contacts shall withstand 15 lbs [66.7 N] axial load without axial displacement in excess of 0.012 [0.305] or damage to contacts or inserts when the axial load is applied to the mating end of the contacts in unmated plugs and receptacles at a rate of approximately 1 lb/sec.

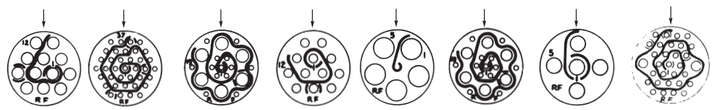
Contact Arrangements[1]

"A Size" Insert Layouts (A =) Shell Size 9



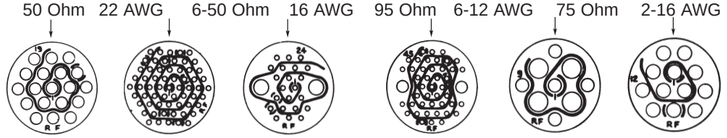
Insert Arrangement [2]	-1	-2	-5	-11	-12	-14	-17	-21
Number of Contacts	7	19	2-22 AWG	7	12	7-22 AWG	4	6-16 AWG
Contact Size	50 Ohm	22 AWG	2-50 Ohm	16 AWG	22 AWG	2-50 Ohm	16 AWG	1-50 Ohm

"B Size" Insert Layouts (B =) Shell Size 12



Insert Arrangement [2]	-9	-10[3]	-15	-19	-34	-37	-47	-49
Number of Contacts	12	37	13-22 AWG	12	5	13-22 AWG	5	29-22 AWG
Contact Size	50 Ohm	22 AWG	6-50 Ohm	16 AWG	95 Ohm	6-12 AWG	75 Ohm	2-16 AWG

"C Size" Insert Layouts (C =) Shell Size 15



Insert Arrangement [2]	-3	-4	-7	-13	-27	-48
Number of Contacts	19	61	22-22 AWG	43-22 AWG	5-75 Ohm	12
Contact Size	50 Ohm	22 AWG	2-75 Ohm	2-50 Ohm	4-95 Ohm	75 Ohm

Notes: [1] Views shown are front face view of receptacles. Front face view of plugs is mirror image of that shown.
[2] Arrow (▼) indicates insert top or vertical position in relation to top or vertical position of connector housings.
[3] Arrangement also available in hermetic seal receptacles.

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MARC 43 Series Connectors (Continued)

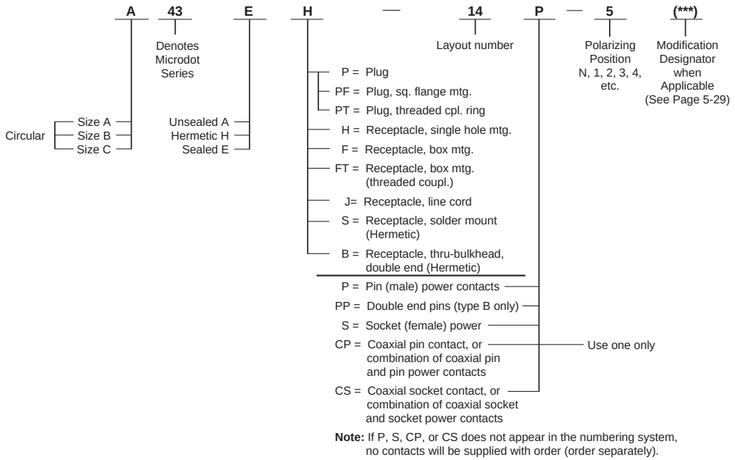
Part Number and Ordering Information

MARC 43 Series Connector part numbers indicate size, shape, insert layout, type of seal, style of contact and polarization. **Note:** Pin or socket (power or coaxial) contacts may be used in either plugs or receptacles. However, it is recommended that pins be placed in the receptacle when possible to take advantage of our "scoop-proof" design. (The style—pin or socket—of a coaxial contact refers to the outer contact body.)

Alternate Keying. Standard alternate polarizing key positions are shown below. Additional polarizing keyways are available upon request.

Supplemental Accessory Hardware. We also manufacture supplemental accessory hardware (protective covers, cable clamps, etc.) to adapt these connectors to almost any application. For modifications to fit your requirements, contact Tyco Electronics.

Typical Part Number



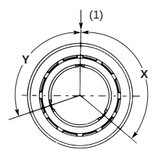
Note: If P, S, CP, or CS does not appear in the numbering system, no contacts will be supplied with order (order separately).

Polarizing Key Positions

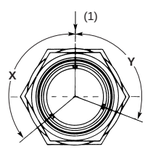
All MARC 43 Series Connector multi-pin plugs and receptacles are available in alternate polarizing positions as listed below:

(1) Arrow (↑) indicates top or vertical position (master key-keyway) and coincides with top or vertical position of insert. This relationship remains constant with alternate polarizing key positions.

N—for Normal



Plug



Receptacle

Size A		
Part Number	X°	Y°
A43****N	130	110
A43****-1	130	150
A43****-2	90	110
A43****-3	210	110
A43****-4	130	35
A43****-5	90	230

Size B		
Part Number	X°	Y°
B43****N	130	110
B43****-1	130	90
B43****-2	130	145
B43****-3	105	110
B43****-4	155	110
B43****-5	80	110
B43****-6	190	110
B43****-7	130	170
B43****-8	215	110
B43****-9	80	230
B43****-10	130	30

Size C		
Part Number	X°	Y°
C43****N	130	110
C43****-1	130	90
C43****-2	130	150
C43****-3	130	170
C43****-4	190	110
C43****-5	150	110
C43****-6	90	110
C43****-7	70	110
C43****-8	70	230
C43****-9	90	230
C43****-10	210	110
C43****11	30	110
C43****12	250	30
C43****13	130	30
C43****14	30	230

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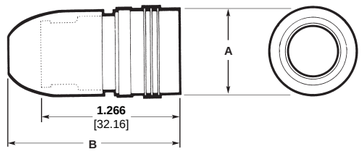
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

MARC 43 Series Connectors (Continued)

Configurations

Type P

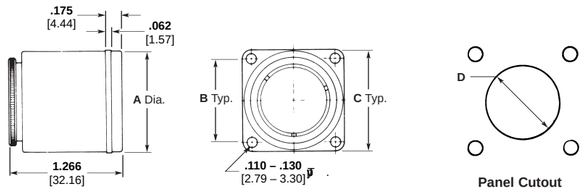
Straight Plug, Push-Pull Coupling, Sealed or Unsealed (Mates with Receptacles, All Types)



Shell Size	Dimensions	
	A	B
A	**.766** 19.46	**1.578** 40.08
B	**.953** 24.21	**1.656** 42.06
C	**1.141** 28.98	**1.75** 44.45

Type PF

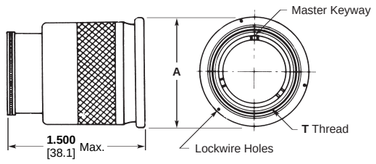
Straight Plug, Square Flange Mounting, Push-Pull Coupling, Sealed or Unsealed (Mates with Receptacles, all Types.)



Shell Size	Dimensions			
	A	B	C	D
A	**.730** 18.54	**.664** 16.86	**.875** 22.23	**.750** 19.05
B	**.920** 23.37	**.786** 19.96	**1.000** 25.40	**.940** 23.88
C	**1.110** 28.19	**.924** 23.47	**1.125** 28.58	**1.130** 28.70

Type PT

Straight Plug, Threaded Coupling, Sealed or Unsealed (Mates with Receptacles, Types H, HH, and FT)



Shell Size	Dimensions	
	A	T (Class 2B)
A	**.813** 20.65	5/8-32 UN
B	**1.000** 25.40	13/16-28 UN
C	**1.19** 30.23	1-28 UN

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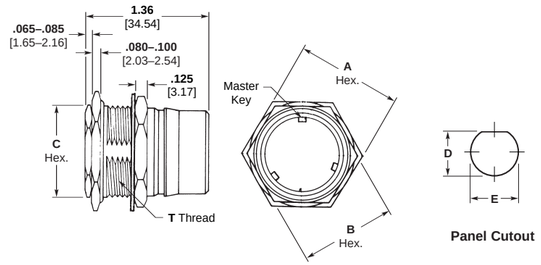
MARC 43 Series Connectors (Continued)

Configurations (Continued)

Type H

Receptacle, Single Hole Mounting
Sealed or Unsealed
(Mates with Plugs, Types P, PF and PT)

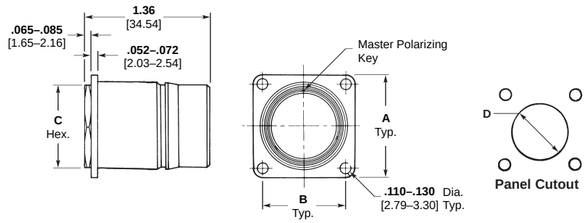


Shell Size	Dimensions					
	A	B	C	D	E	T (Class 2A)
A	**.75** 19.05	**.687** 17.45	**.562** 14.27	**.607-.611** 15.42-15.52	**.625-.629** 15.8-15.97	5/8-32 UN
B	**.937** 23.80	**.875** 22.23	**.75** 19.05	**.794-.798** 20.17-20.27	**.812-.816** 20.62-20.72	13/16-28 UN
C	**1.125** 28.58	**1.062** 26.97	**.875** 22.23	**.975-.979** 24.77-24.87	**.999-1.003** 25.37-25.47	1-28 UN

.313 [7.95] max. panel for P & PF
.109 [2.77] max. panel. for PT

Type 43F

Receptacle, Box Mounting, Sealed or Unsealed (Mates with Plugs, Types P and PF)



Shell Size	Dimensions			
	A	B	C	D
A	**.875** 22.23	**.594** 15.08	**.562** 14.27	**.595** 15.11
B	**1.000** 25.40	**.786** 19.96	**.75** 19.05	**.783** 19.89
C	**1.125** 28.58	**.906** 23.01	**.875** 22.23	**.960** 24.38

Max. panel thickness is .375 [9.53].

Note: Unless otherwise shown, tolerances are: Decimals ±.015 [±.381], fractions ±1/32.

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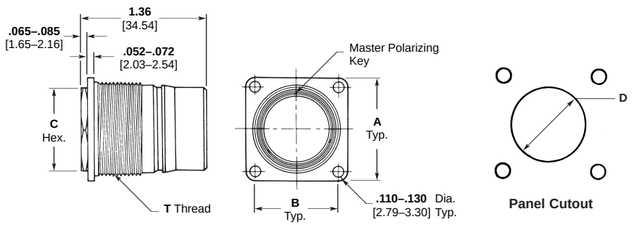
MARC 43 Series Connectors (Continued)

Configurations (Continued)

Type FT

Receptacle, Box Mounting, Threaded Coupling, Sealed or Unsealed (Mates with Plugs, Types PT, P and PF)

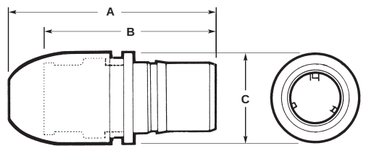


Shell Size	Dimensions				
	A	B	C	T (Class 2A)	D
A	**.875** 22.23	**.594** 15.08	**.562** 14.27	5/8-32 UN	**.645** 16.38
B	**1.000** 25.40	**.786** 19.96	**.75** 19.05	13/16-28 UN	**.832** 21.13
C	**1.125** 28.58	**.906** 23.01	**.875** 22.23	1-28 UN	**1.020** 25.90

Max. panel thickness is .125 [3.18].

Type J

Receptacle, Line Cord, Sealed or Unsealed (Mates with Plugs, Types P and PF)



Shell Size	Dimensions		
	A	B	C
A	**1.703** 43.26	**1.36** 34.54	**.766** 19.46
B	**1.781** 45.24	**1.36** 34.54	**.953** 24.21
C	**1.875** 47.63	**1.36** 34.54	**1.141** 28.98

Note: Unless otherwise shown, tolerances are: Decimals ±.015 [±.381], fractions ±1/32.

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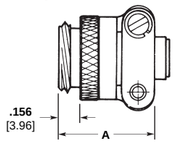
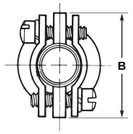
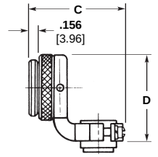
Accessories

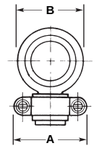
Cable Clamps





Straight





Right-Angle

Shell Size	Part Number	A [Max.]	B [Max.]
A	086-0099-00X1	**.704** 17.88	**.750** 19.05
B	086-0100-00X1	**.773** 19.63	**.932** 23.67
C	086-0101-00X1	**.829** 21.05	**1.078** 27.38

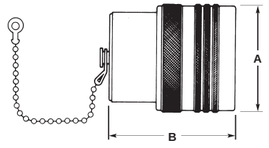
Shell Size	Part Number	A [Max.]	B [Max.]	C [Max.]	D [Max.]
A	086-0103-00X1	**.737** 18.72	**.600** 15.24	**1.100** 27.94	**.879** 22.33
B	086-0104-00X1	**.913** 23.19	**.770** 19.55	**1.250** 31.75	**1.067** 27.10
C	086-0105-00X1	**1.048** 26.62	**.962** 24.43	**1.469** 37.31	**1.233** 31.32

Contacts (see pages 5-44 and 5-45)

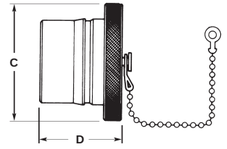
Contact Size	Pin Part Number	Socket Part Number
22 AWG	083-0009-00R4	082-0464-00Y9
16 AWG	083-0158-00R4	082-0113-00T1
12 AWG	083-0173-00R4	082-0132-00T1
50 ohm Coaxial (Solder Type)	084-0024-00T2	084-0027-00T2
50 ohm Coaxial (Crimp Type)	141-1500-0001	142-1500-0001
75 ohm Coaxial	084-0025-00T2	084-0028-00T2
95 ohm Coaxial	084-0026-00T2	084-0029-00T2

Contact Cavity Sealing Plugs (see page 5-46)

Contact Size	Sealed Connector Part Number	Unsealed Connector Part Number
22 AWG	086-0055-0000	086-0001-0000
16 AWG	086-0056-0000	086-0014-0000
12 AWG	086-0057-0000	086-0015-0000
50 ohm Coaxial	086-0058-0000	086-0061-0000
75 ohm Coaxial	086-0059-0000	086-0062-0000
95 ohm Coaxial	086-0060-0000	086-0063-0000



Receptacle Cover



Plug Cover

Protective Covers

Shell Size	Receptacle Cover Part Number[1]		Plug Cover Part Number[1]		Dimensions (Max.)			
	With Chain	Without Chain	With Chain	Without Chain	A	B	C	D
A	086-0049-00J2	086-0073-00P1	086-0052-00J2	086-0076-00P1	**.766** 19.46	**.950** 24.13	**.969** 24.62	**.913** 23.19
B	086-0050-00J2	086-0074-00P1	086-0053-00J2	086-0077-00P1	**.953** 24.21	**.950** 24.13	**1.156** 29.36	**.913** 23.19
C	086-0051-00J2	086-0075-00P1	086-0054-00J2	086-0078-00P1	**1.141** 28.98	**.950** 24.13	**1.344** 34.14	**.913** 23.19

[1] For threaded plug (PT) and receptacle (FT) covers, consult Tyco Electronics. Wire rope/lanyard attachments and plastic protective caps also available, consult Tyco Electronics.

Modifications

The MARC 43 Series Connector modification identification system provides alteration of standard MARC 43 Series Connectors to include special finishes, accessories, MARC 53 Series Connector housings, and custom quality assurance provisions — processing, testing, serialization, traceability. Consult your sales representative or Tyco Electronics for additional modification information.

Standard modifications include:

(009): MARC 43 Series Connector, anodized finish — black.

(048): MARC 43 Series Connector, iridite finish — gold.

(056): MARC 43 Series Connector, cadmium plated — clear.

(057): MARC 43 Series Connector including cable clamp, straight type.

(078): MARC 43 Series Connector insert arrangement plus MARC 53 Series Connector positive lock coupling.

(094): MARC 43 Series Connector coaxial insert arrangement to include all-crimp coaxial contacts plus MARC 53 Series Connector positive lock coupling.

(098): MARC 43 Series Connector connector including cable clamp, right-angle type.

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General Information

The MARC 53 Series Connector family represents a major advancement in the design of high density (.080 [2.03] contact centers), subminiature, power and coaxial contact connectors. The MARC 53 Series Connectors consists of two connector styles — the Military approved MD53 featuring shoulder entrapped contacts, and the new RMD53 utilizing rear insertable/removable contacts. MARC 53 Series Connectors combine positive lock — the rugged, push-pull, lock-coupling mechanism — with the unique positive seal multiple sealing system.

Positive lock is our new finger-tip, push-pull coupling with the safety lock feature, and is the only connector made with positive "blind mating" indication. When the plug is fully engaged, the coupling ring can be rotated 45° to the safety lock position; if the plug is not completely engaged, the coupling ring cannot be turned to the safety lock position. Consequently, under "blindmating" conditions, it is always possible to determine if the plug is properly engaged without visual reference, damage, or accidental disengagement.

The environmental integrity is guaranteed by multiple seal construction using silicone rubber "0" rings and a floating, voidless insert construction. The floating insert design allows the inserts to move within the connector housing to control interfacial sealing pressure in spite of tolerance accumulation, and a compression interfacial seal with minimum engaging force. Both the primary "0" ring system and the continuous dielectric construction withstand the MIL-C-38300A altitude breathing test. The sealing system meets the air leakage requirements of not more than 1 cubic inch of air per hour at a 30 P.S.I. pressure differential. This redundant sealing method is indicative of the inherent reliability built into our connectors.

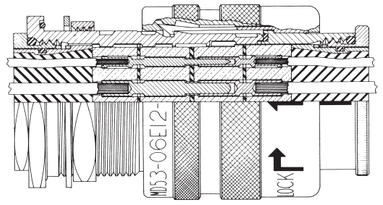
MARC 53 Series Connector power contacts are manufactured from high grade copper alloys, and are designed to be crimped with standard M22520 tooling using subminiature contact locators.

MARC 53 Series Connectors incorporate hard insulators in both the plug and receptacle inserts for exceptional contact stability. Shoulder entrapment positively retains the front insertable MD53 contacts between the front and rear insulators. The new RMD53 contacts are rear insertable and removable and are retained within the connector insulators by clips which can be visually inspected. No insertion or extraction tools are required for either the MD53 or RMD53 contacts using nominal size wire.

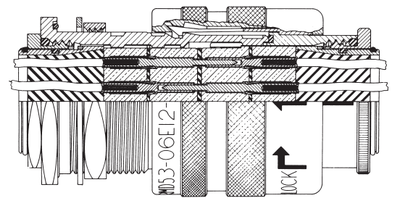
MARC 53 Series Connectors are truly field serviceable… no special tools are required for maintainability. In addition, connector subcomponents damaged through handling or misuse can be procured separately generally without the need to scrap entire connector units.

Weight reductions as high as 67% are achieved without loss of performance.

MARC 53 Series Connectors are available in both environmental and hermetic styles. In addition to the positive lock plug, a threaded coupling plug is also available. Part numbers for configurations offering various finishes and accessories plus other design variations to satisfy special requirements are also available.



MD53
Shoulder Entrapped Contacts



RMD53
Rear Insertable Contacts

Materials and Finishes

Housings and quick disconnect couplings are machined from bar stock aluminum to combine maximum strength with minimum weight. Threaded couplings are machined from non-magnetic, stainless steel bar stock for durability of the coupling threads. Contacts are manufactured from high conductivity copper alloys which have been selected for low contact resistance over the operating range of the connectors. Inserts are molded from flame-resistant, glass-filled diallyl phthalate, meeting ASTM D5948 requirements. All resilient parts are made of high-temperature, silicone elastomers. Fuel resistant compounds are used where swelling affects the performance of the connector. All materials are selected for their non-magnetic properties.

The standard finish is hard black, non-conductive, anodized finish on connector housings and quick disconnect couplings; stainless steel threaded coupling is passivated with black oxide finish. Conductive finish modifications include gold finish and electroless nickel finish. Multi-finish modifications for connector plugs include black anodized disconnect coupling with conductive finish on shell grounding members. Contacts are gold plated per MIL-G-45204 requirements. See Page 5-39 for modification information.

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Service and Performance Data

MARC 53 Series Connectors (Continued)

I. Electrical — Electrical Ratings

Contact Size	Current Rating (Amperes, Max., 81°F [+27°C])	Dielectric Withstanding Voltage (RMS)	Working Voltage		Contact Resistance (Millivolts, Max.)
			Sea Level	110,000[1] Ft. Alt.	
22 AWG	5	1000	750	300	15
16 AWG	20	1000	750	300	20

[1] 10,000 ft equals 33,528 m altitude.

Wire Sizes Accommodated

Contact Size	Cond. Dia. (Stranded)[1]	Jacket Size[2]
22 AWG	**.019-.032** [.483-.813]	**.039-.054** [.991-1.37]
16 AWG	**.038-.061** [.965-1.55]	**065-.081** [1.65-2.05]

[1] Tolerance of conductor diameters required for a reliable crimp. Smaller sizes readily accommodated — consult Tyco Electronics.
[2] Smaller jacketed cable can be accommodated but environmental seal may be impaired. Smooth extruded jacket should be used for consistent wire sealing.

Insulation Resistance: 5000 megohms, minimum, at room ambient conditions.

II. Mechanical — Durability: 500 Cycles Mate/Unmate. Coupling/Uncoupling Forces and Tightening Torques:

Shell Size	Coupling/ Uncoupling Force (In-Lbs.) Max.	Tightening Torque (In-Lbs.)	
		Retaining Nut	Mounting Nut
9	18 [80.07 N]	20 [2.26 Nm], Max.	30-45 [3.39 – 5.08 Nm]
12	22 [97.86 N]	20 [2.26 Nm], Max.	40-55 [4.52 – 6.21 Nm]
15	27 [120.10 N]	20 [2.26 Nm], Max.	55-70 [6.21 – 7.91 Nm]
18	32 [142.34 N]	20 [2.26 Nm], Max.	70-85 [7.91 – 9.60 Nm]

Operating Temperature: –67°F to 257°F [–55°C to +125°C]
Connector Mated Length: MD Plug (06) mated to MD Receptacles (00) (01) (02) (12): 2.031 [51.58], max. RMD Plug (06) mated to RMD Receptacles: 2.217 [56.31], max.

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MARC 53 Series Connectors (Continued)

Test Data

MARC 53 Series Connectors exceed the requirements of specification MIL-C-38300A (USAF) as detailed in the applicable M38300A (USAF) military specification sheets.

MARC 53 Series Connectors meet the following selected test parameters as specified below:

DESCRIPTION MIL-C-38300 Test Para	TEST REQUIREMENTS
Contact Retention Para. 4.10.3	MD Contacts shall withstand 15 lbs [66.72 N] axial load and RMD contacts 10 lbs [44.48 N] axial load without axial displacement in excess of 0.012 [.305] or damage to contacts or inserts when the axial load is applied to the mating end of the contacts in unmated plugs and receptacles at a rate of approximately 1 lb/sec. [4.45 N].
Contact Resistance Para. 4.10.8	The potential drop across normally mated contacts shall not exceed 25 mv under room ambient and high temperature service conditions when measured as specified in MIL-C-26636, Fig. 2, with maximum rated current.
Dielectric Withstanding Voltage, Altitude and Sea Level Para. 4.10.10	No evidence of dielectric breakdown or flashover when mated and unmated plugs are subjected to 645 and 180 volts RMS, respectively, at altitudes up to 110,000 feet [33,528 m] and 1000 volts RMS at sea level.
Insulation Resistance, Room and High Temp. Para. 4.10.13 and 4.10.13.1	Insulation resistance of mated plugs and receptacles shall be 5000 megohms, minimum, at room temperature and 1000 megohms, minimum, at 257°F [+125°C] when measured per MIL-STD-202, Method 302, Test Condition B.
Coupling and Uncoupling Para. 4.11.3	Plugs and receptacles shall withstand up to 500 cycles of engagement and separation (locking mechanism actuated with each cycle) without detrimental damage to plugs or receptacles or not satisfying subsequent tests of MIL-C-38300.
Fluid Immersion Para. 4.11.5	Mating and unmating forces shall not exceed 27 lbs, [120.10 N] maximum, (15 shell size) after fully wired plugs and receptacles are immersed for 20 hours, each, in hydraulic fluid (MIL-H-5606) and high temperature lubricating oil (MIL-L-9236) followed by a one-hour dry.
Sweep Vibration, Mated Para. 4.11.6	Mated connectors shall show no circuit interruptions greater than one microsecond during 12 hours vibration to include six sweeps in each axis at extreme temperatures of –85°F [–65°C] and 257°F [+125°C] per MIL-STD-202, Method 204, Test Condition D. Post inspection shall show no detrimental cracking, breaking, or loosening of parts.
Moisture Resistance Para. 4.11.8	The insulation resistance of mated connectors shall exceed 1000 megohms after subjection to moisture resistance testing per MIL-STD-202, Method 106, as amended by MIL-C-38300.
Altitude Breathing Para. 4.11.12	The insulation resistance of wired and mated connectors shall be 5000 megohms, minimum, and there shall be no flashover or breakdown at a test voltage of 1000 volts RMS after the third cycle and while immersed in 5% salt water solution at 68°F [20°C] and room ambient pressure pressure at 68°F [20°C].
Salt Spray Para. 4.11.13	Unmated plugs and receptacles shall show no excessive corrosion which would detrimentally affect the electrical and mechanical performance of the connectors after subjection to 24 hours exposure to salt spray atmosphere per MIL-STD-202, Method 101.

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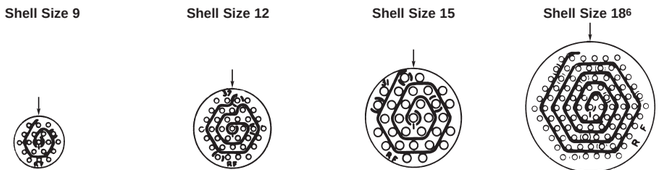
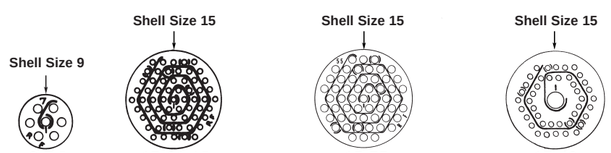
MARC 53 Series Connectors (Continued)

Contact Arrangements [1,2]



	Shell Size 9	Shell Size 12	Shell Size 15	Shell Size 18[6]
Insert Arrangement [3]	9-19 [4,5]	12-37 [4,5]	15-31 [5]	18-91 [4,5]
Number of Contacts	19	37	31	91
Contact Size	22 AWG	22 AWG	16 AWG	22 AWG



	Shell Size 9	Shell Size 15	Shell Size 15	Shell Size 15
Insert Arrangement [3]	9-7 [5]	15-61 [4,5]	15-55	15-43
Number of Contacts	7	61	55	1-95 ohm
Contact Size	16 AWG	22 AWG	22-20 AWG	42-22 AWG

[1] Views shown are front face view of receptacles. Front face view of plugs is mirror image of that shown.
[2] In addition to those inserts shown, MARC 43 Series Connector inserts may be utilized in MARC 53 Series Connector housings. See page 5-29, MARC 43 Series Connector modifications.
[3] Arrow (▾) indicates insert top or vertical position in relation to top or vertical position of connector housings.
[4] Arrangement also available in RMD style.
[5] Arrangement also available in hermetic seal receptacles.
[6] Arrangement available in 06, 00, 01.

Part Number and Ordering Information

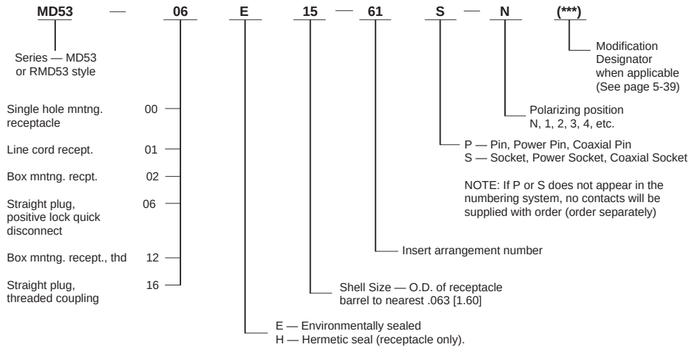
MARC 53 Series Connector part numbers indicate size, shape, insert layout, type of seal, style of contact and polarization.

Note: Pin or socket (power or coaxial) contacts may be used in either plugs or receptacles. However, it is recommended that pins be placed in the receptacles when possible to take advantage of our "scoop-proof" design.

Alternate Keying — Standard alternate polarizing key positions are shown below. Additional polarizing keyways are available upon request.

Supplemental Accessory Hardware — We also manufacture supplemental accessory hardware (protective covers, shield adapters, etc.) to adapt these connectors to almost any application. For modifications to fit your requirements, contact Tyco Electronics.

Typical Part Number



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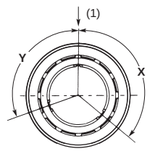
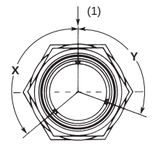
MARC 53 Series Connectors (Continued)

Polarizing Key Positions

All of our multi-pin plugs and receptacles are available in alternate polarizing positions as listed below:



Plug
(Shell sizes 9, 12, 15 only)

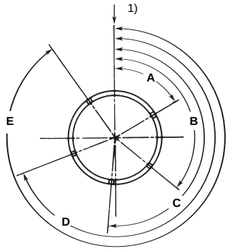


Receptacle
(Shell sizes 9, 12, 15 only)

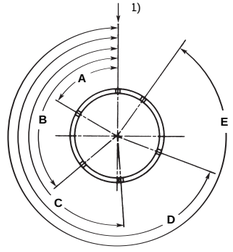
Shell Size 9		
Part Number	X°	Y°
(R) MD53-***9-***-N	130	110
(R) MD53-***9-***-1	130	150
(R) MD53-***9-***-2	90	110
(R) MD53-***9-***-3	210	110
(R) MD53-***9-***-4	130	35
(R) MD53-***9-***-5	90	230

Shell Size 12		
Part Number	X°	Y°
(R) MD53-***12-***-N	130	110
(R) MD53-***12-***-1	130	90
(R) MD53-***12-***-2	130	145
(R) MD53-***12-***-3	105	110
(R) MD53-***12-***-4	155	110
(R) MD53-***12-***-5	80	110
(R) MD53-***12-***-6	190	110
(R) MD53-***12-***-7	130	170
(R) MD53-***12-***-8	215	110
(R) MD53-***12-***-9	80	230
(R) MD53-***12-***-10	130	30

Shell Size 15		
Part Number	X°	Y°
(R) MD53-***15-***-N	130	110
(R) MD53-***15-***-1	130	90
(R) MD53-***15-***-2	130	150
(R) MD53-***15-***-3	130	170
(R) MD53-***15-***-4	190	110
(R) MD53-***15-***-5	150	110
(R) MD53-***15-***-6	90	110
(R) MD53-***15-***-7	70	110
(R) MD53-***15-***-8	70	230
(R) MD53-***15-***-9	90	230
(R) MD53-***15-***-10	210	110
(R) MD53-***15-***-11	30	110
(R) MD53-***15-***-12	250	30
(R) MD53-***15-***-13	130	30
(R) MD53-***15-***-14	30	230



Plug
(Shell size 18 only)



Receptacle
(Shell size 18 only)

Shell Size 18					
Part Number	A°	B°	C°	D°	E°
(R) MD53-***18-***-N	60	130	185	250	325
(R) MD53-***18-***-1	70	130	205	270	320
(R) MD53-***18-***-2	55	130	210	250	310
(R) MD53-***18-***-3	50	130	190	235	305
(R) MD53-***18-***-4	75	125	190	250	320
(R) MD53-***18-***-5	80	150	205	250	300
(R) MD53-***18-***-6	50	90	175	250	315
(R) MD53-***18-***-7	70	120	175	250	295
(R) MD53-***18-***-8	70	130	205	260	325
(R) MD53-***18-***-9	35	90	130	215	285
(R) MD53-***18-***-10	75	140	210	250	310

(1) Arrow (▼) indicates top or vertical position (master key/keyway) and coincides with top or vertical position of insert shown on page 5-25. This relationship remains constant with alternate polarizing key positions.

(R) Rear insertable and removable.

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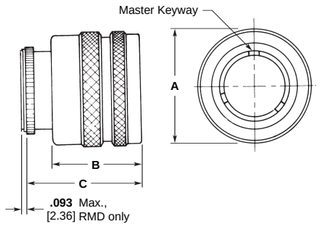
MARC 53 Series Connectors (Continued)

Configurations

MD53-06E/RMD53-06E

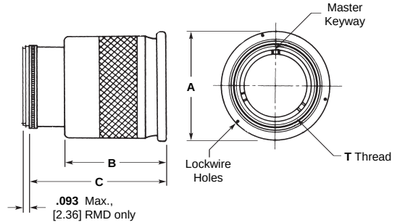
Straight Plug, positive lock Coupling, Environmental (Mates with Receptacles, All Types)



Shell Size	Dimensions		
	A	B (Max.)	C (Max.)
9	**.890** 22.60	**1.000** 25.4	**1.281** 32.54
12	**1.078** 27.38	**1.000** 25.4	**1.281** 32.54
15	**1.262** 32.05	**1.000** 25.4	**1.281** 32.54
18	**1.577** 40.06	**1.000** 25.4	**1.281** 32.54

MD53-16E/RMD53-16E

Straight Plug, Threaded Coupling, Environmental (Mates with Receptacles, Types 00 and 12; Not available in 18 Shell Size)



Shell Size	Dimensions			
	A	B (Max.)	C (Max.)	T (Class 2B)
9	**.812** 20.62	**1.125** 28.57	**1.500** 38.1	5/8-32UN
12	**1.000** 25.4	**1.125** 28.57	**1.500** 38.1	13/16-28UN
15	**1.187** 30.15	**1.125** 28.57	**1.500** 38.1	1-28UN
18	**1.437** 36.50	**1.125** 28.57	**1.437** 36.50	1-1⁄4-28UN

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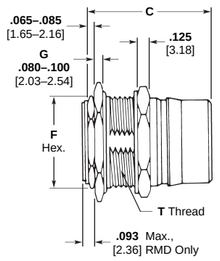
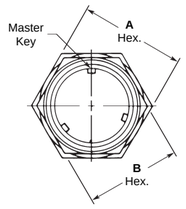
MARC 53 Series Connectors (Continued)

Configurations (Continued)

MD53-00E/RMD53-00E

Receptacle, Single Hole Mounting, Environmental (Mates with Plugs, Type 06 and 16)





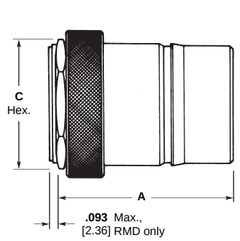
Panel Cutout

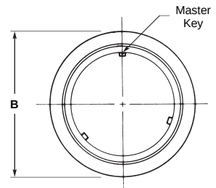
Shell Size	Dimensions							
	A	B	C	D	E	F	G	T (Class 2A)
9	**.75** 19.05	**.687** 17.45	**1.360** 34.54	**.607-.611** 15.42-15.52	**.625-.629** 15.87-15.97	**.563** 14.30	**.090** 2.29	5/8-32NS
12	**.937** 23.80	**.875** 22.23	**1.360** 34.54	**.794-.798** 20.17-20.27	**.812-.816** 20.62-20.73	**.75** 19.05	**.090** 2.29	13/16-28NS
15	**1.125** 28.58	**1.062** 26.97	**1.360** 34.54	**.975-.979** 24.76-24.86	**.999-1.003** 25.37-25.48	**.875** 22.23	**.090** 2.29	1-28UNS
18	**1.625** 41.28	**1.375** 34.93	**1.360** 34.54	**1.214-1.218** 30.83-30.94	**1.251-1.255** 31.77-31.87	**1.125** 28.58	**.125** 3.18	1-1/4-28UN

Note: .313 [7.95] Maximum Panel Thickness when mated with a positive lock 06 Plug.
.109 [2.77] Maximum Panel Thickness when mated with threaded 16 Plug.

MD53-01E/RMD53-01E

Receptacle, Line Cord, Environmental (Mates with Plug, Type 06)





Shell Size	Dimensions		
	A (Max.)	B (Max.)	C
9	**1.360** 34.54	**.766** 19.46	**.562** 14.27
12	**1.360** 34.54	**.953** 24.21	**.75** 19.05
15	**1.360** 34.54	**1.141** 28.98	**.875** 22.23
18	**1.360** 34.54	**1.578** 40.08	**1.125** 28.58

Note: Unless otherwise shown, tolerances are: decimals ± .015 [±.381]; fractions ± 1/32.

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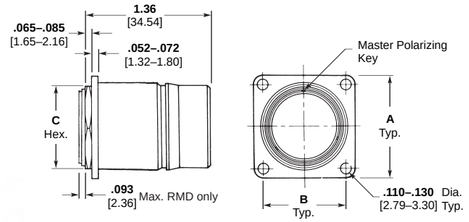
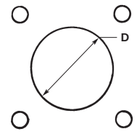
MARC 53 Series Connectors (Continued)

Configurations (Continued)

MD53-02E/RMD53-02E

Receptacle, Box Mounting, Environmental (Mates with Plug, Type 06)





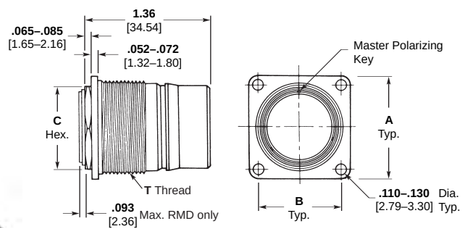
Panel Cutout

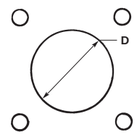
.375 [9.53] Max. Panel Thickness for rear-mount applications.

Shell Size	Dimensions			
	A	B	C	D
9	**.875** 22.23	**.594** 15.09	**.563** 14.30	**.595** 15.11
12	**1.000** 25.40	**.786** 19.96	**.75** 19.05	**.783** 19.89
15	**1.125** 28.58	**.906** 23.01	**.875** 22.23	**.960** 24.38
18	**1.344** 34.14	**1.062** 26.97	**1.125** 28.58	**1.212** 30.78

MD53-12E/RMD53-12E
Threaded Coupling

Receptacle, Box Mounting, Environmental (Mates with Plugs, Type 06 and 16; not available in 18 Shell Size)





Panel Cutout

.125 [3.18] Max. Panel Thickness when mated with threaded 16 Plug for rear mount applications.

Shell Size	Dimensions				
	A	B	C	T (Class 2A)	D
9	**.875** 22.23	**.594** 15.09	**.563** 14.30	5/8-32UN	**.645** 16.38
12	**1.000** 25.40	**.786** 19.96	**.75** 19.05	13/16-28UN	**.832** 21.13
15	**1.125** 28.58	**.906** 23.01	**.875** 22.23	1-28UN	**1.020** 25.91

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MARC 53 Series Connectors (Continued)

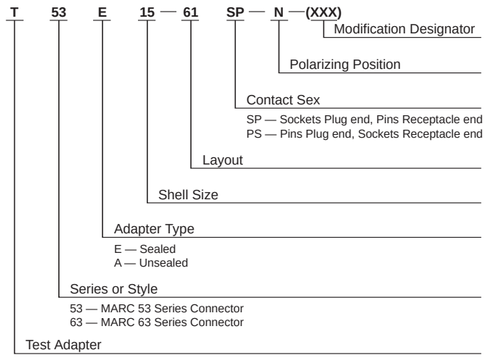
Accessories

Test Adapter

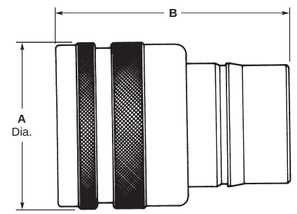
The test adapter accessory is utilized primarily as a connector simulator to preserve the end-use connector where this connector would be subjected to extensive testing, matings, or probings. The test adapter, when mated, provides the exact mating interface as that of the end-use connector and is completely field serviceable.

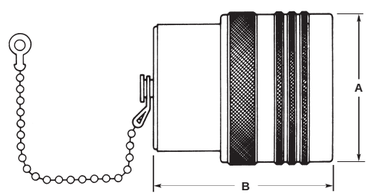
Test Adapter Product Part Number System

How to Specify

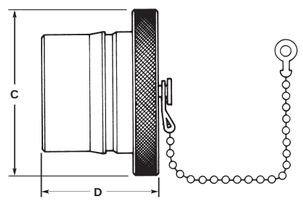


Shell Size	Dimension	
	A (Max.)	B (Max.)
9	**.906** 23.01	**2.670** 67.82
12	**1.094** 27.79	**2.670** 67.82
15	**1.281** 32.54	**2.670** 67.82
18	**1.594** 40.49	**2.670** 67.82





Receptacle Cover



Plug Cover

Protective Covers

Shell Size	Receptacle Cover Part Number[1]		Plug Cover Part Number[1]		Dimensions (Max.)			
	With Chain	Without Chain	With Chain	Without Chain	A	B	C	D
9	086-0049-00AL	086-0073-00W3	086-0052-00L6	086-0076-00P2	**.766** 19.46	**.950** 24.13	**.969** 24.61	**.913** 23.19
12	086-0050-00AL	086-0074-00W3	086-0053-00L6	086-0077-00P2	**.953** 24.21	**.950** 24.13	**1.156** 29.36	**.913** 23.19
15	086-0051-00AL	086-0075-00W3	086-0054-00L6	086-0078-00P2	**1.141** 28.98	**.950** 24.13	**1.344** 34.14	**.913** 23.19
18	086-0146-00AL	086-0139-00W3	086-0147-00L6	086-0140-00P2	**1.578** 40.08	**1.000** 25.4	**1.781** 45.24	**.913** 23.19

[1] For threaded plug (PT) cover, consult Tyco Electronics. Wire rope/lanyard attachments and plastic protective caps also available, consult Tyco Electronics.

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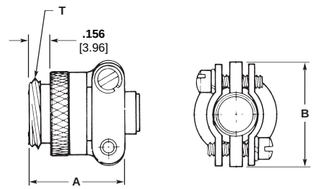
UK: 44-208-420-8341

MARC 53 Series Connectors (Continued)

Accessories (Continued)

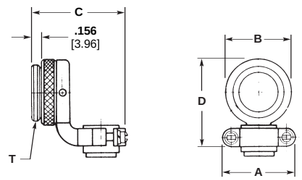
Cable Clamps

Shell Size	Clamp Part Number MD	Clamp Part Number RMD	A	B	T Thd. 2A
9	086-0099-00F5	086-0175-00F3	**.704** 17.88	**.750** 19.05	1/2-20 UNF
12	086-0100-00F5	086-0176-00F3	**.773** 19.63	**.932** 23.67	11/16-24 UNEF
15	086-0101-00F5	086-0177-00F3	**.829** 21.06	**1.078** 27.38	13/16-24 UNEF
18	086-0142-00F5	086-0178-00F3	**.890** 22.61	**1.250** 31.75	1-28 UN



Straight

Shell Size	Clamp Part Number MD	Clamp Part Number RMD	A	B (Max.)	C (Max.)	D	T Thd. 2A
9	086-0103-00F5	086-0179-00F3	**.737** 18.72	**.600** 15.24	**1.100** 27.94	**.879** 22.32	1/2-20 UNF
12	086-0104-00F5	086-0180-00F3	**.913** 23.19	**.775** 19.68	**1.250** 31.75	**1.067** 27.10	11/16-24 UNEF
15	086-0105-00F5	086-0181-00F3	**1.048** 26.62	**.962** 24.43	**1.469** 37.31	**1.233** 31.32	13/16-20 UNEF
18	086-0143-00F5	086-0182-00F3	**1.225** 31.12	**1.185** 30.01	**1.550** 39.37	**1.550** 39.37	1-28 UN



Right-Angle

Contacts (see pages 5-44 and 5-45)

Contact Size	Pin Part Number MD	Pin Part Number RMD	Socket Part Number MD	Socket Part Number RMD
22 AWG	083-0009-00R4	083-1200-00R4	082-0464-00Y9	082-0462-00Y9
16 AWG	083-0158-00R4	—	082-0113-00T1	—

Note: Standard packaging includes same quantity of contacts as contact cavities in insert.

Contact Cavity Sealing Plugs (see page 5-46)

Contact Size	Standard Length Part Number MD	Standard Length Part Number RMD	Short Length Part Number MD	Short Length Part Number RMD
22 AWG	086-0055-0000	086-0148-0000	082-0009-0000	086-0009-0000
16 AWG	086-0056-0000	—	082-0010-0000	—

Note: Standard length plug occupies contact cavity and wire sealing grommet. Short length plug occupies wire sealing grommet only (to be used behind non-wired contacts and in plugs which mate to hermetic receptacles).

Modifications

We offer a unique modification identification system which provides alteration of standard MARC 53 Series Connectors to include special finishes, accessories, MARC 43 Series Connector contact arrangements, and custom quality assurance provisions — processing, testing, serialization, traceability. Consult Tyco Electronics for additional modification information.

Standard modifications include:

(503): MARC 53 Series Connector including cable clamp, straight type

(504): MARC 53 Series Connector including cable clamp, right-angle type

(506): MARC 53 Series Connector, gold finish

(507): MARC 53 Series Connector, electroless nickel finish

(508): MARC 53 Series Connector, black anodized coupling ring, gold over electroless nickel housings, retaining nuts and hardware.

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MARC 63 Series Connectors RMD63 Performance Data

MARC 63 Series Connectors,0 RMD63 Series meet or exceed the performance requirements of specification MIL-C-38300A (USAF) as detailed in the M38300A (USAF) military specification sheets covering the MARC 53 Series Connectors. Tyco Electronics can supply detailed, cross reference information. MARC 63 Series Connectors, RMD63 Series meet the following selected test parameters as specified below:

DESCRIPTION	TEST REQUIREMENTS
Contact Retention	Contacts are to withstand 15 lbs. [66.72 N] axial load and RMD contacts 10 lbs. [44.48 N] axial load without axial displacement in excess of 0.012 [.305] or damage to contacts or inserts when the axial load is applied to the mating end of the contacts in unmated plugs and receptacles at a rate of approximately 1 lb/sec. [4.45 N].
Contact Resistance	The potential drop across normally mated contacts shall not exceed 25 mv under room ambient and high temperature service conditions when measured as specified in MIL-C-26636, Fig. 2, with maximum rated current.
Dielectric Withstanding Voltage, Altitude and Sea Level	No evidence of dielectric breakdown or flashover when mated and unmated plugs are subjected to 645 and 180 volts RMS, respectively, at altitudes up to 110,000 [33,528 m] feet and 1000 volts RMS at sea level.
Insulation Resistance, Room and High Temp.	Insulation resistance of mated plugs and receptacles shall be 5000 megohms, minimum, at room temperature and 1000 megohms, minimum, at 257°F [+125°C] when measured per MIL-STD-202, Method 302, Test Condition B.
Coupling and Uncoupling	Plugs and receptacles shall withstand up to 500 cycles of engagement and separation without detrimental damage to plugs or receptacles or not satisfying subsequent tests of MIL-C-38300.
Fluid Immersion	Mating and unmating forces shall not exceed 27 lbs. [120.10 N], maximum, (15 shell size) after fully wired plugs and receptacles are immersed for 20 hours, each, in hydraulic fluid (MIL-H-5606) and high temperature lubricating oil (MIL-L-9236) followed by a one-hour dry.
Sweep Vibration, Mated	Mated connectors shall show no circuit interruptions greater than one microsecond during 12 hours vibration to include six sweeps in each axis at extreme temperatures of –85°F [–65°C] and 257°F [+125°C] per MIL-STD-202, Method 204, Test Condition D. Post inspection shall show no detrimental cracking, breaking, or loosening of parts.
Moisture Resistance	The insulation resistance of mated connectors shall exceed 1000 megohms after subjection to moisture resistance testing per MIL-STD-202, Method 106, as amended by MIL-C-38300.
Altitude Breathing	The insulation resistance of wired and mated connectors shall be 5000 megohms, minimum, and there shall be no flashover or breakdown at test voltage of 1000 volts RMS after the third cycle and while immersed in 5% salt water solution at 68°F [20°C] and room ambient pressure at 68°F [20°C].
Salt Spray	Unmated plugs and receptacles shall show no excessive corrosion which would detrimentally affect the electrical and mechanical performance of the connectors after subjection to 24 hours exposure to salt spray atmosphere per MIL-STD-202, Method 101.

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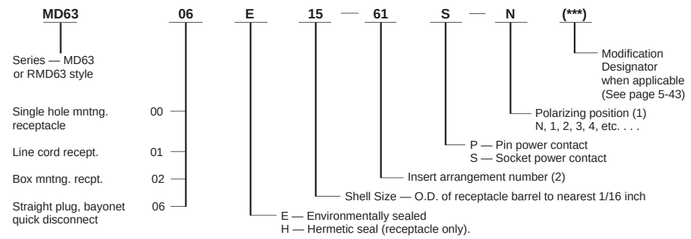
MARC 63 Series Connectors (Continued)

Part Number and Ordering Information

Connector part numbers indicate size, shape, insert layout, type of seal, style of contact and polarization.

Note: Pin or socket (power or coaxial) contacts may be used in either plugs or receptacles. However, it is recommended that pins be placed in the receptacle when possible to take advantage of our "scoop-proof" design.

Typical Part Number

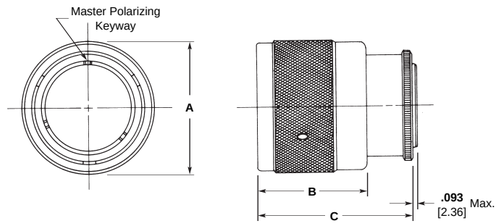


(1) For polarizing key positions see MARC 53 Series Connectors.
(2) For contact arrangements see MARC 53 Series Connectors.
Note: If P or S does not appear in the numbering system, no contacts will be supplied with order (order separately).

Configurations

MD63-06E/RMD63-06E

Straight Plug, Bayonet Coupling, Environmental and Non-Environmental (Mates with Receptacles 02, 00 and 01)



Shell Size	Dimensions		
	A	B (Max.)	C (Max.)
9	**.813** 20.65	**1.000** 25.4	**1.288** 32.72
12	**1.000** 25.40	**1.000** 25.4	**1.288** 32.72
15	**1.125** 28.58	**1.000** 25.4	**1.288** 32.72
18	**1.594** 40.49	**1.000** 25.4	**1.288** 32.72

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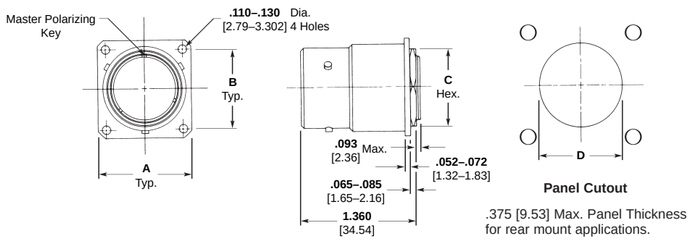
MARC 63 Series Connectors (Continued)

Configurations (Continued)

MD63-02E/RMD63-02E

Receptacle, Box Mounting, Environmental and Non-Environmental (Mates with Plug, Type 06)

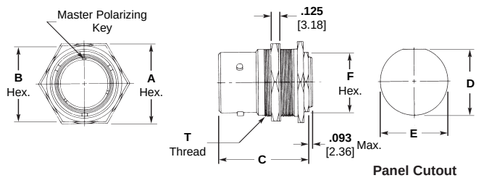


.375 [9.53] Max. Panel Thickness for rear mount applications.

Shell Size	Dimensions			
	A	B	C	D
9	**.875** 22.23	**.662** 16.81	**.562** 14.27	**.693-.697** 17.60-17.70
12	**1.000** 25.40	**.786** 19.96	**.75** 19.05	**.881-.885** 22.38-22.48
15	**1.125** 28.58	**.906** 23.01	**.875** 22.23	**1.006-1.011** 25.55-25.68
18	**1.344** 34.14	**1.062** 26.97	**1.125** 28.58	**1.250-1.260** 30.48-32.00

MD63-00E/RMD63-00E

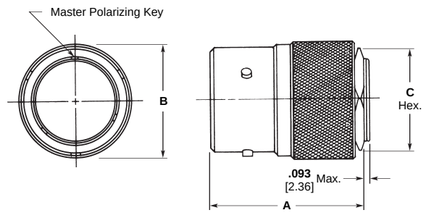
Receptacle, Single Hole Mounting, Environmental and Non-Environmental (Mates with Plug, Type 06)



Shell Size	Dimensions						
	A	B	C	D	E	F	T (Class 2A)
9	**.813** 20.65	**.75** 19.05	**1.360** 34.54	**.669-.673** 16.99-17.09	**.693-.697** 17.60-17.70	**.562** 14.27	11/16-32UN
12	**1.000** 25.40	**.937** 23.80	**1.360** 34.54	**.850-.856** 21.59-21.74	**.881-.885** 22.38-22.48	**.75** 19.05	7/8-28UN
15	**1.125** 28.58	**1.062** 26.97	**1.360** 34.54	**.975-.979** 24.76-24.87	**1.006-1.010** 25.55-25.65	**.875** 22.23	1-28UN
18	**1.625** 41.28	**1.375** 34.93	**1.360** 34.54	**1.212-1.216** 30.78-30.88	**1.251-1.255** 31.78-31.88	**1.125** 28.58	1-1/4-28UN

MD63-01E/RMD63-01E

Receptacle, Line Cord, Environmental (Mates with Plug, Type 06)



Shell Size	Dimensions		
	A	B (Max.)	C
9	**1.360** 34.54	**.703** 17.86	**.562** 14.27
12	**1.360** 34.54	**.891** 22.63	**.75** 19.05
15	**1.360** 34.54	**1.016** 25.81	**.875** 22.23
18	**1.360** 34.54	**1.203** 30.56	**1.125** 28.58

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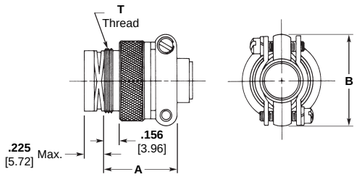
MARC 63 Series Connectors (Continued)

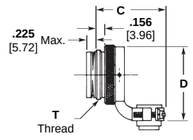
Accessories

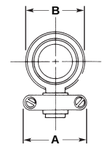
Cable Clamps



Straight

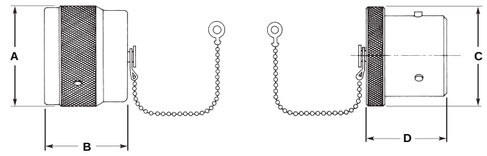
Shell Size	Part Number	A	B	T Thread
9	086-0175-00N1	**.704** 17.88	**.750** 19.05	1/2-20UNF-2A
12	086-0176-00N1	**.773** 19.63	**.932** 23.67	11/16-24UNEF-2A
15	086-0177-00N1	**.829** 21.06	**1.078** 27.38	13/16-20UNEF-2A
18	086-0178-00N1	**.890** 22.61	**1.250** 31.75	1-28UN-2A





Angle

Shell Size	Part Number	A	B (Max.)	C (Max.)	D	T Thread
9	086-0179-00N1	**.737** 18.72	**.600** 15.24	**1.100** 27.94	**.879** 22.32	1/2-20UNF-2A
12	086-0180-00N1	**.913** 23.19	**.785** 19.94	**1.250** 31.75	**1.067** 27.10	11/16-24UNEF-2A
15	086-0181-00N1	**1.048** 26.62	**.962** 24.43	**1.469** 37.31	**1.233** 31.21	13/16-20UNEF-2A
18	086-0182-00N1	**1.225** 31.12	**1.185** 30.10	**1.550** 39.37	**1.550** 39.37	1-28UN-2A



Protective Covers

Shell Size	Receptacle Part Number		Plug Part Number		Dimensions			
	Without Chain	With Chain	Without Chain	With Chain	A	B	C	D
9	086-0253-00P2	086-0257-00L6	086-0261-00F5	086-0265-00L6	**.813** 20.65	**.950** 24.13	**.813** 20.65	**.913** 23.19
12	086-0254-00P2	086-0258-00L6	086-0262-00F5	086-0266-00L6	**1.000** 25.40	**.950** 24.13	**1.000** 25.40	**.913** 23.19
15	086-0255-00P2	086-0259-00L6	086-0263-00F5	086-0267-00L6	**1.125** 28.58	**.950** 24.13	**1.125** 28.58	**.913** 23.19
18	086-0256-00P2	086-0260-00L6	086-0264-00F5	086-0268-00L6	**1.594** 40.49	**.950** 24.13	**1.594** 40.49	**.913** 23.19

Plastic Protective Covers also available; consult Tyco Electronics.

Modifications

We offer a unique modification system which provides alteration of standard MARC 63 Series Connectors to include special finishes, accessories, and custom quality assurance provisions — processing, testing, serialization, traceability. Consult your sales representative or Tyco Electronics for additional modification information.

Standard modifications include:

(801): MARC 63 Series Connector, electroless nickel finish

(803): MARC 63 Series Connector including cable clamp, straight type

(804): MARC 63 Series Connector including cable clamp, right-angle type

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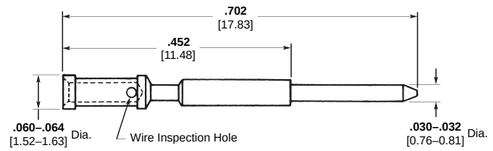
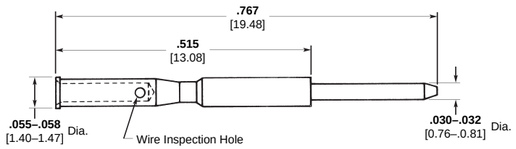
Contacts for MARC 43, MARC 53 and MARC 63 Connectors

MARC 43, MD53, MD63 Series

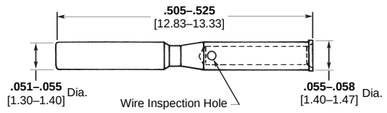


Part Number 083-0009-00R4
(6-1532030-1) 22 AWG Pin

MARC RMD53, RMD63 Series

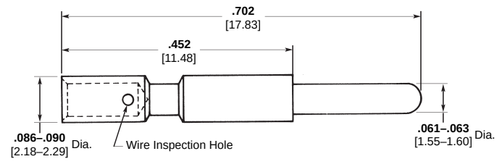


Part Number 083-1200-00R4
(4-1532036-8) 22 AWG Pin

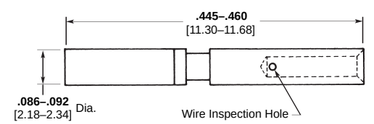


Part Number 082-0461-00Y9
(5-1532030-6) 22 AWG Socket

MARC 43, MD53, MD63 Series

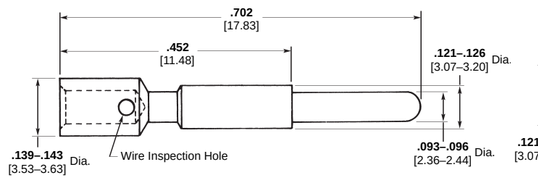


Part Number 083-0158-00R4
(8-1532030-1) 16 AWG Pin

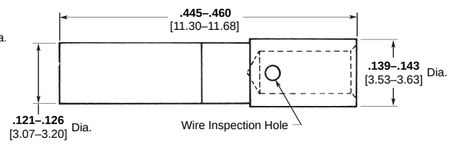


Part Number 082-0113-00T1
(3-1532030-3) 16 AWG Socket

MARC 43 Series

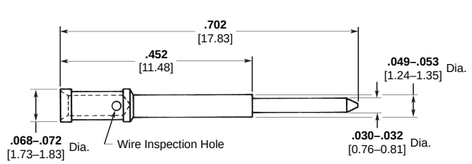


Part Number 083-0173-00R4
12 AWG Pin



Part Number 082-0132-00T1
(3-1532030-4) 12 AWG Socket

MARC MD53, MD63 Series



Part Number 083-1435-00R4
(7-1532037-3) 22-20 AWG Pin

Catalog 1308940
Revised 8-06

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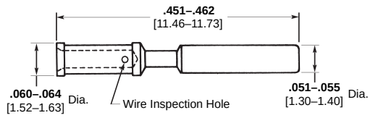
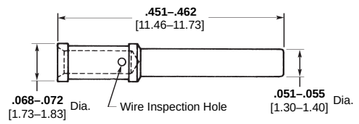
Contacts for MARC 43, MARC 53 and MARC 63 Connectors (Continued)

MARC 43, MD53, MD63 Series



Part Number 082-0464-00Y9
(5-1532030-7) 22 AWG Socket

MARC MD53, MD63 Series

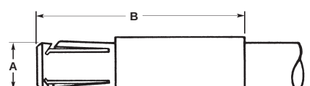


Part Number 082-0466-00Y9
22-20 AWG Socket

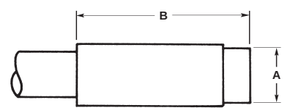
Coaxial Contacts

MARC 43, MD53, MD63 Series

Solder Type Coaxial Contacts



CP Type

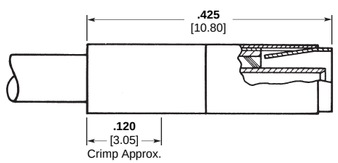


CS Type

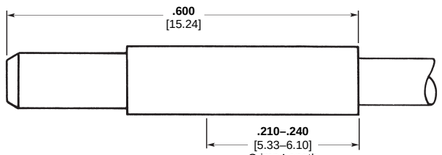
Contact	Part Number	Type	A Dia.	B
50 Ω	084-0027-00T2 (5-1532129-8)	CS	**.109** 2.77	**.452** 11.48
	084-0024-00T2 (5-1532129-7)	CP	**.093** 2.36	**.600** 15.24
75 Ω	084-0028-00T2 (5-1532129-9)	CS	**.123** 3.12	**.452** 11.48
	084-0025-00T2 (7-1532155-0)	CP	**.106** 2.69	**.600** 15.24
95 Ω	084-0029-00T2 (5-1532168-1)	CS	**.168** 4.27	**.452** 11.48
	084-0026-00T2	CP	**.149** 3.78	**.600** 15.24

MARC 43 Series

LEPRA/CON Crimp Type, 50 Ohm Coaxial Contacts



Part Number 142-1500-0001
CS Socket



Part Number 141-1500-0001
CP Pin

5

Pin and Socket Connectors

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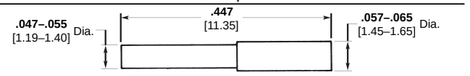
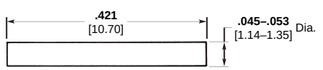
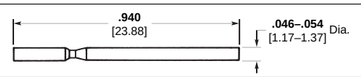
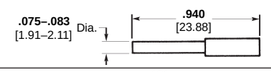
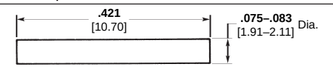
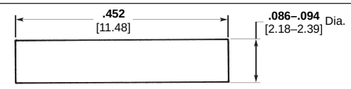
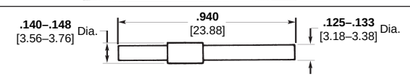
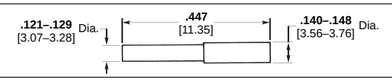
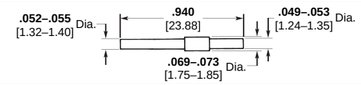
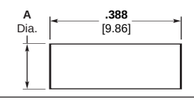
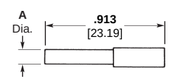
Contact Cavity Sealing Plugs

Size	Part Number	Application	Description
22 AWG	086-0001-0000	Unsealed 43 Series	
	086-0009-0000	Sealed 43 Series MD53, RMD53 MD63, RMD63	
	086-0148-0000	RMD53, RMD63	
16 AWG	086-0056-0000	Sealed 43 Series MD53, MD63	
	086-0010-0000	Sealed 43 Series MD53, MD63	
	086-0014-0000	Unsealed 43 Series	
12 AWG	086-0057-0000	Sealed 43 Series	
	086-0015-0000	Unsealed 43 Series	
22/20 AWG	086-0251-0000	MD53, MD63	

Size	Part Number	Application	A Dia.	B Dia.	Description
5052	086-0061-0000	Unsealed 43 Series	**.112-.120** 2.84-3.05	—	
7552	086-0062-0000		**.135-.143** 3.43-3.63	—	
9552	086-0063-0000		**.178-.186** 4.52-4.72	—	
5052	086-0058-0000	Sealed 43 Series	**.081-.089** 2.06-2.26	**.112-.120** 2.84-3.05	
7552	086-0059-0000		**.106-.114** 2.69-2.90	**.135-.143** 3.43-3.63	
9552	086-0060-0000		**.151-.159** 3.84-4.04	**.178-.186** 4.52-4.72	

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UK: 44-208-420-8341

Assembly Tools

MARC 43, 53 and 63 Series Connectors

Removal Tool — None required.

Crimp Tools — Turret style tool (M22520/1-01 and TH88) MICRODOT Part Number 010-0080-0000 — Crimps all power contacts.

Locator Style Tool — MICRODOT Part Number 010-0070-0000 with locators.

Contact Size	Wire Size	Locator
22	22, 24	010-0072-0000
22	26	010-0087-0000
16	16, 18	010-0075-0000

For MARC 43 Series Connector Crimp Coax Contacts Use 010-0132-0000 & 010-0169-0000.

MARC 73 Series Connectors

Description	Part Number
Crimp Tool w/ Locator	010-3008-0000
Crimp Tool Only	010-3009-0000 M22520/2-01
Locator Only	010-3010-0000

Description	Part Number
Crimp Tool w/ Locator	010-3002-0000
Crimp Tool Only	010-0190-0000
Locator Only	010-3007-0000

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Service and Performance Data

MARC 73 Series Connectors meet or exceed the performance requirements of specification MIL-C-38999. Your sales representative or field engineer can supply detailed, cross-reference information. MARC 73 Series Connectors meet the following selected test parameters as specified below:

DESCRIPTION	TEST REQUIREMENTS
Contact Retention	Contacts are to withstand 10 lbs [44.48 N] axial load without axial displacement in excess of 0.012 [0.30] or damage to contacts or inserts when the axial load is applied to the mating end of the contacts in unmated plugs and receptacles at a rate of approximately 1 lb/sec. [4.45 N].
Contact Resistance	The potential drop across normally mated contacts shall not exceed 25 mv under room ambient and high temperature service conditions when measured as specified in MIL C-39029 with maximum rated current.
Dielectric Withstanding Voltage, Altitude and Sea Level	No evidence of dielectric breakdown or flashover when mated and unmated plugs are subjected to 645 and 180 volts RMS, respectively, at altitudes up to 70,000 feet [21,336 m] and 1000 volts RMS at sea level.
Insulation Resistance, Room and High Temp.	Insulation resistance of mated plugs and receptacles shall be 5000 megohms, minimum, at room temperature and 1000 megohms, minimum, at 257°F [+125°C] when measured per MIL-STD 202, Method 302, Test Condition B.
Coupling and Uncoupling	Plugs and receptacles shall withstand up to 500 cycles of engagement and separation without detrimental damage to plugs or receptacles or not satisfying subsequent tests.
Fluid Immersion	Mating and unmating forces shall not exceed 27 lbs [120.10 N] maximum, (15 shell size) after fully wired plugs and receptacles are immersed for 20 hours, each, in hydraulic fluid (MIL-H-5606) and high temperature lubricating oil (MIL-L-9236) followed by a one-hour dry.
Sweep Vibration, Mated	Mated connectors shall show no circuit interruptions greater than one microsecond during 12 hours vibration to include six sweeps in each axis at extreme temperatures of –85°F [–65°C] and 257°F [+125°C] per MIL-STD-202, Method 204, Test Condition D. Post inspection shall show no detrimental cracking, breaking, or loosening of parts.
Moisture Resistance	The insulation resistance of mated connectors shall exceed 1000 megohms after subjection to moisture resistance testing per MIL-STD-202, Method 106.
Altitude Breathing	The insulation resistance of wired and mated connectors shall be 5000 megohms, minimum, and there shall be no flashover or breakdown at test voltage of 1000 volts RMS after the third cycle and while immersed in 5% salt water solution at 68°F [20°C] and room ambient pressure at 68°F [20°C].
Salt Spray	Unmated plugs and receptacles shall show no excessive corrosion which would detrimentally affect the electrical and mechanical performance of the connectors after subjection to 24 hours exposure to salt spray atmosphere per MIL-STD-202, Method 101.

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Service and Performance Data

I. Electrical — Electrical Ratings

Contact Size	Current Rating (Amperes, Max., 81°F [+27°C])	Dielectric Withstanding Voltage (RMS)	Working Voltage		Contact Resistance (Millivolts, Max.)
			Sea Level	110,000 Ft. Alt.[1]	
22 AWG	5	1000	750	300	8

[1] 110,000 ft = 33,528 m

Wire Range Accommodations

Wire Barrel Size	Wire Size (AWG)	O.D. of Finished Wire		Wire Spec. MIL-W-16878
		Range	Nominal	
22 AWG	26	.029 0.74 Min.	.031 0.79 Nom.	Type “E” or “ET”
	24	—	.036 0.91 Nom.	Type “ET”
	22	.044 1.12 Max.	.042 1.07 Nom.	Type “ET”

II. Mechanical — Durability: 500 Cycles Mate/Unmate.

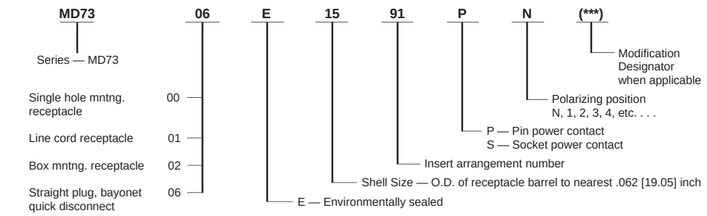
Coupling/Uncoupling Forces and Tightening Torques:

Shell Size	Coupling/ Uncoupling Force (In-Lbs.) Max.	Tightening Torque (In-Lbs.)	
		Retaining Nut	Mounting Nut
9	10 [44.48]	20 [2.26 N] Max.	30-45 [3.39 Nm – 5.08 Nm]
12	15 [66.72]	20 [2.26 N] Max.	40-55 [4.52 Nm – 6.21 Nm]
15	22 [97.86]	20 [2.26 N] Max.	55-70 [6.21 Nm – 7.91 Nm]
18	28 [124.55]	20 [2.26 N] Max.	70-85 [7.91 Nm – 9.60 Nm]

Operating Temperature: –67°F to 257°F [–55°C to +125°C].
Connector Mated Length: 2.217 [56.31] Max.

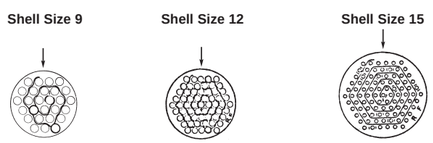
Part Number and Ordering Information

MARC 73 Series Connector part numbers indicate size, shape, insert layout, type of seal, style of contact and polarization.



Notes: Pin contacts in plug; socket contacts in receptacle.
If P or S does not appear in the numbering system, no contacts will be supplied with order (order separately).

Contact Arrangements[1]



	Shell Size 9	Shell Size 12	Shell Size 15
Insert Arrangement [2]	9-27[3]	12-61[3]	15-91[3]
Number of Contacts	27	61	91
Contact Size	22 AWG	22 AWG	22 AWG

[1] Views shown are front face views of receptacles. Front face view of plug is mirror image of that shown.
[2] Arrow (▼) indicates insert top or vertical position in relation to top or vertical position of housing.
[3] The 22 AWG contact arrangements will accommodate MIL-W-16878 Type ET, 22, 24, 26 AWG wire. Contact spacing is on 0.065 [1.65] centers.

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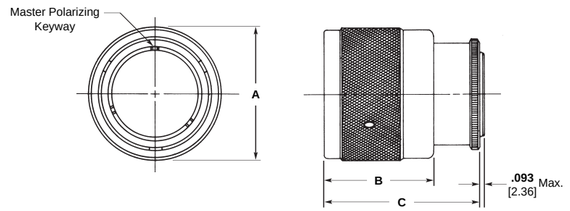
MARC 73 Series Connectors (Continued)

Configurations

MD73-06E

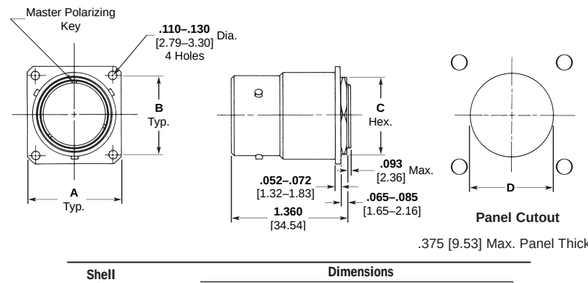
Straight Plug, Bayonet Coupling, Environmental and Non-Environmental (Mates with Receptacles 02, 00 and 01)



Shell Size	Dimensions		
	A	B (Max.)	C (Max.)
9	**.813** 20.65	**1.000** 25.40	**1.288** 32.72
12	**1.000** 25.40	**1.000** 25.40	**1.288** 32.72
15	**1.125** 28.58	**1.000** 25.40	**1.288** 32.72
18	**1.594** 40.49	**1.000** 25.40	**1.288** 32.72

MD73-02E

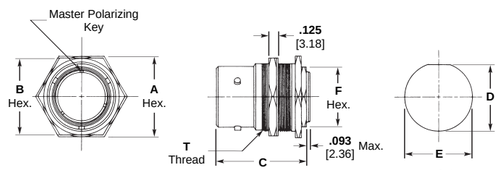
Receptacle, Box Mounting, Environmental and Non-Environmental (Mates with Plug, Type 06)



Shell Size	Dimensions			
	A	B	C	D
9	**.875** 22.23	**.662** 16.81	**.562** 14.27	**.693-.697** 17.60-17.70
12	**1.000** 25.40	**.786** 19.96	**.75** 19.05	**.881-.885** 22.38-22.48
15	**1.125** 28.58	**.906** 23.01	**.875** 22.23	**1.006-1.011** 25.55-25.68
18	**1.344** 34.14	**1.062** 26.97	**1.125** 28.58	**1.250-1.260** 31.75-32.00

MD73-00E

Receptacle, Single Hole Mounting, Environmental and Non-Environmental (Mates with Plug, Type 06)



Shell Size	Dimensions						
	A	B	C	D	E	F	T (Class 2A)
9	**.813** 20.65	**.75** 19.05	**1.360** 34.54	**.669-.673** 16.99-17.09	**.693-.697** 17.60-17.70	**.562** 14.27	11/16-32UN
12	**1.000** 25.40	**.937** 23.80	**1.360** 34.54	**.850-.856** 21.59-21.74	**.881-.885** 22.38-22.48	**.75** 19.05	7/8-28UN
15	**1.125** 28.58	**1.062** 26.97	**1.360** 34.54	**.975-.979** 24.77-24.87	**1.006-1.010** 25.55-25.65	**.875** 22.23	1-28UN
18	**1.625** 41.28	**1.375** 34.93	**1.360** 34.54	**1.212-1.216** 30.78-30.89	**1.251-1.255** 31.78-31.88	**1.125** 28.58	1-1/4-28UN

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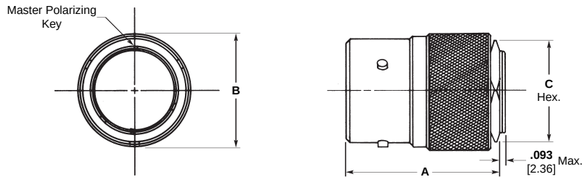
MARC 73 Series Connectors (Continued)

Configurations (Continued)

MD73-01E

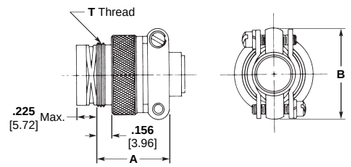
Receptacle, Line Cord, Environmental (Mates with Plug, Type 06)



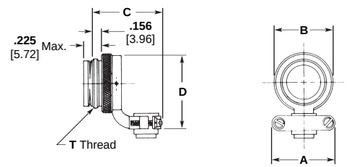
Shell Size	Dimensions		
	A	B (Max.)	C
9	**1.360** 34.54	**.703** 17.86	**.562** 14.27
12	**1.360** 34.54	**.891** 20.57	**.75** 19.05
15	**1.360** 34.54	**1.016** 25.81	**.875** 22.23
18	**1.360** 34.54	**1.203** 30.56	**1.125** 28.58

Accessories

Cable Clamps



Shell Size	Clamp Part Number	A	B	T Thd. 2A
9	086-0341-00N1	**.704** 17.88	**.750** 19.05	1/2-20 UNF
12	086-0342-00N1	**.773** 19.63	**.932** 23.67	11/16-24 UNEF
15	086-0343-00N1	**.829** 21.06	**1.078** 27.38	13/16-20 UNEF
18	086-0344-00N1	**.890** 22.61	**1.250** 31.75	1-28 UN



Shell Size	Clamp Part Number	A	B (Max.)	C (Max.)	D	T Thd. 2A
9	086-0337-00N1	**.737** 18.72	**.600** 15.24	**1.100** 27.94	**.879** 22.33	1/2-20 UNF
12	086-0338-00N1	**.913** 23.19	**.785** 19.94	**1.250** 31.75	**1.067** 27.10	11/16-24 UNEF
15	086-0339-00N1	**1.048** 26.62	**.962** 24.43	**1.469** 37.31	**1.233** 31.32	13/16-20 UNEF
18	086-0340-00N1	**1.225** 31.12	**1.185** 30.10	**1.550** 39.37	**1.550** 39.37	1-28 UN

Catalog 1308940
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Japan: 81-44-844-8013
UK: 44-208-420-8341

Accessories (Continued)

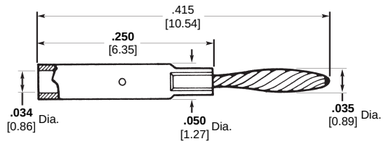
Contacts

Twist pin — 22 Pins and Sockets

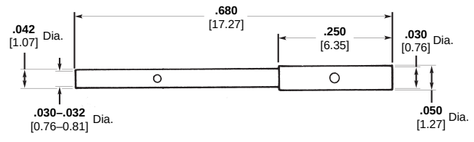
Copper alloy plated .000050 [0.00127] gold over copper flash per MIL-G-45204, Type II

Rating — 5 amps

Contact Resistance — .008 ohms max.



Part Number 096-0526-0000

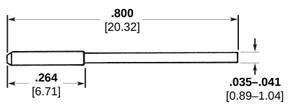


Part Number 096-0626-0001

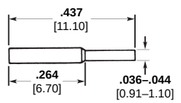
Engineering/Separation Forces — 6 oz. [1.67 N] max. / .502 [.139 N] min.

Durability — 2000 cycles

Contact Cavity Sealing Plugs



Part Number 086-0331-0000



Part Number 086-0330-0000

Contact Size	Sealing Plug Part Number	Filler Plug Part Number
22 AWG	086-0331-0000	086-0330-0000

Note: Sealing plug occupies insert and grommet cavities. Filler plug occupies insert cavity only.

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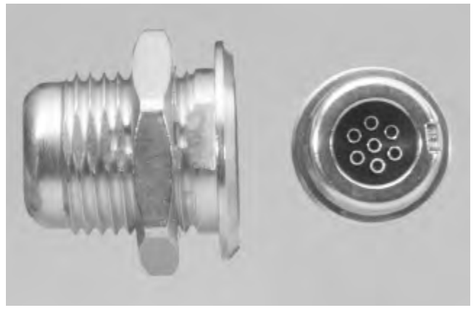
MQR Series — Microminiature Circular Connectors



MQR stands for MICRODOT Quick Release. This line of circular quick disconnect connectors has metal shells with push-pull couplings which provide a positive connection for rugged environmental use. The MQR series is specified for cable-to-cable and cable-to-panel applications.

The plug connector side contains socket contacts. The receptacle connector side contains pin contacts. Because the pin contact is "active" or "live", the pins require the physical protection that the receptacle side offers. (Similar to a "protected" or "shrouded" header.)

While there is no optional hardware for the MQR series, the receptacles incorporate a standard jam nut to tighten the connector down to the board or panel.

MQR connectors are manufactured to the performance specifications of MIL-DTL-83513.

How to Specify/ Ordering Code

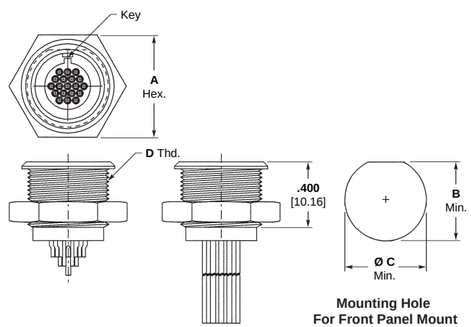
MQR — A — 37 P — 6 A 1 — 18.0

- Connector Series
- Shell, Material & Finish
  - A — Aluminum, Electroless Nickel Finish
  - B — Brass, Sulfamate Nickel Finish
- Number of Contacts**
  - 7, 19, 37*
- Shell
  - P — Plug (Socket Contact)
  - F — Receptacle, Front Panel Mount (Pin Contact)
  - R — Receptacle, Rear Panel Mount (Pin Contact)
- Per MIL-W-16878
  - A — Type E, 7 strand
  - B — Type ET, 7 strand
  - C — Type E, 19 strand
  - D — Type ET, 19 strand
  - F — 7 strand per MIL-W-22759/11 (28 AWG only)
  - G — 19 strand per MIL-C-22759/11 26 AWG, 24 AWG
  - L — Copper, solid
  - Q — Stranded per MIL-W-22759/33
- Wire Type
- Wire Size
  - 4 — 24 AWG
  - 5 — 25 AWG
  - 6 — 26 AWG
  - 8 — 28 AWG
  - 0 — 30 AWG
- Insulation Color or Finish
  - 1 — All white
  - 2 — All yellow
  - 3 — All gray
  - 4 — Gold plated
  - 5 — Tin dipped gold plated
  - 6 — Bare (unfinished)
  - 7 — Color coded per MIL-STD-681, System I
  - 9 — 10 Solid color repeating (starts with black)
- Length in Inches (Min.)
- X — Special, Does not fit description.
- S — Solder pot

*uses twist pin contacts
** Other non-standard sizes are also available, contact Tyco Electronics for details.

Front Panel Mount (MQR Receptacle)

Size	Dimensions			
	A (Hex)	B (Min.)	Ø C (Min.)	D Thd.
7	**.500** 12.7	**.361** 9.17	**.376** 9.55	3/8-32 UNEF-2A
19	**.625** 15.88	**.477** 12.16	**.501** 12.73	1/2-28 UNEF-2A
37	**.812** 20.62	**.722** 18.39	**.751** 19.07	3/4-20 UNEF-2A



Front Panel Mount (19 Position Shown)

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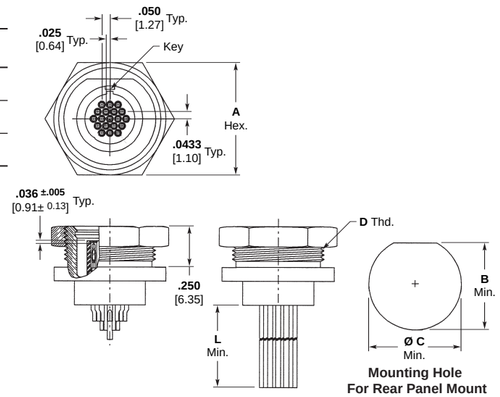
UK: 44-208-420-8341

MQR Series — Microminiature Circular Connectors (Continued)

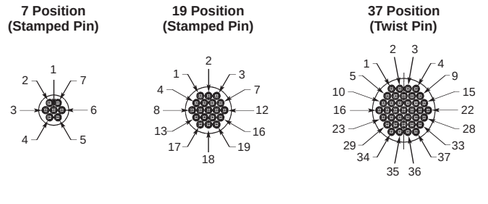
Rear Panel Mount (MQR Receptacle)

Size	Dimensions			
	A (Hex)	B (Min.)	Ø C (Min.)	D Thd.
7	**.500** 12.7	**.422** 10.72	**.440** 11.18	7/16-28 UNEF-2A
19	**.687** 17.45	**.531** 13.49	**.564** 14.33	9/16-24 UNEF-2A
37	**.812** 20.62	**.722** 18.39	**.751** 19.07	3/4-20 UNEF-2A



Rear Panel Mount (19 Position Shown)

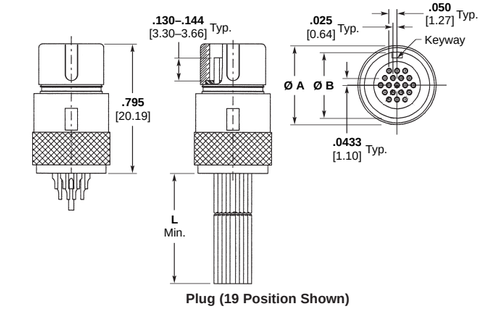
Circular MQR Series Quick Release Receptacle



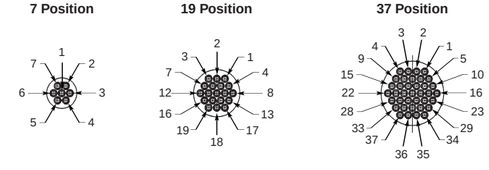
Circular MQR Series Quick Release Plug

MQR Plug

Size	Dimensions	
	Ø A	Ø B
7	**.375** 9.53	**.300** 7.62
19	**.475** 12.07	**.400** 10.16
37	**.750** 19.05	**.630** 16.00



Plug (19 Position Shown)



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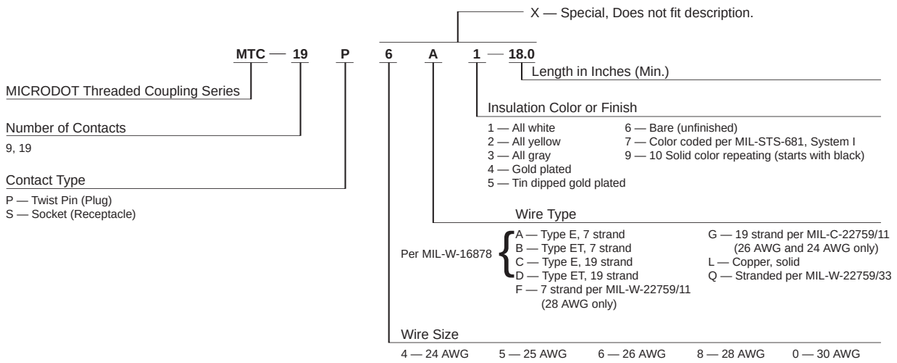
MTC Series — Microminiature Circular Connectors

How to Specify/ Ordering Code

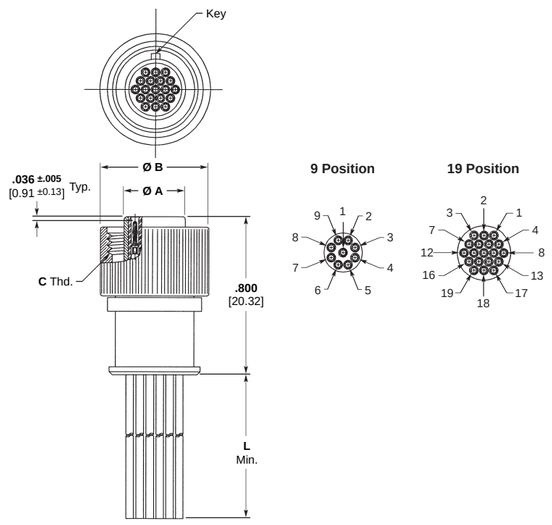


Material and Finish

Shell — Aluminum, nickel plated
Contact — Copper alloy, gold plated
Insulator — RYTON

MTC Series Plug

Size	Dimensions		
	Ø A	Ø B	C Thd.
9	**.227** 5.77	**.456** 11.58	**M10 x 0.75** 19.05
19	**.308** 7.82	**.545** 13.84	**M12 x 1** 25.40



MTC Series Plug (19 Position Shown)

5 Pin and Socket Connectors

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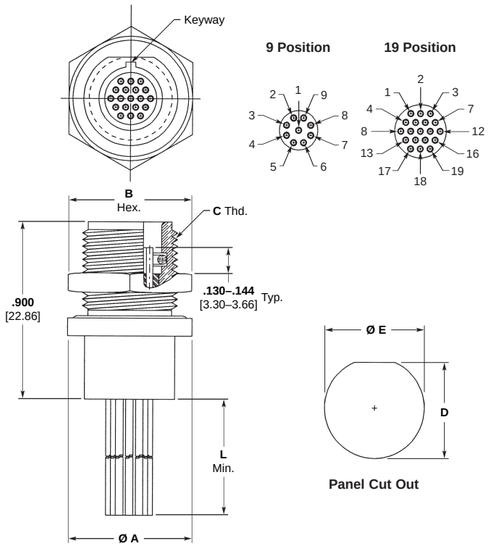
MTC Series — Microminiature Circular Connectors (Continued)

MTC Series Receptacle

Size	Dimensions				
	Ø A	B Hex.	C Thd.	D Min.	Ø E Min.
9	**.562** 14.27	**.500** 12.70	**M10 x 0.75** 19.05	**.370** 9.40	**.394** 10.01
19	**.625** 15.88	**.625** 15.88	**M12 x 1** 25.40	**.445** 11.30	**.474** 12.04



Panel Cut Out

MTC Series Receptacle (19 Position Shown)

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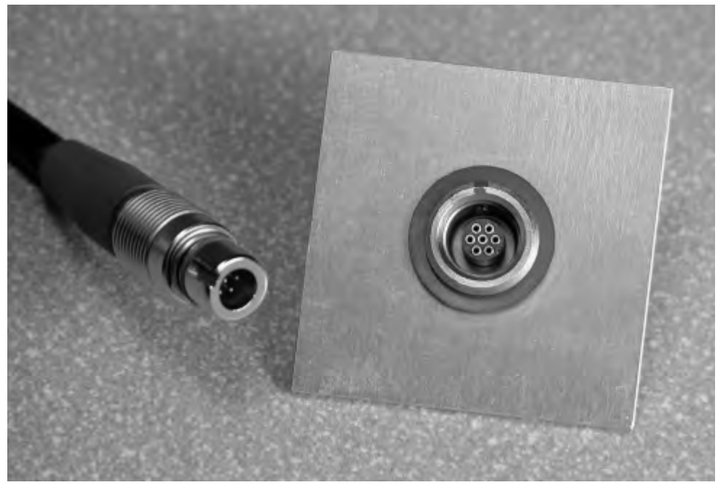
Metal-Shell Micro Circular Connectors

Push/Pull Coupling

Product Facts

- Push to mate, pull to release coupling mechanism
- High performance at lower cost
- High density for limited space applications
- Multiple shell sizes and keying configurations
- Resistant to autoclaving (1000 cycles @ 275°F [135°C]) or chemical sterilization (500 cycles)
- Precision, screw machine contacts
- No assembly or application tools required
- Environmentally sealed (IP67) and shielded



Small, circular connector for Medical and Industrial applications available in 2 shell sizes M11 (7 pos.) and M14 (19 pos.)

Applications

- Medical Equipment, Instrumentation, Military and Aerospace
- Rugged industrial environments
- Outdoor applications

Electrical Characteristics

Current Carrying Capacity — 1 Amp

Operating Voltage — 200 VAC max.

Termination Resistance — 20 mOhm max.

Mechanical Characteristics

- Push/pull, positive lock coupling
- 500 minimum mating cycles with screw machine pin and socket contacts
- 5000 minimum mating cycles with spring probe contacts
- Overmold or heat-shrink tubing for sealing and strain relieving

Wire Size — 24–30 AWG [0.2–0.06 mm²]

Termination — Solder

Max. Operating Temperature — 300°F [149°C]

Material and Finish

Spring Probe Pin — Brass, 10 µin. [.25 µm] gold finish over nickel on mating end, tin-lead over nickel on solder cup/tail

Spring Probe Pad — Brass, 30 µin. [.76 µm] gold finish over nickel on entire contact

Screw Machine Pin — Brass, 30 µin. [.76 µm] gold finish over nickel on entire contact

Screw Machine Socket — **Brass Body** — beryllium copper clip, 30 µin. [.76 µm] gold flash over nickel **Clip** — tin-lead over nickel body

Housing — Nickel plated brass

Insulator — High temperature thermoplastic, white

For More Information

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Phone: 717-986-7696
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E-mail: jafulpon@tycoelectronics.com

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Phone: 717-592-4292
Fax: 717-986-3530
E-mail: rcmauch@tycoelectronics.com

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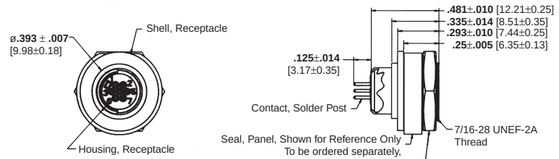
Metal-Shell Micro Circular Connectors (Continued)

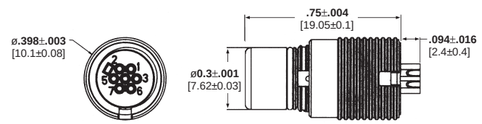
Push/Pull Coupling
(Continued)

Shell Size M11
(7 Position shown)

Receptacle Assembly, Rear Panel Mount, Solder Tail

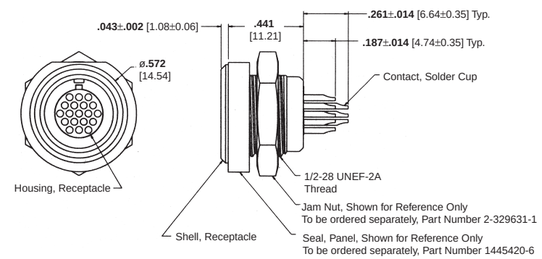


Plug Assembly

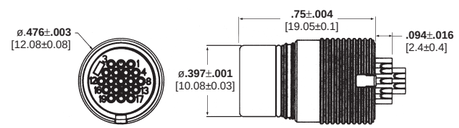


Shell Size M14
(19 Position shown)

Receptacle Assembly, Front Panel Mount, Solder Cup



Plug Assembly



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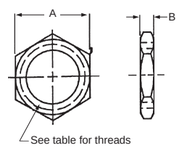
Metal-Shell Micro Circular Connectors (Continued)

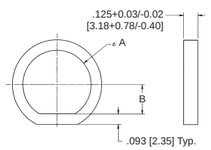
Push/Pull Coupling
(Continued)

Jam Nuts



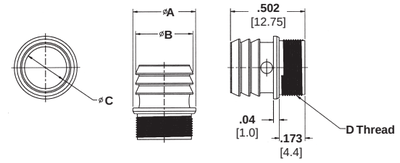
Shell Size	Dimensions A	Dimensions B	Thread	Part Number	Panel Mount
M11	**.500** 12.7	**.093** 2.36	7/16-28 UNEF-2B	2-1532077-4	Rear
	.500 12.7	**.125** 3.18	3/8-32 UNEF-2B	1-330249-1	Front
M14	**.750** 19.05	**.093** 2.36	9/16-24 UNEF-2B	3-1532042-8	Rear
	.563 14.29	**.093** 2.36	1/2-28 UNEF-2B	2-329631-1	Front

Panel Seals



Shell Size	Dimensions A	Dimensions B	Part Number	Panel Mount
M11	**.430** 10.9	**.177** 4.5	1445420-3	Rear
	.364 9.25	**.165** 4.2	1445420-4	Front
M14	**.551** 14.0	**.236** 6.0	1445420-5	Rear
	.492 12.5	**.207** 5.25	1445420-6	Front

Overmold Adapter



Shell Size	Dimensions A	Dimensions B	Dimensions C	Thread	Part Number
M11	**.326** 8.29	**.295** 7.5	**.193** 4.9	5-16 - 32 UNEF-2A	1604366-4
M14	**.424** 10.76	**.385** 9.8	**.283** 7.2	0.380-64 Special	1604366-3

Product Offering

Contact System	Shell Size	No. of Pos.	Front Panel Mount Rcpt. Solder Cup	Front Panel Mount Rcpt. Solder Tail	Rear Panel Mount Rcpt. Solder Cup	Rear Panel Mount Rcpt. Solder Tail	Plug Solder Cup
Spring Probe	M11	7	1604446-1	1604440-1	1604443-1	1604215-1	1604213-1
	M14	19	1738477-1	1604449-1	1604472-1	1604444-1	1604481-1
Pin & Socket	M11	7	1604448-1	1604527-1	1604502-1	1604392-1	1604515-1
	M14	19	1604471-1	1604441-1	1604480-1	1604131-1	1604512-1

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UK: 44-208-420-8341

Metal-Shell Micro Circular Connectors with Spring-Loaded Contacts

Threaded Coupling

Product Facts

- **High cycle life spring probe and pad contact interface—5000+ mating cycles**
- **Threaded coupling mechanism**
- **High density for limited space applications**
- **Multiple shell sizes and keying configurations**
- **Resistant to autoclaving (1000 cycles @ 275°F [135°C]) or chemical sterilization (500 cycles)**
- **Jam nut style, rear panel mounting**
- **Precision, screw machine contacts**
- **No assembly or application tools required**
- **Environmentally sealed (IP67) and shielded**
- **High performance at lower cost**
- **Alternate pin and socket contact interface available**
- **Matte black, low reflectivity finish**
- **Optimized wiring pattern of standard connector configuration — 8 position Ethernet**
- **Single piece adapter for shield termination and overmolding**

Small, rugged circular connector for Military and Aerospace, Medical and Industrial, applications in 2 shell sizes M11 (7 pos.) and M14 (19 pos.).

Applications

- Military & Aerospace
- Medical Equipment
- Instrumentation & Test Equipment
- Portable Computing, Data Management, Communications and Sensing Devices
- Rugged Solution for Gigabit Ethernet and USB 2.0
- Outdoor Applications

Mechanical Characteristics

- Threaded coupling
- 5000 minimum mating cycles with spring probe contacts
- Environmentally sealed, IP 67 - water immersion, 1M for 30 minutes (in mated condition)
- Overmold or heat-shrink tubing for sealing and strain relieving

Wire Size — 30–24 AWG [0.06–0.2 mm²] (24 AWG wire is solid or 7-strand only)

Termination — Solder

Max. Operating Temperature — 392°F [200°C]

Material and Finish

Spring Probe Pin — Brass, 10 µin. [.25 µm] gold finish over nickel on mating end, tin-lead over nickel on solder cup/tail

Spring Probe Pad — Brass, 30 µin. [.76 µm] gold finish over nickel on entire contact

Shell — Black chrome plated (Nickel plated brass option)

Insulator — High temperature thermo-plastic, white

Standards and Specifications

Design Objectives
108-2169

Spring Probe Product Specification
108-1943

For More Information

Technical Support
E-mail: newproducts@tycoelectronics.com

Catalog 1308940
Revised 8-06

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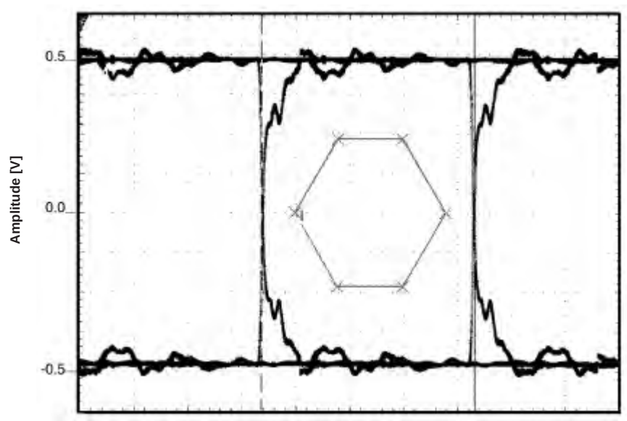
Metal-Shell Micro Circular Connectors with Spring-Loaded Contacts (Continued)

Threaded Coupling
(Continued)

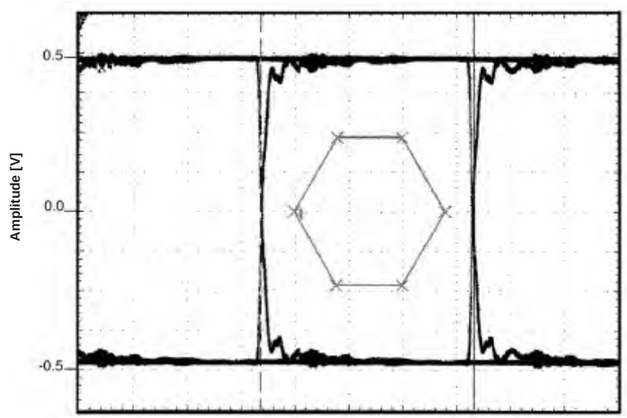
Electrical Characteristics
Current Carrying Capacity —
2 AMP — UL
1.3 AMP — CSA
Operating Voltage — 200 VAC max.
Termination Resistance —
20 mOhm max.

Eye Pattern (Time Domain Measurement of Voltage vs. Time)
Pin and Socket Contact System



Eye Pattern Mask Created per USB 2.0 Specification
480 Mb/s Data Rate

Eye Pattern (Time Domain Measurement of Voltage vs. Time)
Spring Probe Contact System



Eye Pattern Mask Created per USB 2.0 Specification
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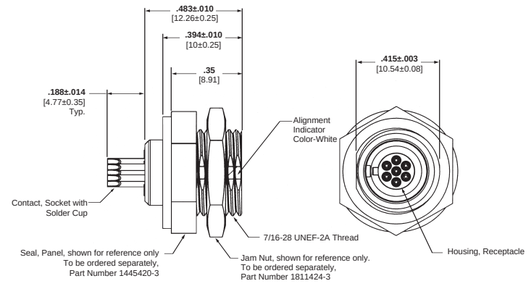
Metal-Shell Micro Circular Connectors with Spring-Loaded Contacts (Continued)

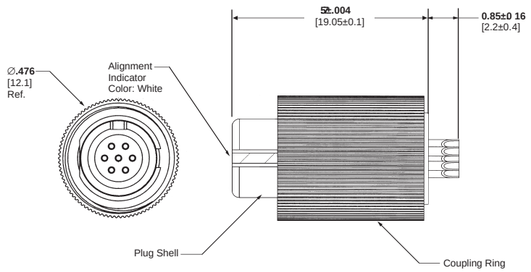
Threaded Coupling
(Continued)

Shell Size M11
(7 Position shown)

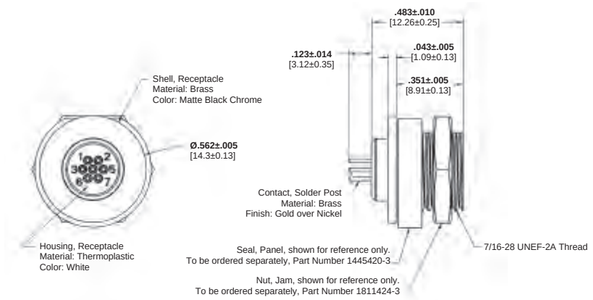
Receptacle Assembly, Solder Cups



Plug Assembly, Pin Contacts



Receptacle Assembly, Board Mount



Contact System	Shell Size	No. of Pos.	Rear Panel Mount		
			Solder Cup Receptacle	Plug	Solder Tail Receptacle
Spring Probe	M11	7	1604750-2	1738548-2	1811577-1
	M14	8*	1877236-1	1877007-1	1877666-1
	M14	19	1738553-2	1738552-2	1811547-1
Pin & Socket	M11	7	1738547-2	1738541-2	1811578-1
	M14	19	1738551-2	1738550-2	1811579-1

Note: Bright Nickel finish available.
*Ethernet configuration

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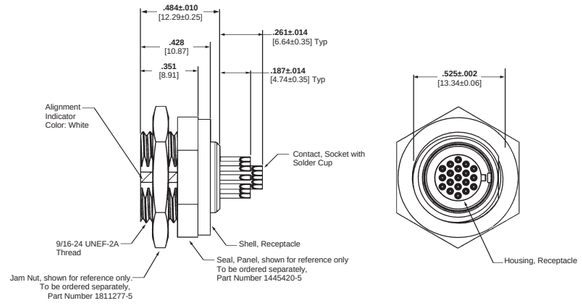
Metal-Shell Micro Circular Connectors with Spring-Loaded Contacts (Continued)

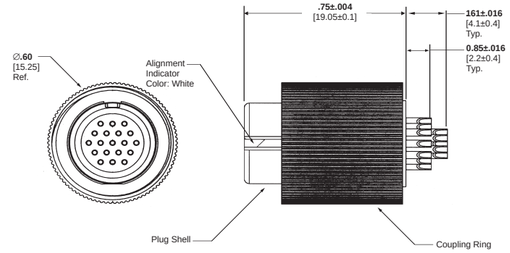
Threaded Coupling
(Continued)

Shell Size M14
(19 Position shown)

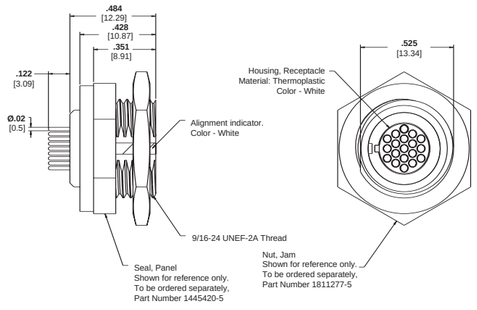
Receptacle Assembly, Solder Cup



Plug Assembly



Receptacle Assembly, Board Mount



Ethernet Assembly, 8 Position

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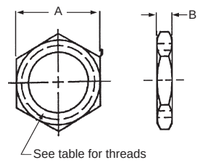
Metal-Shell Micro Circular Connectors with Spring-Loaded Contacts (Continued)

Threaded Coupling
(Continued)

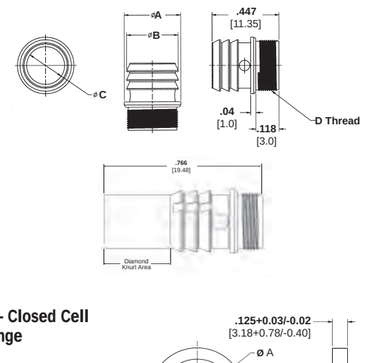
Accessories

Jam Nuts



Shell Size	Dimensions A	Dimensions B	Thread	Finish	Part Number
M11	**.553** 14.05	**.093** 2.36	7/16-28 UNEF-2B	Black Chrome	1811424-3
M14	**.750** 19.05	**.093** 2.36	9/16-24 UNEF-2B	Black Chrome	1811277-5

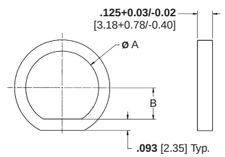
Overmold Adapter



Shell Size	Dimensions A	Dimensions B	Dimensions C	Thread	Part Number
M11	**.326** 8.29	**.295** 7.50	**.193** 4.90	5-16 - 32 UNEF-2A	1604366-4
M14	**.424** 10.76	**.385** 9.80	**.283** 7.20	0.380-64 Special	1604366-3
M14* Ext.	**.326** 8.29	**.316** 8.04	**.230** 5.84	5/6-32 UNEF-2A	1604366-7

*Extended Adapter for Shield Termination and Overmold.

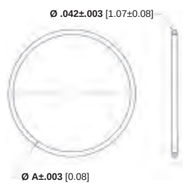
Panel Seals — Closed Cell Neoprene Sponge (color - black)



Shell Size	Dimensions A	Dimensions B	Panel Mount	Part Number
M11	**.430** 10.90	**.177** 4.50	Rear	1445420-3
M14	**.551** 14.00	**.236** 6.00	Rear	1445420-5

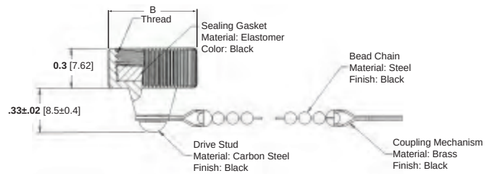
Panel Seals — Flourosilicone O-Ring** (color - blue)

Note: Optional — replaces closed cell neoprene panel seal



Shell Size	Dimension A ± .005	Panel Mount	Part Number
M11	**.437** 11.10	Rear	1877244-4
M14	**.571** 14.52	Rear	1877244-2

Dust Caps



Shell Size	Dimension B ± 0.25	Thread	Finish	Part Number
M11	**.551** 14.00	7/16-28 UNEF-2B	Black Chrome	1738941-2
M14	**.669** 17.00	9/16-24 UNEF-2B	Black Chrome	1738941-4

Note: Bright Nickel finish available.

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General Purpose Rectangular (GPR) Connectors

Product Facts

- A high density solution compared to circular connectors
  - Slim shell design with high contact density
  - Stackable shells that do not require additional space for locking and unlocking the connectors
  - Uses two to three times less space
- A versatile solution suitable for disconnect panels or equipment with three mounting styles:
  - Rack
  - Cable to cable
  - Panel mounting
- A modular concept with a large variety of options
  - Shell can accommodate a wide variety of inserts for signal, power, coax, data bus and fiber optic contacts
  - Optional grounding blocks (to meet FAA HIRF requirements)
  - Pin and socket inserts can be mounted on either plug or receptacle shells
- A cost savings and user friendly solution
  - Inserts can be wired in the shop and later installed in the shells
  - A common panel cut out eases the connector installation and reduces cost
  - Inserts can be easily installed and removed from the shell
  - Inserts and shells are keyed to prevent mismating
  - Standard MIL tools for contact crimping and contact insertion/ extraction
  - Field replaceable sub assemblies
  - Vibration resistant self-locking threads

A smart connector

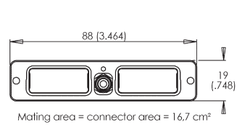
Tyco Electronics is recognized in the Aerospace and Defense industry for its global offering in interconnect solutions. The General Purpose Rectangular A & B Series connectors complement our ARINC connector line and provide additional flexibility with improved performance in a smaller mating area compared to standard circular MIL-Spec connectors.

The GPRA and GPRB series offer a wide range of solutions based on two insert sizes, a large variety of shells and contacts. The GPRA and GPRB series provides an excellent trade-off between the number of available contacts and the space actually used. GPRA inserts are a good option for low density applications whereas GPRB inserts offer twice the density of GPRA inserts.

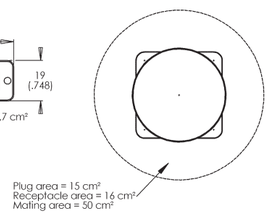
In addition, the concept is completely modular and expandable.

They can also be easily tailored for custom requirements, such as shell modifications for additional inserts.

Order catalog 1654763 for additional information on custom solutions.



GPRB2 fitted with 80x size 22 contacts



MIL-C-38999 21-35 fitted with 79x size 22 contacts

Product manufactured under license from Radiall, S.A.

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General Purpose Rectangular (GPR) Connectors (Continued)

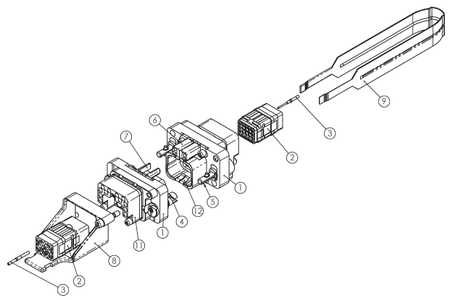
Introduction (Continued)

GPRA1

2 quarter-turn fasteners

16 keying positions

Max. density:
20 x #22 contacts

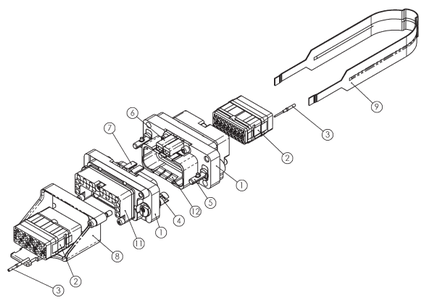


GPRB1

2 quarter-turn fasteners

16 keying positions

Max. density:
40 x #22 contacts

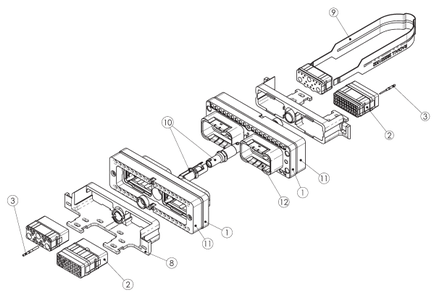


GPRB2

1 central jackscrew/jacknut

12 keying positions

Max. density:
80 x #22 contacts



1	shell	8	backshell
2	insert	9	insert insertion/extraction tool
3	contact	10	locking & polarization device
4 & 5	locking device	11	grounding block
6 & 7	polarization device	12	grounding springs

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Performance Characteristics

Contacts

Electrical characteristics conform to MIL-C-39029 Type A

Electrical Characteristics

Grounding Block Contact

	Contact with Wire Size	Current Amps
Contact to Contact	Contact + 20 AWG	7.5
Contact to Mounting Surface	Contact + 20 AWG	7.5

Contacts

Contact Size	Wire Size	Current Amps
22	26 AWG	2
	24 AWG	3
	22 AWG	5
20	20 AWG	7.5
16	16 AWG	13
12	12 AWG	23
5	8 AWG	80 [1]

[1] Size 5 contacts are not part of MIL-C-39029 type A.

EMI Shielding Effectiveness

Frequency (MHz)	Leakage Attenuation (dB)
100	65
200	63
300	63
400	62
500	60
600	60

Dielectric Withstanding Voltage (MIL-STD-1344/Method 3001.1.1 with Leakage Current < 1 mΩ)

Level	Voltage (VRMS)
Sea level	1500
15,240 m [50,000 feet]	800

Insulation Resistance (MIL-STD-1344/Method 3003.1)

Ambient Temperature	> 5,000 MΩ
175°C [347°F]	> 200 MΩ

Other Characteristics

Shell to Shell Conductivity — < 2.5 mΩ
Operating Voltage — 400 Vrms or 500 Vdc at sea level
Voltage Stability (Ground Block) — Maximum variation 4mV (MIL-T-81714)
Magnetic Permeability — < 2
Comparative Tracking Index — 250 V

Mechanical Characteristics

Mating/Unmating Durability — 100 cycles
Mating Torque for GPRB2 Jackscrew — 1.2 Nm [11 in. lbs.]
Random Vibration —
GPRA1/GPRB1 — 20g (MIL-STD-1344/Method 2005.1, test condition 4)
GPRB2 — 41.7g (MIL-STD-1344/Method 2005.1, test condition 6)
Shock — 50g (MIL-STD-1344/Method 2004.1, test condition A)

Contact Retention — (MIL-STD-1344/Method 2007.1 on terminated connectors)

Contact Size	Retention Force	Max. Displacement
Ground Block	88 N [20 lbs.]	0.3 mm [.012 in.]
22	53.4 N [12 lbs.]	0.38 mm [.015 in.]
20	89 N [20 lbs.]	0.38 mm [.015 in.]
16	111.2 N [25 lbs.]	0.38 mm [.015 in.]
12	133.45 N [30 lbs.]	0.38 mm [.015 in.]

Insert Retention — 500 N [112 lbs.] (MIL-STD-1344/Method 2010.1)

Environmental Characteristics

Temperature Range — -65°C to +155°C [-85°F to +311°F]
Temperature Life — 1000 h @ 155°C [311°F]
Salt Spray — 96 hours (Nickel plating) (MIL-STD-1344/Method 1001.1, test condition A)
Humidity — 10 days
Altitude Immersion — 3 cycles at 15,240 m [50,000 ft.] (MIL-STD-1344/Method 1004.1)
Fluid Immersion — (MIL-STD-1344/Method 1016)

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General Purpose Rectangular (GPR) Connectors (Continued)

GPRA1 Shell Descriptive Part Number Format

Descriptive Part Numbering System

Use this guide to construct descriptive part numbers for GPRA1 shells. Refer to table below for the corresponding Tyco Electronics Part Number.

GPRA 1 P B 0 4 N

I – GPRA Series

II – Shell Size

1 — Shell size 1 (1 cavity shell)

III – Shell Style

P — Plug
R — Receptacle
W — Plug with grounding block
Z — Receptacle with grounding block and grounding springs

IV – Modification Code

B — No mounting holes (for plug only)
M — Panel rear mounted connector with 2 x 6.32 UNC mounting holes for receptacle shell only (see note 1)

V – Locking Device

0 — Quarter-turn fastener

VI – Polarization Code

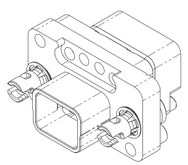
4 — Shell delivered with polarizing hardware unassembled
5 — Shell delivered with no polarizing hardware

VII – Shell Plating

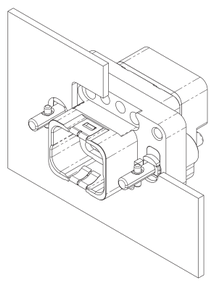
N — Nickel plating (96H Salt spray)

Note 1: Self-locking mounting holes are designed for rear panel mounting.

Size	Style	Modification	Locking Device	Polarization Hardware	Plating	Descriptive Part Number	Tyco Electronics Part Number
1	Plug	No mounting holes	1/4-Turn Fastener	Kit: Shell & Hardware Unassembled	Nickel	GPRA1PB04N	1738228-1
				No Hardware		GPRA1PB05N	1738229-1
	Plug, with Grounding Block			Kit: Shell & Hardware Unassembled		GPRA1WB04N	1738230-1
				No Hardware		GPRA1WB05N	1738231-1
	Receptacle	Rear Panel Mount, with two 6-32 UNC holes		Kit: Shell & Hardware Unassembled		GPRA1RM04N	1738232-1
				No Hardware		GPRA1RM05N	1738233-1
	Receptacle, with Grounding Block & Grounding Springs			Kit: Shell & Hardware Unassembled		GPRA1ZM04N	1738234-1
				No Hardware		GPRA1ZM05N	1738235-1



GPRA1WB05N



GPRA1ZM05N
Panel Rear Mounted Connector

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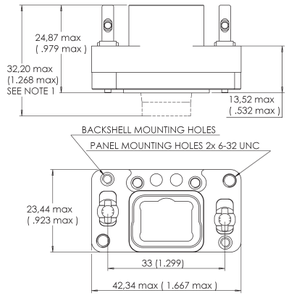
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

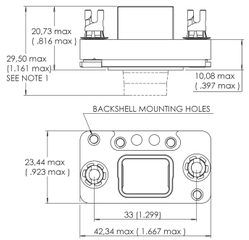
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

General Purpose Rectangular (GPR) Connectors (Continued)

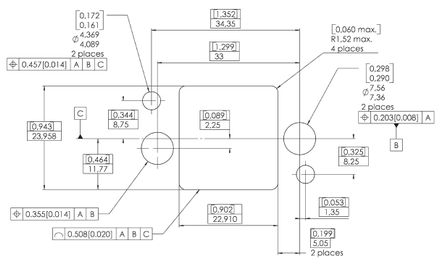
GPRA1 Shell Dimensions



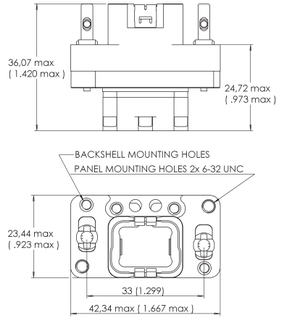
Receptacle Without Grounding Block
GPRA1RM05N



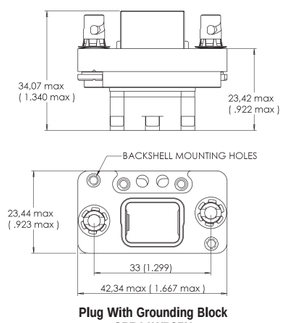
Plug Without Grounding Block
GPRA1PB05N



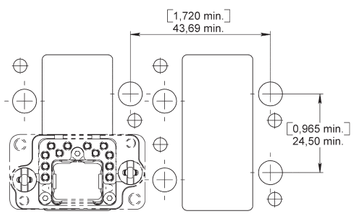
Single Panel Cut Out (See Note 2)



Receptacle
With Grounding Block
GPRA1ZM05N



Plug With Grounding Block
GPRA1WB05N



Multiple Panel Cut Out (See Note 2)

Note 1: Maximum dimension for inserts with grommets (Part Number GPRAE and GPRAH)
Note 2: Rear mounting side view with key post oriented to the upper side (receptacle only)

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General Purpose Rectangular (GPR) Connectors (Continued)

GPRB1 Shell Descriptive Part Number Format

Descriptive Part Numbering System

Use this guide to construct descriptive part numbers for GPRB1 shells. Refer to table below for the corresponding Tyco Electronics Part Number.

GPRB 1 W B 0 5 N

I – GPRB Series

II – Shell Size

1 — Shell size 1 (1 cavity shell)

III – Shell Style

P — Plug
R — Receptacle
W — Plug with grounding block
Z — Receptacle with grounding block and grounding springs

IV – Modification Code

B — No mounting holes (for plug only)
M — Panel rear mounted connector with 2 x 6.32 UNC mounting holes for receptacle shell only (see note 1)

V – Locking Device

0 — Quarter-turn fastener

VI – Polarization Code

4 — Shell delivered with polarizing hardware unassembled
5 — Shell delivered with no polarizing hardware

VII – Shell Plating

N — Nickel plating (96H Salt spray)

Note 1: Self-locking mounting holes are designed for rear panel mounting.

Size	Style	Modification	Locking Device	Polarization Hardware	Plating	Descriptive Part Number	Tyco Electronics Part Number
1	Plug	No mounting holes	1/4-Turn Fastener	Kit: Shell & Hardware Unassembled	Nickel	GPRB1PB04N	1738236-1
				No Hardware		GPRB1PB05N	1738237-1
	Plug, with Grounding Block			Kit: Shell & Hardware Unassembled		GPRB1WB04N	1738238-1
				No Hardware		GPRB1WB05N	1738239-1
	Receptacle	Rear Panel Mount, with two 6-32 UNC holes		Kit: Shell & Hardware Unassembled		GPRB1RM04N	1738240-1
				No Hardware		GPRB1RM05N	1738241-1
	Receptacle, with Grounding Block & Grounding Springs			Kit: Shell & Hardware Unassembled		GPRB1ZM04N	1738242-1
				No Hardware		GPRB1ZM05N	1738243-1

GPRB1WB05N

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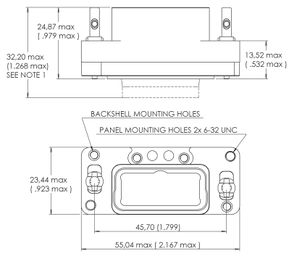
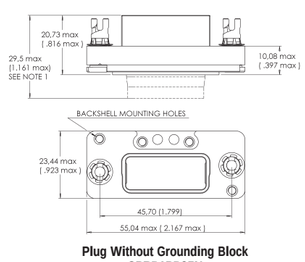
General Purpose Rectangular (GPR) Connectors (Continued)

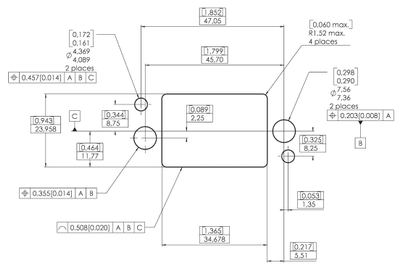
GPRB1 Shell Dimensions



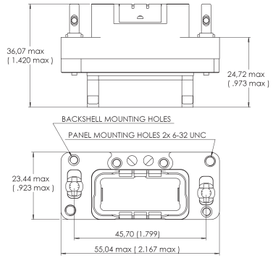
Receptacle Without Grounding Block
GPRB1RM05N



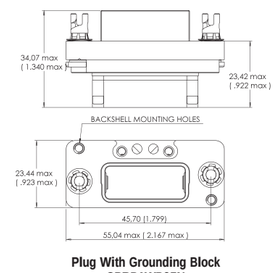
Plug Without Grounding Block
GPRB1PB05N



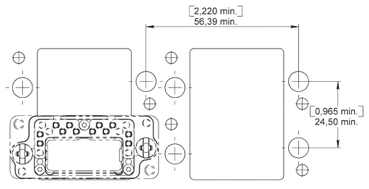
Single Panel Cut Out
(See Note 2)



Receptacle With Grounding Block
GPRB1ZM05N



Plug With Grounding Block
GPRB1WB05N



Multiple Panel Cut Out
(See Note 2)

Note 1: Maximum dimension for inserts with grommets (Part Number GPRBE and GPRBH)
Note 2: Rear mounting side view with key post oriented to the upper side (receptacle only)
Note 3: Only insert with keying A can be used with GPRB1 shells

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UK: 44-208-420-8341

General Purpose Rectangular (GPR) Connectors (Continued)

GPRB2 (Horizontal) Shell Descriptive Part Number Format

Descriptive Part Numbering System

Use this guide to construct descriptive part numbers for GPRB2 shells. Refer to page 5-73 for the corresponding Tyco Electronics Part Number.

GPRB 2 P B 1 2 N

I – GPRB Series

II – Shell Size

2 — Shell size 2 (2 cavities shell)

III – Shell Style

P — Plug (see note 1)
H — Receptacle with grounding springs (see note 1)
W — Plug with grounding block (see note 2)
Z — Receptacle with grounding block and grounding springs (see note 2)
L — Receptacle with flange and grounding springs (see note 1)

IV – Modification Code

A — Panel rear mounted connector with 4 x 6.32 UNC mounting holes (see note 3)
B — No mounting holes
D — Connector with 2 x Ø 3.10 mm thru holes
L — Panel rear mounted connector with 2 x 4.40 UNC mounting holes (see note 3)

V – Locking & Polarizing Device

1 — Jackscrew (see note 4)
2 — Jacknut (see note 4)
3 — Without locking device (see note 5)
4 — Pin polarization guide for Rack and Panel application (see note 6)
5 — Socket polarization guide for Rack and Panel application (see note 6)

VI – Polarization Code

2 — Polarizing device A to F delivered unassembled (see note 7)
3 — Polarizing device N to Z delivered unassembled (see note 7)

VII – Shell Plating

N — Nickel plating (96H Salt spray)

Notes: 1. The standard modification codes for these shells are B, D or L.
2. With modification codes A or B only.
3. Self-locking mounting holes are designed for rear panel mounting.
4. Jackscrew/Jacknut can be mounted on either plug or receptacle shell. However, the standard options are:
—Jackscrew for plug shells
—Jacknut for receptacle shells
5. Option 3 in paragraph V cancels the polarization code paragraph IV, i.e. the shell is delivered with no polarizing device.
6. Pin/Socket polarization guides can be mounted on either plug or receptacle shells. However, the standard options are:
—Pin polarization guide for plug shells
—Socket polarization guide for receptacle shells
7. Polarizing device is delivered unassembled, it must be locked with resin by the user (LOCTITE™ 272 must be used).
—if no polarizing device is required, omit this step and go to VII.

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General Purpose Rectangular (GPR) Connectors (Continued)

Size	Style	Modification	Locking & Polarization Device	Polarization Hardware	Plating	Descriptive Part Number	Tyco Electronics Part Number
2	Plug	No mounting holes	N/A	N/A	Nickel	GPRB2PB3N	1738244-1
			Jackscrew	Kit: Shell & A-F Hardware Unassembled		GPRB2PB12N	1738245-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2PB13N	1738246-1
			Pin Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2PB42N	1738247-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2PB43N	1738248-1
		Connector with two thru-holes [3.10mm Dia.]	N/A	N/A		GPRB2PD3N	1738249-1
			Jackscrew	Kit: Shell & A-F Hardware Unassembled		GPRB2PD12N	1738250-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2PD13N	1738251-1
			Pin Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2PD42N	1738252-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2PD43N	1738253-1
		Rear Panel Mount, with two 4-40 UNC holes	N/A	N/A		GPRB2PL3N	1738254-1
			Jackscrew	Kit: Shell & A-F Hardware Unassembled		GPRB2PL12N	1738255-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2PL13N	1738256-1
			Pin Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2PL42N	1738257-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2PL43N	1738258-1
	Plug, with Grounding Block	No mounting holes	N/A	N/A		GPRB2WB3N	1738259-1
			Jackscrew	Kit: Shell & A-F Hardware Unassembled		GPRB2WB12N	1738260-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2WB13N	1738261-1
			Pin Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2WB42N	1738262-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2WB43N	1738263-1
		Rear Panel Mount, with four 6-32 UNC holes	N/A	N/A		GPRB2WA3N	1738264-1
			Jackscrew	Kit: Shell & A-F Hardware Unassembled		GPRB2WA12N	1738265-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2WA13N	1738266-1
			Pin Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2WA42N	1738267-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2WA43N	1738268-1
	Receptacle, with Grounding Springs	No mounting holes	N/A	N/A		GPRB2HB3N	1738269-1
			Jacknut	Kit: Shell & A-F Hardware Unassembled		GPRB2HB22N	1738270-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2HB23N	1738271-1
			Socket Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2HB52N	1738272-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2HB53N	1738273-1
		Connector with two thru-holes [3.10mm Dia.]	N/A	N/A		GPRB2HD3N	1738274-1
			Jacknut	Kit: Shell & A-F Hardware Unassembled		GPRB2HD22N	1738275-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2HD23N	1738276-1
			Socket Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2HD52N	1738277-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2HD53N	1738278-1
		[4.3mm Dia.]		Kit: Shell & N-Z Hardware Unassembled		—	1877335-1
		Rear Panel Mount, with two 4-40 UNC holes	N/A	N/A		GPRB2HL3N	1738279-1
			Jacknut	Kit: Shell & A-F Hardware Unassembled		GPRB2HL22N	1738280-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2HL23N	1738281-1
			Socket Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2HL52N	1738282-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2HL53N	1738283-1
	Receptacle, with Flange & Grounding Springs	No mounting holes	N/A	N/A		GPRB2LB3N	1738284-1
			Jacknut	Kit: Shell & A-F Hardware Unassembled		GPRB2LB22N	1738285-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2LB23N	1738286-1
			Socket Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2LB52N	1738287-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2LB53N	1738288-1
		Connector with two thru-holes [3.10mm Dia.]	N/A	N/A		GPRB2LD3N	1738289-1
			Jacknut	Kit: Shell & A-F Hardware Unassembled		GPRB2LD22N	1738290-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2LD23N	1738291-1
			Socket Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2LD52N	1738292-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2LD53N	1738293-1
		Rear Panel Mount, with two 4-40 UNC holes	N/A	N/A		GPRB2LL3N	1738294-1
			Jacknut	Kit: Shell & A-F Hardware Unassembled		GPRB2LL22N	1738295-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2LL23N	1738296-1
			Socket Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2LL52N	1738297-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2LL53N	1738298-1
	Receptacle, with Grounding Block & Grounding Springs	No mounting holes	N/A	N/A		GPRB2ZB3N	1738299-1
			Jacknut	Kit: Shell & A-F Hardware Unassembled		GPRB2ZB22N	1738300-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2ZB23N	1738301-1
			Socket Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2ZB52N	1738302-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2ZB53N	1738303-1
		Rear Panel Mount, with four 6-32 UNC holes	N/A	N/A		GPRB2ZA3N	1738304-1
			Jacknut	Kit: Shell & A-F Hardware Unassembled		GPRB2ZA22N	1738305-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2ZA23N	1738306-1
			Socket Polarization Guide	Kit: Shell & A-F Hardware Unassembled		GPRB2ZA52N	1738307-1
				Kit: Shell & N-Z Hardware Unassembled		GPRB2ZA53N	1738308-1

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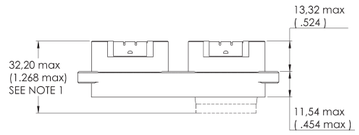
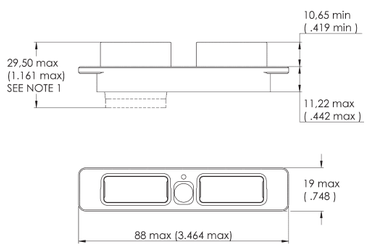
General Purpose Rectangular (GPR) Connectors (Continued)

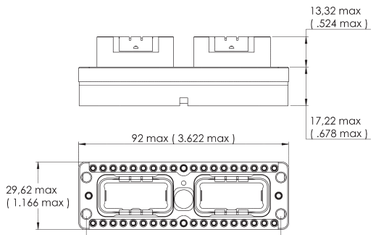
GPRB2 (Horizontal) Shell Dimensions



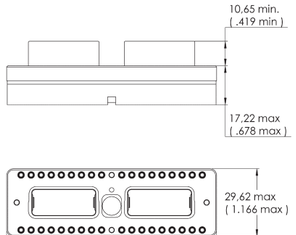
Receptacle Without Grounding Block
GPRB2HD3N



Plug Without Grounding Block
GPRB2PB3N



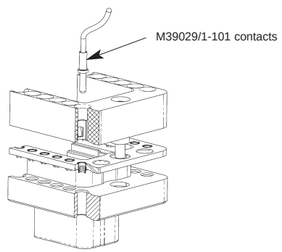
Receptacle
With Grounding Block
GPRB2ZA3N

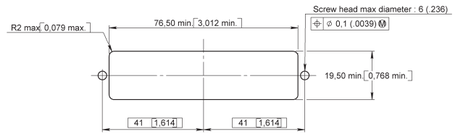


Plug
With Grounding Block
GPRB2WB3N

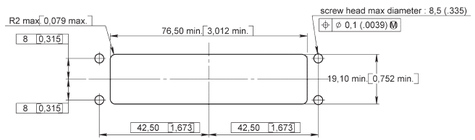
Grounding Block

A solution for High Intensity Radiated Electromagnetic Frequencies. The patented design provides a direct grounding to the shell.





Panel Cut Out
Modification Code D and L



Panel Cut Out
Modification Code A

Note 1: Maximum dimension for inserts with grommets (Part Number GPRBE and GPRBH)

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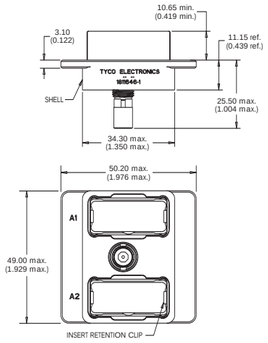
UK: 44-208-420-8341

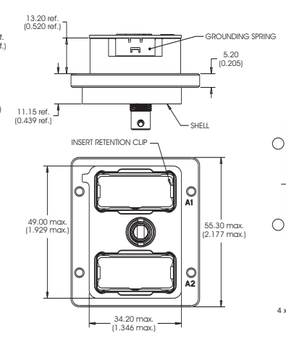
GPRB2 Vertical (Square) Shell and Strain Relief Dimensions

Shell Kits with Two Cavities for Key-A Inserts

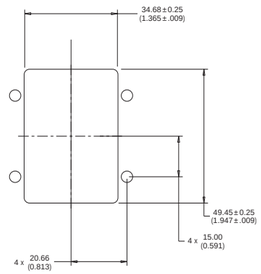
[1]Kit: Shell & A-F hardware unassembled
[2]Assembly: Hardware assembled in polarization position E



Plug Shell, Vertical
GPRB2
1877719-1[1]
1811646-1[2]



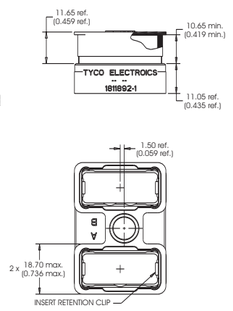
Receptacle Shell, Vertical
GPRB2
1877720-1[1]
1811648-1[2]



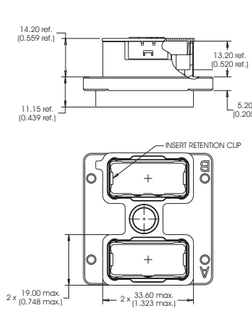
Recommended Panel Cutout

Shell Kits with Two Cavities for Key-A and Key-B Inserts

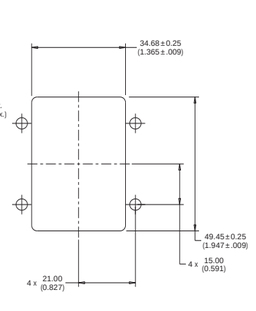
[1]Kit: Shell & A-F hardware unassembled



Plug Shell Kit, Vertical with A-F Jackscrew
GPRB2
1811892-1[1]

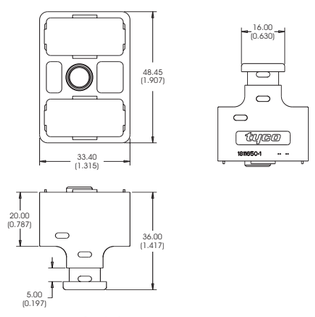


Receptacle Shell Kit, Vertical,
Rear Panel Mount, with A-F Jackscrew
GPRB2
1811894-1[1]



Recommended Panel Cutout

Strain Relief Kit, Vertical GPRB2



1811650-1

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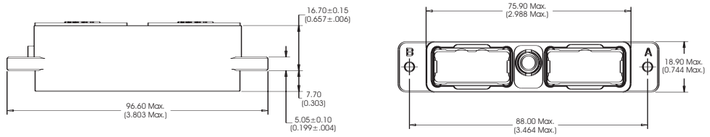
General Purpose Rectangular (GPR) Connectors (Continued)

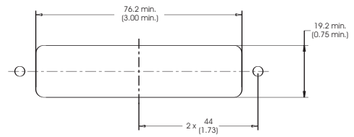
Galley Insert (GAIN) Shell Dimensions

Product Facts

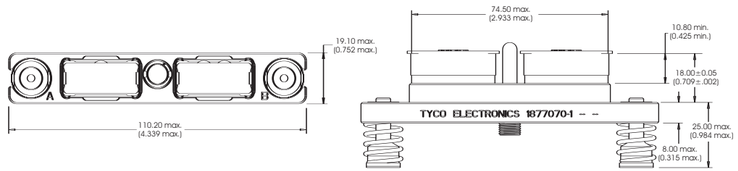
- Designed for ARINC 810 — standard interfaces for Galley Insert (GAIN) Equipment
- Spring-Loaded, float-mounting plug shell design allows ±1mm variation in the mating direction
- Blind mating guide pin & socket accept ±2mm/ 2° lateral misalignment
- Product incorporates:
  - size 22 signal contact
  - size 8 TWINAX contacts
- 500 mating cycles durability



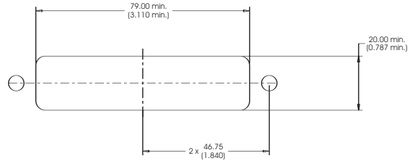
Receptacle Shell, Front Panel Mount, with Guide Socket
GPRB2
1811119-1



Recommended Panel Cutout



Plug Shell, Spring-Loaded, Float-Mounting
GPRB2
1877070-1



Recommended Panel Cutout

Description	Part Number	Drawing
Fully Assembled Receptacle	1877652-1	N
Fully Assembled Plug	1877646-1	N
Receptacle Shell Assembly	1811119-1	Y
Plug Shell Assembly	1877070-1	Y
25Q1 Pin Insert Assembly	1811121-1	Y
25Q1 Socket Insert Assembly	1811122-1	Y
06 Pin Insert Assembly	1738101-1	Y
06 Socket Insert Assembly	1738104-1	Y
Size 22 Pin Contact	1738007-1	Y
Size 22 Socket Contact	1738008-1	Y
Size 12 Pin Contact	1738017-1	Y
Size 12 Socket Contact	1738018-1	Y
Size 8 TWINAX Pin Contact	1811865-1,-2	Y
Size 8 TWINAX Socket Contact	1811866-1,-2	Y
Size 22 Sealing Plug	592104-4	Y
Strain Relief (Straight)	1738313-1	Y
Protective Cover, Plug	1738211-1	Y
Protective Cover, Receptacle	1738212-1	Y
Seal Assembly, Size 8, GPR	1954046-1	N
100 TWINAX Raychem Cable	0024T1426	Y

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General Purpose Rectangular (GPR) Connectors (Continued)

Insert Assemblies for High Speed Applications

F12 LuxCis™ Insert Assemblies

Product Facts

- ARINC 801 approved
- Optical termini for use with GPR, ARINC 600, circular MIL-DTL-38999 connectors.
- Industry Standard 1.25mm ceramic ferrule
- Compatible with 1.5-2.2mm tight jacket and loose tube cable construction:
  - MT - Tight jacket cable
  - ML – Loose tube cable
- SingleMode (SM) and MultiMode (MM) versions
- LuxCis® termini part numbers:
  1828199-1 MM/ML Version
  1828200-1 MM/MT Version
  1918614-1 SM/ML Version
  1918616-1 SM/ML Version-APC
  1918615-1 SM/MT Version
  1918617-1 SM/MT Version - APC

Materials:

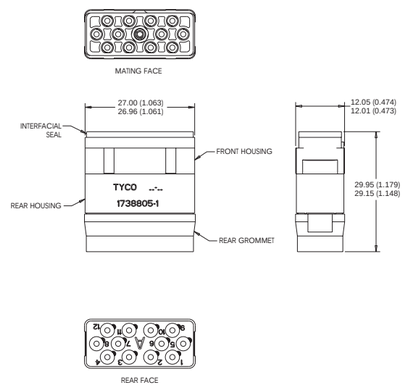
Housings – Nickel Plated Copper
Ferrule – Zirconia
Spring – Stainless Steel
Crimp Sleeve – Nickel Plated Copper
Protective Cover – Silicone

Optical Performance

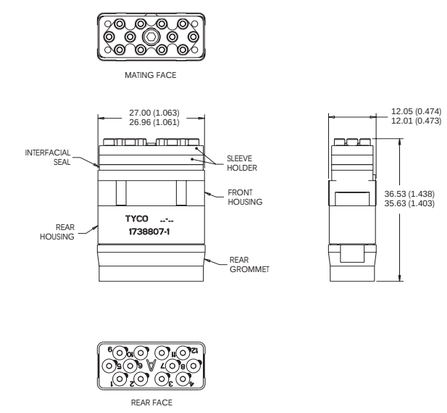
Single mode, 1310nm/1550nm (UPC)
Attenuation, Mean – 0.15dB
Return Loss - >50dB
Multimode, 850nm.1310nm
Attenuation, Mean – 0.10dB
Return Loss - >20dB

Assembly Capabilities

Tyco Electronics has extensive Rugged Optic Harness capabilities. Please consult your local Tyco Electronics Sales Representative for assistance.



Insert Assembly, without Sleeve Holder, Environmental, F12
Key A 1738805-1
Key B 1738806-1



Insert Assembly, with Sleeve Holder, Environmental, F12, Key A GPRB
Key A 1738807-1
Key B 1738808-1

LuxCis® Optical Termini Part Numbers

Cable Dia.	Cable Structure ML (loose & tight) MT (ultra tight)	S/M Fiber 125,3 µm PC/UPC	S/M Fiber 125,3 µm APC	M/M Fiber 128 µm PC
0.9mm Buffer	—	*	*	*
1.5 - 2.2mm	ML	1918614-1	1918616-1	1828199-1
1.5 - 2.2mm	MT	1918615-1	1918617-1	1828200-1

Consult your local Tyco Electronics Sales Representative for additional options.
* Contact Tyco Electronics for availability.

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General Purpose Rectangular (GPR) Connectors (Continued)

Insert Assemblies for High Speed Applications (Continued)

Product Facts

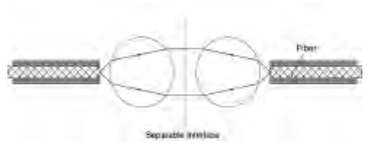
- No wear on fiber optic interface; Very vibration resistant
- Easy to handle, easy to clean. Durable connection that is highly resistant to dirt/debris.
- Singlemode or multimode
- Common 850/1300 Dual Wavelength, 1310, or 1550 nm wavelengths
- Easy alignment for low-loss repeatable performance
- Consistent overall optical "link budget" assured
- Low sensitivity to thermal fluctuations and interface contamination
- Repeatable low-loss performance in harsh environments.

Expanded Beam Products

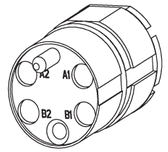
- Ball lens expands cross-sectional area of light over 200 times for multimode and over 2000 times for singlemode
- Rugged hermaphroditic construction (i.e., same insert mates to each other)
- Physically non-contacting mating conditions; no wear, installed fiber ferrule protected by ball lens
- PRO BEAM Mini Connector field deployable interconnects
- Insert/holder blocks designed for Mini-Expanded Beam
- Common insert for 1- through 4-channels
- Unique Modular Design, for use with multimode and singlemode fiber.
- Cable assembly and termination services

Expanded Beam Insert

- Mini-Expanded Beam insert for multi-channel small form factor – the smallest expanded beam multi-channel insert in the industry a Tyco Electronics exclusive.



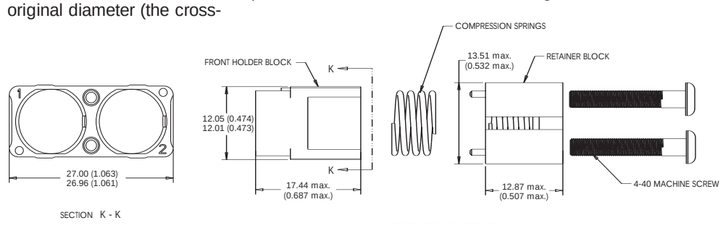
Expanded Beam Principle



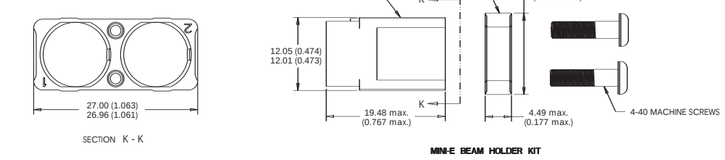
Expanded Beam Inserts

Fiber Optic interconnect/cable system using Expanded Beam technology, which physically expands and collimates the transmission signal into an optical beam over 14 times its original diameter (the cross sectional area of the light beam increases over 200 times for multimode optical signals). For singlemode signals, the collimated beam is over 45 times its original diameter (the cross-sectional area of the light beam increases over 2,000 times). It is then refocused back down onto the core of the receiving fiber. This approach provides ease of alignment and low sensitivity to thermal changes and contamination. High strength, precision connector housings enhance a durable connection, optimizing low loss and repeatable performance.

Suitable for aerospace, avionics, field-deployable communications, marine ship-to-shore applications, security systems, mobile diagnostic units, oil and gas exploration and other harsh environment applications demanding strength, durability and reliable performance in conditions of multiple couplings/decouplings, blindmate situations, and high vibration.



Holder Kit, Pin (Spring-Loaded), Mini-Expanded Beam, Key A GPRB 1445162-1



Holder Kit, Socket (Fixed), Mini-Expanded Beam, Key A GPRB 1445163-1

Assembly Capabilities

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General Purpose Rectangular (GPR) Connectors (Continued)

Insert Descriptive Part Number Format

Descriptive Part Numbering System

Use this guide to construct descriptive part numbers for GPRA & B inserts. Refer to pages 5-80 to 5-83 for the corresponding Tyco Electronics Part Number.

GPRA E 20 P A

GPRA Series
Inserts for GPRA1 shells (see note 1 and 3)

Class
E — Environmental with rear grommet and interfacial seal for pin inserts
Environmental with rear grommet for socket inserts
N — Non environmental (no rear grommet, no interfacial seal)
H — Inserts for pin contacts with a rear grommet and without interfacial seal

Contact arrangement
00 - 1C1 - 04 - 09 - 14 - 14M - 17 - 20 - F5

Contact Type
P — Pin
S — Socket

Insert Keying
A keying only

GPRB E 40 P B

GPRB Series
Inserts for GPRB1 and GPRB2 shells (see note 1 and 3)

Class
E — Environmental with rear grommet and interfacial seal for pin inserts
Environmental with rear grommet for socket inserts
N — Non environmental (no rear grommet, no interfacial seal)
H — Inserts for pin contacts with a rear grommet and without interfacial seal

Contact arrangement
00 - C3 - 06 - 13C1 - 14 - 17 - 20C1 - 22 - 28 - 30 - 34 - 40
25Q1 - 10Q2 - 3Q3 - F12 - MEB2

Contact Type
P — Pin
S — Socket

Insert Keying
A — Insert with keying A (see note 2)
B — Insert with keying B (see note 2)

Notes: 1. Inserts are designed for rear release contacts.
2. For GPRB2 shells, use one insert keyed A and one insert keyed B. For GPRB1 shells, use one insert keyed A only.
3. Pin and socket inserts can be installed in either plug or receptacle shell.

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Insert Descriptive Part Number Format

GPRA Insert Part Numbers

Series	Contact Arrangement	Contact Type	Classification	Keying	Descriptive Part Number	Tyco Electronics Part Number
A	00	N/A	Dummy Insert	N/A	GPRAN00	1738049-1
	1C1	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRAE1C1PA	1738050-1
			Insert with Rear Grommet, without Interfacial Seal		GPRAH1C1PA	1738051-1
			Non-environmental (no Grommet or Seal)		GPRAN1C1PA	1738052-1
		Socket	Environmental, with Rear Grommet		GPRAE1C1SA	1738053-1
			Non-environmental (no Grommet or Seal)		GPRAN1C1SA	1738054-1
	04	Pin	Environmental, with Rear Grommet & Interfacial Seal		GPRAE04PA	1738055-1
			Insert with Rear Grommet, without Interfacial Seal		GPRAH04PA	1738056-1
			Non-environmental (no Grommet or Seal)		GPRAN04PA	1738057-1
		Socket	Environmental, with Rear Grommet		GPRAE04SA	1738058-1
			Non-environmental (no Grommet or Seal)		GPRAN04SA	1738059-1
	09	Pin	Environmental, with Rear Grommet & Interfacial Seal		GPRAE09PA	1738060-1
			Insert with Rear Grommet, without Interfacial Seal		GPRAH09PA	1738061-1
			Non-environmental (no Grommet or Seal)		GPRAN09PA	1738062-1
		Socket	Environmental, with Rear Grommet		GPRAE09SA	1738063-1
			Non-environmental (no Grommet or Seal)		GPRAN09SA	1738064-1
	14	Pin	Environmental, with Rear Grommet & Interfacial Seal		GPRAE14PA	1738065-1
			Insert with Rear Grommet, without Interfacial Seal		GPRAH14PA	1738066-1
			Non-environmental (no Grommet or Seal)		GPRAN14PA	1738067-1
		Socket	Environmental, with Rear Grommet		GPRAE14SA	1738068-1
			Non-environmental (no Grommet or Seal)		GPRAN14SA	1738069-1
	14M	Pin	Environmental, with Rear Grommet & Interfacial Seal		GPRAE14MPA	1738070-1
			Insert with Rear Grommet, without Interfacial Seal		GPRAH14MPA	1738071-1
			Non-environmental (no Grommet or Seal)		GPRAN14MPA	1738072-1
		Socket	Environmental, with Rear Grommet		GPRAE14MSA	1738073-1
			Non-environmental (no Grommet or Seal)		GPRAN14MSA	1738074-1
	17	Pin	Environmental, with Rear Grommet & Interfacial Seal		GPRAE17PA	1738075-1
			Insert with Rear Grommet, without Interfacial Seal		GPRAH17PA	1738076-1
			Non-environmental (no Grommet or Seal)		GPRAN17PA	1738077-1
		Socket	Environmental, with Rear Grommet		GPRAE17SA	1738078-1
			Non-environmental (no Grommet or Seal)		GPRAN17SA	1738079-1
	20	Pin	Environmental, with Rear Grommet & Interfacial Seal		GPRAE20PA	1738080-1
			Insert with Rear Grommet, without Interfacial Seal		GPRAH20PA	1738081-1
			Non-environmental (no Grommet or Seal)		GPRAN20PA	1738082-1
		Socket	Environmental, with Rear Grommet		GPRAE20SA	1738083-1
			Non-environmental (no Grommet or Seal)		GPRAN20SA	1738084-1
	F5	LuxCis® Termini	Environmental, without Sleeve Holder		GPRAEF5PA	1954043-1
			Environmental, with Sleeve Holder		GPRAEF5SA	1954044-1

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General Purpose Rectangular (GPR) Connectors (Continued)

GPRB Insert Part Numbers

Series	Contact Arrangement	Contact Type	Classification	Keying	Descriptive Part Number	Tyco Electronics Part Number
B	00	N/A	Dummy Insert	N/A	GPRBN00	1738085-1
	C3	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBEC3PA	1738086-1
				B	GPRBEC3PB	1738091-1
			Insert with Rear Grommet, without Interfacial Seal	A	GPRBHC3PA	1738087-1
				B	GPRBHC3PB	1738092-1
			Non-environmental (no Grommet or Seal)	A	GPRBNC3PA	1738088-1
				B	GPRBNC3PB	1738093-1
		Socket	Environmental, with Rear Grommet	A	GPRBEC3SA	1738089-1
				B	GPRBEC3SB	1738094-1
			Non-environmental (no Grommet or Seal)	A	GPRBNC3SA	1738090-1
				B	GPRBNC3SB	1738095-1
	06	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE06PA	1738096-1
				B	GPRBE06PB	1738101-1
			Insert with Rear Grommet, without Interfacial Seal	A	GPRBH06PA	1738097-1
				B	GPRBH06PB	1738102-1
			Non-environmental (no Grommet or Seal)	A	GPRBN06PA	1738098-1
				B	GPRBN06PB	1738103-1
		Socket	Environmental, with Rear Grommet	A	GPRBE06SA	1738099-1
				B	GPRBE06SB	1738104-1
			Non-environmental (no Grommet or Seal)	A	GPRBN06SA	1738100-1
				B	GPRBN06SB	1738105-1
	13C1	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE13C1PA	1738106-1
				B	GPRBE13C1PB	1738111-1
			Insert with Rear Grommet, without Interfacial Seal	A	GPRBH13C1PA	1738107-1
				B	GPRBH13C1PB	1738112-1
			Non-environmental (no Grommet or Seal)	A	GPRBN13C1PA	1738108-1
				B	GPRBN13C1PB	1738113-1
		Socket	Environmental, with Rear Grommet	A	GPRBE13C1SA	1738109-1
				B	GPRBE13C1SB	1738114-1
			Non-environmental (no Grommet or Seal)	A	GPRBN13C1SA	1738110-1
				B	GPRBN13C1SB	1738115-1
	14	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE14PA	1738116-1
				B	GPRBE14PB	1738121-1
			Insert with Rear Grommet, without Interfacial Seal	A	GPRBH14PA	1738117-1
				B	GPRBH14PB	1738122-1
			Non-environmental (no Grommet or Seal)	A	GPRBN14PA	1738118-1
				B	GPRBN14PB	1738123-1
		Socket	Environmental, with Rear Grommet	A	GPRBE14SA	1738119-1
				B	GPRBE14SB	1738124-1
			Non-environmental (no Grommet or Seal)	A	GPRBN14SA	1738120-1
				B	GPRBN14SB	1738125-1
	17	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE17PA	1738126-1
				B	GPRBE17PB	1738131-1
			Insert with Rear Grommet, without Interfacial Seal	A	GPRBH17PA	1738127-1
				B	GPRBH17PB	1738132-1
			Non-environmental (no Grommet or Seal)	A	GPRBN17PA	1738128-1
				B	GPRBN17PB	1738133-1
		Socket	Environmental, with Rear Grommet	A	GPRBE17SA	1738129-1
				B	GPRBE17SB	1738134-1
			Non-environmental (no Grommet or Seal)	A	GPRBN17SA	1738130-1
				B	GPRBN17SB	1738135-1

Continued on next page

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UK: 44-208-420-8341

General Purpose Rectangular (GPR) Connectors (Continued)

GPRB Insert Part Numbers (Continued)

Series	Contact Arrangement	Contact Type	Classification	Keying	Descriptive Part Number	Tyco Electronics Part Number
B	20C1	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE20C1PA	1738136-1
				B	GPRBE20C1PB	1738141-1
			Insert with Rear Grommet, without Interfacial Seal	A	GPRBH20C1PA	1738137-1
				B	GPRBH20C1PB	1738142-1
			Non-environmental (no Grommet or Seal)	A	GPRBN20C1PA	1738138-1
				B	GPRBN20C1PB	1738143-1
		Socket	Environmental, with Rear Grommet	A	GPRBE20C1SA	1738139-1
				B	GPRBE20C1SB	1738144-1
			Non-environmental (no Grommet or Seal)	A	GPRBN20C1SA	1738140-1
				B	GPRBN20C1SB	1738145-1
	22	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE22PA	1738146-1
				B	GPRBE22PB	1738151-1
			Insert with Rear Grommet, without Interfacial Seal	A	GPRBH22PA	1738147-1
				B	GPRBH22PB	1738152-1
			Non-environmental (no Grommet or Seal)	A	GPRBN22PA	1738148-1
				B	GPRBN22PB	1738153-1
		Socket	Environmental, with Rear Grommet	A	GPRBE22SA	1738149-1
				B	GPRBE22SB	1738154-1
			Non-environmental (no Grommet or Seal)	A	GPRBN22SA	1738150-1
				B	GPRBN22SB	1738155-1
	28	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE28PA	1738156-1
				B	GPRBE28PB	1738161-1
			Insert with Rear Grommet, without Interfacial Seal	A	GPRBH28PA	1738157-1
				B	GPRBH28PB	1738162-1
			Non-environmental (no Grommet or Seal)	A	GPRBN28PA	1738158-1
				B	GPRBN28PB	1738163-1
		Socket	Environmental, with Rear Grommet	A	GPRBE28SA	1738159-1
				B	GPRBE28SB	1738164-1
			Non-environmental (no Grommet or Seal)	A	GPRBN28SA	1738160-1
				B	GPRBN28SB	1738165-1
	30	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE30PA	1738166-1
				B	GPRBE30PB	1738171-1
			Insert with Rear Grommet, without Interfacial Seal	A	GPRBH30PA	1738167-1
				B	GPRBH30PB	1738172-1
			Non-environmental (no Grommet or Seal)	A	GPRBN30PA	1738168-1
				B	GPRBN30PB	1738173-1
		Socket	Environmental, with Rear Grommet	A	GPRBE30SA	1738169-1
				B	GPRBE30SB	1738174-1
			Non-environmental (no Grommet or Seal)	A	GPRBN30SA	1738170-1
				B	GPRBN30SB	1738175-1
	34	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE34PA	1738176-1
				B	GPRBE34PB	1738181-1
			Insert with Rear Grommet, without Interfacial Seal	A	GPRBH34PA	1738177-1
				B	GPRBH34PB	1738182-1
			Non-environmental (no Grommet or Seal)	A	GPRBN34PA	1738178-1
				B	GPRBN34PB	1738183-1
		Socket	Environmental, with Rear Grommet	A	GPRBE34SA	1738179-1
				B	GPRBE34SB	1738184-1
			Non-environmental (no Grommet or Seal)	A	GPRBN34SA	1738180-1
				B	GPRBN34SB	1738185-1
	40	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE40PA	1738186-1
				B	GPRBE40PB	1738191-1
			Insert with Rear Grommet, without Interfacial Seal	A	GPRBH40PA	1738187-1
				B	GPRBH40PB	1738192-1
			Non-environmental (no Grommet or Seal)	A	GPRBN40PA	1738188-1
				B	GPRBN40PB	1738193-1
		Socket	Environmental, with Rear Grommet	A	GPRBE40SA	1738189-1
				B	GPRBE40SB	1738194-1
			Non-environmental (no Grommet or Seal)	A	GPRBN40SA	1738190-1
				B	GPRBN40SB	1738195-1

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General Purpose Rectangular (GPR) Connectors (Continued)

GPRB Insert Part Numbers (Continued)

Series	Contact Arrangement	Contact Type	Classification	Keying	Descriptive Part Number	Tyco Electronics Part Number
B	25Q1	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE25Q1PA	1811121-1
				B	GPRBE25Q1PB	1877567-1
		Socket	Environmental, with Rear Grommet	A	GPRBE25Q1SA	1811122-1
				B	GPRBE25Q1SB	1877568-1
	10Q2	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE10Q2PA	1877702-1
				B	GPRBE10Q2PB	1877706-1
		Socket	Environmental, with Rear Grommet	A	GPRBE10Q2SA	1877704-1
				B	GPRBE10Q2SB	1877708-1
			Non-environmental (no Grommet or Seal)	A	GPRBN10Q2SA	1954067-1
	3Q3	Pin	Environmental, with Rear Grommet & Interfacial Seal	A	GPRBE3Q3PA	1877694-1
		Socket	Environmental, with Rear Grommet	A	GPRBE3Q3SA	1877696-1
	F12	LuxCis Termini	Environmental, without Sleeve Holder	A	GPRBEF12PA	1738805-1
				B	GPRBEF12PB	1738806-1
			Environmental, with Sleeve Holder	A	GPRBEF12SA	1738807-1
				B	GPRBE2F12SB	1738808-1
	M2	Mini-Expanded Beam	Spring-loaded Half	A	GPRBEM2PA	1445162-1
			Fixed Half	A	GPRBEM2SA	1445163-1

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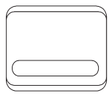
General Purpose Rectangular (GPR) Connectors (Continued)

Insert Arrangements

GPRA Inserts[1]



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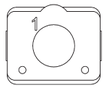
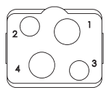
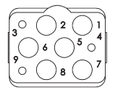
Dummy Insert



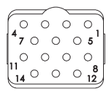
1C1
1 x Size 5 Contacts



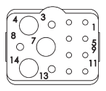
04
2 x Size 15 or 16 Contacts
2 x Size 12 Contacts



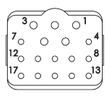
09
3 x Size 20 Contacts
6 x Size 15 or 16 Contacts



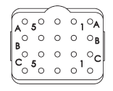
14
14 x Size 20 Contacts



14M
8 x Size 22 Contacts
3 x Size 20 Contacts
3 x Size 15 or 16 Contacts



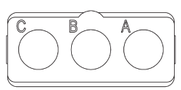
17
12 x Size 22 Contacts
5 x Size 20 Contacts



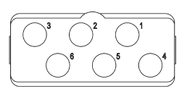
20
20 x Size 22 Contacts

GPRB Inserts[1, 2]

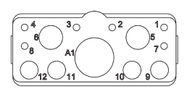
00
Dummy Insert



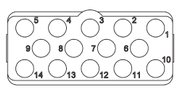
C3
3 x Size 5 Contacts



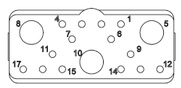
06
6 x Size 12 Contacts



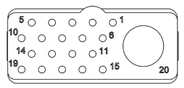
13C1
2 x Size 12 Contacts
4 x Size 15 or 16 Contacts
6 x Size 20 Contacts
1 x Size 5 Contacts



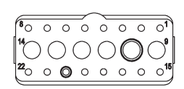
14
14 x Size 15 or 16 Contacts



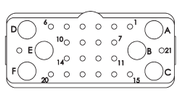
17
14 x Size 20 Contacts
3 x Size 12 Contacts



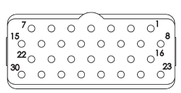
20C1
19 x Size 20 Contacts
1 x Size 5 Contacts



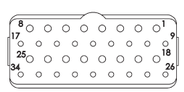
22
16 x Size 20 Contacts
6 x Size 15 or 16 Contacts



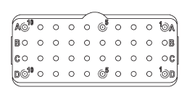
28
22 x Size 22 Contacts
6 x Size 15 or 16 Contacts



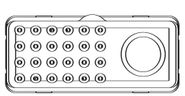
30
30 x Size 20 Contacts



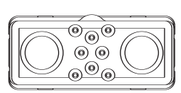
34
18 x Size 22 Contacts
16 x Size 20 Contacts



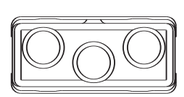
40
40 x Size 22 Contacts



25QI[3]

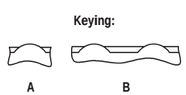


10Q2[3]



3Q3[3]

Keying:



A **B**

Note
[1] Pin inserts: Mating faces shown above.
[2] In a GPRB2 shell, one insert must be “A” keyed and the other one must be “B” keyed (See at right).
[3] Size 8 cavity applicable for use with ARINC 600 Quadrax or Twinax contacts.

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General Purpose Rectangular (GPR) Connectors (Continued)

Contact and Application Tooling Part Numbers

Form	Contact Size	Wire Size	Type	Contacts Tyco PN	Contact Crimp Tools & Positioners				Contact Insertion/Extraction Tools	
					Crimp Tool Tyco P/N	Crimp Tool MIL P/N	Positioner Tyco P/N	Positioner MIL P/N	Tyco Part Number	MIL Part Number
Crimp Contacts	22	22 - 24 - 26	Pin	1738007-1	601966-1	M22520/2-01	601966-8	M22520/2-23	91066-1	M81969/1-01
			Socket	1738008-1						
	22 - Reduced Crimp Barrel	28 - 30	Pin	1738009-1						
			Socket	1738010-1						
	20	20 - 22 - 24	Pin	1738011-1			601966-5	M22520/2-08	91067-2	M81969/1-02
			Socket	1738012-1						
	16	16 - 18 - 20	Pin	1738013-1	601967-1	M22520/1-01	601967-2	M22520/1-02	91066-3	M81969/1-03
			Socket	1738014-1						
	16 - Reduced Crimp Barrel	20 - 22 - 24	Pin	1738015-1						
			Socket	1738016-1						
	12	12 - 14	Pin	1738017-1					1738327-1	M81969/28-02
			Socket	1738018-1						
	5	8 - 10	Pin	1738019-1	N/A	M22520/23-01 & M22520/23-02	Locator 1738331-1	N/A	1811509-1	M81969/28-01
			Socket	1738020-1						
	16 -Mating End 20-Crimp Barrel	20 - 22 - 24	Ground Block Contact	2-592404-1 M39029/1-101	601966-1	M22520/2-01	N/A	M22520/2-02 or /2-11	592105-1	M81969/14-11 or /14-02

Form	Contact Size	Wire Size	Type	Contacts Tyco PN	Center Conductor / Contact Crimp Tools & Positioners				Outer Conductor Crimp Tools & Die Sets			
					Crimp Tool Tyco P/N	Crimp Tool MIL P/N	Positioner Tyco P/N	Positioner MIL P/N	Crimp Tool Tyco P/N	Crimp Tool MIL P/N	Die Set Tyco P/N	Die Set MIL P/N
Coaxial Crimp Contacts	5	RG142 RG223 KX23	Pin	1738021-1	601966-1	M22520/2-01	1738332-1	N/A	608650-1	M22520/5-01	1738336-1	M22520/5-05
			Socket	1738022-1								
	5	RG174 RG316 KX22	Pin	1738023-1								
			Socket	1738024-1								
	15	RG174 RG179 RG316 - KX22	Pin	1738025-1								
			Socket	1738026-1								
	15	RG178 KX21 ST	Pin	1738027-1			1738333-1	N/A	601963-1	M22520/4-01	1738337-1	N/A
			Socket	1738028-1								
	15	KX21 DT	Pin	1738029-1								
			Socket	1738030-1								
	15	UT .047	Pin	1738031-1								
			Socket	1738032-1								
Concentric Twinax Crimp Contacts	5	PAN61421 M17/176-0002	Pin	1738033-1	608650-1	M22520/5-01	1738338-1	N/A	608650-1	M22520/5-01	1738336-1	M22520/5-05
			Socket	1738034-1								

Form	Contact Size	Hex Crimp Number	Reference Cables	Type	Contacts Tyco PN
ARINC 600 QUADRAX Contacts	8	0.218	Tensolite NF24Q100, NF26Q100, 24443/03130X-4 (LD), 2443/P025X-4 (LD), Raychem CEC-RWC-18687, CEC-RWC-18664	Pin	1445692-1
				Socket	1445693-1
			DRAKA F4703-3, F4704-4	Pin	1445692-6
				Socket	1445693-6
		0.231	Tensolite 26473/02006X-4 (LD), Raychem CEC-RWC-18684, CEC-RWC-18680	Pin	1877039-1
				Socket	1877040-1
		—	—	Seal Assembly	1877626-1
Non-Concentric TWINAX Contacts	8	—	Raychem 100 Twinax 0024T1426	Pin	1811865-1
				Socket	1811866-1
				Seal Assembly	1954046-1

PC Tail Contacts

Inserts pre-assembled with PC tail contacts with straight or right-angle termination are available — Consult Tyco Electronics.

Contact Size	Type	Configuration	Tyco Part Number	Contact Insertion/Extraction Tools	
				Tyco Part Number	MIL Part Number
22	Pin	Straight	1738709-1	91066-1	M81969/1-01
20	Pin	Straight	1738710-1	91067-2	M81969/1-02
12	Pin	Straight	1738711-1	1738327-1	M81969/28-02

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Contact and Application Tooling Part Numbers (Continued)

LuxCis® Optical Termini Part Numbers

Cable Dia.	Cable Structure ML (loose & tight) MT (ultra tight)	S/M Fiber 125,3 µm PC/UPC	S/M Fiber 125,3 µm APC	M/M Fiber 128 µm PC
0.9mm Buffer	—	*	*	*
1.5 - 2.2mm	ML	1918614-1	1918616-1	1828199-1
1.5 - 2.2mm	MT	1918615-1	1918617-1	1828200-1

Consult your local Tyco Electronics Sales Representative for additional options.
* Contact Tyco Electronics for availability.

Spare Parts and Tools

Spare Parts

Grounding Spring Part Number 1738199-1

GPRA and GPRB Series

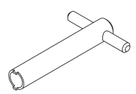
Part Number	Description	To Be Used With
1738199-1	Grounding Spring	GPRA
1738200-1	Dust Cap – Plug Shell	GPRA
1738201-1	Dust Cap – Receptacle Shell	GPRA
1738203-1	Jacknut – A/B/C/D/E/F	GPRB2
1738204-1	Jacknut – N/R/W/X/Y/Z	GPRB2
1738205-1	Jackscrew – A/B/C/D/E/F	GPRB2
1738206-1	Jackscrew – N/R/W/X/Y/Z	GPRB2
1738207-1	Socket Polarization Guide – A/B/C/D/E/F	GPRB2 Rack & Panel application
1738208-1	Socket Polarization Guide – N/R/W/X/Y/Z	GPRB2 Rack & Panel application
1738209-1	Pin Polarization Guide – A/B/C/D/E/F	GPRB2 Rack & Panel application
1738210-1	Pin Polarization Guide – N/R/W/X/Y/Z	GPRB2 Rack & Panel application
1738213-1	Dust Cap – Plug Shell	GPRB1
1738214-1	Dust Cap – Receptacle Shell	GPRB1
1738211-1	Dust Cap – Plug Shell	GPRB2
1738212-1	Dust Cap – Receptacle Shell	GPRB2
1877328-1	Anti-Static Dust Cap – Plug Shell	GPRB2
1877329-1	Anti-Static Dust Cap – Receptacle Shell	GPRB2
1738400-1	Grounding Spring	GPRB1 & B2
1738428-1	Polarization Key, Male	GPRA & GPRB1
1738429-1	Polarization Key, Female	GPRA & GPRB1
1738440-1	Key Retention Plate Assembly	GPRA & GPRB1

Tools

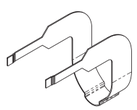
GPRA and GPRB Series

Part Number	Description	To Be Used With
1738215-1	Insert extraction tool	GPRA
1738216-1	Allen wrench locking system	GPRA, GPRB1
1738217-1	Insert handling case	GPRA, GPRB1 & B2
1738218-1	Insert extraction tool	GPRB1 & B2
1738219-1	Right-angle insert extraction tool	GPRB1 & B2
1738220-1	Spigot wrench for locking device w/1/4 inch adapter	GPRB2
1738221-1	Spigot wrench for locking device w/handle	GPRB2

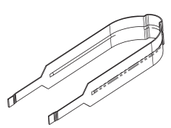
Insert Handling Case Part Number 1738217-1



Spigot Wrench for Locking Device with Handle Part Number 1738221-1



Right-Angle Insert Extraction Tool Part Number 1738219-1



Insert Extraction Tool Part Number 1738218-1

Stainless steel testing tools are available to check the wiring of the inserts without the shell — Consult Tyco Electronics.

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General Purpose Rectangular (GPR) Connectors (Continued)

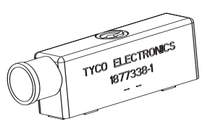
EMI Backshells and Strain Reliefs

GPRB Series

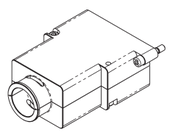
Part Number	Description	Used With
1738310-1	Straight strain relief	GPRB1
1738311-1	45° strain relief	GPRB1
1738312-1	Straight backshell	GPRB1
1738313-1	Straight strain relief	GPRB2
1738314-1	Backshell for shielded termination	GPRB2
1738315-1	Backshell for screened twisted-pair cables	GPRB2
1738316-1	Backshell for large sized wire harnesses	GPRB2
1811650-1	Straight Strain Relief	GPRB2-Vertical
1877338-1	90° Exit Backshell	GPRB2

GPRA Series

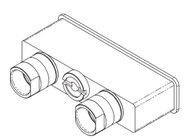
Part Number	Description
1738317-1	Straight strain relief
1738318-1	45° strain relief
1738319-1	Straight backshell



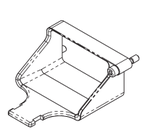
Backshell Kit, 90° Exit
Part Number 1877338-1



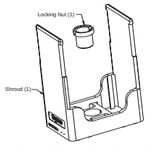
Straight Backshell
Part Number 1738312-1



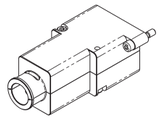
Backshell for
Shielded Termination
Part Number 1738314-1



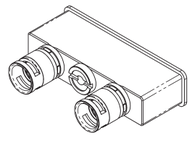
Straight Strain Relief
Part Number 1738310-1



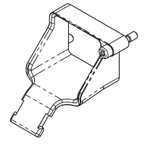
Vertical Strain Relief Kit, Fiber Optic
Part Number 1877736-1



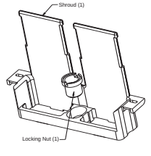
Straight Backshell
Part Number 1738319-1



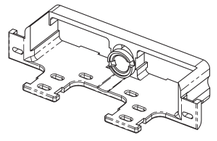
Backshell for Screened
Twisted Pair Cables
Part Number 1738315-1



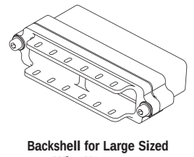
45° Strain Relief
Part Number 1738318-1



Horizontal Strain Relief Kit, Fiber Optic
Part Number 1877888-1



Straight Strain Relief
Part Number 1738313-1



Backshell for Large Sized
Wire Harnesses
Part Number 1738316-1

GPRB2 Vertical Strain Relief
Part Number 1811650-1

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DUALOBE Rectangular Connectors

NANONICS D-style rectangular connectors have earned the distinction of being the most popular and widely utilized style of Nano connectors. These connectors incorporate the DUALOBE polarization scheme.
This polarization scheme negates the need for mating guide pins and does not increase the package size. The DUALOBE series of connectors are available in both machined aluminum and molded plastic shells, both in one and two row connector housings. Single row configurations commonly have standard pin counts from 5 to 51, while the higher density two row configurations have pin counts from 9 to 65. These connectors can be terminated in many different ways. Standard configurations include wires, surface mount, thru-hole, solder cup, “duckbill”, and panel mount. Wired harness assemblies and custom configurations can also be accommodated. Such custom configurations include filtered, hermetic, environmentally sealed, and blind mate connectors.

This family of connectors is designed to meet the requirements of MIL-DTL-83513, with a few size related modifications. Designed primarily for the military and aerospace industry, the DUALOBE series is especially well suited when high reliability, coupled with reduced size and weight, are serious design parameters. A clear example of this is the use of NANONICS connectors in such applications as smart munitions, missile defense, aircraft communications, and UAV's. In addition to the above applications, with the wide temperature range of the DUALOBE connector (–200°C to +200°C), the space and petroleum industries have also found many uses for this connector. The performance and reliability at cryogenic temperatures, along with the low outgassing material properties, has led to an increased usage in space applications. Such applications include nitrogen-cooled optics, low and high earth orbiting satellites, telescopes, deep space probes, orbiters, and rovers. On the opposite end of the spectrum, the petroleum exploration industry utilizes these connectors for their performance and reliability in downhole environments at temperatures exceeding 150°C.

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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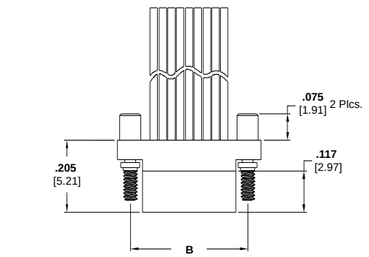
DUALOBE Rectangular Connectors (Continued)

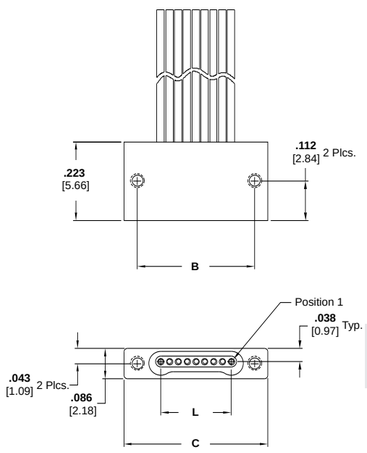
Wired Connectors — Single Row, Flying Leads

Plug

Receptacle



Plug with Flying Leads
Drawing Number 1589455



Receptacle with Flying Leads
Drawing Number 1589457

Product Facts

- Plastic or Metal Shell
- Standard Sizes: 5, 9, 15, 25, 37, and 51
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations

Size	Dimensions		
	B	C	L
5	**0.233** [5.92]	**0.3085** [7.84]	**0.100** [2.54]
9	**0.333** [8.46]	**0.4085** [10.38]	**0.200** [5.08]
15	**0.483** [12.27]	**0.5585** [14.19]	**0.350** [8.89]
25	**0.733** [18.62]	**0.8085** [20.54]	**0.600** [15.24]
37	**1.033** [26.24]	**1.1085** [28.16]	**0.900** [22.86]
51	**1.383** [35.13]	**1.4585** [37.05]	**1.250** [31.75]

Catalog 1308940
Revised 8-06

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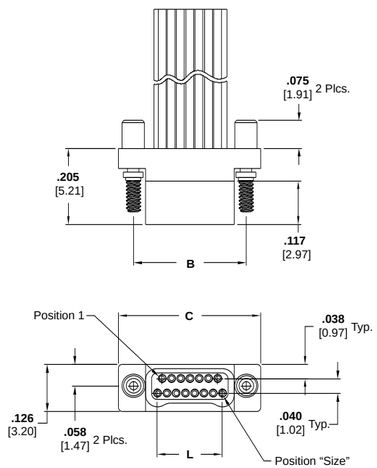
DUALOBE Rectangular Connectors (Continued)

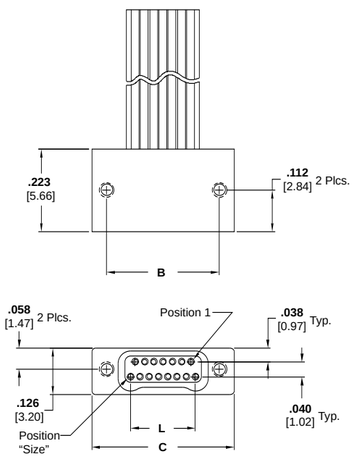
Wired Connectors — Two Row, Flying Leads

Plug

Receptacle



Plug with Flying Leads
Drawing Number 1589472



Receptacle with Flying Leads
Drawing Number 1589476

Product Facts

- Plastic or Metal Shell
- Standard Sizes: 9, 15, 25, 37, 51 and 65
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations

Size	Dimensions		
	B	C	L
9	**0.229** [5.82]	**0.3085** [7.84]	**0.100** [2.54]
15	**0.304** [7.72]	**0.3835** [9.74]	**0.175** [4.45]
25	**0.429** [10.90]	**0.5085** [12.92]	**0.300** [7.62]
37	**0.579** [14.71]	**0.6585** [16.73]	**0.450** [11.43]
51	**0.754** [19.15]	**0.8335** [21.17]	**0.625** [15.88]
65	**0.929** [23.60]	**1.0085** [25.62]	**0.800** [20.32]

Catalog 1308940
Revised 8-06

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DUALOBE Rectangular Connectors (Continued)

Part Numbering Guideline for Wired Connectors

DUALOBE Connectors - Wire Terminations

S X X XXX XX X XX XXX X

Class
S Dualobe

Rows
S 1 Row
T 2 Row

Type
L LCP (Plastic)
M Metal (Al, Ni Plate)

Positions
005 5 Position (single row only)
009 9 Position
015 15 Position
025 25 Position
037 37 Position
051 51 Position
065 65 Position (two row only)

Configurations
PC Plug
SC Receptacle

Conductor Size/Strands
0 28 AWG Solid
1 30 AWG Solid
2 30 AWG 7 Strand
3 32 AWG 7 Strand
4 34 AWG 7 Strand

Conductor Type

DX	White TEFLON	**DM**	Color Coded TEFLON per MIL-STD-681
DY	White PTFE M16878/6	**DT**	White TEFZEL M22759/33
DC	Color Coded TEFLON	**GX**	TEFLON Ribbon Cable FEP

Conductor Length
XXX Three numbers only, length is in inches (i.e. 012 = twelve inches)
CXX A "C" followed by two numbers, length is in centimeters (i.e. C06 = six centimeters)
MXX An "M" followed by two numbers, length is in meters (i.e. M02 = two meters)

Threads/Jackscrew

Threads (Receptacles Only)		Jackscrews (Plugs Only)	
N	Thread for 1.0 mm Jackscrews	**M**	1.0 mm Non Captive Jackscrew
Q	Thread for 1.2 mm Jackscrews	**N**	1.0 mm Captive Jackscrew
		Q	1.2 mm Captive Jackscrew

Catalog 1308940
Revised 8-06

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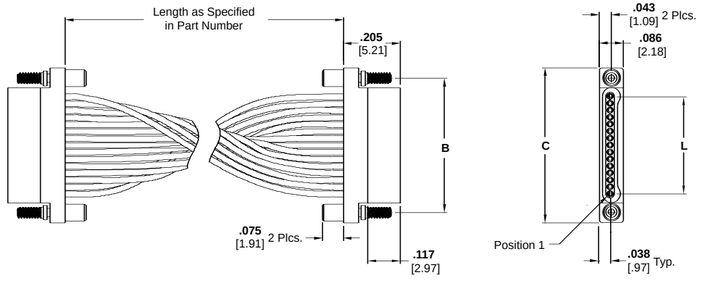
DUALOBE Rectangular Connectors (Continued)

Jumper Assembly Connectors — Single Row

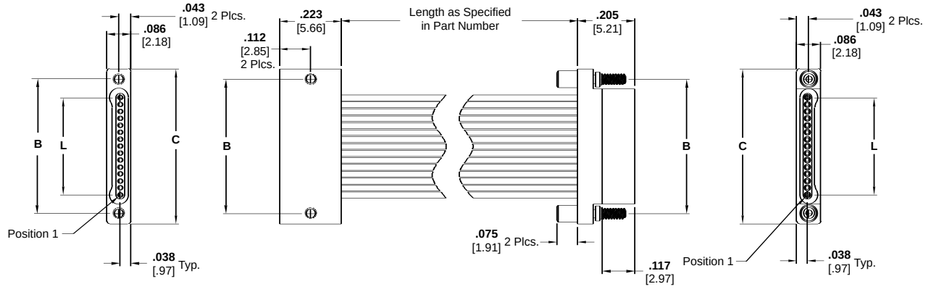
Plug to Receptacle

Product Facts

- Plastic or Metal Shell
- Standard Sizes: 5, 9, 15, 25, 37, and 51
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations



Plug to Plug
Drawing Number 1589735



Plug to Receptacle
Drawing Number 1589736

Size	Dimensions		
	B	C	L
5	**0.233** [5.92]	**0.3085** [7.84]	**0.100** [2.54]
9	**0.333** [8.46]	**0.4085** [10.38]	**0.200** [5.08]
15	**0.483** [12.27]	**0.5585** [14.19]	**0.350** [8.89]
25	**0.733** [18.62]	**0.8085** [20.54]	**0.600** [15.24]
37	**1.033** [26.24]	**1.1085** [28.16]	**0.900** [22.86]
51	**1.383** [35.13]	**1.4585** [37.05]	**1.250** [31.75]

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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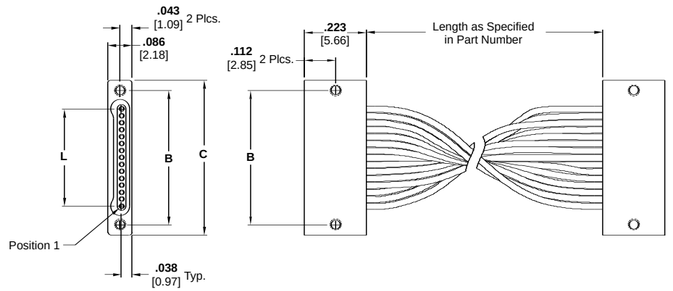
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DUALOBE Rectangular Connectors (Continued)

Jumper Assembly Connectors — Single Row (Continued)



Receptacle to Receptacle
Drawing Number 1589803

Size	Dimensions		
	B	C	L
5	**0.233** [5.92]	**0.3085** [7.84]	**0.100** [2.54]
9	**0.333** [8.46]	**0.4085** [10.38]	**0.200** [5.08]
15	**0.483** [12.27]	**0.5585** [14.19]	**0.350** [8.89]
25	**0.733** [18.62]	**0.8085** [20.54]	**0.600** [15.24]
37	**1.033** [26.24]	**1.1085** [28.16]	**0.900** [22.86]
51	**1.383** [35.13]	**1.4585** [37.05]	**1.250** [31.75]

5 Pin and Socket Connectors

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

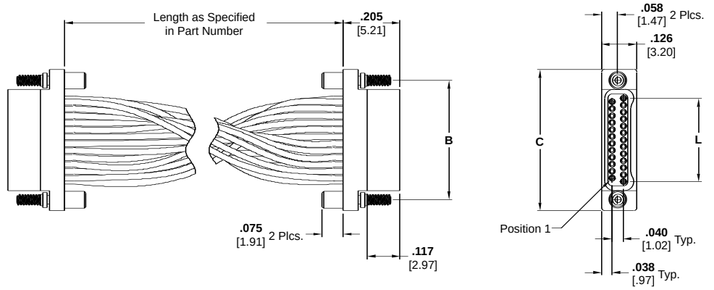
DUALOBE Rectangular Connectors (Continued)

Jumper Assembly Connectors — Two Row

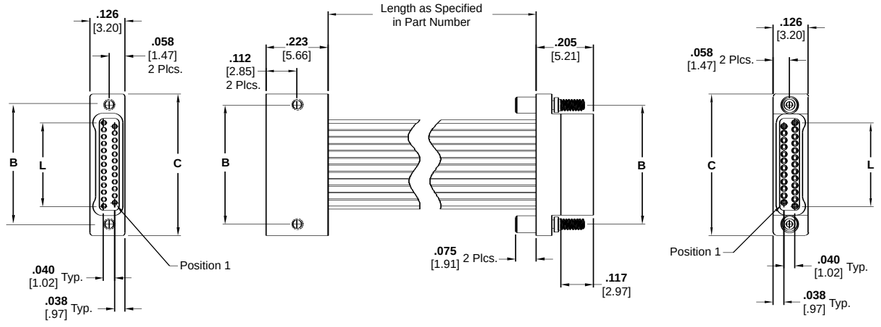
Plug to Receptacle

Product Facts

- Plastic or Metal Shell
- Standard Sizes: 9, 15, 25, 37, 51 and 65
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations



Plug to Plug
Drawing Number 1589737



Plug to Receptacle
Drawing Number 1589738

Size	Dimensions		
	B	C	L
9	**0.229** [5.82]	**0.3085** [7.84]	**0.100** [2.54]
15	**0.304** [7.72]	**0.3835** [9.74]	**0.175** [4.45]
25	**0.429** [10.90]	**0.5085** [12.92]	**0.300** [7.62]
37	**0.579** [14.71]	**0.6585** [16.73]	**0.450** [11.43]
51	**0.754** [19.15]	**0.8335** [21.17]	**0.625** [15.88]
65	**0.929** [23.60]	**1.0085** [25.62]	**0.800** [20.32]

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

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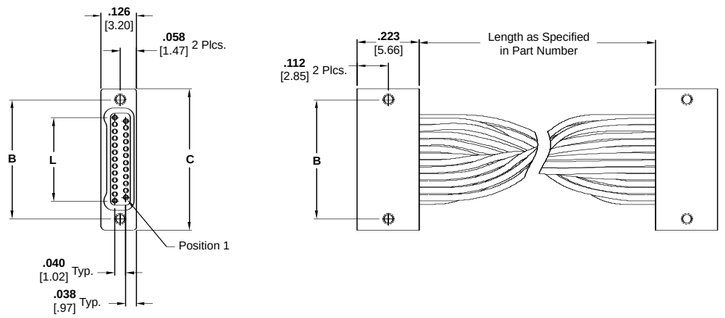
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DUALOBE Rectangular Connectors (Continued)

Jumper Assembly Connectors — Two Row (Continued)



Receptacle to Receptacle
Drawing Number 1589804

Size	Dimensions		
	B	C	L
9	**0.229** [5.82]	**0.3085** [7.84]	**0.100** [2.54]
15	**0.304** [7.72]	**0.3835** [9.74]	**0.175** [4.45]
25	**0.429** [10.90]	**0.5085** [12.92]	**0.300** [7.62]
37	**0.579** [14.71]	**0.6585** [16.73]	**0.450** [11.43]
51	**0.754** [19.15]	**0.8335** [21.17]	**0.625** [15.88]
65	**0.929** [23.60]	**1.0085** [25.62]	**0.800** [20.32]

Catalog 1308940
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UK: 44-208-420-8341

Part Numbering Guideline for Jumper Assemblies

DUALOBE Connectors - Jumper Terminations

J X X XXX XX X XX XXX X

Class
J Jumper

Rows
S 1 Row
T 2 Row

Type
L LCP (Plastic)
M Metal (Al, Ni Plate)

Positions
005 5 Position (single row only)
009 9 Position
015 15 Position
025 25 Position
037 37 Position
051 51 Position
065 65 Position (two row only)

Configuration
PP Plug to Plug, 1 to 1
PR Plug to Receptacle, 1 to 1
PD Plug to Plug, low to high in row
RR Receptacle to Receptacle, 1 to 1

Conductor Size/Strands
0 28 AWG Solid
1 30 AWG Solid
2 30 AWG 7 Strand
3 32 AWG 7 Strand
4 34 AWG 7 Strand

Conductor Type
DX White Teflon
DY White PTFE M16878/6
DC Color Coded Teflon
DM Color Coded Teflon per MIL-STD-681
DT White Tefzel M22759/33
GX Telfon Ribbon Cable

Conductor Length
XXX Three numbers only, length is in inches (i.e. 012 = twelve inches)
CXX A "C" followed by two numbers, length is in centimeters (i.e. C06 = 6 centimeters)
MXX An "M" followed by two numbers, length is in meters (i.e. M02 = 2 meters)

Threads/Jackscrews

Threads (Receptacles Only)	Jackscrews (Plugs Only)
N Thread for 1.0 mm Jackscrews	**M** 1.0 mm Non Captive Jackscrews
Q Thread for 1.2 mm Jackscrews	**N** 1.0 mm Captive Jackscrews
	Q 1.2 mm Captive Jackscrews

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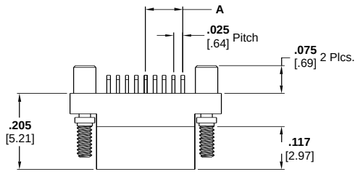
DUALOBE Rectangular Connectors (Continued)

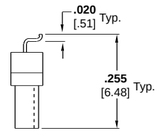
Surface Mount Connectors — Horizontal, Single Row

Receptacle

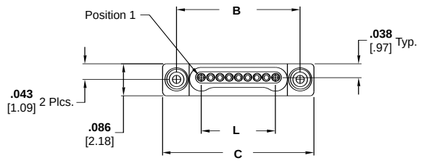
Product Facts

- Plastic or Metal Shell
- Standard Sizes: 5, 9, 15, 25, 37, and 51
- Contact Tyco Electronics for custom configurations
- Suggested pad layouts are available on the referenced drawings on the Tyco Electronics website

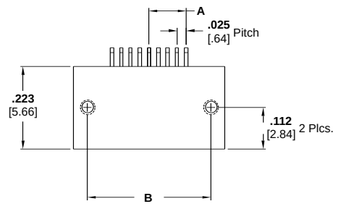


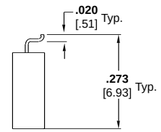


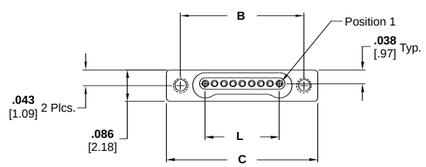
Jackscrews Omitted for Clarity



Plug Assembly
Drawing Number 1589460







Receptacle Assembly
Drawing Number 1589462

Size	Dimensions			
	A	B	C	L
5	**0.050** [1.27]	**0.233** [5.92]	**0.3085** [7.84]	**0.100** [2.54]
9	**0.100** [2.54]	**0.333** [8.46]	**0.4085** [10.38]	**0.200** [5.08]
15	**0.175** [4.45]	**0.483** [12.27]	**0.5585** [14.19]	**0.350** [8.89]
25	**0.300** [7.62]	**0.733** [18.62]	**0.8085** [20.54]	**0.600** [15.24]
37	**0.450** [11.43]	**1.085** [26.24]	**1.1085** [28.16]	**0.900** [22.86]
51	**0.625** [15.88]	**1.383** [35.13]	**1.4585** [37.05]	**1.250** [31.75]

Catalog 1308940
Revised 8-06

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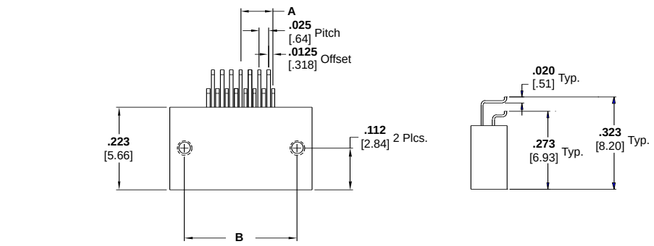
DUALOBE Rectangular Connectors (Continued)

Surface Mount Connectors — Horizontal, Two Row

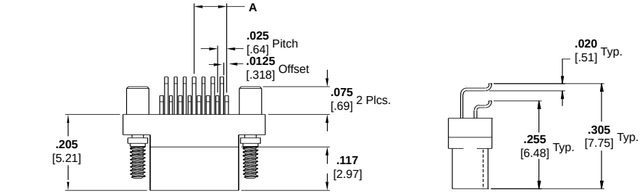
Receptacle

Product Facts

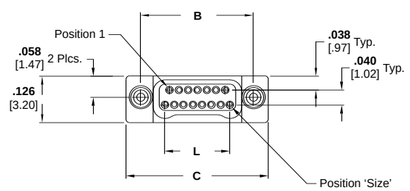
- Plastic or Metal Shell
- Standard Sizes: 9, 15, 25, 37, 51 and 65
- Contact Tyco Electronics for custom configurations
- Suggested pad layouts are available on the referenced drawings on the Tyco Electronics website



Receptacle Assembly
Drawing Number 1589483



Jackscrews Omitted for Clarity



Plug Assembly
Drawing Number 1589490

Size	Dimensions			
	A	B	C	L
9	**0.050** [1.27]	**0.229** [5.82]	**0.3085** [7.84]	**0.100** [2.54]
15	**0.875** [2.23]	**0.304** [7.72]	**0.3835** [9.74]	**0.175** [4.45]
25	**0.150** [3.81]	**0.429** [10.90]	**0.5085** [12.92]	**0.300** [8.89]
37	**0.225** [5.72]	**0.579** [14.71]	**0.6585** [16.73]	**0.450** [11.43]
51	**0.313** [7.95]	**0.754** [19.15]	**0.8335** [21.17]	**0.625** [15.88]
65	**0.400** [10.16]	**0.929** [23.60]	**1.0085** [25.62]	**0.800** [20.32]

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

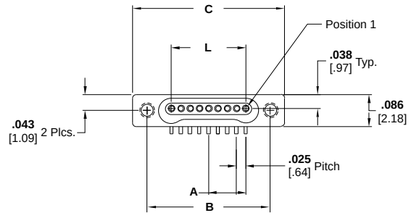
DUALOBE Rectangular Connectors (Continued)

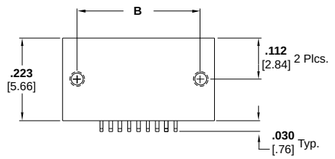
Surface Mount Connectors — Vertical, Single Row

Receptacle

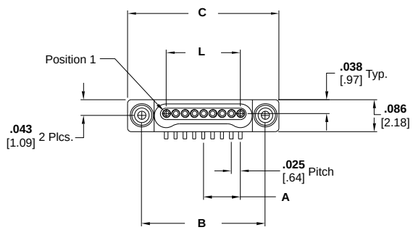
Product Facts

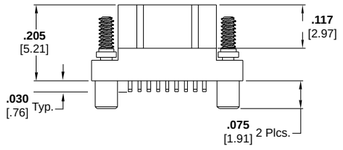
- Plastic or Metal Shell
- Standard Sizes: 5, 9, 15, 25, 37, and 51
- Contact Tyco Electronics for custom configurations
- Suggested pad layouts are available on the referenced drawings on the Tyco Electronics website





Receptacle Assembly
Drawing Number 1589463





Plug Assembly
Drawing Number 1589465

Size	Dimensions			
	A	B	C	L
5	**0.050** [1.27]	**0.233** [5.92]	**0.3085** [7.84]	**0.100** [2.54]
9	**0.100** [2.54]	**0.333** [8.46]	**0.4085** [10.38]	**0.200** [5.08]
15	**0.175** [4.45]	**0.483** [12.27]	**0.5585** [14.19]	**0.350** [8.89]
25	**0.300** [7.62]	**0.733** [18.62]	**0.8085** [20.54]	**0.600** [15.24]
37	**0.450** [11.43]	**1.085** [26.24]	**1.1085** [28.16]	**0.900** [22.86]
51	**0.625** [15.88]	**1.383** [35.13]	**1.4585** [37.05]	**1.250** [31.75]

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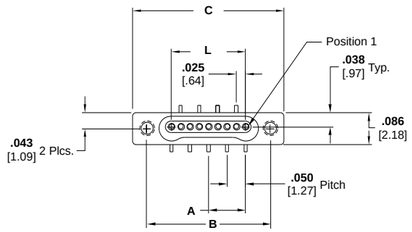
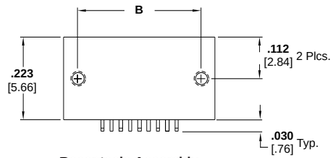
DUALOBE Rectangular Connectors (Continued)

Surface Mount Connectors — Vertical, Single Row with Alternating Leads

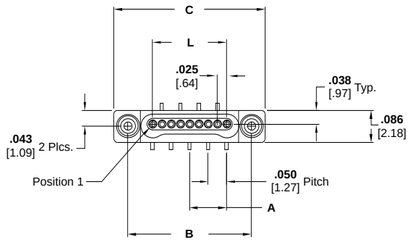
Product Facts

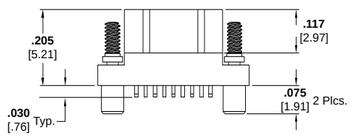
- Plastic or Metal Shell
- Standard Sizes: 5, 9, 15, 25, 37, and 51
- Contact Tyco Electronics for custom configurations
- Suggested pad layouts are available on the referenced drawings on the Tyco Electronics website





Receptacle Assembly
Drawing Number 1589464





Plug Assembly
Drawing Number 1589466

Size	Dimensions			
	A	B	C	L
5	**0.050** [1.27]	**0.233** [5.92]	**0.3085** [7.84]	**0.100** [2.54]
9	**0.100** [2.54]	**0.333** [8.46]	**0.4085** [10.38]	**0.200** [5.08]
15	**0.175** [4.45]	**0.483** [12.27]	**0.5585** [14.19]	**0.350** [8.89]
25	**0.300** [7.62]	**0.733** [18.62]	**0.8085** [20.54]	**0.600** [15.24]
37	**0.450** [11.43]	**1.085** [26.24]	**1.1085** [28.16]	**0.900** [22.86]
51	**0.625** [15.88]	**1.383** [35.13]	**1.4585** [37.05]	**1.250** [31.75]

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Revised 8-06

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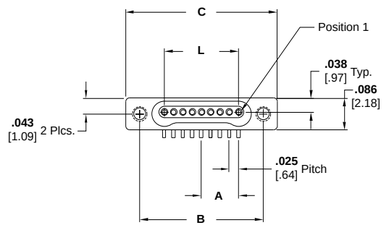
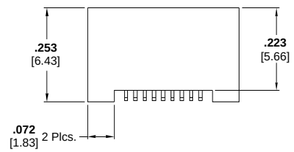
DUALOBE Rectangular Connectors (Continued)

Surface Mount Connectors — Vertical, Single Row with Integrated Standoffs

Product Facts

- Metal Shell
- Standard Sizes: 5 , 9, 15, 25, 37, and 51
- Contact Tyco Electronics for custom configurations
- Suggested pad layouts are available on the referenced drawings on the Tyco Electronics website





Receptacle Assembly
Drawing Number 1589467

Size	Dimensions			
	A	B	C	L
5	**0.050** [1.27]	**0.233** [5.92]	**0.3085** [7.84]	**0.100** [2.54]
9	**0.100** [2.54]	**0.333** [8.46]	**0.4085** [10.38]	**0.200** [5.08]
15	**0.175** [4.45]	**0.483** [12.27]	**0.5585** [14.19]	**0.350** [8.89]
25	**0.300** [7.62]	**0.733** [18.62]	**0.8085** [20.54]	**0.600** [15.24]
37	**0.450** [11.43]	**1.085** [26.24]	**1.1085** [28.16]	**0.900** [22.86]
51	**0.625** [15.88]	**1.383** [35.13]	**1.4585** [37.05]	**1.250** [31.75]

Catalog 1308940
Revised 8-06

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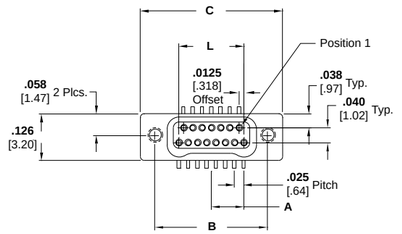
DUALOBE Rectangular Connectors (Continued)

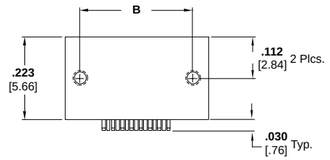
Surface Mount Connectors — Vertical, Two Row

Receptacle

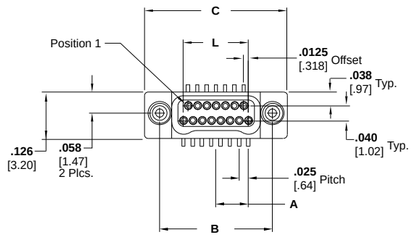
Product Facts

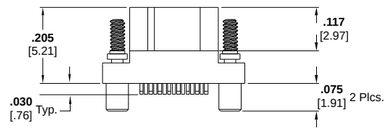
- Plastic or Metal Shell
- Standard Sizes: 9, 15, 25, 37, 51 and 65
- Contact Tyco Electronics for custom configurations
- Suggested pad layouts are available on the referenced drawings on the Tyco Electronics website





Receptacle Assembly
Drawing Number 1589484





Plug Assembly
Drawing Number 1589485

Size	Dimensions			
	A	B	C	L
9	**0.050** [1.27]	**0.229** [5.82]	**0.3085** [7.84]	**0.100** [2.54]
15	**0.875** [2.23]	**0.304** [7.72]	**0.3835** [9.74]	**0.175** [4.45]
25	**0.150** [3.81]	**0.429** [10.90]	**0.5085** [12.92]	**0.300** [8.89]
37	**0.225** [5.72]	**0.579** [14.71]	**0.6585** [16.73]	**0.450** [11.43]
51	**0.313** [7.95]	**0.754** [19.15]	**0.8335** [21.17]	**0.625** [15.88]
65	**0.400** [10.16]	**0.929** [23.60]	**1.0085** [25.62]	**0.800** [20.32]

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

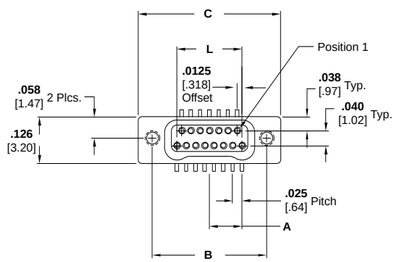
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

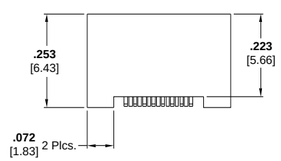
DUALOBE Rectangular Connectors (Continued)

Surface Mount Connectors — Vertical, Two Row with Integrated Standoffs

Product Facts

- Metal Shell
- Standard Sizes: 9, 15, 25, 37, 51 and 65
- Contact Tyco Electronics for custom configurations
- Suggested pad layouts are available on the referenced drawings on the Tyco Electronics website





Receptacle Assembly
Drawing Number 1589486

Size	Dimensions			
	A	B	C	L
9	**0.050** [1.27]	**0.229** [5.82]	**0.3085** [7.84]	**.100** [2.54]
15	**0.875** [2.23]	**0.304** [7.72]	**0.3835** [9.74]	**.175** [4.45]
25	**0.150** [3.81]	**0.429** [10.90]	**0.5085** [12.92]	**.300** [8.89]
37	**0.225** [5.72]	**0.579** [14.71]	**0.6585** [16.73]	**.450** [11.43]
51	**0.313** [7.95]	**0.754** [19.15]	**0.8335** [21.17]	**.625** [15.88]
65	**0.400** [10.16]	**0.929** [23.60]	**1.0085** [25.62]	**.800** [20.32]

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

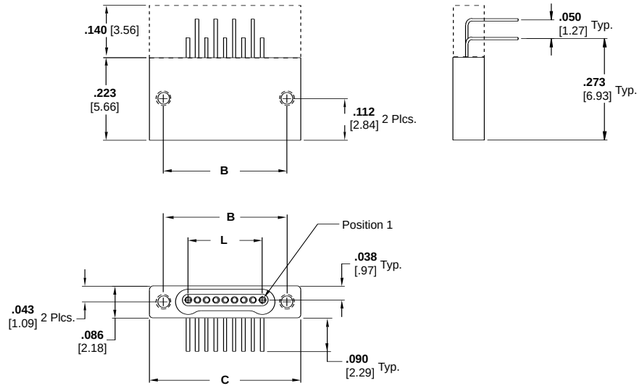
DUALOBE Rectangular Connectors (Continued)

Thru-Hole Connectors — Horizontal, 1 Row to 2 Row, .050 Spacing

Receptacle

Product Facts

- Plastic or Metal Shell
- Standard Sizes: 5, 9, 15, 25, 37, and 51
- Contact Tyco Electronics for custom configurations
- Suggested thru-hole layouts are available on the referenced drawings on the Tyco Electronics website



Receptacle Assembly
Drawing Number 1589469

Plug Assembly
Drawing Number 1589471

Size	Dimensions		
	B	C	L
5	**0.233** [5.92]	**0.3085** [7.84]	**0.100** [2.54]
9	**0.333** [8.46]	**0.4085** [10.38]	**0.200** [5.08]
15	**0.483** [12.27]	**0.5585** [14.19]	**0.350** [8.89]
25	**0.733** [18.62]	**0.8085** [20.54]	**0.600** [15.24]
37	**1.033** [26.24]	**1.1085** [28.16]	**0.900** [22.86]
51	**1.383** [35.13]	**1.4585** [37.05]	**1.250** [31.75]

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

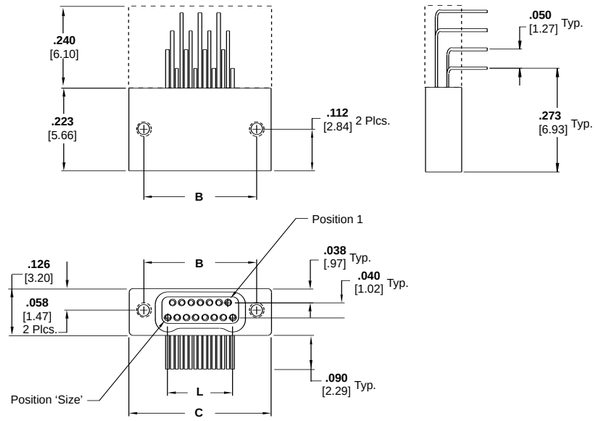
DUALOBE Rectangular Connectors (Continued)

Thru-Hole Connectors — Horizontal, 2 Row to 4 Row, .050 Spacing

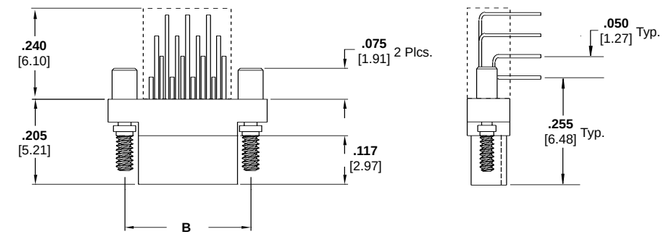
Receptacle

Product Facts

- Plastic or Metal Shell
- Standard Sizes: 9, 15, 25, 37, 51 and 65
- Contact Tyco Electronics for custom configurations
- Suggested thru-hole layouts are available on the referenced drawings on the Tyco Electronics website



Receptacle Assembly
Drawing Number 1589487



Plug Assembly
Drawing Number 1589481

Size	Dimensions		
	B	C	L
9	**0.229** [5.82]	**0.3085** [7.84]	**0.100** [2.54]
15	**0.304** [7.72]	**0.3835** [9.74]	**0.175** [4.45]
25	**0.429** [10.90]	**0.5085** [12.92]	**0.300** [7.62]
37	**0.579** [14.71]	**0.6585** [16.73]	**0.450** [11.43]
51	**0.754** [19.15]	**0.8335** [21.17]	**0.625** [15.88]
65	**0.929** [23.60]	**1.0085** [25.62]	**0.800** [20.32]

Catalog 1308940
Revised 8-06

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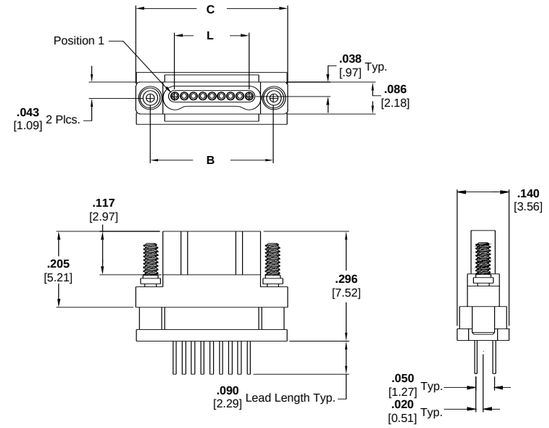
DUALOBE Rectangular Connectors (Continued)

Thru-Hole Connectors — Vertical Mount, 1 Row to 2 Row Connectors, .050 Spacing

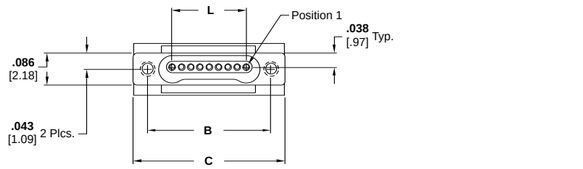
Receptacle

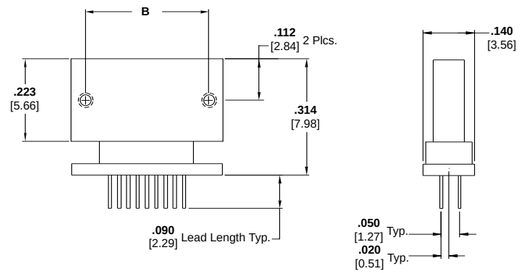
Product Facts

- Plastic or Metal Shell
- Standard Sizes: 5, 9, 15, 25, 37 and 51
- Contact Tyco Electronics for custom configurations
- Suggested thru-hole layouts are available on the referenced drawings on the Tyco Electronics website



Plug Assembly
Drawing Number 1589461





Receptacle Assembly
Drawing Number 1589470

Size	Dimensions		
	B	C	L
5	**0.233** [5.92]	**0.3085** [7.84]	**0.100** [2.54]
9	**0.333** [8.46]	**0.4085** [10.38]	**0.200** [5.08]
15	**0.483** [12.27]	**0.5585** [14.19]	**0.350** [8.89]
25	**0.733** [18.62]	**0.8085** [20.54]	**0.600** [15.24]
37	**1.033** [26.24]	**1.1085** [28.16]	**0.900** [22.86]
51	**1.383** [35.13]	**1.4585** [37.05]	**1.250** [31.75]

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

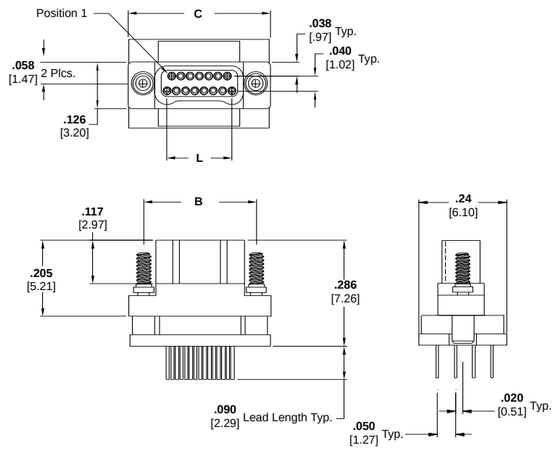
DUALOBE Rectangular Connectors (Continued)

Thru-Hole Connectors — Vertical Mount, 2 Row to 4 Row Connectors, .050 Spacing

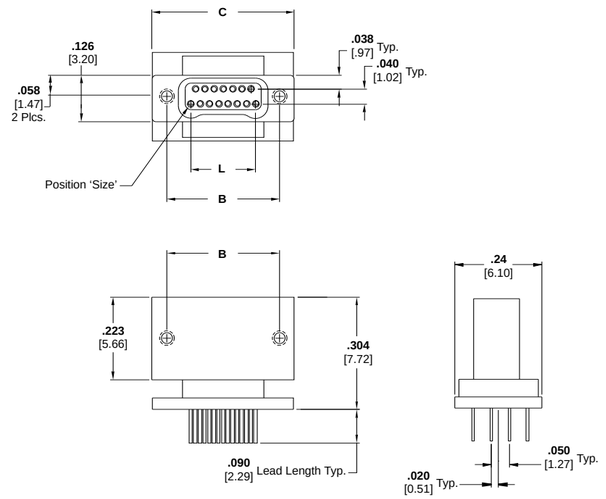
Receptacle

Product Facts

- Plastic or Metal Shell
- Standard Sizes: 9, 15, 25, 37, 51 and 65
- Contact Tyco Electronics for custom configurations
- Suggested thru-hole layouts are available on the referenced drawings on the Tyco Electronics website



Plug Assembly
Drawing Number 1589482



Receptacle Assembly
Drawing Number 1589488

Size	Dimensions		
	B	C	L
9	**0.229** [5.82]	**0.3085** [7.84]	**0.100** [2.54]
15	**0.304** [7.72]	**0.3835** [9.74]	**0.175** [4.45]
25	**0.429** [10.90]	**0.5085** [12.92]	**0.300** [7.62]
37	**0.579** [14.71]	**0.6585** [16.73]	**0.450** [11.43]
51	**0.754** [19.15]	**0.8335** [21.17]	**0.625** [15.88]
65	**0.929** [23.60]	**1.0085** [25.62]	**0.800** [20.32]

Catalog 1308940
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DUALOBE Rectangular Connectors (Continued)

Part Numbering Guideline for Surface Mount and Thru-Hole Connectors

DUALOBE Connectors - Surface Mount and Thru Hole Terminations

S X X XXX XX(X) X X

Class
S Dualobe

Rows
S 1 Row
T 2 Row

Type
L LCP (Plastic)
M Metal (Al, Ni Plate)

Positions
005 5 Position (single row only)
009 9 Position
015 15 Position
025 25 Position
037 37 Position
051 51 Position
065 65 Position (two row only)

Threads/Jackscrew

Threads (Receptacles Only)	Jackscrews (Plugs Only)
N Thread for 1.0 mm Jackscrews	**M** 1.0 mm Non Captive Jackscrews
Q Thread for 1.2 mm Jackscrews	**N** 1.0 mm Captive Jackscrews
	Q 1.2 mm Captive Jackscrews

Mounting Hardware

A 1.2 mm x .160”	**K** 1.0 mm x .200” w/ 4 standoffs
C 1.0 mm x .200” w/ 2 standoffs	**L** 1.2 mm x .200” w/ 2 standoffs
D 1.2 mm x .160” w/ 2 standoffs	**P** 1.2 mm x .200” w/ 4 standoffs
H 1.0 mm x .160”	**S** 1.0 mm x .160” w/ 2 standoffs
I 1.2 mm x .200”	

Configurations
B2 Plug, Horizontal SMT
B4 Plug, Vertical SMT
B42 Plug, Vertical SMT, .020” Extended Leads
B44 Plug, Vertical SMT, .040” Extended Leads
B43 Plug, Vertical SMT, .020” Extended Leads, 2 side exit (single row only)
B45 Plug, Vertical SMT, .040” Extended Leads, 2 side exit (single row only)
L2 Receptacle, Horizontal SMT
L4 Receptacle, Vertical SMT
L42 Receptacle, Vertical SMT, .020” Extended Leads
L44 Receptacle, Vertical SMT, .040” Extended Leads
L43 Receptacle, Vertical SMT, .020” Extended Leads, 2 side exit (single row only)
L45 Receptacle, Vertical SMT, .040” Extended Leads, 2 side exit (single row only)
L8 Receptacle, Vertical SMT, w/ integrated standoffs (metal shell only)
L82 Receptacle, Vertical SMT, w/ integrated standoffs, .020” Extended Leads (metal shell only)
L84 Receptacle, Vertical SMT, w/ integrated standoffs, .040” Extended Leads (metal shell only)
L83 Receptacle, Vertical SMT, w/ integrated standoffs, .020” Extended Leads (single row and metal shell only)
L85 Receptacle, Vertical SMT, w/ integrated standoffs, .040” Extended Leads (single row and metal shell only)
C5 Plug, Vertical Mount, Thru Hole
C6 Plug, Horizontal Mount, Thru Hole
M5 Receptacle, Vertical Mount, Thru Hole
M6 Receptacle, Horizontal Mount, Thru Hole

Catalog 1308940
Revised 8-06

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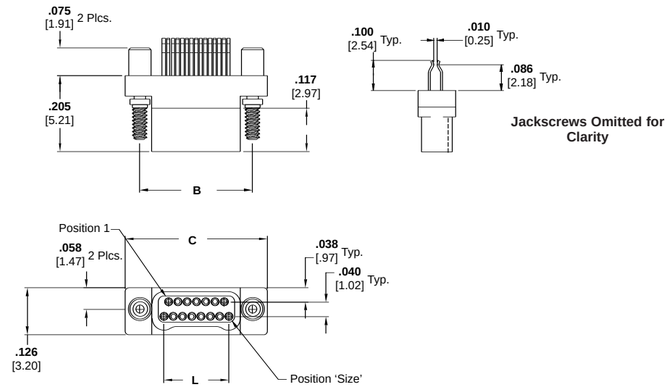
Japan: 81-44-844-8013
UK: 44-208-420-8341

DUALOBE Rectangular Connectors (Continued)

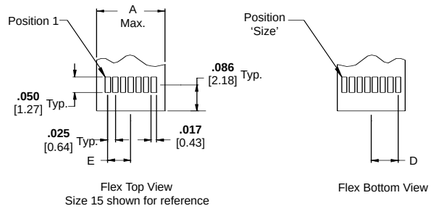
Flex Termination “Duckbill” Connectors — Two Row

Product Facts

- Plastic or Metal Shell
- Standard Sizes: 9, 15, 25, 37, 51 and 65
- Contact Tyco Electronics for custom configurations



Plug Assembly
Drawing Number 1589066



Typical Flex Pad Layout

Size	Dimensions					
	A	B	C	D	E	L
9	**0.150** [3.81]	**0.229** [5.82]	**0.3085** [7.84]	**0.0500** [1.27]	**0.0375** [0.95]	**0.100** [2.54]
15	**0.225** [5.72]	**0.304** [7.72]	**0.3835** [9.74]	**0.0875** [2.22]	**0.0750** [1.90]	**0.175** [4.45]
25	**0.350** [8.89]	**0.429** [10.90]	**0.5085** [12.92]	**0.1500** [3.81]	**0.1375** [3.49]	**0.300** [7.62]
37	**0.500** [12.7]	**0.579** [14.71]	**0.6585** [16.73]	**0.2250** [5.72]	**0.2125** [5.40]	**0.450** [11.43]
51	**0.675** [17.1]	**0.754** [19.15]	**0.8335** [21.17]	**0.3125** [7.94]	**0.3000** [7.62]	**0.625** [15.88]
65	**0.850** [21.6]	**0.929** [23.60]	**1.0085** [25.62]	**0.4000** [10.2]	**0.3875** [9.84]	**0.800** [20.32]

Catalog 1308940
Revised 8-06

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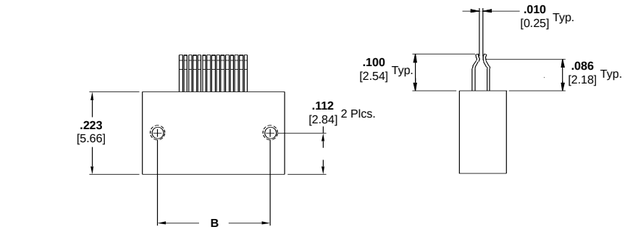
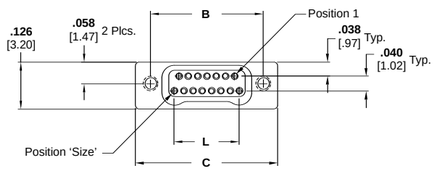
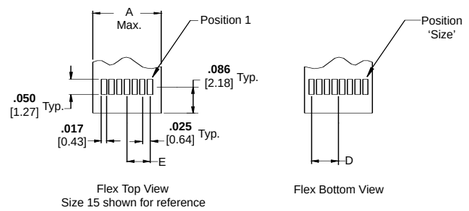
DUALOBE Rectangular Connectors (Continued)

Flex Termination “Duckbill” Connectors — Two Row (Continued)





Receptacle Assembly
Drawing Number 1589067



Flex Top View
Size 15 shown for reference

Flex Bottom View

Typical Flex Pad Layout

Part Numbering Guideline for Flex Termination “Duckbill” Connectors

DUALOBE Connectors - “Duckbill” Termination

S T X XXX 11378 XX X

Class
S Dualobe

Rows
T 2 Row

Type
L LCP (Plastic)
M Metal (Al, Ni Plate)

Positions
009 9 Position
015 15 Position
025 25 Position
037 37 Position
051 51 Position
065 65 Position

Termination Code
11378 “Duckbill” Termination

Configuration
PC Plug
SC Receptacle

Threads/Jackscrew

Threads (Receptacles Only)	Jackscrews (Plugs Only)
N Thread for 1.0 mm Jackscrews	**M** 1.0 mm Non Captive Jackscrews
Q Thread for 1.2 mm Jackscrews	**N** 1.0 mm Captive Jackscrews
	Q 1.2 mm Captive Jackscrews

Catalog 1308940
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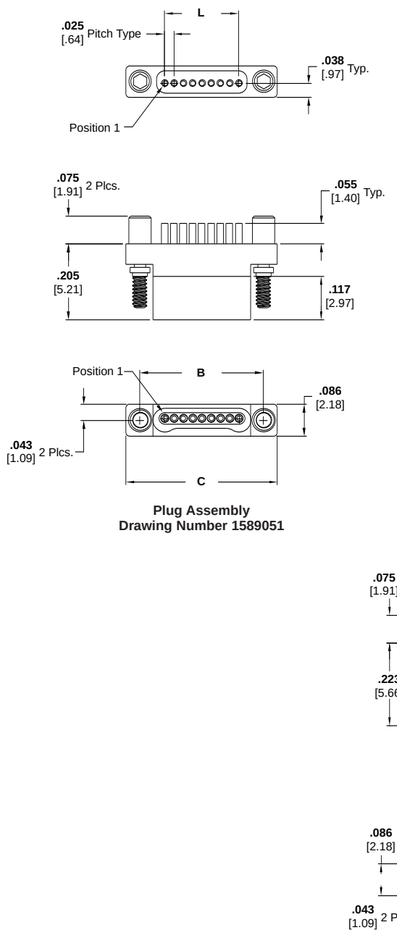
DUALOBE Rectangular Connectors (Continued)

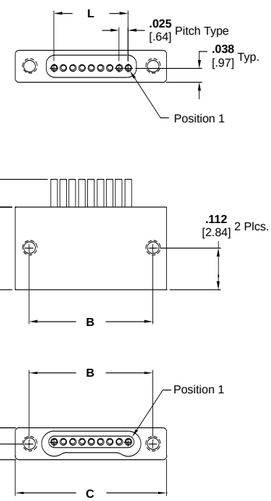
Solder Cup Connectors — Single Row

Product Facts

- Plastic or Metal Shell
- Standard Sizes: 5, 9, 15, 25, 37 and 51
- Contact Tyco Electronics for custom configurations



Plug Assembly
Drawing Number 1589051



Receptacle Assembly
Drawing Number 1589052

Size	Dimensions		
	B	C	L
5	**0.233** [5.92]	**0.3085** [7.84]	**0.100** [2.54]
9	**0.333** [8.46]	**0.4085** [10.38]	**0.200** [5.08]
15	**0.483** [12.27]	**0.5585** [14.19]	**0.350** [8.89]
25	**0.733** [18.62]	**0.8085** [20.54]	**0.600** [15.24]
37	**1.033** [26.24]	**1.1085** [28.16]	**0.900** [22.86]
51	**1.383** [35.13]	**1.4585** [37.05]	**1.250** [31.75]

Catalog 1308940
Revised 8-06

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DUALOBE Rectangular Connectors (Continued)

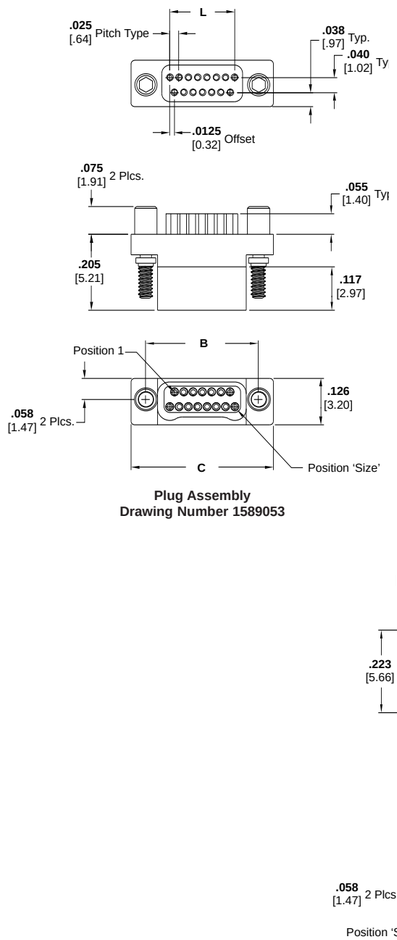
Solder Cup Connectors — Two Row

Plug

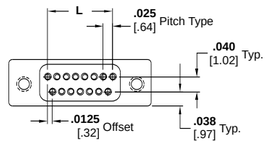
Receptacle

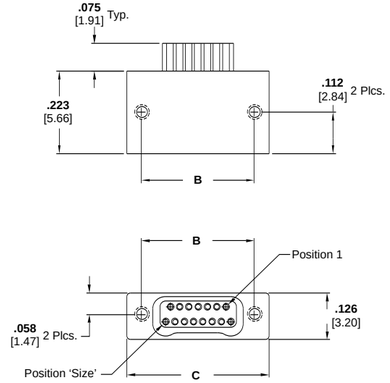
Product Facts

- Plastic or Metal Shell
- Standard Sizes: 9, 15, 25, 37, 51 and 65
- Contact Tyco Electronics for custom configurations



Plug Assembly
Drawing Number 1589053





Receptacle Assembly
Drawing Number 1589054

Size	Dimensions		
	B	C	L
9	**0.229** [5.82]	**0.3085** [7.84]	**0.100** [2.54]
15	**0.304** [7.72]	**0.3835** [9.74]	**0.175** [4.45]
25	**0.429** [10.90]	**0.5085** [12.92]	**0.300** [7.62]
37	**0.579** [14.71]	**0.6585** [16.73]	**0.450** [11.43]
51	**0.754** [19.15]	**0.8335** [21.17]	**0.625** [15.88]
65	**0.929** [23.60]	**1.0085** [25.62]	**0.800** [20.32]

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DUALOBE Rectangular Connectors (Continued)

Part Numbering Guideline for Solder Cup Connectors

DUALOBE Connectors - Solder Cup Termination

S X X XXX 11500 XX X

Class
S Dualobe

Rows
S 1 Row
T 2 Row

Type
L LCP (Plastic)
M Metal (Al, Ni Plate)

Positions
005 5 Position (single row only)
009 9 Position
015 15 Position
025 25 Position
037 37 Position
051 51 Position
065 65 Position (two row only)

Termination Code
11500 Solder Cup Termination

Configuration
PC Plug
SC Receptacle

Threads/Jackscrew

Threads (Receptacles Only)
N Thread for 1.0 mm Jackscrews
Q Thread for 1.2 mm Jackscrews

Jackscrews (Plugs Only)
M 1.0 mm Non Captive Jackscrews
N 1.0 mm Captive Jackscrews
Q 1.2 mm Captive Jackscrews

Catalog 1308940
Revised 8-06

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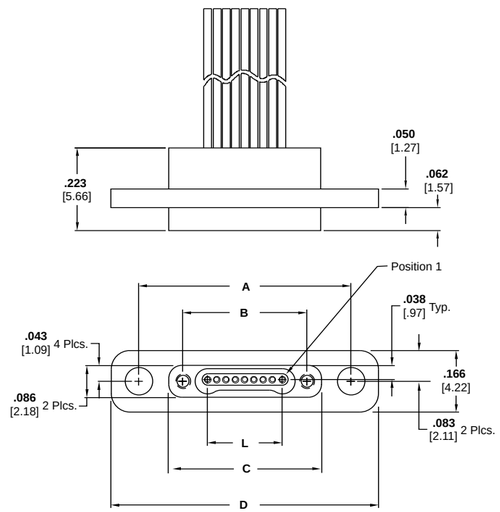
Japan: 81-44-844-8013
UK: 44-208-420-8341

DUALOBE Rectangular Connectors (Continued)

Panel Mount Connectors — Single Row, Flying Leads

Product Facts

- Metal Shell
- Standard Sizes: 5, 9, 15, 25, 37 and 51
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations



Receptacle Assembly
Drawing Number 1589851

Size	Dimensions				
	A	B	C	D	L
5	**0.470** [11.94]	**0.233** [5.92]	**0.310** [7.87]	**0.620** [15.75]	**0.100** [2.54]
9	**0.570** [14.48]	**0.333** [8.46]	**0.410** [10.41]	**0.720** [18.29]	**0.200** [5.08]
15	**0.720** [18.29]	**0.483** [12.27]	**0.560** [14.22]	**0.870** [22.10]	**0.350** [8.89]
25	**0.970** [24.64]	**0.733** [18.62]	**0.810** [20.57]	**1.120** [28.45]	**0.600** [15.24]
37	**1.270** [32.26]	**1.033** [26.24]	**1.110** [28.19]	**1.420** [36.07]	**0.900** [22.86]
51	**1.620** [14.15]	**1.383** [35.13]	**1.460** [37.08]	**1.770** [44.96]	**1.250** [31.75]

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

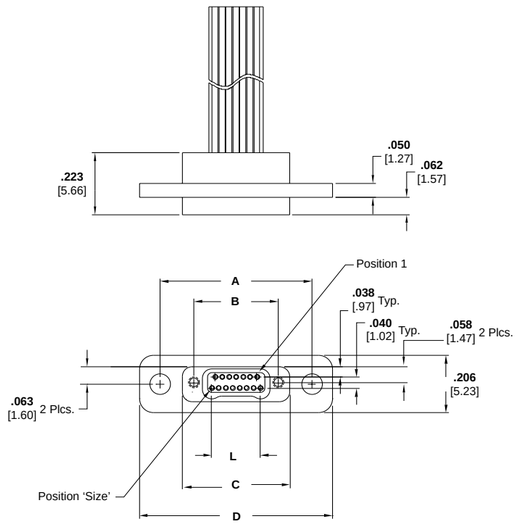
DUALOBE Rectangular Connectors (Continued)

Panel Mount Connectors — Two Row, Flying Leads

Receptacle

Product Facts

- Metal Shell
- Standard Sizes: 9, 15, 25, 37, 51 and 65
- Contact Tyco Electronics for custom configurations



Receptacle Assembly
Drawing Number 1589050

Size	Dimensions				
	A	B	C	D	L
9	**0.470** [11.94]	**0.229** [5.82]	**0.310** [7.87]	**0.620** [15.75]	**0.100** [2.54]
15	**0.545** [13.84]	**0.304** [7.72]	**0.385** [9.78]	**0.695** [17.65]	**0.175** [4.45]
25	**0.670** [17.02]	**0.429** [10.90]	**0.510** [12.95]	**0.820** [20.83]	**0.300** [7.62]
37	**0.820** [20.83]	**0.579** [14.71]	**0.660** [16.76]	**0.970** [24.64]	**0.450** [11.43]
51	**0.995** [25.27]	**0.754** [19.15]	**0.835** [21.21]	**1.145** [29.08]	**0.625** [15.88]
65	**1.170** [20.72]	**0.929** [23.60]	**1.010** [25.65]	**1.320** [33.53]	**0.800** [20.32]

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Part Numbering Guideline for Panel Mount Connectors

DUALOBE Connectors - Panel Mount

P X M XXX SC X XX XXX X

Class
P Panel Mount

Rows
S 1 Row
T 2 Row

Type
M Metal (Al, Ni Plate)

Positions
005 5 Position (single row only)
009 9 Position
015 15 Position
025 25 Position
037 37 Position
051 51 Position
065 65 Position (two row only)

Configuration
SC Receptacle

Conductor Size/Strands
0 28 AWG Solid
1 30 AWG Solid
2 30 AWG 7 Strand
3 32 AWG 7 Strand
4 34 AWG 7 Strand

Conductor Type

DX	White Teflon	**DM**	Color Coded Teflon per MIL-STD-681
DY	White PTFE per M16878/6	**DT**	White Tefzel per M22759/33
DC	Color Coded Teflon	**GX**	Teflon Ribbon Cable

Conductor Length
XXX Three numbers only, length is in inches (i.e. 012 = twelve inches)
CXX A “C” follwed by two numbers, length is in centimeters (i.e. C06 = 6 centimeters)
MXX An “M” followed by two numbers, length is in meters (i.e. M02 = 2 meters)

Jackscrew Threads
Threads
N Thread for 1.0 mm Jackscrews
Q Thread for 1.2 mm Jackscrews

Catalog 1308940
Revised 8-06

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DUALOBE Rectangular Connectors Part Number Cross Reference

NANONICS Part Number	Tyco Electronics Part Number
Wired Connectors	
SSL005PC0DC006N	0-1589455-2
SSL005PC0DC012N	0-1589455-3
SSL005PC0DX012M	7-1589456-3
SSL005PC2DC002N	2-1589827-7
SSL005PC2DC004	0-1589455-4
SSL005PC2DC006	0-1589455-5
SSL005PC2DC006N	0-1589455-6
SSL005PC2DC012N	6-1589456-4
SSL005PC2DX006N	0-1589455-7
SSL005SC0DC006N	0-1589457-1
SSL005SC2DC006N	0-1589457-2
SSL005SC2DC012N	7-1589457-6
SSL005SC3DM024N	0-1589457-3
SSL009PC0DC006N	0-1589455-8
SSL009PC0DMM03N	0-1589455-9
SSL009PC0DX012M	7-1589456-4
SSL009PC2DC001N	1-1589455-0
SSL009PC2DC003	1-1589455-1
SSL009PC2DC006N	1-1589455-2
SSL009PC2DC009N	1-1589455-3
SSL009PC2DC012	1-1589455-4
SSL009PC2DC012M	1-1589455-5
SSL009PC2DC012N	1-1589455-6
SSL009PC2DC012Q	9-1589456-2
SSL009PC2DC018N	1-1589455-7
SSL009PC2DC024N	7-1589456-9
SSL009PC2DCC03N	1-1589455-8
SSL009PC2DCC10N	1-1589455-9
SSL009PC2DM010N	2-1589455-0
SSL009PC2DM018M	2-1589455-1
SSL009PC2DMC60Q	2-1589455-2
SSL009SC0DMM03N	0-1589457-4
SSL009SC2DC003	0-1589457-5
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SSL009SC2DC012Q	9-1589457-2
SSL009SC2DM006N	0-1589457-8
SSL009SC2GX006	1-1589457-0
SSL015PC0DC012N	0-1589827-6
SSL015PC0DMM03N	2-1589455-3
SSL015PC0DX012M	7-1589456-5
SSL015PC2DC003N	0-1589827-3
SSL015PC2DC006N	2-1589455-4
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SSL015PC2DC012M	0-1589827-2
SSL015PC2DC012N	2-1589455-7
SSL015PC2DC016N	0-1589827-8
SSL015PC2DC018	2-1589455-8
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SSL015PC2DC024	2-1589455-9
SSL015PC2DC024M	7-1589456-2
SSL015PC2DC024N	0-1589827-9
SSL015PC2DC036N	0-1589827-5
SSL015PC2DM018M	3-1589455-0
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SSL037PC2DC012N	3-1589455-8
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SSM009PC2DC060N	6-1589455-9
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SSM015SC0DC024N	0-1589901-7
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SSM015SC2DC006N	4-1589457-2
SSM015SC2DC012N	4-1589457-3
SSM015SC2DC018	4-1589457-4
SSM015SC2DC018N	9-1589457-4
SSM015SC2DC024N	9-1589457-3
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SSM015SC2DX006N	4-1589457-8
SSM015SC2DX012HN	4-1589457-9
SSM015SC2DX018N	5-1589457-0
SSM015SC2DX024HN	5-1589457-2
SSM015SC2DY012N	5-1589457-3
SSM015SC2DY018N	5-1589457-4
SSM015SC4DX005N	5-1589457-5
SSM025PC0DC024N	2-1589827-4
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SSM025PC2DC010N	1-1589456-6
SSM025PC2DC012	1-1589456-7
SSM025PC2DC012N	1-1589456-8
SSM025PC2DC012Q	8-1589456-1
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SSM025PC2DC018N	2-1589456-0
SSM025PC2DC024N	9-1589456-1

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DUALOBE Rectangular Connectors Part Number Cross Reference (Continued)

NANONICS Part Number	Tyco Electronics Part Number
SSM025PC2DC025N	2-1589456-1
SSM025PC2DC030N	2-1589456-2
SSM025PC2DC036N	2-1589456-3
SSM025PC2DCC30N	2-1589456-4
SSM025PC2DCC50N	1-1589827-5
SSM025PC2DM018Q	9-1589456-9
SSM025PC2DM024N	8-1589456-3
SSM025PC2DT012N	1-1589827-8
SSM025PC2DX006N	2-1589456-5
SSM025PC2DX012N	2-1589456-6
SSM025PC2DX018N	2-1589456-7
SSM025PC2DX024N	2-1589456-8
SSM025PC2GX006	2-1589456-9
SSM025PC2GX018N	3-1589456-0
SSM025PC3DY006N	3-1589456-1
SSM025PC4DX015N	7-1589456-7
SSM025SC0DC024N	0-1589901-8
SSM025SC0DC036N	7-1589457-9
SSM025SC2DC006N	8-1589457-6
SSM025SC2DC012N	5-1589457-6
SSM025SC2DC018	5-1589457-7
SSM025SC2DC024N	5-1589457-9
SSM025SC2DT012N	0-1589901-1
SSM025SC2DX006N	6-1589457-0
SSM025SC2DX018N	6-1589457-1
SSM025SC2DX024HN	6-1589457-3
SSM025SC2DX024N	8-1589457-1
SSM025SC3DY006N	6-1589457-4
SSM037PC0DC006M	1-1589827-2
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SSM051PC2DC018	4-1589456-8
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SSM051PC2DNC15Q	5-1589456-8
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STL015PC2DX036N	3-1589472-9
STL015PC2DY006N	9-1589475-4
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STL015SC2DC008N	1-1589476-2
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STL015SC3DX024N	1-1589476-8
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STL025PC2DC015Q	8-1589475-2
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STL025PC2DC020N	4-1589472-8
STL025PC2DC030N	4-1589472-9
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STL025PC2DT024N	6-1589475-2
STL025PC2DY006N	9-1589475-5
STL025PC2GX036	4-1589788-7
STL025PC3DX006N	5-1589472-1
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STL025PC4DX030N	5-1589472-2
STL025SC2DC001N	1-1589476-9
STL025SC2DC006N	2-1589476-0
STL025SC2DC012N	2-1589476-1
STL025SC2DC030N	2-1589476-2
STL025SC2DC036N	2-1589476-3
STL025SC3DC004N	9-1589477-4
STL025SC3DX030N	0-1589777-5
STL037PC2DC010N	5-1589472-3
STL037PC2DC012	5-1589472-4
STL037PC2DC012M	5-1589472-5
STL037PC2DC012N	5-1589472-6
STL037PC2DC012Q	8-1589788-2
STL037PC2DC017N	5-1589472-7
STL037PC2DC018M	5-1589472-8
STL037PC2DC018N	5-1589472-9
STL037PC2DC018Q	2-1589788-4
STL037PC2DC020Q	6-1589472-0
STL037PC2DC024N	3-1589788-0
STL037PC2DC036M	6-1589472-1
STL037PC2DC036N	6-1589472-2
STL037PC2DC040N	6-1589472-3
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STL037PC2DY020N	7-1589475-4
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STL037SC2DC012N	2-1589476-4
STL037SC2DC012Q	2-1589476-5
STL037SC2DC030N	2-1589476-6
STL037SC2DC036N	2-1589476-7
STL037SC2DCC15N	2-1589476-8
STL037SC3DC001N	2-1589777-8
STL037SC3DX024N	2-1589476-9
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STL051PC2DC003N	6-1589472-8
STL051PC2DC006N	6-1589472-9
STL051PC2DC012	7-1589472-0
STL051PC2DC012N	7-1589472-1
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STL051PC2DC018N	3-1589788-8
STL051PC2DC018Q	2-1589788-5
STL051PC2DC024N	7-1589472-3
STL051PC2DC036N	7-1589472-4
STL051PC2DC040N	7-1589472-5
STL051PC2DCC35N	7-1589472-6
STL051PC2DM048N	3-1589475-3
STL051PC2DNC50	7-1589472-7
STL051PC2DT024N	6-1589475-0
STL051SC2DC003N	3-1589476-0
STL051SC2DC012N	3-1589476-1
STL051SC2DC018N	3-1589476-2

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

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USA: 1-800-522-6752
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Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DUALOBE Rectangular Connectors Part Number Cross Reference (Continued)

NANONICS Part Number	Tyco Electronics Part Number
STL051SC2DC024N	3-1589476-3
STL051SC2DC036N	0-1589777-1
STL051SC2DC048	3-1589476-4
STL051SC2DX024	3-1589476-5
STL065PC0DC006N	6-1589475-5
STL065PC0DC012N	3-1589788-4
STL065PC0DC036N	7-1589472-8
STL065PC0DC036Q	1-1589788-7
STL065PC2DC006	7-1589472-9
STL065PC2DC006M	5-1589475-8
STL065PC2DC006N	8-1589472-0
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STL065PC2DC018	8-1589472-2
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STL065PC2DM036N	9-1589472-0
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STL065PC2DTC10N	8-1589788-9
STL065PC2GX036Q	9-1589472-1
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STM009PC0DC020N	9-1589472-3
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STM009PC2DC036N	1-1589473-2
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STM009PC2DC060Q	1-1589473-3
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STM009PC2DCC40N	1-1589473-4
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STM009PC2DT018N	2-1589473-2
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STM009SC2DC018HN	4-1589476-9
STM009SC2DC018N	5-1589476-0
STM009SC2DC024N	5-1589476-1
STM009SC2DC024Q	2-1589777-5
STM009SC2DC036HN	5-1589476-2
STM009SC2DC036N	5-1589476-3
STM009SC2DC048N	5-1589476-4
STM009SC2DC060Q	5-1589476-5
STM009SC2DCC46N	4-1589777-7
STM009SC2DCM01HN	5-1589476-6
STM009SC2DCM01N	9-1589477-1
STM009SC2DCM02N	5-1589476-7
STM009SC2DM012HN	8-1589477-0
STM009SC2DM012Q	2-1589777-0
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STM009SC2DXC15Q	6-1589476-6
STM009SC2DXM01Q	9-1589477-9
STM015PC0DC036N	5-1589788-4
STM015PC0DCM02Q	2-1589473-9
STM015PC0DM012N	3-1589473-0
STM015PC0DM024N	1-1589788-3
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STM015PC2DC006N	3-1589473-8
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STM015PC2DC018N	4-1589473-2
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STM015PC2DCC10Q	0-1589788-9
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STM015PC2DXC15Q	6-1589473-9
STM015PC2GX004N	7-1589473-0
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STM015PC4DX024N	8-1589475-7
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STM015SC2DM036N	1-1589777-0
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STM015SC2DT012N	4-1589777-4
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STM015SC4DX012Q	9-1589476-5
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STM015SC4DXC20N	9-1589476-7
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STM025PC0DC060N	4-1589475-4
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STM025PC0DM024N	1-1589788-4
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STM025PC2DC010N	8-1589473-1
STM025PC2DC010Q	6-1589788-0
STM025PC2DC012	8-1589473-2
STM025PC2DC012N	8-1589473-3
STM025PC2DC015N	8-1589473-4
STM025PC2DC016N	8-1589473-5
STM025PC2DC018N	8-1589473-6
STM025PC2DC020N	8-1589473-7
STM025PC2DC020Q	8-1589473-8

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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DUALOBE Rectangular Connectors Part Number Cross Reference (Continued)

NANONICS Part Number	Tyco Electronics Part Number
STM025PC2DC024N	8-1589473-9
STM025PC2DC024Q	9-1589473-0
STM025PC2DC030N	9-1589473-1
STM025PC2DC036M	9-1589473-2
STM025PC2DC036N	9-1589473-3
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STM037PC2DC072N	4-1589474-9
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STM037SC2DC006Q	3-1589477-0
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STM051PC2DC012Q	7-1589474-3
STM051PC2DC015N	7-1589474-4
STM051PC2DC015Q	2-1589788-0
STM051PC2DC016N	7-1589474-5
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STM051PC2DC018N	7-1589474-7
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STM051SC2DC015HN	5-1589477-1
STM051SC2DC015N	5-1589477-2
STM051SC2DC016N	5-1589477-3

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Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DUALOBE Rectangular Connectors Part Number Cross Reference (Continued)

NANONICS Part Number	Tyco Electronics Part Number
STM051SC2DC018HN	5-1589477-4
STM051SC2DC018N	5-1589477-5
STM051SC2DC018Q	5-1589477-6
STM051SC2DC036N	5-1589477-7
STM051SC2DC036Q	0-1589777-7
STM051SC2DC060N	5-1589477-8
STM051SC2DC060Q	5-1589477-9
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STM051SC2DM024N	4-1589777-2
STM051SC2DMM01N	6-1589477-1
STM051SC2DT012N	0-1589777-3
STM051SC2DT018N	4-1589777-5
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STM065SC2DT012N	0-1589777-2
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Jumper Assemblies	
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JSL051PD2GXC80N	8-1589671-2
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NANONICS Part Number	Tyco Electronics Part Number
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JSM015PP2GX018N	0-1589672-8
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JSM025PR2DC006N	2-1589672-6
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JSM051PD2GXC12N	4-1589672-9
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JSM051PD2GXC17N	5-1589672-1
JSM051PD2GXC50N	5-1589672-2
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JSM051PP2GXC17N	5-1589672-6
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JTL009PD2GX012N	7-1589699-3

NANONICS Part Number	Tyco Electronics Part Number
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JTL009PP2DX006N	1-1589737-7
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JTL015PP2DX006N	1-1589737-6
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JTL015PR2DX008	9-1589672-6
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JTL025PD2DC1.25N	5-1589699-7
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JTL025PP2DC001N	4-1589737-2
JTL025PP2DC036N	9-1589672-8
JTL025PP2DCC05N	0-1589737-5
JTL025PP2DCC07N	9-1589672-9
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JTL025PR2DCM31N	0-1589673-4
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JTL037PP2DC024N	4-1589737-1
JTL037PP2DC07.5N	0-1589673-5
JTL037PP2DC08.5N	0-1589673-6
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JTL037PP2DX003N	0-1589673-9
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JTL051PR2DC048	1-1589673-8
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JTL065PP2DX012N	0-1589737-8
JTL065PR2DX002N	0-1589738-8
JTM009PD2DX003N	3-1589673-1
JTM009PD2DX006N	3-1589673-2
JTM009PP2DC006N	4-1589737-9
JTM009PP2DC012N	4-1589737-8
JTM009PP2DC02.5N	3-1589673-3
JTM009PP2DM004N	1-1589737-0
JTM009PP2DT002N	3-1589673-4
JTM009PP2DT004N	3-1589673-5

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

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USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DUALOBE Rectangular Connectors Part Number Cross Reference (Continued)

NANONICS Part Number	Tyco Electronics Part Number
JTM009PP2DX006N	3-1589673-6
JTM009PR2DC003Q	1-1589738-9
JTM009PR2DCC50N	3-1589673-7
JTM009PR2DT002M	0-1589738-3
JTM009PR2DX001N	2-1589738-5
JTM015PD2DX006N	0-1589798-1
JTM015PD2GX006N	0-1589798-2
JTM015PD2GX012N	6-1589673-4
JTM015PP2DC006M	6-1589673-5
JTM015PP2DC012M	6-1589673-6
JTM015PP2DC02.5N	6-1589673-7
JTM015PP2DC05.5N	4-1589737-4
JTM015PP2DT004N	6-1589673-8
JTM015PP2DX001N	6-1589673-9
JTM015PP2DX005Q	2-1589737-8
JTM015PP2DX006N	7-1589673-0
JTM015PP2DX009N	7-1589673-1
JTM015PP2DX024N	7-1589673-2
JTM015PP2DY003N	1-1589737-9
JTM015PP2DY011N	2-1589737-0
JTM015PP2DY022N	2-1589737-1
JTM015PR2DC002N	7-1589673-8
JTM015PR2DC003Q	2-1589738-0
JTM015PR2DC012M	7-1589673-9
JTM015PR2DT001N	8-1589673-0
JTM015PR2DT002M	0-1589738-2
JTM015PR2DX001N	2-1589738-6
JTM015PR2DX003N	0-1589738-6
JTM015RR2DC012N	0-1589804-1
JTM025PD2GX002N	0-1589798-3
JTM025PP2DC001N	4-1589737-7
JTM025PP2DC012N	4-1589737-6
JTM025PP2DC018N	3-1589737-3
JTM025PP2DC024N	3-1589737-5
JTM025PP2DC030N	3-1589737-7
JTM025PP2DC035N	5-1589737-0
JTM025PP2DC2.75N	1-1589737-8
JTM025PP2DM024M	3-1589737-2
JTM025PP2DX001N	2-1589674-8
JTM025PP2DX012N	2-1589674-9
JTM025PP2DX018N	3-1589674-0
JTM025PP2DX022N	3-1589674-1
JTM025PP2DX03.8M	3-1589674-2
JTM025PP2DX03.8N	3-1589674-3
JTM025PP2DX040N	2-1589737-4
JTM025PP2DY006	0-1589737-6
JTM025PP2DY006N	3-1589674-4
JTM025PP2DY020N	3-1589674-5
JTM025PP2DY024N	2-1589737-3
JTM025PR0DXC20N	3-1589674-6
JTM025PR0DXC30N	3-1589674-7
JTM025PR2DC003Q	2-1589738-1
JTM025PR2DT001N	3-1589674-8
JTM025PR2DT002M	0-1589738-1
JTM025PR2DT240N	3-1589674-9
JTM025PR2DX0.5N	4-1589674-0
JTM025PR2DX001N	2-1589738-7
JTM025PR2DX003N	0-1589738-5

NANONICS Part Number	Tyco Electronics Part Number
JTM025PR2DX006Q	4-1589674-1
JTM025PR2DX012N	4-1589674-2
JTM025PR2DX020	4-1589674-3
JTM037PD2DC002N	8-1589674-8
JTM037PD2DC004N	8-1589674-9
JTM037PD2GX012N	9-1589674-0
JTM037PD2GX024N	9-1589674-1
JTM037PP0DM006	9-1589674-2
JTM037PP0DM006N	3-1589737-9
JTM037PP2DC018N	3-1589737-4
JTM037PP2DC024N	3-1589737-6
JTM037PP2DC036N	3-1589737-8
JTM037PP2DC041N	5-1589737-1
JTM037PP2DX001.75N	9-1589674-3
JTM037PP2DX001N	9-1589674-4
JTM037PP2DX002N	0-1589737-9
JTM037PP2DX002Q	3-1589737-0
JTM037PP2DX004N	9-1589674-6
JTM037PP2DX006Q	9-1589674-7
JTM037PP2DX009Q	9-1589674-8
JTM037PP2DX010Q	2-1589737-9
JTM037PP2DX016	9-1589674-9
JTM037PP2DX024N	0-1589675-1
JTM037PP2DX3.5N	2-1589737-6
JTM037PR0DC036M	0-1589675-3
JTM037PR2DC003Q	2-1589738-2
JTM037PR2DC005N	1-1589738-2
JTM037PR2DCC16Q	1-1589738-0
JTM037PR2DT001N	0-1589675-4
JTM037PR2DT002M	0-1589738-4
JTM037PR2DX001	1-1589738-1
JTM037PR2DX001N	0-1589675-5
JTM037PR2DX001Q	1-1589738-6
JTM037PR2DX006Q	1-1589738-7
JTM037PR2GX002	0-1589675-6
JTM037PR2GX003N	0-1589675-7
JTM051PD2DC002N	0-1589798-4
JTM051PD2DT004N	6-1589675-1
JTM051PD2DXC10N	6-1589675-2
JTM051PP2DC001N	4-1589737-5
JTM051PP2DC004N	6-1589675-3
JTM051PP2DC2.5N	7-1589699-4
JTM051PP2DT005	0-1589737-2
JTM051PP2DX001N	6-1589675-4
JTM051PP2DX004N	6-1589675-5
JTM051PP2DX009Q	5-1589737-2
JTM051PP2DX012N	6-1589675-6
JTM051PP2DX036N	1-1589737-3
JTM051PP2DX040N	1-1589737-4
JTM051PP2DX2.5N	6-1589675-7
JTM051PP2DX4.5N	6-1589675-8
JTM051PR0DC036N	2-1589738-9
JTM051PR2DC002N	6-1589675-9
JTM051PR2DC003Q	2-1589738-3
JTM051PR2DC005	7-1589675-0
JTM051PR2DC006Q	2-1589738-4
JTM051PR2DC018N	0-1589738-7
JTM051PR2DT001N	7-1589675-1

NANONICS Part Number	Tyco Electronics Part Number
JTM051PR2DX002N	7-1589675-2
JTM051PR2GX002	7-1589675-3
JTM051PR2GX006Q	7-1589675-4
JTM051RR2DC003	7-1589675-5
JTM065PD2GX022N	7-1589699-1
JTM065PP2DC004N	1-1589737-2
JTM065PP2DMC10Q	3-1589737-1
JTM065PP2DX002N	0-1589676-1
JTM065PP2DX004N	0-1589676-2
JTM065PP2DX006N	0-1589676-3
JTM065PP2DX007N	0-1589676-4
JTM065PR2DC001N	0-1589676-5
JTM065PR2DC003	0-1589676-6
JTM065PR2DC003N	0-1589676-7
JTM065PR2DX001N	2-1589738-8
JTM065PR2DX004N	0-1589676-8
JTM065PR2DX004Q	1-1589738-8
JTM065PR2GX001N	0-1589676-9
JTM065RR2DC003	1-1589676-0

Surface Mount

NANONICS Part Number	Tyco Electronics Part Number
SSL005L2AN	0-1589462-5
SSL005L2HN	0-1589462-6
SSL009B2H	0-1589700-2
SSL009L2AN	0-1589462-7
SSL009L2AQ	0-1589462-8
SSL009L2HN	0-1589462-9
SSL009L42HN	0-1589463-1
SSL009L43KN	0-1589464-1
SSL009L4CN	0-1589463-2
SSL009L4KN	0-1589463-3
SSL015L2AN	1-1589462-0
SSL015L2AQ	1-1589462-1
SSL015L2CN	1-1589462-2
SSL015L2H	1-1589462-3
SSL015L2HN	1-1589462-4
SSL015L4N	0-1589463-4
SSL015L4PQ	2-1589463-6
SSL025B2	0-1589460-1
SSL025L23N	1-1589462-5
SSL025L2AN	1-1589462-6
SSL025L2HN	1-1589462-7
SSL025L42	0-1589463-5
SSL037B2H	0-1589700-3
SSL037B2N	0-1589460-4
SSL037L2HN	1-1589462-8
SSL037L43KN	0-1589464-2
SSL051B2	0-1589460-5
SSL051L2CN	1-1589462-9
SSL051L2HN	2-1589462-0
SSM005L2HN	2-1589462-1
SSM005L2N	4-1589462-8
SSM005L82HN	0-1589467-3
SSM005L84HN	0-1589467-4
SSM005L85HN	0-1589468-1
SSM009B2H	0-1589700-4
SSM009B2N	0-1589460-7
SSM009L2	2-1589462-2

NANONICS Part Number	Tyco Electronics Part Number
SSM009L2AN	2-1589462-3
SSM009L2AQ	2-1589462-4
SSM009L2HN	2-1589462-5
SSM009L2N	2-1589462-6
SSM009L2SN	2-1589462-7
SSM009L42KN	0-1589463-6
SSM009L44KN	0-1589463-7
SSM009L44N	0-1589463-8
SSM009L4AQ	2-1589463-7
SSM009L4KN	0-1589463-9
SSM009L85HN	0-1589468-2
SSM015B2N	1-1589460-3
SSM015B45H	0-1589466-1
SSM015H5	0-1589819-1
SSM015L2AN	2-1589462-8
SSM015L2AQ	2-1589462-9
SSM015L2CN	3-1589462-0
SSM015L2HN	3-1589462-1
SSM015L2N	4-1589462-7
SSM015L2SN	3-1589462-2
SSM015L44KN	1-1589463-0
SSM015L4KN	1-1589463-1
SSM015L4PQ	1-1589463-2
SSM015L82HN	0-1589467-2
SSM015L84HN	0-1589467-5
SSM015L85HN	0-1589468-3
SSM025B2H	0-1589700-5
SSM025B44N	0-1589465-1
SSM025B45K	0-1589466-2
SSM025L23N	3-1589462-3
SSM025L2AN	3-1589462-4
SSM025L2AQ	3-1589462-5
SSM025L2GQ	4-1589462-9
SSM025L2HN	3-1589462-6
SSM025L2N	5-1589462-2
SSM025L2SN	3-1589462-8
SSM025L42HN	2-1589463-4
SSM025L44HN	1-1589463-3
SSM025L44KN	1-1589463-4
SSM025L44SN	2-1589463-8
SSM025L45KN	0-1589464-3
SSM025L4HN	1-1589463-5
SSM025L4KN	1-1589463-6
SSM025L4PQ	1-1589463-7
SSM025L4SN	1-1589463-8
SSM037B2	0-1589460-9
SSM037B2H	0-1589700-6
SSM037B2N	1-1589460-2
SSM037L2AQ	3-1589462-9
SSM037L2HN	4-1589462-1
SSM037L2IQ	5-1589462-1
SSM037L42IQ	2-1589463-5
SSM037L42KN	1-1589463-9
SSM037L4KN	2-1589463-0
SSM037L82AQ	0-1589467-6
SSM037L84KN	0-1589467-1
SSM037L85PQ	0-1589468-4
SSM051B2H	0-1589700-1

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DUALOBE Rectangular Connectors Part Number Cross Reference (Continued)

NANONICS Part Number	Tyco Electronics Part Number
SSM051L2AQ	4-1589462-3
SSM051L2GQ	5-1589462-0
SSM051L2HN	4-1589462-4
SSM051L2IQ	4-1589462-5
SSM051L42KN	2-1589463-1
SSM051L44KN	2-1589463-2
SSM051L4KN	2-1589463-3
STL009L23N	8-1589483-3
STL009L2AQ	9-1589483-2
STL009L2H	0-1589483-8
STL009L2HN	0-1589483-9
STL009L423N	0-1589484-1
STL009L42CN	9-1589484-0
STL009L42HN	8-1589484-4
STL009L42KN	0-1589484-2
STL009L44KN	9-1589484-3
STL009L4KN	0-1589484-3
STL009L4N	9-1589484-2
STL015B2N	0-1589490-1
STL015B44N	0-1589485-1
STL015L23N	1-1589483-0
STL015L2AN	1-1589483-1
STL015L2AQ	1-1589483-2
STL015L2CN	1-1589483-3
STL015L2HN	1-1589483-4
STL015L2HQ	8-1589483-7
STL015L2N	8-1589483-6
STL015L423N	0-1589484-4
STL015L42KN	0-1589484-5
STL015L44KN	0-1589484-6
STL015L44N	0-1589484-7
STL015L4CQ	0-1589484-8
STL015L4HN	0-1589484-9
STL015L4KN	1-1589484-0
STL025B2	0-1589490-2
STL025B2N	1-1589490-1
STL025B44M	2-1589485-3
STL025L2AN	1-1589483-5
STL025L2AQ	1-1589483-6
STL025L2CN	8-1589483-9
STL025L2HN	1-1589483-7
STL025L2HQ	8-1589483-8
STL025L2JN	1-1589483-8
STL025L42KN	1-1589484-1
STL025L44KN	9-1589484-4
STL025L44N	1-1589484-2
STL025L4HN	1-1589484-3
STL025L4KN	1-1589484-4
STL025L4PQ	8-1589484-6
STL037B2M	1-1589490-3
STL037B42	0-1589485-2
STL037L23N	1-1589483-9
STL037L2AN	2-1589483-0
STL037L2AQ	2-1589483-1
STL037L2HN	2-1589483-2
STL037L2JN	2-1589483-3
STL037L2KN	9-1589483-7
STL037L2N	8-1589483-5
STL037L42KN	8-1589484-2
STL037L44KN	1-1589484-5
STL037L4HN	1-1589484-6
STL051L2AN	9-1589483-4
STL051L2AQ	2-1589483-4
STL051L2CN	2-1589483-5
STL051L2HN	2-1589483-6
STL051L42KN	1-1589484-7
STL051L4HN	1-1589484-8
STL051L4KN	1-1589484-9
STL051L4PQ	8-1589484-7
STL065L2AQ	9-1589483-0
STL065L2HN	2-1589483-7
STL065L2N	2-1589483-8
STL065L42KN	2-1589484-0
STL065L44N	2-1589484-1
STL065L4CQ	2-1589484-2
STL065L4KN	2-1589484-3
STL065T5	0-1589814-1
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STM009B42N	0-1589485-3
STM009B44Q	1-1589485-5
STM009H2N	0-1589902-4
STM009L23N	2-1589483-9
STM009L2AN	9-1589483-9
STM009L2AQ	8-1589483-2
STM009L2CN	7-1589483-8
STM009L2HN	3-1589483-0
STM009L2N	3-1589483-1
STM009L2SN	3-1589483-2
STM009L42CN	8-1589484-1
STM009L42HN	2-1589484-4
STM009L42KN	2-1589484-5
STM009L44HN	2-1589484-6
STM009L44PQ	2-1589484-7
STM009L44Q	2-1589484-8
STM009L4AQ	2-1589484-9
STM009L4KN	3-1589484-0
STM009L4PQ	3-1589484-1
STM009L84HN	2-1589486-4
STM009L8HN	1-1589486-7
STM015B2N	0-1589490-3
STM015B42N	0-1589485-4
STM015H2N	0-1589902-3
STM015H5Q	0-1589813-1
STM015L23N	3-1589483-4
STM015L2AQ	3-1589483-5
STM015L2CN	7-1589483-7
STM015L2HN	3-1589483-6
STM015L2HQ	3-1589483-7
STM015L2LQ	3-1589483-8
STM015L2N	3-1589483-9
STM015L2SN	4-1589483-0
STM015L42KN	3-1589484-2
STM015L44AQ	3-1589484-3
STM015L44HN	3-1589484-4
STM015L44KN	3-1589484-5
STM015L44Q	3-1589484-6
STM015L4HN	3-1589484-7
STM015L4KN	3-1589484-8
STM015L4PQ	3-1589484-9
STM015L4SN	8-1589484-8
STM015L82CN	3-1589486-0
STM015L82HN	0-1589486-1
STM015L82IQ	1-1589486-3
STM015L82LQ	2-1589486-1
STM015L84AQ	3-1589486-5
STM015L84CN	3-1589486-2
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STM015L84IQ	3-1589486-4
STM015L84KN	0-1589486-2
STM015L8HN	3-1589486-7
STM025B2N	0-1589490-4
STM025B42N	0-1589485-5
STM025B44	0-1589485-6
STM025B44N	1-1589485-9
STM025B44Q	1-1589485-7
STM025H2N	0-1589902-2
STM025H44N	0-1589817-1
STM025H5N	0-1589813-2
STM025H5Q	0-1589813-3
STM025L2AN	4-1589483-2
STM025L2AQ	4-1589483-3
STM025L2CN	4-1589483-4
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STM025L2HQ	4-1589483-6
STM025L2IQ	4-1589483-7
STM025L2JN	4-1589483-8
STM025L2N	4-1589483-9
STM025L42CN	7-1589484-9
STM025L42KN	4-1589484-0
STM025L44HM	4-1589484-1
STM025L44HN	4-1589484-2
STM025L44KN	4-1589484-3
STM025L44N	4-1589484-4
STM025L44PQ	4-1589484-5
STM025L44Q	4-1589484-6
STM025L4CN	7-1589484-6
STM025L4KN	4-1589484-7
STM025L4LQ	4-1589484-8
STM025L4PN	4-1589484-9
STM025L4PQ	5-1589484-0
STM025L4SN	5-1589484-1
STM025L82CN	2-1589486-9
STM025L82HN	0-1589486-3
STM025L84CN	3-1589486-3
STM025L84KN	0-1589486-4
STM025L8HN	0-1589486-9
STM037B2H	0-1589480-1
STM037B2M	1-1589490-4
STM037B2N	0-1589490-5
STM037B4	2-1589485-0
STM037B42N	0-1589485-8
STM037B42Q	1-1589485-8
STM037B4N	0-1589485-9
STM037H2N	0-1589902-1
STM037L23N	5-1589483-2
STM037L2AN	5-1589483-3
STM037L2AQ	5-1589483-4
STM037L2CN	8-1589483-1
STM037L2HN	5-1589483-5
STM037L2IQ	9-1589483-1
STM037L2KN	9-1589483-8
STM037L2N	8-1589483-4
STM037L2SN	5-1589483-7
STM037L2TQ	9-1589483-5
STM037L42AQ	9-1589484-7
STM037L42HN	5-1589484-2
STM037L42K	5-1589484-3
STM037L42KN	5-1589484-4
STM037L42PQ	8-1589484-3
STM037L44DQ	8-1589484-0
STM037L44KN	5-1589484-5
STM037L44N	8-1589484-9
STM037L44PQ	5-1589484-6
STM037L44Q	5-1589484-7
STM037L44SN	5-1589484-8
STM037L4CN	7-1589484-7
STM037L4HN	5-1589484-9
STM037L4KN	6-1589484-0
STM037L4PQ	6-1589484-1
STM037L4SN	9-1589484-6
STM037L82AQ	0-1589486-5
STM037L82HN	1-1589486-2
STM037L82PQ	1-1589486-1
STM037L84AQ	1-1589486-6
STM037L84HN	2-1589486-7
STM037L84N	1-1589486-9
STM037L84PQ	3-1589486-6
STM037L84SN	3-1589486-8
STM037L8HN	4-1589486-0
STM051B2H	0-1589480-2
STM051B2N	0-1589490-6
STM051B2Q	0-1589490-8
STM051B42N	1-1589485-0
STM051B4N	2-1589485-2
STM051H5	0-1589813-4
STM051L23N	5-1589483-9
STM051L2AQ	6-1589483-0
STM051L2CN	6-1589483-2
STM051L2HN	6-1589483-3
STM051L2HQ	6-1589483-4
STM051L2IQ	7-1589483-9
STM051L2JN	6-1589483-5
STM051L2Q	6-1589483-6
STM051L2SN	6-1589483-8
STM051L2TQ	9-1589483-6
STM051L42HN	6-1589484-3
STM051L42KN	6-1589484-4
STM051L42N	6-1589484-5
STM051L44HN	6-1589484-6
STM051L44KN	6-1589484-7
STM051L44PQ	6-1589484-8
STM051L44Q	6-1589484-9

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DUALOBE Rectangular Connectors Part Number Cross Reference (Continued)

NANONICS Part Number	Tyco Electronics Part Number
STM051L4CN	7-1589484-8
STM051L4HN	9-1589484-1
STM051L4KN	7-1589484-0
STM051L4PQ	7-1589484-1
STM051L4SN	9-1589484-5
STM051L82AQ	3-1589486-9
STM051L82HN	2-1589486-0
STM051L82IQ	1-1589486-5
STM051L82LQ	2-1589486-2
STM051L84HN	2-1589486-8
STM051L8HN	1-1589486-0
STM065B2H	0-1589480-3
STM065B2N	1-1589490-0
STM065B2Q	0-1589490-9
STM065B42N	1-1589485-1
STM065B42Q	2-1589485-1
STM065B44	1-1589485-2
STM065B44N	1-1589485-6
STM065B44Q	1-1589485-3
STM065B4Q	1-1589485-4
STM065L23N	7-1589483-0
STM065L2AQ	7-1589483-1
STM065L2CN	7-1589483-2
STM065L2HN	7-1589483-3
STM065L2IQ	8-1589483-0
STM065L2JN	7-1589483-4
STM065L2KN	7-1589483-5
STM065L42HN	7-1589484-2
STM065L42KN	7-1589484-3
STM065L42N	7-1589484-4
STM065L4KN	7-1589484-5
STM065L82AQ	0-1589486-6
STM065L82HN	0-1589486-7
STM065L82IQ	1-1589486-4
STM065L82LQ	2-1589486-3
STM065L84HN	2-1589486-6
STM065L84IQ	0-1589486-8
STM065L84N	3-1589486-1
STM065L8HN	1-1589486-8

Through-Hole

NANONICS Part Number	Tyco Electronics Part Number
SSL005M6SN	0-1589469-6
SSL009M5CN	1-1589470-5
SSL009M6A	3-1589469-5
SSL009M6CN	3-1589469-9
SSL009M6D	0-1589469-7
SSL009M6H	0-1589469-8
SSL009M6SN	0-1589469-9
SSL015M5KN	0-1589470-2
SSL015M6A	3-1589469-6
SSL015M6CN	3-1589469-8
SSL015M6D	1-1589469-0
SSL015M6N	1-1589469-1
SSL015M6SN	4-1589469-5
SSL025M5CN	0-1589470-3
SSL025M6A	3-1589469-7
SSL025M6CN	4-1589469-0
SSL025M6D	1-1589469-2
SSL025M6DQ	1-1589469-3
SSL025M6H	1-1589469-4
SSL025M6HN	1-1589469-5
SSL025M6SQ	1-1589469-6
SSL037M5N	0-1589470-4
SSL037M6SN	4-1589469-1
SSM005M6SN	1-1589469-7
SSM009C5Q	0-1589461-1
SSM009C6Q	0-1589471-1
SSM009M5CN	0-1589470-5
SSM009M5HN	0-1589470-6
SSM009M5LQ	0-1589470-7
SSM009M6AQ	1-1589469-8
SSM009M6CN	1-1589469-9
SSM009M6DQ	2-1589469-0
SSM009M6HN	2-1589469-2
SSM009M6SN	2-1589469-4
SSM015C5N	0-1589461-2
SSM015C6N	0-1589471-4
SSM015M5CN	0-1589470-8
SSM015M5LQ	0-1589470-9
SSM015M6HN	2-1589469-5
SSM015M6SN	2-1589469-6
SSM025C6Q	0-1589471-2
SSM025M5CN	1-1589470-0
SSM025M5HN	1-1589470-1
SSM025M5LQ	1-1589470-2
SSM025M5N	1-1589470-4
SSM025M6AQ	4-1589469-6
SSM025M6DQ	2-1589469-7
SSM025M6HN	2-1589469-8
SSM025M6SN	3-1589469-0
SSM037C5Q	0-1589461-4
SSM037C6N	0-1589471-3
SSM037M6HN	3-1589469-2
SSM037M6HQ	4-1589469-2
SSM037M6SN	3-1589469-3
SSM051C5N	0-1589461-3
SSM051M5CN	1-1589470-3
SSM051M6N	4-1589469-4
SSM051M6SN	3-1589469-4
STL009M5CN	4-1589488-8
STL009M5KN	6-1589488-5
STL009M5L	0-1589488-7
STL009M6CN	6-1589487-1
STL009M6HN	7-1589487-8
STL015C5N	0-1589482-6
STL015M5CN	0-1589488-8
STL015M5KN	6-1589488-6
STL015M5SN	5-1589488-1
STL015M6CN	0-1589487-6
STL015M6HN	6-1589487-4
STL015M6KN	7-1589487-5
STL015M6SN	0-1589487-7
STL025C5N	0-1589482-1
STL025C6N	0-1589481-1
STL025M5	1-1589488-0
STL025M5CN	1-1589488-1
STL025M5KN	5-1589488-2
STL025M6	0-1589487-9
STL025M6D	6-1589487-3
STL025M6DQ	1-1589487-0
STL025M6HN	6-1589487-5
STL025M6KN	7-1589487-6
STL025M6N	1-1589487-1
STL025M6SN	1-1589487-2
STL037M5CN	4-1589488-9
STL037M5LQ	1-1589488-3
STL037M5Q	1-1589488-4
STL037M6HN	6-1589487-6
STL037M6SN	1-1589487-5
STL051M5CN	1-1589488-5
STL051M5KN	5-1589488-4
STL051M6A	1-1589487-6
STL051M6AN	8-1589487-0
STL051M6HN	6-1589487-7
STL051M6IN	8-1589487-1
STL051M6SN	1-1589487-7
STL065M5KN	5-1589488-3
STL065M6HN	8-1589487-2
STL065M6SN	1-1589487-8
STM009C5N	1-1589482-3
STM009C5Q	1-1589482-5
STM009C6N	0-1589481-2
STM009M5AQ	5-1589488-8
STM009M5CN	1-1589488-6
STM009M5DQ	1-1589488-7
STM009M5HN	1-1589488-8
STM009M5LQ	1-1589488-9
STM009M5PQ	5-1589488-9
STM009M5Q	2-1589488-0
STM009M6AN	1-1589487-9
STM009M6AQ	5-1589487-6
STM009M6CN	6-1589487-9
STM009M6DQ	2-1589487-0
STM009M6HN	2-1589487-1
STM009M6IQ	5-1589487-7
STM009M6SN	2-1589487-2
STM015C5N	0-1589482-7
STM015C6N	0-1589481-3
STM015M5AN	2-1589488-1
STM015M5AQ	7-1589488-1
STM015M5CN	2-1589488-2
STM015M5HN	2-1589488-3
STM015M5KN	2-1589488-4
STM015M5LN	2-1589488-5
STM015M5LQ	2-1589488-6
STM015M5PQ	2-1589488-7
STM015M5SN	6-1589488-7
STM015M6AN	2-1589487-3
STM015M6CN	6-1589487-8
STM015M6DQ	2-1589487-4
STM015M6HN	2-1589487-5
STM015M6IQ	5-1589487-8
STM015M6N	2-1589487-6
STM015M6S	2-1589487-7
STM015M6SN	2-1589487-8
STM015M9AN	0-1589489-1
STM015M9HN	0-1589489-3
STM025C5N	0-1589482-2
STM025C5Q	1-1589482-1
STM025C6N	0-1589481-4
STM025M5AQ	6-1589488-4
STM025M5CN	2-1589488-8
STM025M5HN	2-1589488-9
STM025M5LQ	3-1589488-0
STM025M5PQ	3-1589488-1
STM025M5SN	3-1589488-2
STM025M6AN	2-1589487-9
STM025M6CN	3-1589487-0
STM025M6DQ	3-1589487-1
STM025M6HN	3-1589487-2
STM025M6N	3-1589487-3
STM025M6Q	3-1589487-4
STM025M6SN	3-1589487-5
STM025M9AN	0-1589489-2
STM025M9HN	0-1589489-4
STM037C5	0-1589482-9
STM037C5N	1-1589482-6
STM037C5Q	1-1589482-2
STM037C6N	0-1589481-5
STM037C6Q	0-1589481-9
STM037M5AN	3-1589488-3
STM037M5AQ	5-1589488-7
STM037M5CN	3-1589488-4
STM037M5HN	3-1589488-5
STM037M5N	3-1589488-6
STM037M5PQ	3-1589488-7
STM037M5SN	3-1589488-8
STM037M6AN	3-1589487-6
STM037M6AQ	3-1589487-7
STM037M6CN	7-1589487-9
STM037M6DN	3-1589487-8
STM037M6DQ	3-1589487-9
STM037M6HN	4-1589487-0
STM037M6IQ	6-1589487-0
STM037M6SN	4-1589487-1
STM037M6SQ	4-1589487-2
STM051C5	1-1589482-0
STM051C5N	0-1589482-3
STM051C5Q	0-1589482-4
STM051C6N	0-1589481-6
STM051M5AQ	3-1589488-9
STM051M5CN	4-1589488-0
STM051M5DQ	4-1589488-1
STM051M5LQ	4-1589488-2
STM051M5PQ	4-1589488-3
STM051M5SN	6-1589488-8
STM051M6CN	4-1589487-3
STM051M6DQ	4-1589487-4
STM051M6HN	4-1589487-5
STM051M6N	7-1589487-2
STM051M6PQ	4-1589487-6

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NANONICS Part Number	Tyco Electronics Part Number
STM051M6SN	4-1589487-7
STM051M6SQ	4-1589487-8
STM065C5M	0-1589482-8
STM065C5N	1-1589482-4
STM065C5Q	0-1589482-5
STM065C6	0-1589481-7
STM065C6N	0-1589481-8
STM065M5AQ	7-1589488-0
STM065M5CN	4-1589488-4
STM065M5FN	5-1589488-5
STM065M5HN	5-1589488-0
STM065M5IQ	7-1589488-2
STM065M5LQ	4-1589488-6
STM065M5N	4-1589488-7
STM065M5SN	6-1589488-9
STM065M6	5-1589487-0
STM065M6AQ	7-1589487-3
STM065M6CN	5-1589487-1
STM065M6HN	5-1589487-3
STM065M6KN	6-1589487-2
STM065M6SN	5-1589487-4
Flex Term "Duckbill"	
STL00911378PC	0-1589066-3
STL00911378PCN	0-1589066-4
STL00911378SCN	0-1589067-1
STL01511378PCN	0-1589066-5
STL02511378PCN	0-1589066-6
STL02511378SCN	0-1589067-2
STL03711378PC	2-1589066-4
STL03711378PCN	0-1589066-7
STL05111378PCN	0-1589066-8
STL05111378SCHN	0-1589067-3
STL06511378PC	0-1589066-9
STL06511378PCN	1-1589066-0
STL06511378SCN	0-1589067-4
STM00911378PCN	1-1589066-1
STM00911378SCN	0-1589067-6
STM01511378PCN	2-1589066-3
STM01511378SCN	0-1589067-7
STM02511378PC	1-1589066-2
STM02511378PCN	1-1589066-3
STM02511378SCN	0-1589067-8
STM03711378PCN	1-1589066-4
STM03711378PCQ	1-1589066-5
STM03711378SCN	1-1589067-2
STM05111378PC	1-1589066-6
STM05111378PCM	1-1589066-7
STM05111378PCN	1-1589066-8
STM05111378PCQ	1-1589066-9
STM05111378SCN	0-1589067-9
STM06511378PC	2-1589066-2
STM06511378PCN	2-1589066-0
STM06511378PCQ	2-1589066-1
STM06511378SCN	1-1589067-0
Solder Cup Termination	
SSL00511500PCN	0-1589051-1
SSL00511500SCN	0-1589052-1
SSL00911500PC	0-1589051-2
SSL00911500PCN	0-1589051-3
SSL00911500SCN	0-1589052-2
SSL01511500PCM	0-1589051-4
SSL01511500PCN	0-1589051-5
SSL01511500SCN	0-1589052-3
SSM00511500PC	1-1589051-4
SSM00511500PCH	0-1589051-6
SSM00511500PCN	0-1589051-7
SSM00511500SCN	0-1589052-4
SSM00911500PC	0-1589051-8
SSM00911500PCN	0-1589051-9
SSM00911500SCN	1-1589052-1
SSM01511500PCN	1-1589051-0
SSM01511500SC	0-1589052-5
SSM01511500SCN	1-1589052-0
SSM02511500SCQ	0-1589052-7
SSM03711500PC	1-1589051-1
SSM03711500PCN	1-1589051-2
SSM05111500PCN	1-1589051-3
SSM05111500SCN	0-1589052-8
STL00911500PC	2-1589053-2
STL00911500PCN	0-1589053-1
STL00911500SCN	0-1589054-1
STL01511500PC	2-1589053-1
STL01511500PCN	0-1589053-2
STL01511500SCN	0-1589054-2
STL02511500PC	0-1589053-3
STL02511500PCN	0-1589053-4
STL02511500SC	0-1589054-3
STL03711500PCN	0-1589053-5
STL03711500SCN	0-1589054-4
STL05111500PCN	0-1589053-6
STM00911500PCN	0-1589053-7
STM00911500SCN	0-1589054-5
STM01511500PCN	0-1589053-8
STM01511500PCQ	0-1589053-9
STM01511500SCHN	0-1589054-6
STM01511500SCN	0-1589054-7
STM01511500SCQ	1-1589054-4
STM02511500PC	1-1589053-0
STM02511500PCN	1-1589053-1
STM02511500PCQ	2-1589053-3
STM02511500SC	0-1589054-8
STM02511500SCN	0-1589054-9
STM03711500PCN	1-1589053-2
STM03711500PCQ	1-1589053-3
STM03711500SCN	1-1589054-0
STM05111500PCN	1-1589053-4
STM05111500PCQ	1-1589053-5
STM05111500SCN	1-1589054-1
STM05111500SCQ	1-1589054-5
STM06511500PC	1-1589053-6
STM06511500PCN	1-1589053-7
STM06511500SCN	1-1589054-2
STM06511500SCQ	1-1589054-6
Panel Mount	
PSM005SC2DC024N	0-1589851-2
PSM009SC2DC060N	0-1589851-1
PTM009SC2DC060N	0-1589050-7
PTM015SC2DC024N	0-1589050-4
PTM015SC2DC060N	0-1589050-5
PTM025SC2DC060N	0-1589050-6
PTM037SC2DC018N	0-1589050-3
PTM065SC2DC018N	0-1589050-2

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Revised 8-06

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Microminiature D Connectors

Product Facts

- Designed for both military and commercial applications
- Low engaging force is achieved by the manner in which Twist Pin Contacts are designed
- The metal shell and plastic shell are available with solder cup and solid or stranded wire terminations
- Mating force maximum is 10 oz. [2.78N] times the number of contacts
- Durability — No known mechanical or electrical issues detrimental to the function of the connectors after 500 cycles of mating and unmating
- Current Rating — 3 amps max per contact

MICRODOT Connectors MCK and MCD High Density Microminiature “D” Connectors described in this catalog comprise a complete connector system, which is adaptable to a numerous variety of form factors. Low engaging force is achieved by the manner in which the twist pin contacts are designed. By constructing the male contact as a breathing helical spring, electrical contact is achieved at many points around the periphery of the pin bundle rather than at a few discrete points, as in conventional pin designs. Normal twist pin engagement force is 6 oz. [1.67N] typically and 8 oz. [2.22N] maximum. The low force twist pins exhibit an engaging force of 4 oz. [1.11N] typically and 5 oz. [1.39N] maximum. Low force twist pins are standard in MIL-DTL-83513 configurations of MCK and MCD connectors and may be supplied as an option in all other configurations.

The MCK and MCD Series of connectors featured in this catalog are designed to meet the applicable requirements of MIL-DTL-83513, for intermateability, interchangeability, and performance. Designed for both military and commercial applications, the MCK’s and MCD’s are especially well suited for use in miniaturized airborne and space electronics, computers, and test equipment. The metal shell MCK’s and plastic shell MCD’s are available with solder cup, and solid or stranded wire terminations. MCK transition blocks are standard for printed circuit board mounting. Custom termination configurations for both MCK and MCD can be accommodated. Micro D’s are also supplied in wired harness assemblies.

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MCK/MCD/MCDM Series Metal and Plastic Shell Connectors

Technical and Performance Data

(Applicable to MCK, MCD and MCDM unless otherwise noted)

Electrical

Contacts — Pin 24 AWG twist pin, Socket 24 AWG precision machined barrel, Wire Range 24 AWG to 30 AWG solid and stranded.

Contact Resistance — (voltage drop) 25 millivolts max. at 3 amps, 77°± 7.4°F [25°± 3° C].

Current Rating — 3 amps max. per contact.

Dielectric Withstanding Voltage — Volts RMS 60 Hz at room ambient. At sea level 600V solder pots, 750V wire terminations & transition blocks. At 70,000 ft. [21,336 m] 150V solder pots, 200V wire terminations & transition blocks.

Insulation Resistance — 5,000 megohms min. (@ 500 VDC) at ambient room temperature.

Magnetic Permeability — 2 mu max.

Mechanical

Contact Spacing — .050 [1.27mm] centers.

Contact Engagement & Separation — Standard contact engaging force is 6.0 oz. [1.67N] (8.0 oz. [2.22N] max.). Separation force is 0.5 [.14N] oz. min.

Mating Force Maximum — Calculated as 10 oz. times the number of contacts.

Environmental

Temperature Range — –67°F to 257°F [–55° C to +125°C] for MCK/MCD, –67°F to 302°F [–55°C to +150°C] for MCDM.

Vibration — No discontinuity in excess of 1 µ sec. when tested in accordance with MIL-STD-1344, Method 2005, test Condition IV.

Solderability — Connectors shall pass the test requirements of MIL-STD-202, Method 208

Shock — No discontinuity in excess of 1 µ sec. when tested in accordance with MIL-STD-1344, Method 2004, test Condition E.

Durability — No mechanical or electrical defects detrimental to the function of the connectors after 500 cycles of mating and unmating.

Humidity — After exposure to humidity as specified by MIL-STD-1344, Method 1002, Type II, IR shall be 1 megohm min. following step 7a of Method 1002 and 1000 megohms min. after 24 hours of conditioning per Method 1002.

Salt Spray — Connectors shall meet the performance requirements of contact resistance, mating and unmating forces, and contact retention after being subjected to the 48-hour 5% solution salt spray test per MIL-STD-1344, Method 1001, Condition B.

Fluid Immersion — Unmated connectors after being fully immersed in one of the following fluids, for the prescribed time, will mate at a force of 10 oz. [2.78N] times the number of contacts or less: Perchloroethylene, 2 hours; Lubricating oil per MIL-L-23699, 20 hours.

Insert Retention — Inserts will withstand a 50 lb. [34N/cm²] per square inch load in either direction.

Crimp Termination Tensile Strength — (Unassembled contacts with crimped stranded wire terminations) Wires will not pull out of contacts when the following axial loads are applied: 24 AWG, 5 lbs. [22.24N]; 26 AWG, 4 lbs. [17.79N]; 28 AWG, 3 lbs. [13.34N]

Outgassing — When tested in accordance with SP-R-0022, Total Mass Loss (TML) shall be less than 1.0% and Volatile Condensable Material (VCM) shall be less than 0.1% of the original specimen.

Materials and Finishes

Contacts — Copper alloy plated with .000050 [.00127] gold over copper flash per MIL-G-45204 Type II.

Hardware — see pages 5-135 and 5-136.

MCK-Metal Shell —

Insulator — Liquid crystal polymer (LCP) per ASTM D5138, or Polyphenylene sulfide GST-40F per ASTM D5927 or MIL-M-24519

Interfacial Seal — Fluorosilicone Rubber per MIL-R-25988 (socket side only)

Body Shell — Aluminum alloy-high grade plated

Cadmium per QQ-P-416

Nickel, electroless per AMS 2404

Transition Block Shell —

Liquid crystal polymer (LCP) per ASTM D5138, or Polyphenylene sulfide GST-40F per ASTM D5927 or MIL-M-24519

Potting Material — Epoxy, Black

MCD-Plastic Shell —

Insulator/Body — Polyester, glass filled per MIL-M-24519, Liquid crystal polymer (LCP) per ASTM D5138, or Polyphenylene sulfide GST-40F per ASTM D5927 or MIL-M-24519

Wire Terminations —

Solid copper per QQ-W-343 gold plated per MIL-G-45204

Stranded TEFLON insulated per MIL-W-16878

Stranded TEFLON insulated per MIL-W-22759/11, /33

Solid copper per QQ-W-343, solder dipped (Transition block)

MCDM-Metal Shell —

Insulator — Diallyl Phthalate per MIL-M-14, Type SDG-F

Body Shell — Aluminum alloy—high grade, nickel plated

Twist Pin, Pin and Socket Contacts

The contact spring member normally found in socket contacts has been eliminated by creating a breathing helical spring principle on the pin contact — smaller, more durable contacts can be manufactured economically.

Wire range 24-36 AWG solid & stranded.

MIL-DTL-83513 — Only the descriptive legend in ***bold italic*** is applicable to current MIL-DTL-83513 configurations; MIL-DTL-83513/1 through /4 — MCK metal shell; MIL-DTL-83513/6 through /9 — MCD plastic shell.

In addition, MIL-DTL-83513 solid copper wire termination is specified 25 AWG, 0.5; and 1.0 [25.4] lengths only and stranded insulated wire termination is specified 26 AWG, 18.0 [457.2] and 36.0 [914.4] lead lengths only. Hardware for MIL-DTL-83513 configurations is specified separately by the M83513/5-XX designation. M83513/1 through /4 and /6 through /9 specify no hardware (B). Mounting/mating hardware is shown on page 5-135 with the applicable military nomenclature. The MICRODOT catalog part number for a MIL-DTL-83513 configuration may be constructed to include the desired hardware.

See pages 5-152 to 5-156 for M83513/ cross reference.

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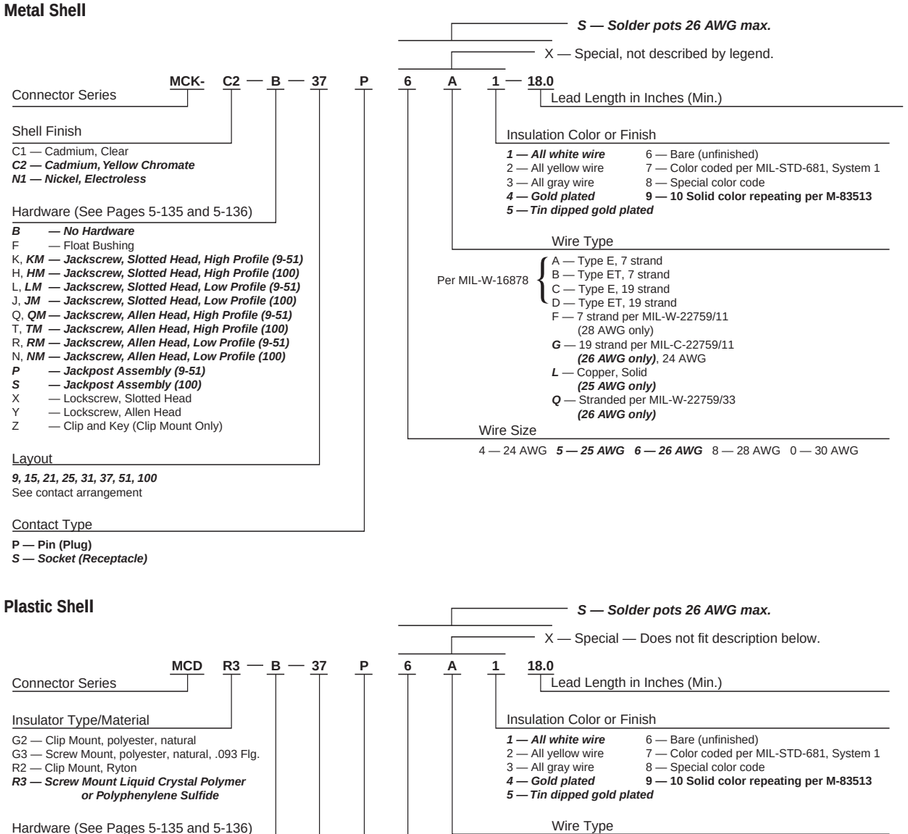
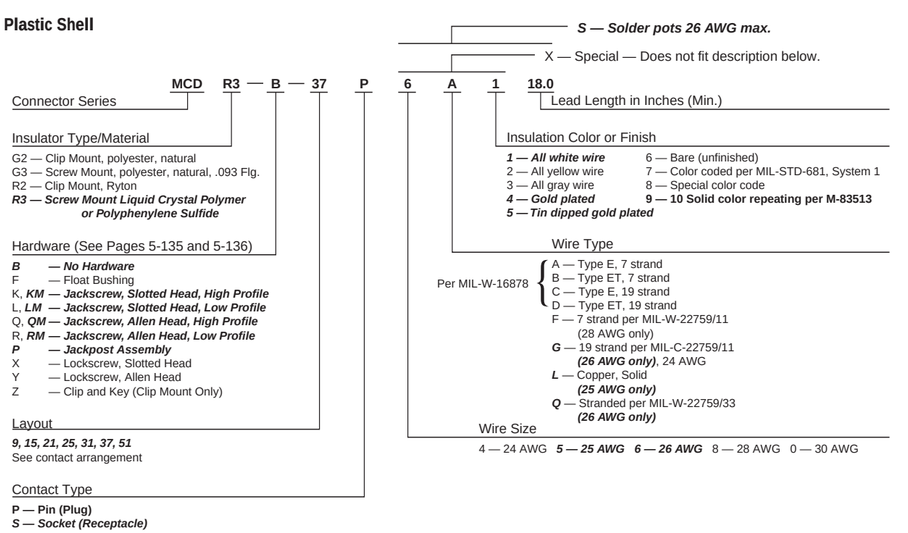
Japan: 81-44-844-8013
UK: 44-208-420-8341

How To Specify MCK and MCD Connectors

Metal Shell



Plastic Shell



Note: Items in ***bold italic*** are qualified to MIL-DTL-83513.

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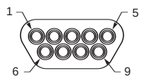
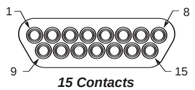
Contact Arrangements

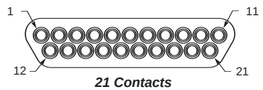
Face View of Pin Insert
(Socket Side is Mirror Image)



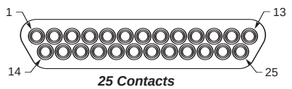
9 Contacts



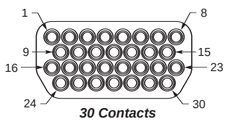
15 Contacts



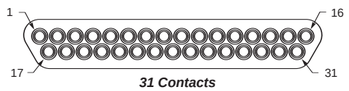
21 Contacts



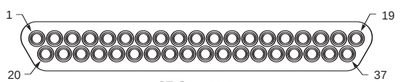
25 Contacts



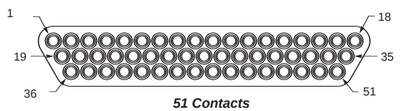
30 Contacts
(MCDM Only)



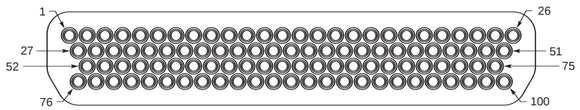
31 Contacts



37 Contacts



51 Contacts



100 Contacts
(MCK Only)

Note: MCK metal shells are not designed to intermate or interchange with MCD plastic shells. If metal/plastic intermating is desired, use MCDM Series Metal Shell on pages 5-146 and 5-147 with MCD Series Plastic Shell on page 5-132.

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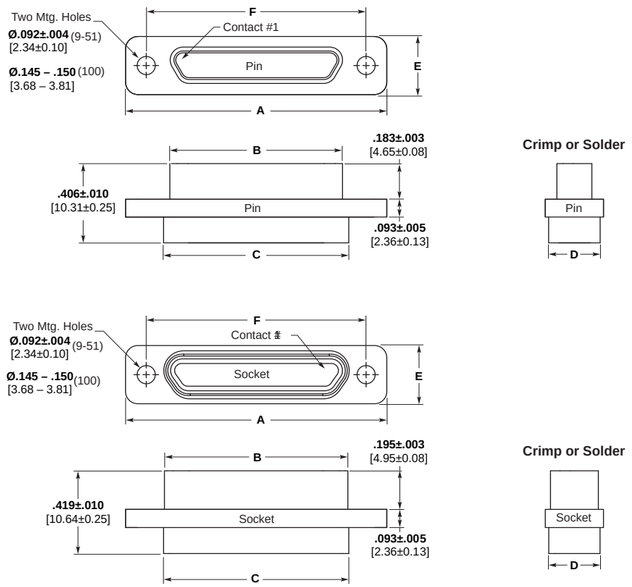
Microminiature D Connectors (Continued)

MCK Series Metal Shell Connectors

Dimensions per MIL-DTL-83513

Plug (Pin Side)

Receptacle (Socket Side)



Part Number	A ± .010 [.254]	B Max.	C + .010 [.254] – .018 [.457]	D Max	E ± .010 [.254]	F ± 005 [.127]
MCK**- 9P***	**.775** 19.68	**.3338** 8.48	**.390** 9.91	**.270** 6.86	**.298** 7.57	**.565** 14.35
MCK**- 9S***	**.775** 19.68	**.4018** 10.21	**.390** 9.91	**.270** 6.86	**.298** 7.57	**.565** 14.35
MCK**- 15P***	**.925** 23.50	**.4838** 12.29	**.540** 13.72	**.270** 6.86	**.298** 7.57	**.715** 18.16
MCK**- 15S***	**.925** 23.50	**.5518** 14.02	**.540** 13.72	**.270** 6.86	**.298** 7.57	**.715** 18.16
MCK**- 21P***	**1.075** 27.30	**.6338** 16.10	**.690** 17.53	**.270** 6.86	**.298** 7.57	**.865** 21.97
MCK**- 21S***	**1.075** 27.30	**.7018** 18.05	**.690** 17.53	**.270** 6.86	**.298** 7.57	**.865** 21.97
MCK**- 25P***	**1.175** 29.84	**.7338** 18.64	**.790** 20.07	**.270** 6.86	**.298** 7.57	**.965** 24.51
MCK**- 25S***	**1.175** 29.84	**.8018** 20.37	**.790** 20.07	**.270** 6.86	**.298** 7.57	**.965** 24.51
MCK**- 31P***	**1.325** 33.66	**.8838** 22.45	**.940** 23.88	**.270** 6.86	**.298** 7.57	**1.115** 28.32
MCK**- 31S***	**1.325** 33.66	**.9518** 24.18	**.940** 23.88	**.270** 6.86	**.298** 7.57	**1.115** 28.32
MCK**- 37P***	**1.475** 37.46	**1.0338** 26.26	**1.090** 27.69	**.270** 6.86	**.298** 7.57	**1.265** 32.13
MCK**- 37S***	**1.475** 37.46	**1.1018** 27.99	**1.090** 27.69	**.270** 6.86	**.298** 7.57	**1.265** 32.13
MCK**- 51P***	**1.425** 36.20	**.9838** 24.99	**1.040** 26.42	**.310** 7.87	**.341** 8.66	**1.215** 30.86
MCK**- 51S***	**1.425** 36.20	**1.0518** 26.72	**1.040** 26.42	**.310** 7.87	**.341** 8.66	**1.215** 30.86
MCK**- 100P***	**2.160** 54.86	**1.3838** 35.15	**1.432** 36.37	**.360** 9.15	**.384** 9.75	**1.800** 45.71
MCK**- 100S***	**2.160** 54.86	**1.508** 38.30	**1.432** 36.37	**.360** 9.15	**.384** 9.75	**1.800** 45.71

P = Pin, S = Socket

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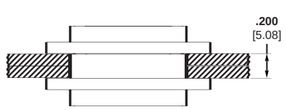
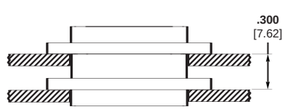
MCK Series Metal Shell Connectors Panel Mounting — Cutout Dimensions

Panel Mounting Dimensions — MCK



Plug and Receptacle
Rear Mounted

Plug and Receptacle
Front Mounted



Plug Front Mounted
Receptacle Rear Mounted

Panel Cutout Dimensions — MCK

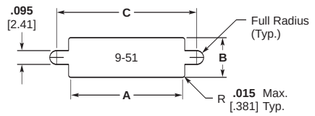
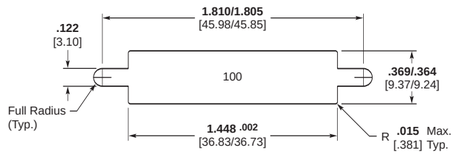
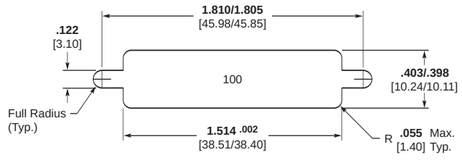


Figure 1
Front Mounting

Figure 2
Rear Mounting



Front Mounting



Rear Mounting

Number of Contacts	Fig.	A + .004 [.102] − .000 [.000]	B + .004 [.102] − .000 [.000]	C + .005 [.127] − .000 [.000]
9	1	**.404** 10.26	**.274** 6.96	**.570** 14.48
	2	**.406** 10.31	**.257** 6.53	**.570** 14.48
15	1	**.554** 14.07	**.274** 6.96	**.720** 18.29
	2	**.556** 14.12	**.257** 6.53	**.720** 18.29
21	1	**.704** 17.88	**.274** 6.96	**.870** 22.10
	2	**.706** 17.93	**.257** 6.53	**.870** 22.10
25	1	**.804** 20.42	**.274** 6.96	**.970** 24.64
	2	**.806** 20.47	**.257** 6.53	**.970** 24.64
31	1	**.954** 24.23	**.274** 6.96	**1.120** 28.45
	2	**.956** 24.28	**.257** 6.53	**1.120** 28.45
37	1	**1.104** 28.04	**.274** 6.96	**1.270** 32.26
	2	**1.106** 28.09	**.257** 6.53	**1.270** 32.26
51	1	**1.054** 26.77	**.314** 7.98	**1.220** 30.99
	2	**1.056** 26.82	**.300** 7.62	**1.220** 30.99

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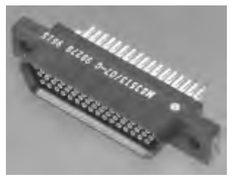
Microminiature D Connectors (Continued)

MCD Series Plastic Shell Connectors

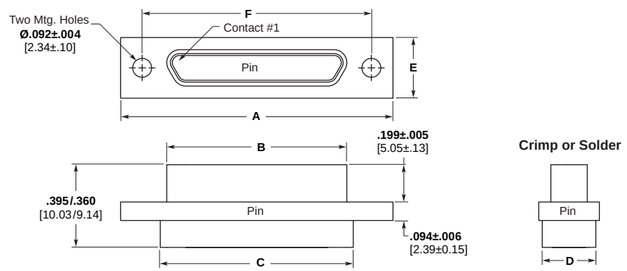
Screw Mount Dimensions Per MIL-DTL-83513

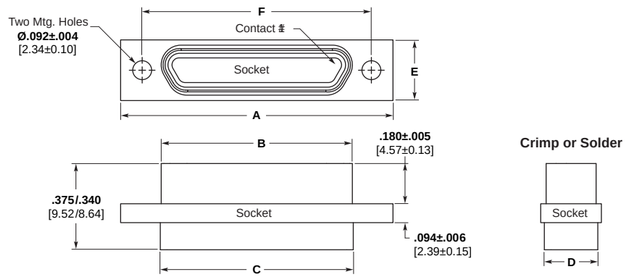
Plug (Pin Side)



Receptacle (Socket Side)

Liquid Crystal Polymer or Polyphenylene Sulfide — MCDR3* per MIL-DTL-83513





Note: MCD Plastic Screw Mount Series is intermateable with MCDM Metal Series Connectors (Pages 5-146 and 5-147).

Part Number	A ± .010 [.254]	B Max.	C + .010 [.254] – .018 [.457]	D Max	E ± .010 [.254]	F ± 005 [.127]	Avg. Weight lbs. ± 5% [grams]
MCD**- 9P***	**.778** 19.76	**.2918** 7.412	**.398** 10.11	**.173** 4.39	**.208** 5.28	**.565** 14.35	**.0017** 0.77
MCD**- 9S***	**.778** 19.76	**.3798** 9.647	**.398** 10.11	**.173** 4.39	**.208** 5.28	**.565** 14.35	**.0016** 0.72
MCD**- 15P***	**.928** 23.57	**.4418** 11.222	**.548** 13.92	**.173** 4.39	**.208** 5.28	**.715** 18.16	**.0024** 1.08
MCD**- 15S***	**.928** 23.57	**.5298** 13.457	**.548** 13.92	**.173** 4.39	**.208** 5.28	**.715** 18.16	**.0023** 1.04
MCD**- 21P***	**1.078** 27.38	**.5918** 15.032	**.698** 17.73	**.173** 4.39	**.208** 5.28	**.865** 21.97	**.0035** 1.59
MCD**- 21S***	**1.078** 27.38	**.6798** 17.267	**.698** 17.73	**.173** 4.39	**.208** 5.28	**.865** 21.97	**.0034** 1.54
MCD**- 25P***	**1.178** 29.92	**.6918** 17.572	**.798** 20.27	**.173** 4.39	**.208** 5.28	**.965** 24.51	**.0042** 1.90
MCD**- 25S***	**1.178** 29.92	**.7798** 19.807	**.798** 20.27	**.173** 4.39	**.208** 5.28	**.965** 24.51	**.0037** 1.67
MCD**- 31P***	**1.328** 33.73	**.8418** 21.382	**.948** 24.08	**.173** 4.39	**.208** 5.28	**1.115** 28.32	**.0053** 2.40
MCD**- 31S***	**1.328** 33.73	**.9298** 23.617	**.948** 24.08	**.173** 4.39	**.208** 5.28	**1.115** 28.32	**.0048** 2.17
MCD**- 37P***	**1.478** 37.54	**.9918** 25.192	**1.098** 27.89	**.173** 4.39	**.208** 5.28	**1.265** 32.13	**.0057** 2.58
MCD**- 37S***	**1.478** 37.54	**1.0798** 27.427	**1.098** 27.89	**.173** 4.39	**.208** 5.28	**1.265** 32.13	**.0051** 2.31
MCD**- 51P***	**1.428** 36.27	**.9418** 23.922	**1.048** 26.62	**.220** 5.59	**.250** 6.35	**1.215** 30.86	**.0072** 3.26
MCD**- 51S***	**1.428** 36.27	**1.0298** 26.157	**1.048** 26.62	**.220** 5.59	**.250** 6.35	**1.215** 30.86	**.0063** 2.85

P = Pin, S = Socket
Note: Weight given is with .500 [12.7] uninsulated, solid, 24 AWG gold plated copper pigtails.
*See "How to Specify" for description, on page 5-128.

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Microminiature D Connectors (Continued)

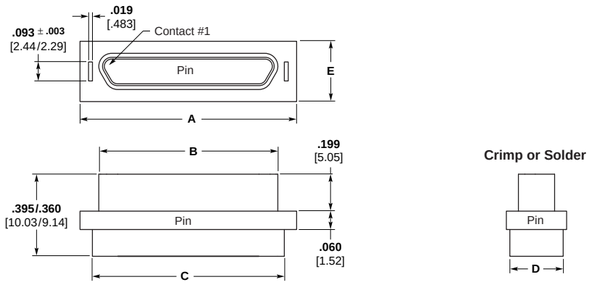
MCD Series Plastic Shell Connectors (Continued)

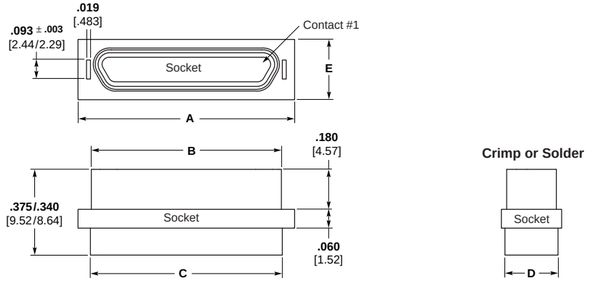
Clip Mount — MCD

Plug (Pin Side)

Receptacle (Socket Side)

Note: Clip Mount not covered by current issue of MIL-DTL-83513.





Part Number	A ± .005 [.127]	B Max.	C ± .010 [.254]	D ± .010 [.254]	E ± .005 [.127]	Avg. Weight lbs. ± 5% [grams]
MCD**- 9P***	**.506** 12.85	**.2918** 74.12	**.398** 10.11	**.165** 4.19	**.208** 5.28	**.0017** 0.77
MCD**- 9S***	**.506** 12.85	**.3798** 96.47	**.398** 10.11	**.165** 4.19	**.208** 5.28	**.0016** 0.72
MCD**- 15P***	**.656** 16.66	**.4418** 112.22	**.548** 13.92	**.165** 4.19	**.208** 5.28	**.0024** 1.08
MCD**- 15S***	**.656** 16.66	**.5298** 134.57	**.548** 13.92	**.165** 4.19	**.208** 5.28	**.0023** 1.04
MCD**- 21P***	**.806** 20.47	**.5918** 150.32	**.698** 17.73	**.165** 4.19	**.208** 5.28	**.0035** 1.59
MCD**- 21S***	**.806** 20.47	**.6798** 172.67	**.698** 17.73	**.165** 4.19	**.208** 5.28	**.0034** 1.54
MCD**- 25P***	**.906** 23.01	**.6918** 175.72	**.798** 20.27	**.165** 4.19	**.208** 5.28	**.0042** 1.90
MCD**- 25S***	**.906** 23.01	**.7798** 198.07	**.798** 20.27	**.165** 4.19	**.208** 5.28	**.0037** 1.67
MCD**- 31P***	**1.056** 26.82	**.8418** 213.82	**.948** 24.08	**.165** 4.19	**.208** 5.28	**.0053** 2.40
MCD**- 31S***	**1.056** 26.82	**.9298** 236.17	**.948** 24.08	**.165** 4.19	**.208** 5.28	**.0048** 2.17
MCD**- 37P***	**1.206** 30.63	**.9918** 251.92	**1.098** 27.89	**.165** 4.19	**.208** 5.28	**.0057** 2.58
MCD**- 37S***	**1.206** 30.63	**1.0798** 274.27	**1.098** 27.89	**.165** 4.19	**.208** 5.28	**.0051** 2.31
MCD**- 51P***	**1.156** 29.36	**.9418** 239.22	**1.048** 26.62	**.208** 5.28	**.250** 6.35	**.0072** 3.26
MCD**- 51S***	**1.156** 29.36	**1.0298** 261.57	**1.048** 26.62	**.208** 5.28	**.250** 6.35	**.0063** 2.85

P = Pin, S = Socket
Note: Weight given is with .500 [12.7] uninsulated, solid, 24 AWG gold plated copper pigtails.
*See "How to Specify" for description, on page 5-128.

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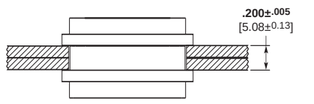
Japan: 81-44-844-8013
UK: 44-208-420-8341

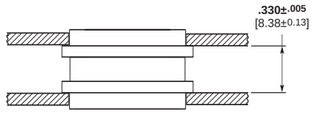
MCD Series Plastic Shell Connectors Panel Mounting — Cutout Dimensions

Panel Mounting Dimensions — MCD

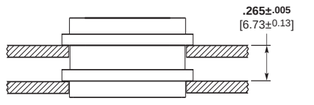
Clip Mount



Plug and Receptacle
Rear Mounted

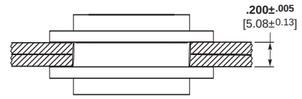


Plug and Receptacle
Front Mounted

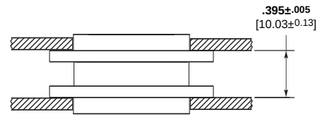


Plug Front Mounted
Receptacle Rear Mounted

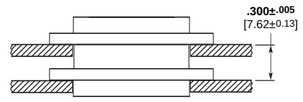
Screw Mount



Plug and Receptacle
Rear Mounted



Plug and Receptacle
Front Mounted



Plug Front Mounted
Receptacle Rear Mounted

Panel Cutout Dimensions — MCD

Clip Mounting

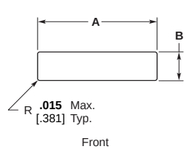


Figure 1

Screw Mounting

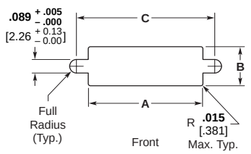


Figure 2

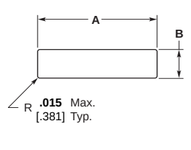


Figure 3

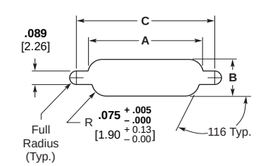


Figure 4

Notes: Front mounting preferred.

Number of Contacts	Fig.	A + .004 [.102] − .000 [.000]	B + .004 [.102] − .000 [.000]	C + .005 [.127] − .000 [.000]
9	1	**.438** [11.13]	**.177** [4.50]	—
	2	**.412** [10.46]	**.177** [4.50]	**.570** [14.48]
	3	**.438** [11.13]	**.222** [5.64]	—
	4	**.384** [9.75]	**.222** [5.64]	**.570** [14.48]
15	1	**.588** [14.93]	**.177** [4.50]	—
	2	**.562** [14.27]	**.177** [4.50]	**.720** [18.29]
	3	**.588** [14.93]	**.222** [5.64]	—
	4	**.534** [13.56]	**.222** [5.64]	**.720** [18.29]
21	1	**.738** [18.75]	**.177** [4.50]	—
	2	**.712** [18.08]	**.177** [4.50]	**.870** [22.10]
	3	**.738** [18.75]	**.222** [5.64]	—
	4	**.684** [17.37]	**.222** [5.64]	**.870** [22.10]
25	1	**.838** [21.29]	**.177** [4.50]	—
	2	**.812** [20.62]	**.177** [4.50]	**.970** [24.64]
	3	**.838** [21.29]	**.222** [5.64]	—
	4	**.784** [19.91]	**.222** [5.64]	**.970** [24.64]
31	1	**.988** [25.10]	**.177** [4.50]	—
	2	**.962** [24.43]	**.177** [4.50]	**1.120** [28.45]
	3	**.988** [25.10]	**.222** [5.64]	—
	4	**.934** [23.72]	**.222** [5.64]	**1.120** [28.45]
37	1	**1.138** [28.91]	**.177** [4.50]	—
	2	**1.112** [28.24]	**.177** [4.50]	**1.270** [32.26]
	3	**1.138** [28.91]	**.222** [5.64]	—
	4	**1.084** [27.53]	**.222** [5.64]	**1.270** [32.26]
51	1	**1.088** [27.64]	**.224** [5.69]	—
	2	**1.062** [26.97]	**.224** [5.69]	**1.220** [30.99]
	3	**1.088** [27.64]	**.264** [6.71]	—
	4	**1.034** [26.26]	**.264** [6.71]	**1.220** [30.99]

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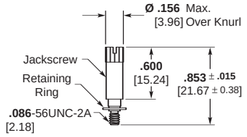
Mounting and Coupling Hardware

For Screw Mount MCK, MCD and MCDM

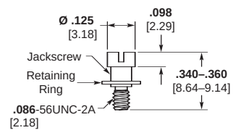
9-51 Contacts Slot Head

(K)
(KM)



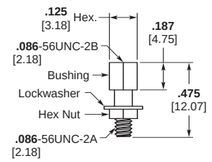
Part Number 5-1532137-8
Jackscrew Assembly
High Profile
(K) 096-0002-0010
M83513/5-06
(KM) S96-0002-0084

(L)
(LM)



Part Number 5-1532137-7
Jackscrew Assembly
Low Profile
(L) 096-0002-0011
M83513/5-05
(LM) S96-0002-0085

(P)

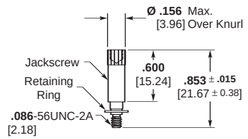


Part Number 5-1532137-9
Jackpost Assembly
(P) S96-0002-0009
M83513/5-07

P mates with K,KM, L,LM, Q,QM and R,RM Jackscrew Assemblies.

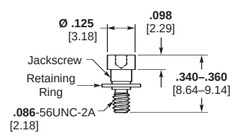
9-51 Contacts 1/16" Allen Head

(Q)
(QM)



Part Number 5-1532137-6
Jackscrew Assembly
High Profile
(Q) 096-0002-0014
M83513/5-03
(QM) S96-0002-0086

(R)
(RM)

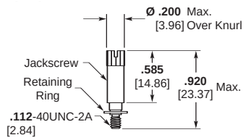


Part Number 5-1532137-5
Jackscrew Assembly
Low Profile
(R) 096-0002-0015
M83513/5-02
(RM) S96-0002-0087

Notes:
1. Jackpost Assemblies will accommodate .094 [2.39] max. thickness panel.
2. Letter(s) in parentheses is to assist in ordering hardware with the connector (See "How To Specify" page 5-128).
3. Single letters (e.g. K) designate hardware kits (2 pcs. per kit) that meets M83513/05 requirements except the material is 303 stainless steel, passivated.
4. Add M suffix (e.g. KM) to designate hardware that meets all M83513/05 requirements. Material is corrosion resistant steel, non-magnetic, 125,000 PSI tensile strength minimum (Applies to jackscrews only).
5. Non-MIL hardware ordered separately should be ordered in pairs; i.e. 2 pcs. P/N 096-0002-0009 per connector half.
6. Items in ***bold italic*** are qualified to MIL-DTL-83513.

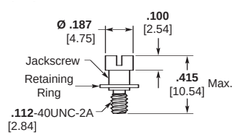
100 Contacts Slot Head

(H)
(HM)



Part Number 6-1532137-3
Jackscrew Assembly
High Profile
(H) 096-0002-0061
M83513/5-16
(HM) S96-0002-0088

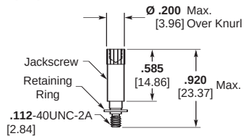
(J)
(JM)



Part Number 6-1532137-2
Jackscrew Assembly
Low Profile
(J) 096-0002-0062
M83513/5-15
(JM) S96-0002-0089

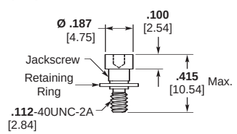
100 Contacts 1/16" Allen Head

(T)
(TM)



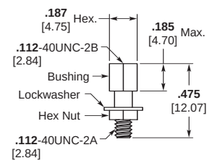
Part Number 6-1532137-1
Jackscrew Assembly
High Profile
(T) 096-0002-0064
M83513/5-13
(TM) S96-0002-0090

(N)
(NM)



Part Number 6-1532137-0
Jackscrew Assembly
Low Profile
(N) 096-0002-0065
M83513/5-12
(NM) S96-0002-0091

(S)



Part Number 6-1532137-4
Jackpost Assembly
(S) S96-0002-0060
M83513/5-17

S mates with H,HM, J,JM, T,TM and N,NM Jackscrew Assemblies.

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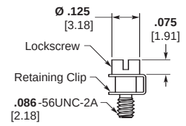
Mounting and Coupling Hardware (Continued)

For Screw Mount MCK, MCD and MCDM (Continued)

Slot Head

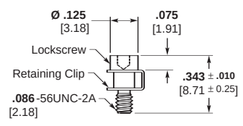
(X)



Part Number 4-1532137-3
Lockscrew Assembly
096-0002-0008

1/16" Allen Head

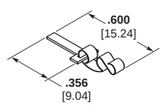
(Y)



Part Number 1495164-1
Lockscrew Assembly
096-0002-0013

For Clip Mount — MCD

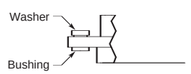
(Z)



Part Number 1466018-1
Mounting Key and Clip
P/N 096-0001-0000
(2 Required)

For Float Mount — MCK, MCD and MCDM

(F)



Float Mount Bushing
(Factory Installed)

Notes:
1. Jackpost Assemblies will accommodate .094 [2.39] max. thickness panel.
2. Letter(s) in parentheses is to assist in ordering hardware with the connector (See “How To Specify” page 5-128).
3. Hardware ordered separately should be ordered in pairs; i.e. 2 pcs. P/N 096-0002-0013 per connector half.

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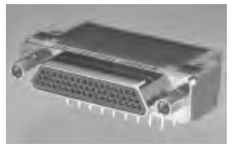
Japan: 81-44-844-8013
UK: 44-208-420-8341

Microminiature D Connectors (Continued)

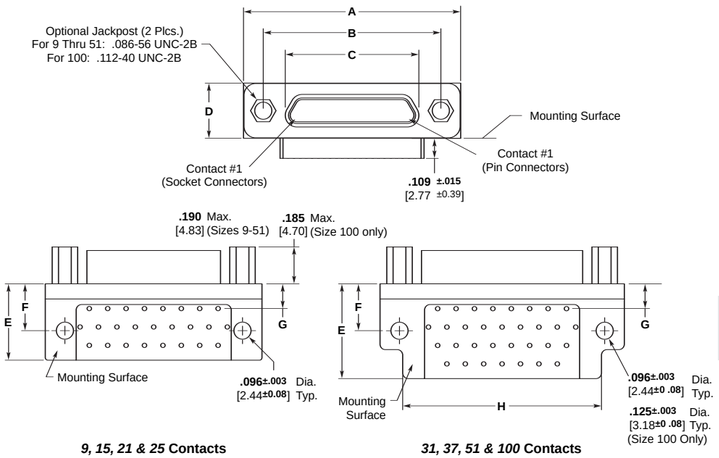
MCK Transition Blocks

RT1 — Right-Angle Termination Configuration



MIL-DTL-83513/10 through /21 configurations. 90° — Lo Profile termination configurations.

See pages 5-152 to 5-156 for M83513 cross references.



***9, 15, 21 & 25* Contacts** ***31, 37, 51 & 100* Contacts**

How To Specify

MCK — C2 — P — 37 — P — RT1

Right-Angle Termination (Solder Dipped)
RT1 — w/ .109 Leads
RT1A — w/ .140 Leads
RT1B — w/ .172 Leads

Contact Type
S = STD Socket
P = STD Pin

Layout
9, 15, 21, 25, 31, 37, 51 and 100

Hardware
P = Jackpost (9-51)
B = No Hardware
S = (100)

Shell Finish
C2 = Cadmium, Yellow Chromate
N1 = Nickel, Electroless

Connector Series
(See page 5-130)

Notes:
1. For terminal identification see page 5-139.
2. Grid pattern for all configurations is .100 x .100 [2.54 x 2.54].
3. Lead lengths shown are for RT1.
4. Items in ***bold italic*** are qualified to MIL-DTL-83513.

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UK: 44-208-420-8341

MCK Transition Blocks
(Continued)

RT1 — Right-Angle Termination Configuration
(Continued)

Part Number	A Max.	B ± 005 [.127]	C Max.	D Max.	E Max.	F +.010 [.254]	G +.010 [.254]	H Max.
MCK-**- *- 9PRT1	**.787** 19.99	**.565** 14.35	**.3338** 8.48	**.308** 7.83	**.425** 10.80	**.250** 6.35	**.230** 5.84	—
MCK-**- *- 9SRT1	**.787** 19.99	**.565** 14.35	**.4018** 10.21	**.308** 7.83	**.425** 10.80	**.250** 6.35	**.230** 5.84	—
MCK-**- *- 15PRT1	**.937** 23.80	**.715** 18.16	**.4838** 12.29	**.308** 7.83	**.425** 10.80	**.250** 6.35	**.130** 3.30	—
MCK-**- *- 15SRT1	**.937** 23.80	**.715** 18.16	**.5518** 14.02	**.308** 7.83	**.425** 10.80	**.250** 6.35	**.130** 3.30	—
MCK-**- *- 21PRT1	**1.087** 27.61	**.865** 21.97	**.6338** 16.10	**.308** 7.83	**.425** 10.80	**.250** 6.35	**.130** 3.30	—
MCK-**- *- 21SRT1	**1.087** 27.61	**.865** 21.97	**.7018** 17.83	**.308** 7.83	**.425** 10.80	**.250** 6.35	**.130** 3.30	—
MCK-**- *- 25PRT1	**1.187** 30.15	**.965** 24.51	**.7338** 18.64	**.308** 7.83	**.425** 10.80	**.250** 6.35	**.130** 3.30	—
MCK-**- *- 25SRT1	**1.187** 30.15	**.965** 24.51	**.8018** 20.37	**.308** 7.83	**.425** 10.80	**.250** 6.35	**.130** 3.30	—
MCK-**- *- 31PRT1	**1.337** 33.96	**1.115** 28.32	**.8838** 22.45	**.308** 7.83	**.525** 13.34	**.250** 6.35	**.130** 3.30	**1.090** 27.69
MCK-**- *- 31SRT1	**1.337** 33.96	**1.115** 28.32	**.9518** 24.18	**.308** 7.83	**.525** 13.34	**.250** 6.35	**.130** 3.30	**1.090** 27.69
MCK-**- *- 37PRT1	**1.487** 37.77	**1.265** 32.13	**1.0338** 26.26	**.308** 7.83	**.525** 13.34	**.250** 6.35	**.130** 3.30	**1.190** 30.23
MCK-**- *- 37SRT1	**1.487** 37.77	**1.265** 32.13	**1.1018** 27.99	**.308** 7.83	**.525** 13.34	**.250** 6.35	**.130** 3.30	**1.190** 30.23
MCK-**- *- 51PRT1	**1.435** 36.45	**1.215** 30.86	**.9838** 24.99	**.351** 8.92	**.660** 16.76	**.300** 7.62	**.150** 3.81	**1.230** 31.24
MCK-**- *- 51SRT1	**1.435** 36.45	**1.215** 30.86	**1.0518** 26.72	**.351** 8.92	**.660** 16.76	**.300** 7.62	**.150** 3.81	**1.230** 31.24
MCK-**- *- 100PRT1	**2.175** 55.25	**1.800** 45.72	**1.3838** 35.15	**.394** 10.01	**1.010** 25.65	**.400** 10.16	**.200** 5.08	**1.825** 46.36
MCK-**- *- 100SRT1	**2.175** 55.25	**1.800** 45.72	**1.508** 38.30	**.394** 10.01	**1.010** 25.65	**.400** 10.16	**.200** 5.08	**1.825** 46.36

P = Pin, S = Socket

Note: Items in ***bold italic*** are qualified to MIL-DTL-83513.

Catalog 1308940
Revised 8-06

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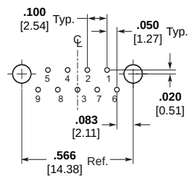
Microminiature D Connectors (Continued)

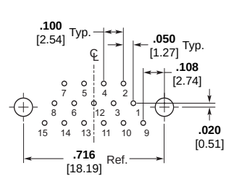
MCK Transition Blocks
(Continued)

RT1 — Right-Angle Termination Configuration
(Continued)

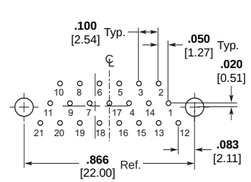
View is from mounting surface of connector. Plug configuration shown. For receptacle, use mirror image. (Except 100 contacts)



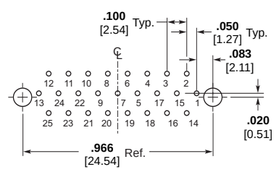
9 Contacts



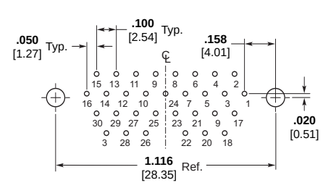
15 Contacts



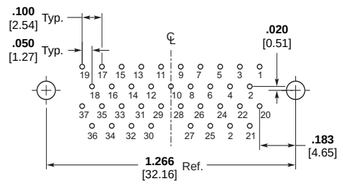
21 Contacts



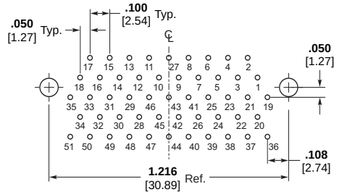
25 Contacts



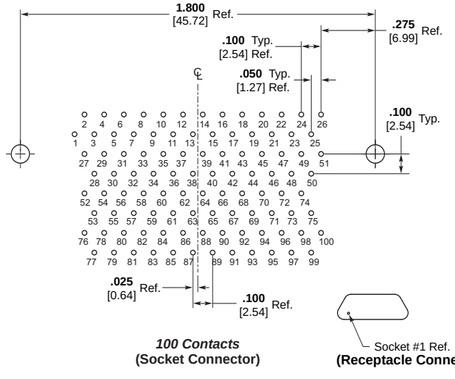
31 Contacts



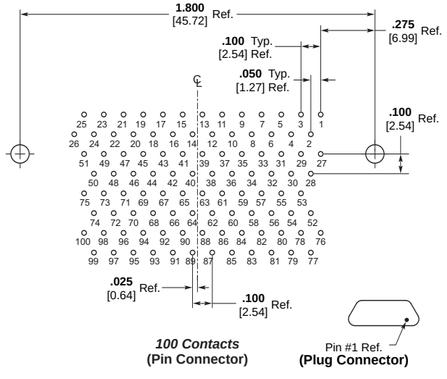
37 Contacts



51 Contacts



100 Contacts
(Socket Connector)
(Receptacle Connector)



100 Contacts
(Pin Connector)
(Plug Connector)

Catalog 1308940
Revised 8-06

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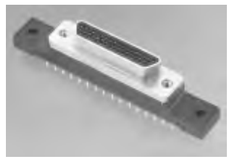
Microminiature D Connectors (Continued)

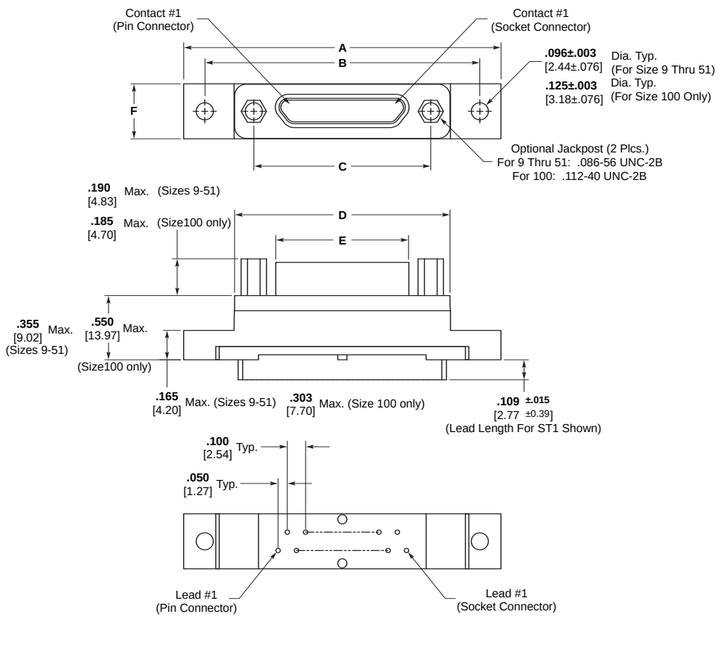
MCK Transition Blocks
(Continued)

ST1 — Straight Termination Configuration



MIL-DTL-83513/22 through /27 configurations. 180° — Lo Profile termination configurations.

See page 5-156 for M83513 cross references.



How To Specify

MCK — C2 — P — 37 — P — ST1

Straight Termination (Solder Dipped)
ST1 — w/ .109 Leads
ST1A — w/ .140 Leads
ST1B — w/ .172 Leads

Contact Type
S = STD Socket
P = STD Pin

Layout
9, 15, 21, 25, 31, 37, 51 and 100

Hardware
P = Jackpost (9-51)
B = No Hardware
S = (100)

Shell Finish
C2 = Cadmium, Yellow Chromate
N1 = Nickel, Electroless

Connector Series

(See page 5-130)

Notes:
1. For terminal identification see page 5-142.
2. Grid pattern for all configurations is .100 x .100 [2.54 x 2.54].
3. Lead lengths shown are for ST1.
4. Items in ***bold italic*** are qualified to MIL-DTL-83513.

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Revised 8-06

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MCK Transition Blocks
(Continued)

ST1 — Straight Termination Configuration (Continued)

Part Number	A Max.	B ± .007 [.178]	C ± .005 [.127]	D Max.	E Max.	F Max.
MCK-**- *- 9PST1	**1.390** 35.31	**1.150** 29.21	**.565** 14.35	**.885** 22.48	**.3338** 8.48	**.308** 7.83
MCK-**- *- 9SST1	**1.390** 35.31	**1.150** 29.21	**.565** 14.35	**.885** 22.48	**.4018** 10.21	**.308** 7.83
MCK-**- *- 15PST1	**1.390** 35.31	**1.150** 29.21	**.715** 18.16	**.945** 24.00	**.4838** 12.29	**.308** 7.83
MCK-**- *- 15SST1	**1.390** 35.31	**1.150** 29.21	**.715** 18.16	**.945** 24.00	**.5518** 14.02	**.308** 7.83
MCK-**- *- 21PST1	**1.690** 42.93	**1.450** 36.83	**.865** 21.97	**1.185** 30.10	**.6338** 16.10	**.308** 7.83
MCK-**- *- 21SST1	**1.690** 42.93	**1.450** 36.83	**.865** 21.97	**1.185** 30.10	**.7018** 17.83	**.308** 7.83
MCK-**- *- 25PST1	**1.740** 44.20	**1.500** 38.10	**.965** 24.51	**1.275** 32.39	**.7338** 18.64	**.308** 7.83
MCK-**- *- 25SST1	**1.740** 44.20	**1.500** 38.10	**.965** 24.51	**1.275** 32.39	**.8018** 20.37	**.308** 7.83
MCK-**- *- 31PST1	**2.040** 51.82	**1.800** 45.72	**1.115** 28.32	**1.575** 40.01	**.8838** 22.45	**.308** 7.83
MCK-**- *- 31SST1	**2.040** 51.82	**1.800** 45.72	**1.115** 28.32	**1.575** 40.01	**.9518** 24.18	**.308** 7.83
MCK-**- *- 37PST1	**2.340** 59.44	**2.100** 53.34	**1.265** 32.13	**1.875** 47.63	**1.0338** 26.26	**.308** 7.83
MCK-**- *- 37SST1	**2.340** 59.44	**2.100** 53.34	**1.265** 32.13	**1.875** 47.63	**1.1018** 27.99	**.308** 7.83
MCK-**- *- 51PST1	**2.270** 57.66	**2.000** 50.80	**1.215** 30.86	**1.775** 45.09	**.9838** 24.99	**.351** 8.92
MCK-**- *- 51SST1	**2.280** 57.91	**2.000** 50.80	**1.215** 30.86	**1.775** 45.09	**1.0518** 26.72	**.351** 8.92
MCK-**- *- 100PST1	**3.250** 82.55	**2.800** 71.12	**1.800** 45.72	**2.585** 65.66	**1.3838** 35.15	**.460** 11.68
MCK-**- *- 100SST1	**3.250** 82.55	**2.800** 71.12	**1.800** 45.72	**2.585** 65.66	**1.508** 38.30	**.460** 11.68

P = Pin, S = Socket

Note: Items in ***bold italic*** are qualified to MIL-DTL-83513.

Catalog 1308940
Revised 8-06

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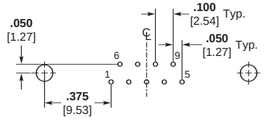
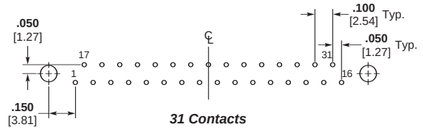
UK: 44-208-420-8341

MCK Transition Blocks
(Continued)

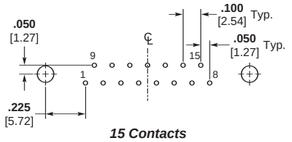
ST1 — Straight Termination Configuration (Continued)
View is from mounting surface of connector. Plug configuration shown. For receptacle, use mirror image.



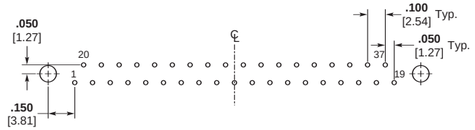
9 Contacts



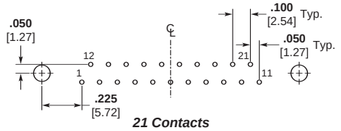
31 Contacts



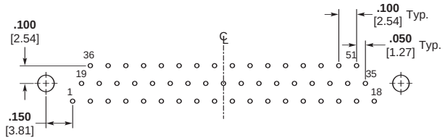
15 Contacts



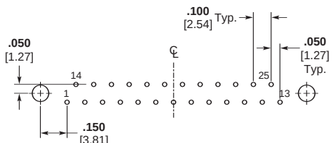
37 Contacts



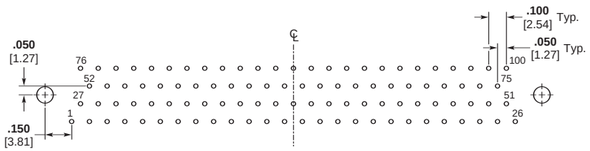
21 Contacts



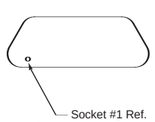
51 Contacts



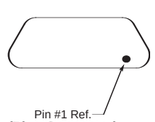
25 Contacts



100 Contacts



(Receptacle Connector)



(Plug Connector)

Catalog 1308940
Revised 8-06

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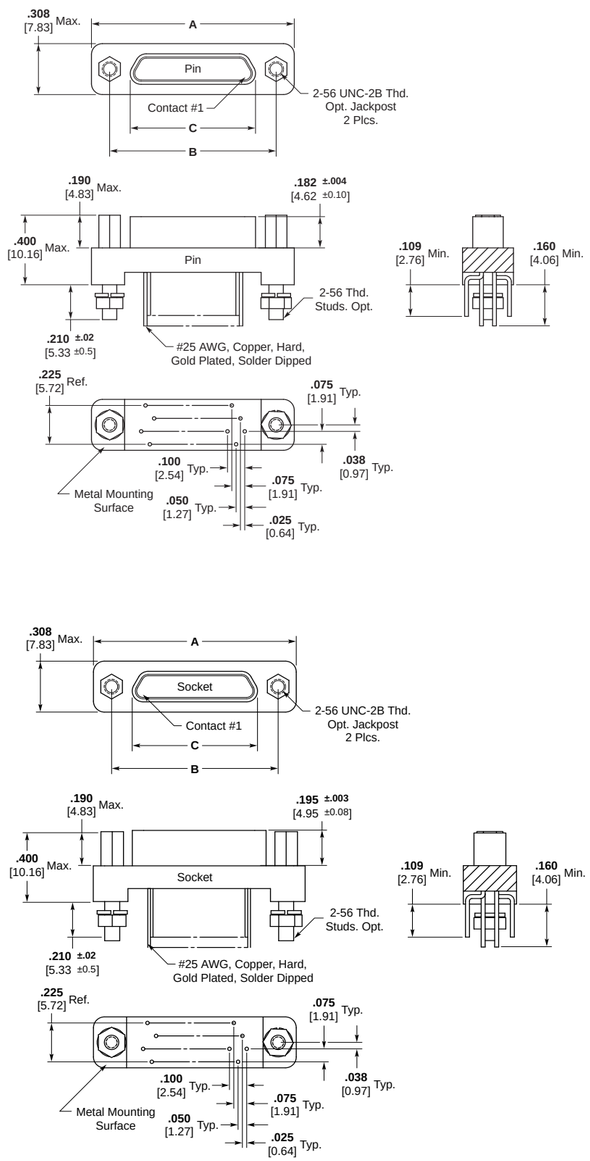
Microminiature D Connectors (Continued)

MCK ST2 Series Straight Mount PCB Connectors

MCK with Cactus Bend Termination

- Meets MIL-DTL-83513 Performance requirements
- Single metal shell with no Transition Block
- Low profile and light weight
- .100 [2.54] x .075 [1.91] grid pattern
- Design allows lower cost construction



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MCK ST2 Series Straight Mount PCB Connectors
(Continued)

Part Number	A Max.	B ± .005	C Max.
MCK-**-*- 9 PST2	**.785** 19.94	**.565** 14.35	**.333** 8.46
MCK-**-*- 9 SST2	**.785** 19.94	**.565** 14.35	**.402** 10.21
MCK-**-*- 15 PST2	**.935** 23.75	**.715** 18.16	**.483** 12.27
MCK-**-*- 15 SST2	**.935** 23.75	**.715** 18.16	**.552** 14.02
MCK-**-*- 21 PST2	**1.085** 27.56	**.865** 21.97	**.633** 16.08
MCK-**-*- 21 SST2	**1.085** 27.56	**.865** 21.97	**.702** 17.83
MCK-**-*- 25 PST2	**1.185** 30.10	**.965** 24.51	**.733** 18.62
MCK-**-*- 25 SST2	**1.185** 30.10	**.965** 24.51	**.802** 20.37
MCK-**-*- 31 PST2	**1.335** 33.91	**1.115** 28.32	**.883** 22.43
MCK-**-*- 31 SST2	**1.335** 33.91	**1.115** 28.32	**.952** 24.18
MCK-**-*- 37 PST2	**1.485** 37.72	**1.265** 32.13	**1.033** 26.24
MCK-**-*- 37 SST2	**1.485** 37.72	**1.265** 32.13	**1.102** 27.99

How To Specify

MCK — C2 — P — 37 — P — ST2

- **Straight Termination**
- **Contact Type**
  - S = Standard Socket
  - P = Standard Pin
- **Layout**
  - 9, 15, 21, 25, 31, 37
- **Hardware**
  - P = Jackpost (2-56 THD)
  - B = No Hardware
- **Shell Finish**
  - C2 = Cadmium, Yellow Chromate
  - N1 = Nickel, Electroless
- **Connector Series**
  - (See Page 5-130)

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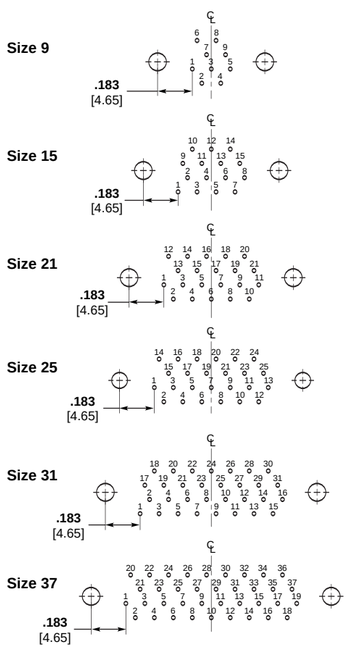
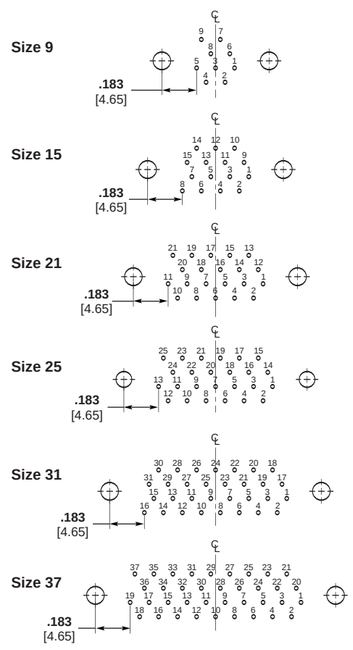
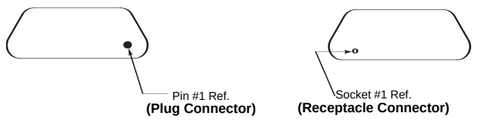
MCK ST2 Series Straight Mount PCB Connectors
(Continued)

View is of mounting surface of pin connector



View is of mounting surface of socket connector





5

Pin and Socket Connectors

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MCDM Series Metal Shell Connectors

Technical & Performance Data

Performance

Contact Resistance — The average mated contact resistance is 4 milliohms, with a maximum value of 8 milliohms, using standard #24 solid copper leads when measured directly behind the crimp joints of the mated pin and socket contacts. The average resistance value at 100 microvolts is 4.8 milliohms.

Dielectric Withstanding Voltage (60 Hz rms room temperature) — Solder Pots: 600 VAC at sea level; 150 VAC at 70,000 feet [21,336 m]. Wire Terminations: 750 VAC at sea level; 200 VAC at 70,000 feet [21,336m]

Vibration (Per MIL-STD-202C, Method 204-A, Condition D) — No discontinuity in excess of 1 microsecond during twelve 20 minute sweeps from 10 to 2,000 CPS at .06 double amplitude or 20 G forces, whichever is less.

Corrosion Resistance (Per MIL-STD-202C, Method 101B, Condition B) — Both mated and unmated samples do not exceed the maximum allowable contact resistance (8 milliohms) when subjected to the 48 hour salt spray test.

Durability — The contact resistance after 500 mating cycles is less than the maximum allowable, 8 milliohms.

Insulation Resistance — Greater than 5,000 megohms at room temperature for the materials listed under "Materials".

Maximum Current Carrying Capacity — No. 24 contact, 3 amperes. It must be recognized, however, that all the wires to a connector will not carry their maximum current under all environmental conditions due to wire temperature.

Contact Engaging and Separation Forces — 6 oz. [1.67N] maximum (eng.); 0.5 oz. [.14N] minimum (sep.).

Temperature Range (Operating) — Diallyl phthalate –67°F to 257°F [–55°C to +125°C].

Materials

Insulator — Diallyl phthalate per MIL-M-14, Type SDG-F or Liquid Crystal Polymer (LCP) per ASTM D5138.

Contacts — Pin Contact: Copper alloy and beryllium copper alloy make up the complete construction. Socket Contact: Copper alloy.

Body Shell — High grade aluminum alloy.

Finishes

Contacts — Standard finish is 0.000050 [0.00127] gold over copper flash per MIL-G-45204, Type II.

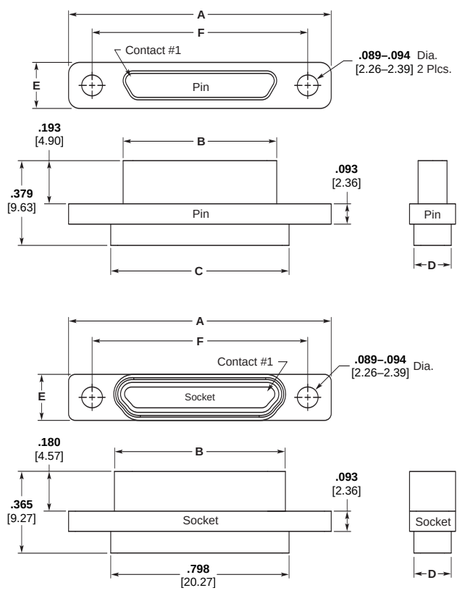
Body Shell — Electroless nickel per AMS 2404.

Note:
Insulators are molded into their metal shells — No bonded joint is used.

Screw Mount

The only metal shell connector that mates with all existing plastic types. This line is ideal for external use and other applications requiring frequent disconnect and remating. When durability and reliability are paramount the metal shell connector is unsurpassed — it eliminates the need for retrofitting where new metal shell varieties must mate with older plastic types.

Originally designed for military applications, they are currently used for commercial requirements, including computers.



Catalog 1308940
Revised 8-06

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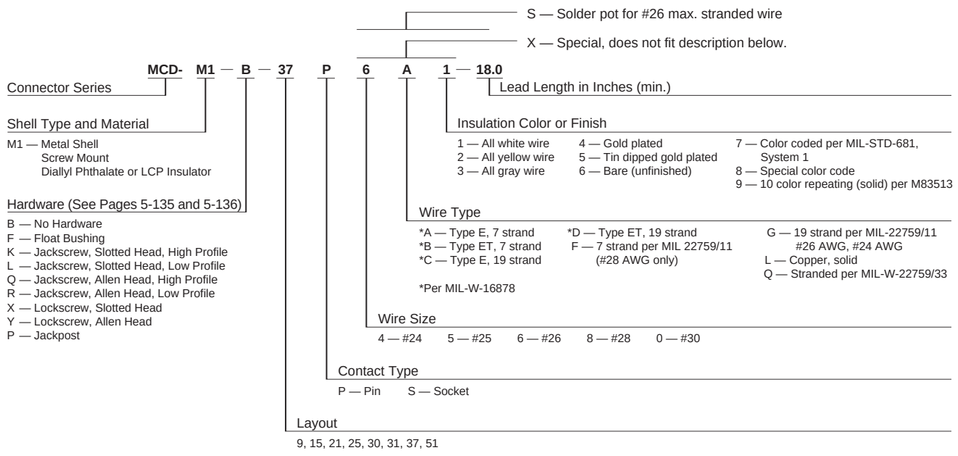
UK: 44-208-420-8341

MCDM Series Metal Shell Connectors (Continued)

Screw Mount (Continued)

How To Specify



Part Number	A ± .005 [± .127]	B ± .005 [± .127]	C ± .010 [± .254]	D ± .010 [± .254]	E ± .005 [± .127]	F ± .005 [± .127]	Avg. Weight lbs. ± 5% [grams]
MCDM1-9P***	**.780** 19.81	**.290** 7.36	**.398** 10.11	**.165** 4.19	**.208** 5.28	**.565** 14.35	**.003** 1.36
MCDM1-9S***	**.780** 19.81	**.365** 9.27	**.398** 10.11	**.165** 4.19	**.208** 5.28	**.565** 14.35	**.003** 1.36
MCDM1-15P***	**.930** 23.62	**.440** 11.18	**.548** 13.92	**.165** 4.19	**.208** 5.28	**.715** 18.16	**.004** 1.81
MCDM1-15S***	**.930** 23.62	**.515** 13.08	**.548** 13.92	**.165** 4.19	**.208** 5.28	**.715** 18.16	**.004** 1.81
MCDM1-21P***	**1.080** 27.43	**.590** 14.99	**.698** 17.73	**.165** 4.19	**.208** 5.28	**.865** 21.97	**.005** 2.26
MCDM1-21S***	**1.080** 27.43	**.665** 16.89	**.698** 17.73	**.165** 4.19	**.208** 5.28	**.865** 21.97	**.005** 2.26
MCDM1-25P***	**1.180** 29.97	**.690** 17.53	**.798** 20.27	**.165** 4.19	**.208** 5.28	**.965** 24.51	**.006** 2.72
MCDM1-25S***	**1.180** 29.97	**.765** 19.43	**.798** 20.27	**.165** 4.19	**.208** 5.28	**.965** 24.51	**.005** 2.26
MCDM1-30P***	**.930** 23.62	**.435** 11.05	**.548** 13.92	**.252** 6.40	**.295** 7.49	**.715** 18.16	**.007** 3.17
MCDM1-30S***	**.930** 23.62	**.515** 13.08	**.548** 13.92	**.252** 6.40	**.295** 7.49	**.715** 18.16	**.007** 3.17
MCDM1-31P***	**1.330** 33.78	**.840** 21.34	**.948** 16.46	**.165** 4.19	**.208** 5.28	**1.115** 28.32	**.007** 3.17
MCDM1-31S***	**1.330** 33.78	**.915** 23.24	**.948** 16.46	**.165** 4.19	**.208** 5.28	**1.115** 28.32	**.006** 2.72
MCDM1-37P***	**1.480** 37.59	**.990** 25.15	**1.098** 27.89	**.165** 4.19	**.208** 5.28	**1.270** 32.26	**.007** 3.17
MCDM1-37S***	**1.480** 37.59	**1.065** 27.05	**1.098** 27.89	**.165** 4.19	**.208** 5.28	**1.270** 32.26	**.007** 3.17
MCDM1-51P***	**1.430** 36.32	**.940** 23.88	**1.048** 26.62	**.208** 5.28	**.250** 6.35	**1.215** 30.86	**.009** 4.08
MCDM1-51S***	**1.430** 36.32	**1.015** 25.78	**1.048** 26.62	**.208** 5.28	**.250** 6.35	**1.215** 30.86	**.008** 3.62

Note: Weight given is with .500 [12.7] uninsulated, solid, 24 AWG gold plated copper pigtails.

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Microminiature D Connectors (Continued)

MCDM Series Metal Shell RF COMBOMATE Connectors

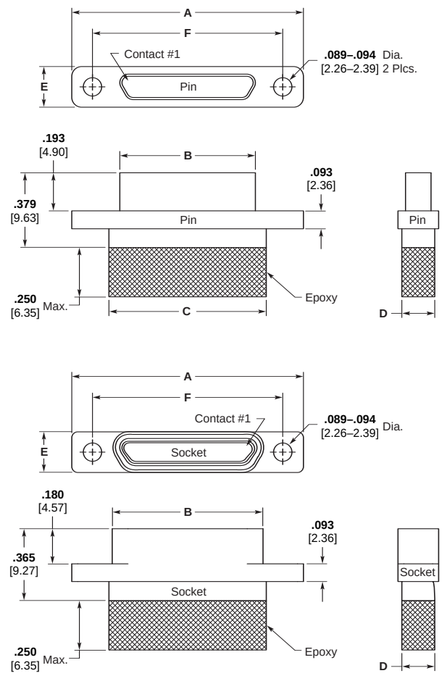
Screw Mount Coaxial Terminations

Available *now* — RF Performance in standard subminiature rectangular connectors, with VSWR values of 1.01 to 1.10 in frequencies ranging in DC to 2.3 GHz. This is the COMBOMATE Connector.

This series of connectors incorporates the same metal shells and twist pin contacts used in the widely accepted, high reliability, MCDM Series.

The RF COMBOMATE Connector Series will accommodate RG 196 A/U or RG 178 B/U coaxial cable terminated in a unique manner in standard, already tooled insert layouts. This feature results in savings in cost, time and space.

The RF COMBOMATE Connector Series will accommodate a maximum of 17 RG 196 A/U or RG 178 B/U cables in an area of less than .225 sq. inches [14.51 mm²]. Mixed layouts with coaxial terminations and standard AWG 24, 26 and 28 are also immediately available in 7 different shell sizes. The overall envelope and mounting dimensions of equivalent size of COMBOMATE Connectors are exactly the same as the standard MCDM Series.



Performance Data — Coaxial Terminations

Impedance — 49.0 to 51.0 Ohms.

Voltage Standing Wave Ratio (VSWR) — 1.01:1 to 1.10:1 at frequency ranging in DC to 2.3 GHz.

Dielectric Withstanding Voltage (60 Hz rms room temperature) — 750 VAC at sea level;
200 VAC at 70,000 feet [21,336 m].

(Actual Test Data)	Crosstalk (Between Adjacent Lines)			
	1 to 2	2 to 3	3 to 4	4 to 5
30 MHz	60.0 db	59.8 db	60.7 db	60.0 db
100 MHz	49.1 db	48.3 db	51.7 db	50.6 db
175 MHz	42.6 db	41.4 db	47.2 db	47.0 db
500 MHz	38.0 db	38.8 db	39.5 db	40.0 db
1000 MHz	31.6 db	32.0 db	30.0 db	32.5 db
2000 MHz	22.4 db	22.5 db	22.3 db	20.8 db
3000 MHz	21.5 db	23.9 db	21.4 db	24.2 db

Insertion Loss					
Sample	#1	#2	#3	#4	#5
30 MHz	.08 db	.08 db	.08 db	.08 db	.08 db
100 MHz	.24 db	.24 db	.25 db	.25 db	.25 db
175 MHz	.35 db	.36 db	.36 db	.34 db	.32 db
500 MHz	.58 db	.50 db	.60 db	.58 db	.48 db
1000 MHz	1.25 db	1.33 db	1.36 db	1.35 db	1.24 db
2000 MHz	1.48 db	1.71 db	1.42 db	1.40 db	1.45 db
3000 MHz	2.66 db	2.45 db	2.74 db	2.86 db	2.84 db

Note: Verification of all test data is on file at Tyco Electronics and is available upon request.
All test runs using RG 196 A/U.

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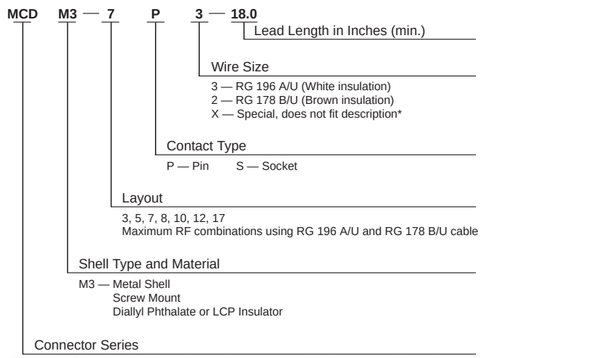
MCDM Series Metal Shell RF COMBOMATE Connectors (Continued)

Screw Mount Coaxial Terminations (Continued)

How To Specify



***Ordering Criteria:** A wide variety of contact combinations, coaxial and power mixed, are available. Contact Tyco Electronics for additional arrangement numbers.

Part Number	A ± .005 [± .127]	B ± .005 [± .127]	C Max.	D Max.	E ± .005 [± .127]	F ± .005 [± .127]
MCDM3-3P**	**.780** 19.81	**.290** 7.36	**.408** 10.36	**.200** 5.08	**.208** 5.28	**.565** 14.35
MCDM3-3S**	**.780** 19.81	**.365** 9.27	**.408** 10.36	**.200** 5.08	**.208** 5.28	**.565** 14.35
MCDM3-5P**	**.930** 23.62	**.440** 11.18	**.558** 14.17	**.200** 5.08	**.208** 5.28	**.715** 18.16
MCDM3-5S**	**.930** 23.62	**.515** 13.08	**.558** 14.17	**.200** 5.08	**.208** 5.28	**.715** 18.16
MCDM3-7P**	**1.080** 27.43	**.590** 14.99	**.708** 17.98	**.200** 5.08	**.208** 5.28	**.865** 21.97
MCDM3-7S**	**1.080** 27.43	**.665** 16.89	**.708** 17.98	**.200** 5.08	**.208** 5.28	**.865** 21.97
MCDM3-8P**	**1.180** 29.97	**.690** 17.53	**.808** 20.52	**.200** 5.08	**.208** 5.28	**.965** 24.51
MCDM3-8S**	**1.180** 29.97	**.765** 19.43	**.808** 20.52	**.200** 5.08	**.208** 5.28	**.965** 24.51
MCDM3-10P**	**1.330** 33.78	**.840** 21.34	**.958** 24.33	**.200** 5.08	**.208** 5.28	**1.115** 28.32
MCDM3-10S**	**1.330** 33.78	**.915** 23.24	**.958** 24.33	**.200** 5.08	**.208** 5.28	**1.115** 28.32
MCDM3-12P**	**1.480** 37.59	**.990** 25.15	**1.108** 27.89	**.200** 5.08	**.208** 5.28	**1.270** 32.26
MCDM3-12S**	**1.480** 37.59	**1.065** 27.05	**1.108** 27.89	**.200** 5.08	**.208** 5.28	**1.270** 32.26
MCDM3-17P**	**1.430** 36.32	**.940** 23.88	**1.058** 26.87	**.245** 6.22	**.250** 6.35	**1.215** 30.86
MCDM3-17S**	**1.430** 36.32	**1.015** 25.78	**1.058** 26.87	**.245** 6.22	**.250** 6.35	**1.215** 30.86

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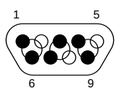
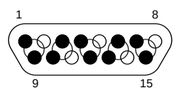
MCDM Series Metal Shell RF COMBOMATE Connectors (Continued)

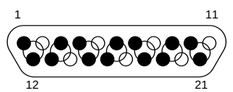
Contact Arrangement as Viewed from the Engaging Face of the Pin Side



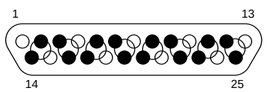
3
RG196 A/U or RG 178 B/U



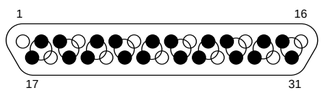
5
RG196 A/U or RG 178 B/U



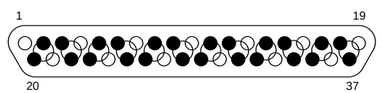
7
RG196 A/U or RG 178 B/U



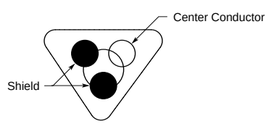
8
RG196 A/U or RG 178 B/U



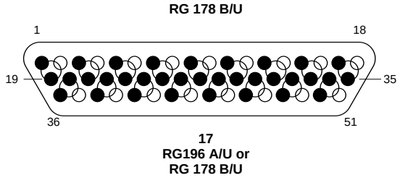
10
RG196 A/U or RG 178 B/U



12
RG196 A/U or RG 178 B/U



Termination Pattern



17
RG196 A/U or RG 178 B/U

Note: The above contact arrangements are the maximum densities that can be obtained in each shell size when using RG 196 A/U or RG 178 B/U cable.

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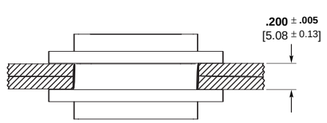
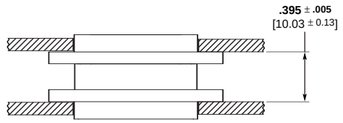
MCDM Series Metal Shell Connectors Panel Mounting — Cutout Dimensions

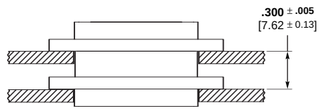
Panel Mounting Dimensions — MCDM



Plug and Receptacle
Rear Mounted



Plug and Receptacle
Front Mounted



Plug Front Mounted
Receptacle Rear Mounted

Panel Cutout Dimensions

Screw Mounting

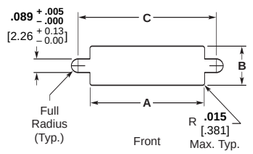


Figure 1

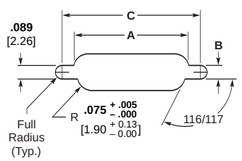


Figure 2

Note: Front mounting preferred.

Number of Contacts	Fig.	A + .004 [+ .102] − .000 [− .000]	B + .004 [+ .102] − .000 [− .000]	C + .005 [+ .127] − .000 [− .000]
9	1	**.412** [10.46]	**.177** [4.50]	**.570** [14.48]
	2	**.384** [9.75]	**.222** [5.64]	**.570** [14.48]
15	1	**.562** [14.27]	**.177** [4.50]	**.720** [18.29]
	2	**.534** [13.56]	**.222** [5.64]	**.720** [18.29]
21	1	**.712** [18.08]	**.177** [4.50]	**.870** [22.10]
	2	**.684** [17.37]	**.222** [5.64]	**.870** [22.10]
25	1	**.812** [20.62]	**.177** [4.50]	**.970** [24.64]
	2	**.784** [19.91]	**.222** [5.64]	**.970** [24.64]
31	1	**.962** [24.43]	**.177** [4.50]	**1.120** [28.45]
	2	**.934** [23.72]	**.222** [5.64]	**1.120** [28.45]
37	1	**1.112** [28.24]	**.177** [4.50]	**1.270** [32.26]
	2	**1.084** [27.53]	**.222** [5.64]	**1.270** [32.26]
51	1	**1.062** [26.97]	**.224** [5.69]	**1.220** [30.99]
	2	**1.034** [26.26]	**.264** [6.71]	**1.220** [30.99]

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Microminiature D Connectors vs. MIL-DTL-83513 Cross Reference

MCK (Metal Shell)

Military Part No.	MICRODOT Part No.
M83513/01-A*	MCK-**-B- 9PS
M83513/01-B*	MCK-**-B- 15PS
M83513/01-C*	MCK-**-B- 21PS
M83513/01-D*	MCK-**-B- 25PS
M83513/01-E*	MCK-**-B- 31PS
M83513/01-F*	MCK-**-B- 37PS
M83513/01-G*	MCK-**-B- 51PS
M83513/01-H*	MCK-**-B-100PS
M83513/02-A*	MCK-**-B- 9SS
M83513/02-B*	MCK-**-B- 15SS
M83513/02-C*	MCK-**-B- 21SS
M83513/02-D*	MCK-**-B- 25SS
M83513/02-E*	MCK-**-B- 31SS
M83513/02-F*	MCK-**-B- 37SS
M83513/02-G*	MCK-**-B- 51SS
M83513/02-H*	MCK-**-B-100SS
M83513/03-A01*	MCK-**-B- 9P6G1-18.0
M83513/03-B01*	MCK-**-B- 15P6G1-18.0
M83513/03-C01*	MCK-**-B- 21P6G1-18.0
M83513/03-D01*	MCK-**-B- 25P6G1-18.0
M83513/03-E01*	MCK-**-B- 31P6G1-18.0
M83513/03-F01*	MCK-**-B- 37P6G1-18.0
M83513/03-G01*	MCK-**-B- 51P6G1-18.0
M83513/03-H01*	MCK-**-B-100P6G1-18.0
M83513/03-A02*	MCK-**-B- 9P6G1-36.0
M83513/03-B02*	MCK-**-B- 15P6G1-36.0
M83513/03-C02*	MCK-**-B- 21P6G1-36.0
M83513/03-D02*	MCK-**-B- 25P6G1-36.0
M83513/03-E02*	MCK-**-B- 31P6G1-36.0
M83513/03-F02*	MCK-**-B- 37P6G1-36.0
M83513/03-G02*	MCK-**-B- 51P6G1-36.0
M83513/03-H02*	MCK-**-B-100P6G1-36.0
M83513/03-A03*	MCK-**-B- 9P6G9-18.0
M83513/03-B03*	MCK-**-B- 15P6G9-18.0
M83513/03-C03*	MCK-**-B- 21P6G9-18.0
M83513/03-D03*	MCK-**-B- 25P6G9-18.0
M83513/03-E03*	MCK-**-B- 31P6G9-18.0
M83513/03-F03*	MCK-**-B- 37P6G9-18.0
M83513/03-G03*	MCK-**-B- 51P6G9-18.0
M83513/03-H03*	MCK-**-B-100P6G9-18.0
M83513/03-A04*	MCK-**-B- 9P6G9-36.0
M83513/03-B04*	MCK-**-B- 15P6G9-36.0
M83513/03-C04*	MCK-**-B- 21P6G9-36.0
M83513/03-D04*	MCK-**-B- 25P6G9-36.0
M83513/03-E04*	MCK-**-B- 31P6G9-36.0
M83513/03-F04*	MCK-**-B- 37P6G9-36.0
M83513/03-G04*	MCK-**-B- 51P6G9-36.0
M83513/03-H04*	MCK-**-B-100P6G9-36.0
M83513/03-A05*	MCK-**-B- 9P5L4-0.5
M83513/03-B05*	MCK-**-B- 15P5L4-0.5
M83513/03-C05*	MCK-**-B- 21P5L4-0.5
M83513/03-D05*	MCK-**-B- 25P5L4-0.5
M83513/03-E05*	MCK-**-B- 31P5L4-0.5
M83513/03-F05*	MCK-**-B- 37P5L4-0.5
M83513/03-G05*	MCK-**-B- 51P5L4-0.5
M83513/03-H05*	MCK-**-B-100P5L4-0.5
M83513/03-A06*	MCK-**-B- 9P5L4-1.0
M83513/03-B06*	MCK-**-B- 15P5L4-1.0
M83513/03-C06*	MCK-**-B- 21P5L4-1.0
M83513/03-D06*	MCK-**-B- 25P5L4-1.0

Military Part No.	MICRODOT Part No.
M83513/03-E06*	MCK-**-B- 31P5L4-1.0
M83513/03-F06*	MCK-**-B- 37P5L4-1.0
M83513/03-G06*	MCK-**-B- 51P5L4-1.0
M83513/03-H06*	MCK-**-B-100P5L4-1.0
M83513/03-A07*	MCK-**-B- 9P5L5-0.5
M83513/03-B07*	MCK-**-B- 15P5L5-0.5
M83513/03-C07*	MCK-**-B- 21P5L5-0.5
M83513/03-D07*	MCK-**-B- 25P5L5-0.5
M83513/03-E07*	MCK-**-B- 31P5L5-0.5
M83513/03-F07*	MCK-**-B- 37P5L5-0.5
M83513/03-G07*	MCK-**-B- 51P5L5-0.5
M83513/03-H07*	MCK-**-B-100P5L5-0.5
M83513/03-A08*	MCK-**-B- 9P5L5-1.0
M83513/03-B08*	MCK-**-B- 15P5L5-1.0
M83513/03-C08*	MCK-**-B- 21P5L5-1.0
M83513/03-D08*	MCK-**-B- 25P5L5-1.0
M83513/03-E08*	MCK-**-B- 31P5L5-1.0
M83513/03-F08*	MCK-**-B- 37P5L5-1.0
M83513/03-G08*	MCK-**-B- 51P5L5-1.0
M83513/03-H08*	MCK-**-B-100P5L5-1.0
M83513/03-A09*	MCK-**-B- 9P6Q1-18.0
M83513/03-B09*	MCK-**-B- 15P6Q1-18.0
M83513/03-C09*	MCK-**-B- 21P6Q1-18.0
M83513/03-D09*	MCK-**-B- 25P6Q1-18.0
M83513/03-E09*	MCK-**-B- 31P6Q1-18.0
M83513/03-F09*	MCK-**-B- 37P6Q1-18.0
M83513/03-G09*	MCK-**-B- 51P6Q1-18.0
M83513/03-H09*	MCK-**-B-100P6Q1-18.0
M83513/03-A10*	MCK-**-B- 9P6Q1-36.0
M83513/03-B10*	MCK-**-B- 15P6Q1-36.0
M83513/03-C10*	MCK-**-B- 21P6Q1-36.0
M83513/03-D10*	MCK-**-B- 25P6Q1-36.0
M83513/03-E10*	MCK-**-B- 31P6Q1-36.0
M83513/03-F10*	MCK-**-B- 37P6Q1-36.0
M83513/03-G10*	MCK-**-B- 51P6Q1-36.0
M83513/03-H10*	MCK-**-B-100P6Q1-36.0
M83513/03-A11*	MCK-**-B- 9P6Q9-18.0
M83513/03-B11*	MCK-**-B- 15P6Q9-18.0
M83513/03-C11*	MCK-**-B- 21P6Q9-18.0
M83513/03-D11*	MCK-**-B- 25P6Q9-18.0
M83513/03-E11*	MCK-**-B- 31P6Q9-18.0
M83513/03-F11*	MCK-**-B- 37P6Q9-18.0
M83513/03-G11*	MCK-**-B- 51P6Q9-18.0
M83513/03-H11*	MCK-**-B-100P6Q9-18.0
M83513/03-A12*	MCK-**-B- 9P6Q9-36.0
M83513/03-B12*	MCK-**-B- 15P6Q9-36.0
M83513/03-C12*	MCK-**-B- 21P6Q9-36.0
M83513/03-D12*	MCK-**-B- 25P6Q9-36.0
M83513/03-E12*	MCK-**-B- 31P6Q9-36.0
M83513/03-F12*	MCK-**-B- 37P6Q9-36.0
M83513/03-G12*	MCK-**-B- 51P6Q9-36.0
M83513/03-H12*	MCK-**-B-100P6Q9-36.0
M83513/03-A13*	MCK-**-B- 9P6G1-72.0
M83513/03-B13*	MCK-**-B- 1 5P6G1-72.0
M83513/03-C13*	MCK-**-B- 21P6G1-72.0
M83513/03-D13*	MCK-**-B- 25P6G1-72.0
M83513/03-E13*	MCK-**-B- 31P6G1-72.0
M83513/03-F13*	MCK-**-B- 37P6G1-72.0
M83513/03-G13*	MCK-**-B- 51P6G1-72.0
M83513/03-H13*	MCK-**-B-100P6G1-72.0

Military Part No.	MICRODOT Part No.
M83513/03-A14*	MCK-**-B- 9P6G9-72.0
M83513/03-B14*	MCK-**-B- 15P6G9-72.0
M83513/03-C14*	MCK-**-B- 21P6G9-72.0
M83513/03-D14*	MCK-**-B- 25P6G9-72.0
M83513/03-E14*	MCK-**-B- 31P6G9-72.0
M83513/03-F14*	MCK-**-B- 37P6G9-72.0
M83513/03-G14*	MCK-**-B- 51P6G9-72.0
M83513/03-H14*	MCK-**-B-100P6G9-72.0
M83513/03-A15*	MCK-**-B- 9P6Q1-72.0
M83513/03-B15*	MCK-**-B- 15P6Q1-72.0
M83513/03-C15*	MCK-**-B- 21P6Q1-72.0
M83513/03-D15*	MCK-**-B- 25P6Q1-72.0
M83513/03-E15*	MCK-**-B- 31P6Q1-72.0
M83513/03-F15*	MCK-**-B- 37P6Q1-72.0
M83513/03-G15*	MCK-**-B- 51P6Q1-72.0
M83513/03-H15*	MCK-**-B-100P6Q1-72.0
M83513/03-A16*	MCK-**-B- 9P6Q9-72.0
M83513/03-B16*	MCK-**-B- 15P6Q9-72.0
M83513/03-C16*	MCK-**-B- 21P6Q9-72.0
M83513/03-D16*	MCK-**-B- 25P6Q9-72.0
M83513/03-E16*	MCK-**-B- 31P6Q9-72.0
M83513/03-F16*	MCK-**-B- 37P6Q9-72.0
M83513/03-G16*	MCK-**-B- 51P6Q9-72.0
M83513/03-H16*	MCK-**-B-100P6Q9-72.0
M83513/04-A01*	MCK-**-B- 9S6G1-18.0
M83513/04-B01*	MCK-**-B- 15S6G1-18.0
M83513/04-C01*	MCK-**-B- 21S6G1-18.0
M83513/04-D01*	MCK-**-B- 25S6G1-18.0
M83513/04-E01*	MCK-**-B- 31S6G1-18.0
M83513/04-F01*	MCK-**-B- 37S6G1-18.0
M83513/04-G01*	MCK-**-B- 51S6G1-18.0
M83513/04-H01*	MCK-**-B-100S6G1-18.0
M83513/04-A02*	MCK-**-B- 9S6G1-36.0
M83513/04-B02*	MCK-**-B- 15S6G1-36.0
M83513/04-C02*	MCK-**-B- 21S6G1-36.0
M83513/04-D02*	MCK-**-B- 25S6G1-36.0
M83513/04-E02*	MCK-**-B- 31S6G1-36.0
M83513/04-F02*	MCK-**-B- 37S6G1-36.0
M83513/04-G02*	MCK-**-B- 51S6G1-36.0
M83513/04-H02*	MCK-**-B-100S6G1-36.0
M83513/04-A03*	MCK-**-B- 9S6G9-18.0
M83513/04-B03*	MCK-**-B- 15S6G9-18.0
M83513/04-C03*	MCK-**-B- 21S6G9-18.0
M83513/04-D03*	MCK-**-B- 25S6G9-18.0
M83513/04-E03*	MCK-**-B- 31S6G9-18.0
M83513/04-F03*	MCK-**-B- 37S6G9-18.0
M83513/04-G03*	MCK-**-B- 51S6G9-18.0
M83513/04-H03*	MCK-**-B-100S6G9-18.0
M83513/04-A04*	MCK-**-B- 9S6G9-36.0
M83513/04-B04*	MCK-**-B- 15S6G9-36.0
M83513/04-C04*	MCK-**-B- 21S6G9-36.0
M83513/04-D04*	MCK-**-B- 25S6G9-36.0
M83513/04-E04*	MCK-**-B- 31S6G9-36.0
M83513/04-F04*	MCK-**-B- 37S6G9-36.0
M83513/04-G04*	MCK-**-B- 51S6G9-36.0
M83513/04-H04*	MCK-**-B-100S6G9-36.0
M83513/04-A05*	MCK-**-B- 9S5L4-0.5
M83513/04-B05*	MCK-**-B- 15S5L4-0.5
M83513/04-C05*	MCK-**-B- 21S5L4-0.5
M83513/04-D05*	MCK-**-B- 25S5L4-0.5

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

MCK (Metal Shell) (Continued)

Military Part No.	MICRODOT Part No.
M83513/04-E05*	MCK-**-B- 31S5L4-0.5
M83513/04-F05*	MCK-**-B- 37S5L4-0.5
M83513/04-G05*	MCK-**-B- 51S5L4-0.5
M83513/04-H05*	MCK-**-B-100S5L4-0.5
M83513/04-A06*	MCK-**-B- 9S5L4-1.0
M83513/04-B06*	MCK-**-B- 15S5L4-1.0
M83513/04-C06*	MCK-**-B- 21S5L4-1.0
M83513/04-D06*	MCK-**-B- 25S5L4-1.0
M83513/04-E06*	MCK-**-B- 31S5L4-1.0
M83513/04-F06*	MCK-**-B- 37S5L4-1.0
M83513/04-G06*	MCK-**-B- 51S5L4-1.0
M83513/04-H06*	MCK-**-B-100S5L4-1.0
M83513/04-A07*	MCK-**-B- 9S5L5-0.5
M83513/04-B07*	MCK-**-B- 15S5L5-0.5
M83513/04-C07*	MCK-**-B- 21S5L5-0.5
M83513/04-D07*	MCK-**-B- 25S5L5-0.5
M83513/04-E07*	MCK-**-B- 31S5L5-0.5
M83513/04-F07*	MCK-**-B- 37S5L5-0.5
M83513/04-G07*	MCK-**-B- 51S5L5-0.5
M83513/04-H07*	MCK-**-B-100S5L5-0.5
M83513/04-A08*	MCK-**-B- 9S5L5-1.0
M83513/04-B08*	MCK-**-B- 15S5L5-1.0
M83513/04-C08*	MCK-**-B- 21S5L5-1.0
M83513/04-D08*	MCK-**-B- 25S5L5-1.0
M83513/04-E08*	MCK-**-B- 31S5L5-1.0
M83513/04-F08*	MCK-**-B- 37S5L5-1.0
M83513/04-G08*	MCK-**-B- 51S5L5-1.0
M83513/04-H08*	MCK-**-B-100S5L5-1.0
M83513/04-A09*	MCK-**-B- 9S6Q1-18.0
M83513/04-B09*	MCK-**-B- 15S6Q1-18.0
M83513/04-C09*	MCK-**-B- 21S6Q1-18.0
M83513/04-D09*	MCK-**-B- 25S6Q1-18.0
M83513/04-E09*	MCK-**-B- 31S6Q1-18.0
M83513/04-F09*	MCK-**-B- 37S6Q1-18.0
M83513/04-G09*	MCK-**-B- 51S6Q1-18.0
M83513/04-H09*	MCK-**-B-100S6Q1-18.0
M83513/04-A10*	MCK-**-B- 9S6Q1-36.0
M83513/04-B10*	MCK-**-B- 15S6Q1-36.0
M83513/04-C10*	MCK-**-B- 21S6Q1-36.0
M83513/04-D10*	MCK-**-B- 25S6Q1-36.0
M83513/04-E10*	MCK-**-B- 31S6Q1-36.0
M83513/04-F10*	MCK-**-B- 37S6Q1-36.0
M83513/04-G10*	MCK-**-B- 51S6Q1-36.0
M83513/04-H10*	MCK-**-B-100S6Q1-36.0
M83513/04-A11*	MCK-**-B- 9S6Q9-18.0
M83513/04-B11*	MCK-**-B- 15S6Q9-18.0
M83513/04-C11*	MCK-**-B- 21S6Q9-18.0
M83513/04-D11*	MCK-**-B- 25S6Q9-18.0
M83513/04-E11*	MCK-**-B- 31S6Q9-18.0
M83513/04-F11*	MCK-**-B- 37S6Q9-18.0
M83513/04-G11*	MCK-**-B- 51S6Q9-18.0
M83513/04-H11*	MCK-**-B-100S6Q9-18.0
M83513/04-A12*	MCK-**-B- 9S6Q9-36.0
M83513/04-B12*	MCK-**-B- 15S6Q9-36.0
M83513/04-C12*	MCK-**-B- 21S6Q9-36.0
M83513/04-D12*	MCK-**-B- 25S6Q9-36.0
M83513/04-E12*	MCK-**-B- 31S6Q9-36.0
M83513/04-F12*	MCK-**-B- 37S6Q9-36.0
M83513/04-G12*	MCK-**-B- 51S6Q9-36.0
M83513/04-H12*	MCK-**-B-100S6Q9-36.0
M83513/04-A13*	MCK-**-B- 9S6G1-72.0
M83513/04-B13*	MCK-**-B- 15S6G1-72.0
M83513/04-C13*	MCK-**-B- 21S6G1-72.0
M83513/04-D13*	MCK-**-B- 25S6G1-72.0
M83513/04-E13*	MCK-**-B- 31S6G1-72.0
M83513/04-F13*	MCK-**-B- 37S6G1-72.0
M83513/04-G13*	MCK-**-B- 51S6G1-72.0
M83513/04-H13*	MCK-**-B-100S6G1-72.0
M83513/04-A14*	MCK-**-B- 9S6G9-72.0
M83513/04-B14*	MCK-**-B- 15S6G9-72.0
M83513/04-C14*	MCK-**-B- 21S6G9-72.0
M83513/04-D14*	MCK-**-B- 25S6G9-72.0
M83513/04-E14*	MCK-**-B- 31S6G9-72.0
M83513/04-F14*	MCK-**-B- 37S6G9-72.0
M83513/04-G14*	MCK-**-B- 51S6G9-72.0
M83513/04-H14*	MCK-**-B-100S6G9-72.0
M83513/04-A15*	MCK-**-B- 9S6Q1-72.0
M83513/04-B15*	MCK-**-B- 15S6Q1-72.0
M83513/04-C15*	MCK-**-B- 21S6Q1-72.0
M83513/04-D15*	MCK-**-B- 25S6Q1-72.0
M83513/04-E15*	MCK-**-B- 31S6Q1-72.0
M83513/04-F15*	MCK-**-B- 37S6Q1-72.0
M83513/04-G15*	MCK-**-B- 51S6Q1-72.0
M83513/04-H15*	MCK-**-B-100S6Q1-72.0
M83513/04-A16*	MCK-**-B- 9S6Q9-72.0
M83513/04-B16*	MCK-**-B- 15S6Q9-72.0
M83513/04-C16*	MCK-**-B- 21S6Q9-72.0
M83513/04-D16*	MCK-**-B- 25S6Q9-72.0
M83513/04-E16*	MCK-**-B- 31S6Q9-72.0
M83513/04-F16*	MCK-**-B- 37S6Q9-72.0
M83513/04-G16*	MCK-**-B- 51S6Q9-72.0
M83513/04-H16*	MCK-**-B-100S6Q9-72.0

*C = Cadmium or N = Nickel (space applications only)
**C2 = Cadmium or N1 = Nickel (space applications only)

Hardware

Military Part No.	MICRODOT Part No.
M83513/05-02	“A. HD, J/S, L.F, #2”
M83513/05-12	“A. HD, J/S, L.F, #4”
M83513/05-03	“A. HD, J/S,H.F, #2”
M83513/05-13	“A. HD, J/S, H.F. #4”
M83513/05-05	“S. HD, J/S, L.F, #2”
M83513/05-15	“S. HD, J/S, L.F, #4”
M83513/05-06	“S. HD, J/S, H.F, #2”
M83513/05-16	“S. HD, J/S, H.F, #4”
M83513/05-07	“JACKPOST ASSY #2”
M83513/05-17	“JACKPOST ASSY, #4”

MCDR (Plastic Shell)

Military Part No.	MICRODOT Part No.
M83513/06-A	MCDR3-B- 9PS
M83513/06-B	MCDR3-B-15PS
M83513/06-C	MCDR3-B-21PS
M83513/06-D	MCDR3-B-25PS
M83513/06-E	MCDR3-B-31PS
M83513/06-F	MCDR3-B-37PS
M83513/06-G	MCDR3-B-51PS
M83513/07-A	MCDR3-B- 9SS
M83513/07-B	MCDR3-B-15SS
M83513/07-C	MCDR3-B-21SS
M83513/07-D	MCDR3-B-25SS
M83513/07-E	MCDR3-B-31SS
M83513/07-F	MCDR3-B-37SS
M83513/07-G	MCDR3-B-51SS
M83513/08-A01	MCDR3-B- 9P6G1-18.0
M83513/08-B01	MCDR3-B-15P6G1-18.0
M83513/08-C01	MCDR3-B-21P6G1-18.0
M83513/08-D01	MCDR3-B-25P6G1-18.0
M83513/08-E01	MCDR3-B-31P6G1-18.0
M83513/08-F01	MCDR3-B-37P6G1-18.0
M83513/08-G01	MCDR3-B-51P6G1-18.0
M83513/08-A02	MCDR3-B- 9P6G1-36.0
M83513/08-B02	MCDR3-B-15P6G1-36.0
M83513/08-C02	MCDR3-B-21P6G1-36.0
M83513/08-D02	MCDR3-B-25P6G1-36.0
M83513/08-E02	MCDR3-B-31P6G1-36.0
M83513/08-F02	MCDR3-B-37P6G1-36.0
M83513/08-G02	MCDR3-B-51P6G1-36.0
M83513/08-A03	MCDR3-B- 9P6G9-18.0
M83513/08-B03	MCDR3-B-15P6G9-18.0
M83513/08-C03	MCDR3-B-21P6G9-18.0
M83513/08-D03	MCDR3-B-25P6G9-18.0
M83513/08-E03	MCDR3-B-31P6G9-18.0
M83513/08-F03	MCDR3-B-37P6G9-18.0
M83513/08-G03	MCDR3-B-51P6G9-18.0
M83513/08-A04	MCDR3-B- 9P6G9-36.0
M83513/08-B04	MCDR3-B-15P6G9-36.0
M83513/08-C04	MCDR3-B-21P6G9-36.0
M83513/08-D04	MCDR3-B-25P6G9-36.0

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Microminiature D Connectors vs. MIL-DTL-83513 Cross Reference (Continued)

MCDR (Plastic Shell) (Continued)

Military Part No.	MICRODOT Part No.
M83513/08-E04	MCDR3-B-31P6G9-36.0
M83513/08-F04	MCDR3-B-37P6G9-36.0
M83513/08-G04	MCDR3-B-51P6G9-36.0
M83513/08-A05	MCDR3-B- 9P5L4-0.5
M83513/08-B05	MCDR3-B-15P5L4-0.5
M83513/08-C05	MCDR3-B-21P5L4-0.5
M83513/08-D05	MCDR3-B-25P5L4-0.5
M83513/08-E05	MCDR3-B-31P5L4-0.5
M83513/08-F05	MCDR3-B-37P5L4-0.5
M83513/08-G05	MCDR3-B-51P5L4-0.5
M83513/08-A06	MCDR3-B- 9P5L4-1.0
M83513/08-B06	MCDR3-B-15P5L4-1.0
M83513/08-C06	MCDR3-B-21P5L4-1.0
M83513/08-D06	MCDR3-B-25P5L4-1.0
M83513/08-E06	MCDR3-B-31P5L4-1.0
M83513/08-F06	MCDR3-B-37P5L4-1.0
M83513/08-G06	MCDR3-B-51P5L4-1.0
M83513/08-A07	MCDR3-B- 9P5L5-0.5
M83513/08-B07	MCDR3-B-15P5L5-0.5
M83513/08-C07	MCDR3-B-21P5L5-0.5
M83513/08-D07	MCDR3-B-25P5L5-0.5
M83513/08-E07	MCDR3-B-31P5L5-0.5
M83513/08-F07	MCDR3-B-37P5L5-0.5
M83513/08-G07	MCDR3-B-51P5L5-0.5
M83513/08-A08	MCDR3-B- 9P5L5-1.0
M83513/08-B08	MCDR3-B-15P5L5-1.0
M83513/08-C08	MCDR3-B-21P5L5-1.0
M83513/08-D08	MCDR3-B-25P5L5-1.0
M83513/08-E08	MCDR3-B-31P5L5-1.0
M83513/08-F08	MCDR3-B-37P5L5-1.0
M83513/08-G08	MCDR3-B-51P5L5-1.0
M83513/08-A09	MCDR3-B- 9P6Q1-18.0
M83513/08-B09	MCDR3-B-15P6Q1-18.0
M83513/08-C09	MCDR3-B-21P6Q1-18.0
M83513/08-D09	MCDR3-B-25P6Q1-18.0
M83513/08-E09	MCDR3-B-31P6Q1-18.0
M83513/08-F09	MCDR3-B-37P6Q1-18.0
M83513/08-G09	MCDR3-B-51P6Q1-18.0
M83513/08-A10	MCDR3-B- 9P6Q1-36.0
M83513/08-B10	MCDR3-B-15P6Q1-36.0
M83513/08-C10	MCDR3-B-21P6Q1-36.0
M83513/08-D10	MCDR3-B-25P6Q1-36.0
M83513/08-E10	MCDR3-B-31P6Q1-36.0
M83513/08-F10	MCDR3-B-37P6Q1-36.0
M83513/08-G10	MCDR3-B-51P6Q1-36.0
M83513/08-A11	MCDR3-B- 9P6Q9-18.0
M83513/08-B11	MCDR3-B-15P6Q9-18.0
M83513/08-C11	MCDR3-B-21P6Q9-18.0
M83513/08-D11	MCDR3-B-25P6Q9-18.0
M83513/08-E11	MCDR3-B-31P6Q9-18.0
M83513/08-F11	MCDR3-B-37P6Q9-18.0
M83513/08-G11	MCDR3-B-51P6Q9-18.0
M83513/08-A12	MCDR3-B- 9P6Q9-36.0
M83513/08-B12	MCDR3-B-15P6Q9-36.0
M83513/08-C12	MCDR3-B-21P6Q9-36.0
M83513/08-D12	MCDR3-B-25P6Q9-36.0
M83513/08-E12	MCDR3-B-31P6Q9-36.0
M83513/08-F12	MCDR3-B-37P6Q9-36.0
M83513/08-G12	MCDR3-B-51P6Q9-36.0
M83513/08-A13	MCDR3-B- 9P6G1-72.0
M83513/08-B13	MCDR3-B-15P6G1-72.0
M83513/08-C13	MCDR3-B-21P6G1-72.0
M83513/08-D13	MCDR3-B-25P6G1-72.0
M83513/08-E13	MCDR3-B-31P6G1-72.0
M83513/08-F13	MCDR3-B-37P6G1-72.0
M83513/08-G13	MCDR3-B-51P6G1-72.0
M83513/08-A14	MCDR3-B- 9P6G9-72.0
M83513/08-B14	MCDR3-B-15P6G9-72.0
M83513/08-C14	MCDR3-B-21P6G9-72.0
M83513/08-D14	MCDR3-B-25P6G9-72.0
M83513/08-E14	MCDR3-B-31P6G9-72.0
M83513/08-F14	MCDR3-B-37P6G9-72.0
M83513/08-G14	MCDR3-B-51P6G9-72.0
M83513/08-A15	MCDR3-B- 9P6Q1-72.0
M83513/08-B15	MCDR3-B-15P6Q1-72.0
M83513/08-C15	MCDR3-B-21P6Q1-72.0
M83513/08-D15	MCDR3-B-25P6Q1-72.0
M83513/08-E15	MCDR3-B-31P6Q1-72.0
M83513/08-F15	MCDR3-B-37P6Q1-72.0
M83513/08-G15	MCDR3-B-51P6Q1-72.0
M83513/08-A16	MCDR3-B- 9P6Q9-72.0
M83513/08-B16	MCDR3-B-15P6Q9-72.0
M83513/08-C16	MCDR3-B-21P6Q9-72.0
M83513/08-D16	MCDR3-B-25P6Q9-72.0
M83513/08-E16	MCDR3-B-31P6Q9-72.0
M83513/08-F16	MCDR3-B-37P6Q9-72.0
M83513/08-G16	MCDR3-B-51P6Q9-72.0
M83513/09-A01	MCDR3-B- 9S6G1-18.0
M83513/09-B01	MCDR3-B-15S6G1-18.0
M83513/09-C01	MCDR3-B-21S6G1-18.0
M83513/09-D01	MCDR3-B-25S6G1-18.0
M83513/09-E01	MCDR3-B-31S6G1-18.0
M83513/09-F01	MCDR3-B-37S6G1-18.0
M83513/09-G01	MCDR3-B-51S6G1-18.0
M83513/09-A02	MCDR3-B- 9S6G1-36.0
M83513/09-B02	MCDR3-B-15S6G1-36.0
M83513/09-C02	MCDR3-B-21S6G1-36.0
M83513/09-D02	MCDR3-B-25S6G1-36.0
M83513/09-E02	MCDR3-B-31S6G1-36.0
M83513/09-F02	MCDR3-B-37S6G1-36.0
M83513/09-G02	MCDR3-B-51S6G1-36.0
M83513/09-A03	MCDR3-B- 9S6G9-18.0
M83513/09-B03	MCDR3-B- 15S6G9-18.0
M83513/09-C03	MCDR3-B- 21S6G9-18.0
M83513/09-D03	MCDR3-B-25S6G9-18.0
M83513/09-E03	MCDR3-B-31S6G9-18.0
M83513/09-F03	MCDR3-B-37S6G9-18.0
M83513/09-G03	MCDR3-B-51S6G9-18.0
M83513/09-A04	MCDR3-B- 9S6G9-36.0
M83513/09-B04	MCDR3-B-15S6G9-36.0
M83513/09-C04	MCDR3-B-21S6G9-36.0
M83513/09-D04	MCDR3-B-25S6G9-36.0
M83513/09-E04	MCDR3-B-31S6G9-36.0
M83513/09-F04	MCDR3-B-37S6G9-36.0
M83513/09-G04	MCDR3-B-51S6G9-36.0
M83513/09-A05	MCDR3-B- 9S5L4-0.5
M83513/09-B05	MCDR3-B-15S5L4-0.5
M83513/09-C05	MCDR3-B-21S5L4-0.5
M83513/09-D05	MCDR3-B-25S5L4-0.5
M83513/09-E05	MCDR3-B-31S5L4-0.5
M83513/09-F05	MCDR3-B-37S5L4-0.5
M83513/09-G05	MCDR3-B-51S5L4-0.5
M83513/09-A06	MCDR3-B- 9S5L4-1.0
M83513/09-B06	MCDR3-B-15S5L4-1.0
M83513/09-C06	MCDR3-B-21S5L4-1.0
M83513/09-D06	MCDR3-B-25S5L4-1.0
M83513/09-E06	MCDR3-B-31S5L4-1.0
M83513/09-F06	MCDR3-B-37S5L4-1.0
M83513/09-G06	MCDR3-B-51S5L4-1.0
M83513/09-A07	MCDR3-B- 9S5L5-0.5
M83513/09-B07	MCDR3-B-15S5L5-0.5
M83513/09-C07	MCDR3-B-21S5L5-0.5
M83513/09-D07	MCDR3-B-25S5L5-0.5
M83513/09-E07	MCDR3-B-31S5L5-0.5
M83513/09-F07	MCDR3-B-37S5L5-0.5
M83513/09-G07	MCDR3-B-51S5L5-0.5
M83513/09-A08	MCDR3-B- 9S5L5-1.0
M83513/09-B08	MCDR3-B-15S5L5-1.0
M83513/09-C08	MCDR3-B-21S5L5-1.0
M83513/09-D08	MCDR3-B-25S5L5-1.0
M83513/09-E08	MCDR3-B-31S5L5-1.0
M83513/09-F08	MCDR3-B-37S5L5-1.0
M83513/09-G08	MCDR3-B-51S5L5-1.0
M83513/09-A09	MCDR3-B- 9S6Q1-18.0
M83513/09-B09	MCDR3-B-15S6Q1-18.0
M83513/09-C09	MCDR3-B-21S6Q1-18.0
M83513/09-D09	MCDR3-B-25S6Q1-18.0
M83513/09-E09	MCDR3-B-31S6Q1-18.0
M83513/09-F09	MCDR3-B-37S6Q1-18.0
M83513/09-G09	MCDR3-B-51S6Q1-18.0
M83513/09-A10	MCDR3-B- 9S6Q1-36.0
M83513/09-B10	MCDR3-B-15S6Q1-36.0
M83513/09-C10	MCDR3-B-21S6Q1-36.0
M83513/09-D10	MCDR3-B-25S6Q1-36.0
M83513/09-E10	MCDR3-B-31S6Q1-36.0
M83513/09-F10	MCDR3-B-37S6Q1-36.0
M83513/09-G10	MCDR3-B-51S6Q1-36.0
M83513/09-A11	MCDR3-B- 9S6Q9-18.0
M83513/09-B11	MCDR3-B-15S6Q9-18.0
M83513/09-C11	MCDR3-B-21S6Q9-18.0
M83513/09-D11	MCDR3-B-25S6Q9-18.0
M83513/09-E11	MCDR3-B-31S6Q9-18.0
M83513/09-F11	MCDR3-B-37S6Q9-18.0
M83513/09-G11	MCDR3-B-51S6Q9-18.0
M83513/09-A12	MCDR3-B- 9S6Q9-36.0
M83513/09-B12	MCDR3-B-15S6Q9-36.0
M83513/09-C12	MCDR3-B-21S6Q9-36.0
M83513/09-D12	MCDR3-B-25S6Q9-36.0
M83513/09-E12	MCDR3-B-31S6Q9-36.0
M83513/09-F12	MCDR3-B-37S6Q9-36.0
M83513/09-G12	MCDR3-B-51S6Q9-36.0
M83513/09-A13	MCDR3-B- 9S6G1-72.0
M83513/09-B13	MCDR3-B-15S6G1-72.0
M83513/09-C13	MCDR3-B-21S6G1-72.0
M83513/09-D13	MCDR3-B-25S6G1-72.0
M83513/09-E13	MCDR3-B-31S6G1-72.0
M83513/09-F13	MCDR3-B-37S6G1-72.0
M83513/09-G13	MCDR3-B-51S6G1-72.0
M83513/09-A14	MCDR3-B- 9S6G9-72.0
M83513/09-B14	MCDR3-B-15S6G9-72.0

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UK: 44-208-420-8341

Microminiature D Connectors vs. MIL-DTL-83513 Cross Reference (Continued)

MCDR (Plastic Shell) (Continued)

Military Part No.	MICRODOT Part No.
M83513/09-C14	MCDR3-B-21S6G9-72.0
M83513/09-D14	MCDR3-B-25S6G9-72.0
M83513/09-E14	MCDR3-B-31S6G9-72.0
M83513/09-F14	MCDR3-B-37S6G9-72.0
M83513/09-G14	MCDR3-B-51S6G9-72.0
M83513/09-A15	MCDR3-B- 9S6Q1-72.0
M83513/09-B15	MCDR3-B-15S6Q1-72.0

Military Part No.	MICRODOT Part No.
M83513/09-C15	MCDR3-B-21S6Q1-72.0
M83513/09-D15	MCDR3-B-25S6Q1-72.0
M83513/09-E15	MCDR3-B-31S6Q1-72.0
M83513/09-F15	MCDR3-B-37S6Q1-72.0
M83513/09-G15	MCDR3-B-51S6Q1-72.0
M83513/09-A16	MCDR3-B- 9S6Q9-72.0
M83513/09-B16	MCDR3-B-15S6Q9-72.0

Military Part No.	MICRODOT Part No.
M83513/09-C16	MCDR3-B-21S6Q9-72.0
M83513/09-D16	MCDR3-B-25S6Q9-72.0
M83513/09-E16	MCDR3-B-31S6Q9-72.0
M83513/09-F16	MCDR3-B-37S6Q9-72.0
M83513/09-G16	MCDR3-B-51S6Q9-72.0

MCK (Metal Shell)

Military Part No.	MICRODOT Part No.
M83513/10-A01*N	MCK-**-B- 9PRT1
M83513/10-B01*N	MCK-**-B- 15PRT1
M83513/10-C01*N	MCK-**-B- 21PRT1
M83513/10-D01*N	MCK-**-B- 25PRT1
M83513/10-E01*N	MCK-**-B- 31PRT1
M83513/10-F01*N	MCK-**-B- 37PRT1
M83513/10-A01*P	MCK-**-P- 9PRT1
M83513/10-B01*P	MCK-**-P- 15PRT1
M83513/10-C01*P	MCK-**-P- 21PRT1
M83513/10-D01*P	MCK-**-P- 25PRT1
M83513/10-E01*P	MCK-**-P- 31PRT1
M83513/10-F01*P	MCK-**-P- 37PRT1
M83513/10-A02*N	MCK-**-B- 9PRT1A
M83513/10-B02*N	MCK-**-B- 15PRT1A
M83513/10-C02*N	MCK-**-B- 21PRT1A
M83513/10-D02*N	MCK-**-B- 25PRT1A
M83513/10-E02*N	MCK-**-B- 31PRT1A
M83513/10-F02*N	MCK-**-B- 37PRT1A
M83513/10-A02*P	MCK-**-P- 9PRT1A
M83513/10-B02*P	MCK-**-P- 15PRT1A
M83513/10-C02*P	MCK-**-P- 21PRT1A
M83513/10-D02*P	MCK-**-P- 25PRT1A
M83513/10-E02*P	MCK-**-P- 31PRT1A
M83513/10-F02*P	MCK-**-P- 37PRT1A
M83513/10-A03*N	MCK-**-B- 9PRT1B
M83513/10-B03*N	MCK-**-B- 15PRT1B
M83513/10-C03*N	MCK-**-B- 21PRT1B
M83513/10-D03*N	MCK-**-B- 25PRT1B
M83513/10-E03*N	MCK-**-B- 31PRT1B
M83513/10-F03*N	MCK-**-B- 37PRT1B
M83513/10-A03*P	MCK-**-P- 9PRT1B
M83513/10-B03*P	MCK-**-P- 15PRT1B
M83513/10-C03*P	MCK-**-P- 21PRT1B
M83513/10-D03*P	MCK-**-P- 25PRT1B
M83513/10-E03*P	MCK-**-P- 31PRT1B
M83513/10-F03*P	MCK-**-P- 37PRT1B
M83513/11-G01*N	MCK-**-B- 51PRT1
M83513/11-G01*P	MCK-**-P- 51PRT1
M83513/11-G02*N	MCK-**-B- 51PRT1A
M83513/11-G02*P	MCK-**-P- 51PRT1A
M83513/11-G03*N	MCK-**-B- 51PRT1B
M83513/11-G03*P	MCK-**-P- 51PRT1B
M83513/12-H01*N	MCK-**-B-100PRT1
M83513/12-H01*P	MCK-**-P-100PRT1
M83513/12-H02*N	MCK-**-B-100PRT1A
M83513/12-H02*P	MCK-**-P-100PRT1A
M83513/12-H03*N	MCK-**-B-100PRT1B

Military Part No.	MICRODOT Part No.
M83513/12-H03*P	MCK-**-P-100PRT1B
M83513/13-A01*N	MCK-**-B- 9SRT1
M83513/13-B01*N	MCK-**-B- 15SRT1
M83513/13-C01*N	MCK-**-B- 21SRT1
M83513/13-D01*N	MCK-**-B- 25SRT1
M83513/13-E01*N	MCK-**-B- 31SRT1
M83513/13-F01*N	MCK-**-B- 37SRT1
M83513/13-A01*P	MCK-**-P- 9SRT1
M83513/13-B01*P	MCK-**-P- 15SRT1
M83513/13-C01*P	MCK-**-P- 21SRT1
M83513/13-D01*P	MCK-**-P- 25SRT1
M83513/13-E01*P	MCK-**-P- 31SRT1
M83513/13-F01*P	MCK-**-P- 37SRT1
M83513/13-A02*N	MCK-**-B- 9SRT1A
M83513/13-B02*N	MCK-**-B- 15SRT1A
M83513/13-C02*N	MCK-**-B- 21SRT1A
M83513/13-D02*N	MCK-**-B- 25SRT1A
M83513/13-E02*N	MCK-**-B- 31SRT1A
M83513/13-F02*N	MCK-**-B- 37SRT1A
M83513/13-A02*P	MCK-**-P- 9SRT1A
M83513/13-B02*P	MCK-**-P- 15SRT1A
M83513/13-C02*P	MCK-**-P- 21SRT1A
M83513/13-D02*P	MCK-**-P- 25SRT1A
M83513/13-E02*P	MCK-**-P- 31SRT1A
M83513/13-F02*P	MCK-**-P- 37SRT1A
M83513/13-A03*N	MCK-**-B- 9SRT1B
M83513/13-B03*N	MCK-**-B- 15SRT1B
M83513/13-C03*N	MCK-**-B- 21SRT1B
M83513/13-D03*N	MCK-**-B- 25SRT1B
M83513/13-E03*N	MCK-**-B- 31SRT1B
M83513/13-F03*N	MCK-**-B- 37SRT1B
M83513/13-A03*P	MCK-**-P- 9SRT1B
M83513/13-B03*P	MCK-**-P- 15SRT1B
M83513/13-C03*P	MCK-**-P- 21SRT1B
M83513/13-D03*P	MCK-**-P- 25SRT1B
M83513/13-E03*P	MCK-**-P- 31SRT1B
M83513/13-F03*P	MCK-**-P- 37SRT1B
M83513/14-G01*N	MCK-**-B- 51SRT1
M83513/14-G01*P	MCK-**-P- 51SRT1
M83513/14-G02*N	MCK-**-B- 51SRT1A
M83513/14-G02*P	MCK-**-P- 51SRT1A
M83513/14-G03*N	MCK-**-B- 51SRT1B
M83513/14-G03*P	MCK-**-P- 51SRT1B
M83513/15-H01*N	MCK-**-B-100SRT1
M83513/15-H01*P	MCK-**-P-100SRT1
M83513/15-H02*N	MCK-**-B-100SRT1A
M83515/15-H02*P	MCK-**-P-100SRT1A

Military Part No.	MICRODOT Part No.
M83513/15-H03*N	MCK-**-B-100SRT1B
M83513/15-H03*P	MCK-**-P-100SRT1B
M83513/16-A01*N	MCK-**-B- 9PRT3
M83513/16-B01*N	MCK-**-B- 15PRT3
M83513/16-C01*N	MCK-**-B- 21PRT3
M83513/16-D01*N	MCK-**-B- 25PRT3
M83513/16-E01*N	MCK-**-B- 31PRT3
M83513/16-F01*N	MCK-**-B- 37PRT3
M83513/16-A01*P	MCK-**-P- 9PRT3
M83513/16-B01*P	MCK-**-P- 15PRT3
M83513/16-C01*P	MCK-**-P- 21PRT3
M83513/16-D01*P	MCK-**-P- 25PRT3
M83513/16-E01*P	MCK-**-P- 31PRT3
M83513/16-F01*P	MCK-**-P- 37PRT3
M83513/16-A02*N	MCK-**-B- 9PRT3A
M83513/16-B02*N	MCK-**-B- 15PRT3A
M83513/16-C02*N	MCK-**-B- 21PRT3A
M83513/16-D02*N	MCK-**-B- 25PRT3A
M83513/16-E02*N	MCK-**-B- 31PRT3A
M83513/16-F02*N	MCK-**-B- 37PRT3A
M83513/16-A02*P	MCK-**-P- 9PRT3A
M83513/16-B02*P	MCK-**-P- 15PRT3A
M83513/16-C02*P	MCK-**-P- 21PRT3A
M83513/16-D02*P	MCK-**-P- 25PRT3A
M83513/16-E02*P	MCK-**-P- 31PRT3A
M83513/16-F02*P	MCK-**-P- 37PRT3A
M83513/16-A03*N	MCK-**-B- 9PRT3B
M83513/16-B03*N	MCK-**-B- 15PRT3B
M83513/16-C03*N	MCK-**-B- 21PRT3B
M83513/16-D03*N	MCK-**-B- 25PRT3B
M83513/16-E03*N	MCK-**-B- 31PRT3B
M83513/16-F03*N	MCK-**-B- 37PRT3B
M83513/16-A03*P	MCK-**-P- 9PRT3B
M83513/16-B03*P	MCK-**-P- 15PRT3B
M83513/16-C03*P	MCK-**-P- 21PRT3B
M83513/16-D03*P	MCK-**-P- 25PRT3B
M83513/16-E03*P	MCK-**-P- 31PRT3B
M83513/16-F03*P	MCK-**-P- 37PRT3B
M83513/17-G01*N	MCK-**-B- 51PRT3
M83513/17-G01*P	MCK-**-P- 51PRT3
M83513/17-G02*N	MCK-**-B- 51PRT3A
M83513/17-G02*P	MCK-**-P- 51PRT3A
M83513/17-G03*N	MCK-**-B- 51PRT3B
M83513/17-G03*P	MCK-**-P- 51PRT3B
M83513/18-H01*N	MCK-**-B-100PRT3
M83513/18-H01*P	MCK-**-P-100PRT3
M83513/18-H02*N	MCK-**-B-100PRT3A

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Microminiature D Connectors vs. MIL-DTL-83513 Cross Reference (Continued)

MCK (Metal Shell) (Continued)

Military Part No.	MICRODOT Part No.
M83515/18-H02*P	MCK-**-P-100PRT3A
M83513/18-H03*N	MCK-**-B-100PRT3B
M83513/18-H03*P	MCK-**-P-100PRT3B
M83513/19-A01*N	MCK-**-B- 9SRT3
M83513/19-B01*N	MCK-**-B- 15SRT3
M83513/19-C01*N	MCK-**-B- 21SRT3
M83513/19-D01*N	MCK-**-B- 25SRT3
M83513/19-E01*N	MCK-**-B- 31SRT3
M83513/19-F01*N	MCK-**-B- 37SRT3
M83513/19-A01*P	MCK-**-P- 9SRT3
M83513/19-B01*P	MCK-**-P- 15SRT3
M83513/19-C01*P	MCK-**-P- 21SRT3
M83513/19-D01*P	MCK-**-P- 25SRT3
M83513/19-E01*P	MCK-**-P- 31SRT3
M83513/19-F01*P	MCK-**-P- 37SRT3
M83513/19-A02*N	MCK-**-B- 9SRT3A
M83513/19-B02*N	MCK-**-B- 15SRT3A
M83513/19-C02*N	MCK-**-B- 21SRT3A
M83513/19-D02*N	MCK-**-B- 25SRT3A
M83513/19-E02*N	MCK-**-B- 31SRT3A
M83513/19-F02*N	MCK-**-B- 37SRT3A
M83513/19-A02*P	MCK-**-P- 9SRT3A
M83513/19-B02*P	MCK-**-P- 15SRT3A
M83513/19-C02*P	MCK-**-P- 21SRT3A
M83513/19-D02*P	MCK-**-P- 25SRT3A
M83513/19-E02*P	MCK-**-P- 31SRT3A
M83513/19-F02*P	MCK-**-P- 37SRT3A
M83513/19-A03*N	MCK-**-B- 9SRT3B
M83513/19-B03*N	MCK-**-B- 15SRT3B
M83513/19-C03*N	MCK-**-B- 21SRT3B
M83513/19-D03*N	MCK-**-B- 25SRT3B
M83513/19-E03*N	MCK-**-B- 31SRT3B
M83513/19-F03*N	MCK-**-B- 37SRT3B
M83513/19-A03*P	MCK-**-P- 9SRT3B
M83513/19-B03*P	MCK-**-P- 15SRT3B
M83513/19-C03*P	MCK-**-P- 21SRT3B
M83513/19-D03*P	MCK-**-P- 25SRT3B
M83513/19-E03*P	MCK-**-P- 31SRT3B
M83513/19-F03*P	MCK-**-P- 37SRT3B
M83513/20-G01*N	MCK-**-B- 51SRT3
M83513/20-G01*P	MCK-**-P- 51SRT3
M83513/20-G02*N	MCK-**-B- 51SRT3A
M83513/20-G02*P	MCK-**-P- 51SRT3A
M83513/20-G03*N	MCK-**-B- 51SRT3B
M83513/20-G03*P	MCK-**-P- 51SRT3B
M83513/21-H01*N	MCK-**-B-100SRT3
M83513/21-H01*P	MCK-**-P-100SRT3
M83513/21-H02*N	MCK-**-B-100SRT3A
M83515/21-H02*P	MCK-**-P-100SRT3A
M83513/21-H03*N	MCK-**-B-100SRT3B
M83513/21-H03*P	MCK-**-P-100SRT3B
M83513/22-A01*N	MCK-**-B- 9PST1
M83513/22-B01*N	MCK-**-B- 15PST1
M83513/22-C01*N	MCK-**-B- 21PST1
M83513/22-D01*N	MCK-**-B- 25PST1
M83513/22-E01*N	MCK-**-B- 31PST1
M83513/22-F01*N	MCK-**-B- 37PST1
M83513/22-A01*P	MCK-**-P- 9PST1
M83513/22-B01*P	MCK-**-P- 15PST1
M83513/22-C01*P	MCK-**-P- 21PST1
M83513/22-D01*P	MCK-**-P- 25PST1
M83513/22-E01*P	MCK-**-P- 31PST1
M83513/22-F01*P	MCK-**-P- 37PST1
M83513/22-A02*N	MCK-**-B- 9PST1A
M83513/22-B02*N	MCK-**-B- 15PST1A
M83513/22-C02*N	MCK-**-B- 21PST1A
M83513/22-D02*N	MCK-**-B- 25PST1A
M83513/22-E02*N	MCK-**-B- 31PST1A
M83513/22-F02*N	MCK-**-B- 37PST1A
M83513/22-A02*P	MCK-**-P- 9PST1A
M83513/22-B02*P	MCK-**-P- 15PST1A
M83513/22-C02*P	MCK-**-P- 21PST1A
M83513/22-D02*P	MCK-**-P- 25PST1A
M83513/22-E02*P	MCK-**-P- 31PST1A
M83513/22-F02*P	MCK-**-P- 37PST1A
M83513/22-A03*N	MCK-**-B- 9PST1B
M83513/22-B03*N	MCK-**-B- 15PST1B
M83513/22-C03*N	MCK-**-B- 21PST1B
M83513/22-D03*N	MCK-**-B- 25PST1B
M83513/22-E03*N	MCK-**-B- 31PST1B
M83513/22-F03*N	MCK-**-B- 37PST1B
M83513/22-A03*P	MCK-**-P- 9PST1B
M83513/22-B03*P	MCK-**-P- 15PST1B
M83513/22-C03*P	MCK-**-P- 21PST1B
M83513/22-D03*P	MCK-**-P- 25PST1B
M83513/22-E03*P	MCK-**-P- 31PST1B
M83513/22-F03*P	MCK-**-P- 37PST1B
M83513/23-G01*N	MCK-**-B- 51PST1
M83513/23-G01*P	MCK-**-P- 51PST1
M83513/23-G02*N	MCK-**-B- 51PST1A
M83513/23-G02*P	MCK-**-P- 51PST1A
M83513/23-G03*N	MCK-**-B- 51PST1B
M83513/23-G03*P	MCK-**-P- 51PST1B
M83513/24-H01*N	MCK-**-B-100PST1
M83513/24-H01*P	MCK-**-P-100PST1
M83513/24-H02*N	MCK-**-B-100PST1A
M83515/24-H02*P	MCK-**-P-100PST1A
M83513/24-H03*N	MCK-**-B-100PST1B
M83513/24-H03*P	MCK-**-P-100PST1B
M83513/25-A01*N	MCK-**-B- 9SST1
M83513/25-B01*N	MCK-**-B- 15SST1
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M83513/25-F01*N	MCK-**-B- 37SST1
M83513/25-A01*P	MCK-**-P- 9SST1
M83513/25-B01*P	MCK-**-P- 15SST1
M83513/25-C01*P	MCK-**-P- 21SST1
M83513/25-D01*P	MCK-**-P- 25SST1
M83513/25-E01*P	MCK-**-P- 31SST1
M83513/25-F01*P	MCK-**-P- 37SST1
M83513/25-A02*N	MCK-**-B- 9SST1A
M83513/25-B02*N	MCK-**-B- 15SST1A
M83513/25-C02*N	MCK-**-B- 21SST1A
M83513/25-D02*N	MCK-**-B- 25SST1A
M83513/25-E02*N	MCK-**-B- 31SST1A
M83513/25-F02*N	MCK-**-B- 37SST1A
M83513/25-A02*P	MCK-**-P- 9SST1A
M83513/25-B02*P	MCK-**-P- 15SST1A
M83513/25-C02*P	MCK-**-P- 21SST1A
M83513/25-D02*P	MCK-**-P- 25SST1A
M83513/25-E02*P	MCK-**-P- 31SST1A
M83513/25-F02*P	MCK-**-P- 37SST1A
M83513/25-A03*N	MCK-**-B- 9SST1B
M83513/25-B03*N	MCK-**-B- 15SST1B
M83513/25-C03*N	MCK-**-B- 21SST1B
M83513/25-D03*N	MCK-**-B- 25SST1B
M83513/25-E03*N	MCK-**-B- 31SST1B
M83513/25-F03*N	MCK-**-B- 37SST1B
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M83513/25-E03*P	MCK-**-P- 31SST1B
M83513/25-F03*P	MCK-**-P- 37SST1B
M83513/26-G01*N	MCK-**-B- 51SST1
M83513/26-G01*P	MCK-**-P- 51SST1
M83513/26-G02*N	MCK-**-B- 51SST1A
M83513/26-G02*P	MCK-**-P- 51SST1A
M83513/26-G03*N	MCK-**-B- 51SST1B
M83513/26-G03*P	MCK-**-P- 51SST1B
M83513/27-H01*N	MCK-**-B-100SST1
M83513/27-H01*P	MCK-**-P-100SST1
M83513/27-H02*N	MCK-**-B-100SST1A
M83515/27-H02*P	MCK-**-P-100SST1A
M83513/27-H03*N	MCK-**-B-100SST1B
M83513/27-H03*P	MCK-**-P-100SST1B

*C = Cadmium or N = Nickel (space applications only)
**C2 = Cadmium or N1 = Nickel (space applications only)

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Introduction

Product Facts

- Designed for both military and commercial applications
- Well-suited for external conditions
- Precise contact alignment with extremely low engaging forces
- Product offering consists of metal shell, plastic shell, panel mount, printed circuit board and strip connectors
- Metal shell connector promotes high durability and reliability

Twist Pin contact High Density Microminiature Connectors described in this catalog comprise a complete contact system which is adaptable to a numerous variety of form factors. Precise contact alignment, with extremely low engaging forces, results from the manner in which the Twist Pin contact system is packaged — by constructing the male contact as a breathing helical spring, electrical contact is achieved at many points around the periphery of the pin bundle.

Featured in this catalog is the twist pin contact line, which accommodates round wire and Flat Conductor Cable (FCC), Edgeboard Connectors.

Applications requiring frequent mating and disconnect call for the metal shell connector version. This style connector promotes high durability and reliability.

Designed for both military and commercial applications, this latest innovation is especially well-suited to use in external conditions.

This catalog also features light-weight plastic connectors in a strip (MCS) format as well as JACKMATE Connectors (MCJ Series) format for small package application requiring high reliability.

Edgeboard applications are covered in this catalog with a special High Density Standard Module (HDSM) Connector as well as MIL-DTL-55302 (MCEM) Connectors. The high mating forces of these larger connectors are greatly reduced with the use of the low force twist pins and sockets which are standard for this product line.

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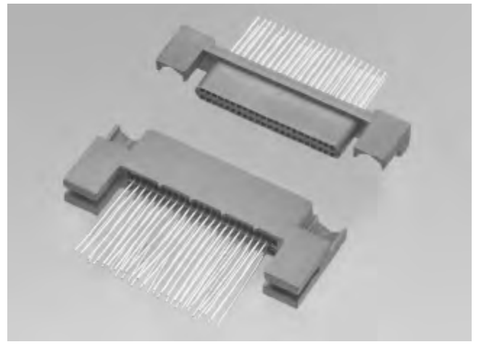
MCE Series Plastic Shell Edgeboard Connectors

Designed for commercial applications requiring frequent disconnect and connect, including data recorders and computers. Motherboard connector can be ordered to fit any pattern on your circuit board.

This new connector features the proven twist pin contact with precision contact alignment with extremely low engaging forces.

Units are available with contacts as few as 40 and as many as 110. Wire sizes 28 through 24, any type of plating or color coding, any kind of wire termination including wire wrap — a high degree of flexibility for your military or commercial application.

Two hexagonal polarizing keys can provide up to 36 different key combinations are supplied.



40 Contacts

Technical & Performance Data — Twist Pin Plastic Shell Connectors

Electrical

Contact Resistance — The average mated contact resistance is 4 milliohms, with a maximum value of 8 milliohms, using standard 24 AWG solid copper leads when measured directly behind the crimp joints of the mated pin and socket contacts. The average resistance value at 100 microvolts is 4.8 milliohms.

Dielectric Withstanding Voltage — 800 VAC RMS at sea level (600 for solder pots); 200 VAC RMS at 70,000 feet [21,336m] (150 for solder pots).

Corrosion Resistance (Per MIL-STD-202C, Method 101B, Condition B) — Both mated and unmated samples do not exceed the maximum allowable contact resistance (8 milliohms) when subjected to the 48 hour salt spray test.

Durability — The contact resistance after 500 mating cycles is less than the maximum allowable, 8 milliohms.

Insulation Resistance — Greater than 5,000 megohms at room temperature.

Maximum Current Carrying Capacity — No. 24 contact 3 amperes. It must be recognized however, that all the wires to a connector will not carry their maximum current under all environmental conditions due to wire temperature.

Mechanical

Contact Engaging & Separation Forces — 8.0 oz. max. [2.24N] (eng.), 0.5 oz. min.[.14N] (sep.)

Environmental

Temperature Range (Operating) — –67°F to 257°F [–55°C to +125°C].

Vibration (Per MIL-STD-202C, Method 204A, Condition D) — No discontinuity in excess of 1 µ sec. during twelve 20 minute sweeps from 10 to 2000 CPS at .06 double amplitude or 20 G forces, whichever is less.

Materials

Insulator — Liquid Crystal Polymer (LCP) per ASTM D5138 or Polyphenylene Sulfide per MIL-M-24519.

Contacts — Pin-contact: Copper alloy and beryllium copper alloy make up the complete construction. Socket contact: Copper alloy.

Hardware — Corrosion resistant stainless steel.

Finishes

Insulator — None.

Contacts — Standard finish is 0.000050 [0.00127] gold over copper flash per MIL-G-45204, Type II.

Hardware — Passivated per QQ-P-35.

Twist Pin — 24 Gauge Pin and Socket Contacts

The contact spring member normally found in socket contacts has been eliminated by creating a breathing helical spring principle on the pin contact — smaller, more durable contacts can be manufactured economically.

Wire range 24-36 AWG solid & stranded.

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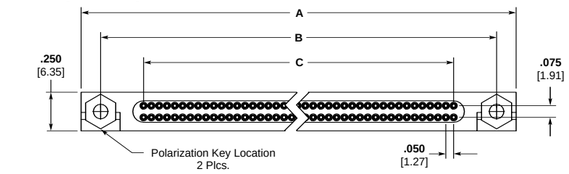
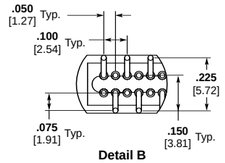
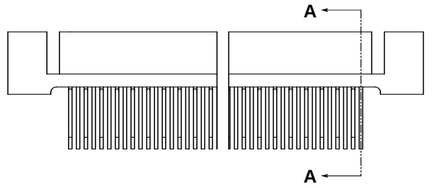
MCE Series Plastic Shell Edgeboard Connectors (Continued)

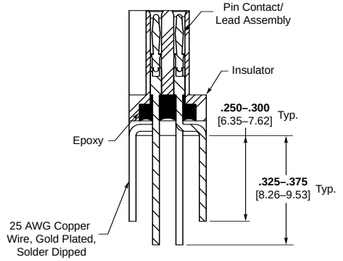
Motherboard (Pin Side)



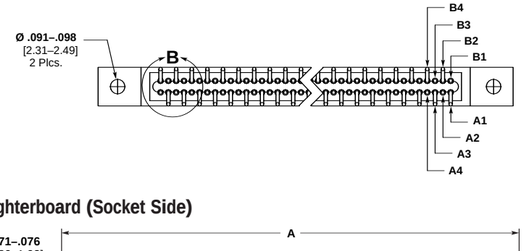


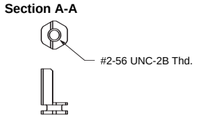
Detail B





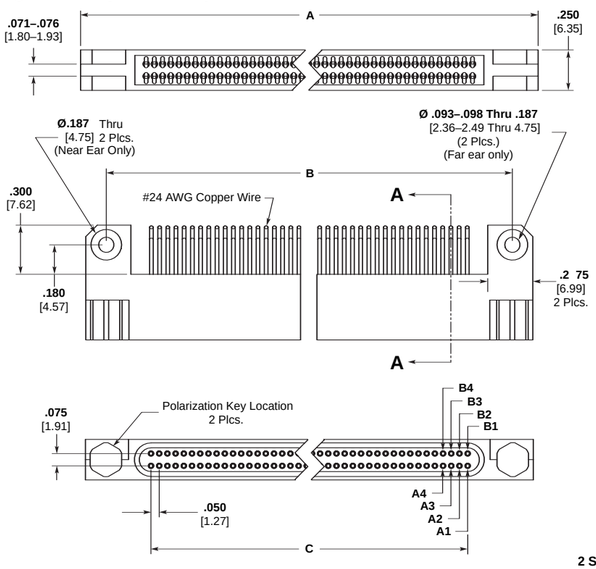
Section A-A

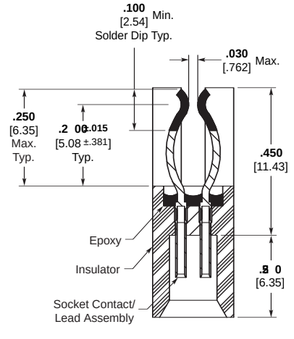




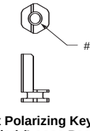
Hex Polarizing Key
2 Supplied (Loose Packed)

Daughterboard (Socket Side)





Section A-A



Hex Polarizing Key
2 Supplied (Loose Packed)

5

Pin and Socket Connectors

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

MCE Series Plastic Shell Edgeboard Connectors (Continued)

Dimensions for .062 [1.57] PC Board

No. of Contacts	A ± .010 [± .254]	B ± .005 [± .127]	C Basic
40	**1.750** 44.45	**1.500** 38.10	**.950** 24.13
44	**1.850** 46.99	**1.600** 40.64	**1.050** 26.67
80	**2.750** 69.85	**2.500** 63.50	**1.950** 49.53
110	**3.500** 88.90	**3.250** 82.55	**2.700** 68.58

Note: For PC Boards of different widths, consult Tyco Electronics.

How To Specify

Mounting — Holes on the Daughterboard side can be modified.

Catalog 1308940
Revised 8-06

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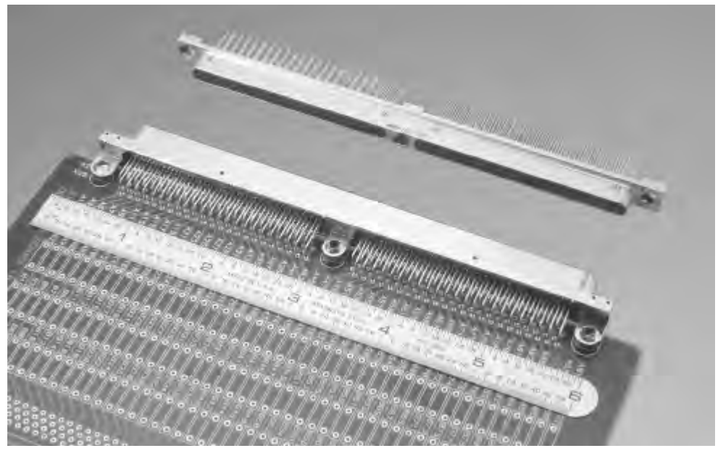
MCEM Series Metal Shell Edgeboard Connectors



Product Facts

- Meets MIL-DTL-55302 performance requirements
- Layouts 128 and 184 are QPL to slash sheets 120, 121, 122 and 123
- Connectors are available in 40, 44, 80, 110, 128, 152, and 184 positions
- Utilizes low force twist pins and our low force sockets. Mating forces in the 3 to 4 oz. [.83 to 1.11N] range per contact are typical with low force pin and low force socket
- Designed for surface mounting and through-the-board mounting
- Available termination
  - Motherboard (pin side) — cactus bend
  - Daughterboard (socket side) — coke bottle, right-angle bend to "A" or "B" side
  - Solder pots, and variety of other wire terminations for pin and socket connectors available at customer's request
- Two hexagonal polarizing keys (per MIL-DTL-55302 slash sheet 124) are provided. Jackscrew hardware is available. For programmable keying/jacking modifications consult Tyco Electronics

In addition to the plastic versions of the 2 piece edgeboard connectors, a metal shell assembly is designed and tooled. The metal shells are made of aluminum alloy per QQ-A-591. The insert material is Diallyl phthalate, Polyphenylene sulfide (Ryton) or Liquid Crystal Polymer (LCP). The technical and performance data is essentially the same as that shown for the MCDM Series on page 5-146. These are rugged, durable connectors and are ideal for use in areas of high density packaging and where frequent connect and disconnects are required. Designed initially for applications in airborne data recorders, computers and associated equipment in navigational systems. The motherboard connector can be ordered to fit any pattern on the circuit board. The units can also be provided with contacts on .100 [2.54] spacing which results in .100 [2.54] grid pattern.

Performance Data

Electrical

Contact Resistance — The average mated contact resistance is 4 milliohms, with a maximum value of 8 milliohms. The average resistance value at 100 microvolts is 4.8 milliohms.

Dielectric Withstanding Voltage — 800 VAC RMS at sea level (600 for solder pots); 200 VAC RMS at 70,000 feet [21,336m] (150 for solder pots).

Durability — Less than the maximum allowable, 8 milliohms after 500 mating cycles.

Insulation Resistance — Greater than 5,000 megohms at room ambient temperature.

Maximum Current Carrying Capacity — No. 24 contact 3 amperes.

Mechanical

Contact Engaging & Separation Forces — 5.0 oz. max. [1.39N] (eng.), 0.5 oz. min. [.14N] (sep.).

Environmental

Temperature Range — –67°F to 302°F [–55°C to +150°C] for Diallyl Phthalate; –67°F to 257°F [–55°C to +125°C] for Polyphenylene Sulfide.

Vibration — No discontinuity in excess of 1 µ sec. during twelve 20 minute sweeps from 10 to 2000 CPS at .06 double amplitude or 20 G forces, whichever is less.

Materials and Finish

Shells — High grade aluminum alloy, electroless nickel plated per AMS 2404.

Insulator — Diallyl Phthalate per MIL-M-14, Type SDG-F (for 128 & 184); Polyphenylene Sulfide per MIL-M-24519 (for 40, 44, 80, 110 & 152), or Liquid Crystal Polymer per ASTM D5138.

Contacts — Pin (low force): beryllium and OFHC copper, gold plated. Socket (low force): Copper alloy, gold plated.

Hardware — Corrosion resistant stainless steel passivated.

Catalog 1308940
Revised 8-06

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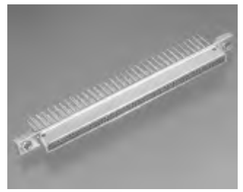
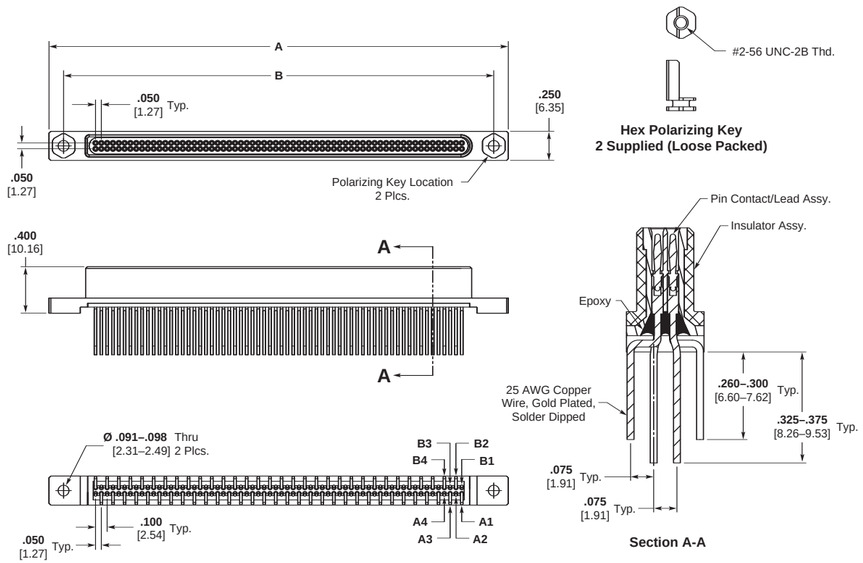
MCEM Series Metal Shell Edgeboard Connectors (Continued)

Motherboard (Pin Side)

40, 44, 80, 110 & *128* Positions





Dimensions for .062 [1.57] PC Board

No. of Contacts	A ± .010 [± .254]	B ± .005 [± .127]
40	**1.750** 44.45	**1.500** 38.10
44	**1.850** 46.99	**1.600** 40.64
80	**2.750** 69.85	**2.500** 63.50
110	**3.500** 88.90	**3.250** 82.55
128	**3.950** 100.33	**3.700** 93.98

Note: For PC Boards of different widths, consult Tyco Electronics.

Note: Items in ***bold italic*** are qualified to MIL-DTL-55302. Configuration shown is per MIL-DTL-55302/120.

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

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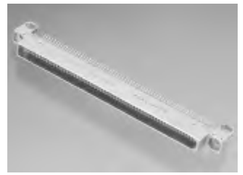
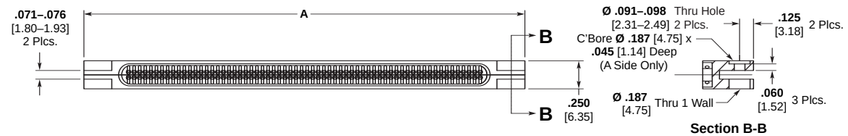
Japan: 81-44-844-8013
UK: 44-208-420-8341

MCEM Series Metal Shell Edgeboard Connectors (Continued)

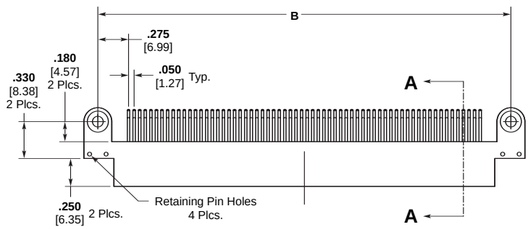
Daughterboard (Socket Side)

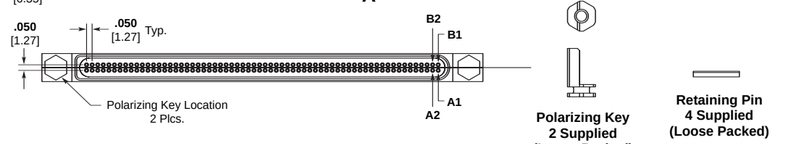
40, 44, 80, 110 & *128* Positions

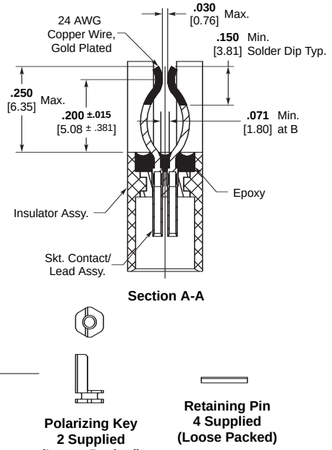




Section B-B







Section A-A

Polarizing Key 2 Supplied (Loose Packed)

Retaining Pin 4 Supplied (Loose Packed)

Note: Board thickness .070 [1.78] Max.

How To Specify

MCE	M1	128	L	6	L	4	0.5

Connector Series

Material
M1 — Metal Shell

Layout
40, 44, 80, 110, ***128***, 152, ***184***

Contact Type
L — Low Force Pin (Motherboard Connector)
SL — Low Force Socket* (Daughterboard Connector)

Wire Size
4–24 AWG ***5–25 AWG*** 6–26 AWG 8–28 AWG 0–30 AWG

Wire Type
*A — Type E, 7 strand
*B — Type ET, 7 strand
*C — Type E, 19 strand
*D — Type ET, 19 strand
F — 7 strand per MIL-C-22759/11 (#28 AWG only)
G — 19 strand per MIL-C-22759/11 26 AWG, 24 AWG
L — Copper, solid
Q — Stranded per MIL-W-22759/33
*Per MIL-W-16878

Insulation Color or Finish
1 — All white wire
2 — All yellow wire
3 — All gray wire
4 — Gold plated
5 — Tin dipped gold plated
6 — Bare (unfinished)
7 — Color coded per MIL-STD-681, System 1
8 — Special color code
9 — Ten solid color repeating (starts with black)

Lead Length in Inches (min.)

Z — Wire layout as illustrated.

X — Special, does not fit description below.

S — Solder pots for 26 AWG max.

Note: Items in ***bold italic*** are qualified to MIL-DTL-55302. Configuration shown is per MIL-DTL-55302/121.

Polarization – Hexagonal hardware is supplied with connector.
Mounting — Standard mounting holes are shown. Consult Tyco Electronics for modifications.

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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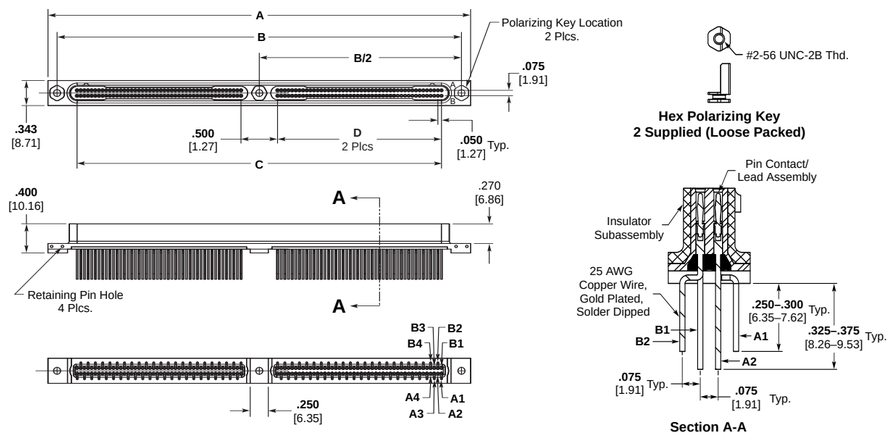
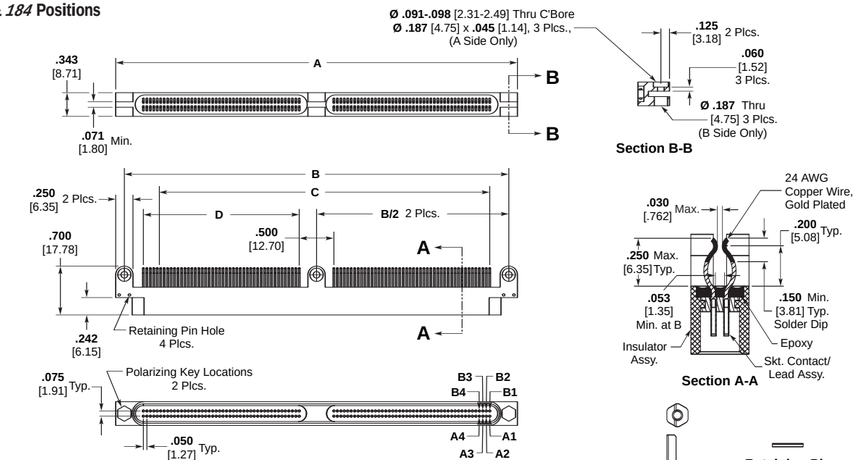
Japan: 81-44-844-8013
UK: 44-208-420-8341

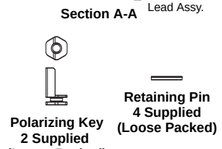
MCEM Series Metal Shell Edgeboard Connectors (Continued)

Motherboard (Pin Side)
152 & *184* Positions



Daughterboard (Socket Side)
152 & *184* Positions





No. of Contacts	A ± .010 [± .254]	B ± .005 [± .127]	C Basic	D Basic
152	**4.550** 115.57	**4.300** 109.22	**4.750** 120.65	**1.850** 46.99
184	**5.800** 147.32	**5.550** 140.97	**5.000** 127.00	**2.250** 57.15

Note:
Items in ***bold italic*** are qualified to MIL-DTL-55302.Configuration shown is per MIL-DTL-55302/121.

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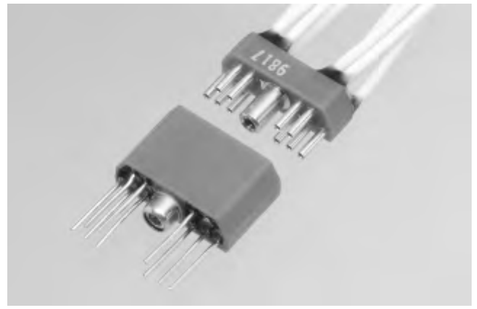
JACKMATE MCJ(M) Series Plastic (Metal) Shell Center Jackscrew Connectors



JACKMATE Connectors are the first Twist Pin contact assemblies designed to accommodate center jackscrews that provide jacking action when mating or unmating the connectors. Although the units were initially developed for high density cord-to-cord or in-line applications, either plug or receptacle can be adapted to a PC board. The jacking hardware consist of a threaded bushing and a captivated jackscrew which are made of corrosion resistant stainless steel and are molded into the JACKMATE Connector Insulator.

The twist pin contacts are on .050 [1.27] center-to-center linear spacing and contact terminations are available in solid wire or stranded wire. There is a high degree of flexibility with this JACKMATE connector design for commercial or military applications.

Available in MCJ(M) Series Plastic (Metal) Shells.

JACKMATE MCJ Series Plastic Shell Center Jackscrew Connectors

Technical & Performance Data

Electrical

Contact Resistance — The average mated contact resistance is 4 milliohms, with a maximum value of 8 milliohms, using standard 24 AWG solid copper leads when measured directly behind the crimp joints of the mated pin and socket contacts. The average resistance value at 100 microvolts is 4.8 milliohms.

Dielectric Withstanding Voltage (60 Hz rms room temperature) — Solder Pots: 600 VAC at sea level; 150 VAC at 70,000 feet [21,336m] Wire Terminations: 750 VAC at sea level; 200 VAC at 70,000 feet [21,336m].

Corrosion Resistance (Per MIL-STD-202C, Method 101B, Condition B) — Both mated and unmated samples do not exceed the maximum allowable contact resistance (8 milliohms) when subjected to the 48 hour salt spray test.

Durability — The contact resistance after 500 mating cycles is less than the maximum allowable, 8 milliohms.

Insulation Resistance — Greater than 5,000 megohms at room temperature for the materials listed under “Materials”.

Maximum Current Carrying Capacity — No. 24 contact 3 amperes. It must be recognized, however, that all the wires to a connector will not carry their maximum current under all environmental conditions due to wire temperature.

Mechanical

Contact Engaging & Separation Forces — 8.0 oz. max. [2.22N] (eng.), 0.5 oz. min. [.14N] (sep.).

Environmental

Temperature Range (Operating) — –67°F to 257°F [–55°C to 125°C].

Vibration (Per MIL-STD-202C, Method 204-A, Condition D) — No discontinuity in excess of 1 µ sec. during twelve 20 minute sweeps from 10 to 2000 CPS at .06 double amplitude or 20 G forces, whichever is less.

Materials

Insulator — Glass filled Nylon Type 6.

Contacts — Pin contact: copper alloy and beryllium copper alloy make up the complete construction; Socket contact: copper alloy.

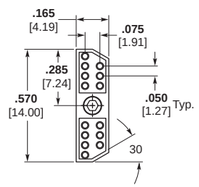
Hardware — Corrosive resistant stainless steel.

Finishes

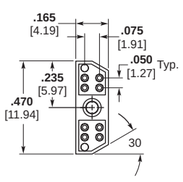
Contacts — Standard finish is 0.000050 [0.00127] gold over copper flash per MIL-G-45204, Type II.

Hardware — Passivated Per QQ-P-35.

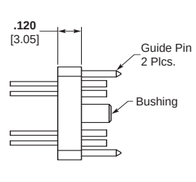
10 & 14 Contact Layout



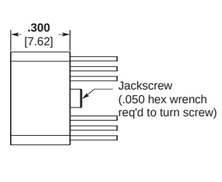
14 Layout



10 Layout



Receptacle



Plug

Catalog 1308940
Revised 8-06

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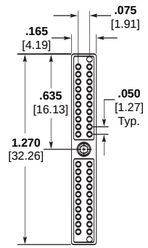
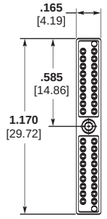
UK: 44-208-420-8341

JACKMATE MCJ Series Plastic Shell Center Jackscrew Connectors (Continued)

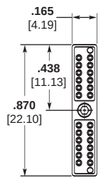
26, 38 & 46 Contact Layout



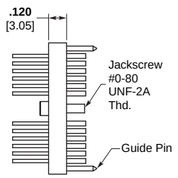
42 Layout



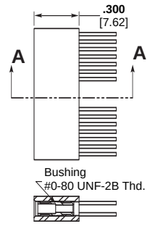
38 Layout



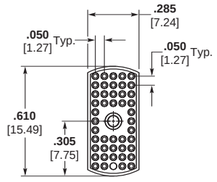
26 Layout



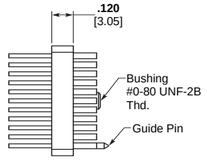
Receptacle



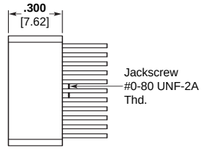
Section A-A
Plug



46 Layout



Receptacle



Plug

How To Specify

MCJ B2 — 10 P 4 L 4 — 0.5

Connector Series

Shell Material
B2 Glass filled nylon, type 6/10, blue

Layout (Positions)
10, 14, 26, 38, 42, 46

Contact Type
P Pin
S Socket

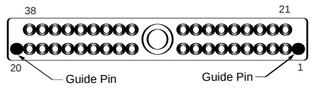
Wire Size
4—24 AWG 5—25 AWG 6—26 AWG 8—28 AWG 0—30 AWG

Wire Type
*A Type E, 7 strand
*B Type ET, 7 strand
*C Type E, 19 strand
*D Type ET, 19 strand
F 7 strand per MIL-C-22759/11 (#28 AWG only)
G 19 strand per MIL-C-22759/11 26 AWG, 24 AWG
L Copper, solid
Q Stranded per MIL-W-22759/33
*Per MIL-W-16878

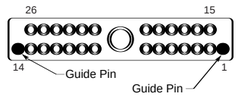
Insulation Color or Finish
1 All white wire
2 All yellow wire
3 All gray wire
4 Gold plated
5 Tin dipped gold plated
6 Bare (unfinished)
7 Color coded per MIL-STD-681, System 1
8 Special color code
9 Ten solid color repeating (starts with black)

Lead Length in Inches (min.)

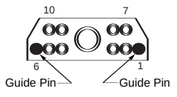
Contact Arrangement as Viewed from the Engaging Face of the Pin Side



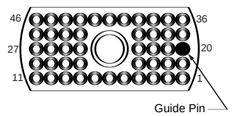
38 Positions



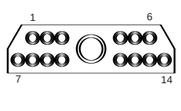
26 Positions



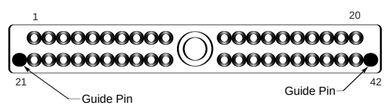
10 Positions



46 Positions



14 Positions



42 Positions

Guide pin locations illustrated are for standards configuration only. Any location is available.
Guide pins are supplied in socket connectors and blank cavities are in pin connector.

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

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USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

JACKMATE MCJM Series Metal Shell Center Jackscrew Connectors

Technical and Performance Data for Metal Shell

Electrical

Contact Resistance — The average mated contact resistance is 4 milliohms, with a maximum value of 8 milliohms, using standard 24 AWG solid copper leads when measured directly behind the crimp joints of the mated pin and socket contacts. The average resistance value at 100 microvolts is 4.8 milliohms.

Dielectric Withstanding Voltage (60 Hz rms room temperature) — Solder Pots: 600 VAC at sea level; 150 VAC at 70,000 feet [21,336m]. Wire Terminations: 750 VAC at sea level; 200 VAC at 70,000 feet [21,336m].

Corrosion Resistance (Per MIL-STD-202C, Method 101B, Condition B) — Both mated and unmated samples do not exceed the maximum allowable contact resistance (8 milliohms) when subjected to the 48 hour salt spray test.

Durability — The contact resistance after 500 mating cycles is less than the maximum allowable, 8 milliohms.

Insulation Resistance — Greater than 5,000 megohms at room temperature for the materials listed under "Materials".

Maximum Current Carrying Capacity — No. 24 contact 3 amperes. It must be recognized, however, that all the wires to a connector will not carry their maximum current under all environmental conditions due to wire temperature.

Mechanical

Contact Engaging & Separation Forces — 8.0 oz. max. [2.22N] (eng.), 0.5 oz. min.[.14N] (sep.).

Environmental

Temperature Range (Operating) — –67°F to 302°F [–55°C to 150°C] for Diallyl Phthalate.

Vibration (Per MIL-STD-202C, Method 204-A, Condition D) — No discontinuity in excess of 1 µ sec. during twelve 20 minute sweeps from 10 to 2000 CPS at .06 double amplitude or 20 G forces, whichever is less.

Materials

Insulator — Diallyl Phthalate per MIL-M-14, Type SDG-F.

Contacts — Pin contact: copper alloy and beryllium copper alloy make up the complete construction; Socket contact: copper alloy.

Body Shells — Pin body shell: stainless steel, Types 304, Condition A per QQ-S-766; Socket body shell: aluminum alloy per QQ-A-591, A-380 alloy.

Hardware — Corrosion resistant stainless steel.

Finishes

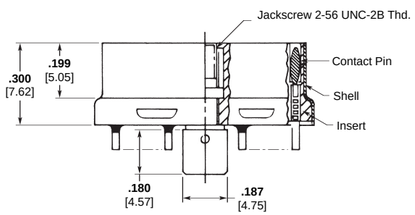
Contacts — Standard finish is 0.000050 [0.00127] gold over copper flash per MIL-G-45204, Type II.

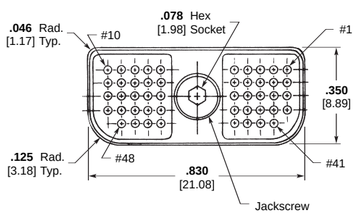
Body Shells — Pin body shell: passivated per MIL-F-14072 (E-300); Socket body shell: electroless nickel per AMS 204, Class 3, except thickness is 0.001/0.0015 [0.025/0.038].

Hardware — Passivated per QQ–P–35.

Notes: 1. Insulators are molded into their metal shells — No bonded joint is used.
2. Standard material used unless otherwise specified.

Plug (Pin Side)
Shell Type M1





5 Pin and Socket Connectors

Catalog 1308940
Revised 8-06

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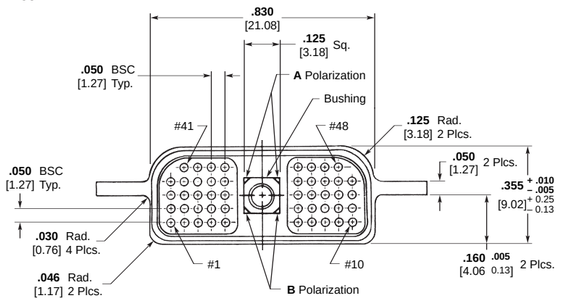
Japan: 81-44-844-8013
UK: 44-208-420-8341

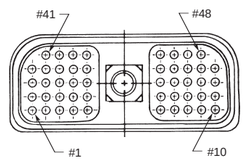
JACKMATE MCJM Series Metal Shell Center Jackscrew Connectors (Continued)

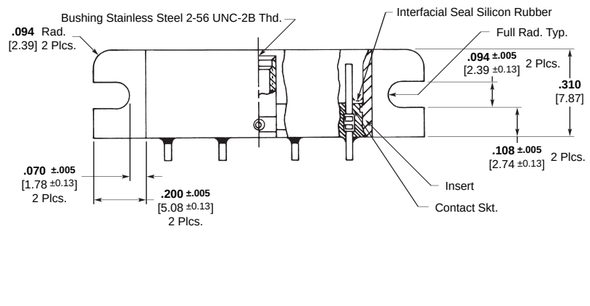
Receptacle (Socket Side)

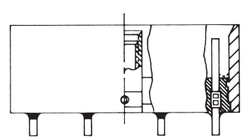
Shell Type M1



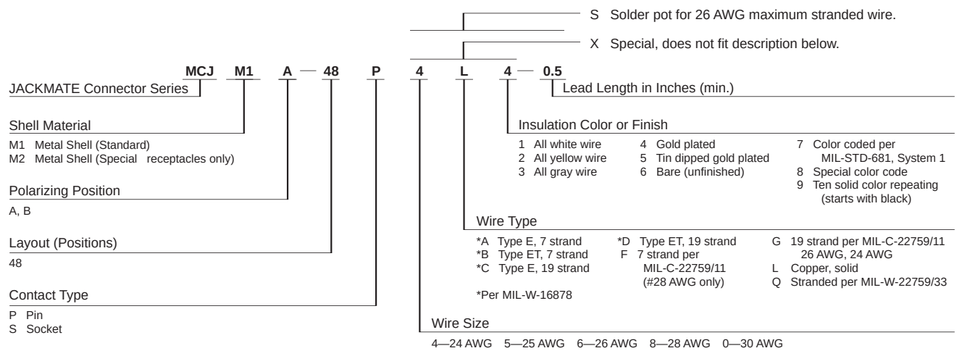
Shell Type M2







How To Specify



Catalog 1308940
Revised 8-06

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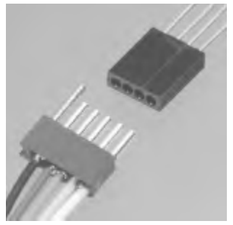
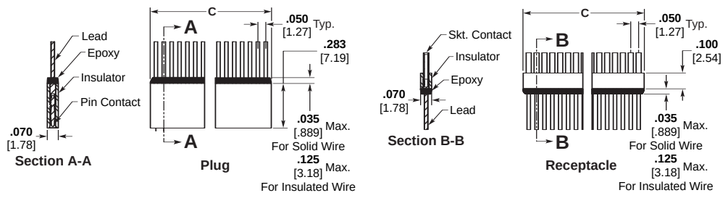
MCS Series Plastic Strip Connectors





Part No. By Size	C Max.
MCSAR*-1**	**.070** [1.78]
MCSAR*-2**	**.120** [3.05]
MCSAR*-3**	**.170** [4.32]
MCSAR*-4**	**.220** [5.59]
MCSAR*-5**	**.270** [6.86]
MCSAR*-6**	**.320** [8.13]
MCSAR*-7**	**.420** [10.67]
MCSAR*-8**	**.420** [10.67]
MCSAR*-9**	**.470** [11.94]
MCSAR*-10**	**.520** [13.21]
MCSAR*-11**	**.570** [14.48]
MCSAR*-12**	**.620** [15.75]
MCSAR*-13**	**.670** [17.02]
MCSAR*-14**	**.720** [18.29]
MCSAR*-15**	**.770** [19.56]
MCSAR*-16**	**.820** [20.83]
MCSAR*-17**	**.870** [22.10]
MCSAR*-18**	**.920** [23.37]
MCSAR*-19**	**.970** [24.64]
MCSAR*-20**	**1.020** [25.91]
MCSAR*-21**	**1.070** [27.18]
MCSAR*-22**	**1.120** [28.45]
MCSAR*-23**	**1.170** [29.72]
MCSAR*-24**	**1.220** [30.99]
MCSAR*-25**	**1.270** [32.26]
MCSAR*-26**	**1.320** [33.53]
MCSAR*-27**	**1.370** [34.80]
MCSAR*-28**	**1.420** [36.07]
MCSAR*-29**	**1.470** [37.34]
MCSAR*-30**	**1.520** [38.61]

Part No. By Size	C Max.
MCSAR*-31**	**1.570** [39.88]
MCSAR*-32**	**1.620** [41.15]
MCSAR*-33**	**1.670** [42.42]
MCSAR*-34**	**1.720** [43.69]
MCSAR*-35**	**1.770** [44.96]
MCSAR*-36**	**1.820** [46.23]
MCSAR*-37**	**1.870** [47.50]
MCSAR*-38**	**1.920** [48.77]
MCSAR*-39**	**1.970** [50.04]
MCSAR*-40**	**2.020** [51.31]
MCSAR*-41**	**2.070** [52.58]
MCSAR*-42**	**2.120** [53.85]
MCSAR*-43**	**2.170** [55.12]
MCSAR*-44**	**2.220** [56.39]
MCSAR*-45**	**2.270** [57.66]
MCSAR*-46**	**2.320** [58.93]
MCSAR*-47**	**2.370** [60.20]
MCSAR*-48**	**2.420** [61.47]
MCSAR*-49**	**2.470** [62.74]
MCSAR*-50**	**2.520** [64.01]
MCSAR*-51**	**2.570** [65.28]
MCSAR*-52**	**2.620** [66.55]
MCSAR*-53**	**2.670** [67.82]
MCSAR*-54**	**2.720** [69.09]
MCSAR*-55**	**2.770** [70.36]
MCSAR*-56**	**2.820** [71.63]
MCSAR*-57**	**2.870** [72.90]
MCSAR*-58**	**2.920** [74.17]
MCSAR*-59**	**2.970** [75.44]
MCSAR*-60**	**3.020** [76.71]

Part No. By Size	C Max.
MCSAR*-61**	**3.070** [77.98]
MCSAR*-62**	**3.120** [79.25]
MCSAR*-63**	**3.170** [80.52]
MCSAR*-64**	**3.220** [81.79]
MCSAR*-65**	**3.270** [83.06]
MCSAR*-66**	**3.320** [84.33]
MCSAR*-67**	**3.370** [85.60]
MCSAR*-68**	**3.420** [86.87]
MCSAR*-69**	**3.470** [88.14]
MCSAR*-70**	**3.520** [89.41]
MCSAR*-71**	**3.570** [90.68]
MCSAR*-72**	**3.620** [91.95]
MCSAR*-73**	**3.670** [93.22]
MCSAR*-74**	**3.720** [94.49]
MCSAR*-75**	**3.770** [95.76]
MCSAR*-76**	**3.820** [97.03]
MCSAR*-77**	**3.870** [98.30]
MCSAR*-78**	**3.920** [99.57]
MCSAR*-79**	**3.970** [100.84]
MCSAR*-80**	**4.020** [102.11]
MCSAR*-81**	**4.070** [103.38]
MCSAR*-82**	**4.120** [104.65]
MCSAR*-83**	**4.170** [105.92]
MCSAR*-84**	**4.220** [107.19]
MCSAR*-85**	**4.270** [108.46]
MCSAR*-86**	**4.320** [109.73]
MCSAR*-87**	**4.370** [111.00]
MCSAR*-88**	**4.420** [112.27]
MCSAR*-89**	**4.470** [113.54]
MCSAR*-90**	**4.520** [114.81]

Part No. By Size	C Max.
MCSAR*-91**	**4.570** [116.08]
MCSAR*-92**	**4.620** [117.35]
MCSAR*-93**	**4.670** [118.62]
MCSAR*-94**	**4.720** [119.89]
MCSAR*-95**	**4.770** [121.16]
MCSAR*-96*	**4.820** [122.43]
MCSAR*-97**	**4.870** [123.70]
MCSAR*-98**	**4.920** [124.97]
MCSAR*-99**	**4.970** [126.24]
MCSAR*-100**	**5.020** [127.51]
MCSAR*-101**	**5.070** [128.78]
MCSAR*-102**	**5.120** [130.05]
MCSAR*-103**	**5.170** [131.32]
MCSAR*-104**	**5.220** [132.59]
MCSAR*-105**	**5.270** [133.86]
MCSAR*-106**	**5.320** [135.13]
MCSAR*-107**	**5.370** [136.40]
MCSAR*-108**	**5.420** [137.67]
MCSAR*-109**	**5.470** [138.94]
MCSAR*-110**	**5.520** [140.21]
MCSAR*-111**	**5.570** [141.48]
MCSAR*-112**	**5.620** [142.75]
MCSAR*-113**	**5.670** [144.02]
MCSAR*-114**	**5.720** [145.29]
MCSAR*-115**	**5.770** [146.56]
MCSAR*-116**	**5.820** [147.83]
MCSAR*-117**	**5.870** [149.10]
MCSAR*-118**	**5.920** [150.37]
MCSAR*-119**	**5.970** [151.64]
MCSAR*-120**	**6.020** [152.91]

How To Specify

MCS AR 2 — 26 P 6 A 1 — 18.0

Connector Series

Insulator Type and Material
AR — Polyphenylene Sulfide per MIL-M-24519 or Liquid Crystal Polymer per ASTM D5138

Contact Locations
1 — Contact in every cavity
2 — Contact in every other cavity 1, 3, 5...
3 — Contact in every cavity except guide pin cavity in each end cavity
4 — Contact in every other cavity 2, 4, 6... and guide pin in each end cavity
X — Other than above
Standard Polarization
Guide pins are in socket connectors.
Blank cavities are in pin connectors.

Number of Cavities (120 Max.)

Contact Type
P — Pin S — Socket

Wire Size
4–24 AWG 5–25 AWG 6–26 AWG 8–28 AWG 0–30 AWG

Wire Type
*A — Type E, 7 strand
*B — Type ET, 7 strand
*C — Type E, 19 strand
*D — Type ET, 19 strand
F — 7 strand per MIL-22759/11 (#28 AWG only)
G — 19 strand per MIL-22759/11 26 AWG, 24 AWG
M — Copper, solid
Q — Stranded per MIL-W-22759/33
*Per MIL-W-16878

Insulation Color or Finish
1 — All white wire
2 — All yellow wire
3 — All gray wire
4 — Gold plated
5 — Tinned
6 — Bare (unfinished)
7 — Color coded per MIL-STD-681, System 1
8 — Special color code
9 — Ten solid color repeating (starts with black)

Lead Length in Inches (min.)

X — Special, does not fit description below.

S — Solder pot for 26 AWG maximum stranded wire.

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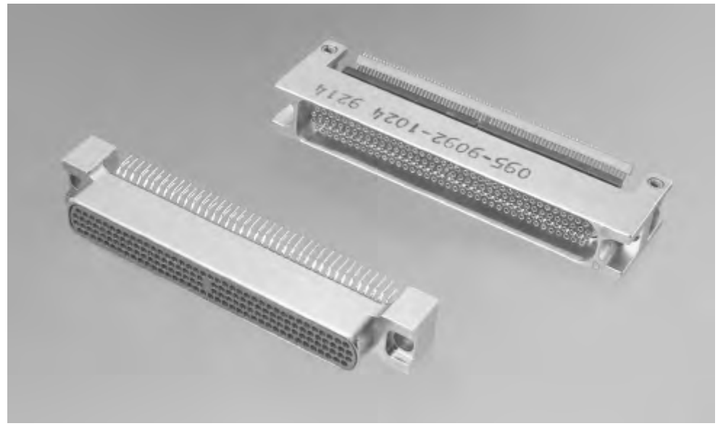
High Density Standard Module (HDSM) Connectors

Product Facts

- Designed for surface mounting on both daughterboard and motherboard for increased circuit density
- Basic design offers 38, 78, 120, 152, 200, 304, and 400 contact designs
- High reliability twist pin and socket per MIL-DTL-83513 and MIL-DTL-55302
- Connector permits lateral movement of daughterboard to accommodate clamping of the heatsink
- Plated through-hole mounting available
- Available with flying leads
- Extender card option available
- Typical mating force for 304 contacts is 38 pounds
- Designed to withstand vapor phase soldering
- Two rotatable (six position) polarizing keys are provided accommodating 36 possible combinations
- Jackscrew hardware available; consult Tyco Electronics
- Different modular inserts may be specified to include coax (Pixi/Con), fiber optic or other special contacts
- Inserts may be partially or fully loaded and installed in the connector shell in various configurations



The MICRODOT HDSM connector is designed for 4 row .050 [1.27] pitch density with a special low force twist pin that meets all requirements of MIL-DTL-55302 and MIL-DTL-83513. This high density connector allows the use of construction to double the packaging density with surface mount capability.

Performance Data Summary

Electrical

Contacts — Pin 24 AWG twist pin, Socket #24 AWG, Wire range 24 AWG to 32 AWG solid and stranded.

Contact Resistance (voltage drop) — 25 millivolts max. at 3 amps, 25° ± 3°C.

Current Rating — 3 amps max. per contact

Dielectric Withstanding Voltage — Volts RMS 60 Hz at room ambient:
600 V for solder pots at sea level.
150 V for solder pots at 70,000 ft. [21,336m].
500 V for wire terminations at sea level.
200 V for wire terminations at 70,000 ft.

Insulation Resistance — 5,000 megohms min. at room ambient.

Magnetic Permeability — 2 mμ max.

Mechanical

Contact Spacing — .050 [1.27] centers

Contact Engagement & Separation — 5.0 oz max. [1.39N] (eng.) 0.5 oz. min. [.14N] 3.5 oz. typ. [.97N] (sep.) force.

Materials and Finishes

Contacts — Copper alloy plated with .000050 [0.00127] gold over copper flash per MIL-G-45204, Type II.

Metal Shell —
Insulator — Liquid Crystal Polymer (LCP) per ASTM D5138 or Polyphenylene Sulfide per MIL-M-24519
Body Shell — Aluminum alloy plated Nickel, electroless per MIL-C-26074.

Environmental

Temperature Range — –67°F to 257°F [–55°C to +125°C].

Vibration — No discontinuity in excess of 1 micro sec. when tested in accordance with MIL-STD-1344, Method 2005, test Condition IV.

Insulator Retention — Inserts will withstand a 50 lb. per square inch load in either direction.

Shock — No discontinuity in excess of 1 micro sec. when tested in accordance with MIL-STD-1344, Method 2004, test Condition E.

Durability — No mechanical or electrical defects detrimental to the function of the connectors after 500 cycles of mating and unmating. (Caution: Mating force increases during durability cycling may be noted).

Humidity — After exposure to humidity as specified by MIL-STD-1344, Method 1002, Type II, IR shall be 1 megohm min. immediately following step 7a of Method 1002 and 1000 megohms min. after 24 hours of conditioning per Method 1002.

Salt Spray — Connectors shall meet the performance requirements of contact resistance, mating and unmating forces, and contact retention after being subjected to the 48-hour 5% solution salt spray test per MIL-STD-1344, Method 1001, Condition B.

Crimp Termination Tensile Strength — Unassembled contacts with crimped stranded wire terminations. Wires will not pull out of contacts when the following axial loads are applied:
24 AWG, 5 lbs., 26 AWG, 4 lbs.,
28 AWG, 3 lbs.

Catalog 1308940
Revised 8-06

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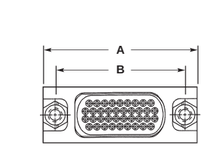
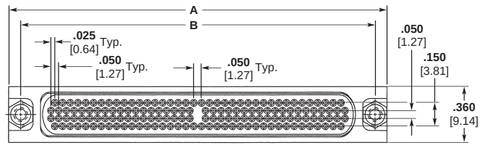
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

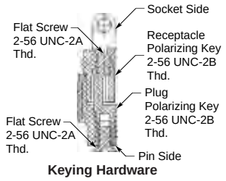
High Density Standard Module (HDSM) Connectors (Continued)



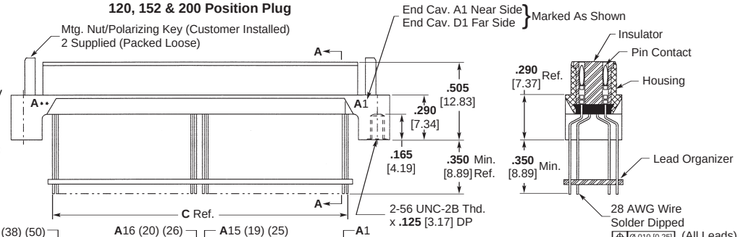
38 & 78 Position Plug



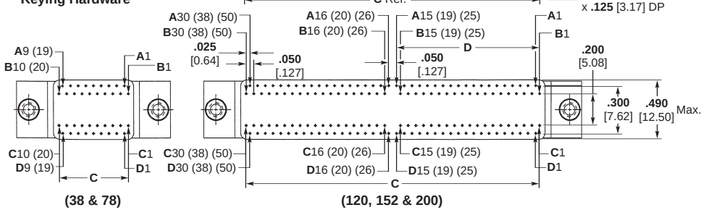
120, 152 & 200 Position Plug



Keying Hardware

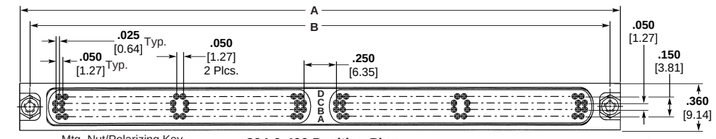


Section A-A

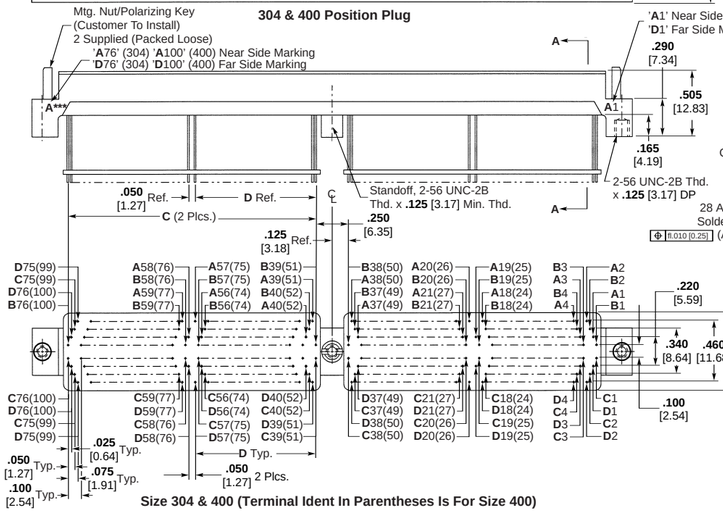


(38 & 78)

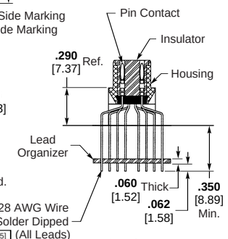
(120, 152 & 200)



304 & 400 Position Plug



Size 304 & 400 (Terminal Ident In Parentheses Is For Size 400)



Section A-A

Catalog 1308940
Revised 8-06

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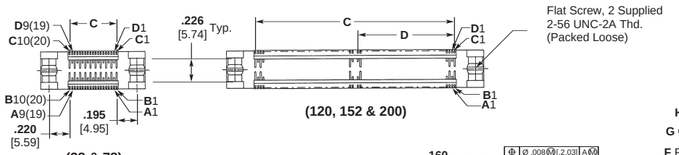
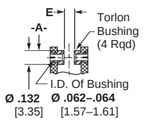
High Density Standard Module (HDSM) Connectors (Continued)

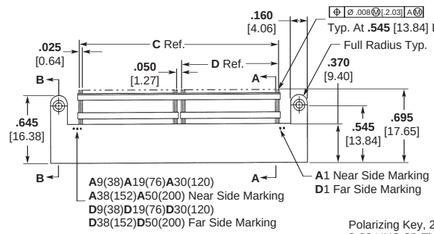


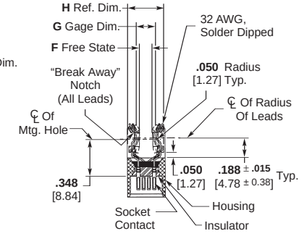
(38 & 78)

(120, 152 & 200)

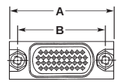


Section B-B

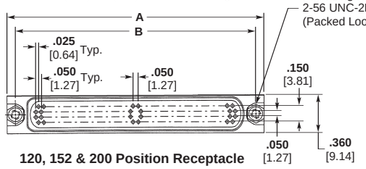




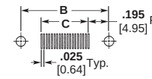
Section A-A



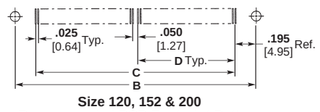
38 & 78 Position Receptacle



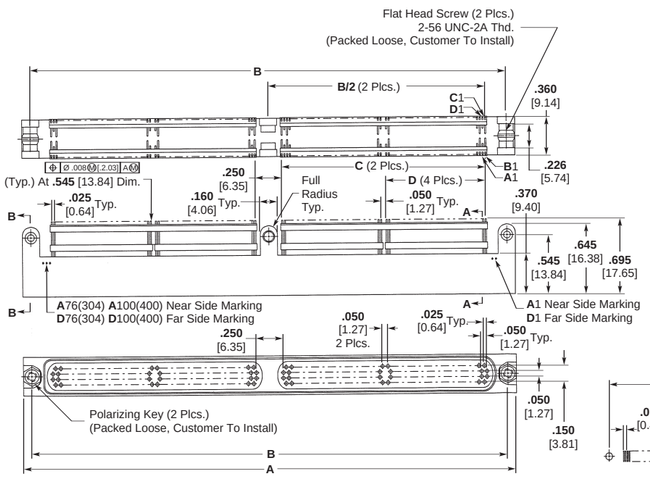
120, 152 & 200 Position Receptacle

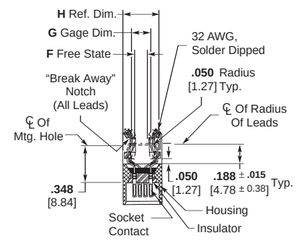


Size 38 & 78

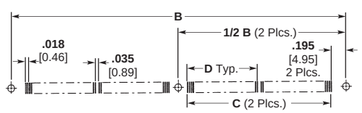


Size 120, 152 & 200
Recommended PCB Footprint Pattern





Section A-A



Size 304 & 400
Recommended PCB Footprint Pattern

Catalog 1308940
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High Density Standard Module (HDSM) Connectors (Continued)

No. of Cavities	A Dim.	B Dim.	C Dim.	D Dim.
Single Bay				
38	**1.000** 25.40	**.840** 21.34	**.450** 11.43	—
78	**1.500** 38.10	**1.340** 34.04	**.950** 24.13	—
120	**2.050** 52.07	**1.890** 48.01	**1.500** 38.10	**.725** 18.42
152	**2.450** 62.23	**2.290** 58.17	**1.900** 48.26	**.925** 23.50
200	**3.050** 77.47	**2.890** 73.41	**2.500** 63.50	**1.225** 31.12
Double Bay				
304	**4.600** 116.84	**4.440** 112.78	**1.900** 48.26	**.925** 23.50
400	**5.800** 147.32	**5.640** 143.26	**2.500** 63.50	**1.225** 31.12

How To Specify

HDSM 1 — 152 L 4 L 4 — 0.5

Connector Series

Contact Location
1 — Full complement of contacts
2 — Contacts in outside row only
3 — Contacts in inside row only
4 — Other than above or special housing

Layout
38, 78, 120, 152, 200, 304 & 400

Contact Type
L — Low Force Pin
SL — Low Force Socket

Wire Size
4—24 AWG 5—25 AWG 6—26 AWG 8—28 AWG 0—30 AWG

Wire Type
*A — Type E, 7 strand
*B — Type ET, 7 strand
*C — Type E, 19 strand
*D — Type ET, 19 strand
F — 7 strand per MIL-W-22759/11 (#28 AWG only)
G — 19 strand per MIL-W-22759/11 26 AWG, 24 AWG
L — Copper, solid
Q — Stranded per MIL-W-22759/33

*Per MIL-W-16878

Wire Color/Finish
1 — All white
2 — All yellow
3 — All gray
4 — Gold plated
5 — Tin dipped gold plated
6 — Bare (unfinished)
7 — Color coded per MIL-STD-681, System 1
8 — Special color code
9 — Ten basic color repeating on each row (A, B, C, D) (starting with black)

Wire Length

S — Solder pot
Z — Coke Bottle Termination (Receptacle only, see Table I)
ZA — 4 Row Wire Termination (Plug only)
ZB — 8 Row Wire Termination (Plug only)
X — Special Wire and/or other than above

Table I

Dash No.	Gap Between Bushing "E"	F Dim.	G Dim.	H Dim. (Ref.)
1	**.100** 2.54	**.120** 3.05	**.180** 4.57	**.330** 8.38
2	**.093** 2.36	**.060** 1.52	**.150** 3.81	**.330** 8.38
3	**.118** 2.99	**.235** 5.97	**.260** 6.60	**.483** 12.27
4	**.145** 3.68	**.120** 3.05	**.180** 4.57	**.330** 8.38

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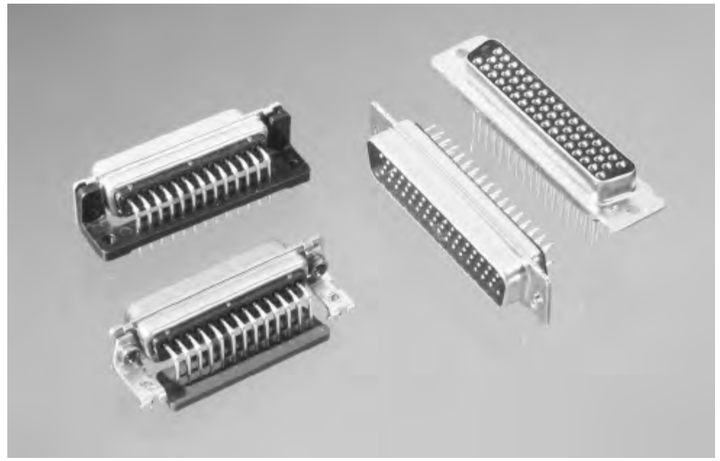
AMPLIMITE Subminiature Connectors

Introduction

Product Facts

- **Military qualified connectors conform to the latest amendments of MIL-DTL-24308**
- **Industrial versions available that use the same manufacturing process of MIL-C-24308 connectors**
- **Non-magnetic versions available per NASA spec, or with rubber grommet on rear of NASA-type connector**
- **ULTRA-LITE AMPLIMITE non-magnetic connectors save weight and improve EMI shielding vs. brass shell NASA-style connectors**
- **MIL-C-39029 contacts offer reliability and economies of high speed termination by automatic machine**
- **Connector savers (feed-through) preserve permanently mounted connectors in high use applications**
- **Choice of sizes — Size 1 through 5 for Series 109, standard density with 9, 15, 25, 37 and 50 contacts; Size 1 through 6 for Series 90, high density with 15, 26, 44, 62, 78 and 104 contacts**
- **Series 109 standard density connectors are available with cavities for power or coaxial contacts mixed with size 20 signal contacts**
- **Right-angle and straight PC board connectors in Series 109, standard density**
- **Preloaded, straight-posted connectors available in Series 90, high density**
- **Preloaded, solder cup connectors available in Series 109, standard density**
- **Produced under a Quality Management System certified to ISO 9001**

  A copy of the certificate is available upon request



AMPLIMITE Military Subminiature D Connectors are compact pin and socket connectors especially designed for high density packages. They are ideally suited for applications such as military equipment, ground support devices, computer peripheral equipment, modems and industrial instrumentation.

In addition to the complete selection of standard military subminiature D-type connectors, Tyco Electronics offers special application versions such as connectors which mix power/coax cavities with size 20 signal contacts; feed-through connectors which provide a disposable interface for high use applications; and special non-magnetic connectors with a rubber grommet on the rear, for strain relief.

Series 109 and Series 90 military connectors conform to the latest amendments of the MIL-DTL-24308 specification and thus are intermateable with similar connectors in the same sizes from other manufacturers. A broad range of connectors is included in this catalog, complemented by a variety of commercial cable clamps and mating hardware, which can be found in catalog 1307612.

Each AMPLIMITE crimp connector has metal clips which retain the pins and sockets after they are loaded into the inserts from the rear.

Series 109 connectors accept size 20 contacts, while Series 90 connectors accept size 22 contacts. Cavity spacing conforms to military specifications.

Size 20 and size 22 pins and sockets are designed for an 8-indent crimp. They are supplied loose-piece for crimping in a standard M22520/2 hand operated tool or tape-mounted for high speed application by an AMP-TAPEMATIC Stripper/Crimper Machine.

Series 90 and Series 109 connectors preloaded with contacts are available for printed circuit board mounting.

Special Series 109 connectors with power/coax cavities accept power contacts for 18 through 8 AWG [0.8-8 mm^2] wire or coaxial contacts for RG/U 174, 188A and 316 cable, in combination with standard size 20 signal contacts.

A complete range of non-military AMPLIMITE subminiature D connectors, contacts and accessories are shown in catalog 1307612, available on request from Tyco Electronics.

Connectors for crimp, snap-in contacts are available in both series, standard shells and non-magnetic, plus non-magnetic with rear rubber grommet.

Connector savers extend life in high-use applications.

Straight posted versions available in both (Series 109) standard density and (Series 90) high density connectors.

Coax or power contacts can be mixed with signal contacts.

Right-angle board mount connectors for Series 109, standard density connections.

ULTRA-LITE AMPLIMITE Connectors for state-of-the-art weight savings and EMI performance.

The Series 109 and 90 Blindmate Plug connectors are designed to prevent butting of contacts during mating.

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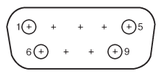
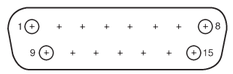
AMPLIMITE Connectors, Series 109

Series 109 Connectors (Standard Density)

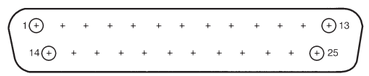
Insert Arrangements



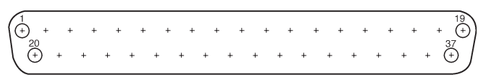
9 Position
(Shell Size 1)
MS 18273-1



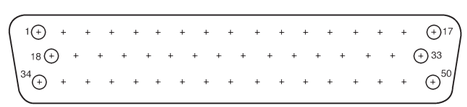
15 Position
(Shell Size 2)
MS 18274-1



25 Position
(Shell Size 3)
MS 18275-1



37 Position
(Shell Size 4)
MS 18276-1



50 Position
(Shell Size 5)
MS 18277-1

Note: Mating face of plug shown; receptacle is mirror image.

Performance Specifications

All Series 109 AMPLIMITE military connectors conform to the latest amendments of military specification MIL-DTL-24308. For more detailed information refer to MIL-DTL-24308.

All Series 109 Connectors are designed for a –67°F to 257°F [–55°C to +125°C] temperature range.

Series 109 contact current rating for Crimp Snap Connectors for MIL-C-39029 7.5 amps in free air.

Series 109 contact current rating for PCB Mount Connectors 5.0 amps per 108-1770.

Technical Documents List

The following technical documents cover the application and performance of AMPLIMITE Series 109 Connectors, contacts, tooling and accessories.

Military Specifications

MIL-DTL-24308	Connectors, Electric, Rectangular, Miniature Polarized Shell, Rack and Panel, General Specifications for
MIL-C-39029	Contacts, Electrical Connector, General Specification for

NASA Specification

GSFC-S-311-P-4	Non-Magnetic Connectors, General Specification for

Instruction Sheets

408-7516	Application Tooling for MIL-C-39029 Contacts
408-7634	Application and Maintenance for Hand Crimping Tool 90302-1
408-7694-1	Application and Maintenance for Hand Crimping Tool 90312-1
408-7954	Application and Maintenance for Hand Crimping Tool 90374-1
408-7508	Insertion/Extraction Tools 91067-1, 91067-2 and 91067-3
408-7837	Female Screwlock Kit 205817-1 and Male Screw/Retainer Kit 211883-5

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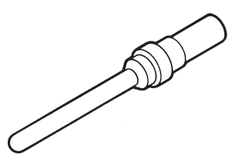
AMPLIMITE Connectors, Series 109 (Continued)

Size 20 Crimp Contacts for Series 109 Connectors (MIL-C-39029)

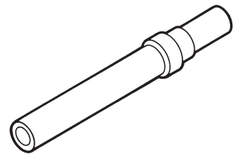
Size 20 Crimp, Snap-In Contacts .040 [1.02] Pin Diameter

Material and Finish

Pin and Socket Body —
[a]**Contact Body & Mating Area** — Copper alloy, plated gold .000050–.000100 [0.00127–0.00254] thick over .000050–.000100 [0.00127–0.00254] thick nickel underplate.
[b]**Contact Body** — Copper alloy, gold flash .000005 [0.00013] min thick over .000050–.000100 [0.00127–0.00254] thick nickel underplate.
[b]**Mating Area** — Copper alloy, plated gold .000050 min thick over .000050–.000100 [0.00127–0.00254] thick nickel underplate.
Socket Hood — Passivated stainless steel.



Pin
M39029/64-369
(Supersedes M24308/11-1)



Socket
M39029/63-368
(Supersedes M24308/10-1)

Wire Size Range AWG	Wire Size Range [mm²]	Ins. Dia. (Max.)	Contact Configuration	Tape Mounted Contacts Part Number	Loose Piece Contacts Military Part No. (M39029/)	Loose Piece Contacts AMP Part No.	Hand Tool Tool No. (M22520/)	Hand Tool Positioner No. (M22520/)	Contact Color Band
20-24	0.6-0.2	**.072** 1.83	Pin	205089-2[a]	64-369	205089-1[a]	02-01	02-08	orange, blue, white
			Socket	205090-2[a]	63-368	205090-1[a]	02-01	02-08	orange, blue, gray
20-24	0.6-0.2	**.072** 1.83	Pin	1218371-2[b]	64-369	1218371-1[b]	02-01	02-08	orange, blue, white
			Socket	1218372-2[b]	63-368	1218372-1[b]	02-01	02-08	orange, blue, gray

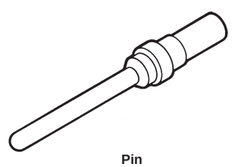
Tape mounted contacts are used in the AMP-TAPEMATIC Stripper/Crimper Machine Part Number **599406-7** (page 5-225).
Notes: 1. These contacts are used in Series 109 military connectors.
2. Insertion/Extraction Tool Part Number **91067-2** (Military Part Number **M81969/1-02**) is used to install and remove pin and socket contacts.
3. See Instruction Sheet 408-7516 for wire length, tool and selector settings.
4. Color bands are read in the direction of terminal (wire barrel) end to mating end.

Size 20 Crimp Contacts for Series 109 Connectors (Industrial Grade)

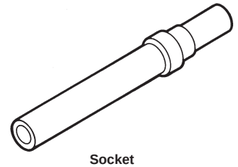
Size 20 Crimp, Snap-In Contacts .040 [1.02] Pin Diameter

Material and Finish

Pin and Socket Body —
Pin Body — Brass, plated gold .000030 [0.00076] min thick over .000050–.000150 [0.00127–0.00381] thick nickel underplate.
Socket Body — Brass, plated gold .000010 [0.00025] min thick over .000050–.000150 [0.00127–0.00381] thick nickel underplate.
Socket Clip — Copper alloy, plated gold .000050 [0.00013] min thick over .000050–.000150 [0.00127–0.00381] thick nickel underplate.



Pin



Socket

Wire Size Range AWG	Wire Size Range [mm²]	Ins. Dia. (Max.)	Contact Configuration	Tape Mounted Contacts Part Number	Loose Piece Contacts Part Number	Hand Tool Tool No. (M22520/)	Hand Tool Positioner No. (M22520/)
20-24	0.6-0.2	**.072** 1.83	Pin	1218266-4	1218266-3	02-01	02-08
			Socket	1218267-4	1218267-3	02-01	02-08
18	0.8	**.083** 2.11	Pin	1218266-2	1218266-1	02-01	02-08
			Socket	1218267-2	1218267-1	02-01	02-08

Tape mounted contacts are used in the AMP-TAPEMATIC Stripper/Crimper Machine Part Number **599406-7** (page 5-225).
Notes: 1. These contacts are used in Series 109 connectors.
2. Insertion/Extraction Tool Part Number **91067-2** (Military Part Number **M81969/1-02**) is used to install and remove pin and socket contacts.
3. See Instruction Sheet 408-7516 for wire length, tool and selector settings.

Catalog 1308940
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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Size 20 Posted Contacts for Series 109 Connectors

Material and Finish

Pin and Socket Body —
Leaded nickel copper or beryllium copper, plated per chart below

Socket Hood —
See chart below

Pin and Socket Insertion/Extraction Tool

AMP Part Number 91067-2 or
MIL Number M81969/1-02

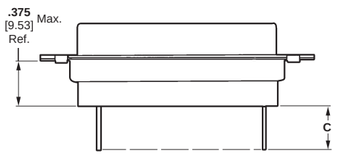
Insertion tip, for replacement
Part Number 126195-3

Extraction tip, for replacement
Part Number 126195-4

Notes:
1. Contacts on this page can be used with connectors on pages 5-180 to 5-185, 5-199, 5-200 and 5-220.
2. Mating End of pin and socket complies with MIL-C-39029.
3. See page 5-227 for PCB layouts.

Pin
(See Drawing Number 212565 for Latest Configuration)

Socket
(See Drawing Number 208778 for Latest Configuration)



Post Extension When Used in a Standard Connector

Post Diameter ± .002 [± .050]	Post Extension C ± .025 [± 0.63]	Part Numbers		Contact Plating	Socket Hood Material and Finish
		Pin	Socket		
.018 0.46	**.325** 8.25	1-212565-0	1-208778-0	Gold .000050–.000100 [0.00127–0.00254] thick over .000150–.000250 [0.00381–0.00635] thick copper underplate	Passivated Stainless Steel
.018 0.46	**.325** 8.25	—	1-208778-1	Gold .000050–.000100 [0.00127–0.00254] thick over .000050–.000150 [0.00127–0.00381] thick nickel underplate	Passivated Stainless Steel
.018 0.46	**.240** 6.10	—	1-208778-2	Gold .000050–.000100 [0.00127–0.00254] thick over .000150–.000250 [0.00381–0.00635] thick copper underplate	Passivated Stainless Steel

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Size 20 Posted Contacts for Series 109 Connectors (High Current Upgrade Program)

The High Current Size 20 contact has been designed to fit into the Series 109 AMPLIMITE Connectors per MIL-C-24308.

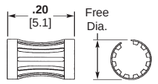
Material

Body — Copper Alloy
Louvertac Band — Beryllium Copper

Finish

Body — Gold
Louvertac Band — Gold

Current-Carrying Capacity. The High Current Size 20 contact with a 20 gage wire attached to the .030 [.762] diameter solder tail acquired an initial 86°F [30°C] T-Rise of 11.85 amps in free air.

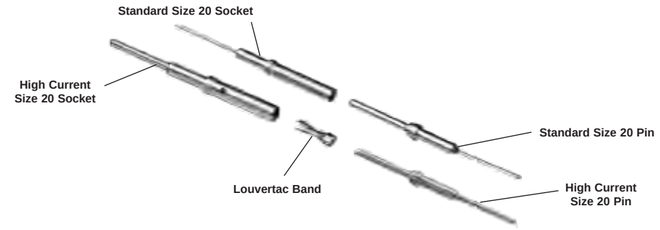


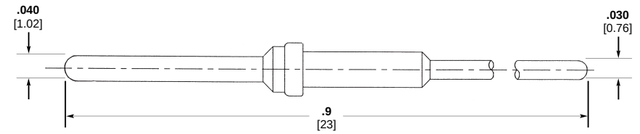
Multiple contact point due to hyperbolic shape.

The contacts can be sold loose piece or installed into any of the MIL Standard connectors.

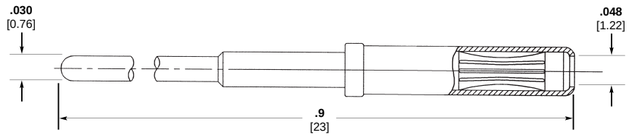
Pin and Socket Insertion/Extraction Tool

Part Number 91067-2 or MIL number M81969/1-02
Insertion tip, for replacement Part Number 126195-3
Extraction tip, for replacement Part Number 126195-4

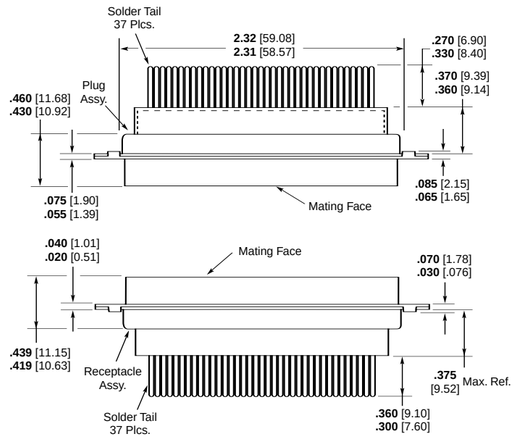




Pin Part Number 194081-1



Socket Part Number 194083-1



Typical Fully-Loaded 37 Position Plug and Receptacle

Note: 1. High Current contacts with Louvertac bands are NOT intermateable with any other contact.

5

Pin and Socket Connectors

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Crimp, Series 109, Standard Density Connectors (MIL Qualified)

Material and Finish

Shell — Steel, cadmium plated

Insert — Approved material per MIL-DTL-24308

Retention Clips — Stainless steel

Related Product Data

Cavity Identification — page 5-176

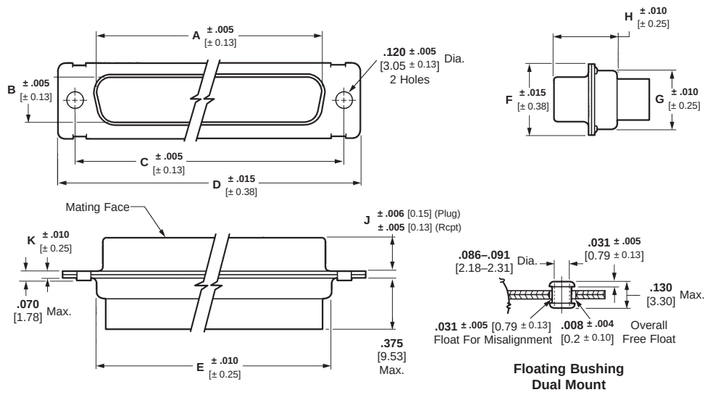
Contacts — pages 5-177 to 5-179

Mounting, Mating Specifications — page 5-226

Accessories — pages 5-231 to 5-233

Attention: Connector Marking

Connector marking may differ from package marking. All connectors marked per MIL-DTL-24308.



Floating Bushing Dual Mount

Series 109 Plugs per MIL-DTL-24308

No. of Contact Pos. (Shell Size)	Dimensions A (Inside)	B (Inside)	C	D	E	F	G	H	J	K	Standard Mount: Military Part No. M24308/	Standard Mount: AMP Part No.	Floating Bushing Mount: Military Part No. M24308/	Floating Bushing Mount: AMP Part No.	Description
9 (1)	**.666** 16.92	**.329** 8.36	**.984** 24.99	**1.213** 30.81	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.422** 10.72	**.235** 5.97	**.030** 0.76	4-259F	205162-1	4-324F	205412-1	Plug only
											4-1F	205556-2	4-302F	205486-2	Plug with pins
15 (2)	**.994** 25.25	**.329** 8.36	**1.312** 33.32	**1.541** 39.14	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.422** 10.72	**.235** 5.97	**.030** 0.76	4-260F	205164-1	4-325F	205408-1	Plug only
											4-2F	205558-2	4-303F	205409-2	Plug with pins
25 (3)	**1.534** 38.96	**.329** 8.36	**1.852** 47.04	**2.088** 53.04	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.426** 10.82	**.230** 5.84	**.039** 0.99	4-261F	205166-1	4-326F	205413-1	Plug only
											4-3F	205560-2	4-304F	205487-2	Plug with pins
37 (4)	**2.182** 55.42	**.329** 8.36	**2.500** 63.5	**2.729** 69.32	**2.272** 57.71	**.494** 12.55	**.422** 10.72	**.426** 10.82	**.230** 5.84	**.039** 0.99	4-262F	205168-1	4-327F	205414-1	Plug only
											4-4F	205562-2	4-305F	205488-2	Plug with pins
50 (5)	**2.079** 52.81	**.441** 11.2	**2.406** 61.11	**2.635** 66.93	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.426** 10.82	**.230** 5.84	**.039** 0.99	4-263F	205170-1	4-328F	205415-1	Plug only
											4-5F	205564-2	4-306F	205431-2	Plug with pins

Series 109 Receptacles per MIL-DTL-24308

No. of Contact Pos. (Shell Size)	Dimensions A (Outside)	B (Outside)	C	D	E	F	G	H	J	K	Standard Mount: Military Part No. M24308/	Standard Mount: AMP Part No.	Floating Bushing Mount: Military Part No. M24308/	Floating Bushing Mount: AMP Part No.	Description
9 (1)	**.643** 16.33	**.311** 7.9	**.984** 24.99	**1.213** 30.81	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.429** 10.9	**.243** 6.17	**.030** 0.76	2-281F	205161-1	2-292F	205416-1	Recept. only
											2-1F	205555-2	2-23F	205483-2	Recept. with sockets
15 (2)	**.971** 24.66	**.311** 7.9	**1.312** 33.32	**1.541** 39.14	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.429** 10.9	**.243** 6.17	**.030** 0.76	2-282F	205163-1	2-293F	205417-1	Recept. only
											2-2F	205557-2	2-24F	205433-2	Recept. with sockets
25 (3)	**1.511** 38.38	**.311** 7.9	**1.852** 47.04	**2.088** 53.04	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.429** 10.9	**.243** 6.17	**.039** 0.99	2-283F	205165-1	2-294F	205418-1	Recept. only
											2-3F	205559-2	2-25F	205484-2	Recept. with sockets
37 (4)	**2.159** 54.84	**.311** 7.9	**2.500** 63.5	**2.729** 69.32	**2.272** 57.71	**.494** 12.55	**.422** 10.72	**.429** 10.9	**.243** 6.17	**.039** 0.99	2-284F	205167-1	2-295F	205419-1	Recept. only
											2-4F	205561-2	2-26F	205485-2	Recept. with sockets
50 (5)	**2.064** 52.43	**.423** 10.74	**2.406** 61.11	**2.635** 66.93	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.429** 10.9	**.243** 6.17	**.039** 0.99	2-285F	205169-1	2-296F	205420-1	Recept. only
											2-5F	205563-2	2-27F	205432-2	Recept. with sockets

Notes: 1. Size 20 contacts supplied with connectors are loose piece.
2. "F" is stamped on connectors following **M24308** Part Number as required. -"F" designates cadmium shell plating.
3. See pages 5-235 through 5-239 (Military to AMP Part Number cross reference) for additional part numbers.

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Crimp, Series 109, Standard Density Connectors (MIL Qualified) — Zinc Plated RoHS Compliant

Material and Finish

Shell — Steel, zinc plated
Insert — Approved material per MIL-DTL-24308
Retention Clips — Stainless steel

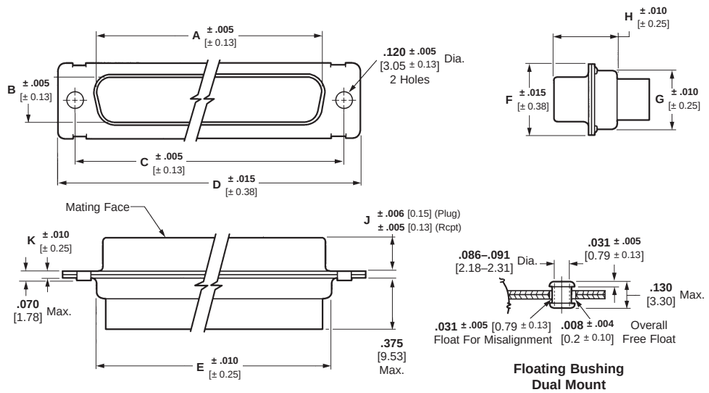
Related Product Data:

Cavity Identification — page 5-176
Contacts — pages 5-177 to 5-179
Mounting, Mating Specifications — page 5-226
Accessories — pages 5-231 to 5-233

Attention: Connector Marking

Connector marking may differ from package marking. All connectors marked per MIL-DTL-24308.

RoHS Ready



Floating Bushing Dual Mount

Series 109 Plugs per MIL-DTL-24308

No. of Contact Pos. (Shell Size)	Dimensions A (Inside)	B (Inside)	C	D	E	F	G	H	J	K	Standard Mount: Military Part No. M24308/	Standard Mount: AMP Part No.	Floating Bushing Mount: Military Part No. M24308/	Floating Bushing Mount: AMP Part No.	Description
9 (1)	**.666** 16.92	**.329** 8.36	**.984** 24.99	**1.213** 30.81	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.422** 10.72	**.235** 5.97	**.030** 0.76	4-259	1757819-1	4-324	1757821-1	Plug only
											4-1	1757819-6	4-302	1757821-6	Plug with pins
15 (2)	**.994** 25.25	**.329** 8.36	**1.312** 33.32	**1.541** 39.14	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.422** 10.72	**.235** 5.97	**.030** 0.76	4-260	1757819-2	4-325	1757821-2	Plug only
											4-2	1757819-7	4-303	1757821-7	Plug with pins
25 (3)	**1.534** 38.96	**.329** 8.36	**1.852** 47.04	**2.088** 53.04	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.426** 10.82	**.230** 5.84	**.039** 0.99	4-261	1757819-3	4-326	1757821-3	Plug only
											4-3	1757819-8	4-304	1757821-8	Plug with pins
37 (4)	**2.182** 55.42	**.329** 8.36	**2.500** 63.5	**2.729** 69.32	**2.272** 57.71	**.494** 12.55	**.422** 10.72	**.426** 10.82	**.230** 5.84	**.039** 0.99	4-262	1757819-4	4-327	1757821-4	Plug only
											4-4	1757819-9	4-305	1757821-9	Plug with pins
50 (5)	**2.079** 52.81	**.441** 11.2	**2.406** 61.11	**2.635** 66.93	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.426** 10.82	**.230** 5.84	**.039** 0.99	4-263	1757819-5	4-328	1757821-5	Plug only
											4-5	1-1757819-0	4-306	1-1757821-0	Plug with pins

Series 109 Receptacles per MIL-DTL-24308

No. of Contact Pos. (Shell Size)	Dimensions A (Outside)	B (Outside)	C	D	E	F	G	H	J	K	Standard Mount: Military Part No. M24308/	Standard Mount: AMP Part No.	Floating Bushing Mount: Military Part No. M24308/	Floating Bushing Mount: AMP Part No.	Description
9 (1)	**.643** 16.33	**.311** 7.9	**.984** 24.99	**1.213** 30.81	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.429** 10.9	**.243** 6.17	**.030** 0.76	2-281	1757820-1	2-292	1757822-1	Recept. only
											2-1	1757820-6	2-23	1757822-6	Recept. with sockets
15 (2)	**.971** 24.66	**.311** 7.9	**1.312** 33.32	**1.541** 39.14	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.429** 10.9	**.243** 6.17	**.030** 0.76	2-282	1757820-2	2-293	1757822-2	Recept. only
											2-2	1757820-7	2-24	1757822-7	Recept. with sockets
25 (3)	**1.511** 38.38	**.311** 7.9	**1.852** 47.04	**2.088** 53.04	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.429** 10.9	**.243** 6.17	**.039** 0.99	2-283	1757820-3	2-294	1757822-3	Recept. only
											2-3	1757820-8	2-25	1757822-8	Recept. with sockets
37 (4)	**2.159** 54.84	**.311** 7.9	**2.500** 63.5	**2.729** 69.32	**2.272** 57.71	**.494** 12.55	**.422** 10.72	**.429** 10.9	**.243** 6.17	**.039** 0.99	2-284	1757820-4	2-295	1757822-4	Recept. only
											2-4	1757820-9	2-26	1757822-9	Recept. with sockets
50 (5)	**2.064** 52.43	**.423** 10.74	**2.406** 61.11	**2.635** 66.93	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.429** 10.9	**.243** 6.17	**.039** 0.99	2-285	1757820-5	2-296	1757822-5	Recept. only
											2-5	1-1757820-0	2-27	1-1757822-0	Recept. with sockets

Notes: 1. Size 20 contacts supplied with connectors are loose piece.
2. See pages 5-235 through 5-239 (Military to AMP Part Number cross reference) for additional part numbers.

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Crimp, Series 109, Standard Density Connectors (Industrial Grade)

Material and Finish

Shell — Steel, zinc plated
Insert — Approved material per MIL-DTL-24308
Retention Clips — Stainless steel

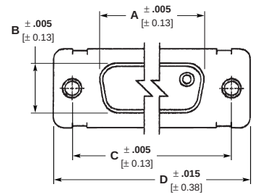
Related Product Data

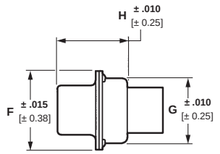
Cavity Identification — page 5-176
Contacts — pages 5-177 to 5-179
Mounting, Mating Specifications — page 5-226
Accessories — pages 5-231 to 5-233

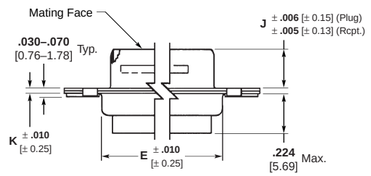
Attention: Connector Marking

Connector marking may differ from package marking.

Note: Meets requirements of MIL-DTL-24308







Clinch Nut Mount

Series 109 Plugs

No. of Contact Pos. (Shell Size)	Dimensions										Standard Mount Part Number	Description
	A (Inside)	B (Inside)	C	D	E	F	G	H	J	K		
9 (1)	**.666** 16.92	**.329** 8.36	**.984** 24.99	**1.213** 30.81	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.422** 10.72	**.235** 5.97	**.030** 0.76	1218748-1	Plug only
15 (2)	**.994** 25.25	**.329** 8.36	**1.312** 33.32	**1.541** 39.14	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.422** 10.72	**.235** 5.97	**.030** 0.76	1218748-2	Plug only
25 (3)	**1.534** 38.96	**.329** 8.36	**1.852** 47.04	**2.088** 53.04	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.426** 10.82	**.230** 5.84	**.039** 0.99	1218748-3	Plug only
37 (4)	**2.182** 55.42	**.329** 8.36	**2.500** 63.5	**2.729** 69.32	**2.272** 57.71	**.494** 12.55	**.422** 10.72	**.426** 10.82	**.230** 5.84	**.039** 0.99	1218748-4	Plug only
50 (5)	**2.079** 52.81	**.441** 11.2	**2.406** 61.11	**2.635** 66.93	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.426** 10.82	**.230** 5.84	**.039** 0.99	1218748-5	Plug. only

Clinch Nut Mount available, contact Tyco Electronics.

Series 109 Receptacles

No. of Contact Pos. (Shell Size)	Dimensions										Clinch Nut Mount Part Number	Description
	A (Inside)	B (Inside)	C	D	E	F	G	H	J	K		
9 (1)	**.643** 16.33	**.311** 7.9	**.984** 24.99	**1.213** 30.81	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.429** 10.9	**.243** 6.17	**.030** 0.76	1218749-1	Recept. only
15 (2)	**.971** 24.66	**.311** 7.9	**1.312** 33.32	**1.541** 39.14	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.429** 10.9	**.243** 6.17	**.030** 0.76	1218749-2	Recept. only
25 (3)	**1.511** 38.38	**.311** 7.9	**1.852** 47.04	**2.088** 53.04	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.429** 10.9	**.243** 6.17	**.039** 0.99	1218749-3	Recept. only
37 (4)	**2.159** 54.84	**.311** 7.9	**2.500** 63.5	**2.729** 69.32	**2.272** 57.71	**.494** 12.55	**.422** 10.72	**.429** 10.9	**.243** 6.17	**.039** 0.99	1218749-4	Recept. only
50 (5)	**2.064** 52.43	**.423** 10.74	**2.406** 61.11	**2.635** 66.93	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.429** 10.9	**.243** 6.17	**.039** 0.99	1218749-5	Recept. only

Standard Mount available, contact Tyco Electronics.

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

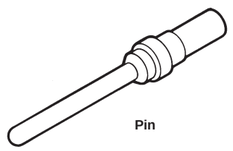
Non-Magnetic Crimp Plugs, Series 109, Standard Density Connectors (NASA Qualified)

Connector Material and Finish

Shell — Brass, gold plated
Insert — Approved material per MIL-DTL-24308
Retention Clips — Copper alloy

Related Product Data

Cavity Identification — page 5-176
Mounting, Mating Specifications — page 5-226
Accessories — pages 5-231 to 5-233



Pin

Pin Contact

Wire Size Range	AMP Part No. / NASA No.
26-28 0.15-0.08	206794-2 —
20-24 0.6-0.2	205089-4 G-10-P1

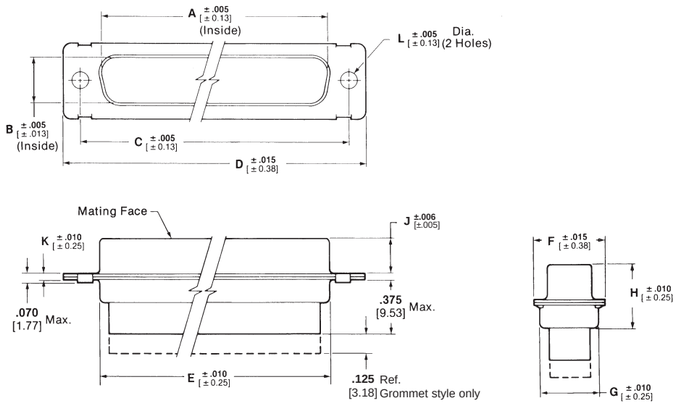
Strip length .140 [3.56]
Max. insulation diameter .072 [1.83]
Hand tool M22520/2-01 or AMP Part Number 601966-1
Positioner M22520/2-08 or AMP Part Number 601966-5

Contact Material and Finish

Copper alloy plated gold .000050–.000100 [0.00127–0.00254] thick over .000100–.000150 [0.00254–0.00381] copper underplate

Pin and Socket Insertion/Extraction Tool

AMP Part Number 91067-2 or MIL Number M81969/1-02
Insertion tip, for replacement Part Number 126195-3
Extraction tip, for replacement Part Number 126195-4



Non-Magnetic Plugs per NASA Specification

No. of Contact Pos. (Shell Size)	Dimensions A	B	C	D	E	F	G	H	J	K	L	NASA Number	AMP Part Number
9 (1)	**.666** 16.92	**.329** 8.36	**.984** 24.99	**1.213** 30.81	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.422** 10.72	**.235** 5.97	**.030** 0.76	**.154** 3.91	311P409-1P-B-15	207252-1
											.120 3.05	311P409-1P-B-12	207252-2
15 (2)	**.994** 25.25	**.329** 8.36	**1.312** 33.32	**1.541** 39.14	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.422** 10.72	**.235** 5.97	**.030** 0.76	**.154** 3.91	311P409-2P-B-15	206798-1
											.120 3.05	311P409-2P-B-12	206798-2
25 (3)	**1.534** 38.96	**.329** 8.36	**1.852** 47.04	**2.088** 53.04	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.426** 10.82	**.230** 5.84	**.039** 0.99	**.154** 3.91	311P409-3P-B-15	206800-1
											.120 3.05	311P409-3P-B-12	206800-2
37 (4)	**2.182** 55.42	**.329** 8.36	**2.500** 63.5	**2.729** 69.32	**2.272** 57.71	**.494** 12.55	**.422** 10.72	**.426** 10.82	**.230** 5.84	**.039** 0.99	**.154** 3.91	311P409-4P-B-15	206802-1
											.120 3.05	311P409-4P-B-12	206802-2
50 (5)	**2.079** 52.81	**.441** 11.20	**2.406** 61.11	**2.635** 66.93	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.426** 10.82	**.230** 5.84	**.039** 0.99	**.154** 3.91	311P409-5P-B-15	206804-1
											.120 3.05	311P409-5P-B-12	206804-2

Non-Magnetic Plugs With Silicone Rubber Rear Grommet[1]

No. of Contact Pos. (Shell Size)	Dimensions A	B	C	D	E	F	G	H	J	K	L	Part Number
9 (1)	**.666** 16.92	**.329** 8.36	**.984** 24.99	**1.213** 30.81	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.422** 10.72	**.235** 5.97	**.030** 0.76	**.120** 3.05	211638-4
15 (2)	**.994** 25.25	**.329** 8.36	**1.312** 33.32	**1.541** 39.14	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.422** 10.72	**.235** 5.97	**.030** 0.76	**.120** 3.05	211639-4
25 (3)	**1.534** 38.96	**.329** 8.36	**1.852** 47.04	**2.088** 53.04	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.426** 10.82	**.230** 5.84	**.039** 0.99	**.120** 3.05	211640-4
37 (4)	**2.182** 55.42	**.329** 8.36	**2.500** 63.5	**2.729** 69.32	**2.272** 57.71	**.494** 12.55	**.422** 10.72	**.426** 10.82	**.230** 5.84	**.039** 0.99	**.120** 3.05	211641-4
50 (5)	**2.079** 52.81	**.441** 11.20	**2.406** 61.11	**2.635** 66.93	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.426** 10.82	**.230** 5.84	**.039** 0.99	**.120** 3.05	211642-4

[1] Grommet provided for cable strain relief.

Catalog 1308940
Revised 8-06

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Canada: 1-905-470-4425
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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Non-Magnetic Crimp Receptacles, Series 109, Standard Density Connectors (NASA Qualified)

Connector Material and Finish

Shell — Brass, gold plated

Insert — Approved material per MIL-DTL-24308

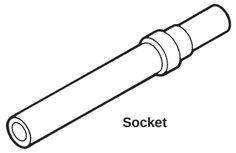
Retention Clips — Copper alloy

Related Product Data

Cavity Identification — page 5-176

Mounting, Mating Specifications — page 5-226

Accessories — pages 5-231 to 5-233



Socket

Socket Contact	
Wire Size Range	**AMP Part No. / NASA No.**
26-28 0.15-0.08	206795-1 —
20-24 0.6-0.2	206793-1 G-10-S1

Strip length .140 [3.56]
Max. insulation diameter .072 [1.83]

Hand tool M22520/2-01 or AMP Part Number 601966-1

Positioner M22520/2-08 or AMP Part Number 601966-5

Contact Material and Finish

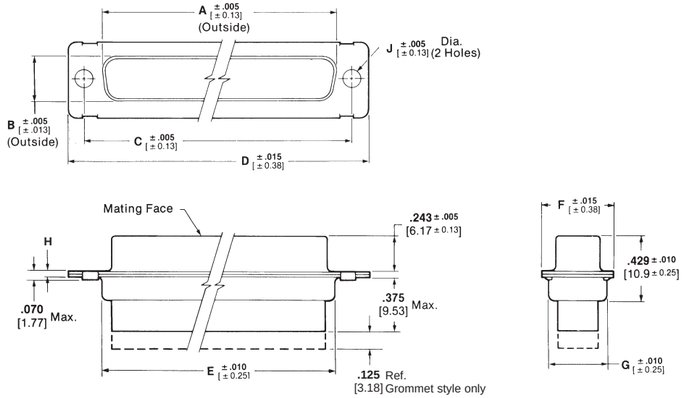
Copper alloy plated gold .000050–.000100 [0.00127–0.00254] thick over .000100–.000150 [0.00254–0.00381] copper underplate

Pin and Socket Insertion/Extraction Tool

AMP Part Number 91067-2 or MIL Number M81969/1-02

Insertion tip, for replacement Part Number 126195-3

Extraction tip, for replacement Part Number 126195-4



Non-Magnetic Receptacles per NASA Specification

No. of Contact Pos. (Shell Size)	Dimensions									NASA Number	AMP Part Number
	A	B	C	D	E	F	G	H	J		
9 (1)	**.643** 16.33	**.311** 7.9	**.984** 24.99	**1.213** 30.81	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.030** 0.76	**.154** 3.91	311P409-1S-B-15	207253-1
									.120 3.05	311P409-1S-B-12	207253-2
15 (2)	**.971** 24.66	**.311** 7.9	**1.312** 33.32	**1.541** 39.14	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.030** 0.76	**.154** 3.91	311P409-2S-B-15	206799-1
									.120 3.05	311P409-2S-B-12	206799-2
25 (3)	**1.511** 38.38	**.311** 7.9	**1.852** 47.04	**2.088** 53.04	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.039** 0.99	**.154** 3.91	311P409-3S-B-15	206801-1
									.120 3.05	311P409-3S-B-12	206801-2
37 (4)	**2.159** 55.42	**.311** 7.9	**2.500** 63.5	**2.729** 69.32	**2.272** 57.71	**.494** 12.55	**.422** 10.72	**.039** 0.99	**.154** 3.91	311P409-4S-B-15	206803-1
									.120 3.05	311P409-4S-B-12	206803-2
50 (5)	**2.064** 52.43	**.423** 10.74	**2.406** 61.11	**2.635** 66.93	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.039** 0.99	**.154** 3.91	311P409-5S-B-15	206805-1
									.120 3.05	311P409-5S-B-12	206805-2

Non-Magnetic Receptacles With Silicone Rubber Rear Grommet[1]

No. of Contact Pos. (Shell Size)	Dimensions									Part Number
	A	B	C	D	E	F	G	H	J	
9 (1)	**.643** 16.33	**.311** 7.9	**.984** 24.99	**1.213** 30.81	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.030** 0.76	**.120** 3.05	211633-4
15 (2)	**.971** 24.66	**.311** 7.9	**1.312** 33.32	**1.541** 39.14	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.030** 0.76	**.120** 3.05	211634-4
25 (3)	**1.511** 38.38	**.311** 7.9	**1.852** 47.04	**2.088** 53.04	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.039** 0.99	**.120** 3.05	211635-4
37 (4)	**2.159** 54.84	**.311** 7.9	**2.500** 63.5	**2.729** 69.32	**2.272** 57.71	**.494** 12.55	**.422** 10.72	**.039** 0.99	**.120** 3.05	211636-4
50 (5)	**2.064** 52.43	**.423** 10.74	**2.406** 61.11	**2.635** 66.93	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.039** 0.99	**.120** 3.05	211637-4

[1] Grommet provided for cable strain relief.

Catalog 1308940
Revised 8-06

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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Crimp, Blindmate Plugs, Series 109, Standard Density Connectors

Materials and Finish

[1] **Shell, Front** — Aluminum alloy, cadmium plated with yellow chromate

[2] **Shell, Front** — Aluminum alloy, zinc plated with yellow trichromate

[1] **Shell, Rear** — Steel, cadmium plated with yellow chromate

[2] **Shell, Rear** — Steel, zinc plated with yellow trichromate

Insert Assembly — Approved material per MIL-DTL-24308

Retention Clips — Stainless steel

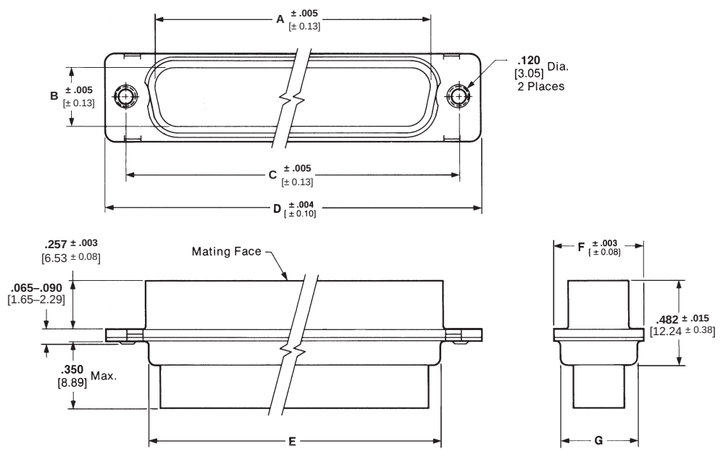
Related Product Data

Cavity Identification — page 5-176

Contacts — pages 5-177 to 5-179

Mounting Specifications — page 5-226

Mating information contained on page 5-226 does not pertain to Blindmate design. Flange to flange spacing can be a max. of .270 [6.86].



No. of Contact Pos. (Shell Size)	Dimensions							Part Number
	A	B	C	D	E	F	G	
9 (1)	**.656** 16.66	**.324** 8.23	**.984** 24.99	**1.224** 31.09	**.769/.750** 19.53/19.05	**.506** 12.85	**.432/.413** 10.97/10.49	445005-1[1]
15 (2)	**.984** 25.0	**.324** 8.23	**1.312** 33.32	**1.552** 39.42	**1.093/1.074** 27.76/27.28	**.506** 12.85	**.432/.413** 10.97/10.49	445006-1[1]
25 (3)	**1.524** 38.71	**.324** 8.23	**1.852** 47.04	**2.099** 53.31	**1.635/1.616** 41.53/41.05	**.506** 12.85	**.432/.413** 10.97/10.49	445007-1[1] 5-445007-1[2]
37 (4)	**2.172** 55.17	**.324** 8.23	**2.500** 63.5	**2.740** 69.60	**2.282/2.263** 57.96/57.48	**.506** 12.85	**.432/.413** 10.97/10.49	445008-1[1] 5-445008-1[2]
50 (5)	**2.082** 52.88	**.444** 11.28	**2.406** 61.11	**2.646** 67.21	**2.188/2.167** 55.58/55.04	**.617** 15.67	**.544/.525** 13.82/13.34	445009-1[1] 5-445009-1[2]

[1] See Material and Finish above.
[2] See Material and Finish for RoHS compliant Part Numbers above.
Note: See page 5-200 for Blindmate coax/signal combinations.

Catalog 1308940
Revised 8-06

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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Straight PCB, Series 109, Standard Density Connectors (MIL Qualified)

Material and Finish

Shell — Steel, cadmium plated

Insert — Approved material per MIL-DTL-24308

Contact — Copper alloy plated gold over nickel underplate*

Spacer — Aluminum alloy, Iridite finish

Related Product Data

Cavity Identification — page 5-176

Mounting, Mating Specifications — page 5-226

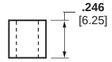
Accessories — pages 5-231 to 5-233

PCB Layouts — See page 5-227 or Tyco Electronics customer drawing.

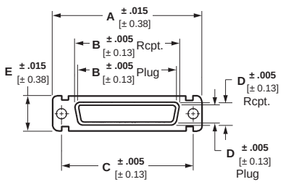
***Socket Body** — .000050 [0.00127] min. gold over .000050 [0.00127] min. nickel

Mating Area — .000050 [0.00127] min. gold over .000050 [0.00127] min. nickel

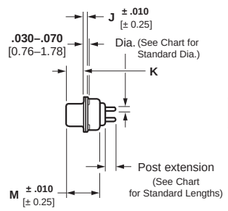
Plug Body — .000050 [0.00127] min. gold over .000050 [0.00127] min. nickel

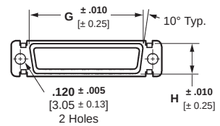


Spacer



Standard Shell





MS Shell Size	Connector Style	Dimensions									
		A	B	C	D	E	G	H	J	K	M
1	Plug	**1.213** 30.81	**.666** 16.92	**.984** 24.99	**.329** 8.36	**.494** 12.55	**.759** 19.28	**.422** 10.72	**.030** 0.76	**.238/.229** 6.04/5.81	**.422** 10.72
	Receptacle	**1.213** 30.81	**.643** 16.33	**.984** 24.99	**.311** 7.90	**.494** 12.55	**.759** 19.28	**.422** 10.72	**.030** 0.76	**.248/.238** 6.29/6.04	**.429** 10.90
2	Plug	**1.541** 39.14	**.994** 25.25	**1.312** 33.32	**.329** 8.36	**.494** 12.55	**1.083** 27.51	**.422** 10.72	**.030** 0.76	**.238/.229** 6.04/5.81	**.422** 10.72
	Receptacle	**1.541** 39.14	**.971** 24.66	**1.312** 33.32	**.311** 7.90	**.494** 12.55	**1.083** 27.51	**.422** 10.72	**.030** 0.76	**.248/.238** 6.29/6.04	**.429** 10.90
3	Plug	**2.088** 53.04	**1.534** 38.96	**1.852** 47.04	**.329** 8.36	**.494** 12.55	**1.625** 41.28	**.422** 10.72	**.039** 0.99	**.236/.224** 5.99/5.68	**.426** 10.82
	Receptacle	**2.088** 53.04	**1.511** 38.38	**1.852** 47.04	**.311** 7.90	**.494** 12.55	**1.625** 41.28	**.422** 10.72	**.030** 0.76	**.248/.238** 6.29/6.04	**.429** 10.90
4	Plug	**2.729** 69.32	**2.182** 55.42	**2.500** 63.5	**.329** 8.36	**.494** 12.55	**2.272** 57.71	**.422** 10.72	**.039** 0.99	**.236/.224** 5.99/5.68	**.426** 10.82
	Receptacle	**2.729** 69.32	**2.159** 54.84	**2.500** 63.5	**.311** 7.90	**.494** 12.55	**2.272** 57.71	**.422** 10.72	**.030** 0.76	**.248/.238** 6.29/6.04	**.429** 10.90
5	Plug	**2.635** 66.93	**2.079** 52.81	**2.406** 61.11	**.441** 11.20	**.605** 15.37	**2.178** 55.32	**.534** 13.56	**.039** 0.99	**.236/.224** 5.99/5.68	**.426** 10.82
	Receptacle	**2.635** 66.93	**2.064** 52.43	**2.406** 61.11	**.423** 10.74	**.605** 15.37	**2.178** 55.32	**.534** 13.55	**.030** 0.76	**.248/.238** 6.29/6.04	**.429** 10.90

Receptacle Assemblies

Shell Size	No. Pos.	Post Dia.	Post Ext. ± .020 [± 0.51]	Military Part No. M24308/	AMP Part No.
1	9	**.030** 0.76	**.156** 3.96	23-1F	443975-1
2	15	**.030** 0.76	**.156** 3.96	23-2F	443975-2
3	25	**.030** 0.76	**.156** 3.96	23-3F	443975-3
4	37	**.030** 0.76	**.156** 3.96	23-4F	443975-4
5	50	**.030** 0.76	**.156** 3.96	23-5F	443975-5
1	9	**.030** 0.76	**.188** 4.78	23-7F	443976-1
2	15	**.030** 0.76	**.188** 4.78	23-8F	443976-2
3	25	**.030** 0.76	**.188** 4.78	23-9F	443976-3
4	37	**.030** 0.76	**.188** 4.78	23-10F	443976-4
5	50	**.030** 0.76	**.188** 4.78	23-11F	443976-5
1	9	**.040** 1.02	**.156** 3.96	23-13F	443977-1
2	15	**.040** 1.02	**.156** 3.96	23-14F	443977-2
3	25	**.040** 1.02	**.156** 3.96	23-15F	443977-3
4	37	**.040** 1.02	**.156** 3.96	23-16F	443977-4
5	50	**.040** 1.02	**.156** 3.96	23-17F	443977-5
1	9	**.040** 1.02	**.188** 4.78	23-19F	443978-1
2	15	**.040** 1.02	**.188** 4.78	23-20F	443978-2
3	25	**.040** 1.02	**.188** 4.78	23-21F	443978-3
4	37	**.040** 1.02	**.188** 4.78	23-22F	443978-4
5	50	**.040** 1.02	**.188** 4.78	23-23F	443978-5

Plug Assemblies

Shell Size	No. Pos.	Post Dia.	Post Ext. ± .020 [± 0.51]	Military Part No. M24308/	AMP Part No.
1	9	**.030** 0.76	**.156** 3.96	24-1F	1218124-1
2	15	**.030** 0.76	**.156** 3.96	24-2F	1218124-2
3	25	**.030** 0.76	**.156** 3.96	24-3F	1218124-3
4	37	**.030** 0.76	**.156** 3.96	24-4F	1218124-4
5	50	**.030** 0.76	**.156** 3.96	24-5F	1218124-5
1	9	**.030** 0.76	**.188** 4.78	24-7F	1218125-1
2	15	**.030** 0.76	**.188** 4.78	24-8F	1218125-2
3	25	**.030** 0.76	**.188** 4.78	24-9F	1218125-3
4	37	**.030** 0.76	**.188** 4.78	24-10F	1218125-4
5	50	**030** 0.76	**.188** 4.78	24-11F	1218125-5
1	9	**.040** 1.02	**.156** 3.96	24-13F	1218126-1
2	15	**.040** 1.02	**.156** 3.96	24-14F	1218126-2
3	25	**.040** 1.02	**.156** 3.96	24-15F	1218126-3
4	37	**.040** 1.02	**.156** 3.96	24-16F	1218126-4
5	50	**.040** 1.02	**.156** 3.96	24-17F	1218126-5
1	9	**.040** 1.02	**.188** 4.78	24-19F	1218127-1
2	15	**.040** 1.02	**.188** 4.78	24-20F	1218127-2
3	25	**040** 1.02	**.188** 4.78	24-21F	1218127-3
4	37	**.040** 1.02	**.188** 4.78	24-22F	1218127-4
5	50	**.040** 1.02	**.188** 4.78	24-23F	1218127-5

Catalog 1308940
Revised 8-06

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Dimensions are shown for reference purposes only. Specifications subject to change.

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Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Straight PCB, Series 109, Standard Density Connectors (Industrial Grade)

Material and Finish

Shell — Steel, see below

Insert — Approved material per MIL-DTL-24308

Contact — Copper alloy plated gold over nickel underplate*

Spacer — Aluminum alloy, Iridite finish

Related Product Data

Cavity Identification — page 5-176

Mounting, Mating Specifications — page 5-226

Accessories — pages 5-231 to 5-233

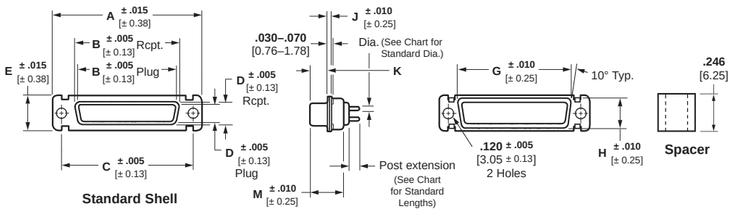
PCB Layouts — See page 5-227 or Tyco Electronics customer drawing.

*[a]**Socket Body and Mating Area** — .000050 [0.00127] min. gold over .000050 [0.00127] min. nickel

Plug Body and Mating Area — .000050 [0.00127] min. gold over .000050 [0.00127] min. nickel

[b]**Mating Area** — Copper alloy with .000030 [0.00076] min. gold plate over .000050 [0.00127] min. nickel underplate

Product Specification — 108-1770



MS Shell Size	Connector Style	Dimensions									
		A	B	C	D	E	G	H	J	K	M
1	Plug	**1.213** 30.81	**.666** 16.92	**.984** 24.99	**.329** 8.36	**.494** 12.55	**.759** 19.28	**.422** 10.72	**.030** 0.76	**.238/.229** 6.04/5.81	**.422** 10.72
	Receptacle	**1.213** 30.81	**.643** 16.33	**.984** 24.99	**.311** 7.90	**.494** 12.55	**.759** 19.28	**.422** 10.72	**.030** 0.76	**.248/.238** 6.29/6.04	**.429** 10.90
2	Plug	**1.541** 39.14	**.994** 25.25	**1.312** 33.32	**.329** 8.36	**.494** 12.55	**1.083** 27.51	**.422** 10.72	**.030** 0.76	**.238/.229** 6.04/5.81	**.422** 10.72
	Receptacle	**1.541** 39.14	**.971** 24.66	**1.312** 33.32	**.311** 7.90	**.494** 12.55	**1.083** 27.51	**.422** 10.72	**.030** 0.76	**.248/.238** 6.29/6.04	**.429** 10.90
3	Plug	**2.088** 53.04	**1.534** 38.96	**1.852** 47.04	**.329** 8.36	**.494** 12.55	**1.625** 41.28	**.422** 10.72	**.039** 0.99	**.236/.224** 5.99/5.68	**.426** 10.82
	Receptacle	**2.088** 53.04	**1.511** 38.38	**1.852** 47.04	**.311** 7.90	**.494** 12.55	**1.625** 41.28	**.422** 10.72	**.030** 0.76	**.248/.238** 6.29/6.04	**.429** 10.90
4	Plug	**2.729** 69.32	**2.182** 55.42	**2.500** 63.5	**.329** 8.36	**.494** 12.55	**2.272** 57.71	**.422** 10.72	**.039** 0.99	**.236/.224** 5.99/5.68	**.426** 10.82
	Receptacle	**2.729** 69.32	**2.159** 54.84	**2.500** 63.5	**.311** 7.90	**.494** 12.55	**2.272** 57.71	**.422** 10.72	**.030** 0.76	**.248/.238** 6.29/6.04	**.429** 10.90
5	Plug	**2.635** 66.93	**2.079** 52.81	**2.406** 61.11	**.441** 11.20	**.605** 15.37	**2.178** 55.32	**.534** 13.56	**.039** 0.99	**.236/.224** 5.99/5.68	**.426** 10.82
	Receptacle	**2.635** 66.93	**2.064** 52.43	**2.406** 61.11	**.423** 10.74	**.605** 15.37	**2.178** 55.32	**.534** 13.55	**.030** 0.76	**.248/.238** 6.29/6.04	**.429** 10.90

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

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C. America: 57-1-254-4444

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Straight PCB, Series 109, Standard Density Connectors (Industrial Grade) (Continued)

Material and Finish

Shell — Steel, see below

[1] **Tin Plated Finish** — Tin or tin-lead .000200–.000400 [0.00508–0.01016] thick over .000100–.000200 [0.00254–0.00508] copper

[2] **Tin Plated RoHS Compliant Finish** — Tin .000200–.000400 [0.00508–0.01016] thick over .000100–.000200 [0.00254–0.00508] copper

[3] **Zinc Plated RoHS Compliant Finish** — Zinc .000200–.000400 [0.00508–0.01016] thick, yellow trivalent chromate

Insert — Approved material per MIL-DTL-24308

Contact — Copper alloy plated gold over nickel underplate*

Spacer — Aluminum alloy, Iridite finish

Related Product Data

Cavity Identification — page 5-176

Mounting, Mating Specifications — page 5-226

Accessories — pages 5-231 to 5-233

PCB Layouts — See page 5-227 or Tyco Electronics customer drawing.

*[a] **Socket Body and Mating Area** — .000050 [0.00127] min. gold over .000050 [0.00127] min. nickel

Plug Body and Mating Area — .000050 [0.00127] min. gold over .000050 [0.00127] min. nickel

[b] **Mating Area** — Copper alloy with .000030 [0.00076] min. gold plate over .000050 [0.00127] min. nickel underplate

Product Specification — 108-1770

Shell Size	No. Pos.	Post Dia.	Post Ext. ± .020 [± 0.51]	Receptacle Part Number		
				Tin Plated Shells[a]	Tin Plated Shells[b]	Zinc Plated RoHS Shells[a,3]
1	9	.030 0.76	.156 3.96	1218826-1[1]	1218293-1[1]	1218289-1
2	15	.030 0.76	.156 3.96	1218826-2[1]	1218293-2[1] 5-1218293-2[2]	1218289-2
3	25	.030 0.76	.156 3.96	1218826-3[1]	1218293-3[1]	1218289-3
4	37	.030 0.76	.156 3.96	1218826-4[1]	1218293-4[1]	1218289-4
5	50	.030 0.76	.156 3.96	1218826-5[1]	1218293-5[1]	1218289-5
1	9	.030 0.76	.188 4.78	1218827-1[1]	1218294-1[1]	1218290-1
2	15	.030 0.76	.188 4.78	1218827-2[1]	1218294-2[1]	1218290-2
3	25	.030 0.76	.188 4.78	1218827-3[1]	1218294-3[1]	1218290-3
4	37	.030 0.76	.188 4.78	1218827-4[1]	1218294-4[1]	1218290-4
5	50	.030 0.76	.188 4.78	1218827-5[1]	1218294-5[1]	1218290-5
1	9	.040 1.02	.156 3.96	1218828-1[1]	1218295-1[1]	1218291-1
2	15	.040 1.02	.156 3.96	1218828-2[1]	1218295-2[1]	1218291-2
3	25	.040 1.02	.156 3.96	1218828-3[1]	1218295-3[1]	1218291-3
4	37	.040 1.02	.156 3.96	1218828-4[1]	1218295-4[1]	1218291-4
5	50	.040 1.02	.156 3.96	1218828-5[1]	1218295-5[1]	1218291-5
1	9	.040 1.02	.188 4.78	1218829-1[1]	1218296-1[1]	1218292-1
2	15	.040 1.02	.188 4.78	1218829-2[1]	1218296-2[1] 5-1218296-2[2]	1218292-2
3	25	.040 1.02	.188 4.78	1218829-3[1]	1218296-3[1] 5-1218296-3[2]	1218292-3
4	37	.040 1.02	.188 4.78	1218829-4[1]	1218296-4[1]	1218292-4
5	50	.040 1.02	.188 4.78	1218829-5[1]	1218296-5[1]	1218292-5

1 See Tin Plated finish above.
2 See Tin Plated RoHS compliant finish above.
3 See Zinc Plated RoHS compliant finish above.

Shell Size	No. Pos.	Post Dia.	Post Ext. ± .020 [± 0.51]	Plug Part Number	
				Tin Plated Shells[a]	Zinc Plated RoHS Shells[a,3]
1	9	.030 0.76	.156 3.96	1218374-1[1]	1218378-1
2	15	.030 0.76	.156 3.96	1218374-2[1]	1218378-2
3	25	.030 0.76	.156 3.96	1218374-3[1]	1218378-3
4	37	.030 0.76	.156 3.96	1218374-4[1]	1218378-4
5	50	.030 0.76	.156 3.96	1218374-5[1]	1218378-5
1	9	.030 0.76	.188 4.78	1218375-1[1]	1218379-1
2	15	.030 0.76	.188 4.78	1218375-2[1] 5-1218375-2[2]	1218379-2
3	25	.030 0.76	.188 4.78	1218375-3[1]	1218379-3
4	37	.030 0.76	.188 4.78	1218375-4[1]	1218379-4
5	50	030 0.76	.188 4.78	1218375-5[1]	1218379-5
1	9	.040 1.02	.156 3.96	1218376-1[1]	1218380-1
2	15	.040 1.02	.156 3.96	1218376-2[1]	1218380-2
3	25	.040 1.02	.156 3.96	1218376-3[1]	1218380-3
4	37	.040 1.02	.156 3.96	1218376-4[1]	1218380-4
5	50	.040 1.02	.156 3.96	1218376-5[1]	1218380-5
1	9	.040 1.02	.188 4.78	1218377-1[1]	1218381-1
2	15	.040 1.02	.188 4.78	1218377-2[1]	1218381-2
3	25	040 1.02	.188 4.78	1218377-3[1]	1218381-3
4	37	.040 1.02	.188 4.78	1218377-4[1]	1218381-4
5	50	.040 1.02	.188 4.78	1218377-5[1]	1218381-5

1 See Tin Plated finish above.
2 See Tin Plated RoHS compliant finish above.
3 See Zinc Plated RoHS compliant finish above.

Catalog 1308940
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Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Straight PCB, Series 109, Make First/Break Last Sub-D Connectors (Industrial Grade)

Material and Finish

Shell — Steel, cadmium or tin plated

Insert — Polyester per MIL-M-24519

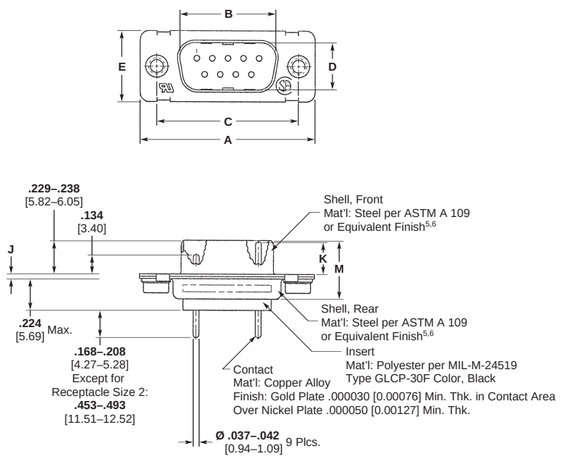
Contact — Copper alloy with .000030 [0.00076] min. gold plate over .000050 [0.00127] min. nickel underplate

[3] **Regular Length Contact Location:** 1, 6, and 9

[4] **Short Length Contact Location:** 2 thru 5, 7, and 8

[5] **Finish** — Cadmium per QQ-P-416

[6] **Finish** — Tin plated per MIL-T-10727



MS Shell Size	Connector Style	Dimensions									
		A	B	C	D	E	G	H	J	K	M
1	Plug	**1.213** 30.81	**.666** 16.92	**.984** 24.99	**.329** 8.36	**.494** 12.55	**.759** 19.28	**.422** 10.72	**.020/.040** 0.51/1.02	**.223** 5.66	**.412/.432** 10.46/10.97
	Receptacle	**1.213** 30.81	**.643** 16.33	**.984** 24.99	**.311** 7.90	**.494** 12.55	**.759** 19.28	**.422** 10.72	**.238/.248** 6.05/6.30	**.178** 4.52	**.419/.439** 10.64/11.15
2	Receptacle	**1.541** 39.14	**.971** 24.66	**1.312** 33.32	**.311** 7.90	**.494** 12.55	**1.083** 27.51	**.422** 10.72	**.238/.248** 6.05/6.30	**.178** 4.52	**.419/.439** 10.64/11.15
3	Plug	**2.088** 53.04	**1.534** 38.96	**1.852** 47.04	**.329** 8.36	**.494** 12.55	**1.625** 41.28	**.422** 10.72	**.029/.049** 0.74/1.24	**.217** 5.51	**.416/.435** 10.57/11.07

Plug Assemblies

Shell Size	No. Pos.	Post Dia.	Plug Part Number	
			Tin Plated Shells	Cadmium Plated Shells
1	9	**.037/.043** 0.94/1.09	443638-2	443638-1
3	25	**.037/.043** 0.94/1.09	443631-2	443631-1

Receptacle Assemblies

Shell Size	No. Pos.	Post Dia.	Plug Part Number	
			Tin Plated Shells	Cadmium Plated Shells
1	9	**.037/.043** 0.94/1.09	443637-2	443637-1
2	15	**.037/.043** 0.94/1.09	443646-2	443646-1

Catalog 1308940
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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Right-Angle, PCB Plugs, Series 109, Standard Density Connectors (MIL Qualified)

Material and Finish

Shell — Steel, cadmium plated

Insert and Post Spacer — Approved material per MIL-DTL-24308

Contact — Copper alloy with .000050 [0.00127] min. gold plate over .000050 [0.00127] min. nickel underplate

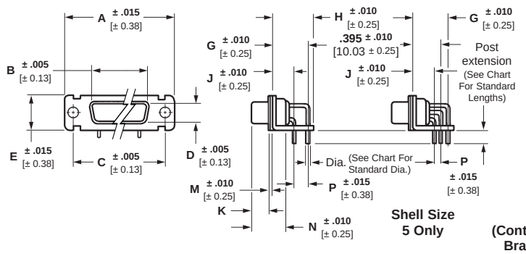
Related Product Data

Cavity Identification — page 5-176

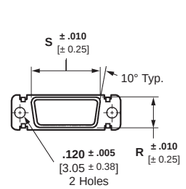
Mounting, Mating Specifications — page 5-226

Accessories — pages 5-231 to 5-233

PCB Layouts — See page 5-227 or Tyco Electronics customer drawing.



Shell Size 5 Only



Rear View (Contacts, Inserts & Right-Angle Brackets Omitted for Clarity)

MS Shell Size	Connector Style	Dimensions													
		A	B	C	D	E	G	H	J	K	M	N	P	R	S
1	Plug	**1.213** 30.81	**.666** 16.92	**.984** 24.99	**.329** 8.36	**.494** 12.55	**.395** 10.03	**.484** 12.29	**.283** 7.19	**.238/.229** 6.04/5.81	**.030** 0.76	**.422** 10.72	**.112** 2.84	**.422** 10.72	**.759** 19.28
2	Plug	**1.541** 39.14	**.994** 25.25	**1.312** 33.33	**.329** 8.36	**.494** 12.55	**.395** 10.03	**.484** 12.29	**.283** 7.19	**.238/.229** 6.04/5.81	**.030** 0.76	**.422** 10.72	**.112** 2.84	**.422** 10.72	**1.083** 27.51
3	Plug	**2.088** 53.04	**1.534** 38.96	**1.852** 47.04	**.329** 8.36	**.494** 12.55	**.395** 10.03	**.484** 12.29	**.283** 7.19	**.236/.224** 5.99/5.68	**.039** 0.99	**.426** 10.82	**.112** 2.84	**.422** 10.72	**1.625** 29.59
4	Plug	**2.729** 69.32	**2.182** 55.42	**2.500** 63.5	**.329** 8.36	**.494** 12.55	**.395** 10.03	**.484** 12.29	**.283** 7.19	**.236/.224** 5.99/5.68	**.039** 0.99	**.426** 10.82	**.112** 2.84	**.422** 10.72	**2.272** 57.71
5	Plug	**2.635** 66.93	**2.079** 52.81	**2.406** 61.11	**.441** 10.44	**.605** 15.37	**.507** 12.88	**.594** 15.09	**.283** 7.19	**.236/.224** 5.99/5.68	**.039** 0.99	**.426** 10.82	**.112** 2.84	**.534** 13.56	**2.178** 55.32

Plug Assemblies — .030 [0.76] Post Dia.

Shell Size	No. Pos.	Post Ext. ± .020 [± 0.51]	Military Part No. M24308/	AMP Part No.
1	9	**.125** 3.18	24-25F	1218440-1
2	15	**.125** 3.18	24-26F	1218440-2
3	25	**.125** 3.18	24-27F	1218440-3
4	37	**.125** 3.18	24-28F	1218440-4
5	50	**.125** 3.18	24-29F	1218440-5
1	9	**.156** 3.96	24-31F	1218441-1
2	15	**.156** 3.96	24-32F	1218441-2
3	25	**.156** 3.96	24-33F	1218441-3
4	37	**.156** 3.96	24-34F	1218441-4
5	50	**.156** 3.96	24-35F	1218441-5
1	9	**.188** 4.78	24-49F	1218444-1
2	15	**.188** 4.78	24-50F	1218444-2
3	25	**.188** 4.78	24-51F	1218444-3
4	37	**.188** 4.78	24-52F	1218444-4
5	50	**.188** 4.78	24-53F	1218444-5

Plug Assemblies — .040 [1.02] Post Dia.

Shell Size	No. Pos.	Post Ext. ± .020 [± 0.51]	Military Part No. M24308/	AMP Part No.
1	9	**.125** 3.18	24-37F	1218442-1
2	15	**.125** 3.18	24-38F	1218442-2
3	25	**.125** 3.18	24-39F	1218442-3
4	37	**.125** 3.18	24-40F	1218442-4
5	50	**.125** 3.18	24-41F	1218442-5
1	9	**.156** 3.96	24-43F	1218443-1
2	15	**.156** 3.96	24-44F	1218443-2
3	25	**.156** 3.96	24-45F	1218443-3
4	37	**.156** 3.96	24-46F	1218443-4
5	50	**.156** 3.96	24-47F	1218443-5
1	9	**.188** 4.78	24-55F	1218445-1
2	15	**.188** 4.78	24-56F	1218445-2
3	25	**.188** 4.78	24-57F	1218445-3
4	37	**.188** 4.78	24-58F	1218445-4
5	50	**.188** 4.78	24-59F	1218445-5

Note: The suffix "F" on M24308 part numbers designates cadmium shell plating.

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

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Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Right-Angle, PCB Receptacles, Series 109, Standard Density Connectors (MIL Qualified)

Material and Finish

Shell — Steel, cadmium plated

Insert and Post Spacer — Approved material per MIL-DTL-24308

Contacts —

Socket Body — Copper alloy with .000050 [0.00127] min. gold plate over .000050 [0.00127] min. nickel underplate

Mating Area — Copper alloy with .000050 [0.00127] min. gold plate over .000050 [0.00127] min. nickel underplate

Related Product Data

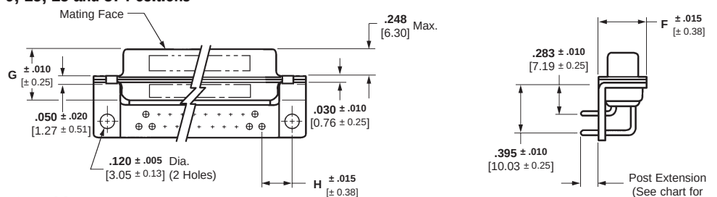
Cavity Identification — page 5-176

Mounting, Mating Specifications — page 5-226

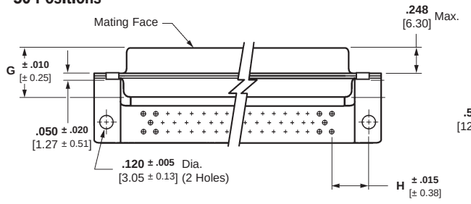
Accessories — pages 5-231 to 5-233

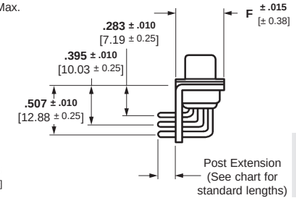
PCB Layouts — See page 5-227 or Tyco Electronics customer drawing.

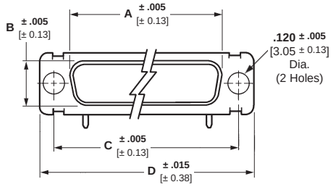
9, 15, 25 and 37 Positions



50 Positions







Receptacle Assemblies

No. of Contact Pos. (Shell Size)	Dimensions						
	A (Outside)	B (Outside)	C	D	F	G	H
9 (1)	**.643** 16.33	**.311** 7.9	**.984** 24.99	**1.213** 30.81	**.494** 12.55	**.429** 10.97	**.276** 7.01
15 (2)	**.971** 24.66	**.311** 7.9	**1.312** 33.32	**1.541** 39.14	**.494** 12.55	**.429** 10.97	**.278** 7.06
25 (3)	**1.511** 38.38	**.311** 7.9	**1.852** 47.04	**2.088** 53.04	**.494** 12.55	**.429** 10.97	**.274** 6.96
37 (4)	**2.159** 54.84	**.311** 7.9	**2.500** 63.5	**2.729** 69.32	**.494** 12.55	**.429** 10.97	**.272** 6.91
50 (5)	**2.064** 52.43	**.423** 10.74	**2.406** 61.11	**2.635** 66.93	**.605** 15.37	**.429** 10.97	**.333** 8.46

Receptacle Assemblies — .030 [0.76] Post Dia.

Shell Size	No. Pos.	Post Ext. ± .020 [± 0.51]	Military Part No. M24308/	AMP Part No.
1	9	**.125** 3.18	23-25F	1218434-1
2	15	**.125** 3.18	23-26F	1218434-2
3	25	**.125** 3.18	23-27F	1218434-3
4	37	**.125** 3.18	23-28F	1218434-4
5	50	**.125** 3.18	23-29F	1218434-5
1	9	**.156** 3.96	23-31F	1218408-1
2	15	**.156** 3.96	23-32F	1218408-2
3	25	**.156** 3.96	23-33F	1218408-3
4	37	**.156** 3.96	23-34F	1218408-4
5	50	**.156** 3.96	23-35F	1218408-5
1	9	**.188** 4.78	23-49F	1218437-1
2	15	**.188** 4.78	23-50F	1218437-2
3	25	**.188** 4.78	23-51F	1218437-3
4	37	**.188** 4.78	23-52F	1218437-4
5	50	**.188** 4.78	23-53F	1218437-5

Receptacle Assemblies — .040 [1.02] Post Dia.

Shell Size	No. Pos.	Post Ext. ± .020 [± 0.51]	Military Part No. M24308/	AMP Part No.
1	9	**.125** 3.18	23-37F	1218435-1
2	15	**.125** 3.18	23-38F	1218435-2
3	25	**.125** 3.18	23-39F	1218435-3
4	37	**.125** 3.18	23-40F	1218435-4
5	50	**.125** 3.18	23-41F	1218435-5
1	9	**.156** 3.96	23-43F	1218436-1
2	15	**.156** 3.96	23-44F	1218436-2
3	25	**.156** 3.96	23-45F	1218436-3
4	37	**.156** 3.96	23-46F	1218436-4
5	50	**.156** 3.96	23-47F	1218436-5
1	9	**.188** 4.78	23-55F	1218438-1
2	15	**.188** 4.78	23-56F	1218438-2
3	25	**.188** 4.78	23-57F	1218438-3
4	37	**.188** 4.78	23-58F	1218438-4
5	50	**.188** 4.78	23-59F	1218438-5

Note: The suffix "F" on M24308 part numbers designates cadmium shell plating.

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Right-Angle, PCB Plugs, Series 109, Standard Density Connectors (Industrial Grade)

Material and Finish

Shell — Steel, see below

[1] **Tin Plated Finish** — Tin or tin-lead .000200–.000400 [0.00508–0.01016] thick over .000100–.000200 [0.00254–0.00508] copper

[2] **Tin Plated RoHS Compliant Finish** — Tin .000200–.000400 [0.00508–0.01016] thick over .000100–.000200 [0.00254–0.00508] copper

[3] **Zinc Plated RoHS Compliant Finish** — Zinc .000200–.000400 [0.00508–0.01016] thick, yellow trivalent chromate

Insert and Post Spacer — Approved material per MIL-DTL-24308

Contact — Copper alloy with .000050 [0.00127] min. gold plate over .000050 [0.00127] min. nickel underplate

Related Product Data

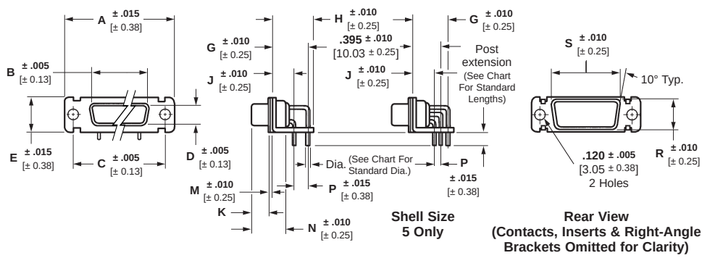
Cavity Identification — page 5-176

Mounting, Mating Specifications — page 5-226

Accessories — pages 5-231 to 5-233

PCB Layouts — See page 5-227 or Tyco Electronics customer drawing.

Product Specification — 108-1770



Shell Size 5 Only

Rear View (Contacts, Inserts & Right-Angle Brackets Omitted for Clarity)

MS Shell Size	Connector Style	Dimensions													
		A	B	C	D	E	G	H	J	K	M	N	P	R	S
1	Plug	**1.213** 30.81	**.666** 16.92	**.984** 24.99	**.329** 8.36	**.494** 12.55	**.395** 10.03	**.484** 12.29	**.283** 7.19	**.238/.229** 6.04/5.81	**.030** 0.76	**.422** 10.72	**.112** 2.84	**.422** 10.72	**.759** 19.28
2	Plug	**1.541** 39.14	**.994** 25.25	**1.312** 33.33	**.329** 8.36	**.494** 12.55	**.395** 10.03	**.484** 12.29	**.283** 7.19	**.238/.229** 6.04/5.81	**.030** 0.76	**.422** 10.72	**.112** 2.84	**.422** 10.72	**1.083** 27.51
3	Plug	**2.088** 53.04	**1.534** 38.96	**1.852** 47.04	**.329** 8.36	**.494** 12.55	**.395** 10.03	**.484** 12.29	**.283** 7.19	**.236/.224** 5.99/5.68	**.039** 0.99	**.426** 10.82	**.112** 2.84	**.422** 10.72	**1.625** 29.59
4	Plug	**2.729** 69.32	**2.182** 55.42	**2.500** 63.5	**.329** 8.36	**.494** 12.55	**.395** 10.03	**.484** 12.29	**.283** 7.19	**.236/.224** 5.99/5.68	**.039** 0.99	**.426** 10.82	**.112** 2.84	**.422** 10.72	**2.272** 57.71
5	Plug	**2.635** 66.93	**2.079** 52.81	**2.406** 61.11	**.441** 10.44	**.605** 15.37	**.507** 12.88	**.594** 15.09	**.283** 7.19	**.236/.224** 5.99/5.68	**.039** 0.99	**.426** 10.82	**.112** 2.84	**.534** 13.56	**2.178** 55.32

Plug Assemblies — .030 [0.76] Post Dia.

Shell Size	No. Pos.	Post Ext. ± .020 [± 0.51]	Part Number	
			Tin Plated Shells[1]	Zinc Plated RoHS Shells[3]
1	9	**.125** 3.18	1218830-1	1218831-1
2	15	**.125** 3.18	1218830-2	1218831-2
3	25	**.125** 3.18	1218830-3	1218831-3
4	37	**.125** 3.18	1218830-4	1218831-4
5	50	**.125** 3.18	1218830-5	1218831-5
1	9	**.156** 3.96	1218832-1	1218833-1
2	15	**.156** 3.96	1218832-2	1218833-2
3	25	**.156** 3.96	1218832-3	1218833-3
4	37	**.156** 3.96	1218832-4	1218833-4
5	50	**.156** 3.96	1218832-5	1218833-5
1	9	**.188** 4.78	1218838-1	1218839-1
2	15	**.188** 4.78	1218838-2	1218839-2
3	25	**.188** 4.78	1218838-3	1218839-3
4	37	**.188** 4.78	1218838-4	1218839-4
5	50	**.188** 4.78	1218838-5	1218839-5

1 See Tin Plated finish above.
3 See Zinc Plated RoHS compliant finish above.

Plug Assemblies — .040 [1.02] Post Dia.

Shell Size	No. Pos.	Post Ext. ± .020 [± 0.51]	Part Number	
			Tin Plated Shells	Zinc Plated RoHS Shells[3]
1	9	**.125** 3.18	1218834-1[1]	1218835-1
2	15	**.125** 3.18	1218834-2[1]	1218835-2
3	25	**.125** 3.18	1218834-3[1]	1218835-3
4	37	**.125** 3.18	1218834-4[1] 5-1218834-4[2]	1218835-4
5	50	**.125** 3.18	1218834-5[1]	1218835-5
1	9	**.156** 3.96	1218836-1[1]	1218837-1
2	15	**.156** 3.96	1218836-2[1]	1218837-2
3	25	**.156** 3.96	1218836-3[1]	1218837-3
4	37	**.156** 3.96	1218836-4[1]	1218837-4
5	50	**.156** 3.96	1218836-5[1]	1218837-5
1	9	**.188** 4.78	1218840-1[1]	1218841-1
2	15	**.188** 4.78	1218840-2[1]	1218841-2
3	25	**.188** 4.78	1218840-3[1]	1218841-3
4	37	**.188** 4.78	1218840-4[1]	1218841-4
5	50	**.188** 4.78	1218840-5[1]	1218841-5

1 See Tin Plated finish above.
2 See Tin Plated RoHS compliant finish above.
3 See Zinc Plated RoHS compliant finish above.

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

Right-Angle, PCB Receptacles, Series 109, Standard Density Connectors (Industrial Grade)

Material and Finish

Shell — Steel, see following page for finish options

Insert and Post Spacer — Approved material per MIL-DTL-24308

Contacts —

Socket Body — Copper alloy with .000050 [0.00127] min. gold plate over .000050 [0.00127] min. nickel underplate

[a]**Mating Area** — Copper alloy with .000050 [0.00127] min. gold plate over .000050 [0.00127] min. nickel underplate

[b]**Mating Area** — Copper alloy with .000030 [0.00076] min. gold plate over .000050 [0.00127] min. nickel underplate

Related Product Data

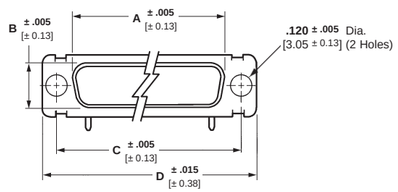
Cavity Identification — page 5-176

Mounting, Mating Specifications — page 5-226

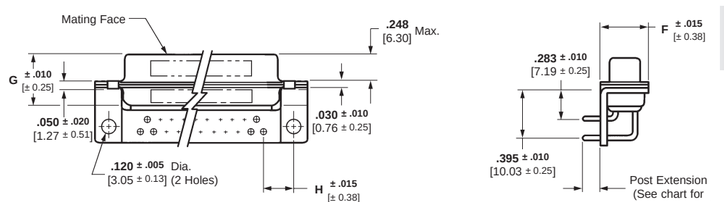
Accessories — pages 5-231 to 5-233

PCB Layouts — See page 5-227 or Tyco Electronics customer drawing.

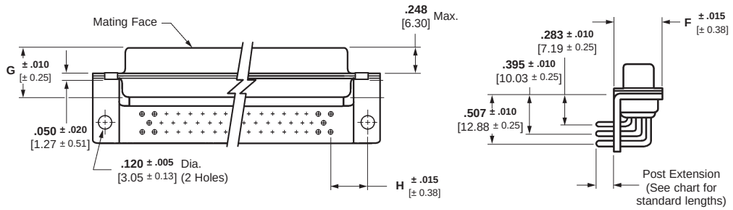
Product Specification — 108-1770



9, 15, 25 and 37 Positions



50 Positions



Receptacle Assemblies

No. of Contact Pos. (Shell Size)	Dimensions						
	A (Outside)	B (Outside)	C	D	F	G	H
9 (1)	**.643** 16.33	**.311** 7.9	**.984** 24.99	**1.213** 30.81	**.494** 12.55	**.429** 10.97	**.276** 7.01
15 (2)	**.971** 24.66	**.311** 7.9	**1.312** 33.32	**1.541** 39.14	**.494** 12.55	**.429** 10.97	**.278** 7.06
25 (3)	**1.511** 38.38	**.311** 7.9	**1.852** 47.04	**2.088** 53.04	**.494** 12.55	**.429** 10.97	**.274** 6.96
37 (4)	**2.159** 54.84	**.311** 7.9	**2.500** 63.5	**2.729** 69.32	**.494** 12.55	**.429** 10.97	**.272** 6.91
50 (5)	**2.064** 52.43	**.423** 10.74	**2.406** 61.11	**2.635** 66.93	**.605** 15.37	**.429** 10.97	**.333** 8.46

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UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Right-Angle, PCB Receptacles, Series 109, Standard Density Connectors (Industrial Grade) (Continued)

Material and Finish

Shell — Steel

Insert and Post Spacer — Approved material per MIL-DTL-24308

Contacts —

Socket Body — Copper alloy with .000050 [0.00127] min. gold plate over .000050 [0.00127] min. nickel underplate

[a]**Mating Area** — Copper alloy with .000050 [0.00127] min. gold plate over .000050 [0.00127] min. nickel underplate

[b]**Mating Area** — Copper alloy with .000030 [0.00076] min. gold plate over .000050 [0.00127] min. nickel underplate

Related Product Data

Cavity Identification — page 5-176

Mounting, Mating Specifications — page 5-226

Accessories — pages 5-231 to 5-233

PCB Layouts — See page 5-227 or Tyco Electronics customer drawing.

Product Specification — 108-1770

Receptacle Assemblies — .030 [0.76] Post Dia.

Shell Size	No. Pos.	Post Ext. ± .020 [± 0.51]	Part Number		
			Tin Plated Shells[b]	Tin Plated Shells[a]	Zinc Plated Shells[a]
1	9	**.125** 3.18	1218842-1	1218844-1	1218843-1
2	15	**.125** 3.18	1218842-2	1218844-2	1218843-2
3	25	**.125** 3.18	1218842-3	1218844-3	1218843-3
4	37	**.125** 3.18	1218842-4	1218844-4	1218843-4
5	50	**.125** 3.18	1218842-5	1218844-5	1218843-5
1	9	**.156** 3.96	1218845-1	1218847-1	1218846-1
2	15	**.156** 3.96	1218845-2	1218847-2	1218846-2
3	25	**.156** 3.96	1218845-3	1218847-3	1218846-3
4	37	**.156** 3.96	1218845-4	1218847-4	1218846-4
5	50	**.156** 3.96	1218845-5	1218847-5	1218846-5
1	9	**.188** 4.78	1218854-1	1218856-1	1218855-1
2	15	**.188** 4.78	1218854-2	1218856-2	1218855-2
3	25	**.188** 4.78	1218854-3	1218856-3	1218855-3
4	37	**.188** 4.78	1218854-4	1218856-4	1218855-4
5	50	**.188** 4.78	1218854-5	1218856-5	1218855-5

Receptacle Assemblies — .040 [1.02] Post Dia.

Shell Size	No. Pos.	Post Ext. ± .020 [± 0.51]	Part Number		
			Tin Plated Shells[b]	Tin Plated Shells[a]	Zinc Plated Shells[a]
1	9	**.125** 3.18	1218848-1	1218850-1	1218849-1
2	15	**.125** 3.18	1218848-2	1218850-2	1218849-2
3	25	**.125** 3.18	1218848-3	1218850-3	1218849-3
4	37	**.125** 3.18	1218848-4	1218850-4	1218849-4
5	50	**.125** 3.18	1218848-5	1218850-5	1218849-5
1	9	**.156** 3.96	1218851-1	1218853-1	1218852-1
2	15	**.156** 3.96	1218851-2	1218853-2	1218852-2
3	25	**.156** 3.96	1218851-3	1218853-3	1218852-3
4	37	**.156** 3.96	1218851-4	1218853-4	1218852-4
5	50	**.156** 3.96	1218851-5	1218853-5	1218852-5
1	9	**.188** 4.78	1218857-1	1218859-1	1218858-1
2	15	**.188** 4.78	1218857-2	1218859-2	1218858-2
3	25	**.188** 4.78	1218857-3	1218859-3	1218858-3
4	37	**.188** 4.78	1218857-4	1218859-4	1218858-4
5	50	**.188** 4.78	1218857-5	1218859-5	1218858-5

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UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Right-Angle, PCB Plugs, Series 109, with One Piece Insert (Industrial Grade)

Material and Finish

Shell — Steel, see below

[1] **Tin Plated Finish** — Tin or tin-lead .000200–.000400 [0.00508–0.01016] thick over .000100–.000200 [0.00254–0.00508] copper

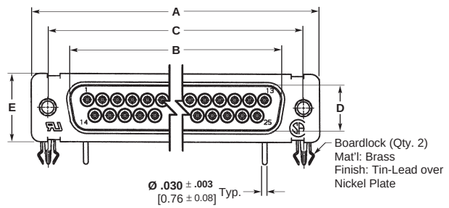
[2] **Zinc Plated RoHS Compliant Finish** — Zinc .000200–.000400 [0.00508–0.01016] thick, yellow trivalent chromate

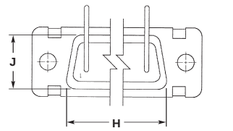
Insert — Thermoplastic

Contact Material — Brass or Beryllium copper

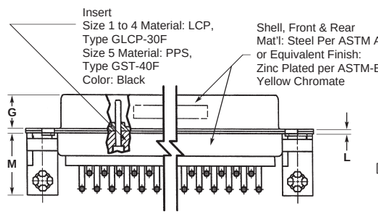
Contact Finish — Gold with .000010 [0.00025] min. gold plate over .000050 [0.00127] min. nickel underplate

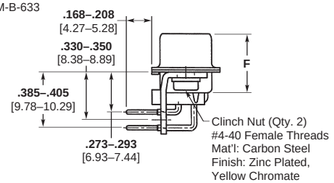
Interfacial Seal — Fluorosilicone

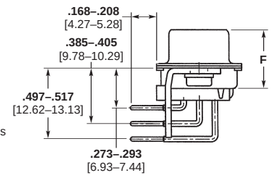


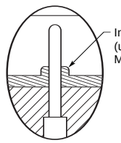


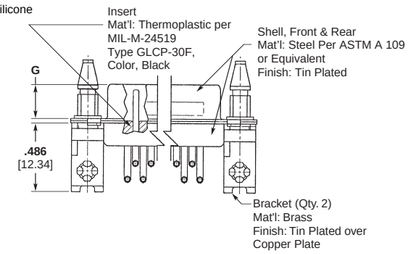
3 and 5 Positions (with Interfacial Seal)

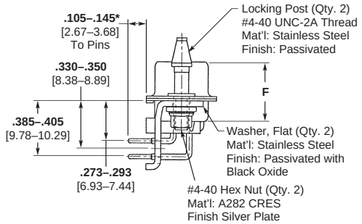












*Signal Contacts are solder dipped with SnPb 63/37 to meet the requirements of MIL-DTL-24308, method 208.

MS Shell Size	Connector Style	Dimensions										
		A	B	C	D	E	F	G	H	J	L	M
1	Plug	**1.198/1.228** 30.43/31.19	**.661/.671** 16.21/16.46	**.979/.989** 24.87/25.12	**.324/.334** 8.23/8.48	**.479/.509** 12.17/12.93	**.412/.432** 10.46/10.97	**.229/.238** 5.82/6.05	**.749/.769** 19.02/19.53	**.412/.432** 10.46/10.97	**.020/.040** 0.51/1.02	—
3	Plug	**2.073/2.103** 52.65/53.42	**1.529/1.539** 38.25/38.51	**1.847/1.857** 46.91/47.17	**.324/.334** 8.23/8.48	**.479/.509** 12.17/12.93	**.416/.436** 10.57/11.07	**.224/.236** 5.69/5.99	**1.615/1.635** 41.02/41.53	**.412/.432** 10.46/10.97	**.029/.049** 0.74/1.24	**.435/.443** 11.05/11.25
5	Plug	**2.620/2.650** 66.55/67.31	**2.074/2.084** 52.30/52.55	**2.401/2.411** 60.99/61.24	**.436/.446** 11.07/11.33	**.590/.620** 14.99/15.75	**.416/.436** 10.57/11.07	**.224/.236** 5.69/5.99	**2.168/2.188** 55.07/55.58	**.524/.544** 13.31/13.82	**.029/.049** 0.74/1.24	**.490/.498** 12.45/12.65

Plug Assemblies — .030 [0.76] Post Dia.

Shell Size	No. Pos.	With interfacial Seal	Part Number	
			Tin Plated Shells[1]	Zinc Plated RoHS Shells[2]
1	9	No	1218606-6	—
3	25	Yes	—	1218538-3
5	50	Yes	—	1218538-5

[1] See Material and Finish above.
[2] See RoHS compliant Material and Finish above.

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Right-Angle, PCB Receptacles, Series 109, with One Piece Insert (Industrial Grade)

Material and Finish

Shell — Steel, tin plated

[1] Tin Plated Finish — Tin or tin-lead .000200–.000400 [0.00508–0.01016] thick over .000100–.000200 [0.00254–0.00508] copper

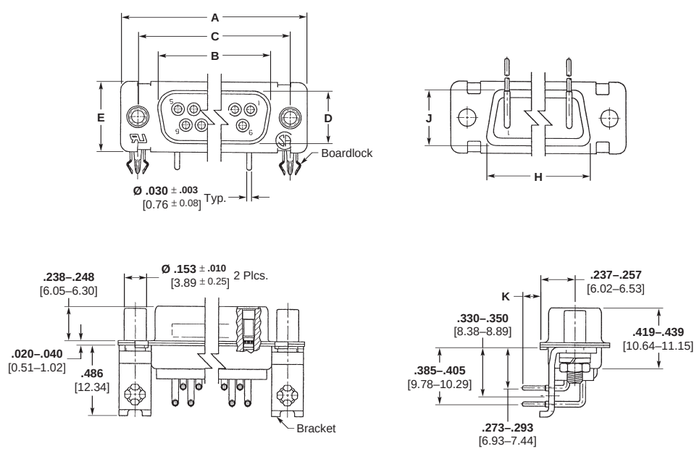
[2] Tin Plated RoHS Compliant Finish — Tin .000200–.000400 [0.00508–0.01016] thick over .000100–.000200 [0.00254–0.00508] copper

Insert — Thermoplastic

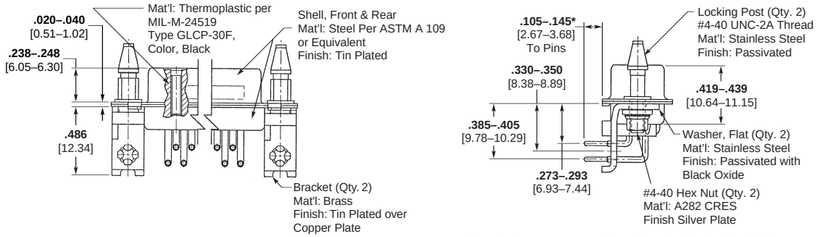
Contact Material — Brass or Beryllium copper

Contact Finish — Gold with .000010 [0.00025] min. gold over .000050 [0.00127] min. nickel underplate

9 Position



9 Position (with Locking Post)



*Signal Contacts are solder dipped with SnPb 63/37 to meet the requirements of MIL-DTL-24308, method 208.

MS Shell Size	Connector Style	Dimensions								Part Number
		A	B	C	D	E	H	J	K	
1	Receptacle	**1.198/1.228** 30.43/31.19	**.638/.648** 16.21/16.46	**.979/.989** 24.87/25.12	**.306/.316** 7.77/8.03	**.479/.509** 12.17/12.93	**.749/.769** 19.02/19.53	**.412/.432** 10.46/10.97	**.105/.145** 2.67/3.68	1218665-1[1] 5-1218665-1[2]
									.136/.176 3.45/4.47	1218665-6[1]
							.749/.769 19.02/19.53	**.412/.432** 10.46/10.97	—	1218607-6[1]

[1] See Material and Finish above.
[2] See RoHS compliant Material and Finish above.

Catalog 1308940
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Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 109 (Continued)

Solder Cup, Series 109, Standard Density Connectors

Material and Finish

Shell — Steel or brass, cadmium plated

Insert — Approved material per MIL-DTL-24308

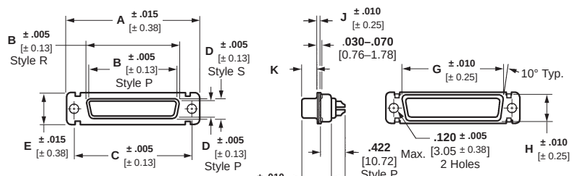
Contact — Copper alloy, plated gold over copper underplate

Related Product Data

Cavity Identification — page 5-176

Mounting, Mating Specifications — page 5-226

Accessories — pages 5-231 to 5-233



Standard Shell

Rear View

MS Shell Size	Connector Style	Dimensions									
		A	B	C	D	E	G	H	J	K	M
1	Plug	**1.213** 30.81	**.666** 16.92	**.984** 24.99	**.329** 8.36	**.494** 12.55	**.759** 19.28	**.422** 10.72	**.030** 0.76	**.238/.229** 6.09/5.81	**.422** 10.72
	Receptacle	**1.213** 30.81	**.643** 16.33	**.984** 24.99	**.311** 7.90	**.494** 12.55	**.759** 19.28	**.422** 10.72	**.030** 0.76	**.248/.238** 6.29/6.09	**.429** 10.90
2	Plug	**1.541** 39.14	**.994** 25.25	**1.312** 33.32	**.329** 8.36	**.494** 12.55	**1.083** 27.51	**.422** 10.72	**.030** 0.76	**.238/.229** 6.09/5.81	**.422** 10.72
	Receptacle	**1.541** 39.14	**.971** 24.66	**1.312** 33.32	**.311** 7.90	**.494** 12.55	**1.083** 27.51	**.422** 10.72	**.030** 0.76	**.248/.238** 6.29/6.09	**.429** 10.90
3	Plug	**2.088** 53.04	**1.534** 38.96	**1.852** 47.04	**.329** 8.36	**.494** 12.55	**1.625** 41.28	**.422** 10.72	**.039** 0.99	**.236/.224** 5.99/5.68	**.426** 10.82
	Receptacle	**2.088** 53.04	**1.511** 38.38	**1.852** 47.04	**.311** 7.90	**.494** 12.55	**1.625** 41.28	**.422** 10.72	**.030** 0.76	**.248/.238** 6.29/6.09	**.429** 10.90
4	Plug	**2.729** 69.32	**2.182** 55.42	**2.500** 63.5	**.329** 8.36	**.494** 12.55	**2.272** 57.71	**.422** 10.72	**.039** 0.99	**.236/.224** 5.99/5.68	**.426** 10.82
	Receptacle	**2.729** 69.32	**2.159** 54.84	**2.500** 63.5	**.311** 7.90	**.494** 12.55	**2.272** 57.71	**.422** 10.72	**.030** 0.76	**.248/.238** 6.29/6.09	**.429** 10.90
5	Plug	**2.635** 66.93	**2.079** 52.81	**2.406** 61.11	**.441** 11.20	**.605** 15.37	**2.178** 55.32	**.534** 13.56	**.039** 0.99	**.236/.224** 5.99/5.68	**.426** 10.82
	Receptacle	**2.635** 66.93	**2.064** 52.43	**2.406** 61.11	**.423** 10.74	**.605** 15.37	**2.178** 55.32	**.534** 13.55	**.030** 0.76	**.248/.238** 6.29/6.09	**.429** 10.90

Solder Cup Assemblies

Steel Shells

Contact Style	Shell Size	No. Pos.	Mount	Military Part No. M24308/	AMP Part No.
Receptacle	1	9	Std.	1-1F	593007-1
	2	15	Std.	1-2F	593007-2
	3	25	Std.	1-3F	593007-3
	4	37	Std.	1-4F	593007-4
	5	50	Std.	1-5F	593007-5
Receptacle	1	9	F/F	1-12F	593008-1
	2	15	F/F	1-13F	593008-2
	3	25	F/F	1-14F	593008-3
	4	37	F/F	1-15F	593008-4
	5	50	F/F	1-16F	593008-5
Receptacle	1	9	D/F	1-23F	593009-1
	2	15	D/F	1-24F	593009-2
	3	25	D/F	1-25F	593009-3
	4	37	D/F	1-26F	593009-4
	5	50	D/F	1-27F	593009-5
Plug	1	9	Std.	3-1F	593002-1
	2	15	Std.	3-2F	593002-2
	3	25	Std.	3-3F	593002-3
	4	37	Std.	3-4F	593002-4
	5	50	Std.	3-5F	593002-5
Plug	1	9	F/F	3-12F	593004-1
	2	15	F/F	3-13F	593004-2
	3	25	F/F	3-14F	593004-3
	4	37	F/F	3-15F	593004-4
	5	50	F/F	3-16F	593004-5

Brass Shells (Non-Magnetic)

Contact Style	Shell Size	No. Pos.	Mount	Military Part No. M24308/	AMP Part No.
Receptacle	1	9	Std.	5-1F	593036-1
	2	15	Std.	5-2F	593036-2
	3	25	Std.	5-3F	593036-3
	4	37	Std.	5-4F	593036-4
	5	50	Std.	5-5F	593036-5
Receptacle	1	9	F/F	5-12F	593037-1
	2	15	F/F	5-13F	593037-2
	3	25	F/F	5-14F	593037-3
	4	37	F/F	5-15F	593037-4
	5	50	F/F	5-16F	593037-5
Receptacle	1	9	D/F	5-23F	593038-1
	2	15	D/F	5-24F	593038-2
	3	25	D/F	5-25F	593038-3
	4	37	D/F	5-26F	593038-4
	5	50	D/F	5-27F	593038-5
Plug	1	9	Std.	7-1F	593057-1
	2	15	Std.	7-2F	593057-2
	3	25	Std.	7-3F	593057-3
	4	37	Std.	7-4F	593057-4
	5	50	Std.	7-5F	593057-5
Plug	1	9	F/F	7-12F	593058-1
	2	15	F/F	7-13F	593058-2
	3	25	F/F	7-14F	593058-3
	4	37	F/F	7-15F	593058-4
	5	50	F/F	7-16F	593058-5

Mounting Abbreviations: Std. = Standard, F/F = Front Float, D/F - Dual Float

Note: The suffix "F" on M24308 part numbers designates cadmium shell plating.

Catalog 1308940
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AMPLIMITE Connectors, Series 109 (Continued)

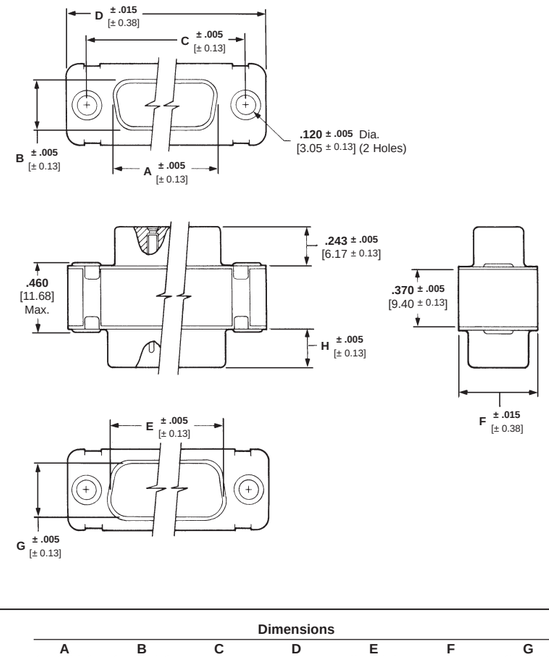
Connector Savers, Series 109, Standard Density

Connector savers prolong the life of permanently installed connectors which would otherwise be subjected to repeated cycles of mating and unmating, in applications such as test interfaces or on testing devices.

Material and Finish

Standard —
Shell — Steel, cadmium plated
Contact Body — Beryllium copper with .000050 [0.00127] min. gold plate over .000050 [0.00127] min. nickel underplate
Socket Hood — Passivated stainless steel
Insert — Glass filled polyester
Spacer — Black nylon

Non Magnetic —
Shell — Brass, gold plated
Contact Body — Beryllium copper with .000050 [0.00127] min. gold plate over .000100 [0.00254] min. copper underplate
Socket Hood — Brass with .000050 [0.00127] min. gold over .000100 [0.00254] min. copper underplate
Insert — Glass filled polyester
Spacer — Black nylon



No. of Contact Pos. (Shell Size)	Dimensions							
	A (outside)	B (outside)	C	D	E (inside)	F	G (inside)	H
9 (1)	**.643** 16.33	**.311** 7.9	**.984** 24.99	**1.213** 30.81	**.666** 16.92	**.494** 12.55	**.329** 8.36	**.235** 5.97
15 (2)	**.971** 24.66	**.311** 7.9	**1.312** 33.32	**1.541** 39.14	**.994** 25.25	**.494** 12.55	**.329** 8.36	**.235** 5.97
25 (3)	**1.511** 38.38	**.311** 7.9	**1.852** 47.04	**2.088** 53.04	**1.534** 38.96	**.494** 12.55	**.329** 8.36	**.230** 5.84
37 (4)	**2.159** 54.84	**.311** 7.9	**2.500** 63.5	**2.729** 69.32	**2.182** 55.42	**.494** 12.55	**.329** 8.36	**.230** 5.84
50 (5)	**2.064** 52.43	**.423** 10.74	**2.406** 61.11	**2.635** 66.93	**2.079** 52.81	**.605** 15.37	**.441** 11.20	**.230** 5.84

No. of Contact Pos. (Shell Size)	Standard (Cadmium Plated Steel Shell)	Non-Magnetic (Gold Plated Brass Shell)
9 (1)	212559-1	212559-2
15 (2)	212560-1	212560-2
25 (3)	212561-1	212562-2
37 (4)	212562-1	212562-2
50 (5)	212563-1	212563-2

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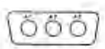
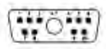
AMPLIMITE Connectors, Coax Mix

Crimp, Power/Coax/Signal Combination Standard Density, Series 109 Connectors

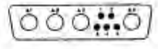


Shell Size	2
Contact Arrangement	3C3[6]
No. of Signal Contacts	0
No. of Coaxial Contacts	3

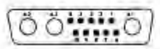


Shell Size	2
Contact Arrangement	11C1
No. of Signal Contacts	10
No. of Coaxial Contacts	1

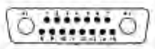
Shell Size	3
Contact Arrangement	5C5
No. of Signal Contacts	0
No. of Coaxial Contacts	5



Shell Size	3
Contact Arrangement	9C4
No. of Signal Contacts	5
No. of Coaxial Contacts	4

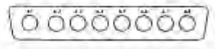


Shell Size	3
Contact Arrangement	13C3
No. of Signal Contacts	10
No. of Coaxial Contacts	3

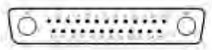


Shell Size	3
Contact Arrangement	17C2
No. of Signal Contacts	15
No. of Coaxial Contacts	2

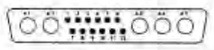
Shell Size	3
Contact Arrangement	21C1
No. of Signal Contacts	20
No. of Coaxial Contacts	1



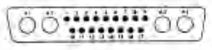
Shell Size	4
Contact Arrangement	8C8
No. of Signal Contacts	0
No. of Coaxial Contacts	8



Shell Size	4
Contact Arrangement	27C2
No. of Signal Contacts	25
No. of Coaxial Contacts	2

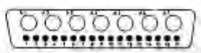


Shell Size	4
Contact Arrangement	17C5
No. of Signal Contacts	12
No. of Coaxial Contacts	5

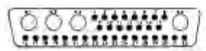


Shell Size	4
Contact Arrangement	21C4
No. of Signal Contacts	17
No. of Coaxial Contacts	4

Shell Size	4
Contact Arrangement	25C3
No. of Signal Contacts	22
No. of Coaxial Contacts	3



Shell Size	5
Contact Arrangement	24C7
No. of Signal Contacts	17
No. of Coaxial Contacts	7



Shell Size	5
Contact Arrangement	36C4
No. of Signal Contacts	32
No. of Coaxial Contacts	4

Material and Finish

Shell — Steel or copper alloy
[a] .000200 [.0000079] min. thick plating.
[b] .000400 [.0000157] min. thick plating.

Plating — Cadmium, tin-lead, tin, gold or zinc

Insert — Approved material per MIL-DTL-24308

Retention Clips — Stainless steel or copper alloy

Contact Selection

Standard:
Size 8 coax: Table I, page 5-203
Size 8 power: page 5-202
Size 20 signal: pages 5-177 to 5-179, 5-183 and 5-184

Insert Arrangement	Standard											
	Cad Plated Steel Shell (.120 Mounting Hole)		RoHS Zinc Plated Steel Shell (.120 Mntg. Hole)		Tin or Tin-Lead Plated Steel Shell (.120 Mntg. Hole)[a]		RoHS Tin Plated Steel Shell (.120 Mntg. Hole)		NASA Gold Plated Brass (.120 Mounting Hole)		NASA Gold Plated Brass (.154 Mounting Hole)	
	Plug (Pin)	Receptacle (Socket)	Plug (Pin)	Receptacle (Socket)	Plug (Pin)	Receptacle (Socket)	Plug (Pin)	Receptacle (Socket)	Plug (Pin)	Receptacle (Socket)	Plug (Pin)	Receptacle (Socket)
3C3	448153-1	445705-4	5-448153-1	5-445705-4	448153-4	445705-1	5-448153-4[a]	5-445705-1[a]	448153-2	445705-2	448153-3	445705-3
11C1	211111-1	211112-1	5-211111-1	5-211112-1	211111-4	211112-4	5-211111-4[a] 211111-6[b]	5-211112-4[a] 211112-6[b]	211111-2	211112-2	211111-3	211112-3
5C5	212491-1	212059-1	5-212491-1	5-212059-1	212491-3	212059-3	5-212491-3[a] 212491-9[b]	5-212059-3[a] 1-212059-9[b]	212491-6	212059-2	212491-7	212059-6
9C4	212498-1	212502-1	5-212498-1	5-212502-1	212498-4	212502-5	5-212498-4[a]	5-212502-5[a]	212498-2	212502-2	212498-3	212502-3
13C3	208810-1	208811-1	5-208810-1	5-208811-1	208810-2	208811-2	5-208810-2[a]	5-208811-2[a]	208810-3	208811-3	208810-4	208811-4
17C2	212506-1	212510-1	5-212506-1	5-212510-1	212506-5	212510-4	5-212506-5[a]	5-212510-4[a]	212506-2	212510-2	212506-4	212510-3
21C1	212522-1	212526-1	5-212522-1	5-212526-1	212522-2	212526-2	5-212522-2[a] 212522-6[b]	5-212526-2[a] 212526-6[b]	212522-3	212526-3	212522-4	212526-4
8C8	446405-1	445730-1	5-446405-1	5-445730-1	446405-4	445730-5	5-446405-4[a]	5-445730-5[a]	446405-2	445730-3	446405-3	445730-4
27C2	212538-1	212542-1	5-212538-1	5-212542-1	212538-4	212542-4	5-212538-4[a]	5-212542-4[a]	212538-2	212542-2	212538-3	212542-3
17C5	212514-1	212518-1	5-212514-1	5-212518-1	212514-5	212518-5	5-212514-5[a]	5-212518-5[a]	212514-3	212518-3	212514-4	212518-4
21C4	212530-1	212534-1	5-212530-1	5-212534-1	212530-4	212534-4	5-212530-4[a] 212530-5[b]	5-212534-4[a] 212534-5[b]	212530-2	212534-2	212530-3	212534-3
25C3	208742-1	208551-1	5-208742-1	5-208551-1	208742-4	208551-4	5-208742-4[a]	5-208551-4[a]	208742-2	208551-2	208742-3	208551-3
24C7	208743-1	208552-1	5-208743-1	5-208552-1	208743-4	208552-4	5-208743-4[a] 208743-5[b]	5-208552-4[a] 208552-6[b]	208743-2	208552-2	208743-6	208552-5
36C4	208744-1	208550-1	5-208744-1	5-208550-1	208744-5	208550-4	5-208744-5[a]	5-208550-4[a]	208744-3	208550-2	208744-4	208550-3

Notes:
1. NASA connectors listed above are qualified to NASA specification 311-P-405. See pages 5-240 and 5-241 for NASA cross reference.
2. Plug insert arrangements shown. Receptacle arrangement is mirror image.
3. Cable clamp/strain relief hardware cannot be used with these arrangements.
4. See pages 5-229 and 5-230 for PCB layouts.
5. The 3C3 arrangement can be mismated 180°. Contact Tyco Electronics or call Technical Support for keyed Part Numbers, 1218654-1 and 1218655-1.
6. All connector plugs with grounding indents except the cadmium plated.

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Crimp, Power/Coax/Signal Combination Standard Density, Series 109 Connectors

(Continued)

Material and Finish

Shell — Steel or copper alloy
[a] .000200 [.0000079] min. thick plating.
[b] .000400 [.0000157] min. thick plating.

Plating — Cadmium, tin-lead, tin, gold or zinc

Insert — Approved material per MIL-DTL-24308

Retention Clips — Stainless steel or copper alloy

Contact Selection

Blindmate:

Size 8 coax: Table II, page 5-204
Size 8 power: page 5-202
Size 20 signal: pages 5-177 to 5-179, 5-183 and 5-184

Insert Arrangement	Blindmate			
	Cad Plated Steel Shell (.120 Mounting Hole)		RoHS Zinc Plated Steel Shell (.120 Mntg. Hole)	
	Plug (Pin)	Receptacle (Socket)	Plug (Pin)	Receptacle (Socket)
3C3	447717-1	447718-1	5-447717-1	5-447718-1
11C1	447721-1	447722-1	5-447721-1	5-447722-1
5C5	446630-1	212049-3	—	5-212049-3
9C4	445701-1	212051-2	—	—
13C3	447723-1	212057-2	5-447723-1	5-212057-2
17C2	447724-1	212053-3	5-447724-1	5-212053-3
21C1	447727-1	212055-2	—	—
8C8	447719-1	447720-1	5-447719-1	5-447720-1
27C2	447732-1	447733-1	—	—
17C5	447725-1	447726-1	—	—
21C4	447728-1	445726-1	—	5-445726-1
25C3	447730-1	447731-1	—	—
24C7	446631-1	445000-2	—	—
36C4	446710-1	446711-1	5-446710-1	5-446711-1

Notes:
1. Plug insert arrangements shown. Receptacle arrangement is mirror image.
2. Cable clamp/strain relief hardware cannot be used with these arrangements.
3. See pages 5-229 and 5-230 for PCB layouts.
4. Blindmate plugs feature a chamfered lead-in on the front shell, which is constructed of aluminum alloy. See page 5-185 for shell dimensions. Blindmate receptacles feature float bushings installed in the mounting holes. See pages 5-180 and 5-181 for shell dimensions.
5. The 3C3 arrangement can be mismated 180°. Contact Tyco Electronics or call Technical Support for keyed Part Numbers, 1218654-1 and 1218655-1.
6. All connector plugs with grounding indents except the cadmium plated.

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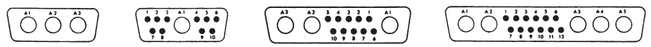
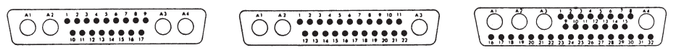
AMPLIMITE Connectors, Coax Mix (Continued)

Boardmount Power/Coax/ Signal/Combination Standard Density, Series 109 Connectors



Shell Size	2	2	3	4
Contact Arrangement	3C3[4]	11C1	13C3	17C5
No. of Signal Contacts	0	10	10	12
No. of Coaxial Contacts	3	1	3	5



Shell Size	4	4	5
Contact Arrangement	21C4	25C3	36C4
No. of Signal Contacts	17	22	32
No. of Coaxial Contacts	4	3	4

Material and Finish

Shell — Steel or copper alloy

Plating — Cadmium or tin

[a] **Tin Plated Finish** — Tin or tin-lead .000200–.000400 [0.00508–0.01016] thick over .000100–.000200 [0.00254–0.00508] copper

[b] **Tin Plated RoHS Compliant Finish** — Tin .000200–.000400 [0.00508–0.01016] thick over .000100–.000200 [0.00254–0.00508] copper

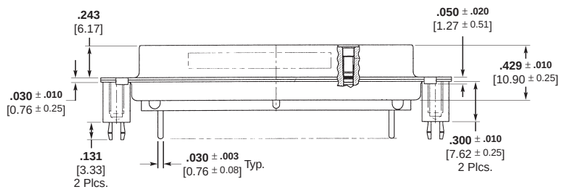
Insert — Approved material per MIL-DTL-24308

Contact Selection

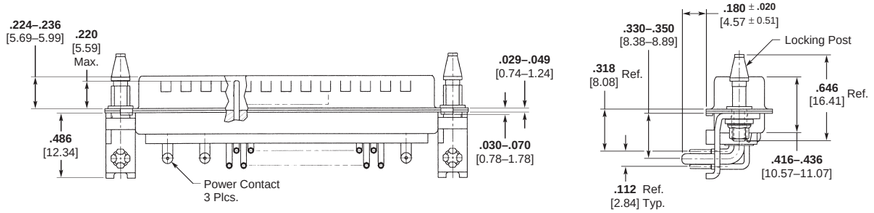
Standard (If not shown with connector):

Size 8 coax: Table I, page 5-203

Size 8 power: page 5-202



Typical Vertical Receptacle



Typical Right-Angle Plug

Contact Config.	Shell Plating	Style	Hardware Options		4-40 Standoff			Contacts		Spacers	Part Number
			Screwlocks	Boardlocks	Clinchnuts	w/ Boardlocks	Locking Posts	Power	Coax		
3C3	Tin	Vertical Recept.	No	No	No	Yes	No	No	No	No	1218896-1[a]
11C1	Cad.	Vertical Plug	No	No	No	No	No	No	Yes	Yes	1218128-1[a]
11C1	Cad.	Vertical Recept.	No	No	No	No	No	No	Yes	Yes	1218129-1[a]
13C3	Tin	Vertical Plug	No	No	No	Yes	No	No	No	No	1218816-1[a]
17C5	Tin	Right-Angle Plug	Yes	Yes	No	No	No	Yes	No	No	1218939-1[a]
21C4	Tin	Vertical Recept.	No	No	No	Yes	No	No	No	No	1218887-1[a]
25C3	Tin	Right-Angle Plug	No	Yes	No	No	Yes	Yes	No	No	1218611-1[a]
36C4	Tin	Vertical Recept.	No	Yes	No	Yes	No	No	No	No	1218807-1[a] 5-1218807-1[b]

Notes:

1. Plug insert arrangements shown. Receptacle arrangement is mirror image.
2. See Tyco Electronics customer drawing for PCB layouts.
3. The 3C3 arrangement can be mismated 180°. Contact your Tyco Electronics Sales Engineer or call Technical Support for keyed Part Numbers.

[a] See Tin Plated finish above.

[b] See Tin Plated RoHS compliant finish above.

Catalog 1308940
Revised 8-06

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AMPLIMITE Connectors, Coax Mix (Continued)

Size 8 Contacts (Power) for Standard Density, Series 109 Power/Coax/ Signal Connectors

Crimp Contacts

Material and Finish

Copper alloy, plated gold over nickel underplate

Retention Clips — Stainless steel or phosphor bronze

Note: clip may differ from view shown

Product Specification

For Crimp Contacts — 108-10045 (current rating and wire size)

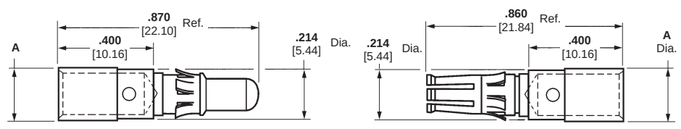
For PCB Contacts — 108-10045-1

Hand Crimp Tool — AMP 608651-1 with positioner AMP 608651-2

Extraction Tool — 318813-1

Printed Circuit Board Contacts

(Use these contacts only with the **Standard** connectors on pages 5-199 and 5-200. Do not use with **Blindmate** connectors.)



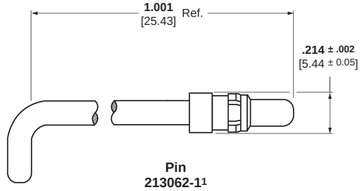
Pin

Socket

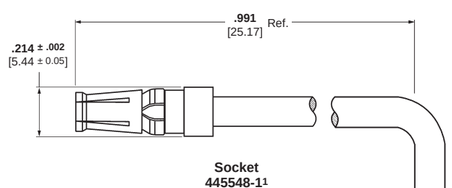
Wire Size Range AWG	Wire Size Range mm²	Dim. A	Part Numbers 50 Gold Pins[3]	30 Gold Pins[3]	50 Gold Sockets	30 Gold Sockets	Blindmate 50 Gold Pins	30 Blindmate Gold Pins
8[2]	8	**.230** 5.84	211159-1	211159-3	211161-1	211161-3	1218385-1	—
10[2]	5	**.185** 4.69	211159-2	211159-4	211161-2	211161-4	—	—
12-14	2-3	**.150** 3.81	212007-1	212007-2	212008-1	212008-2	1218483-1	1218483-2
16-18	0.8-1.4	**.102** 2.59	212013-1[1]	212013-2[1]	212014-1[1]	212014-2[1]	—	—

Notes: 1. 16-18 size use 608668-1 with Positioner 608668-2.
2. Retention clip shown is for 12-14, 16-18 Awg. See Tyco Electronics customer drawing for 8, 10 AWG Retention Clip.
3. Use these contacts only with the **Standard** connectors on pages 5-199 and 5-201. Do not use with **Blindmate** connectors.

Right-Angle

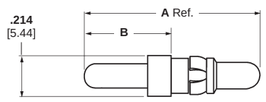


Pin
213062-1[1]
213062-2[2]

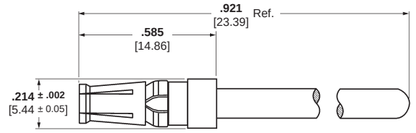


Socket
445548-1[1]
445548-2[2]

Vertical



Pin
See Table



Socket
445798-1[1]
445798-2[2]

Part Number	Dim A	Dim B
449379-1[1]	**.931** [23.65]	**.461** [11.71]
449379-2[1]	**.845** [21.46]	**.375** [9.52]
1-449379-0[2]	**.931** [23.65]	**.461** [11.71]
1-449379-1[2]	**.845** [21.46]	**.375** [9.52]

Note: 1. Standard connector, .000050 [0.00127] gold plating.
2. Standard connector, .000030 [0.00076] gold plating.

Catalog 1308940
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UK: 44-208-420-8341

AMPLIMITE Connectors, Coax Mix (Continued)

RF Contacts for Standard Density, Series 109 Power/ Coax/Signal Connectors

Performance Characteristics

Frequency Range — 0 to 500 MHz
Operating Voltage, Max. — 275 vac rms @ sea level
Termination Resistance, Max. — Center Contact — 6.0 milliohms
Outer Contact — 3.0 milliohms
Insulation Resistance, Min. — 5,000 megohms @ 500 vdc
Dielectric Withstanding Voltage — Sea Level — 800 Volts rms
30,000 ft [9,144 m] — 525 volts rms
70,000 ft [21,336m] — 275 volts rms
VSWR to 500MHz, Max.

Pin/Socket	VSWR
Straight/Straight	1.30
Right-Angle/Straight	1.35
Right-Angle/Right-Angle	1.40

RF Crosstalk — 90dB @ 5-500 MHz
Mating Force, Max. — 4.0 lb [17.8 N]
Unmating Force, Min. — 2.0 oz [0.556 N]
Contact Retention — 20 lb [89 N]
Contact Durability — 500 cycles

Cable RG/U	Force lb	Force [N]
316, 188, 174, 179, 179A, 179B	20	89
188-type Double-Braid	35	155.8
142, 142A, 142B	50	222.5

Operating Temperature — 131°F to 257°F [55°C to +125°C]
Thermal Shock — 131°F to 257°F [55°C to +125°C] per MIL-STD-1344, Method 1003, Cond. A
Physical Shock — 50 G's per MIL-STD-1344, Method 2004, Cond. A
Vibration — MIL-STD-1344, Method 2005, Cond. II
Moisture Resistance — 240 hours per MIL-STD-1344, Method 1002, Cond. II
Salt Fog — 48 hours per MIL-STD-1344, Method 1001, Cond. B

Extraction Tool Numbers

Subminiature D Housings — 58095-1 AMPLIMITE Connector
AMP-HDI Connector Housings — 58095-2

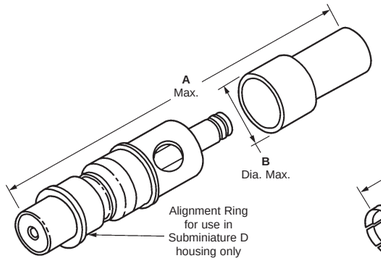
Material and Finish

Brass — per QQ-B-626 and MIL-C-50
Phosphor Bronze — per QQ-B-750
Beryllium Copper — per QQ-C-530
TEFLON—per MIL-P-19468
Nylon—per MIL-M-20693

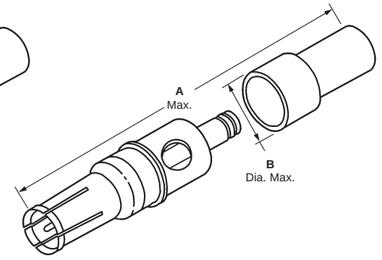
Finish

[a] **Bright Tin-Lead Plating** — per ASTM-B-571
[b] **Bright Tin Plating** — per ASTM-B-545
Copper Plating — per MIL-C-14550
Gold Plating — per MIL-G-45204
Nickel Plating — per QQ-N-290

Extraction Tool — 318813-1
Hand Crimp Tool — 69710-2
Pneu. Crimp Tool — 69365-8
Dies for Crimp Tools — See table
Instruction Sheet —
408-06755 Size 8 Coaxial RF 50-Ohm and Non-Impedance Matched Pin and Socket Contact Kits



Pin



Socket

Table I - Standard

RG/U Cable	Dimensions A	Dimensions B	Contact Part Numbers: Non-Impedance Matched Pin	Non-Impedance Matched Socket	50 Ohm Pin	50 Ohm Socket	Die Insert for Tools
178, 178A, 178B 196, 196A	**.950** 24.13	**.235** 5.94	228618-5[a] 5-228618-5[b]	228596-5	—	—	59993-1
174, 316 188, 188A	**.956** 24.28	**.234** 5.94	228618-1[a] 5-228618-1[b]	228596-1[a] 5-228596-1[b]	221980-1	221981-1	59993-1
179, 179A, 179B 187, 187A, 161 Belden 9221	**.956** 24.28	**.234** 5.94	228618-2[a] 5-228618-2[b]	228596-2[a] 5-228596-2[b]	221980-3	221981-3	59993-1
188-Type Double Braid	**.956** 24.28	**.234** 5.94	228618-3	228596-3	—	—	59993-1
142, 142A, 142B 400, Belden 9246	**1.080** 27.43	**.255** 6.48	228618-4[a] 5-228618-4[b]	228596-4[a] 5-228596-4[b]	221980-2	221981-2	58212-1

Notes:
1. Non Impedance Matched contacts and 50 ohm contacts are not intermateable.
2. Use these contacts only with the **Standard** connectors on pages 5-199 and 5-201.
[a] See Material and Finish above.
[b] See Material and Finish for RoHS compliant Part Numbers above.

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AMPLIMITE Connectors, Coax Mix (Continued)

RF Contacts for Standard Density, Series 109 Power/ Coax/Signal Connectors
(Continued)

Material and Finish

Center Contacts — Beryllium Copper or Brass per QQ-B-626, per QQ-C-530, gold plated

Outer Contacts — Beryllium copper per QQ-C-530, gold plated

Plugs — Beryllium copper per QQ-C-530, gold plated

Jack — Stainless steel per ASTM-A-582, gold plated

Shells — Stainless steel per ASTM-A-582, passivated

Panel Shells — Brass per QQ-B-626, nickel plated

Dielectrics — TEFLON per ASTM-D-1457

Grip Rings — Brass per MIL-C-50 or Beryllium Copper per QQ-C-530, nickel plated

Springs — Steel wire per QQ-W-470

Bushings — Stainless steel per ASTM-A-582, passivated

Retention Springs — Beryllium Copper per QQ-C-530, Tin-Lead Plated

Finishes

Passivate per QQ-P-35
Gold per MIL-G-45204
Nickel per QQ-N-290
Tin-Lead per ASTM-B-545

Performance Characteristics

Electrical Characteristics

Nominal Impedance — 50 ohms

Frequency Range —
2.8 mm: 0 to 26.5 GHz
2.8 mm for size 8 cavities: 0 to 40 GHz

Operating Voltage —
RG-402/U Cable (3.58 [.141] O.D.)
500 volts rms at 60 Hz (sea level)
125 volts rms at 60 Hz
(21 336 m [70,000 ft])
RG-405/U Cable (2.18 [.086] O.D.)
335 volts rms at 60 Hz (sea level)
85 volts rms at 60 Hz
70,000 ft [21,336 m]

Mechanical Characteristics

Cable Retention —
RG-402/U Cable (3.58 [.141] O.D.)–
60 lb [266.9 N], min.
RG-405/U Cable (2.18 [.086] O.D.)–
30 lb [133.4 N], min.

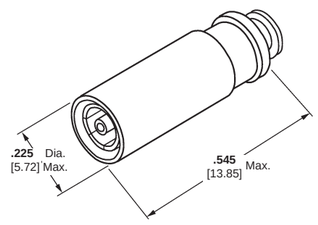
Connector Mating Force —
2.8 mm: 3 lbs Max.

Environmental Characteristics

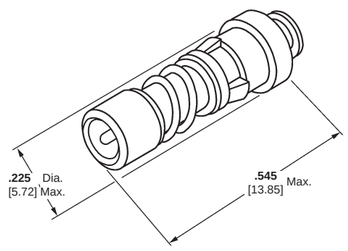
Temperature Range —
–85°F to +221°F [–65°C to +105°C]

Technical Documents

Instruction Sheet —
408-9582 Insertion tool 852115-1 for blindmate 2.8mm plug contact 413242-1
408-9585 Blindmate 2.8mm contacts for semi-rigid .086 in. coaxial cable



Pin



Socket

Table II - 2.8 mm Blindmate

RG/U Cable	Contact Type	Part Number	Crimp Tool	Die Set	Locator	Insertion Tool	Extraction Tool
405 Semi-Rigid **.086** [2.18]	Pin (Plug)	413242-1	59980-1	312253-2	852113-1	852115-1	2-305183-0
	Socket (Jack)	413249-1	59980-1	312253-2	852114-1	—	318813-1

Note:
1. Use these contacts only with the **Blindmate** connectors on page 5-200.

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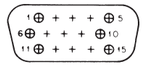
C. America: 57-1-254-4444

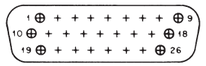
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Series 90 Connectors

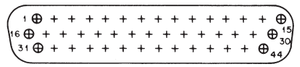
Insert Arrangements



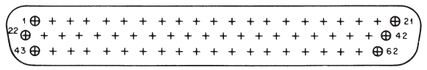
15 Position, Shell Size 1
MS 18273-2



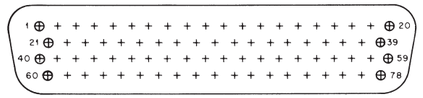
26 Position, Shell Size 2
MS 18274-2



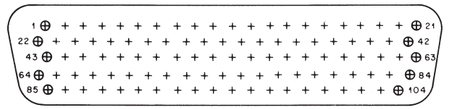
44 Position, Shell Size 3
MS 18275-2



62 Position, Shell Size 4
MS 18276-2



78 Position, Shell Size 5
MS 18277-2



104 Position, Shell Size 6
MS 14004-1

Note: Mating face of plug shown: receptacle is mirror image.

Performance Specifications

All Series 90 AMPLIMITE military connectors conform to the latest amendments of military specification MIL-DTL-24308. For more detailed information, refer to MIL-DTL-24308.

All Series 90 connectors are designed for a –67°F to 257°F [–55°C to +125°C] temperature range.

Technical Documents List

The following is a list of technical documents that cover the application and performance of AMPLIMITE Series 90 military connectors, contacts, tooling and accessories.

Military Specifications

MIL-DTL-24308	Connectors, Electric, Rectangular, Miniature Polarized Shell, Rack and Panel, General Specifications for
MIL-C-39029	Contacts, Electrical Connector, General Specification for

NASA Specification

GSFC-S-311-P-4	Non-Magnetic Connectors, General Specification for

Instruction Sheets

408-7516	Application Tooling for MIL-C-39029 Contacts
408-7610	Application and Maintenance for Hand Crimping Tool 90294-1
408-7508	Insertion/Extraction Tools 91067-1, 91067-2 and 91067-3
408-7837	Female Screwlock Kit 205817-8 and Male Screw/Retainer Kit 211883-5

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UK: 44-208-420-8341

AMPLIMITE Connectors, Series 90 (Continued)

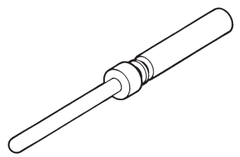
Size 22 Crimp Contacts for Series 90 Connectors (MIL-C-39029)

Snap-In Contacts .030 [0.76] Pin Diameter

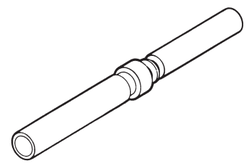
Material and Finish

Pin, Socket Body — Copper alloy, plated gold over nickel underplate

Socket Hood — Passivated stainless steel



Pin
M39029/58-360
(Supersedes M24308/13-1)



Socket
M39029/57-354
(Supersedes M24308/12-1)

Wire Size Range		Ins. Dia. (Max.)	Contact Configuration	Tape Mounted Contacts[1]	Loose Piece Contacts		Hand Tool		Contact Color Bands
AWG	[mm²]			AMP Part No.	Military Part No. (M39029/)	AMP Part No.	Tool No. (M22520/)	Positioner No. (M22520/)	
22-28	0.4-0.8	**.054** 1.38	Pin	204370-5	58-360	204370-2	02-01	02-09	orange, blue, black
			Socket	204351-2	57-354	204351-1	02-01	02-06	orange, green, yellow

[1]Tape mounted contacts are used in the AMP-TAPEMATIC Stripper/Crimper Machine Part Number **599406-7** (page 5-225).

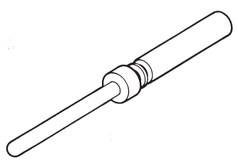
Notes: 1. These contacts are used in Series 90 military connectors.
2. Insertion/Extraction Tool Part Number **91067-1** (Military Part Number **M81969/1-04**) is used to install and remove pin and socket contacts.
3. See Instruction Sheet 408-7516 for wire length, tool and selector settings.
4. Color bands are read in the direction of terminal (wire barrel) end to mating end.

Size 22 Crimp Contacts for Series 90 Connectors (Industrial Grade)

Snap-In Contacts .030 [0.76] Pin Diameter

Material and Finish

Pin Body — Copper alloy with .000050–.000100 [0.00127–0.00254] gold plate over .000050–.000150 [0.00127–0.00381] nickel underplate



Pin

Wire Size Range		Ins. Dia. (Max.)	Contact Configuration	Tape Mounted Contacts[1] Part Number	Loose Piece Contacts Part Number	Hand Tool	
AWG	[mm²]					Tool No. (M22520/)	Positioner No. (M22520/)
22-28	0.4-0.8	**.054** 1.38	Pin	1218699-2	1218699-1	02-01	02-09
			Socket	—	—	—	—

[1]Tape mounted contacts are used in the AMP-TAPEMATIC Stripper/Crimper Machine Part Number **599406-7** (page 5-225).

Notes: 1. These contacts are used in Series 90 connectors.
2. Insertion/Extraction Tool Part Number **91067-1** (Military Part Number **M81969/1-04**) is used to install and remove pin and socket contacts.
3. See Instruction Sheet 408-7516 for wire length, tool and selector settings.

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AMPLIMITE Connectors, Series 90 (Continued)

Size 22 Posted Contacts for Series 90 Connectors

Material and Finish

Pin and Socket Body — Leaded nickel copper or beryllium copper

Socket Hood — See chart below

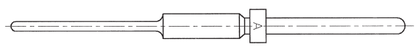
Pin and Socket Insertion/Extraction Tool

AMP Part Number 91067-1 or
MIL Part Number M81969/1-04

Insertion tip, for replacement
Part Number 126237-1

Extraction tip, for replacement
Part Number 126195-2

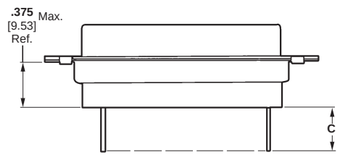
Notes:
1. Contacts on this page can be used with connectors on pages 5-208 to 5-214, 5-221. See page 5-228 for PCB layouts.
2. Mating End of pin and socket complies with MIL-C-39029.



Pin
(See Drawing Number 207683 for Latest Configurations)

Socket
(See Drawing Number 207684 for Latest Configurations)

Post Diameter ± .002 [± .050]	Post Extension C ± .025 [± 0.63]	Part Numbers Pin	Part Numbers Socket	Contact Plating		Socket Hood Material and Finish
				Pin	Socket	
.018 0.46	**.175** 4.45	207683-6	207684-3	.000050–.000100 [0.00127–0.00254] thick gold plate over .000100–.000150 [0.00254–0.00381] thick copper underplate	.000050–.000100 [0.00127–0.00254] thick gold plate over .000100–.000250 [0.00254–0.00635] thick copper underplate	Brass or Beryllium copper with .000050–.000100 [0.00127–0.00254] thick gold plate over .000100–.000250 [0.00254–0.00635] thick copper underplate
	.275 6.99	207683-2	207684-1			
	.525 13.34	207683-4	207684-2			
.025 0.64	**.275** 6.99	207683-8	207684-4	.000050–.000100 [0.00127–0.00254] thick gold plate over .000050–.000150 [0.00127–0.00381] thick nickel underplate		Passivated Stainless Steel
.018 0.46	**.275** 6.99	—	207684-5	.000050–.000100 [0.00127–0.00254] thick gold plate over .000050–.000150 [0.00127–0.00381] thick nickel underplate		Passivated Stainless Steel
	.525 13.34	207683-9	—			
	.175 4.45	1-207683-1	—	.000050–.000100 [0.00127–0.00254] thick gold plate over .000200–.000250 [0.00508–0.00635] thick nickel underplate		—



Post Extension When Used in a Standard Connector

5 Pin and Socket Connectors

Catalog 1308940
Revised 8-06

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 90 (Continued)

Crimp Plugs, Series 90, High Density Connectors

(MIL Qualified)

Material and Finish

Shell — Steel, cadmium plated, yellow chromate

Insert — Approved material per MIL-DTL-24308

Retention Clips — Stainless steel or copper alloy

(Industrial Grade)

Material and Finish

Shell — Steel, zinc plated, yellow trivalent chromate or tin plated with grounding indents (not shown)

Insert — Polyphenylene Sulfide (PPS)

Retention Clips — Stainless steel or copper alloy

Related Product Data

Cavity Identification — page 5-205

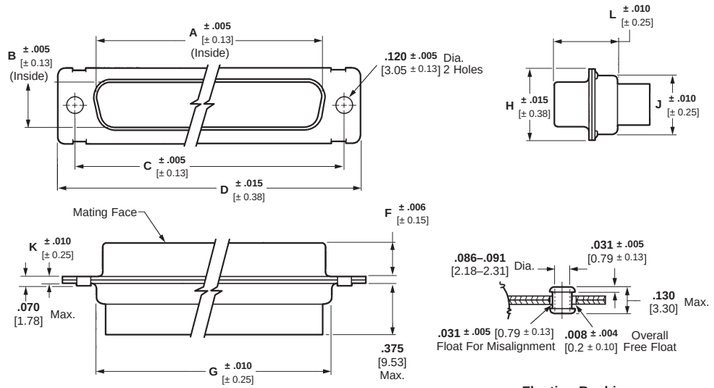
Contacts — pages 5-206, 5-207

Mounting, Mating Dimensions — page 5-226

Accessories — pages 5-231 to 5-233

Attention: MIL Qualified Connector Marking

Connector marking may differ from package marking. All connectors marked per MIL-DTL-24308.



Floating Bushing Dual Mount

No. of Contact Pos. (Shell Size)	Dimensions										MIL Qualified				Description	Industrial Grade[3] Standard Mount RoHS Part No.
											Standard Mount		Floating Bushing Mount			
	A	B	C	D	F	G	H	J	K	L	Military Part No.[2] M24308/	AMP Part No.	Military Part No. M24308/	AMP Part No.		
15 (1)	**.666** 16.92	**.329** 8.36	**.984** 24.99	**1.213** 30.81	**.235** 5.97	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.030** 0.76	**.422** 10.72	4-264F	204501-1	4-329F	204525-1	Plug only	1218746-1[4] 204501-5[5]
											4-11F	204513-2	4-307F	204537-2	Plug with pins[1]	—
26 (2)	**.994** 25.25	**.329** 8.36	**1.312** 33.32	**1.541** 39.14	**.235** 5.97	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.030** 0.76	**.422** 10.72	4-265F	204503-1	4-330F	204527-1	Plug only	1218746-2[4] 204503-4[5]
											4-12F	204515-2	4-308F	204539-2	Plug with pins[1]	—
44 (3)	**1.534** 38.96	**.329** 8.36	**1.852** 47.04	**2.088** 53.04	**.230** 5.84	**1.625** 4.13	**.494** 12.55	**.422** 10.72	**.039** 0.99	**.426** 10.82	4-266F	204505-1	4-331F	204529-1	Plug only	1218746-3[4] 204505-5[5]
											4-13F	204517-2	4-309F	204541-2	Plug with pins[1]	—
62 (4)	**2.182** 55.42	**.329** 8.36	**2.500** 63.5	**2.729** 69.32	**.230** 5.84	**2.272** 57.7	**.494** 12.55	**.422** 10.72	**.039** 0.99	**.426** 10.82	4-267F	204507-1	4-332F	204531-1	Plug only	1218746-4[4] 204507-5[5]
											4-14F	204519-2	4-310F	204543-2	Plug with pins[1]	—
78 (5)	**2.079** 52.81	**.441** 11.2	**2.406** 61.11	**2.635** 66.93	**.230** 5.84	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.039** 0.99	**.426** 10.82	4-268F	204509-1	4-333F	204533-1	Plug only	1218746-5[4] 204509-7[5]
											4-15F	204521-2	4-311F	204545-2	Plug with pins[1]	—
104 (6)	**2.212** 56.18	**.503** 12.78	**2.500** 63.5	**2.729** 69.32	**.230** 5.84	**2.302** 58.47	**.668** 16.97	**.596** 15.14	**.039** 0.99	**.426** 10.82	4-269F	204511-1	4-334F	204535-1	Plug only	1218746-6[4]
											4-16F	204523-2	4-312F	204547-2	Plug with pins[1]	—

Notes: See pages 5-235 through 5-239 (military to AMP Part Number cross reference) for additional part numbers.

[1] Size 22 sockets supplied with receptacles are loose piece.

[2] "F" is stamped on connectors following **M24308** part number as required. "F" designates cadmium shell plating.

[3] Meets requirements of MIL-DTL-24308.

[4] Zinc plated.

[5] Tin plated.

AMPLIMITE Connectors, Series 90 (Continued)

Crimp Plugs, Series 90, High Density Connectors — Zinc Plated, RoHS Compliant

(MIL Qualified)

Material and Finish

Shell — Steel, zinc plated

Insert — Approved material per MIL-DTL-24308

Retention Clips — Stainless steel or copper alloy

(Industrial Grade)

Material and Finish

Shell — Steel, zinc plated

Insert — Polyphenylene Sulfide (PPS)

Retention Clips — Stainless steel or copper alloy

Related Product Data

Cavity Identification — page 5-205

Contacts — pages 5-206, 5-207

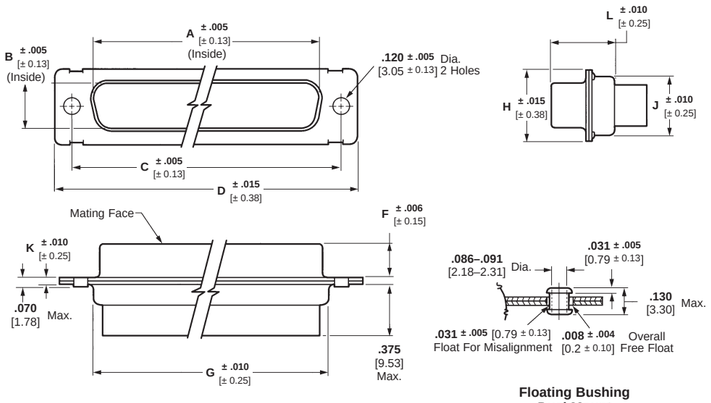
Mounting, Mating Dimensions — page 5-226

Accessories — pages 5-231 to 5-233

Attention: MIL Qualified Connector Marking

Connector marking may differ from package marking. All connectors marked per MIL-DTL-24308.

RoHS Ready



Floating Bushing Dual Mount

No. of Contact Pos. (Shell Size)	Dimensions										MIL Qualified			
											Standard Mount		Floating Bushing Mount	
	A	B	C	D	F	G	H	J	K	L	Military Part No. M24308/	AMP Part No.	Military Part No. M24308/	AMP Part No.
15	**.666**	**.329**	**.984**	**1.213**	**.235**	**.759**	**.494**	**.422**	**.030**	**.422**	4-264	1757823-1	4-329	1757825-1
(1)	16.92	8.36	24.99	30.81	5.97	19.28	12.55	10.72	0.76	10.72	4-11	1757823-7	4-307	1757825-7
26	**.994**	**.329**	**1.312**	**1.541**	**.235**	**1.083**	**.494**	**.422**	**.030**	**.422**	4-265	1757823-2	4-330	1757825-2
(2)	25.25	8.36	33.32	39.14	5.97	27.51	12.55	10.72	0.76	10.72	4-12	1757823-8	4-308	1757825-8
44	**1.534**	**.329**	**1.852**	**2.088**	**.230**	**1.625**	**.494**	**.422**	**.039**	**.426**	4-266	1757823-3	4-331	1757825-3
(3)	38.96	8.36	47.04	53.04	5.84	4.13	12.55	10.72	0.99	10.82	4-13	1757823-9	4-309	1757825-9
62	**2.182**	**.329**	**2.500**	**2.729**	**.230**	**2.272**	**.494**	**.422**	**.039**	**.426**	4-267	1757823-4	4-332	1757825-4
(4)	55.42	8.36	63.5	69.32	5.84	57.7	12.55	10.72	0.99	10.82	4-14	1-1757823-0	4-310	1-1757825-0
78	**2.079**	**.441**	**2.406**	**2.635**	**.230**	**2.178**	**.605**	**.534**	**.039**	**.426**	4-268	1757823-5	4-333	1757825-5
(5)	52.81	11.2	61.11	66.93	5.84	55.32	15.37	13.56	0.99	10.82	4-15	1-1757823-1	4-311	1-1757825-1
104	**2.212**	**.503**	**2.500**	**2.729**	**.230**	**2.302**	**.668**	**.596**	**.039**	**.426**	4-269	1757823-6	4-334	1757825-6
(6)	56.18	12.78	63.5	69.32	5.84	58.47	16.97	15.14	0.99	10.82	4-16	1-1757823-2	4-312	1-1757825-2

Notes: See pages 5-235 through 5-239 (military to AMP Part Number cross reference) for additional part numbers.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 90 (Continued)

Crimp Receptacles, Series 90, High Density Connectors

(MIL Qualified)

Material and Finish

Shell — Steel, cadmium plated
Insert — Approved material per MIL-DTL-24308
Retention Clips — Stainless steel or copper alloy

(Industrial Grade)

Material and Finish

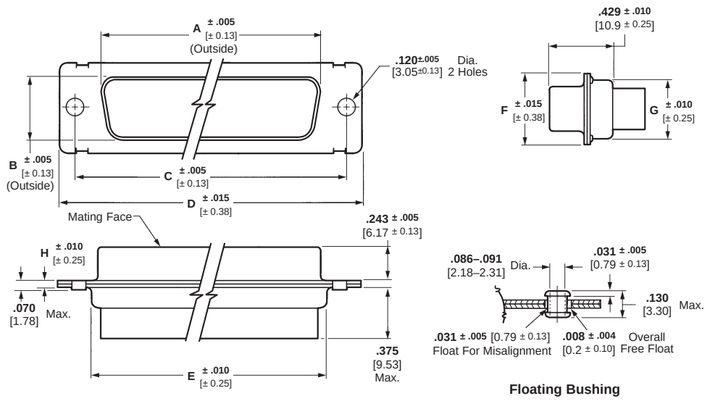
Shell — Steel, zinc plated, yellow trivalent chromate or tin plated
Insert — Polyphenylene Sulfide (PPS)
Retention Clips — Stainless steel or copper alloy

Related Product Data

Cavity Identification — page 5-205
Contacts — pages 5-206, 5-207
Mounting, Mating Dimensions — page 5-226
Accessories — pages 5-231 to 5-233

Attention: Connector Marking

Connector marking may differ from package marking. All connectors marked per MIL-DTL-24308.



Floating Bushing Dual Mount

Clinch Nut Mount

No. of Contact Pos. (Shell Size)	Dimensions								MIL Qualified				Description	Industrial Grade[3] RoHS Part No.
									Standard Mount		Floating Bushing Mount			
	A	B	C	D	E	F	G	H	Military Part No.[2] M24308/	AMP Part No.	Military Part No. M24308/	AMP Part No.		
15 (1)	.643 16.33	.311 7.9	.984 24.99	1.213 30.81	.759 19.28	.494 12.55	.422 10.72	.030 0.76	2-286F	204500-1	2-297F	204524-1	Recept. only	1218747-1[4] 204500-4[5]
									2-11F	204512-2	2-28F	204536-2	Recept. with sockets[1]	—
26 (2)	.971 24.66	.311 7.9	1.312 33.32	1.541 39.14	1.083 27.51	.494 12.55	.422 10.72	.030 0.76	2-287F	204502-1	2-298F	204526-1	Recept. only	1218747-2[4] 204502-4[5]
									2-12F	204514-2	2-29F	204538-2	Recept. with sockets[1]	—
44 (3)	1.511 38.38	.311 7.9	1.852 47.04	2.088 53.04	1.625 41.3	.494 12.55	.422 10.72	.039 0.99	2-288F	204504-1	2-299F	204528-1	Recept. only	1218747-3[4] 204504-5[5]
									2-13F	204516-2	2-30F	204540-2	Recept. with sockets[1]	—
62 (4)	2.159 54.84	.311 8.36	2.500 63.5	2.729 69.32	2.272 57.7	.494 12.55	.422 10.72	.039 0.99	2-289F	204506-1	2-300F	204530-1	Recept. only	1218747-4[4]
									2-14F	204518-2	2-31F	204542-2	Recept. with sockets[1]	—
78 (5)	2.064 52.43	.423 10.74	2.406 61.11	2.635 66.93	2.178 55.32	.605 15.37	.534 13.56	.039 0.99	2-290F	204508-1	2-301F	204532-1	Recept. only	1218747-5[4]
									2-15F	204520-2	2-32F	204544-2	Recept. with sockets[1]	—
104 (6)	2.189 55.6	.485 12.32	2.500 63.5	2.729 69.32	2.302 58.47	.668 16.97	.596 15.14	.039 0.99	2-291F	204510-1	2-302F	204534-1	Recept. only	1218747-6[4]
									2-16F	204522-2	2-33F	204546-2	Recept. with sockets[1]	—

Notes: See pages 5-235 through 5-239 (military to AMP Part Number cross reference) for additional part numbers.
[1] Size 22 sockets supplied with receptacles are loose piece.
[2] "F" is stamped on connectors following **M24308** part number as required. "F" designates cadmium shell plating.
[3] Meets requirements of MIL-DTL-24308.
[4] Clinch Nut Mount, Zinc plated.
[5] Standard Mount, Tin plated.

Catalog 1308940
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AMPLIMITE Connectors, Series 90 (Continued)

Crimp Receptacles, Series 90, High Density Connectors — Zinc Plated, RoHS Compliant

(MIL Qualified)

Material and Finish

Shell — Steel, zinc plated

Insert — Approved material per MIL-DTL-24308

Retention Clips — Stainless steel or copper alloy

(Industrial Grade)

Material and Finish

Shell — Steel, zinc plated

Insert — Polyphenylene Sulfide (PPS)

Retention Clips — Stainless steel or copper alloy

Related Product Data

Cavity Identification — page 5-205

Contacts — pages 5-206, 5-207

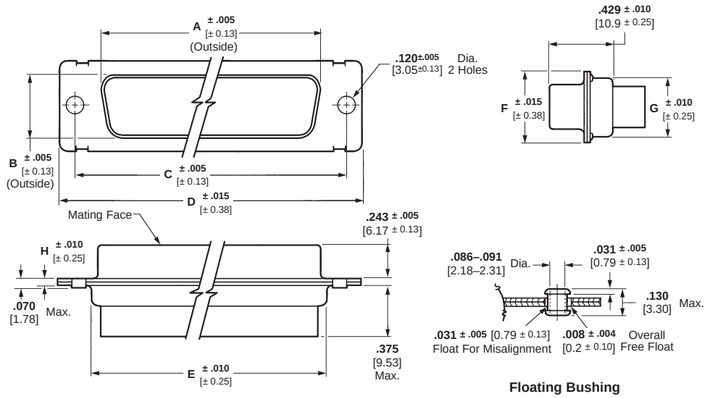
Mounting, Mating Dimensions — page 5-226

Accessories — pages 5-231 to 5-233

Attention: Connector Marking

Connector marking may differ from package marking. All connectors marked per MIL-DTL-24308.

RoHS Ready



Floating Bushing Dual Mount

Clinch Nut Mount

No. of Contact Pos. (Shell Size)	Dimensions								MIL Qualified			
									Standard Mount		Floating Bushing Mount	
	A	B	C	D	E	F	G	H	Military Part No. M24308/	AMP Part No.	Military Part No. M24308/	AMP Part No.
15	**.643**	**.311**	**.984**	**1.213**	**.759**	**.494**	**.422**	**.030**	2-286	1757824-1	2-297	1757826-1
(1)	16.33	7.9	24.99	30.81	19.28	12.55	10.72	0.76	2-11	1757824-7	2-28	1757826-7
26	**.971**	**.311**	**1.312**	**1.541**	**1.083**	**.494**	**.422**	**.030**	2-287	1757824-2	2-298	1757826-2
(2)	24.66	7.9	33.32	39.14	27.51	12.55	10.72	0.76	2-12	1757824-8	2-29	1757826-8
44	**1.511**	**.311**	**1.852**	**2.088**	**1.625**	**.494**	**.422**	**.039**	2-288	1757824-3	2-299	1757826-3
(3)	38.38	7.9	47.04	53.04	41.3	12.55	10.72	0.99	2-13	1757824-9	2-30	1757826-9
62	**2.159**	**.311**	**2.500**	**2.729**	**2.272**	**494**	**.422**	**.039**	2-289	1757824-4	2-300	1757826-4
(4)	54.84	8.36	63.5	69.32	57.7	12.55	10.72	0.99	2-14	1-1757824-0	2-31	1-1757826-0
78	**2.064**	**.423**	**2.406**	**2.635**	**2.178**	**.605**	**.534**	**.039**	2-290	1757824-5	2-301	1757826-5
(5)	52.43	10.74	61.11	66.93	55.32	15.37	13.56	0.99	2-15	1-1757824-1	2-32	1-1757826-1
104	**2.189**	**.485**	**2.500**	**2.729**	**2.302**	**.668**	**.596**	**.039**	2-291	1757824-6	2-302	1757826-6
(6)	55.6	12.32	63.5	69.32	58.47	16.97	15.14	0.99	2-16	1-1757824-2	2-33	1-1757826-2

Notes: See pages 5-235 through 5-239 (military to AMP Part Number cross reference) for additional part numbers.

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UK: 44-208-420-8341

AMPLIMITE Connectors, Series 90 (Continued)

Non-Magnetic Crimp Plugs, Series 90, High Density Connectors (NASA Qualified)

Connector Material and Finish

Shell — Brass, gold plated

Insert — Approved material per MIL-DTL-24308

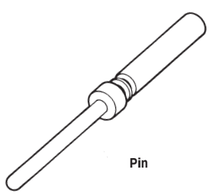
Retention Clips — Copper alloy

Related Product Data

Cavity Identification — page 5-205

Mounting, Mating Specifications — page 5-226

Accessories — pages 5-231 to 5-233



Pin

Wire Size Range	AMP Part No. / NASA No.
22-28 0.4-0.08	204370-8 G-08-P1
26-28 0.15-0.08	206495-3 —

Max. insulation diameter .054 [1.38]

Hand tool AMP Part Number 601966-1 or MIL Part Number M22520/2-01

Positioner AMP Part Number 601966-6 or MIL Part Number M22520/2-09

Contact Material and Finish

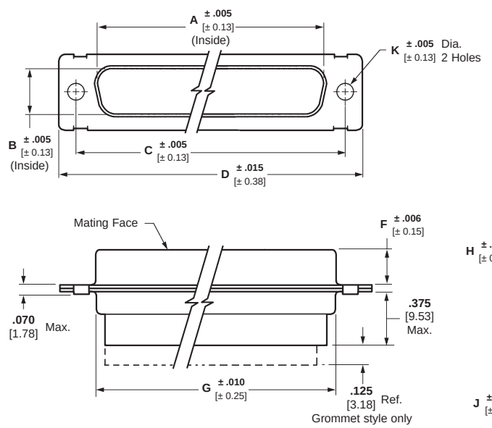
Copper alloy, .000050–.000100 [0.00127–0.0254] thick gold plate over .000100–.000150 [0.0254–0.00381] thick copper underplate

Pin and Socket Insertion/Extraction Tool

AMP Part Number 91067-1 or MIL Part Number M81969/1-04

Insertion tip, for replacement Part Number 126237-1

Extraction tip, for replacement Part Number 126195-2



Non-Magnetic Plugs per NASA Specification

No. of Contact Pos. (Shell Size)	Dimensions A	B	C	D	F	G	H	J	L	K	NASA Part Number	AMP Part Number
15 (1)	**.666** 16.92	**.329** 8.36	**.984** 24.99	**1.213** 30.81	**.235** 5.97	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.422** 10.72	**.154** 3.91	311P407-1P-B-15	206498-1
										.120 3.05	311P407-1P-B-12	206498-4
26 (2)	**.994** 25.25	**.329** 8.36	**1.312** 33.32	**1.541** 39.14	**.235** 5.97	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.422** 10.72	**.154** 3.91	311P407-2P-B-15	206500-1
										.120 3.05	311P407-2P-B-12	206500-4
44 (3)	**1.534** 38.96	**.329** 8.36	**1.852** 47.04	**2.088** 53.04	**.230** 5.84	**1.625** 4.13	**.494** 12.55	**.422** 10.72	**.426** 10.82	**.154** 3.91	311P407-3P-B-15	206063-2
										.120 3.05	311P407-3P-B-12	206063-4
62 (4)	**2.182** 55.42	**.329** 8.36	**2.500** 63.5	**2.729** 69.32	**.230** 5.84	**2.272** 57.7	**.494** 12.55	**.422** 10.72	**.426** 10.82	**.154** 3.91	311P407-4P-B-15	206502-1
										.120 3.05	311P407-4P-B-12	206502-4
78 (5)	**2.079** 52.81	**.441** 11.20	**2.406** 61.11	**2.635** 66.93	**.230** 5.84	**2.178** 57.7	**.605** 15.37	**.534** 13.56	**.426** 10.82	**.154** 3.91	311P407-5P-B-15	206504-1
										.120 3.05	311P407-5P-B-12	206504-4
104 (6)	**2.212** 56.18	**.503** 12.78	**2.500** 63.5	**2.729** 69.32	**.230** 5.84	**2.302** 58.47	**.668** 16.97	**.596** 15.14	**.426** 10.82	**.154** 3.91	311P407-6P-B-15	206066-2
										.120 3.05	311P407-6P-B-12	206066-4

Non-Magnetic Plugs With Silicone Rubber Rear Grommet[1]

No. of Contact Pos. (Shell Size)	Dimensions A	B	C	D	F	G	H	J	K	L	AMP Part Number
15 (1)	**.666** 16.92	**.329** 8.36	**.984** 24.99	**1.213** 30.81	**.235** 5.97	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.120** 3.05	**.422** 10.72	211673-4
26 (2)	**.994** 25.25	**.329** 8.36	**1.312** 33.32	**1.541** 39.14	**.235** 5.97	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.120** 3.05	**.422** 10.72	211674-4
44 (3)	**1.534** 38.96	**.329** 8.36	**1.852** 47.04	**2.088** 53.04	**.230** 5.84	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.120** 3.05	**.426** 10.82	211675-4
62 (4)	**2.182** 55.42	**.329** 8.36	**2.500** 63.5	**2.729** 69.32	**.230** 5.84	**2.272** 57.7	**.494** 12.55	**.422** 10.72	**.120** 3.05	**.426** 10.82	211676-4
78 (5)	**2.079** 52.81	**.441** 11.20	**2.406** 61.11	**2.635** 66.93	**.230** 5.84	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.120** 3.05	**.426** 10.82	211677-4
104 (6)	**2.212** 56.18	**.503** 12.78	**2.500** 63.5	**2.729** 69.32	**.230** 5.84	**2.302** 58.47	**.668** 16.97	**.596** 15.14	**.120** 3.05	**.426** 10.82	211678-4

[1] Grommet provided for cable strain relief.

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

AMPLIMITE Connectors, Series 90 (Continued)

Non-Magnetic Crimp Receptacles, Series 90, High Density Connectors (NASA Qualified)

Connector Material and Finish

Shell — Brass, gold plated

Insert — Approved material per MIL-DTL-24308

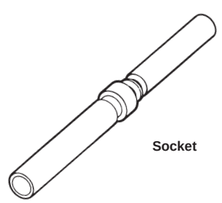
Retention Clips — Copper alloy

Related Product Data

Cavity Identification — page 5-205

Mounting, Mating Specifications — page 5-226

Accessories — pages 5-231 to 5-233



Socket

Wire Size Range	AMP Part No. / NASA No.
22-28 0.4-0.08	206071-1 G-08-S1
26-28 0.15-0.08	206496-1 —

Max. insulation diameter .054 [1.38]

Hand tool AMP Part Number 601966-1 or MIL Part Number M22520/2-01

Positioner AMP Part Number 601966-4 or MIL Part Number M22520/2-06

Contact and Hood Material and Finish

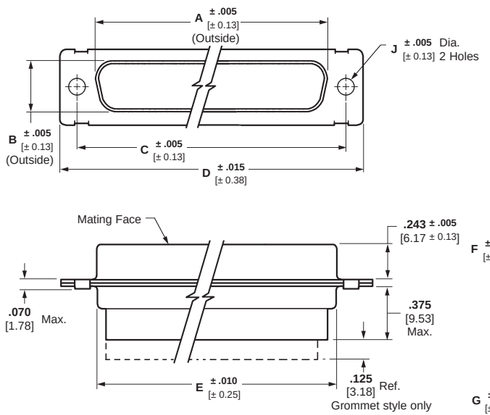
Copper alloy, .000050–.000100 [0.00127–0.0254] thick gold plate over .000100–.000150 [0.0254–0.00381] thick copper underplate

Pin and Socket Insertion/Extraction Tool

AMP Part Number 91067-1 or MIL Part Number M81969/1-04

Insertion tip, for replacement Part Number 126237-1

Extraction tip, for replacement Part Number 126195-2



Non-Magnetic Receptacles per NASA Specification

No. of Contact Pos. (Shell Size)	Dimensions A	B	C	D	E	F	G	J	NASA Part Number	AMP Part Number
15 (1)	**.643** 16.33	**.311** 7.9	**.984** 24.99	**1.213** 30.81	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.154** 3.91	311P407-1S-B-15	206499-1
								.120 3.05	311P407-1S-B-12	206499-4
26 (2)	**.971** 24.66	**.311** 7.9	**1.312** 33.32	**1.541** 39.14	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.154** 3.91	311P407-2S-B-15	206501-1
								.120 3.05	311P407-2S-B-12	206501-4
44 (3)	**1.511** 38.38	**.311** 7.9	**1.852** 47.04	**2.088** 53.04	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.154** 3.91	311P407-3S-B-15	206064-2
								.120 3.05	311P407-3S-B-12	206064-4
62 (4)	**2.159** 54.84	**.311** 7.9	**2.500** 63.5	**2.729** 69.32	**2.272** 57.7	**.494** 12.55	**.422** 10.72	**.154** 3.91	311P407-4S-B-15	206503-1
								.120 3.05	311P407-4S-B-12	206503-4
78 (5)	**2.064** 52.43	**.423** 10.74	**2.406** 61.11	**2.635** 66.93	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.154** 3.91	311P407-5S-B-15	206505-1
								.120 3.05	311P407-5S-B-12	206505-4
104 (6)	**2.189** 55.6	**.485** 12.32	**2.500** 63.5	**2.729** 69.32	**2.302** 58.47	**668** 16.97	**.596** 15.14	**.154** 3.91	311P407-6S-B-15	206065-2
								.120 3.05	311P407-6S-B-12	206065-4

Non-Magnetic Receptacles With Silicone Rubber Rear Grommet[1]

No. of Contact Pos. (Shell Size)	Dimensions A	B	C	D	E	F	G	J	AMP Part Number
15 (1)	**.643** 16.33	**.311** 7.9	**.984** 24.99	**1.213** 30.81	**.759** 19.28	**.494** 12.55	**.422** 10.72	**.120** 3.05	211667-4
26 (2)	**.971** 24.66	**.311** 7.9	**1.312** 33.32	**1.541** 39.14	**1.083** 27.51	**.494** 12.55	**.422** 10.72	**.120** 3.05	211668-4
44 (3)	**1.511** 38.38	**.311** 7.9	**1.852** 47.04	**2.088** 53.04	**1.625** 41.3	**.494** 12.55	**.422** 10.72	**.120** 3.05	211669-4
62 (4)	**2.159** 54.84	**.311** 7.9	**2.500** 63.5	**2.729** 69.32	**2.272** 57.7	**.494** 12.55	**.422** 10.72	**.120** 3.05	*211670-4
78 (5)	**2.064** 52.43	**.423** 10.74	**2.406** 61.11	**2.635** 66.93	**2.178** 55.32	**.605** 15.37	**.534** 13.56	**.120** 3.05	211671-4
104 (6)	**2.189** 55.6	**.485** 12.32	**2.500** 63.5	**2.729** 69.32	**2.302** 58.47	**.668** 16.97	**.596** 15.14	**.120** 3.05	211672-4

[1] Grommet provided for cable strain relief.

Catalog 1308940
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Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, Series 90 (Continued)

Crimp Blindmate Plugs, Series 90, High Density Connectors

Material and Finish

Shell, Front — Aluminum alloy, cadmium plated with yellow chromate

[1] Shell, Front for RoHS Compliant — Aluminum alloy, zinc plated with yellow trivalent chromate

Shell, Rear — Steel, cadmium plated with yellow chromate

[1] Shell, Rear for RoHS Compliant — Steel, zinc plated with yellow trivalent chromate

Insert Assembly — Approved material per MIL-DTL-24308

Retention Clips — Stainless steel

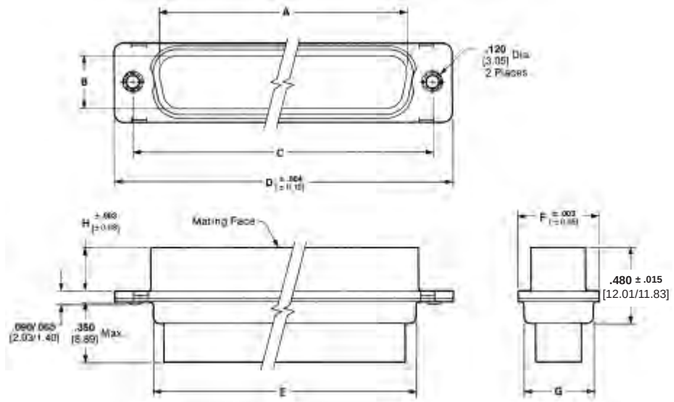
Related Product Data

Cavity Identification — page 5-205

Contacts — pages 5-206, 5-207

Mounting Specifications — page 5-226

Flange to flange spacing can be a max. of .270 [6.86] for Blindmate connectors.



No. of Contact Pos. (Shell Size)	Dimensions A	B	C	D	E	F	G	H	Part Number
15 (1)	**.656** 16.66	**.324** 8.23	**.984** 24.99	**1.224** 31.09	**.769/.750** 19.53/19.05	**.506** 12.85	**.432/.413** 10.97/10.49	**.257** 6.53	213153-1
26 (2)	**.984** 25.0	**.324** 8.23	**1.312** 33.32	**1.552** 39.42	**1.093/1.074** 27.76/27.28	**.506** 12.85	**.432/.413** 10.97/10.49	**.257** 6.53	445010-1
44 (3)	**1.524** 38.71	**.324** 8.23	**1.852** 47.04	**2.099** 53.31	**1.635/1.616** 41.53/41.05	**.506** 12.85	**.432/.413** 10.97/10.49	**.257** 6.53	445011-1 5-445011-1[1]
62 (4)	**2.172** 55.17	**.324** 8.23	**2.500** 63.5	**2.740** 69.6	**2.282/2.263** 57.96/57.48	**.506** 12.85	**.432/.413** 10.97/10.49	**.257** 6.53	213118-1
78 (5)	**2.082** 52.88	**.444** 11.28	**2.406** 61.11	**2.646** 67.21	**2.188/2.167** 55.58/55.04	**.617** 15.67	**.544/.525** 13.82/13.34	**.257** 6.53	445012-1 5-445012-1[1]
104 (6)	**2.212** 56.18	**.503** 12.78	**2.500** 63.5	**2.740** 69.6	**2.302** 58.47	**.680** 17.27	**.606/.587** 15.39/14.91	**.267** 6.78	212933-3

[1] See Material and Finish for RoHS compliant Part Numbers above.

Blindmate Plugs with Floating Bushings

Material and Finish

Shell — Aluminum alloy per 6061, cadmium plated per QQ-P-416, Type II, Class 2 over copper per MIL-C-14550, Class 4.

Insert Assembly — Diallyl phthalate per MIL-M-14, Type SDG-F; or polyester per MIL-M-24519, Type GPT-30F; or polyphenylene sulfide (PPS) per MIL-M-24519, Type GST-40F.

Floating Bushing/Washer — Stainless steel per ASTM-A-582, passivated per QQ-P-35B. Floats .008 ± .004 [0.20 ± 0.10] vertically and .031 [0.79] horizontally.

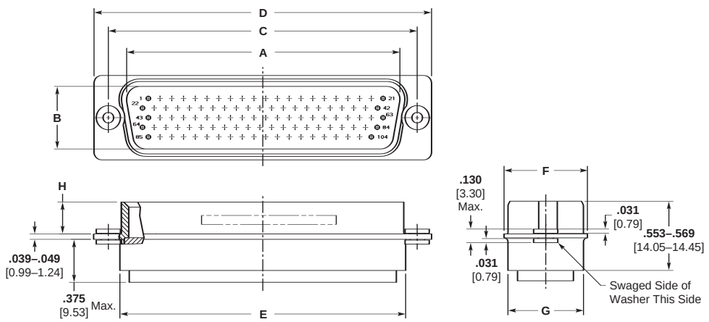
Related Product Data

Cavity Identification — page 5-205

Contacts — pages 5-206, 5-207

Mounting Specifications — page 5-226

Flange to flange spacing can be a max. of .270 [6.86] for Blindmate connectors.



No. of Contact Pos. (Shell Size)	Dimensions A	B	C	D	E	F	G	H	Part Number
104 (6)	**2.213/2.217** 56.21/56.31	**.504/.508** 12.80/12.90	**2.495/2.505** 63.37/63.63	**2.714/2.744** 68.94/69.70	**2.307/2.319** 58.60/58.90	**.673/.683** 17.09/17.35	**.602/.614** 15.29/15.59	**.254/.260** 6.45/6.60	1757207-6
44 (3)	**1.522/1.526** 38.66/38.76	**.321/.327** 8.15/8.31	**1.847/1.857** 46.91/47.17	**2.073/2.103** 52.65/53.42	**1.630/1.642** 41.40/41.71	**.499/.509** 12.67/12.93	**.432/.444** 10.97/11.28	**.254/.260** 6.45/6.60	1757207-3

Note: Additional sizes available upon request.

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UK: 44-208-420-8341

AMPLIMITE Connectors, Series 90 (Continued)

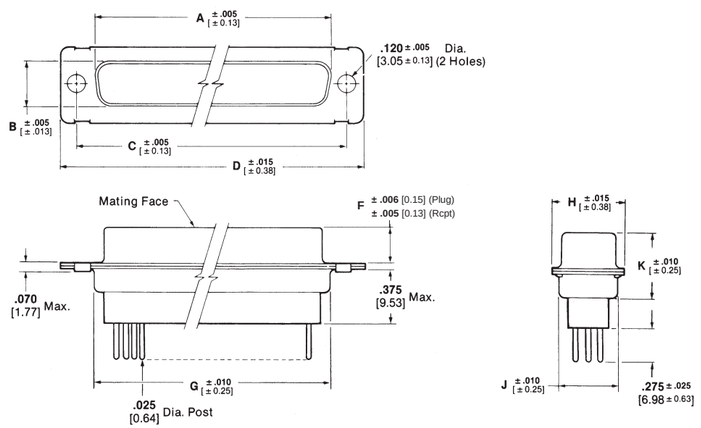
Straight PCB, Series 90, High Density Connectors (Industrial Grade)

Material and Finish

[1] **Shell** — Steel, cadmium plated
[2] **Shell for RoHS Compliant** — Steel, zinc plated
Insert — Polyphenylene Sulfide (PPS)
Retention Clips — Stainless steel

Related Product Data

Cavity Identification — page 5-205
Contacts — page 5-207
Mounting, Mating Dimensions — page 5-226
Accessories — pages 5-231 to 5-233
PCB Layouts — See page 5-228 or Tyco Electronics customer drawing



Replacement Pin Contact
Part Number 207683-8

Plugs

No. of Contact Pos. (Shell Size)	Dimensions									Part Number
	A (Inside)	B (Inside)	C	D	F	G	H	J	K	
15	.666	.329	.984	1.213	.235	.759	.494	.422	.422	208866-1[1]
(1)	16.92	8.36	24.99	30.81	5.97	19.28	12.55	10.72	10.72	5-208866-1[2]
26	.994	.329	1.312	1.541	.235	1.083	.494	.422	.422	208867-1[1]
(2)	25.25	8.36	33.32	39.14	5.97	27.51	12.55	10.72	10.72	5-208867-1[2]
44	1.534	.329	1.852	2.088	.230	1.625	.494	.422	.426	208868-1[1]
(3)	38.96	8.36	47.04	53.04	5.84	41.3	12.55	10.72	10.82	5-208868-1[2]
62	2.182	.329	2.500	2.729	.230	2.272	.494	.422	.426	208869-1[1]
(4)	55.42	8.36	63.5	69.32	5.84	57.7	12.55	10.72	10.82	5-208869-1[2]
78	2.079	.441	2.406	2.635	.230	2.178	.605	.534	.426	208870-1[1]
(5)	52.81	11.20	61.11	66.93	5.84	55.32	15.37	13.56	10.82	5-208870-1[2]
104	2.212	.503	2.500	2.729	.230	2.302	.668	.596	.426	208871-1[1]
(6)	56.18	12.78	63.5	69.32	5.84	58.47	16.97	15.14	10.82	5-208871-1[2]

[1] See Material and Finish above.
[2] See Material and Finish for RoHS compliant Part Numbers above.

Replacement Socket Contact
Part Number 207684-4

Receptacles

No. of Contact Pos. (Shell Size)	Dimensions									Part Number
	A (Outside)	B (Outside)	C	D	F	G	H	J	K	
15	.643	.311	.984	1.213	.243	.759	.494	.422	.429	208872-1[1]
(1)	16.33	7.9	24.99	30.81	6.17	19.28	12.55	10.72	10.9	5-208872-1[2]
26	.971	.311	1.312	1.541	.243	1.083	.494	.422	.429	208873-1[1]
(2)	24.66	7.9	33.32	39.14	6.17	27.51	12.55	10.72	10.9	5-208873-1[2]
44	1.511	.311	1.852	2.088	.243	1.625	.494	.422	.429	208874-1[1]
(3)	38.38	7.9	47.04	53.04	6.17	41.3	12.55	10.72	10.9	5-208874-1[2]
62	2.159	.311	2.500	2.729	.243	2.272	.494	.422	.429	208875-1[1]
(4)	54.84	7.9	63.5	69.32	6.17	57.7	12.55	10.72	10.9	5-208875-1[2]
78	2.064	.423	2.406	2.635	.243	2.178	.605	.534	.429	208876-1[1]
(5)	52.43	10.74	61.11	66.93	6.17	55.32	15.37	13.56	10.9	5-208876-1[2]
104	2.189	.485	2.500	2.729	.243	2.302	.668	.596	.429	208877-1[1]
(6)	55.6	12.32	63.5	69.32	6.17	58.47	16.97	15.14	10.9	5-208877-1[2]

[1] See Material and Finish above.
[2] See Material and Finish for RoHS compliant Part Numbers above.

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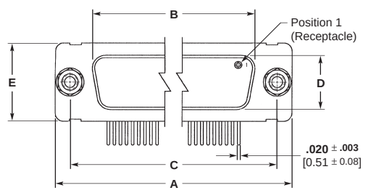
AMPLIMITE Connectors, Series 90 (Continued)

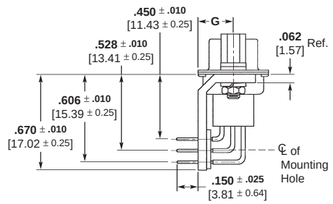
Right-Angle PCB, Series 90, with Female Screwlocks

Material and Finish

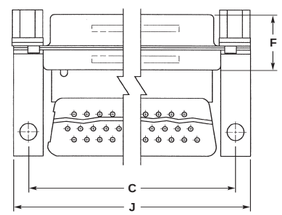
Shell — Brass, gold over copper plated

Insert — Diallyl phthalate or polyester or Polyphenylene Sulfide (PPS)





Shell Size 1 thru 4



Plugs

No. of Contact Pos. (Shell Size)	Dimensions A	B	C	D	E	F	G	J	Part Number
15 (1)	**1.213** 30.81	**.666** 16.92	**.984** 24.99	**.329** 8.36	**.494** 12.55	**.422** 10.72	**.246 ±.010** 6.25 ± 0.25	**1.204** 30.58	1-593326-7
26 (2)	**1.541** 39.14	**.994** 25.25	**1.312** 33.32	**.329** 8.36	**.494** 12.55	**.422** 10.72	**.246 ±.010** 6.25 ± 0.25	**1.532** 38.91	1-593326-8
44 (3)	**2.088** 53.04	**1.534** 38.96	**1.852** 47.04	**.329** 8.36	**.494** 12.55	**.426** 10.82	**.246 ±.010** 6.25 ± 0.25	**2.077** 52.76	1-593326-9
62 (4)	**2.729** 69.32	**2.182** 55.42	**2.500** 63.50	**.329** 8.36	**.494** 12.55	**.426** 10.82	**.246 ±.010** 6.25 ± 0.25	**2.720** 69.09	2-593326-0
78 (5)	**2.635** 66.93	**2.079** 52.81	**2.406** 61.11	**.441** 11.20	**.605** 15.37	**.426** 10.82	**.246 ±.010** 6.25 ± 0.25	**2.626** 66.70	2-593326-1
104 (6)	**2.729** 69.32	**2.213** 56.21	**2.500** 63.50	**.503** 12.78	**.668** 16.97	**.426** 10.82	**.246 ±.010** 6.25 ± 0.25	**2.720** 69.09	2-593326-2

Receptacles

No. of Contact Pos. (Shell Size)	Dimensions A	B	C	D	E	F	G	J	Part Number
15 (1)	**1.213** 30.81	**.643** 16.33	**.984** 24.99	**.311** 7.90	**.494** 12.55	**.422** 10.72	**.248 ±.010** 6.30 ± 0.25	**1.204** 30.58	1-593327-7
26 (2)	**1.541** 39.14	**.971** 24.66	**1.312** 33.32	**.311** 7.90	**.494** 12.55	**.422** 10.72	**.248 ±.010** 6.30 ± 0.25	**1.532** 38.91	1-593327-8
44 (3)	**2.088** 53.04	**1.511** 38.38	**1.852** 47.04	**.311** 7.90	**.494** 12.55	**.426** 10.82	**.248 ±.010** 6.30 ± 0.25	**2.077** 52.76	1-593327-9
62 (4)	**2.729** 69.32	**2.159** 54.84	**2.500** 63.50	**.311** 7.90	**.494** 12.55	**.426** 10.82	**.248 ±.010** 6.30 ± 0.25	**2.720** 69.09	2-593327-0
78 (5)	**2.635** 66.93	**2.064** 52.43	**2.406** 61.11	**.423** 10.74	**.605** 15.37	**.426** 10.82	**.248 ±.010** 6.30 ± 0.25	**2.626** 66.70	2-593327-1
104 (6)	**2.729** 69.32	**2.188** 55.58	**2.500** 63.50	**.485** 12.32	**.668** 16.97	**.426** 10.82	**.248 ±.010** 6.30 ± 0.25	**2.726** 69.24	2-593327-2

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AMPLIMITE Connectors, Series 90 (Continued)

Connector Savers, Series 90, High Density Connectors

Connector savers prolong the life of permanently installed connectors which would otherwise be subjected to repeated cycles of mating and unmating, in applications such as test interfaces or on testing devices.

Material and Finish

Standard

Shell — Steel, cadmium plated

Contact Body — Beryllium copper, .000050 [0.00127] min. gold plate over .000050 [0.00127] min. nickel underplate

Socket Hood — Passivated stainless steel

Insert — Polyphenylene Sulfide (PPS)

Spacer — Black nylon

Non Magnetic

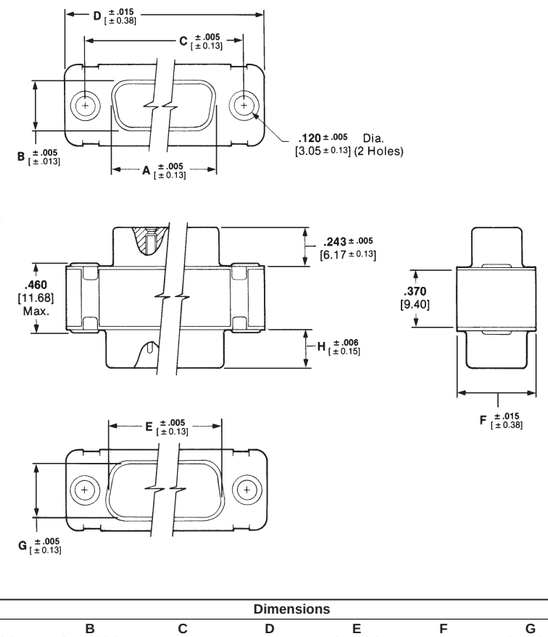
Shell — Brass, gold plated

Contact Body — Beryllium copper, .000050 [0.00127] min. gold plate over .000050 [0.00127] min. copper underplate

Socket Hood — Brass, .000050 [0.00127] min. gold plate over .000100 [0.00254] min. copper underplate

Insert — Polyphenylene Sulfide (PPS)

Spacer — Black nylon



Dimensions							
A (Outside)	B (Outside)	C	D	E (Inside)	F	G (Inside)	H
.643 16.33	.311 7.9	.984 24.99	1.213 30.81	.666 16.92	.494 12.55	.329 8.36	.235 5.97
.971 24.66	.311 7.9	1.312 33.32	1.541 39.14	.994 25.25	.494 12.55	.329 8.36	.235 5.97
1.511 38.38	.311 7.9	1.852 47.04	2.088 53.04	1.534 38.96	.494 12.55	.329 8.36	.230 5.84
2.159 54.84	.311 7.9	2.500 63.5	2.729 69.32	2.182 55.42	.494 12.55	.329 8.36	.230 5.84
2.064 52.43	.423 10.74	2.406 61.11	2.635 66.93	2.079 52.81	.605 15.37	.441 11.20	.230 5.84
2.189 55.60	.485 12.32	2.500 63.5	2.729 69.32	2.212 56.18	.668 16.97	.503 12.78	.230 5.84

No. of Contact Pos. (Shell Size)	Standard (Cadmium Over Steel)	Non-Magnetic (Gold Over Brass)
15 (1)	211010-1	211010-4
26 (2)	211011-1	211011-4
44 (3)	211012-1	211012-4
62 (4)	211013-1	211013-4
78 (5)	211014-1	211014-4
104 (6)	211015-1	211015-4

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UK: 44-208-420-8341

AMPLIMITE Connectors — Meets EU Directive 2002/95/EC RoHS Cross Reference

Material and Finish

Shell — Steel, tin plated per ASTM-B-545, .000400–.000550 [0.01016–0.01397] thick.

Insert — Approved material per MIL-DTL-24308.

Retention Clips — Stainless steel or copper alloy.

Related Product Data

Series 109 Connectors — page 5-180

Series 90 Connectors — pages 5-208 to 5-211

Coax Mix Connectors — page 5-199

Attention: Connector Marking

Connector marking may differ from package marking.

Note: Meets 48 hr. salt spray requirements of MIL-DTL-24308.

Series 109 Connectors

No. of Contact Pos. (Shell Size)	Part Number	Description	Dimensions
9 (1)	205162-6	Plug Only	Refer to page 5-180
	205162-5	Plug Only with Grounding Indents	
	205161-5	Receptacle Only	
15 (2)	205164-6	Plug Only	Refer to page 5-180
	205164-5	Plug Only with Grounding Indents	
	205163-5	Receptacle Only	
25 (3)	205166-5	Plug Only	Refer to page 5-180
	205166-4	Plug Only with Grounding Indents	
	205165-4	Receptacle Only	
37 (4)	205168-7	Plug Only	Refer to page 5-180
	205168-6	Plug Only with Grounding Indents	
	205167-5	Receptacle Only	
50 (5)	205170-5	Plug Only	Refer to page 5-180
	205170-4	Plug Only with Grounding Indents	
	205169-4	Receptacle Only	

Series 90 Connectors

No. of Contact Pos. (Shell Size)	Part Number	Description	Dimensions
15 (1)	204501-6	Plug Only	Refer to pages 5-208 to 5-211
	204501-5	Plug Only with Grounding Indents	
	204500-4	Receptacle Only	
26 (2)	204503-5	Plug Only	Refer to pages 5-208 to 5-211
	204503-4	Plug Only with Grounding Indents	
	204502-4	Receptacle Only	
44 (3)	204505-6	Plug Only	Refer to pages 5-208 to 5-211
	204505-5	Plug Only with Grounding Indents	
	204504-5	Receptacle Only	
62 (4)	204507-6	Plug Only	Refer to pages 5-208 to 5-211
	204507-5	Plug Only with Grounding Indents	
	204506-6	Receptacle Only	
78 (5)	204509-7	Plug Only	Refer to pages 5-208 to 5-211
	204509-8	Plug Only with Grounding Indents	
	204508-5	Receptacle Only	
104 (6)	—	Plug Only	Refer to pages 5-208 to 5-211
	—	Plug Only with Grounding Indents	
	—	Receptacle Only	

Coax Mix Connectors

Insert Arrangement (Shell Size)	Part Number	Description	Dimensions
11C1 (2)	—	Plug Only	Refer to page 5-180
	211111-6	Plug Only with Grounding Indents	
	211112-6	Receptacle Only	
21C1 (3)	212522-7	Plug Only	Refer to page 5-180
	212522-6	Plug Only with Grounding Indents	
	212526-6	Receptacle Only	
5C5 (3)	1-212491-0	Plug Only	Refer to page 5-180
	212491-9	Plug Only with Grounding Indents	
	1-212059-0	Receptacle Only	
21C4 (4)	212530-6	Plug Only	Refer to page 5-180
	212530-5	Plug Only with Grounding Indents	
	212534-5	Receptacle Only	
24C7 (5)	208743-5	Plug Only	Refer to page 5-180
	208743-7	Plug Only with Grounding Indents	
	208552-6	Receptacle Only	

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AMPLIMITE Connectors, ULTRA-LITE Connectors

Product Facts

- One-piece aluminum shells for light-weight and enhanced EMI performance
- Connectors are typically 15–20% lighter than brass counterparts
- Intermates/interchanges with existing designs
- Enhanced EMI performance over brass shells by 10–20 dB
- Series 109 Plugs & Receptacles shell size 1 through 5 (9-50 positions)
- Series 90 Plugs & Receptacles in shell size 1 through 6 (15-104 positions)
- Can be provided with or without grommet
- Plug shells include grounding indents
- Designed to meet NASA 311P
- Designed to meet MIL-DTL-24308D specification
- DSCC Drawings 99012 through 99015

Material and Finish

Housing Material — Polyphenylene Sulfide (PPS)

Shell Finish — .000050 [0.00127] min. gold plate over .00100–.00125 [0.0254–0.0318] nickel underplate

Shell Material — Aluminum alloy

Temperature Range — –67°F to 257°F [–55°C to 125°C]

Voltage Rating — 300 V

Current Rating — Contact current rating per MIL-C-39029
Size 20 — 7.5 amps in free air
Size 22 — 5.0 amps in free air
(refer to MIL Spec. for cable specifications)

Low Level Termination Resistance — 11 Ohm max. 109 Series, 17 milliohms only for 90 Series per MIL-C-39029

Performance Characteristics

Dielectric Withstanding Voltage — 1000 VAC between adjacent pos.

Insulation Resistance — Min. 1000 milliohm between adjacent pos.

Voltage Rating — 300 V

Durability — Up to 500 matings/cycle

Vibration — 3.13 G's RMS between 5–500 Hz 15 minutes per plane

Physical Shock — 18 drops, half-sine 30 G's at 11 millisecond

Temperature Range — –67°F to 257°F [–55°C to 125°C]

Thermal Shock — –67°F to 257°F [–55°C to 125°C]

Temperature-Humidity — 77°F to 149°F [+25°C to +65°C] at 95% relative humidity

Corrosion — Mixed flowing gas, class II

Product Specifications — 108-1834 (Design objectives)

Weight Comparisons for the AMPLIMITE Connector Series 90 (1) PC AL vs the (2) PC Brass NASA Grade Connector Assemblies

Receptacles

Shell Size	Connector Position	Aluminum Shell Assy. Without Grommet	Brass Shell Assy. Without Grommet	Brass to Aluminum % Difference Without Grommet
1	15	4	5.2	23.1%
2	26	6.2	7.5	17.3%
3	44	9	10.9	17.4%
4	62	12.4	15.3	19.0%
5	78	15.3	17.9	14.5%
6	104	17.2	20	14.0%

Note: All weight values are in grams.

Plugs

Shell Size	Connector Position	Aluminum Shell Assy. Without Grommet	Brass Shell Assy. Without Grommet	Brass to Aluminum % Difference Without Grommet
1	15	3.6	4.6	21.7%
2	26	5.3	6.2	14.5%
3	44	7.8	10.3	24.3%
4	62	10.9	14.1	22.7%
5	78	12.7	15.9	20.1%
6	104	14.3	17.5	18.3%

Note: All weight values are in grams.

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, ULTRA-LITE Connectors (Continued)

ULTRA-LITE Connector Plugs and Receptacles, Series 109

Connector Material and Finish

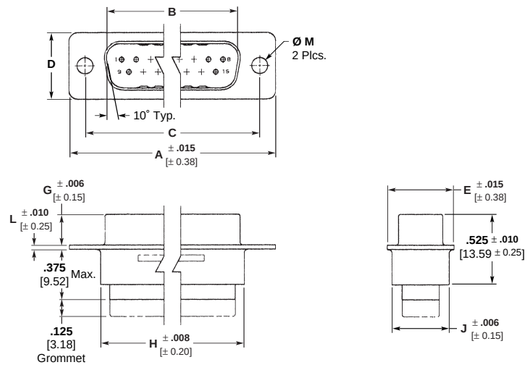
Shell — Aluminum alloy, gold plated per MIL-G-45204 over nickel per MIL-C-26074.

Insert — Blue diallyl phthalate per MIL-M-14 or black Polyphenylene Sulfide (PPS) per MIL-M-24519 or blue thermoplastic per MIL-M-24519

Retention Clips — Beryllium copper

Grommet — Silicon rubber per ZZ-R-765, color: red

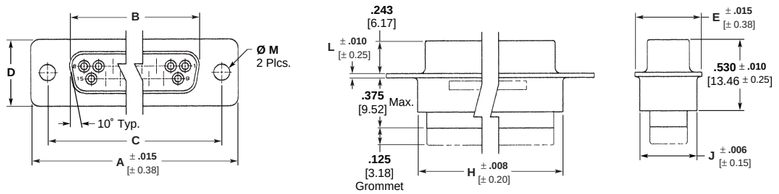
Contacts — Uses size 20 crimp or posted contacts, ref. pages 5-177 to 5-179.



Plugs

No. of Contact Pos. (Shell Size)	Dimensions									NASA Part Number	AMP RoHS Part Number	
	A	B	C	D	E	G	H	J	L		M = .120 [3.05]	M = .154 [3.91]
9 (1)	**1.213** 30.81	**.666** 16.92	**.984** 24.99	**.329** 8.36	**.494** 12.55	**.235** 5.97	**.770** 19.56	**.438** 11.13	**.030** 0.76	311P409-1P-B-15	1218234-1 1218234-6*	1883005-1
15 (2)	**1.541** 39.14	**.994** 25.25	**1.312** 33.32	**.329** 8.36	**.494** 12.55	**.235** 5.97	**1.094** 27.79	**.438** 11.13	**.030** 0.76	311P409-2P-B-15	1218234-2 1218234-7*	1883005-2
25 (3)	**2.088** 53.04	**1.534** 38.96	**1.852** 47.04	**.329** 8.36	**.494** 12.55	**.230** 5.84	**1.636** 41.55	**.438** 11.13	**.039** 0.99	311P409-3P-B-15	1218234-3 1218234-8*	1883005-3
37 (4)	**2.729** 69.32	**2.182** 55.42	**2.500** 63.50	**.329** 8.36	**.494** 12.55	**.230** 5.84	**2.284** 58.01	**.438** 11.13	**.039** 0.99	311P409-4P-B-15	1218234-4 1218234-9*	1883005-4
50 (5)	**2.635** 66.93	**2.079** 52.81	**2.406** 61.11	**.441** 11.20	**.605** 15.38	**.230** 5.84	**2.189** 55.60	**.550** 13.97	**.039** 0.99	311P409-5P-B-15	1218234-5 1-1218234-0*	1883005-5

*Rubber Grommet



Receptacles

No. of Contact Pos. (Shell Size)	Dimensions								NASA Part Number	AMP RoHS Part Number	
	A	B	C	D	E	H	J	L		M = .120 [3.05]	M = .154 [3.91]
9 (1)	**1.213** 30.81	**.643** 16.33	**.984** 24.99	**.311** 7.90	**.494** 12.55	**.770** 19.56	**.438** 11.13	**.030** 0.76	311P409-1S-B-15	1218235-1 1218235-6*	1883006-1
15 (2)	**1.541** 39.14	**.971** 24.66	**1.312** 33.32	**.311** 7.90	**.494** 12.55	**1.094** 27.79	**.438** 11.13	**.030** 0.76	311P409-2S-B-15	1218235-2 1218235-7*	1883006-2
25 (3)	**2.088** 53.04	**1.511** 38.38	**1.852** 47.04	**.311** 7.90	**.494** 12.55	**1.636** 41.55	**.438** 11.13	**.039** 0.99	311P409-3S-B-15	1218235-3 1218235-8*	1883006-3
37 (4)	**2.729** 69.32	**2.159** 54.84	**2.500** 63.50	**.311** 7.90	**.494** 12.55	**2.284** 58.01	**.438** 11.13	**.039** 0.99	311P409-4S-B-15	1218235-4 1218235-9*	1883006-4
50 (5)	**2.635** 66.93	**2.064** 52.43	**2.406** 61.11	**.423** 10.74	**.605** 15.38	**2.189** 55.60	**.550** 13.97	**.039** 0.99	311P409-5S-B-15	1218235-5 1-1218235-0*	1883006-5

*Rubber Grommet

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

ULTRA-LITE Connector Plugs and Receptacles, Series 90

Connector Material and Finish

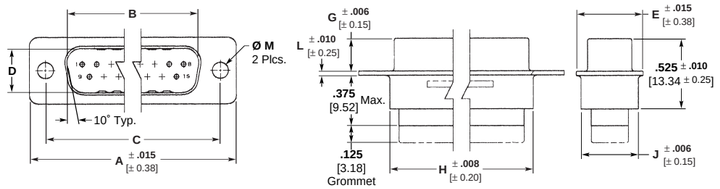
Shell — Aluminum alloy, gold plated per MIL-G-45204 over nickel per MIL-C-26074.

Insert — Blue diallyl phthalate per MIL-M-14 or black Polyphenylene Sulfide (PPS) per MIL-M-24519 or blue thermoplastic per MIL-M-24519

Retention Clips — Beryllium copper

Grommet — Silicon rubber per ZZ-R-765, color: red

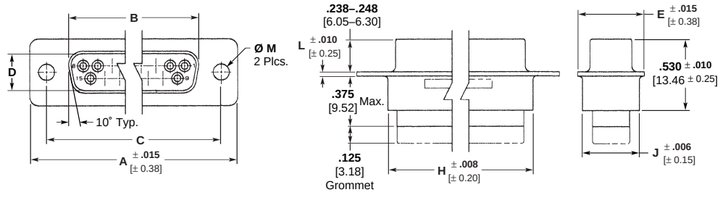
Contacts — Uses size 22 crimp and posted contacts, ref. pages 5-206 and 5-207.



Plugs

No. of Contact Pos. (Shell Size)	Dimensions									NASA Part Number	AMP RoHS Part Number	
	A	B	C	D	E	G	H	J	L		M = .120 [3.05]	M = .154 [3.91]
15 (1)	**1.213** 30.81	**.666** 16.92	**.984** 24.99	**.329** 8.36	**.494** 12.55	**.235** 5.97	**.770** 19.56	**.438** 11.13	**.030** 0.76	311P407-1P-B-15	1218232-1 1218232-7*	1883007-1
26 (2)	**1.541** 39.14	**.994** 25.25	**1.312** 33.32	**.329** 8.36	**.494** 12.55	**.235** 5.97	**1.094** 27.79	**.438** 11.13	**.030** 0.76	311P407-2P-B-15	1218232-2 1218232-8*	1883007-2
44 (3)	**2.088** 53.04	**1.534** 38.96	**1.852** 47.04	**.329** 8.36	**.494** 12.55	**.230** 5.84	**1.636** 41.55	**.438** 11.13	**.039** 0.99	311P407-3P-B-15	1218232-3 1218232-9*	1883007-3
62 (4)	**2.729** 69.32	**2.182** 55.42	**2.500** 63.50	**.329** 8.36	**.494** 12.55	**.230** 5.84	**2.284** 58.01	**.438** 11.13	**.039** 0.99	311P407-4P-B-15	1218232-4 1-1218232-0*	1883007-4
78 (5)	**2.635** 66.93	**2.079** 52.81	**2.406** 61.11	**.441** 11.20	**.605** 15.38	**.230** 5.84	**2.189** 55.60	**.550** 13.97	**.039** 0.99	311P407-5P-B-15	1218232-5 1-1218232-1*	1883007-5
104 (6)	**2.729** 69.32	**2.212** 56.18	**2.500** 63.50	**.503** 12.78	**.668** 16.97	**.230** 5.84	**2.313** 58.75	**.608** 15.44	**.039** 0.99	311P407-6P-B-15	1218232-6 1-1218232-2*	1883007-6

*Rubber Grommet



Receptacles

No. of Contact Pos. (Shell Size)	Dimensions								NASA Part Number	AMP RoHS Part Number	
	A	B	C	D	E	H	J	L		M = .120 [3.05]	M = .154 [3.91]
15 (1)	**1.213** 30.81	**.644** 16.36	**.984** 24.99	**.311** 7.90	**.494** 12.55	**.770** 19.56	**.438** 11.13	**.030** 0.76	311P407-1S-B-15	1218233-1 1218233-7*	1883008-1
26 (2)	**1.541** 39.14	**.972** 24.69	**1.312** 33.32	**.311** 7.90	**.494** 12.55	**1.094** 27.79	**.438** 11.13	**.030** 0.76	311P407-2S-B-15	1218233-2 1218233-8*	1883008-2
44 (3)	**2.088** 53.04	**1.512** 38.40	**1.852** 47.04	**.311** 7.90	**.494** 12.55	**1.636** 41.55	**.438** 11.13	**.039** 0.99	311P407-3S-B-15	1218233-3 1218233-9*	1883008-3
62 (4)	**2.729** 69.32	**2.160** 54.86	**2.500** 63.50	**.311** 7.90	**.494** 12.55	**2.284** 58.01	**.438** 11.13	**.039** 0.99	311P407-4S-B-15	1218233-4 1-1218233-0*	1883008-4
78 (5)	**2.635** 66.93	**2.065** 52.45	**2.406** 61.11	**.423** 10.74	**.605** 15.38	**2.189** 55.60	**.550** 13.97	**.039** 0.99	311P407-5S-B-15	1218233-5 1-1218233-1*	1883008-5
104 (6)	**2.729** 69.32	**2.190** 55.63	**2.500** 63.50	**.485** 12.32	**.668** 16.97	**2.313** 58.75	**.608** 15.44	**.039** 0.99	311P407-6S-B-15	1218233-6 1-1218233-2*	1883008-6

*Rubber Grommet

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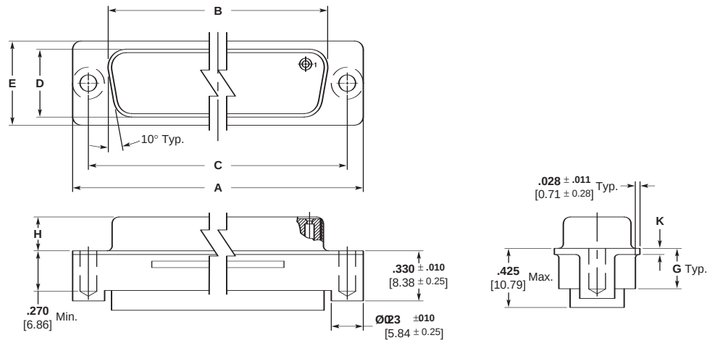
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, ULTRA-LITE Connectors (Continued)

ULTRA-LITE Connector Plugs and Receptacles, Series 109, Crimp

Meets EU Directive 2002/95/EC RoHS



Plugs

No. of Contact Pos. (Shell Size)	Dimensions								NASA Part Number	AMP Part Number
	A	B	C	D	E	G ± .010 [0.25]	H	K		
9	**1.208/1.218**	**.661/.671**	**.979/.989**	**.324/.334**	**.489/.499**	**.294**	**.229/.241**	**.035**	311P409-1P-B-440	1883053-1
(1)	30.68/30.94	16.79/17.04	24.87/25.12	8.23/8.48	12.42/12.67	7.47	5.82/6.12	0.89		
15	**1.536/1.546**	**.989/.999**	**1.307/1.317**	**.324/.334**	**.489/.499**	**.294**	**.229/.241**	**.035**	311P409-2P-B-440	1883053-2
(2)	39.01/39.27	25.12/25.37	33.20/33.45	8.23/8.48	12.42/12.67	7.47	5.82/6.12	0.89		
25	**2.083/2.093**	**1.529/1.239**	**1.848/1.857**	**.324/.334**	**.489/.499**	**.299**	**.224/.236**	**.044**	311P409-3P-B-440	1883053-3
(3)	52.91/53.16	38.84/39.09	46.91/47.17	8.23/8.48	12.42/12.67	7.59	5.69/5.99	1.12		
37	**2.724/2.734**	**2.177/2.187**	**2.495/2.505**	**.324/.334**	**.489/.499**	**.299**	**.224/.236**	**.044**	311P409-4P-B-440	1883053-4
(4)	69.20/69.44	55.30/55.55	63.37/63.63	8.23/8.48	12.42/12.67	7.59	5.69/5.99	1.12		
50	**2.630/2.640**	**2.074/2.084**	**2.401/2.411**	**.436/.446**	**.500/.610**	**.299**	**.224/.236**	**.044**	311P409-5P-B-440	1883053-5
(5)	66.80/67.06	52.68/52.93	60.99/61.24	11.07/11.33	15.24/15.49	7.59	5.69/5.99	1.12		

Receptacles

No. of Contact Pos. (Shell Size)	Dimensions								NASA Part Number	AMP Part Number
	A	B	C	D	E	G ± .010 [0.25]	H	K		
9	**1.208/1.218**	**.638/.648**	**.979/.989**	**.306/.316**	**.489/.499**	**.290**	**.270**	**.035**	311P409-1S-B-440	1883054-1
(1)	30.68/30.94	16.21/16.46	24.87/25.12	7.77/8.03	12.42/12.67	7.37	6.86	0.89		
15	**1.536/1.546**	**.966/.976**	**1.307/1.317**	**.306/.316**	**.489/.499**	**.290**	**.270**	**.035**	311P409-2S-B-440	1883054-2
(2)	39.01/39.27	24.54/24.79	33.20/33.45	7.77/8.03	12.42/12.67	7.37	6.86	0.89		
25	**2.083/2.093**	**1.506/1.516**	**1.847/1.857**	**.306/.316**	**.489/.499**	**.290**	**.270**	**.044**	311P409-3S-B-440	1883054-3
(3)	52.91/53.16	38.25/38.51	46.91/47.17	7.77/8.03	12.42/12.67	7.37	6.86	1.12		
37	**2.724/2.734**	**2.154/2.164**	**2.495/2.505**	**.306/.316**	**.489/.499**	**.290**	**.270**	**.044**	311P409-4S-B-440	1883054-4
(4)	69.20/69.44	54.71/54.97	63.37/63.63	7.77/8.03	12.42/12.67	7.37	6.86	1.12		
50	**2.630/2.640**	**2.059/2.069**	**2.401/2.411**	**.418/.428**	**.600/.610**	**.290**	**.270**	**.044**	311P409-5S-B-440	1883054-5
(5)	66.80/67.06	52.30/52.55	60.99/61.24	10.62/10.87	15.24/15.49	7.37	6.86	1.12		

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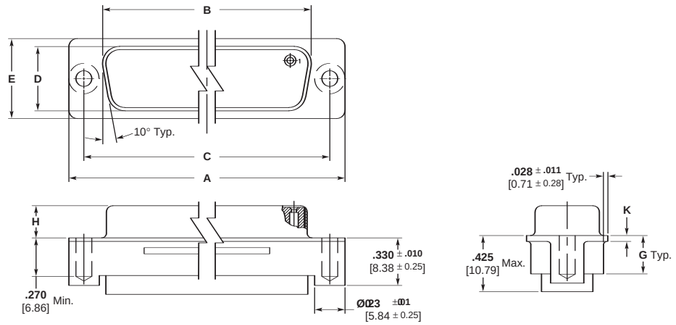
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors, ULTRA-LITE Connectors (Continued)

ULTRA-LITE Connector Plugs and Receptacles, Series 109, Crimp (Continued)

Meets EU Directive 2002/95/EC RoHS



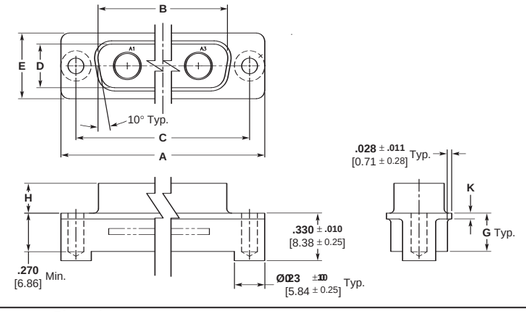
Plugs

No. of Contact Pos. (Shell Size)	Dimensions								NASA Part Number	AMP Part Number
	A	B	C	D	E	G ± .010 [0.25]	H	K		
15 (1)	**1.208/1.218** 30.68/30.94	**.661/.671** 16.79/17.04	**.979/.989** 24.87/25.12	**.324/.334** 8.23/8.48	**.489/.499** 12.42/12.67	**.294** 7.47	**.229/.241** 5.82/6.12	**.035** 0.89	311P407-1P-B-440	1883055-1
26 (2)	**1.536/1.546** 39.01/39.27	**.989/.999** 25.12/25.37	**1.307/1.317** 33.20/33.45	**.324/.334** 8.23/8.48	**.489/.499** 12.42/12.67	**.294** 7.47	**.229/.241** 5.82/6.12	**.035** 0.89	311P407-2P-B-440	1883055-2
44 (3)	**2.083/2.093** 52.91/53.16	**1.529/1.539** 38.84/39.09	**1.847/1.857** 46.91/47.17	**.324/.334** 8.23/8.48	**.489/.499** 12.42/12.67	**.299** 7.59	**.224/.236** 5.69/5.99	**.044** 1.12	311P407-3P-B-440	1883055-3
62 (4)	**2.724/2.734** 69.20/69.44	**2.177/2.187** 55.30/55.55	**2.495/2.505** 63.37/63.63	**.324/.334** 8.23/8.48	**.489/4.99** 12.42/12.67	**.299** 7.59	**.224/.236** 5.69/5.99	**.044** 1.12	311P407-4P-B-440	1883055-4
78 (5)	**2.630/2.640** 66.80/67.06	**2.074/2.084** 52.68/52.93	**2.401/2.411** 60.99/61.24	**.436/.446** 11.07/11.33	**.600/.610** 15.24/15.49	**.299** 7.59	**.224/.236** 5.69/5.99	**.044** 1.12	311P407-5P-B-440	1883055-5

Receptacles

No. of Contact Pos. (Shell Size)	Dimensions								NASA Part Number	AMP Part Number
	A	B	C	D	E	G ± .010 [0.25]	H	K		
15 (1)	**1.208/1.218** 30.68/30.94	**.638/.648** 16.21/16.46	**.979/.989** 24.87/25.12	**.306/.316** 7.77/8.03	**.489/.499** 12.42/12.67	**.290** 7.37	**.243** 6.17	**.035** 0.89	311P407-1S-B-440	1883056-1
26 (2)	**1.536/1.546** 39.01/39.27	**.966/.976** 24.54/24.79	**1.307/1.317** 33.20/33.45	**.306/.316** 7.77/8.03	**.489/.499** 12.42/12.67	**.290** 7.37	**.243** 6.17	**.035** 0.89	311P407-2S-B-440	1883056-2
44 (3)	**2.083/2.093** 52.91/53.16	**1.506/1.516** 38.25/38.51	**1.847/1.857** 46.91/47.17	**.306/.316** 7.77/8.03	**.489/.499** 12.42/12.67	**.290** 7.37	**.243** 6.17	**.044** 1.12	311P407-3S-B-440	1883056-3
62 (4)	**2.724/2.734** 69.20/69.44	**2.154/2.164** 54.71/54.97	**2.495/2.505** 63.37/63.63	**.306/.316** 7.77/8.03	**.489/.499** 12.42/12.67	**.290** 7.37	**.243** 6.17	**.044** 1.12	311P407-4S-B-440	1883056-4
78 (5)	**2.630/2.640** 66.80/67.06	**2.059/2.069** 52.30/52.55	**2.401/2.411** 60.99/61.24	**.418/.428** 10.62/10.87	**.600/.610** 15.24/15.49	**.290** 7.37	**.243** 6.17	**.044** 1.12	311P407-5S-B-440	1883056-5

ULTRA-LITE Connector Plugs and Receptacles, Coax Mix



Insert Arrangement (Shell Size)	Dimensions								NASA Part Number	AMP Part Number
	A	B	C	D	E	G ± .010 [0.25]	H	K		
3C3 (2)	**1.536/1.546** 39.01/39.27	**.989/.999** 25.12/25.37	**1.307/1.317** 33.20/33.45	**.324/.334** 8.23/8.48	**.489/.499** 12.42/12.67	**.294** 7.47	**.229/.241** 5.82/6.12	**.035** 0.89	311P405-7P-B-440	1883057-1
3C3 (2)	**1.536/1.546** 39.01/39.27	**.966/.976** 24.54/24.79	**1.307/1.317** 33.20/33.45	**.306/.316** 7.77/8.03	**.489/.499** 12.42/12.67	**.290** 7.37	**.243** 6.17	**.035** 0.89	311P405-7S-B-440	1883058-1
5C5 (3)	**2.083/2.093** 52.91/53.16	**1.529/1.539** 38.84/39.09	**1.847/1.857** 46.91/47.17	**.324/.334** 8.23/8.48	**.489/.499** 12.42/12.67	**.299** 7.59	**.224/.236** 5.69/5.99	**.044** 1.12	311P405-10P-B-440	1883059-1
5C5 (3)	**2.083/2.093** 52.91/53.16	**1.506/1.516** 38.25/38.51	**1.847/1.857** 46.91/47.17	**.306/.316** 7.77/8.03	**.489/.499** 12.42/12.67	**.290** 7.37	**.243** 6.17	**.044** 1.12	311P405-10S-B-440	1883060-1

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ULTRA-LITE AMPLIMITE Connector Part Numbers vs. NASA's 311P Part Numbers and DSCC Part Numbers

AMPLIMITE Connector Series 90 (High Density Sub "D"'s)

DSCC Part No. w/Grommet	DSCC Part No. w/out Grommet	NASA Part No. w/out Grommet	Plug / Receptacle	Shell Size	Position	ULTRA-LITE Connectors	
						Part No. w/out Grommet	Part No. with Grommet
99012SAFPRA-1	99012NAFPR-1	311P407-1P-B-12	Plug	1	15	1218232-1	1218232-7
99012SAFPRA-2	99012NAFPR-2	311P407-2P-B-12	Plug	2	26	1218232-2	1218232-8
99012SAFPRA-3	99012NAFPR-3	311P407-3P-B-12	Plug	3	44	1218232-3	1218232-9
99012SAFPRA-4	99012NAFPR-4	311P407-4P-B-12	Plug	4	62	1218232-4	1-1218232-0
99012SAFPRA-5	99012NAFPR-5	311P407-5P-B-12	Plug	5	78	1218232-5	1-1218232-1
99012SAFPRA-6	99012NAFPR-6	311P407-6P-B-12	Plug	6	104	1218232-6	1-1218232-2
99014SAESR-1	99014NAESR-1	311P407-1S-B-12	Receptacle	1	15	1218233-1	1218233-7
99014SAESR-2	99014NAESR-2	311P407-2S-B-12	Receptacle	2	26	1218233-2	1218233-8
99014SAESR-3	99014NAESR-3	311P407-3S-B-12	Receptacle	3	44	1218233-3	1218233-9
99014SAESR-4	99014NAESR-4	311P407-4S-B-12	Receptacle	4	62	1218233-4	1-1218233-0
99014SAESR-5	99014NAESR-5	311P407-5S-B-12	Receptacle	5	78	1218233-5	1-1218233-1
99014SAESR-6	99014NAESR-6	311P407-6S-B-12	Receptacle	6	104	1218233-6	1-1218233-2

AMPLIMITE Connector Series 109 (Standard Density Sub "D"'s)

DSCC Part No. w/Grommet	DSCC Part No. w/out Grommet	NASA Part No. w/out Grommet	Plug / Receptacle	Shell Size	Position	ULTRA-LITE Connectors	
						Part No. w/out Grommet	Part No. with Grommet
99013SAEPR-1	99013NAEPR-1	311P409-1P-B-12	Plug	1	9	1218234-1	1218234-7
99013SAEPR-2	99013NAEPR-2	311P409-2P-B-12	Plug	2	15	1218234-2	1218234-8
99013SAEPR-3	99013NAEPR-3	311P409-3P-B-12	Plug	3	25	1218234-3	1218234-9
99013SAEPR-4	99013NAEPR-4	311P409-4P-B-12	Plug	4	37	1218234-4	1-1218234-0
99013SAEPR-5	99013NAEPR-5	311P409-5P-B-12	Plug	5	50	1218234-5	1-1218234-1
99015SAESR-1	99015NAESR-1	311P409-1S-B-12	Receptacle	1	9	1218235-1	1218235-7
99015SAESR-2	99015NAESR-2	311P409-2S-B-12	Receptacle	2	15	1218235-2	1218235-8
99015SAESR-3	99015NAESR-3	311P409-3S-B-12	Receptacle	3	25	1218235-3	1218235-9
99015SAESR-4	99015NAESR-4	311P409-4S-B-12	Receptacle	4	37	1218235-4	1-1218235-0
99015SAESR-5	99015NAESR-5	311P409-5S-B-12	Receptacle	5	50	1218235-5	1-1218235-1

Note: AMP Part Nos. are not NASA approved parts, but will conform to NASA's performance requirements.

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AMPLIMITE Connectors

Application Tools for Series 109 (Size 20) Crimp Contacts

Pin and Socket Insertion/Extraction Tool

AMP Part Number 91067-2 or
MIL Part Number M81969/1-02

Insertion tip, for replacement
Part Number 126195-3

Extraction tip, for replacement
Part Number 126195-4

AMP-TAPEMATIC Stripper/ Crimper Machine Part Number 599406-7

Funnel Part Number 125905-1 for Size 20 Contacts

The AMP-TAPEMATIC Stripper/Crimper Machine strips wire and applies an 8-indent crimp termination per MIL-C-22520. The machine terminates pin and socket contacts which are tape mounted and reel fed. It offers production rates of up to 1200 finished leads per hour, provides overall lower applied costs and maintains a high degree of termination reliability.

Hand Crimping Tool AMP Part Number 601966-1 or MIL Part Number M22520/2-01

Positioner AMP Part Number 601966-5 or MIL Part Number M22520/2-08

This standard military-type hand tool terminates pins and sockets to wire with an 8-indent, M22520/2 crimp. It is ideally suited for prototype, field maintenance and other applications where volume production is not a factor.

Application Tools for Series 90 (Size 22) Crimp Contacts

Pin and Socket Insertion/Extraction Tool

AMP Part Number 91067-1 or
MIL Part Number M81969/1-04

Insertion tip, for replacement
Part Number 126237-1

Extraction tip, for replacement
Part Number 126195-2

AMP-TAPEMATIC Stripper/ Crimper Machine Part Number 599406-7

Funnel Part Number 125905-2 for Size 22 Contacts

The AMP-TAPEMATIC Stripper/Crimper Machine strips wire and applies an 8-indent crimp termination per MIL-C-22520. The machine terminates pin and socket contacts which are tape mounted and reel fed. It offers production rates of up to 1200 finished leads per hour, provides overall lower applied costs and maintains a high degree of termination reliability.

Hand Crimping Tool AMP Part Number 601966-1 or MIL Part Number M22520/2-01

Positioner (Pin) AMP Part Number 601966-6 or MIL Part Number M22520/2-09

Positioner (Socket) AMP Part Number 601966-4 or MIL Part Number M22520/2-06

This standard military-type hand tool terminates pins and sockets to wire with an 8-indent, M22520/2 crimp. It is ideally suited for prototype, field maintenance and other applications where volume production is not a factor.

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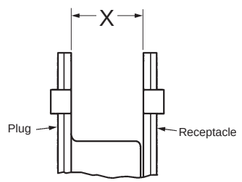
AMPLIMITE Connectors (Continued)

Mating and Mounting Specifications for Series 109 and Series 90 Connectors

Plug Receptacle Mating



Shell Sizes 1 and 2 —
x = .280/.250 [7.11/6.35]

Shell Sizes 3, 4, 5 and 6 —
x = .271/.241 [6.88/6.12]

Blindmate Connectors (all sizes) —
x = .270 [6.86] min.

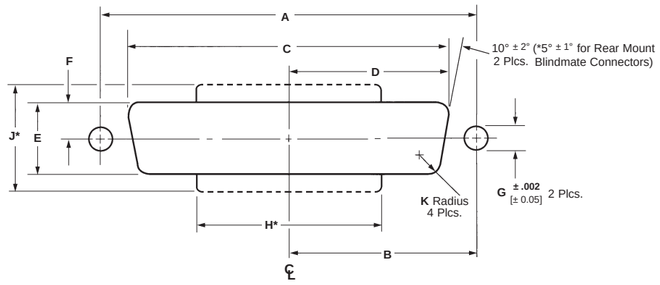
The X dimension is necessary for full mating of connector halves. This dimension must be taken into consideration when determining the method of mounting, panel thickness, etc.

AMPLIMITE Plug, Front-Panel Mounted

AMPLIMITE Receptacle, Rear-Panel Mounted

Attention: Front-Panel Mount

When front mounting a MIL-DTL-24308 connector utilizing the tab method of securing shell halves, it is recommended to utilize a .032 [0.81] thick washer (not supplied) to prevent deformation of connector flange.



Panel Cutout

Shell Size (No. of Contact Pos.)		Mounting Method		Dimensions									
Series 109 Connectors	Series 90 Connectors	Front/Rear Panel	With/Without Flouting Bushing	A	B	C	D	E	F	G	H*	J*	K
1 (9 Pos.)	1 (15 Pos.)	Front	With	.984 24.99	.492 12.5	.906 23.01	.453 11.51	.545 13.84	.273 6.93	.088 2.24	—	—	.083 2.11
			Without			.874 22.2	.437 11.1	.513 13.03	.257 6.53	.120 3.05	—	—	
		Rear	With			.838 21.29	.419 10.64	.481 12.22	.241 6.12	.088 2.24	.332 8.43	.662 16.81	.132 3.35
			Without			.806 20.47	.403 10.24	.449 11.4	.225 5.72	.120 3.05	.300 7.62	.630 16	
2 (15 Pos.)	2 (26 Pos.)	Front	With	1.312 33.32	.656 16.66	1.234 31.34	.617 15.67	.545 13.84	.273 6.93	.088 2.24	—	—	.083 2.11
			Without			1.202 30.53	.601 15.27	.513 13.03	.257 6.53	.120 3.05	—	—	
		Rear	With			1.166 29.62	.583 14.81	.481 12.22	.241 6.12	.088 2.24	.665 6.64	.662 16.81	.132 3.35
			Without			1.134 28.8	.567 14.4	.449 11.4	.225 5.72	.120 3.05	.623 15.82	.630 16	
3 (25 Pos.)	3 (44 Pos.)	Front	With	1.852 47.04	.926 23.52	1.775 45.09	.888 22.55	.545 13.84	.273 6.93	.088 2.24	—	—	.083 2.11
			Without			1.743 44.27	.872 22.15	.513 13.03	.257 6.53	.120 3.05	—	—	
		Rear	With			1.706 43.33	.853 21.67	.481 12.22	.241 6.12	.088 2.24	1.197 30.4	.662 16.81	.132 3.35
			Without			1.674 42.52	.837 21.26	.449 11.4	.225 5.72	.120 3.05	1.165 29.59	.630 16	
4 (37 Pos.)	4 (62 Pos.)	Front	With	2.500 63.5	1.250 31.75	2.423 61.17	1.212 30.78	.545 13.84	.273 6.93	.088 2.24	—	—	.083 2.11
			Without			2.391 60.73	1.196 30.38	.513 13.03	.257 6.53	.120 3.05	—	—	
		Rear	With			2.354 59.79	1.777 29.9	.481 12.22	.241 6.12	.088 2.24	1.845 46.86	.662 16.81	.132 3.35
			Without			2.326 59.08	1.163 29.54	.449 11.4	.225 5.72	.120 3.05	1.813 46.05	.630 16	
5 (50 Pos.)	5 (78 Pos.)	Front	With	2.406 61.11	1.203 30.56	2.329 59.16	1.165 29.59	.655 16.64	.328 8.33	.088 2.24	—	—	.083 2.11
			Without			2.297 58.34	1.149 29.18	.623 15.82	.312 7.92	.120 3.05	—	—	
		Rear	With			2.250 57.15	1.125 28.58	.587 14.91	.294 7.47	.088 2.24	1.740 44.2	.772 19.61	.132 3.35
			Without			2.218 56.34	1.109 28.17	.555 14.1	.278 7.06	.120 3.05	1.708 43.38	.740 18.8	
—	6 (104 Pos.)	Front	With	2.500 63.5	1.250 31.75	2.453 62.31	1.227 31.17	.717 18.21	.359 9.12	.088 2.24	—	—	.083 2.11
			Without			2.421 61.49	1.211 30.76	.685 17.4	.343 8.71	.120 3.05	—	—	
		Rear	With			2.388 60.66	1.194 30.33	.654 16.61	.327 8.31	.088 2.24	1.875 47.64	.835 21.21	.132 3.35
			Without			2.356 59.84	1.179 29.92	.622 5.8	.311 7.9	.120 3.05	1.843 46.81	.803 20.4	

* Panel cutout configuration with these dimensions provides clearance for mounting connectors with cable clamp assemblies.

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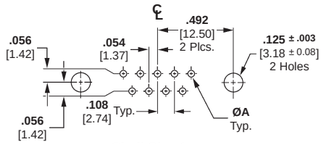
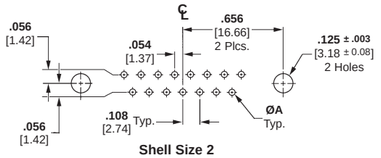
AMPLIMITE Connectors (Continued)

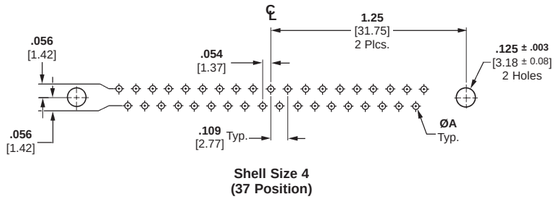
PCB Layouts — Series 109 (Standard Density)



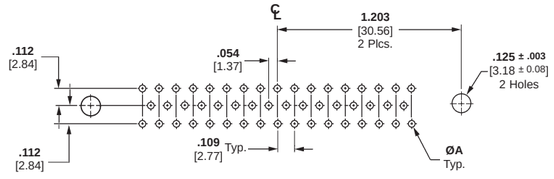
Shell Size 1 (9 Position)



Shell Size 3 (25 Position)



Shell Size 4 (37 Position)



Shell Size 5 (50 Position)

Post Diameter	ØA
.018 [0.46]	**.028** [0.71] — **.038** [0.96]
.025 [0.64]	**.035** [0.89] — **.045** [1.14]
.030 [0.76]	**.040** [1.02] — **.050** [1.27]
.040 [1.02]	**.050** [1.27] — **.060** [1.52]

Notes: 1. Mating face of plug is shown, receptacle is mirror image.
2. PCB mounting hole diameters are provided for connectors with .120 [3.05] diameter mounting holes. For connectors with .154 [3.91] mounting holes, use PCB mounting hole diameter .160 ± .003 [4.06 ± 0.08].
3. PC layouts illustrated above serve as a guide only; they are not to be used for actual design or construction of customer equipment. Consult Tyco Electronics customer print for detailed PC board layout requirements.

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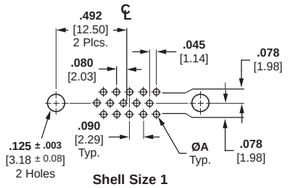
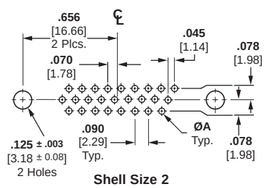
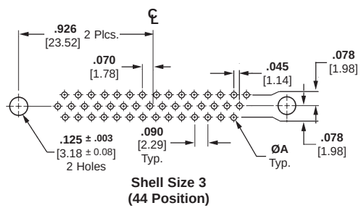
PCB Layouts — Series 90 (High Density)



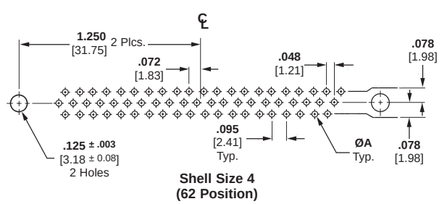
Shell Size 1
(15 Position)



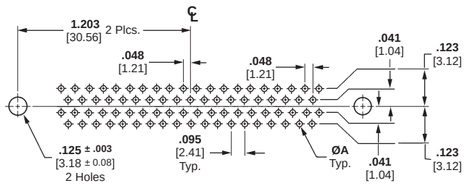
Shell Size 2
(26 Position)



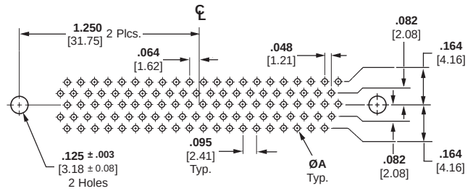
Shell Size 3
(44 Position)



Shell Size 4
(62 Position)



Shell Size 5
(78 Position)



Shell Size 6
(104 Position)

Post Diameter	ØA
.018 [0.46]	**.028** [0.71] — **.038** [0.96]
.025 [0.64]	**.035** [0.89] — **.045** [1.14]
.030 [0.76]	**.040** [1.02] — **.050** [1.27]
.040 [1.02]	**.050** [1.27] — **.060** [1.52]

Notes: 1. Mating face of plug is shown, receptacle is mirror image.
2. PCB mounting hole diameters are provided for connectors with .120 [3.05] diameter mounting holes. For connectors with .154 [3.91] mounting holes, use PCB mounting hole diameter .160 ± .003 [4.06 ± 0.08].
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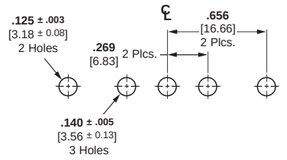
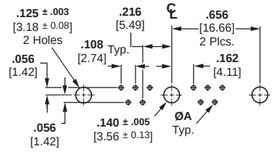
AMPLIMITE Connectors (Continued)

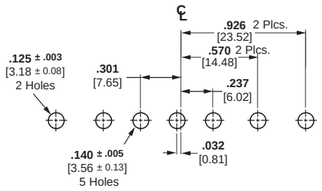
PCB Layouts (Power/Coax/Signal)



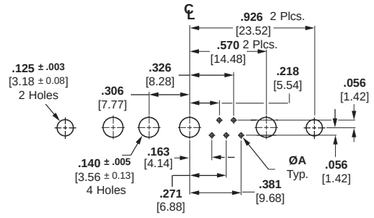
3C3



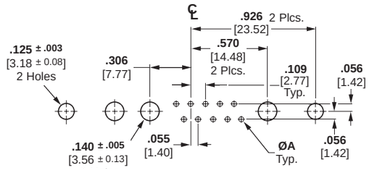
11C1



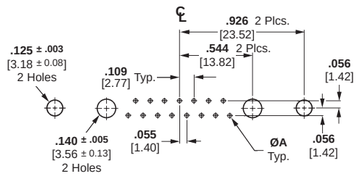
5C5



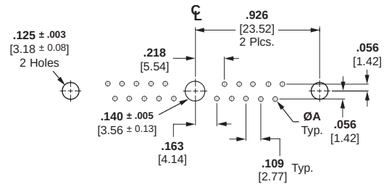
9C4



13C3



17C2



21C1

Post Diameter	ØA
.018 [0.46]	**.028** [0.71] — **.038** [0.96]
.025 [0.64]	**.035** [0.89] — **.045** [1.14]
.030 [0.76]	**.040** [1.02] — **.050** [1.27]
.040 [1.02]	**.050** [1.27] — **.060** [1.52]

Notes: 1. Mating face of plug is shown, receptacle is mirror image.
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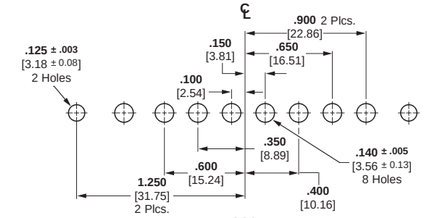
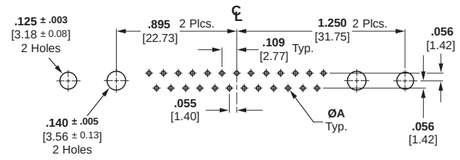
UK: 44-208-420-8341

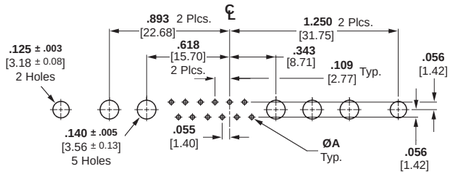
PCB Layouts (Power/Coax/Signal) (Continued)



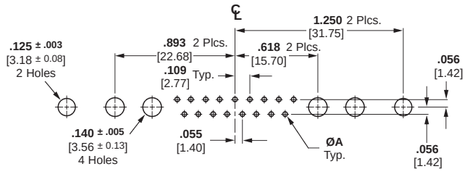
8C8



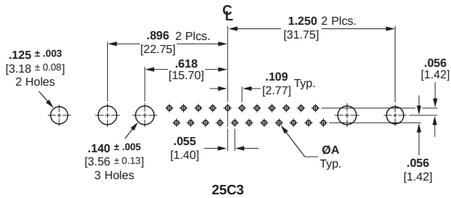
27C2



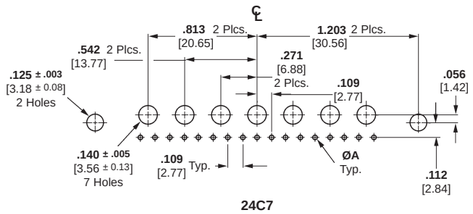
17C5



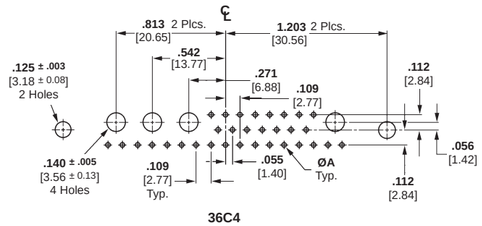
21C4



25C3



24C7



36C4

Post Diameter	ØA
.018 [0.46]	**.028** [0.71] – **.038** [0.96]
.025 [0.64]	**.035** [0.89] – **.045** [1.14]
.030 [0.76]	**.040** [1.02] – **.050** [1.27]
.040 [1.02]	**.050** [1.27] – **.060** [1.52]

Notes: 1. Mating face of plug is shown, receptacle is mirror image.
2. PCB mounting hole diameters are provided for connectors with .120 [3.05] diameter mounting holes. For connectors with .154 [3.91] mounting holes, use PCB mounting hole diameter .160 ± .003 [4.06 ± 0.08].
3. PC layouts illustrated above serve as a guide only; they are not to be used for actual design or construction of customer equipment. Consult Tyco Electronics customer print for detailed PC board layout require-

Catalog 1308940
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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors (Continued)

Accessories

Female Screwlocks for Metal-Shell Connectors

Material and Finish

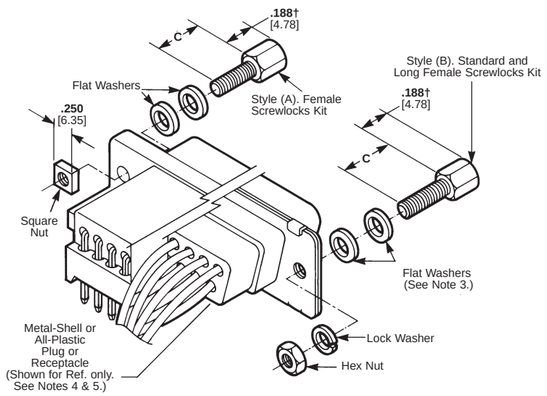
Standard Steel Parts — Cold rolled steel per ASTM A108, zinc plated per ASTM B633, Type II, Class SCI

Stainless Steel — Passivated stainless steel

Technical Documents

Instruction Sheet — 408-7837

Nut Driver, Part Number 811262-1
(Used for assembling female screwlocks to connector flange)



Connector Used with	Style	Dim. C	Thread Size	Finish	Steel Kit Number		Stainless Steel	
					Individual	Bulk Packed△	Standard Kit	Long Special
6	(B)	**.312** 7.93	4-40	Yellow Chromate	205817-1	205817-2	—	—
					748271-1†	—	—	—
				Clear Chromate	205817-3	205817-4	—	—
			M3 (Metric)	Yellow Chromate	207872-1	—	—	—
				Clear Chromate	207872-3	—	—	—
			4-40††	Yellow Chromate	206897-1	—	—	—
.090 Thick Panels †	(B)	**.312** 7.93	4-40	Yellow Chromate	748271-3	—	—	—
6	(B)	**.312** 7.93	4-40	Yellow Chromate	—	—	212447-1	—
6	(B)	**.500** 12.7	4-40	Yellow Chromate	—	—	—	212452-1

Individual Screwlocks
(Washers and Nuts not included)

Connector Used with	Style	Dimension C	Thread Size	Finish	Screwlocks	
					Individual	Bulk Packed△
6	(B)	**.312** 7.93	4-40	Yellow Chromate	205818-2	—
				Clear Chromate	205818-3	—
				Clear Chromate	748558-3△△	748558-4△△
			M2.6** (Metric)	Clear Chromate	749765-3	—
			4-40	Yellow Chromate	748270-2†	—
			M3*** (Metric)	Clear Chromate	747404-3	—
	(Special)	**.185** 4.70	4-40	Clear Chromate	747877-3	—

△Each part is individually bulk packed for multiple kit orders.
△△With captivated star washer. No additional hardware included.
†Part Number 748270-2 and 748271-1 Dimension .158 [4.01]
††206897-1 kit contains 2-screwlocks, 2-hex nuts and 2-retainers.
**M2.6 is the female thread size. The male thread size is 4-40.
***M3 is the female thread size. The male thread size is 4-40.

Notes:
1. All parts are packaged unassembled.
2. Each female screwlock kit is comprised of two assemblies as illustrated above.
3. One or two flat washers may be required for panel thicknesses less than .060 [1.52]. Female screwlocks are not recommended for panel thicknesses greater than .060 [1.52].
4. Female screwlocks with 2-56 thread size are to be used with cable clamps with mounting flanges. Female screwlocks with 4-40 and M3 (Metric) thread sizes can be used with all other cable clamps.
5. Female screwlocks mate with male screw retainers (page 5-232).
6. Series 90 and 109 Connectors without eyelets or floating bushings.

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Accessories (Continued)

Male Screw Retainers for Metal-Shell Connectors

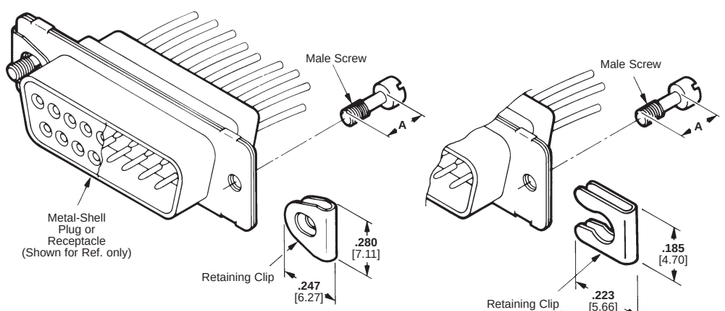
Material and Finish

Male Screw — Steel, zinc plated clear or yellow chromate

Retaining Clip — .012 [0.31] stainless steel

Technical Documents

Instruction Sheet — 408-7837



Male Screw Finish	Thread Size	Dimension A	Male Screw Retainer Kit No. Individual	Male Screw Retainer Kit No. Bulk Packed*
Yellow Chromate	4-40	**.220** 5.59	205980-1	205980-3
		.200 5.08	745136-1	745136-2
	M3 (Metric)	**.225** 5.72	207871-1	—
	M2.6 (Metric)	**.225** 5.72	750035-1	—
Clear Chromate	4-40	**.220** 5.59	205980-4	205980-5
		.200 5.08	745136-3	745136-4

*Each part is individually bulk packed for multiple kit orders.

Notes: 1. All parts are packaged unassembled.
2. Each kit is comprised of two male screws and two retaining clips. Male screw retainers are also furnished as part of cable clamp kits (pages 5-231 and 5-232).
3. Male screw retainers mate with female screwlocks (page 5-231) and with metal-shell board mount connectors featuring 4-40 threaded inserts or female screwlocks.
4. Retaining clip must be assembled onto connector flanges with threaded hole toward wire side of connector.

Stainless Steel Kit

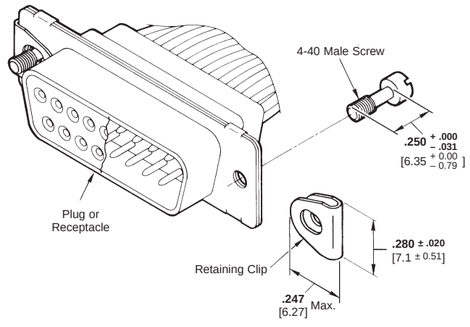
Materials

All Parts — Stainless steel, passivated per QQ-P-35B.

AMP Part Number 211883-5 or
MIL Part Number M24308/25-6P

Notes:
1. Each kit includes two screws and two retainers.
2. Retainer is assembled onto connector flange with threaded hole toward the wire side of the connector.

Male Screw Retainer Kits



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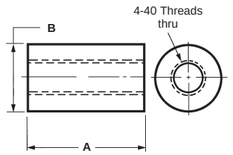
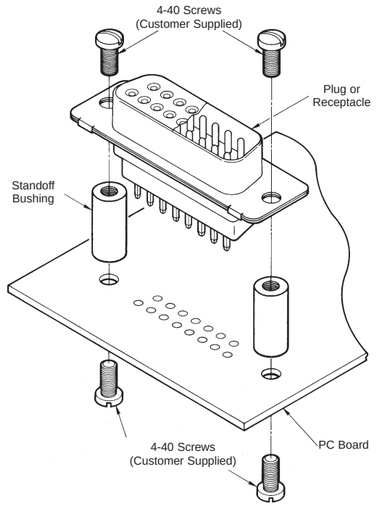
Accessories (Continued)

Standard Bushings (for Connectors with Straight Posted Contacts, PC Board Mounted)



Note: Standoff Bushings are used with a plug or receptacle of PC board mounted connectors.



Material

Aluminum

Kit Numbers

*Parts are individually bulk packed for multiple kit orders.

Part No.	Dim. A	Dim. B	Packaged
205933-3	**.435** 11.05	**.250** 6.35	2 Per Bag
205933-4	**.435** 11.05	**.250** 6.35	*Bulked Pack
443279-2	**.246** 6.25	**.190** 4.83	2 Per Bag
443279-3	**.246** 6.25	**.190** 4.83	*Bulk Pack

Dust Covers

Dust covers for subminiature D connectors are not manufactured by Tyco Electronics. They may be purchased from:**

Caplugs
2150 Elmwood Avenue
Buffalo, NY 14207
Phone: (716) 876-9855
Fax: (716) 874-1680

See Catalog 1307612 for additional hardware such as cable clamps, strain reliefs, etc.

Notes:

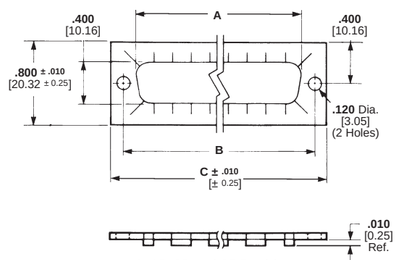
1. There are no cable clamp/strain relief hardware available for size 6 connectors.
2. Cable clamp/strain relief hardware cannot be used with the Power/Coax/Combination Product shown on pages 5-199 to 5-201 of this catalog.

** Caplugs is not an affiliate of Tyco Electronics.

EMI/RFI Gaskets

Material and Finish

Brass, .006 [0.15] thick; bright tin-lead plated



9, 15, 25 and 37 Positions

Shell Size (No. of Contact Pos.)	Dimensions A	Dimensions B	Dimensions C	Gasket Part No.
1 (9)	**.746** 18.95	**.984** 24.99	**1.220** 30.99	747024-3
2 (15)	**1.074** 27.28	**1.312** 33.32	**1.555** 39.50	747025-3
3 (25)	**1.614** 41.00	**1.852** 47.04	**2.100** 53.34	745776-3
4 (37)	**2.266** 57.56	**2.500** 63.50	**2.730** 69.34	745777-3

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AMPLIMITE Connectors (Continued)

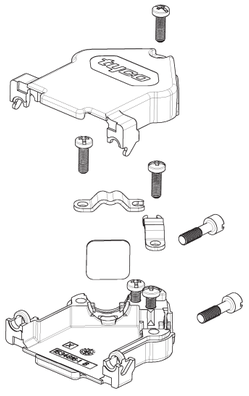
Accessories (Continued)

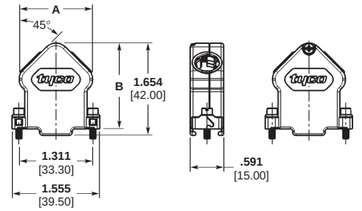
NEW!

Shielded Cable Clamps 45° Exit

Product Facts

- Dual cable entry
- Rugged and durable diecast construction
- Available in 9 to 37 way (shell sizes 1 to 4)
- Choice of screw cable clamp or crimped ferrule
- Blanking plate included for single cable entry applications
- Supplied with jackscrews for locking with mating connector





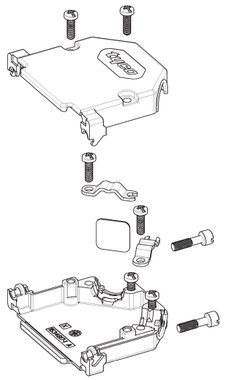
Shell Size	Dimensions A	Dimensions B	Max. Cable Dia.	4-40 Mounting Screw	Cable Clamp Kit No.	Cable Clamp Kit No. for Coax Contacts
1	**1.063** 27.00	**1.378** 35.00	**.354** 9.00	Phillips Head	1534805-1	—
				Hex Head	1534805-2	—
			.365 9.27	Phillips Head	—	1534806-1
				Hex Head	—	1534806-2
2	**1.299** 33.00	**1.535** 39.00	**.433** 11.00	Phillips Head	1534807-1	—
				Hex Head	1534807-2	—
			.430 10.92	Phillips Head	—	1534808-1
				Hex Head	—	1534808-2

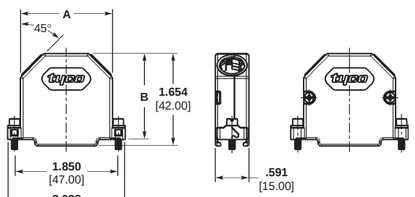
Material and Finish

Cable Clamp Housing — Zinc alloy, plated bright nickel

Screws and Cable Clamps — Steel, zinc plate with supplementary chromate

Dummy Plate — Steel





Shell Size	Dimensions A	Dimensions B	Max. Cable Dia.	4-40 Mounting Screw	Cable Clamp Kit No.	Cable Clamp Kit No. for Coax Contacts
3	**1.642** 41.70	**1.535** 39.00	**.433** 11.00	Phillips Head	1534809-1	—
				Hex Head	1534809-2	—
			.430 10.92	Phillips Head	—	1534810-1
				Hex Head	—	1534810-2
4	**2.291** 58.20	**1.535** 39.00	**.433** 11.00	Phillips Head	1534811-1	—
				Hex Head	1534811-2	—
			.430 10.92	Phillips Head	—	1534812-1
				Hex Head	—	1534812-2

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AMPLIMITE Connectors vs. MIL-DTL-24308 Cross Reference

This list is provided for reference only. In the event that a discrepancy exists between this catalog and the respective military QPL, then the QPL shall take precedence.

	MILITARY PART NUMBER FOR ORDERING	MILITARY PART NUMBER ON CONNECTOR	AMP PART NUMBER FOR ORDERING	AMP PART NUMBER ON CONNECTOR	REMARKS (All connectors provided with contacts unless otherwise specified)
/1	M24308/1-1F	M24308/1-1F	593007-1	593007-1	
	M24308/1-2F	M24308/1-2F	593007-2	593007-2	
	M24308/1-3F	M24308/1-3F	593007-3	593007-3	
	M24308/1-4F	M24308/1-4F	593007-4	593007-4	
	M24308/1-5F	M24308/1-5F	593007-5	593007-5	
	M24308/1-12F	M24308/1-12F	593008-1	593008-1	
	M24308/1-13F	M24308/1-13F	593008-2	593008-2	
	M24308/1-14F	M24308/1-14F	593008-3	593008-3	
	M24308/1-15F	M24308/1-15F	593008-4	593008-4	
	M24308/1-16F	M24308/1-16F	593008-5	593008-5	
	M24308/1-23F	M24308/1-23F	593009-1	593009-1	
	M24308/1-24F	M24308/1-24F	593009-2	593009-2	
	M24308/1-25F	M24308/1-25F	593009-3	593009-3	
	M24308/1-26F	M24308/1-26F	593009-4	593009-4	
	M24308/1-27F	M24308/1-27F	593009-5	593009-5	
/2	M24308/2-1F	M24308/2-1F	205555-2	205555-2	
	M24308/2-2F	M24308/2-2F	205557-2	205557-2	
	M24308/2-3F	M24308/2-3F	205559-2	205559-2	
	M24308/2-4F	M24308/2-4F	205561-2	205561-2	
	M24308/2-5F	M24308/2-5F	205563-2	205563-2	
	M24308/2-6F	M24308/2-1F	205555-3	205555-2	WITH TOOL
	M24308/2-7F	M24308/2-2F	205557-3	205557-2	WITH TOOL
	M24308/2-8F	M24308/2-3F	205559-3	205559-2	WITH TOOL
	M24308/2-9F	M24308/2-4F	205561-3	205561-2	WITH TOOL
	M24308/2-10F	M24308/2-5F	205563-3	205563-2	WITH TOOL
	M24308/2-11F	M24308/2-11F	204512-2	204512-2	
	M24308/2-12F	M24308/2-12F	204514-2	204514-2	
	M24308/2-13F	M24308/2-13F	204516-2	204516-2	
	M24308/2-14F	M24308/2-14F	204518-2	204518-2	
	M24308/2-15F	M24308/2-15F	204520-2	204520-2	
	M24308/2-16F	M24308/2-16F	204522-2	204522-2	
	M24308/2-17F	M24308/2-11F	204512-3	204512-2	WITH TOOL
	M24308/2-18F	M24308/2-12F	204514-3	204514-2	WITH TOOL
	M24308/2-19F	M24308/2-13F	204516-3	204516-2	WITH TOOL
	M24308/2-20F	M24308/2-14F	204518-3	204518-2	WITH TOOL
	M24308/2-21F	M24308/2-15F	204520-3	204520-2	WITH TOOL
	M24308/2-22F	M24308/2-16F	204522-3	204522-2	WITH TOOL
	M24308/2-23F	M24308/2-23F	205483-2	205483-2	
	M24308/2-24F	M24308/2-24F	205433-2	205433-2	
	M24308/2-25F	M24308/2-25F	205484-2	205484-2	
	M24308/2-26F	M24308/2-26F	205485-2	205485-2	
	M24308/2-27F	M24308/2-27F	205432-2	205432-2	
	M24308/2-28F	M24308/2-28F	204536-2	204536-2	
	M24308/2-29F	M24308/2-29F	204538-2	204538-2	
	M24308/2-30F	M24308/2-30F	204540-2	204540-2	
	M24308/2-31F	M24308/2-31F	204542-2	204542-2	
	M24308/2-32F	M24308/2-32F	204544-2	204544-2	
	M24308/2-33F	M24308/2-33F	204546-2	204546-2	
	M24308/2-281F	M24308/2-1F	205161-1	205555-2	LESS CONTACTS
	M24308/2-282F	M24308/2-2F	205163-1	205557-2	LESS CONTACTS
	M24308/2-283F	M24308/2-3F	205165-1	205559-2	LESS CONTACTS
	M24308/2-284F	M24308/2-4F	205167-1	205561-2	LESS CONTACTS
	M24308/2-285F	M24308/2-5F	205169-1	205563-2	LESS CONTACTS
	M24308/2-286F	M24308/2-11F	204500-1	204512-2	LESS CONTACTS
	M24308/2-287F	M24308/2-12F	204502-1	204514-2	LESS CONTACTS
	M24308/2-288F	M24308/2-13F	204504-1	204516-2	LESS CONTACTS
	M24308/2-289F	M24308/2-14F	204506-1	204518-2	LESS CONTACTS
	M24308/2-290F	M24308/2-15F	204508-1	204520-2	LESS CONTACTS
	M24308/2-291F	M24308/2-16F	204510-1	204522-2	LESS CONTACTS

Note: The suffix "F" on M24308 part numbers designates cadmium shell plating.

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AMPLIMITE Connectors vs. MIL-DTL-24308 Cross Reference (Continued)

	MILITARY PART NUMBER FOR ORDERING	MILITARY PART NUMBER ON CONNECTOR	AMP PART NUMBER FOR ORDERING	AMP PART NUMBER ON CONNECTOR	REMARKS (All connectors provided with contacts unless otherwise specified)
/2	M24308/2-292F	M24308/2-23F	205416-1	205483-2	LESS CONTACTS
	M24308/2-293F	M24308/2-24F	205417-1	205433-2	LESS CONTACTS
	M24308/2-294F	M24308/2-25F	205418-1	205484-2	LESS CONTACTS
	M24308/2-295F	M24308/2-26F	205419-1	205485-2	LESS CONTACTS
	M24308/2-296F	M24308/2-27F	205420-1	205432-2	LESS CONTACTS
	M24308/2-297F	M24308/2-28F	204524-1	204536-2	LESS CONTACTS
	M24308/2-298F	M24308/2-29F	204526-1	204538-2	LESS CONTACTS
	M24308/2-299F	M24308/2-30F	204528-1	204540-2	LESS CONTACTS
	M24308/2-300F	M24308/2-31F	204530-1	204542-2	LESS CONTACTS
	M24308/2-301F	M24308/2-32F	204532-1	204544-2	LESS CONTACTS
	M24308/2-302F	M24308/2-33F	204534-1	204546-2	LESS CONTACTS
	M24308/2-342F	M24308/2-342F	211525-2	211525-2	
	M24308/2-343F	M24308/2-343F	211526-2	211526-2	
	M24308/2-344F	M24308/2-344F	211527-2	211527-2	
	M24308/2-345F	M24308/2-345F	211528-2	211528-2	
	M24308/2-346F	M24308/2-346F	211529-2	211529-2	
	M24308/2-347F	M24308/2-347F	211536-2	211536-2	
	M24308/2-348F	M24308/2-348F	211537-2	211537-2	
	M24308/2-349F	M24308/2-349F	211538-2	211538-2	
	M24308/2-350F	M24308/2-350F	211539-2	211539-2	
	M24308/2-351F	M24308/2-351F	211540-2	211540-2	
	M24308/2-352F	M24308/2-352F	211541-2	211541-2	
	M24308/2-482F	M24308/2-342F	211525-1	211525-2	LESS CONTACTS
	M24308/2-483F	M24308/2-343F	211526-1	211526-2	LESS CONTACTS
	M24308/2-484F	M24308/2-344F	211527-1	211527-2	LESS CONTACTS
	M24308/2-485F	M24308/2-345F	211528-1	211528-2	LESS CONTACTS
	M24308/2-486F	M24308/2-346F	211529-1	211529-2	LESS CONTACTS
	M24308/2-487F	M24308/2-347F	211536-1	211536-2	LESS CONTACTS
	M24308/2-488F	M24308/2-348F	211537-1	211537-2	LESS CONTACTS
	M24308/2-489F	M24308/2-349F	211538-1	211538-2	LESS CONTACTS
	M24308/2-490F	M24308/2-350F	211539-1	211539-2	LESS CONTACTS
	M24308/2-491F	M24308/2-351F	211540-1	211540-2	LESS CONTACTS
	M24308/2-492F	M24308/2-352F	211541-1	211541-2	LESS CONTACTS
/3	M24308/3-1F	M24308/3-1F	593002-1	593002-1	
	M24308/3-2F	M24308/3-2F	593002-2	593002-2	
	M24308/3-3F	M24308/3-3F	593002-3	593002-3	
	M24308/3-4F	M24308/3-4F	593002-4	593002-4	
	M24308/3-5F	M24308/3-5F	593002-5	593002-5	
	M24308/3-12F	M24308/3-12F	593004-1	593004-1	
	M24308/3-13F	M24308/3-13F	593004-2	593004-2	
	M24308/3-14F	M24308/3-14F	593004-3	593004-3	
	M24308/3-15F	M24308/3-15F	593004-4	593004-4	
	M24308/3-16F	M24308/3-16F	593004-5	593004-5	
/4	M24308/4-1F	M24308/4-1F	205556-2	205556-2	
	M24308/4-2F	M24308/4-2F	205558-2	205558-2	
	M24308/4-3F	M24308/4-3F	205560-2	205560-2	
	M24308/4-4F	M24308/4-4F	205562-2	205562-2	
	M24308/4-5F	M24308/4-5F	205564-2	205564-2	
	M24308/4-6F	M24308/4-1F	205556-3	205556-2	WITH TOOL
	M24308/4-7F	M24308/4-2F	205558-3	205558-2	WITH TOOL
	M24308/4-8F	M24308/4-3F	205560-3	205560-2	WITH TOOL
	M24308/4-9F	M24308/4-4F	205562-3	205562-2	WITH TOOL
	M24308/4-10F	M24308/4-5F	205564-3	205564-2	WITH TOOL
	M24308/4-11F	M24308/4-11F	204513-2	204513-2	
	M24308/4-12F	M24308/4-12F	204515-2	204515-2	
	M24308/4-13F	M24308/4-13F	204517-2	204517-2	
	M24308/4-14F	M24308/4-14F	204519-2	204519-2	
	M24308/4-15F	M24308/4-15F	204521-2	204521-2	
	M24308/4-16F	M24308/4-16F	204523-2	204523-2	

Note: The suffix “F” on M24308 part numbers designates cadmium shell plating.

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AMPLIMITE Connectors vs. MIL-DTL-24308 Cross Reference (Continued)

	MILITARY PART NUMBER FOR ORDERING	MILITARY PART NUMBER ON CONNECTOR	AMP PART NUMBER FOR ORDERING	AMP PART NUMBER ON CONNECTOR	REMARKS (All connectors provided with contacts unless otherwise specified)
/4	M24308/4-17F	M24308/4-11F	204513-3	204513-2	WITH TOOL
	M24308/4-18F	M24308/4-12F	204515-3	204515-2	WITH TOOL
	M24308/4-19F	M24308/4-13F	204517-3	204517-2	WITH TOOL
	M24308/4-20F	M24308/4-14F	204519-3	204519-2	WITH TOOL
	M24308/4-21F	M24308/4-15F	204521-3	204521-2	WITH TOOL
	M24308/4-22F	M24308/4-16F	204523-3	204523-2	WITH TOOL
	M24308/4-259F	M24308/4-1F	205162-1	205556-2	LESS CONTACTS
	M24308/4-260F	M24308/4-2F	205164-1	205558-2	LESS CONTACTS
	M24308/4-261F	M24308/4-3F	205166-1	205560-2	LESS CONTACTS
	M24308/4-262F	M24308/4-4F	205168-1	205562-2	LESS CONTACTS
	M24308/4-263F	M24308/4-5F	205170-1	205564-2	LESS CONTACTS
	M24308/4-264F	M24308/4-11F	204501-1	204513-2	LESS CONTACTS
	M24308/4-265F	M24308/4-12F	204503-1	204515-2	LESS CONTACTS
	M24308/4-266F	M24308/4-13F	204505-1	204517-2	LESS CONTACTS
	M24308/4-267F	M24308/4-14F	204507-1	204519-2	LESS CONTACTS
	M24308/4-268F	M24308/4-15F	204509-1	204521-2	LESS CONTACTS
	M24308/4-269F	M24308/4-16F	204511-1	204523-2	LESS CONTACTS
	M24308/4-302F	M24308/4-302F	205486-2	205486-2	
	M24308/4-303F	M24308/4-303F	205409-2	205409-2	
	M24308/4-304F	M24308/4-304F	205487-2	205487-2	
	M24308/4-305F	M24308/4-305F	205488-2	205488-2	
	M24308/4-306F	M24308/4-306F	205431-2	205431-2	
	M24308/4-307F	M24308/4-307F	204537-2	204537-2	
	M24308/4-308F	M24308/4-308F	204539-2	204539-2	
	M24308/4-309F	M24308/4-309F	204541-2	204541-2	
	M24308/4-310F	M24308/4-310F	204543-2	204543-2	
	M24308/4-311F	M24308/4-311F	204545-2	204545-2	
	M24308/4-312F	M24308/4-312F	204547-2	204547-2	
	M24308/4-324F	M24308/4-302F	205412-1	205486-2	LESS CONTACTS
	M24308/4-325F	M24308/4-303F	205408-1	205409-2	LESS CONTACTS
	M24308/4-326F	M24308/4-304F	205413-1	205487-2	LESS CONTACTS
	M24308/4-327F	M24308/4-305F	205414-1	205488-2	LESS CONTACTS
	M24308/4-328F	M24308/4-306F	205415-1	205431-2	LESS CONTACTS
	M24308/4-329F	M24308/4-307F	204525-1	204537-2	LESS CONTACTS
	M24308/4-330F	M24308/4-308F	204527-1	204539-2	LESS CONTACTS
	M24308/4-331F	M24308/4-309F	204529-1	204541-2	LESS CONTACTS
	M24308/4-332F	M24308/4-310F	204531-1	204543-2	LESS CONTACTS
	M24308/4-333F	M24308/4-311F	204533-1	204545-2	LESS CONTACTS
	M24308/4-334F	M24308/4-312F	204535-1	204547-2	LESS CONTACTS
/5	M24308/5-1F	M24308/5-1F	593036-1	593036-1	
	M24308/5-2F	M24308/5-2F	593036-2	593036-2	
	M24308/5-3F	M24308/5-3F	593036-3	593036-3	
	M24308/5-4F	M24308/5-4F	593036-4	593036-4	
	M24308/5-5F	M24308/5-5F	593036-5	593036-5	
	M24308/5-12F	M24308/5-12F	593037-1	593037-1	
	M24308/5-13F	M24308/5-13F	593037-2	593037-2	
	M24308/5-14F	M24308/5-14F	593037-3	593037-3	
	M24308/5-15F	M24308/5-15F	593037-4	593037-4	
	M24308/5-16F	M24308/5-16F	593037-5	593037-5	
	M24308/5-23F	M24308/5-23F	593038-1	593038-1	
	M24308/5-24F	M24308/5-24F	593038-2	593038-2	
	M24308/5-25F	M24308/5-25F	593038-3	593038-3	
	M24308/5-26F	M24308/5-26F	593038-4	593038-4	
	M24308/5-27F	M24308/5-27F	593038-5	593038-5	
/23	M24308/23-1F	M24308/23-1F	443975-1	443975-1	
	M24308/23-2F	M24308/23-2F	443975-2	443975-2	
	M24308/23-3F	M24308/23-3F	443975-3	443975-3	
	M24308/23-4F	M24308/23-4F	443975-4	443975-4	
	M24308/23-5F	M24308/23-5F	443975-5	443975-5	

Note: The suffix "F" on M24308 part numbers designates cadmium shell plating.

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AMPLIMITE Connectors vs. MIL-DTL-24308 Cross Reference (Continued)

	MILITARY PART NUMBER FOR ORDERING	MILITARY PART NUMBER ON CONNECTOR	AMP PART NUMBER FOR ORDERING	AMP PART NUMBER ON CONNECTOR	REMARKS (All connectors provided with contacts unless otherwise specified)
/23	M24308/23-7F	M24308/23-7F	443976-1	443976-1	
	M24308/23-8F	M24308/23-8F	443976-2	443976-2	
	M24308/23-9F	M24308/23-9F	443976-3	443976-3	
	M24308/23-10F	M24308/23-10F	443976-4	443976-4	
	M24308/23-11F	M24308/23-11F	443976-5	443976-5	
	M24308/23-13F	M24308/23-13F	443977-1	443977-1	
	M24308/23-14F	M24308/23-14F	443977-2	443977-2	
	M24308/23-15F	M24308/23-15F	443977-3	443977-3	
	M24308/23-16F	M24308/23-16F	443977-4	443977-4	
	M24308/23-17F	M24308/23-17F	443977-5	443977-5	
	M24308/23-19F	M24308/23-19F	443978-1	443978-1	
	M24308/23-20F	M24308/23-20F	443978-2	443978-2	
	M24308/23-21F	M24308/23-21F	443978-3	443978-3	
	M24308/23-22F	M24308/23-22F	443978-4	443978-4	
	M24308/23-23F	M24308/23-23F	443978-5	443978-5	
	M24308/23-25F	M24308/23-25F	1218434-1	1218434-1	
	M24308/23-26F	M24308/23-26F	1218434-2	1218434-2	
	M24308/23-27F	M24308/23-27F	1218434-3	1218434-3	
	M24308/23-28F	M24308/23-28F	1218434-4	1218434-4	
	M24308/23-29F	M24308/23-29F	1218434-5	1218434-5	
	M24308/23-31F	M24308/23-31F	1218408-1	1218408-1	
	M24308/23-32F	M24308/23-32F	1218408-2	1218408-2	
	M24308/23-33F	M24308/23-33F	1218408-3	1218408-3	
	M24308/23-34F	M24308/23-34F	1218408-4	1218408-4	
	M24308/23-35F	M24308/23-35F	1218408-5	1218408-5	
	M24308/23-37F	M24308/23-37F	1218435-1	1218435-1	
	M24308/23-38F	M24308/23-38F	1218435-2	1218435-2	
	M24308/23-39F	M24308/23-39F	1218435-3	1218435-3	
	M24308/23-40F	M24308/23-40F	1218435-4	1218435-4	
	M24308/23-41F	M24308/23-41F	1218435-5	1218435-5	
	M24308/23-43F	M24308/23-43F	1218436-1	1218436-1	
	M24308/23-44F	M24308/23-44F	1218436-2	1218436-2	
	M24308/23-45F	M24308/23-45F	1218436-3	1218436-3	
	M24308/23-46F	M24308/23-46F	1218436-4	1218436-4	
	M24308/23-47F	M24308/23-47F	1218436-5	1218436-5	
	M24308/23-49F	M24308/23-49F	1218437-1	1218437-1	
	M24308/23-50F	M24308/23-50F	1218437-2	1218437-2	
	M24308/23-51F	M24308/23-51F	1218437-3	1218437-3	
	M24308/23-52F	M24308/23-52F	1218437-4	1218437-4	
	M24308/23-53F	M24308/23-53F	1218437-5	1218437-5	
	M24308/23-55F	M24308/23-55F	1218438-1	1218438-1	
	M24308/23-56F	M24308/23-56F	1218438-2	1218438-2	
	M24308/23-57F	M24308/23-57F	1218438-3	1218438-3	
	M24308/23-58F	M24308/23-58F	1218438-4	1218438-4	
	M24308/23-59F	M24308/23-59F	1218438-5	1218438-5	
/24	M24308/24-1F	M24308/24-1F	1218124-1	1218124-1	
	M24308/24-2F	M24308/24-2F	1218124-2	1218124-2	
	M24308/24-3F	M24308/24-3F	1218124-3	1218124-3	
	M24308/24-4F	M24308/24-4F	1218124-4	1218124-4	
	M24308/24-5F	M24308/24-5F	1218124-5	1218124-5	
	M24308/24-7F	M24308/24-7F	1218125-1	1218125-1	
	M24308/24-8F	M24308/24-8F	1218125-2	1218125-2	
	M24308/24-9F	M24308/24-9F	1218125-3	1218125-3	
	M24308/24-10F	M24308/24-10F	1218125-4	1218125-4	
	M24308/24-11F	M24308/24-11F	1218125-5	1218125-5	
	M24308/24-13F	M24308/24-13F	1218126-1	1218126-1	
	M24308/24-14F	M24308/24-14F	1218126-2	1218126-2	
	M24308/24-15F	M24308/24-15F	1218126-3	1218126-3	
	M24308/24-16F	M24308/24-16F	1218126-4	1218126-4	
	M24308/24-17F	M24308/24-17F	1218126-5	1218126-5	

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AMPLIMITE Connectors vs. MIL-DTL-24308 Cross Reference (Continued)

	MILITARY PART NUMBER FOR ORDERING	MILITARY PART NUMBER ON CONNECTOR	AMP PART NUMBER FOR ORDERING	AMP PART NUMBER ON CONNECTOR	REMARKS (All connectors provided with contacts unless otherwise specified)
/24	M24308/24-19F	M24308/24-19F	1218127-1	1218127-1	
	M24308/24-20F	M24308/24-20F	1218127-2	1218127-2	
	M24308/24-21F	M24308/24-21F	1218127-3	1218127-3	
	M24308/24-22F	M24308/24-22F	1218127-4	1218127-4	
	M24308/24-23F	M24308/24-23F	1218127-5	1218127-5	
	M24308/24-25F	M24308/24-25F	1218440-1	1218440-1	
	M24308/24-26F	M24308/24-26F	1218440-2	1218440-2	
	M24308/24-27F	M24308/24-27F	1218440-3	1218440-3	
	M24308/24-28F	M24308/24-28F	1218440-4	1218440-4	
	M24308/24-29F	M24308/24-29F	1218440-5	1218440-5	
	M24308/24-31F	M24308/24-31F	1218441-1	1218441-1	
	M24308/24-32F	M24308/24-32F	1218441-2	1218441-2	
	M24308/24-33F	M24308/24-33F	1218441-3	1218441-3	
	M24308/24-34F	M24308/24-34F	1218441-4	1218441-4	
	M24308/24-35F	M24308/24-35F	1218441-5	1218441-5	
	M24308/24-37F	M24308/24-37F	1218442-1	1218442-1	
	M24308/24-38F	M24308/24-38F	1218442-2	1218442-2	
	M24308/24-39F	M24308/24-39F	1218442-3	1218442-3	
	M24308/24-40F	M24308/24-40F	1218442-4	1218442-4	
	M24308/24-41F	M24308/24-41F	1218442-5	1218442-5	
	M24308/24-43F	M24308/24-43F	1218443-1	1218443-1	
	M24308/24-44F	M24308/24-44F	1218443-2	1218443-2	
	M24308/24-45F	M24308/24-45F	1218443-3	1218443-3	
	M24308/24-46F	M24308/24-46F	1218443-4	1218443-4	
	M24308/24-47F	M24308/24-47F	1218443-5	1218443-5	
	M24308/24-49F	M24308/24-49F	1218444-1	1218444-1	
	M24308/24-50F	M24308/24-50F	1218444-2	1218444-2	
	M24308/24-51F	M24308/24-51F	1218444-3	1218444-3	
	M24308/24-52F	M24308/24-52F	1218444-4	1218444-4	
	M24308/24-53F	M24308/24-53F	1218444-5	1218444-5	
	M24308/24-55F	M24308/24-55F	1218445-1	1218445-1	
	M24308/24-56F	M24308/24-56F	1218445-2	1218445-2	
	M24308/24-57F	M24308/24-57F	1218445-3	1218445-3	
	M24308/24-58F	M24308/24-58F	1218445-4	1218445-4	
	M24308/24-59F	M24308/24-59F	1218445-5	1218445-5	
/25	M24308/25-6P	—	211883-5	—	Male screw retainer kit
/26	M24308/26-1P	—	212447-1	—	Female screwlock kit
	M24308/26-1	—	205817-8	—	Female screwlock kit

Note: The suffix “F” on M24308 part numbers designates cadmium shell plating.
The suffix “P” designates passivated stainless steel.

AMPLIMITE Connectors vs. M39029, M22520 and M81969 Cross Reference

MILITARY PART NUMBER FOR ORDERING	AMP PART NUMBER FOR ORDERING	REMARKS (All connectors provided with contacts unless otherwise specified)
M39029/57-354	204351-1	Size 22 Socket
M39029/58-360	204370-2	Size 22 Pin
M39029/63-368	205090-1	Size 20 Socket
M39029/64-369	205089-1	Size 20 Pin
M22520/2-01	601966-1	Crimp Tool
M22520/2-06	601966-4	Size 22 Socket Positioner
M22520/2-08	601966-5	Size 20 Positioner
M22520/2-09	601966-6	Size 22 Pin Positioner
M81969/1-02	91067-2	Size 20 Ins/Ext Tool
M81969/1-04	91067-1	Size 22 Ins/Ext Tool

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Japan: 81-44-844-8013
UK: 44-208-420-8341

AMPLIMITE Connectors vs. NASA Power/Coax/Signal Combination Cross Reference

AMP PART NUMBER	ASSEMBLY NASA P/N 311-P-4/	DESCRIPTION
448153-2	05-7P-B-12	PLUG,3C3,NON-MAG,.120 MTG HOLE
448153-3	05-7P-B-15	PLUG,3C3,NON-MAG,.154 MTG HOLE
448154-2	05-8P-B-12	PLUG,7C2,NON-MAG,.120 MTG HOLE
448154-3	05-8P-B-15	PLUG,7C2,NON-MAG,.154 MTG HOLE
211111-2	05-9P-B-12	PLUG,11C1,NON-MAG,.120 MTG HOLE
211111-3	05-9P-B-15	PLUG,11C1,NON-MAG,.154 MTG HOLE
212491-6	05-10P-B-12	PLUG,5C5,NON-MAG,.120 MTG HOLE
212491-7	05-10P-B-15	PLUG,5C5,NON-MAG,.154 MTG HOLE
212498-2	05-11P-B-12	PLUG,9C4,NON-MAG,.120 MTG HOLE
212498-3	05-11P-B-15	PLUG,9C4,NON-MAG,.154 MTG HOLE
208810-3	05-12P-B-12	PLUG,13C3,NON-MAG,.120 MTG HOLE
208810-4	05-12P-B-15	PLUG,13C3,NON-MAG,.154 MTG HOLE
212506-2	05-13P-B-12	PLUG,17C2,NON-MAG,.120 MTG HOLE
212506-4	05-13P-B-15	PLUG,17C2,NON-MAG,.154 MTG HOLE
212522-3	05-14P-B-12	PLUG,21C1,NON-MAG,.120 MTG HOLE
212522-4	05-14P-B-15	PLUG,21C1,NON-MAG,.154 MTG HOLE
446405-2	05-15P-B-12	PLUG,8C8,NON-MAG,.120 MTG HOLE
446405-3	05-15P-B-15	PLUG,8C8,NON-MAG,.154 MTG HOLE
212514-3	05-17P-B-12	PLUG,17C5,NON-MAG,.120 MTG HOLE
212514-4	05-17P-B-15	PLUG,17C5,NON-MAG,.154 MTG HOLE
212530-2	05-18P-B-12	PLUG,21C4,NON-MAG,.120 MTG HOLE
212530-3	05-18P-B-15	PLUG,21C4,NON-MAG,.154 MTG HOLE
208742-2	05-20P-B-12	PLUG,25C3,NON-MAG,.120 MTG HOLE
208742-3	05-20P-B-15	PLUG,25C3,NON-MAG,.154 MTG HOLE
212538-2	05-21P-B-12	PLUG,27C2,NON-MAG,.120 MTG HOLE
212538-3	05-21P-B-15	PLUG,27C2,NON-MAG,.154 MTG HOLE
208743-2	05-22P-B-12	PLUG,24C7,NON-MAG,.120 MTG HOLE
208743-6	05-22P-B-15	PLUG,24C7,NON-MAG,.154 MTG HOLE
208744-3	05-23P-B-12	PLUG,36C4,NON-MAG,.120 MTG HOLE
208744-4	05-23P-B-15	PLUG,36C4,NON-MAG,.154 MTG HOLE
445705-2	05-7S-B-12	RECPT,3C3,NON-MAG,.120 MTG HOLE
445705-3	05-7S-B-15	RECPT,3C3,NON-MAG,.154 MTG HOLE
211112-2	05-9S-B-12	RECPT,11C1,NON-MAG,.120 MTG HOLE
211112-3	05-9S-B-15	RECPT,11C1,NON-MAG,.154 MTG HOLE
212059-2	05-10S-B-12	RECPT,5C5,NON-MAG,.120 MTG HOLE
212059-6	05-10S-B-15	RECPT,5C5,NON-MAG,.154 MTG HOLE
212502-2	05-11S-B-12	RECPT,9C4,NON-MAG,.120 MTG HOLE
212502-3	05-11S-B-15	RECPT,9C4,NON-MAG,.154 MTG HOLE
208811-3	05-12S-B-12	RECPT,13C3,NON-MAG,.120 MTG HOLE
208811-4	05-12S-B-15	RECPT,13C3,NON-MAG,.154 MTG HOLE
212510-2	05-13S-B-12	RECPT,17C2,NON-MAG,.120 MTG HOLE
212510-3	05-13S-B-15	RECPT,17C2,NON-MAG,.154 MTG HOLE
212526-3	05-14S-B-12	RECPT,21C1,NON-MAG,.120 MTG HOLE
212526-4	05-14S-B-15	RECPT,21C1,NON-MAG,.154 MTG HOLE
445730-3	05-15S-B-12	RECPT,8C8,NON-MAG,.120 MTG HOLE
445730-4	05-15S-B-15	RECPT,8C8,NON-MAG,.154 MTG HOLE
212518-3	05-17S-B-12	RECPT,17C5,NON-MAG,.120 MTG HOLE
212518-4	05-17S-B-15	RECPT,17C5,NON-MAG,.154 MTG HOLE
212534-2	05-18S-B-12	RECPT,21C4,NON-MAG,.120 MTG HOLE
212534-3	05-18S-B-15	RECPT,21C4,NON-MAG,.154 MTG HOLE
208551-2	05-20S-B-12	RECPT,25C3,NON-MAG,.120 MTG HOLE
208551-3	05-20S-B-15	RECPT,25C3,NON-MAG,.154 MTG HOLE
212542-2	05-21S-B-12	RECPT,27C2,NON-MAG,.120 MTG HOLE
212542-3	05-21S-B-15	RECPT,27C2,NON-MAG,.154 MTG HOLE
208552-2	05-22S-B-12	RECPT,24C7,NON-MAG,.120 MTG HOLE
208552-5	05-22S-B-15	RECPT,24C7,NON-MAG,.154 MTG HOLE
208550-2	05-23S-B-12	RECPT,36C4,NON-MAG,.120 MTG HOLE
208550-3	05-23S-B-15	RECPT,36C4,NON-MAG,.154 MTG HOLE

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AMPLIMITE Connectors vs. NASA Series 109 and 90 Cross Reference

NASA PART NUMBER FOR ORDERING	NASA PART NUMBER ON CONNECTOR	AMP PART NUMBER FOR ORDERING	AMP PART NUMBER ON CONNECTOR	REMARKS (All connectors provided with contacts unless otherwise specified)
311P407-1P-B-15	311P407-1P-B-15	206498-1	206498-1	LESS CONTACTS
311P407-1P-B-12	311P407-1P-B-12	206498-4	206498-4	LESS CONTACTS
311P407-2P-B-15	311P407-2P-B-15	206500-1	206500-1	LESS CONTACTS
311P407-2P-B-12	311P407-2P-B-12	206500-4	206500-4	LESS CONTACTS
311P407-3P-B-15	311P407-3P-B-15	206063-2	206063-2	LESS CONTACTS
311P407-3P-B-12	311P407-3P-B-12	206063-4	206063-4	LESS CONTACTS
311P407-4P-B-15	311P407-4P-B-15	206502-1	206502-1	LESS CONTACTS
311P407-4P-B-12	311P407-4P-B-12	206502-4	206502-4	LESS CONTACTS
311P407-5P-B-15	311P407-5P-B-15	206504-1	206504-1	LESS CONTACTS
311P407-5P-B-12	311P407-5P-B-12	206504-4	206504-4	LESS CONTACTS
311P407-6P-B-15	311P407-6P-B-15	206066-2	206066-2	LESS CONTACTS
311P407-6P-B-12	311P407-6P-B-12	206066-4	206066-4	LESS CONTACTS
311P407-1S-B-15	311P407-1S-B-15	206499-1	206499-1	LESS CONTACTS
311P407-1S-B-12	311P407-1S-B-12	206499-4	206499-4	LESS CONTACTS
311P407-2S-B-15	311P407-2S-B-15	206501-1	206501-1	LESS CONTACTS
311P407-2S-B-12	311P407-2S-B-12	206501-4	206501-4	LESS CONTACTS
311P407-3S-B-15	311P407-3S-B-15	206064-2	206064-2	LESS CONTACTS
311P407-3S-B-12	311P407-3S-B-12	206064-4	206064-4	LESS CONTACTS
311P407-4S-B-15	311P407-4S-B-15	206503-1	206503-1	LESS CONTACTS
311P407-4S-B-12	311P407-4S-B-12	206503-4	206503-4	LESS CONTACTS
311P407-5S-B-15	311P407-5S-B-15	206505-1	206505-1	LESS CONTACTS
311P407-5S-B-12	311P407-5S-B-12	206505-4	206505-4	LESS CONTACTS
311P407-6S-B-15	311P407-6S-B-15	206065-2	206065-2	LESS CONTACTS
311P407-6S-B-12	311P407-6S-B-12	206065-4	206065-4	LESS CONTACTS
311P409-1P-B-15	311P409-1P-B-15	207252-1	207252-1	LESS CONTACTS
311P409-1P-B-12	311P409-1P-B-12	207252-2	207252-2	LESS CONTACTS
311P409-2P-B-15	311P409-2P-B-15	206798-1	206798-1	LESS CONTACTS
311P409-2P-B-12	311P409-2P-B-12	206798-2	206798-2	LESS CONTACTS
311P409-3P-B-15	311P409-3P-B-15	206800-1	206800-1	LESS CONTACTS
311P409-3P-B-12	311P409-3P-B-12	206800-2	206800-2	LESS CONTACTS
311P409-4P-B-15	311P409-4P-B-15	206802-1	206802-1	LESS CONTACTS
311P409-4P-B-12	311P409-4P-B-12	206802-2	206802-2	LESS CONTACTS
311P409-5P-B-15	311P409-5P-B-15	206804-1	206804-1	LESS CONTACTS
311P409-5P-B-12	311P409-5P-B-12	206804-2	206804-2	LESS CONTACTS
311P409-1S-B-15	311P409-1S-B-15	207253-1	207253-1	LESS CONTACTS
311P409-1S-B-12	311P409-1S-B-12	207253-2	207253-2	LESS CONTACTS
311P409-2S-B-15	311P409-2S-B-15	206799-1	206799-1	LESS CONTACTS
311P409-2S-B-12	311P409-2S-B-12	206799-2	206799-2	LESS CONTACTS
311P409-3S-B-15	311P409-3S-B-15	206801-1	206801-1	LESS CONTACTS
311P409-3S-B-12	311P409-3S-B-12	206801-2	206801-2	LESS CONTACTS
311P409-4S-B-15	311P409-4S-B-15	206803-1	206803-1	LESS CONTACTS
311P409-4S-B-12	311P409-4S-B-12	206803-2	206803-2	LESS CONTACTS
311P409-5S-B-15	311P409-5S-B-15	206805-1	206805-1	LESS CONTACTS
311P409-5S-B-12	311P409-5S-B-12	206805-2	206805-2	LESS CONTACTS
G-08-P1		204370-8		SIZE 22 PIN
G-08-S1		206071-1		SIZE 22 SOCKET
G-10-P1		205089-4		SIZE 20 PIN
G-10-S1		206793-1		SIZE 20 SOCKET

Catalog 1308940
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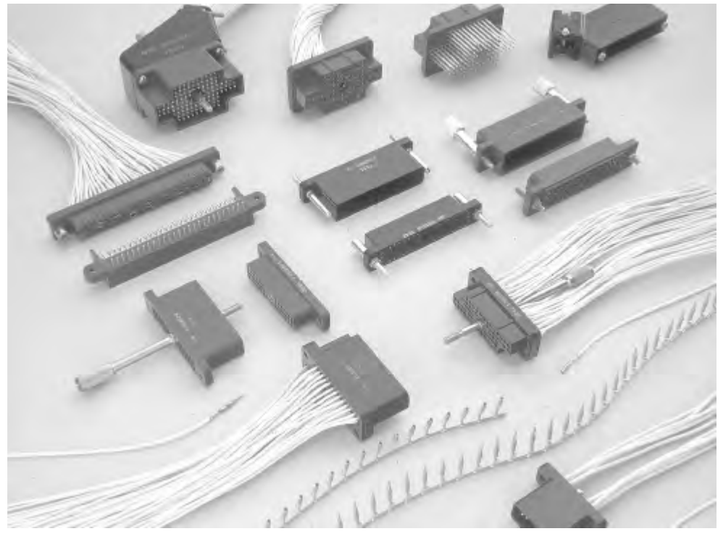
High Density Rectangular Connectors

Product Facts

- **Plug and receptacle connectors are molded plastic blocks categorized by the number of contact positions and type of material**
- **The pin body is fabricated from brass and conforms to MIL-C-50 or ASTM-B-36. The plating is gold per MIL-G-45204 over nickel per QQ-N-290. The retention spring sleeve is fabricated from stainless steel and conforms to QQ-S-766.**
- **The socket body is made of brass per MIL-C-50 or ASTM-B-36. Plating is gold per MIL-G-45204 over nickel per QQ-N-290. The stainless steel retention spring sleeve conforms to QQ-S-766**
- **Shields and cable clamps are molded polysulfone components conforming to MIL-P-46120**
- **Brass keying pins and sockets conform to QQ-B-626 or ASTM-B-16, with zinc plating per QQ-Z-325 or stainless steel per QQ-S-763**
- **Locking rings, washers, bushings, retaining rings, nuts and screws are stainless steel conforming to QQ-S-763 or QQ-S-766**
- **Recognized under the Component Program of Underwriters Laboratories Inc., File No. E28476**



High Density Rectangular (HDR) connectors are designed in response to ever-increasing demands for miniaturization. The grid spacing of .100 x .100 [2.54 x 2.54] provides density for a connector accommodating a 20 thru 30 AWG [0.6 thru 0.05 mm²] wire range.

A variety of contact configurations and platings permits great design flexibility. Machine terminated, crimp snap-in contacts are available for the entire wire range. Also available are .025 [0.64] square posts on pin and socket contacts suitable for wrap-type wiring.

This unique connector is available in 12, 24, 36, 48, 54 and 106 positions in a rectangular housing. A special 95-position connector rounds out this group of rack and panel configured connectors.

A two piece, 80-position connector has been developed for printed circuit boards.

Versatility is designed into this family of connectors. Housings are available with or without center fasteners. Housing material for most connectors is diallyl phthalate or phenolic. When mounting connectors with jackscrews, the receptacle half should be mounted to the chassis or panel. The turnable jackscrews should be positioned on the plug half containing the cable assembly.

Tooling for terminating leads is also available to meet production requirements. For limited production or prototype applications, the CERTI-CRIMP hand tool is ideal. Automatic machines are designed to fit various in-plant production needs.

Technical Features

Available Number of Positions — 12, 24, 36, 48, 54, 106

Center Spacing — .100 [2.54] x .100 [2.54]

Housing material — Diallyl Phthalate or Phenolic

Flammability Rating — UL 94V-0, UL File No. E28476

Contact Material — Brass

Contact Finish — .000030 [0.00076] Au

Contact Size — 20

Wire Size Range — 20–30 AWG

Termination Resistance —

AWG	Gold	Tin
20	8.0	16.5
24	14.5	27.0
26	22.0	—
30	48.0	—

Connector Mating Per Circuit — Gold 25 oz./Contact

Performance Characteristics

Dielectric Withstanding Voltage — 1000 VAC

Insulation Resistance — DAP 50,000 megohms min. (initial), Phenolic 5000 megohms min. (initial)

Voltage Rating — 440 VAC Sea Level @ 3 Amp max.

Connector Mating/Unmating — Gold 25 oz. max., Tin 50 oz. max.

Contact Retention Force — DAP – 5.0 lb., Phenolic – 7.5 lb.

Durability — 500 Matings per Cycle Gold, 250 Matings per Cycle Tin

Temperature Range — DAP –85°F to 257°F [–65°C to 125°C], Phenolic -131°F to 302°F [55°C to 150°C]

Thermal Shock — DAP –85°F to 257°F [–65°C to 125°C], Phenolic -131°F to 302°F [55°C to 125°C]

Maximum Current — 3 Amp max.

Wire Size —

AWG	Test Current
20	3.0
24	2.25
26	1.75
30	1.00

Technical Documents

Product Specifications — Connectors/PC Board Headers — 108-10015

Application Specification — 114-10002

Instruction Sheet — 408-7357, 408-7472, 408-7484

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High Density Rectangular Connectors (Continued)

Contacts

Type XI Crimp Snap-In Contacts

Contact Size — 20
Pin Diameter — .040 [1.02]

Plated as follows

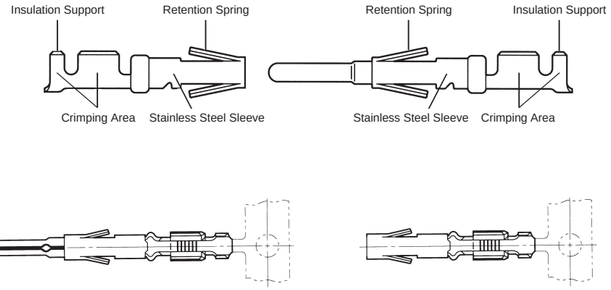
A — .000030 [0.00076] gold over .000050 [0.00127] nickel

B — Gold flash over .000050 [0.00127] nickel on entire contact with additional .000030 [0.00076] gold in contact area

Contact Sleeve — Stainless Steel

Insertion Tool

Part Number 91042-1



Pin **Socket**

Wire Size Range AWG	Wire Size Range mm²	Ins. Dia. Max.	Contact Finish	Part Numbers: Strip Form Pin	Part Numbers: Strip Form Socket	Part Numbers: Loose Piece Pin	Part Numbers: Loose Piece Socket	CERTI-CRIMP Hand Tool No.	Quick-Change Applicator No.: AMP-O-LECTRIC Machine Model G	Quick-Change Applicator No.: AMP-O-MATIC Stripper/Crimper II Machine
20-24	0.6-0.2	**.062** 1.57	A	203816-1	203802-1	203816-3	203802-3	91544-1	—	466904-1
			B	203816-2	203802-2	203816-4	203802-4			
26-30	0.15-0.05	**.048** 1.22	A	203874-1	203875-1	203874-3	203875-3	90223-5	—	—
			B	203874-2	203875-2	203874-4	203875-4			

Wrap-Type Contacts with .025 x .025 [0.64 x 0.64] Posts

Contact Size — 20
Pin Diameter — .040 [1.02]

Plated as follows

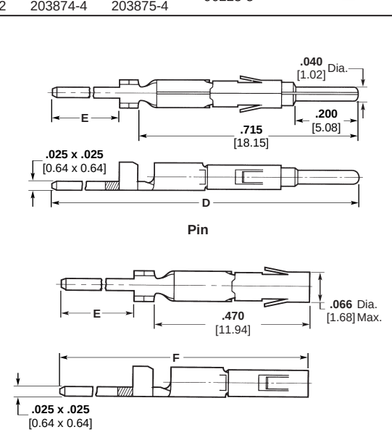
A — .000030 [0.00076] gold over .000050 [.00127] nickel

B — Gold flash over .000050 [.00127] nickel on entire contact with additional .000030 [.00076] gold in contact area

Contact Sleeve — Stainless Steel

Extraction Tool

Part Number 91038-3



Pin

Socket

Max. Terminations Per Post	Dimensions D	Dimensions E	Dimensions F	Contact Finish	Contact Part Numbers* Pin	Contact Part Numbers* Socket
1	**1.022** 25.96	**.257** 6.53	**.767** 19.48	A	1-205171-0	1-205172-0
				B	205171-7	205172-7
2	**1.236** 31.39	**.471** 11.96	**.981** 24.92	A	1-205171-1	1-205172-1
				B	205171-8	205172-8
3	**1.450** 36.83	**.685** 17.40	**1.195** 30.35	A	1-205171-2	1-205172-2
				B	205171-9	205172-9

*Loose piece contacts for maintenance and repair only. Packaged 100 pieces per bag.

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High Density Rectangular Connectors (Continued)

Housings

12, 24, 36, & 48 Positions

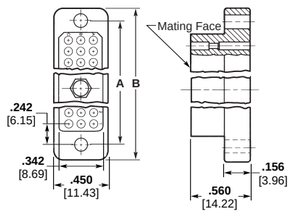
Material — See chart on page 5-245

Related Product Data

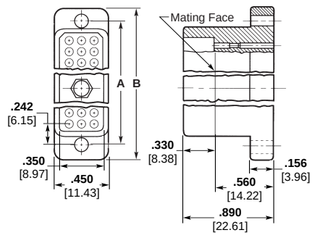
Contacts — Page 5-243

Accessories — Pages 5-251 and 5-252

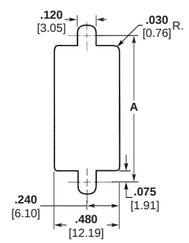
Technical Documents — Page 5-242



Plug



Receptacle



Recommended Panel Cutout

54 Position

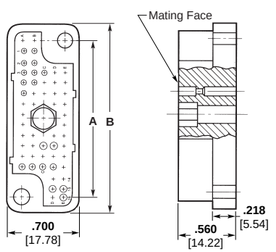
Material — See chart on page 5-245

Related Product Data

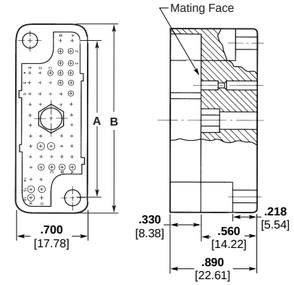
Contacts — Page 5-243

Accessories — Pages 5-251 and 5-252

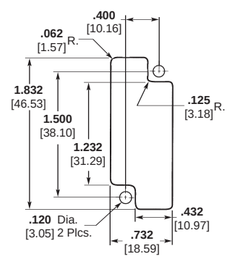
Technical Documents — Page 5-242

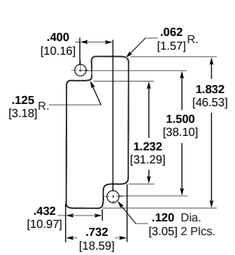


Plug



Receptacle





Recommended Panel Cutout

Catalog 1308940
Revised 8-06

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Housings (Continued)

106 Position

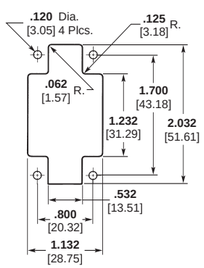
Material — see chart below

Related Product Data

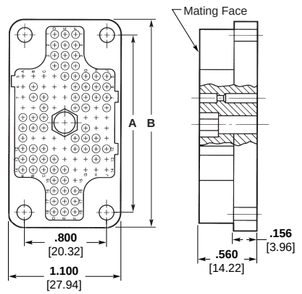
Contacts — Page 5-243

Accessories — Pages 5-251 and 5-252

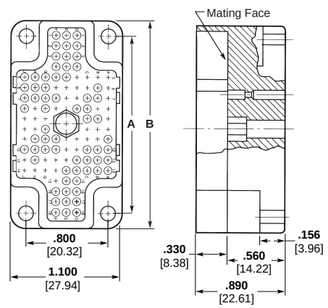
Technical Documents — Page 5-242



Recommended Panel Cutout



Plug



Receptacle

Center Fastener	No. of Positions	Dimensions A	Dimensions B	Center Fastener Type	Part Numbers: Plug Half Phenolic	Part Numbers: Plug Half Diallyl Phthalate	Part Numbers: Receptacle Half Phenolic	Part Numbers: Receptacle Half Diallyl Phthalate
With Center Fastener	12	**1.084** 24.43	**1.334** 33.88	Fixed Female	204727-1	204727-2	—	204728-2
				Long Male Turnable	—	—	204740-1	204740-2
	24	**1.484** 37.69	**1.734** 44.04	Fixed Female	204729-1	204729-2	—	—
				Long Male Turnable	—	204741-2	204742-1	204742-2
				Short Male Turnable	—	—	—	204742-4
	36	**1.884** 47.85	**2.134** 54.20	Fixed Female	204731-1	204731-2	—	204732-2
				Long Male Turnable	204743-1	204743-2	204744-1	204744-2
				Short Male Turnable	204743-3	—	—	—
	48	**2.284** 58.01	**2.534** 64.36	Fixed Female	204733-1	—	204734-1	204734-2
				Long Male Turnable	—	204745-2	204746-1	204746-2
				Short Male Turnable	—	204745-4	—	—
	54	**1.500** 38.10	**1.800** 45.72	Fixed Female	204735-1	—	204736-1	—
				Long Male Turnable	204747-1	204747-2	204748-1	204748-2
				Short Male Turnable	—	—	—	204748-4
	106	**1.700** 43.18	**2.000** 50.80	Fixed Female	204737-1	204737-2	204738-1	204738-2
				Long Male Turnable	204749-1	204749-2	204750-1	204750-2
				Short Male Turnable	—	204749-4	—	204750-4
Without Center Fastener	12	**1.084** 24.43	**1.334** 33.88	—*	204281-2	2-204281-2	204282-2	—
	24	**1.484** 37.69	**1.734** 44.04	—*	—	2-204281-4	204282-4	2-204282-4
	36	**1.884** 47.85	**2.134** 54.20	—*	204281-6	2-204281-6	204282-6	2-204282-6
	48	**2.284** 58.01	**2.534** 64.36	—*	204281-8	2-204281-8	204282-8	—
	54	**1.500** 38.10	**1.800** 45.72	—*	203804-1	203804-2	203803-1	203803-2
	106	**1.700** 43.18	**2.000** 50.80	—*	204260-1	204260-2	204259-1	204259-2

*See page 5-251 for jackscrews.

Catalog 1308940
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High Density Rectangular Connectors (Continued)

Housings (Continued)

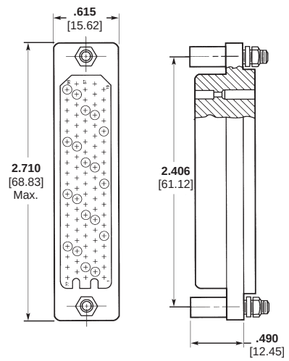
95 Position Connector with Jackscrews

Material

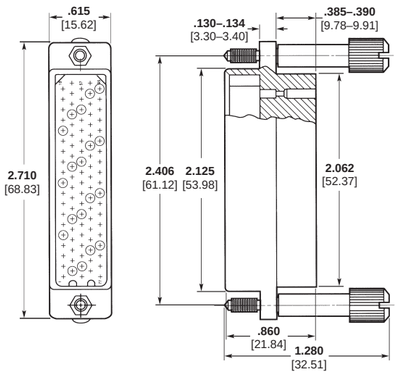
Housing — Diallyl Phthalate
Jackscrews — Stainless Steel

Related Product Data

Contacts — Page 5-243
Technical Documents — Page 5-242



Plug
Part Number 204694-1



Receptacle
Part Number 204693-2

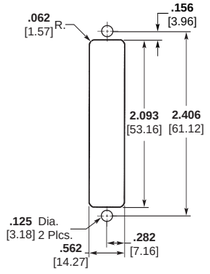
95 Position Connector with Floating Bushings

Material

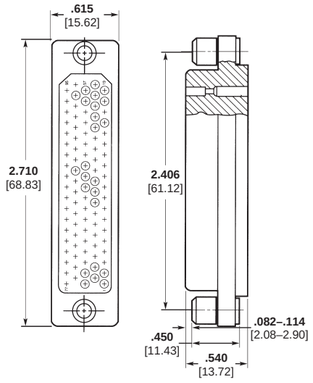
Housing — Diallyl Phthalate
Floating Bushings — Stainless Steel

Related Product Data

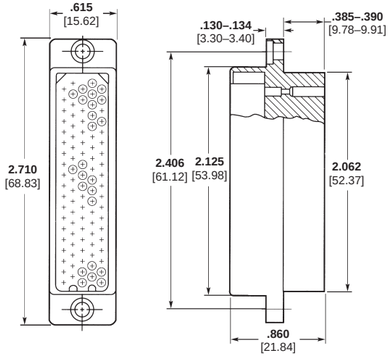
Contacts — Page 5-243
Technical Documents — Page 5-242



Recommended Panel Cutout



Plug
Part Number 204030-1



Receptacle
Part Number 204027-2

Note: Marking on receptacles are on wiring side only.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

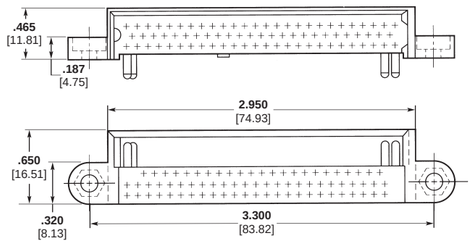
Printed Circuit Board Connector

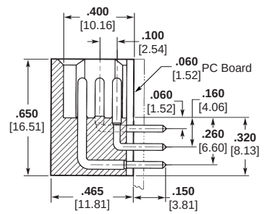
80 Position Pin Header

Material and Finish

Housing — Diallyl Phthalate

Contacts — Brass Plated .000030 [0.00076] Gold over .000030 [0.00076] Nickel





Part Number 204818-4

80 Position Plug with Floating Bushings

Material and Finish

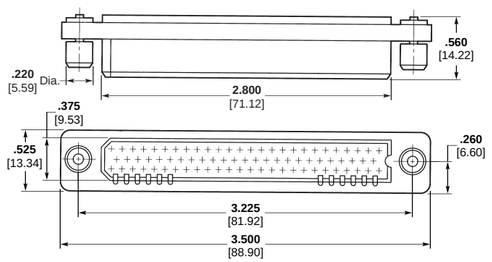
Housing — Diallyl Phthalate

Floating Bushings — Stainless Steel

Related Product Data

Contacts — Page 5-243

Technical Documents — Page 5-242



Part Number 204819-1

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High Density Rectangular Connectors (Continued)

Preloaded Housings, .025 x .025 [0.64 x 0.64] Posted Contacts for Automatic Wiring

12, 24, 36, & 48 Position

Material and Finish

Housing — See Chart

Contact Body — Brass Plated as follows
A — .000030 [0.00076] Gold over .000050 [0.00127] Nickel
B — Gold Flash over .000050 [0.00127] Nickel on entire contact, with additional .000030 [0.00076] Gold in contact area

Contact Sleeve — Stainless Steel

Related Product Data

Contact Size — 20

Pin Diameter — .040 [1.02]

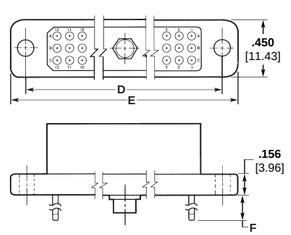
Current Rating — 3.0 Amperes (20 AWG [0.5–0.6 mm²] wire)

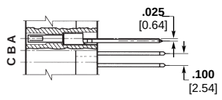
Replacement Contacts — Page 5-243

Mateable Connectors — Pages 5-244 and 5-245

Technical Documents — Page 5-242

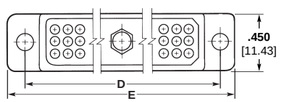
Plug Assembly

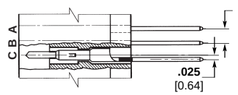




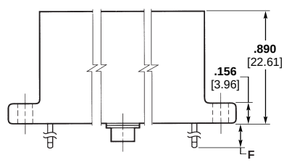
End View

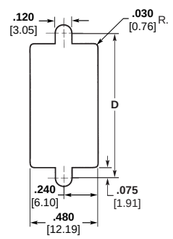
Receptacle Assembly





End View





Recommended Panel Cutout

No. of Positions	Dimensions D	Dimensions E	Contact Finish	Max. Termination Per Post	Dim. F	Part Numbers: Plug Assembly Socket Contacts Phenolic	Part Numbers: Plug Assembly Socket Contacts Diallyl Phthalate	Part Numbers: Receptacle Assembly Pin Contacts Phenolic	Part Numbers: Receptacle Assembly Pin Contacts Diallyl Phthalate
12	**1.084** 27.43	**1.334** 33.88	A	1	**.242** 6.15	—	—	—	2-204682-8
				3	**.670** 17.02	—	—	—	3-204682-0
24	**1.484** 37.69	**1.734** 44.04	A	1	**.242** 6.15	—	6-204683-4	1-204684-9	—
				3	**.670** 17.02	—	6-204683-6	2-204684-1	3-204684-0
			B	1	**.242** 6.15	6-204683-1	7-204683-0	—	—
				3	**.670** 17.02	6-204683-3	—	2-204684-7	—
36	**1.884** 48.85	**2.134** 54.20	A	1	**.242** 6.15	—	—	1-204686-9	2-204686-8
				3	**.670** 17.02	5-204685-7	6-204685-6	—	3-204686-0
			B	1	**.242** 6.15	—	—	—	3-204686-4
				3	**.670** 17.02	6-204685-3	7-204685-2	—	3-204686-6
48	**2.284** 58.01	**2.534** 64.36	A	1	**.242** 6.15	5-204687-5	—	—	2-204688-8
				3	**.670** 17.02	5-204687-7	6-204687-6	—	3-204688-0
			B	1	**.242** 6.15	—	7-204687-0	—	—
				3	**.670** 17.02	6-204687-3	7-204687-2	—	—

Notes: 1. Markings on receptacle assembly are on wiring side only.
2. In addition to combinations listed, all sizes are available with or without female jackscrews. Plugs are available with pins, and receptacles are available with sockets. Consult Tyco Electronics for details.
3. Fixed female jackscrews are included with these assemblies.

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High Density Rectangular Connectors (Continued)

Preloaded Housings, .025 x .025 [0.64 x 0.64] Posted Contacts for Automatic Wiring (Continued)

54 Position

Material and Finish

Housing — See Chart

Contact Body — Brass Plated as follows

A — .000030 [0.00076] Gold over .000050 [0.00127] Nickel

B — Gold Flash over .000050 [0.00127] Nickel on entire contact, with additional .000030 [0.00076] Gold in contact area

Contact Sleeve — Stainless Steel

Related Product Data

Contact Size — 20

Pin Diameter — .040 [1.02]

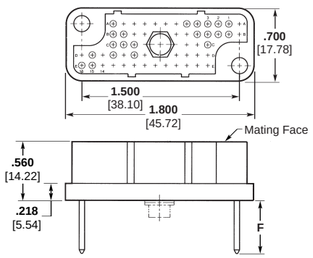
Current Rating — 3.0 Amperes (20 AWG [0.5–0.6 mm²] wire)

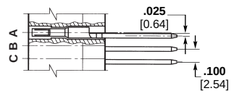
Replacement Contacts — Page 5-243

Mateable Connectors — Pages 5-244 and 5-245

Technical Documents — Page 5-242

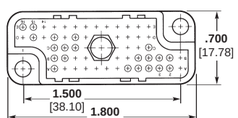
Plug Assembly

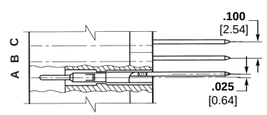




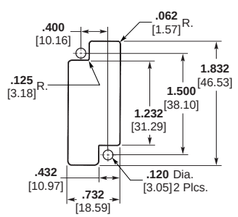
End View

Receptacle Assembly

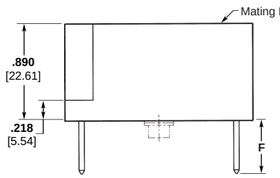




End View



Recommended Panel Cutout for Receptacle



End View

Contact Finish	Max. Termination Per Post	Dim. F	Part Numbers			
			Plug Assembly Socket Contacts		Receptacle Assembly Pin Contacts	
			Phenolic	Diallyl Phthalate	Phenolic	Diallyl Phthalate
A	1	.242 6.15	5-204689-5	6-204689-4	1-204690-9	—
	2	.456 11.58	5-204689-6	6-204689-5	—	—
	3	.670 17.02	5-204689-7	6-204689-6	2-204690-1	3-204690-0
B	1	.242 6.15	6-204689-1	—	—	—
	3	.670 17.02	—	7-204689-2	2-204690-7	—

Notes: 1. Markings on receptacle assembly are on wiring side only.
2. In addition to combinations listed, all sizes are available with or without female jackscrews. Plugs are available with pins, and receptacles are available with sockets. Consult Tyco Electronics for details.
3. Fixed female jackscrews are included with these assemblies.

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High Density Rectangular Connectors (Continued)

Preloaded Housings, .025 x .025 [0.64 x 0.64] Posted Contacts for Automatic Wiring (Continued)

106 Position

Material and Finish

Housing — See Chart

Contact Body — Brass Plated as follows
A — .000030 [0.00076] Gold over .000050 [0.00127] Nickel
B — Gold Flash over .000050 [0.00127] Nickel on entire contact, with additional .000030 [0.00076] Gold in contact area

Contact Sleeve — Stainless Steel

Related Product Data

Contact Size — 20

Pin Diameter — .040 [1.02]

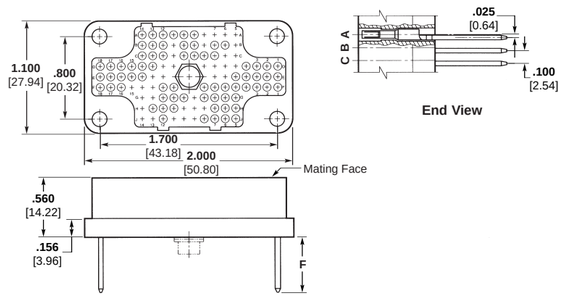
Current Rating — 3.0 Amperes (20 AWG [0.5–0.6 mm²] wire)

Replacement Contacts — Page 5-243

Mateable Connectors — Pages 5-244 and 5-245

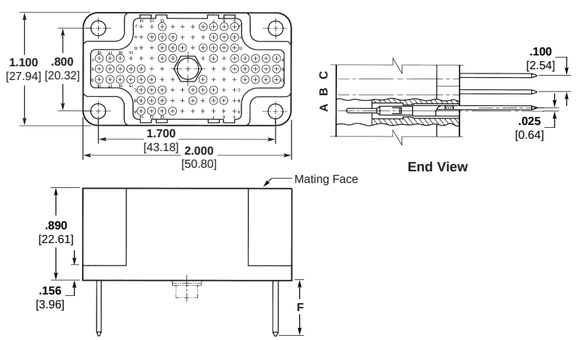
Technical Documents — Page 5-242

Plug Assembly

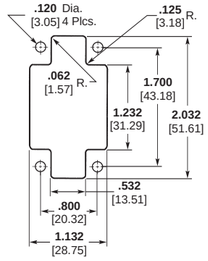


End View

Receptacle Assembly



End View



Recommended Panel Cutout

Contact Finish	Max. Termination Per Post	Dim. F	Part Numbers			
			Plug Assembly Socket Contacts		Receptacle Assembly Pin Contacts	
			Phenolic	Diallyl Phthalate	Phenolic	Diallyl Phthalate
A	1	.242 6.15	5-204691-5	—	—	2-204692-8
	3	.670 17.02	5-204691-7	6-204691-6	2-204692-1	3-204692-0
B	1	.242 6.15	6-204691-1	7-204691-0	—	3-204692-4
	3	.670 17.02	6-204691-3	7-204691-2	2-204692-7	3-204692-6

Notes: 1. Markings on receptacle assembly are on wiring side only.
2. In addition to combinations listed, all sizes are available with or without female jackscrews. Plugs are available with pins, and receptacles are available with sockets. Consult Tyco Electronics for details.
3. Fixed female jackscrews are included with these assemblies.

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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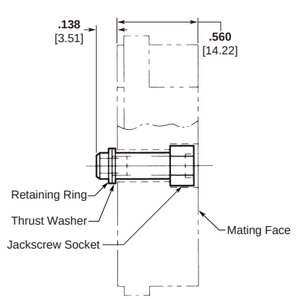
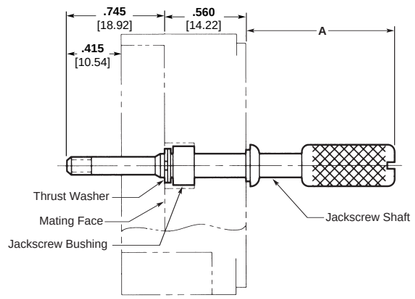
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341



Fixed Female Jackscrew

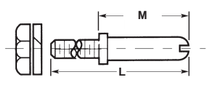


Male Turnable Jackscrew

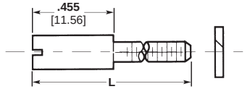
No. of Positions	Type	A	Part No.
12, 24 36, 48	Fixed Female	—	204299-1
	Short Male Turnable	**1.01** 25.65	204298-1
	Long Male Turnable	**1.76** 44.70	204298-2
54, 106	Fixed Female	—	203879-1
	Short Male Turnable	**1.01** 25.65	203880-1
	Long Male Turnable	**1.76** 44.70	203880-2

Note: Short male jackscrews cannot be used with shield and cable clamp assemblies.

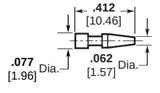
Keying



Guide Pin



Guide Socket



Keying Plug
Part Number 205120-1

Material	Pin			Socket	
	Dim. L	Dim. M	Part No.	Dim. L	Part No.
Zinc Plated Brass	**1.100** 27.94	**.515** 13.08	203881-1	**1.045** 26.54	203882-1
Stainless Steel	**1.100** 27.94	**.515** 13.08	203881-2	**1.045** 26.54	203882-2
Zinc Plated Brass	**1.300** 33.02	**.725** 18.42	205694-1	—	—

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UK: 44-208-420-8341

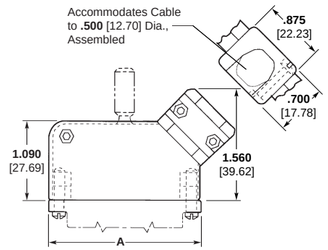
High Density Rectangular Connectors (Continued)

Accessories (Continued)

45° Shield and Cable Clamps

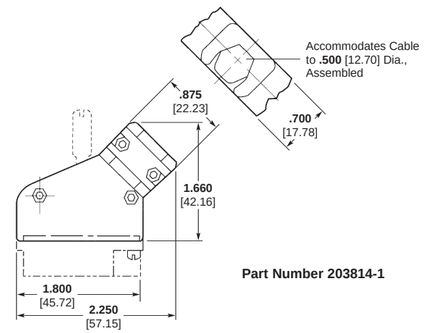
Material — Black Polysulfone

12, 24, 36 & 48 Position



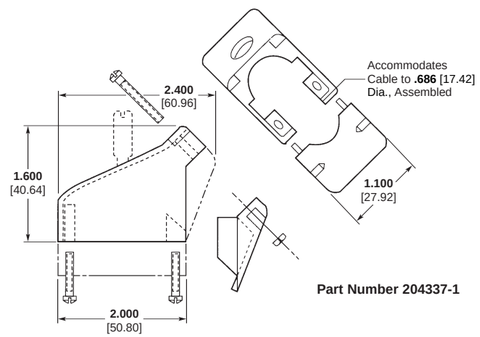
No. of Positions	Dim. A	Part No.
12	**1.334** 33.88	205083-1
24	**1.734** 44.04	205083-2
36	**2.134** 54.20	205083-3
48	**2.534** 64.36	205083-4

54 Position



Part Number 203814-1

106 Position



Part Number 204337-1

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

High Density Rectangular Connectors (Continued)

Application Tooling

Type XI crimp/snap-in contacts may be applied with hand tools, semi-automatic bench equipment or fully-automatic lead-making machines.

CERTI-CRIMP II Straight Action Hand Tools (SAHT)

Premium grade hand tools. Feature ratchet control to provide complete crimp cycle. Die sets close in a straight line. Include a contact locator and wire stop, plus an insulation crimp adjustment lever, when applicable. Approximate weight 1.3 lb [0.59 kg].

AMP-O-LECTRIC Model "K" Terminating Machine, 1-471273-3

Semiautomatic bench machine for use with standard-style applicators. It is an electrically-powered, clutched, flywheel-energy-style machine, equipped with a mechanical strip feed mechanism. Products commonly applied with this machine include AMP splices, AMPLIVAR splices, and FASTON flag receptacles.

Specifications

Width — 21 [533]
Depth — 20 [508]
Height — 24 [610] without reel
Weight — 230 lb [104 kg]
Electrical — 120 VAC, 60 Hz, 6 A
Air — 90-110 psi [6.21-7.59 bar], 6 scfm [0.00282 m^3/s] when required with air-feed applicators
Wire Range — 26-10 AWG [0.12-6 mm^2] solid or stranded, depending on product applied

For more information, contact Tyco Electronics.

AMPOMATOR CLS IV+ Lead-Making Machines, 356500-1, -2

Fully-automatic machines that measure, cut, strip and terminate single leads. Microprocessor-controlled, and programmed and operated using an easy-to-follow, menu-driven touch-screen. Features include direct-drive terminating units with precision crimp height adjustment, fully programmable setups, wire runout and splice detection, and motorized pre-feed with wire straightener. Crimp quality monitoring is also available.

Specifications

Width — 159 [4 040]
Depth — 68 [1 730]
Height — 86 [2 185] with 24 [610] dia. reel
Weight — 2 000 lb [907 kg]
Electrical — 220 VAC, 50 or 60 Hz, single phase, 25 A, with neutral and ground
Air — 90 psi [6.21 bar], 15 scfm [0.0071 m^3/s] sustained
Wire Range — 26-10 AWG [0.12-6 mm^2] stranded, 26-16 AWG [0.12-1.4 mm^2] solid
Lead Lengths — 3-90 [76.2-2 285], 90-1 000 [2 285-25 400] with long lead conveyors

For more information, request Catalog 124324.

Crimp Quality Monitor (CQM), 1320420-1, -2

This unique system provides 100% on-the-fly crimp inspection. It measures the crimp height of each termination, and evaluates the quality of each crimp. If a crimp is questionable, the monitor alerts the operator with both visual and audible alarms. It also provides ports for printing and networking. When used with AMP-O-LECTRIC Model "G" Termination Machines, the monitor is mounted to the machine. When used with AMPOMATOR CLS IV+ Lead-Making Machines, it is integrated into the machine's operating system.

Specifications

Width — 8.8 [220]
Depth — 8.1 [205]
Height — 4.6 [115]
Weight — 5 lb [2.3 kg]
Electrical — 100-240 VAC, 50/60 Hz, 3.2 A

For more information, request Catalog 82275.

Catalog 1308940
Revised 8-06

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Application Tooling

(Continued)

AMP-O-LECTRIC Model "G" Terminating Machines, 354500-1, -9, -11

Semiautomatic bench machines for crimping reeled terminals and contacts, featuring a quiet and reliable direct motor drive, microprocessor controls for ease of setup and operation, and guarding and lighting designed for operator convenience. All models are equipped with either manual or automatic precision adjustment of crimp height. Machine-mounted sensors are available for crimp quality monitoring using conventional miniature-style applicators.

Specifications

Width — 18.7-25.3 [475-643] depending on applicator type

Depth — 21.5-28.1 [546-713] depending on applicator type

Height — 20 [508]

Weight — 240 lb [110 kg]

Electrical — 120 or 220 VAC, 50 or 60 Hz; 310 VA

Air — 90-110 psi [6.21-7.59 bar], 6 scfm [0.00282 m^3/s] when required with air-feed applicators

Wire Range — 26-10 AWG [0.12-6 mm^2] solid or stranded, depending on product applied

For more information, request Catalog 65828.

Entry Level Terminator (ELT), 1338600-1, -2, -3, -4 ,-5, -6

Semiautomatic Bench Terminator for side- and end-feed reeled terminals and contacts. The ELT uses a DC motor with gear box drive. The result is a small-footprint design that is fast and quiet. Cycle time is less than 0.400 seconds with an operation sound level of 76dBa. With a crimp force capacity of 3,000 pounds, the ELT is available for all but the highest crimp force applications. A wide range of optional equipment is also available to meet your specific application requirements.

Specifications

Width — 16.8 [427]

Depth — 20.6 [523]

Height — 20 [510] without reel support

Weight — approx. 150 lb [68 kg]

Electrical — 100-240 VAC, 50/60 Hz, 6A *(Note: Avg <1 A at 120 VAC when used as a bench-top unit at 2,000 cycles per hour operating rate)*

Air — 90-100 psi [6.21-6.90 bar], 6 scfm [0.00282 m^3/s] when required for use with air-feed applicators *(Note: Optional Air Feed Valve Assembly Required)*

Wire Range — Up to 14 AWG [2.5 mm^2]

For more information, request catalog 1308382.

AMP-O-MATIC Stripper/Crimper Machine, 1320895-1

Semiautomatic bench crimping machines that also strip the wire, and are therefore used for terminating jacketed cable. Feature manual precision adjustment of crimp height, keyed strip blades for faster, more accurate setups, and an efficient scrap removal system. All adjustments can be made from the front of the machines without special tools. Available with crimp quality monitoring.

Specifications

Width — 14 [355]

Depth — 18 [457]

Height — 33 [838] without reel

Weight — 150 lb [68 kg]

Electrical — 120 VAC, 50 or 60 Hz, .5 A

Air — 80-100 psi [5.52-6.90 bar], 3.5 scfm [0.00165 m^3/s]

Wire Range — 32-14 AWG [0.03-2 mm^2]

For more information, request Catalog 65004.

Stripping Module

The combination of the Stripping Module with the Entry Level Terminator (ELT) or the AMP-O-LECTRIC Model G Terminator provides an economical and proficient method of stripping wire and crimping terminals on the same machine. Wires are stripped moments before crimping, meaning there is virtually no chance of damaging wire conductors during handling or storage. Once the wire is fed into the start sensor the Stripping Module does the rest, improving placement accuracy.

Specifications

Wire Range Base Module — 0.03 mm^2 - 2.0 mm^2 (32-14 AWG) (30-32 AWG may require special kit.)

Max. Insulation — .200 [5.08]

Cable Breakout — > 1.100 [29.00]

Strip Length — .100 - .400 [2.50 - 10.16]

Noise — Less than 82 dBA (Typical at operator position with standard mechanical feed applicator)

Weight — 4.53 Kilograms (10 lb)

Height — 5.000 [127.00]

Electrical — 100-240 VAC, 50/60 Hz, single phase current, obtains power from the terminator

Air — 620-760 kPa (90-100 psi), 2.83 liters/sec (6 scfm)

Wire Sensor — Gold plated contacts with laser etched target

For more information, request Catalog 1309085.

Catalog 1308940
Revised 8-06

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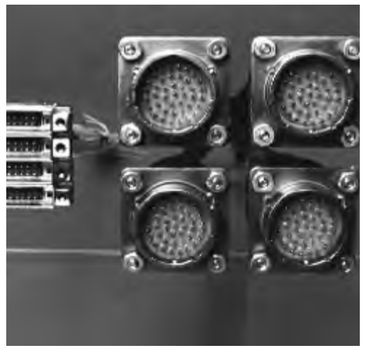
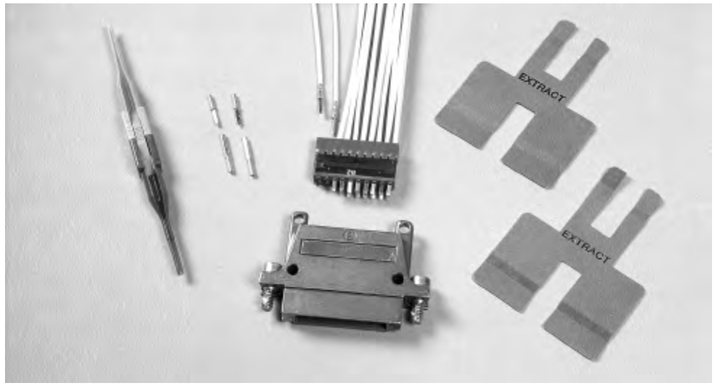
MTC High-Performance Modular Rectangular Connectors with Removable Contacts

Product Facts

- Low-profile rectangular design for high packaging density
- Environmental sealing for aerospace applications
- Modular components for design versatility and logistics savings
- Lightweight materials for weight savings
- Quick-disconnect mating hardware





METRIC
Dimensions in this section are millimeters over inches

System

The Raychem MTC product line is a complete modular connector system consisting of lightweight, environmentally sealed miniature rectangular connectors (shell housings with removable inserts) and individually removable rear-release contacts.

Components

MTC connectors are now available with quick-disconnect mating hardware, EME shielding accessories, and modular inserts that can accommodate a mix of signal and power crimp contacts and coaxial contacts. The need for special termination tooling has been minimized, while the ease of manufacturing and maintenance has been improved.

Configurations

MTC rectangular connectors using jack screws or quick-disconnect hardware can be stacked or panel-mounted next to each other without any provision for grip space, a feature that can save significant panel area.

MTC connectors are available in 1-inch and 2-inch configurations. Modular removable inserts with size 22 and/or size 16 contact cavities can be combined into the 1-inch and 2-inch MTC housings.

Inserts

MTC inserts are available in 20-cavity and 5-cavity versions. The 20-cavity insert accepts size 20-22 (24 AWG to 20 AWG wire) crimp contacts. The 5-cavity insert accepts size 16–14 crimp contacts. Insertion/extraction of the contacts is rear release.

Note:
Other configurations are available in the MTC family (size 12 contacts; 50 mil spacing for double density; accessories). Please contact Tyco Electronics.

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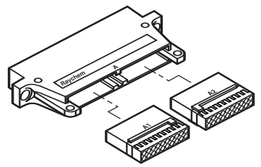
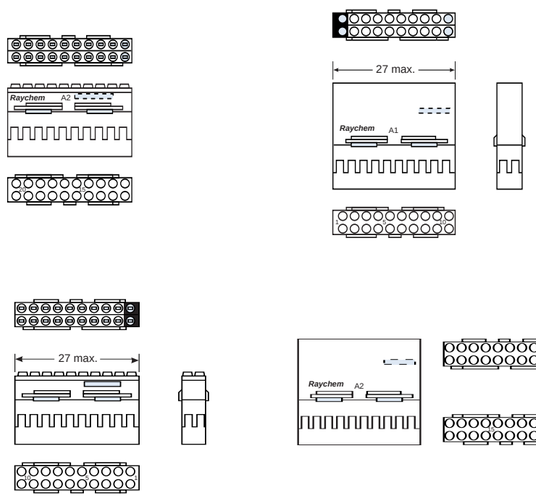
MTC High-Performance Modular Rectangular Connectors with Removable Contacts (Continued)

20-Cavity Inserts



2-inch Shell with Inserts



MTCP-122-20 inserts are used with MTC100 1-inch and 2-inch shells.
The 1-inch shell takes:

- One MTCP-122-20P (pin contact) **or**
- One MTCP-122-20S (socket contact)

The 2-inch shell takes:

- One MTCP-122-20P1 and one MTCP-122-20P2 (pin contact) **or**
- One MTCP-122-20S1 and one MTCP-122-20S2 (socket contact)

2 x 20 Cavity Inserts (Size 20–22) — 2-Inch Shell

Pin Insert	Socket Insert
MTCP-122-20P1	MTCP-122-20S1
MTCP-122-20P2	MTCP-122-20S2

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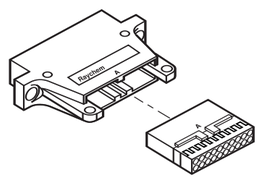
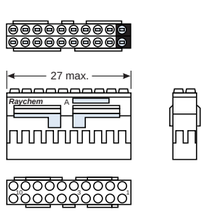
MTC High-Performance Modular Rectangular Connectors with Removable Contacts (Continued)

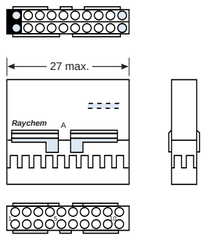
20-Cavity Inserts (Continued)

1 x 20 Cavity Inserts (Size 20–22) — 1-Inch Shell



1-inch Shell with Insert





Pin Insert	Socket Insert
MTCP-122-20P	MTCP-122-20S

Contacts for 20-Cavity Inserts
The contacts for 20-cavity inserts must be ordered separately. They are:
■ CTA-0166—pin contact
■ CTA-0165—socket contact

Contacts accept 24 AWG to 20 AWG wires.

Pin Contact CTA-0166

Socket Contact CTA-0165

Tools		Tools	
Positioner for pin contact	CE-1605900	Positioner for socket contact	CE-1606000
Installation process	ES-61413	Installation process	ES-61413
Contact removal tool (plastic)	CTA-1160	Contact removal tool (plastic)	CTA-1160
Extraction tool for MTCP inserts	CTA-0161	Extraction tool for MTCP inserts	CTA-0161

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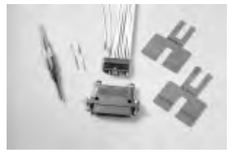
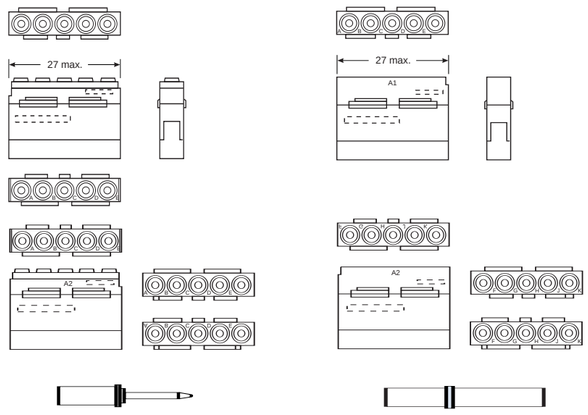
MTC High-Performance Modular Rectangular Connectors with Removable Contacts (Continued)

5-Cavity Inserts (Size 16)





MTCP-116-05 inserts are used with MTC100 1-inch and 2-inch shells.
The 1-inch shell takes:

- One MTCP-116-05-P1 (pin contact) **or**
- One MTCP-116-05-S1 (socket contact)

The 2-inch shell takes:

- One MTCP-116-05P1 and one MTC-116-05P2 (pin contact) **or**
- One MTCP-116-05-S1 and one MTCP-116-05-S2 (socket contact)

5-Cavity Inserts (Size 16)	
Pin Insert	**Socket Insert**
MTCP-116-05P1	MTCP-116-05S1
MTCP-116-05P2	MTCP-116-05S2

Contacts for 5-Cavity Inserts

The contacts for 5-cavity inserts must be ordered separately. They include:	
■ CTA-0079	— pin contact (MS 27493-16) (MIL-C-39029/58 intermateable)
■ CTA-0078	— socket contact (MS 27491-16) (MIL-C-39029/57 intermateable)
■ D-602-0140	— coaxial pin contact (MIL-C-39029/76 intermateable)
■ D-602-0171	— coaxial socket contact (MIL-C-39029/78 intermateable)
Other contacts designed for M38999 Series II connectors can be used.	
Pin Contact	**Socket Contact**
D-602-0140 (coaxial)	D-602-0171 (coaxial)
CTA-0079 (power)	CTA-0078 (power)

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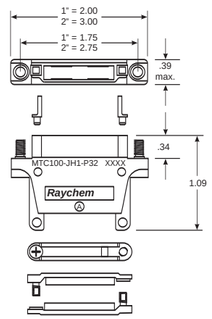
Japan: 81-44-844-8013
UK: 44-208-420-8341

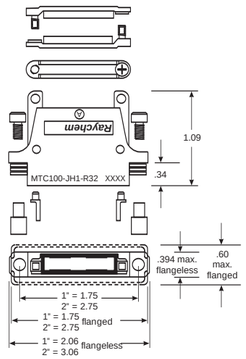
MTC High-Performance Modular Rectangular Connectors with Removable Contacts (Continued)

Hybrid Inserts

Plug



Receptacle



Hybrids
Hybrid insert combinations of size 22 and size 16 contact cavities are also possible.
2-Inch Shell—Hybrid Assembly
Power and signal

Shells

MTC connector housing shells are available with nickel plating (48-hr salt spray performance) or cadmium over nickel plating (500-hr salt spray performance).

MTC connector housings are offered with quick-disconnect or jack-screw mating hardware. Each connector shell is polarized and has 64 user-defined keying combinations. Lightweight, low-profile EME backshells are also available for increased shielding effectiveness of the connector.

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MTC High-Performance Modular Rectangular Connectors with Removable Contacts (Continued)

MTC Shells Ordering Information

M T C 1 0 0 X - X H X - X X 2

2 = Nickel plating.
48-hr salt spray test performance

3 = Cadmium over nickel plating.*
500-hr salt spray test performance

P = Plug housing
R = Receptacle housing, flangeless
F = Receptacle housing, flanged

1 = 1"
2 = 2"

J = Standard housing
S = EMI housing

Q = Quick-disconnect mating hardware
(connector performance per Raychem specification C-6114)

Blank = Jack-screw mating hardware
(connector performance per Raychem specification C-6115)

*Some combinations of shells, mating hardware and EME shielding accessories are not available. Contact Tyco Electronics for product information.

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MTC High-Performance Modular Rectangular Connectors with Removable Contacts (Continued)

Accessories

Low-Profile EME Backshells

Lightweight rectangular EME backshells connect the overall bundle shield to the MTC connector housing. Individual cable shields can also be terminated to the backshell braid by using Raychem SolderSleeve devices.

The backshell is mounted on the MTC housing via the cable clamp screws.

MTC backshell features include a low profile, light weight, and Level II EME performance.

EME Backshell Adapters

CHA-0275	2-inch adapter (plug or receptacle)
CHA-0276	1-inch adapter (plug or receptacle)

MTC Shield-Grounding Busbars

Raychem MTC shield-grounding busbars allow for simple, cost-effective termination of cable shielding to MTC aluminum housings.

Two-inch shield-grounding busbars terminate up to 20 shielded twisted pairs on a 2-inch MTC connector. The individual shields are terminated to “fingers” on the busbar with Raychem SolderSleeve devices.

The busbar is mounted on the MTC housing via cable clamp screws.

MTC busbar features include a simple termination, cost effectiveness, light weight, and Level I EME performance.

Shield-Grounding Busbars

CTA-0022	1-inch busbar (with 5 SolderSleeve terminators)
CTA-0023	2-inch busbar (with 10 SolderSleeve terminators)

EME Shielding Accessories for MTC Connectors

Grounding Block

Allows for cable shield termination grounding on the MTC shell housing via crimp-removable contacts. This grounding scheme allows individual cables to be removed from the connector without cutting a ganged ground connection. Sufficient ground contacts are available to handle shielded twisted-pair cables.

Grounding Block

CHA-0301	1-inch grounding block receptacle shell
CHA-0302	2-inch grounding block receptacle shell
CHA-0303	1-inch grounding block plug shell
CHA-0304	2-inch grounding block plug shell

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Introduction

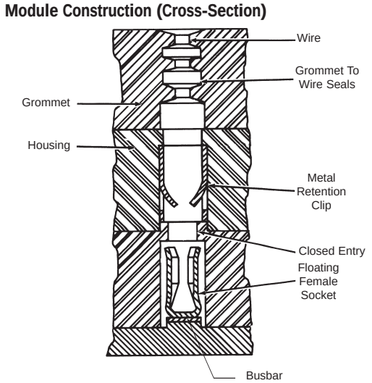
Product Facts

- **The TJS connections are inherently more reliable than conventional threaded and solder terminations**
- **The user's wiring is crimped to gold plated pin contacts, conforming the MIL-C-39029/1, which are individually mated to probe-proof gold plated pre-bussed sockets contained within the module and splice**
- **Modules and Splices — environment proof conforming to the requirements of MIL-T-81714. These modules can be assembled into MIL-T-81714 rails and are individually removable. Brackets are also available to mount individual or triads of modules. The splices are designed to terminate from two to four wires.**
- **Commercial TJS consists of module blocks (either environmental or non-environmental) designed for custom assembled installations. These can be furnished in pre-assembled arrays in rails or individually with rail kits to accommodate various rows and lengths of modules.**
- **TJS Connectors also qualified to German Army Standard VG 95212-31/ VG 95231-102/103/105**

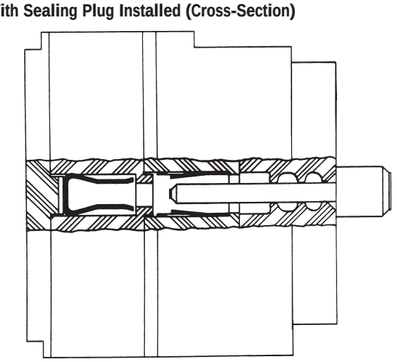
The Terminal Junction System (TJS) provides design engineers with a compact family of modules and splices for interconnecting wires. Both the modules and splices facilitate interconnecting with pre-bussed configurations to which the user's 22 thru 12 AWG wires are terminated with crimped removable pin contacts. Servicing tools required are the commonly available MIL-C-81969/14, plastic tool and MIL-C-22520 crimping tool used for rear release connector contacts.

The TJS eliminates many shortcomings of the conventional lug and threaded termination. The TJS has no loose attaching hardware, such as nuts, screws and lock-washers to complete the termination. The TJS saves space and weight over threaded terminations while reducing installation cost. There is complete electrical isolation and optional environmental sealing grommet in the TJS without user installed busses, barriers, insulating strips, potting and enclosures. The TJS module pre-bussed integral sockets are permanently connected in a variety of bussing arrangements to suit the most exacting circuit requirements. These modules can be user assembled into any required bussing arrangement and contact size permutation.

Typical Module Construction (Cross-Section)



Module With Sealing Plug Installed (Cross-Section)



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Performance Specifications

Voltage Rating —

Sizes 22, 20, 16, 12

Altitude	DWV*	Working Voltage
Sea level	1,500 V	600 V
70,000 Feet**	600 V	300 V

Size 21 (22HD)

Altitude	DWV*	Working Voltage
Sea Level	1,000 V	600 V
70,000 Feet**	325 V	300 V

* DWV = Dielectric Withstanding Voltage
** [21,336m]

Contact Voltage Drop (Max.) —

Contact Size	Test Current	Initial	After Conditioning
21 (22HD)	5.0 A	55 V	65 V
22	5.0 A	45 V	50 V
20	7.5 A	45 V	50 V
16	13.0 A	50 V	55 V
12	23.0 A	40 V	45 V

The MV drop is measured across an adjacent bussed pair of wire contacts.

Operating Temperature Range —

Class	Minimum	Maximum
D	-65°C (-85°F)	+200°C (+392°F)

Altitude Immersion —
Insulation resistance shall not fall below 5,000 megohms after being subjected to three, 70,000-foot [21,336m] altitude immersion cycles in salt water.

Fluid Immersion —
Class D—Extended fluid type

Fluid	
MIL-H-5606	Hydraulic fluid
MIL-L-23699	Lubricating oil
MIL-T-5624	Aviation fuel
MIL-L-7808	Lubrication oil
MIL-A-8243	Anti-ice fluid
MIL-C-25769	Cleaning fluid
Skydrol	500A & 500B
Aerosafe	2300 & 2300W
Flyjet	III
Esso Oil	Turbo 25

Moisture Resistance —
High Humidity (95% RH) 100 megohms min.
After Drying—24 hours 1,000 megohms min.

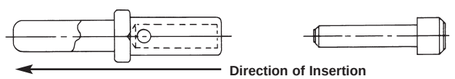
Durability —
No performance degradation after 10 cycles of contact insertion/removal.

Vibration —
Class D
Sine, MIL-STD-202, method 204 condition G
Random, MIL-STD-1344, method 2005.

Shock —
Class D
MIL-STD-1344, Method 2004
(300 G, 3 milliseconds duration, half-sine).

Contacts, Sealing Plugs and Assembly Tools

Contacts and Sealing Plugs



Size	Part Numbers			
	Pin Contacts		Sealing Plugs	
	Commercial	Military	Commercial	Military
21(22HD)	592413-1	M39029/1-507	592104-4	MS27488-22
22	3-592404-1	M39029/1-100	592104-1	MS27488-20
20	2-592404-1	M39029/1-101	592104-1	MS27488-20
16	1-592404-1	M39029/1-102	592104-2	MS27488-16
12	592404-1	M39029/1-103	592104-3	MS27488-12

Insertion/Removal Tools

Size	Part Numbers		Color*	Wire Gage	Contact Wire Dia. Min./Max.	Finished Crimp Tool	Turret or Positioner
	Commercial	Military					
21(22HD)	—	M81969/14-01	Grn/Wh	28-22	**.030-.054** [.76-1.37]	M22520/2-01	M22520/2-32
22	592105-1	M81969/14-11	Rd/Wh	26-22	**.034-.066** [.86-1.68]	M22520/2-01	M22520/2-11
20	592105-1	M81969/14-11	Rd/Wh	24-20	**.038-.083** [.97-2.11]	M22520/1-01 or /2-01	M22520/1-02 or /2-02
16	—	M81969/14-03	Blue/Wh	20-16	**.060-.101** [1.52-2.57]	M22520/1-01	M22520/1-02
12	—	M81969/14-04	Yel/Wh	14-12	**.087-.147** [2.21-3.73]	M22520/1-01	M22520/1-02

* Colored end for contact insertion; white end for release/removal.

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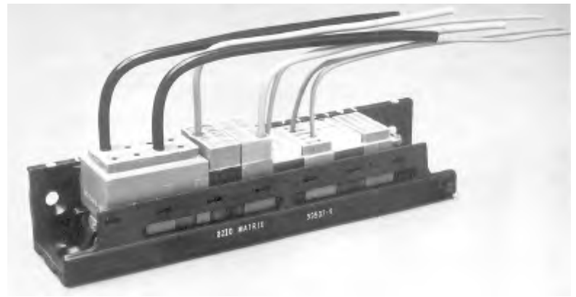
Feedback and Feedthru Terminal Junction Modules

MIL-T-81714 Terminal Junction module blocks are available in sizes 12, 16, 20, 22 and 22HD. The size 12 and 16 feedback blocks have eight cavities each. The size 20 and 22 feedback blocks have 10 cavities each (size 22HD has 21 cavities). The feedthru blocks have the same number of cavities situated on both sides of the block.

Military bussing arrangements are available with each size block.

These module blocks and mounting rail assemblies are qualified to MIL-T-81714. The pin contacts are qualified to MIL-C-39029/1.



Notes: Tyco Electronics has not qualified the Feedthru Modules to MIL-T-81714. The Military part number is shown for reference only.

Feedthru

Military Part Numbers Feedthru Modules	AMP Commercial Part Numbers Feedthru Modules
(Class D) Size 20	
M81714/7-DA1	592608-3
M81714/7-DB1	592608-1
M81714/7-DB2	—
M81714/7-DB3	—
M81714/7-DC1	592608-8
M81714/7-DC2	—
M81714/7-DD1	592608-6
M81714/7-DE1	592608-5
M81714/7-DJ1	—
(Class D) Size 16	
M81714/8-DA1	592604-5
M81714/8-DB1	592604-3
M81714/8-DB2	592604-7

Military Part Numbers Feedthru Modules	AMP Commercial Part Numbers Feedthru Modules
(Class D) Size 16 (Continued)	
M81714/8-DC1	592604-9
M81714/8-DC2	—
M81714/8-DD1	592604-1
M81714/8-DH1	—
(Class D) Size 12	
M81714/9-DA1	592600-9
M81714/9-DB1	592600-7
M81714/9-DB2	1-592600-3
M81714/9-DC1	592600-1
M81714/9-DC2	1-592600-1
M81714/9-DD1	592600-5
M81714/9-DH1	592600-3

Feedback

Military Part Numbers Feedback Modules	AMP MIL Qualified Part Numbers Feedback Modules	AMP Commercial Part Numbers Feedback Modules
(Class D) Size 22	**(Class D) Size 22**	**(Class D) Size 22**
M81714/1-DA1	—	592633-4
M81714/1-DB1	—	592633-2
M81714/1-DB2	—	1-592633-2
M81714/1-DB3	—	2-592633-0
M81714/1-DC1	—	1-592633-4
M81714/1-DC2	—	1-592633-0
M81714/1-DD1	—	592633-8
M81714/1-DE1	—	592633-6
(Class D) Size 21	**(Class D) Size 21**	**(Class D) Size 21**
M81714/17-D31	592629-1	592629-2
M81714/17-D32	592629-3	592629-4
M81714/17-D33	592629-5	592629-6
M81714/17-D34	592629-7	592629-8
M81714/17-D35	592629-9	1-592629-0
M81714/17-D36	4-592629-4	—
M81714/17-D37	1-529629-1	1-592629-2
M81714/17-D38	1-592629-3	1-592629-4
M81714/17-D39	1-592629-5	1-592629-6
M81714/17-D40	1-592629-7	1-592629-8
M81714/17-D42	4-592629-2	4-592629-0
M81714/17-D43	4-592629-3	—
M81714/17-D44	1-592629-9	2-592629-0
M81714/17-D45	4-592629-5	2-592629-2

Military Part Numbers Feedback Modules	AMP MIL Qualified Part Numbers Feedback Modules	AMP Commercial Part Numbers Feedback Modules
(Class D) SIZE 20	**(Class D) SIZE 20**	**(Class D) SIZE 20**
M81714/2-DA1	592624-3	592624-4
M81714/2-DB1	592624-1	592624-2
M81714/2-DB2	1-592624-0	1-592624-1
M81714/2-DB3	1-592624-8	1-592624-9
M81714/2-DC1	1-592624-2	1-592624-3
M81714/2-DC2	2-592624-2	592624-9
M81714/2-DD1	592624-7	592624-8
M81714/2-DE1	592624-5	592624-6
(Class D) SIZE 16	**(Class D) SIZE 16**	**(Class D) SIZE 16**
M81714/3-DA1	592620-5	592620-6
M81714/3-DB1	592620-3	592620-4
M81714/3-DB2	592620-9	1-592620-0
M81714/3-DC1	1-592620-1	1-592620-2
M81714/3-DC2	592620-7	592620-8
M81714/3-DD1	592620-1	592620-2
(Class D) SIZE 12	**(Class D) SIZE 12**	**(Class D) SIZE 12**
M81714/4-DA1		592616-6
M81714/4-DB1	—	592616-4
M81714/4-DB2	—	1-592616-0
M81714/4-DC1	—	1-592616-2
M81714/4-DC2	—	592616-8
M81714/4-DD1	—	592616-1

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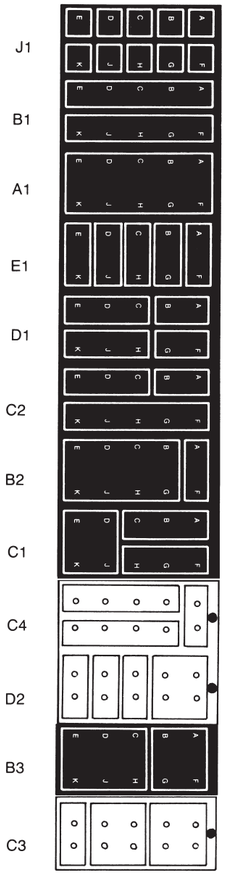
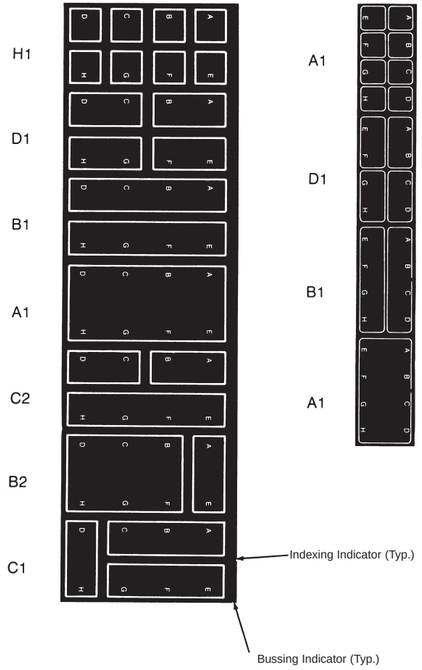
Typical Bussing Arrangements

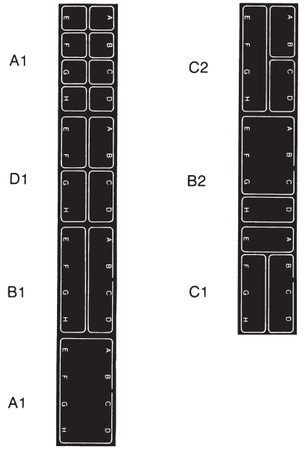
Size 20 and 22 Modules



Size 16 Modules



Size 12 Modules



Consult Tyco Electronics for additional bussing arrangements.

Military Part Numbering (Example)

M81714 / * - D **

Basic Military Prefix

Bussing Arrangement Per MIL-T-81714/*

Class D

Feedback Module	Size 22HD	**17**
	Size 22	**1**
	Size 20	**2**
	Size 16	**3**
	Size 12	**4**
Feedthru Module*	Size 22	**6**
	Size 20	**7**
	Size 16	**8**
	Size 12	**9**

* For Reference Only

Notes: 1. When ordered to military part number, contacts and sealing plugs are included.
2. Mounting hardware is not included; order separately. (See pages 5-285 and 5-286.)
3. Size 16 Module Dim. (Typ.) — (Feedback) .850 [21.59] L x .390 [9.91] W x 1.000 [25.40] H
(Feedthru) .850 [21.59] L x .390 [9.91] W x 1.830 [46.48] H

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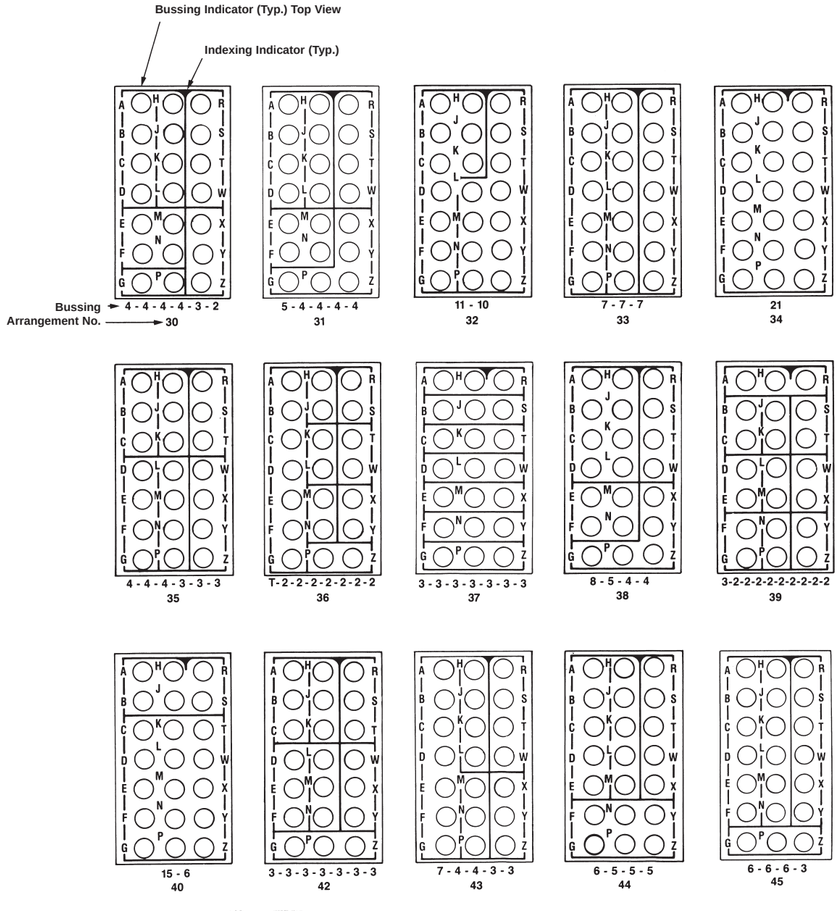
Feedback Terminal Junction Modules (Continued)

Typical Bussing Arrangements

Size 22HD Military, Size 21 Commercial Modules



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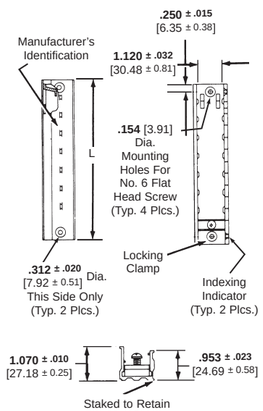
Feedback Terminal Junction Modules (Continued)

Mounting Hardware

Standard Weight Rail Assembly Part Number 591613

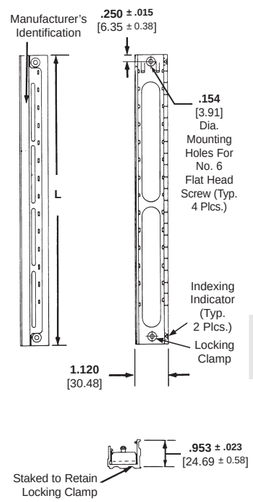


Rail Assembly Dimensions

Length L	591613 and 591621 Part Numbers			
	Standard Weight		Lightweight	
	Commercial	Military	Commercial	Military
	591613	M81714/5	591621	M81714/16
1.781 [45.24]	-1	—	-1	—
2.171 [55.14]	-2	—	-2	—
2.561 [65.05]	-3	-2	-3	-2
2.951 [74.96]	-4	-3	-4	-3
3.341 [84.86]	-5	-4	-5	-4
3.371 [85.62]	-6	-5	-6	-5
4.121 [104.67]	-7	-6	-7	-6
4.511 [114.58]	-8	-7	-8	-7
4.901 [124.49]	-9	-8	-9	-8
5.291 [134.39]	-10	-1	-10	-1
5.681 [144.30]	-11	-9	-11	-9
6.071 [154.20]	-12	-10	-12	-10
6.461 [164.11]	-13	-11	-13	-11
6.851 [174.02]	-14	-12	-14	-12
7.241 [183.92]	-15	-13	-15	-13
7.631 [193.83]	-16	—	-16	—
8.021 [203.73]	-17	—	-17	—
8.411 [213.64]	-18	—	-18	—
8.801 [223.54]	-19	—	-19	—
9.191 [233.45]	-20	—	-20	—

Rail Assemblies are made of black anodized aluminum alloy. Locking clamp screw is corrosion resistant steel (passivated). Rails will accommodate all sizes and various quantities of feedback modules in any combination.

Lightweight Rail Assembly Part Number 591621 (weight savings of up to 40%)



Rail Part Numbering

Military

M81714 / * - *

- **Non-Significant Length Number**
  - **5** = Standard Weight
  - **16** = Lightweight
- **Military Prefix**

Note: Rail Assemblies do not contain module blocks. Order separately. (See page 5-282.)

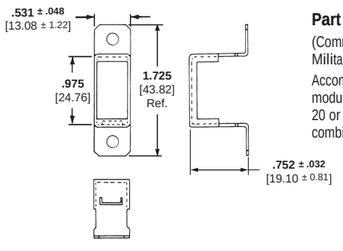
†(based on Size 22, 20, and 16 dimensions)

Individual Module Mounting Brackets

Part Number 591637-1

(Commercial equiv. to Military M81714/29-1)

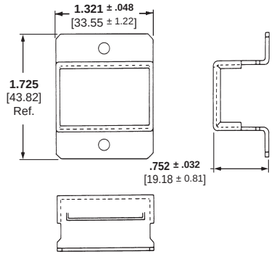
Accommodates one Size 21, 22, 20 or 16 module.



Part Number 591638-1

(Commercial equiv. to Military M81714/29-2)

Accommodates one Size 12 module or three Size 21, 22, 20 or 16 modules in any combination.



Catalog 1308940
Revised 8-06

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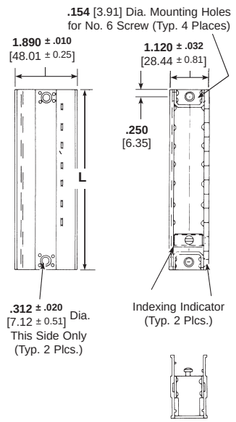
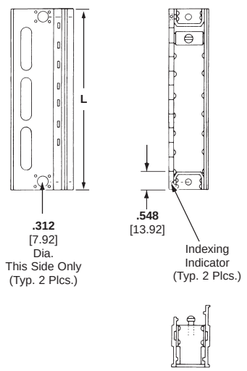
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Mounting Hardware

Standard Weight Rail Assembly Part Number 591601



Lightweight Rail Assembly Part Number 591603



Rail Assembly Dimensions

Length L	591601 and 591603 Part Numbers	
	Standard Weight	Lightweight
	Commercial*	Commercial**
	591601	591603
2.041 [51.84]	-1	—
2.431 [61.75]	-2	—
2.821 [71.65]	-3	—
3.211 [81.56]	-4	—
3.601 [91.46]	-5	-4
3.991 [101.37]	-6	-5
4.381 [111.28]	-7	—
4.771 [121.18]	-8	—
5.161 [131.09]	-9	—
5.551 [141.00]	-10	—
5.941 [150.90]	-11	-1
6.331 [160.81]	-12	—
6.721 [170.71]	-13	—
7.111 [180.62]	-14	-2
7.501 [190.52]	-15	-3
7.891 [200.43]	-16	—
8.281 [210.34]	-17	—
8.671 [220.24]	-18	—
9.061 [230.15]	-19	—
9.451 [240.06]	-20	—

Rail Assemblies are made of black anodized aluminum alloy. Locking clamp screw is corrosion resistant steel (passivated). Rails will accommodate all sizes and various quantities of feed thru modules in any combination.

* Commercial equivalent to M81714/10–*
** Commercial equivalent to M81714/14–*

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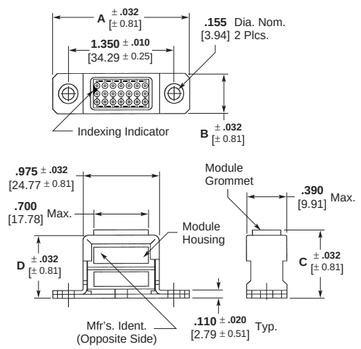
Japan: 81-44-844-8013
UK: 44-208-420-8341

Feedback

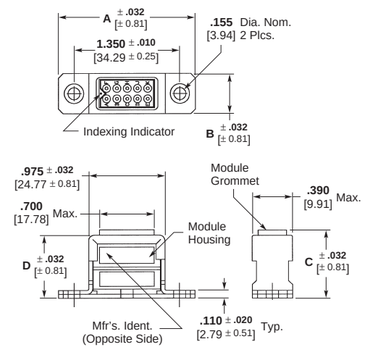
Grounding Flange Modules

AMP Grounding Flange Blocks are available in Sizes 22, 20, 16 and 12. All contacts are bussed together and connected to a ground plate made of nickel plated aluminum.

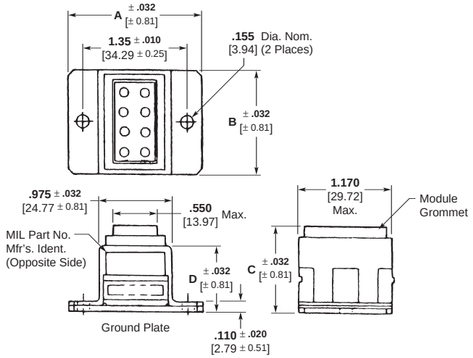
HD22
Part Number 592840



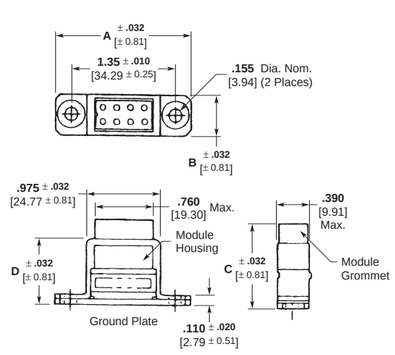
Size 20, 22
Part Number 592836



Size 12
Part Number 592820-1



Size 16
Part Number 592830-1



Commercial Equivalent to Military M81714/28-* **

Contact Size	Dimensions				Part Number
	A	B	C	D	
HD22	**1.725** 43.82	**0.515** 13.08	**0.880** 22.35	**0.817** 20.75	592840-2
22	**1.725** 43.82	**0.515** 13.08	**0.880** 22.35	**0.817** 20.75	592836-3
20	**1.725** 43.82	**0.515** 13.08	**0.880** 22.35	**0.817** 20.75	592836-1
16	**1.725** 43.82	**0.515** 13.08	**1.060** 26.92	**0.817** 20.75	592830-1
12	**1.725** 43.82	**1.305** 33.15	**1.060** 26.92	**0.817** 20.75	592820-1

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UK: 44-208-420-8341

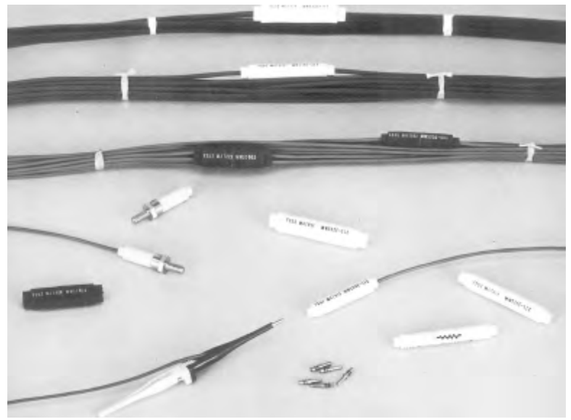
Wire Splices

Single Splice

Built and qualified to MIL-T-81714, the commercial Single Wire Splice provides an environmentally reliable, positive and maintainable in-line disconnect between single wires. Their small diameter permits placement within a wire bundle or electrical harness. The standard M39029/1 pin contact is utilized. Single wire splices are available per MIL-T-81714.

Double Splice

Provides an environmental in-line disconnect for joining up to four wires. Bussed or unbussed contacts are available permitting the versatility of joining wires in double, triple or quadruple combinations.



Part Numbering

Military

M81714/ ** - ** * - *

- **Bussing**
  Blank = Single Wire Splice
- **Class A, B, C or D**
- **Contact Size**
- **11 =** Single Wire Splice
- **Basic Military Prefix**

Double Spliced

Contact Size	Bussed Part Number	Unbussed Part Number
22	592588-6	—
20	592588-5	592589-1
16	592588-4	—

Single Splice

Contact Size	Part Number	MIL Part No. M81714/11
20	592583-3	-20D
16	592583-2	-16D
12	592583-1	-12D

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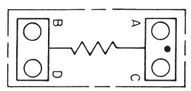
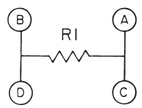
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Electronic Module Blocks and Splices

Electronic Modules, Splices and Mounting Hardware are custom engineered to suit the user's application. During design, specific part numbers will be assigned. (see page 5-293.)

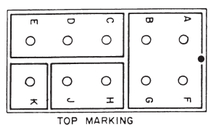


TOP MARKING (TYP)

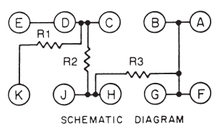


SCHEMATIC DIAGRAM

Fig. 1A

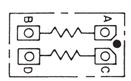


TOP MARKING



SCHEMATIC DIAGRAM

Fig. 5A



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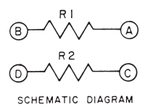
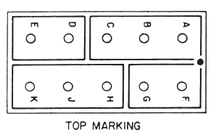
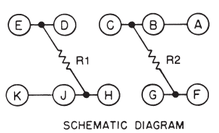


SCHEMATIC DIAGRAM

Fig. 2A

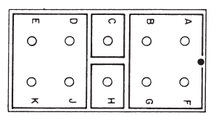


TOP MARKING

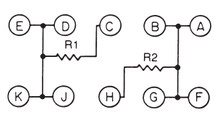


SCHEMATIC DIAGRAM

Fig. 6A

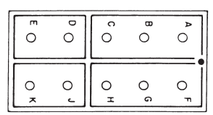


TOP MARKING



SCHEMATIC DIAGRAM

Fig. 3A



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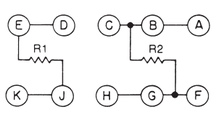
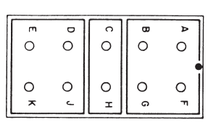


SCHEMATIC DIAGRAM

Fig. 7A



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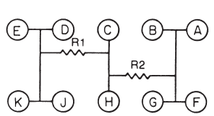
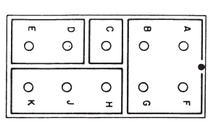


SCHEMATIC DIAGRAM

Fig. 4A



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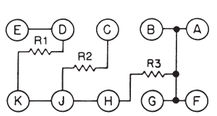

SCHEMATIC DIAGRAM

Fig. 8A

Consult Tyco Electronics for additional circuit arrangements.

Catalog 1308940
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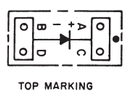
Electronic Module Blocks (Continued)

Typical Diode Circuit Arrangements

(See page 5-293 for Part Numbers.)



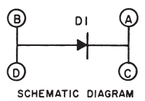
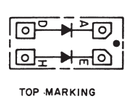


Fig. 1B



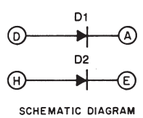
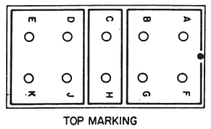


Fig. 2B



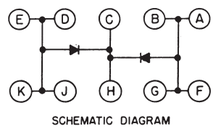


Fig. 3B

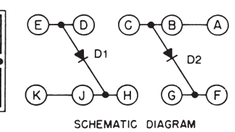
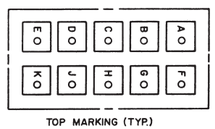


Fig. 4B



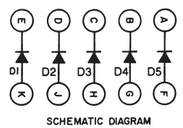
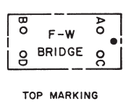


Fig. 5B



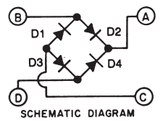
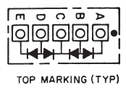


Fig. 6B



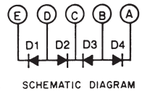


Fig. 7B

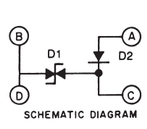


Fig. 8B

Consult Tyco Electronics for additional circuit arrangements.

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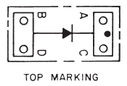
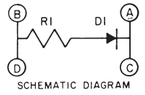
Japan: 81-44-844-8013
UK: 44-208-420-8341

Typical Combination Circuit Arrangements

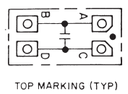


TOP MARKING

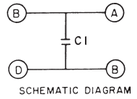


SCHEMATIC DIAGRAM

Fig. 1C



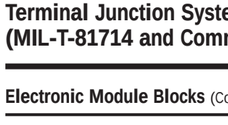
TOP MARKING (TYP)



SCHEMATIC DIAGRAM

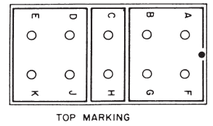
Fig. 2C

TOP MARKING



SCHEMATIC DIAGRAM

Fig. 3C



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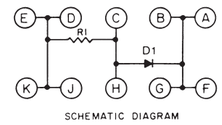
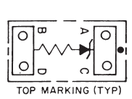


SCHEMATIC DIAGRAM

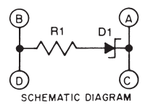
Fig. 4C



SCHEMATIC DIAGRAM

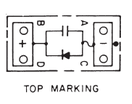
Fig. 5C

TOP MARKING (TYP)

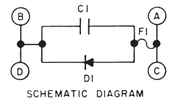


SCHEMATIC DIAGRAM

Fig. 6C

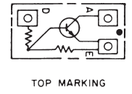


TOP MARKING



SCHEMATIC DIAGRAM

Fig. 7C



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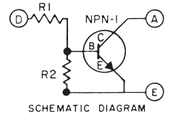

SCHEMATIC DIAGRAM

Fig. 8C

Consult Tyco Electronics for additional circuit arrangements.

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Various Component Types

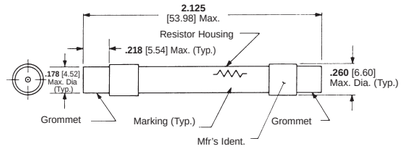

Fig. 1D

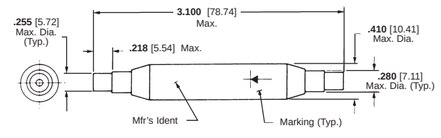

Fig. 2D

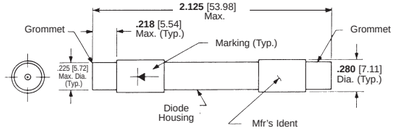

Fig. 3D

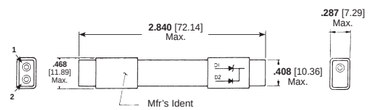

Fig. 4D

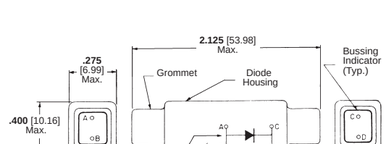

Fig. 5D

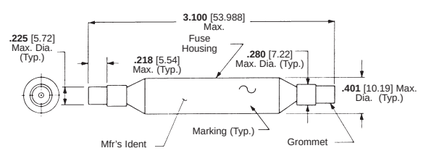

Fig. 8D

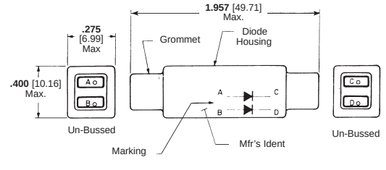

Fig. 9D

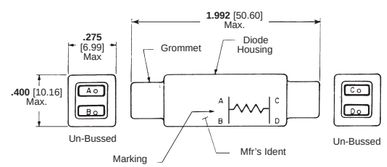

Fig. 9D

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UK: 44-208-420-8341

Electronic Module Blocks and Splices Part Numbering Information

Description	Figure	Part Number	RoHS Compliant Part Number	Electrical Information
Module Blocks	Fig. 1A	591872-1	—	R1=1500 Ω RCR07G152J˝S
		591873-1	—	R1=9100 Ω RLR07C9101GS
		591829-3	—	R1=150 Ω
		591899-1	—	R=RLR20C10R0GS 10 Ω
	Fig. 2A	591892-1	—	R1=R2=127 Ω RNC55H1270FS
		591898-1	5-591898-1	R1=R2=10 Ω RLR20C10R0GS
		591876-1	—	R1=180 Ω RLR07C1800GS R2=487 Ω RLR07C4870FS
		591871-1	5-591871-1	R1=R2=2200 Ω RCR07G222JS
		591875-1	—	R1=180 Ω RLR07C1800GS R2=348 Ω RLR07C3480FS
	Fig. 4A	591911-1	—	R1=34.8 kΩ R2=21.5 kΩ
	Fig. 5B	591854-1	—	D1=D2=D3=D4=D5=JAN1N5618
		591855-1	—	D1=D2=D3=D4=D5=JANTX1N5618
		591857-2	—	D1=D2=D3=D4=D5=JANTX1N5618
	Fig. 7B	592887-1	—	D1=D2=D3=D4=1N4007
Module Blocks (Diode Circuits)	Fig. 1B	591893-2	—	D1=JANTX1N5624
		591894-2	—	D1=JANTX1N751A
		591896-2	—	D1=JANTX1N5552
		591893-2	—	D1=JANTX1N5624
		591894-2	—	D1=JANTX1N751A
		591895-2	5-591895-2	D1=JANTX1N5618
		591864-1	5-591864-1	D1=JAN1N5618
	Fig. 5B	591866-1	—	D1=D2=D3=D4=D5=JANTX1N5554
		591863-1	5-591863-1	D1=D2=D3=D4=D5=JANTX1N5552
		591863-4	—	D1=D2=D3=D4=D5=1N4007
		591865-1	—	D1=D2=D3=D4=D5=JANTX1N5618 Class A
		591855-1	—	D1=D2=D3=D4=D5=JANTX1N5618
Splices	Fig. 2D	591917-1	5-591917-1	R1=RN65C1270F 127 Ω
		591917-3	—	R1=RNC60J1002FS 10 Ω
		591917-4	—	R1=RC20GF681J 680 Ω
		591917-5	—	R1=RLR32C1201GM 1200 Ω
		591917-7	—	R1=RLR32C1000GS 100 Ω
		1-591917-2	—	R1=RLR07C1001GR 1000 Ω
		1-591917-3	—	R1=RLR32C1000GR 100 Ω
		591846-2	—	D1=1N5199
	Fig. 3D	591847-3	—	D1=JAN1N5618
	Fig. 4D	591992-1	—	D1=JANTX1N4972 D2=JANTX1N5618
	Fig. 5D	591841-1	5-591841-1	D1=JAN1N5618
		591889-1	5-591889-1	D1=1N3981
		591890-1	5-591890-1	D1=1N5367B
	Fig. 6D	591842-1	5-591842-1	D1=D2=JAN1N5618

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Military Cross Reference

Note: Products are also qualified to VG 95212-31/ VG 95231-102/103/105. Please contact Tyco Electronics for cross reference.

Military Part Numbers Feedback Modules	AMP MIL Qualified Part Numbers Feedback Modules	AMP Commercial Part Numbers Feedback Modules
(Class A) Size 22		
M81714/1-AA1	—	592634-4
M81714/1-AB1	—	592634-2
M81714/1-AB2	—	1-592634-2
M81714/1-AB3	—	1-592634-7
M81714/1-AC1	—	1-592634-4
M81714/1-AC2	—	1-592634-0
M81714/1-AD1	—	592634-8
M81714/1-AE1	—	592634-6
(Class A) Size 21		
M81714/17-A31	592630-3	592630-4
M81714/17-A32	592630-5	592630-6
M81714/17-A33	592630-7	592630-8
M81714/17-A34	592630-9	1-592630-0
M81714/17-A35	1-592630-1	1-592630-2
M81714/17-A36	1-592630-3	1-592630-4
M81714/17-A37	1-592630-5	1-592630-6
M81714/17-A38	1-592630-7	1-592630-8
M81714/17-A39	1-592630-9	2-592630-0
M81714/17-A40	2-592630-1	2-592630-2
M81714/17-A42	2-592630-3	2-592630-4
M81714/17-A43	4-592630-3	4-592630-4
M81714/17-A44	2-592630-5	2-592630-6
M81714/17-A45	2-592630-7	2-592630-8
(Class A) Size 20		
M81714/2-AA1	592625-5	592625-6
M81714/2-AB1	592625-3	592625-4
M81714/2-AB2	1-592625-3	1-592625-4
M81714/2-AB3	2-592625-1	2-592625-2
M81714/2-AC1	1-592625-5	1-592625-6
M81714/2-AC2	1-592625-1	1-592625-2
M81714/2-AD1	592625-9	1-592625-0
M81714/2-AE1	592625-7	592625-8
(Class A) Size 16		
M81714/3-AA1	592621-7	592621-8
M81714/3-AB1	592621-5	592621-6
M81714/3-AB2	1-592621-1	1-592621-2
M81714/3-AC1	1-592621-3	1-592621-4
M81714/3-AC2	592621-9	1-592621-0
M81714/3-AD1	592621-3	592621-4
(Class A) Size 12		
M81714/4-AA1	—	592617-8
M81714/4-AB1	—	592617-6
M81714/4-AB2	—	1-592617-2
M81714/4-AC1	—	1-592617-4
M81714/4-AC2	—	1-592617-0
M81714/4-AD1	—	592617-4
(Class B) Size 22		
M81714/1-BA1	—	592636-4
M81714/1-BB1	—	592636-2
M81714/1-BB2	—	1-592636-2
M81714/1-BB3	—	1-592636-6
M81714/1-BC1	—	1-592636-4
M81714/1-BC2	—	1-592636-0
M81714/1-BD1	—	592636-8
M81714/1-BE1	—	592636-6
(Class B) Size 21		
M81714/17-B31	592631-3	592631-4
M81714/17-B32	592631-5	592631-6
M81714/17-B33	592631-7	592631-8

Feedback Modules (Class B) Size 21 Continued on page 5-295

Military Cross Reference (Continued)

Military Part Numbers Feedback Modules	AMP MIL Qualified Part Numbers Feedback Modules	AMP Commercial Part Numbers Feedback Modules
(Class B) Size 21 (Continued)		
M81714/17-B34	592631-9	1-592631-0
M81714/17-B35	1-592631-1	1-592631-2
M81714/17-B36	1-592631-3	1-592631-4
M81714/17-B37	1-592631-5	1-592631-6
M81714/17-B38	4-592631-4	—
M81714/17-B39	1-592631-7	1-592631-8
M81714/17-B40	4-592631-2	—
M81714/17-B42	1-592631-9	2-592631-0
M81714/17-B43	2-592631-1	2-592631-2
M81714/17-B44	2-592631-4	2-592631-5
M81714/17-B45	4-592631-3	—
(Class B) Size 20		
M81714/2-BA1	592627-3	592627-4
M81714/2-BB1	592627-1	592627-2
M81714/2-BB2	1-592627-1	1-592627-2
M81714/2-BB3	1-592627-5	1-592627-6
M81714/2-BC1	1-592627-3	1-592627-4
M81714/2-BC2	592627-9	1-592627-0
M81714/2-BD1	592627-7	592627-8
M81714/2-BE1	592627-5	592627-6
(Class B) Size 16		
M81714/3-BA1	592623-5	592623-6
M81714/3-BB1	592623-3	592623-4
M81714/3-BB2	592623-9	1-592623-0
M81714/3-BC1	1-592623-1	1-592623-2
M81714/3-BC2	592623-7	592623-8
M81714/3-BD1	592623-1	592623-2
(Class B) Size 12		
M81714/4-BA1	—	592619-6
M81714/4-BB1	—	592619-4
M81714/4-BB2	—	1-592619-0
M81714/4-BC1	—	1-592619-2
M81714/4-BC2	—	592619-8
M81714/4-BD1	—	592619-2
(Class C) Size 22		
M81714/1-CA1	—	592635-4
M81714/1-CB1	—	592635-2
M81714/1-CB2	—	1-592635-2
M81714/1-CB3	—	1-592635-6
M81714/1-CC1	—	1-592635-4
M81714/1-CC2	—	1-592635-0
M81714/1-CD1	—	592635-8
M81714/1-CE1	—	592635-6
(Class C) Size 21		
M81714/17-C31	592632-1	592632-2
M81714/17-C32	4-592632-3	—
M81714/17-C33	592632-3	592632-4
M81714/17-C34	592632-5	—
M81714/17-C35	592632-6	592632-7
M81714/17-C36	592632-8	592632-9
M81714/17-C37	1-592632-1	1-592632-2
M81714/17-C38	1-592632-3	—
M81714/17-C39	4-592632-4	—
M81714/17-C40	1-592632-4	1-592632-5
M81714/17-C41	4-592632-1	—
M81714/17-C42	4-592632-5	—
M81714/17-C43	1-592632-6	1-592632-7
M81714/17-C44	1-592632-8	1-592632-9
M81714/17-C45	4-592632-6	—

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Military Cross Reference (Continued)

Military Part Numbers Feedback Modules	AMP MIL Qualified Part Numbers Feedback Modules	AMP Commercial Part Numbers Feedback Modules
(Class C) Size 20		
M81714/2-CA1	592626-3	592626-4
M81714/2-CB1	592626-1	592626-2
M81714/2-CB2	1-592626-1	1-592626-2
M81714/2-CB3	2-592626-4	1-592626-5
M81714/2-CC1	1-592626-3	1-592626-4
M81714/2-CC2	592626-9	1-592626-0
M81714/2-CD1	592626-7	592626-8
M81714/2-CE1	592626-5	592626-6
(Class C) Size 16		
M81714/3-CA1	592622-5	592622-6
M81714/3-CB1	592622-3	592622-4
M81714/3-CB2	592622-9	1-592622-0
M81714/3-CC1	1-592622-1	1-592622-2
M81714/3-CC2	592622-7	592622-8
M81714/3-CD1	592622-1	592622-2
(Class C) Size 12		
M81714/4-CA1	—	592618-6
M81714/4-CB1	—	592618-4
M81714/4-CB2	—	1-592618-0
M81714/4-CC1	—	1-592618-2
M81714/4-CC2	—	592618-8
M81714/4-CD1	—	592618-2
(Class D) Size 22		
M81714/1-DA1	—	592633-4
M81714/1-DB1	—	592633-2
M81714/1-DB2	—	1-592633-2
M81714/1-DB3	—	2-592633-0
M81714/1-DC1	—	1-592633-4
M81714/1-DC2	—	1-592633-0
M81714/1-DD1	—	592633-8
M81714/1-DE1	—	592633-6
(Class D) Size 21		
M81714/17-D31	592629-1	592629-2
M81714/17-D32	592629-3	592629-4
M81714/17-D33	592629-5	592629-6
M81714/17-D34	592629-7	592629-8
M81714/17-D35	592629-9	1-592629-0
M81714/17-D36	4-592629-4	—
M81714/17-D37	1-592629-1	1-592629-2
M81714/17-D38	1-592629-3	1-592629-4
M81714/17-D39	1-592629-5	1-592629-6
M81714/17-D40	1-592629-7	1-592629-8
M81714/17-D42	4-592629-2	4-592629-0
M81714/17-D43	4-592629-3	—
M81714/17-D44	1-592629-9	2-592629-0
M81714/17-D45	4-592629-5	2-592629-2
(Class D) Size 20		
M81714/2-DA1	592624-3	592624-4
M81714/2-DB1	592624-1	592624-2
M81714/2-DB2	1-592624-0	1-592624-1
M81714/2-DB3	1-592624-8	1-592624-9
M81714/2-DC1	1-592624-2	1-592624-3
M81714/2-DC2	2-592624-2	592624-9
M81714/2-DD1	592624-7	592624-8
M81714/2-DE1	592624-5	592624-6

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Military Cross Reference (Continued)

Military Part Numbers Feedback Modules	AMP MIL Qualified Part Numbers Feedback Modules	AMP Commercial Part Numbers Feedback Modules
(Class D) Size 16		
M81714/3-DA1	592620-5	592620-6
M81714/3-DB1	592620-3	592620-4
M81714/3-DB2	592620-9	1-592620-0
M81714/3-DC1	1-592620-1	1-592620-2
M81714/3-DC2	592620-7	592620-8
M81714/3-DD1	592620-1	592620-2
M81714/4-DA1	—	592616-6
M81714/4-DB1	—	592616-4
M81714/4-DB2	—	1-592616-0
M81714/4-DC1	—	1-592616-2
M81714/4-DC2	—	592616-8
M81714/4-DD1	—	592616-1

Military Part Numbers Wire Splice	AMP MIL Qualified Part Numbers Wire Splice	AMP Commercial Part Numbers Wire Splice
(Class A) Size 22		
M81714/11-22A	—	1-592575-9
(Class A) Size 20		
M81714/11-20A	592575-7	1-592575-8
(Class A) Size 16		
M81714/11-16A	592575-4	1-592575-4
(Class A) Size 12		
M81714/11-12A	592575-1	1-592575-3
(Class B) Size 22		
M81714/11-22B	—	1-592575-6
(Class B) Size 20		
M81714/11-20B	592575-9	2-592575-2
(Class B) Size 16		
M81714/11-16B	592575-6	2-592575-0
(Class B) Size 12		
M81714/11-12B	592575-3	—
(Class C) Size 22		
M81714/11-22C	—	1-592575-5
(Class C) Size 20		
M81714/11-20C	592575-8	2-592575-1
(Class C) Size 16		
M81714/11-16C	592575-5	1-592575-9
(Class C) Size 12		
M81714/11-12C	592575-2	—
(Class D) Size 22		
M81714/11-22D	—	592583-7
(Class D) Size 20		
M81714/11-20D	592583-3	592583-6
(Class D) Size 16		
M81714/11-16D	592583-2	592583-5
(Class D) Size 12		
M81714/11-12D	592583-1	—

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Military Cross Reference (Continued)

Military Part Numbers Lightweight Feedback Rail Assembly	AMP MIL Qualified Part Numbers Lightweight Feedback Rail Assembly	AMP Commercial Part Numbers Lightweight Feedback Rail Assembly
M81714/16-1	1-591621-0	—
M81714/16-2	591621-3	—
M81714/16-3	591621-4	—
M81714/16-4	591621-5	—
M81714/16-5	591621-6	—
M81714/16-6	591621-7	—
M81714/16-7	591621-8	—
M81714/16-8	591621-9	—
M81714/16-9	1-591621-1	—
M81714/16-10	1-591621-2	—
M81714/16-11	1-591621-3	—
M81714/16-12	1-591621-4	—

Military Part Numbers Feedback Rail Assembly	AMP MIL Qualified Part Numbers Feedback Rail Assembly	AMP Commercial Part Numbers Feedback Rail Assembly
M81714/5-1	1-591613-0	—
M81714/5-2	591613-3	—
M81714/5-3	591613-4	—
M81714/5-4	591613-5	—
M81714/5-5	591613-6	—
M81714/5-6	591613-7	—
M81714/5-7	591613-8	—
M81714/5-8	591613-9	—
M81714/5-9	1-591613-1	—
M81714/5-10	1-591613-2	—
M81714/5-11	1-591613-3	—
M81714/5-12	1-591613-4	—
M81714/5-13	1-591613-5	—

Military Part Numbers Feedthru Modules	AMP MIL Qualified Part Numbers Feedthru Modules	AMP Commercial Part Numbers Feedthru Modules
(Class A) Size 22		
M81714/6-AA1	—	592613-6
M81714/6-AB1	—	592613-4
M81714/6-AB2	—	1-592613-6
M81714/6-AB3	—	2-592613-0
M81714/6-AC1	—	1-592613-8
M81714/6-AC2	—	1-592613-4
M81714/6-AD1	—	1-592613-2
M81714/6-AE1	—	592613-8
M81714/6-AJ1	—	592613-2
(Class A) Size 20		
M81714/7-AA1	—	592609-6
M81714/7-AB1	—	592609-4
M81714/7-AB2	—	1-592609-4
M81714/7-AB3	—	1-592609-8
M81714/7-AC1	—	1-592609-6
M81714/7-AC2	—	1-592609-2
M81714/7-AD1	—	1-592609-0
M81714/7-AE1	—	592609-8
M81714/7-AJ1	—	592609-2

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Military Cross Reference (Continued)

Military Part Numbers Feedthru Modules	AMP MIL Qualified Part Numbers Feedthru Modules	AMP Commercial Part Numbers Feedthru Modules
(Class A) Size 16		
M81714/8-AA1	—	592605-8
M81714/8-AB1	—	592605-6
M81714/8-AB2	—	1-592605-2
M81714/8-AC1	—	1-592605-4
M81714/8-AC2	—	1-592605-0
M81714/8-AD1	—	592605-4
M81714/8-AH1	—	592605-2
(Class A) Size 12		
M81714/9-AA1	—	592601-8
M81714/9-AB1	—	592601-6
M81714/9-AB2	—	1-592601-2
M81714/9-AC1	—	1-592601-4
M81714/9-AC2	—	1-592601-0
M81714/9-AD1	—	592601-4
M81714/9-AH1	—	592601-2
(Class B) Size 22		
M81714/6-BA1	—	592615-6
M81714/6-BB1	—	592615-4
M81714/6-BB2	—	1-592615-4
M81714/6-BB3	—	1-592615-8
M81714/6-BC1	—	1-592615-6
M81714/6-BC2	—	1-592615-2
M81714/6-BD1	—	1-592615-0
M81714/6-BE1	—	592615-8
M81714/6-BJ1	—	592615-2
(Class B) Size 20		
M81714/7-BA1	—	592611-6
M81714/7-BB1	—	592611-4
M81714/7-BB2	—	1-592611-4
M81714/7-BB3	—	1-592611-8
M81714/7-BC1	—	1-592611-6
M81714/7-BC2	—	1-592611-2
M81714/7-BD1	—	1-592611-0
M81714/7-BE1	—	592611-8
M81714/7-BJ1	—	592611-2
(Class B) Size 16		
M81714/8-BA1	—	592607-8
M81714/8-BB1	—	592607-6
M81714/8-BB2	—	1-592607-2
M81714/8-BC1	—	1-592607-4
M81714/8-BC2	—	1-592607-0
M81714/8-BD1	—	592607-4
M81714/8-BH1	—	592607-2
(Class B) Size 12		
M81714/9-BA1	—	592603-8
M81714/9-BB1	—	592603-6
M81714/9-BB2	—	1-592603-2
M81714/9-BC1	—	1-592603-4
M81714/9-BC2	—	1-592603-0
M81714/9-BD1	—	592603-4
M81714/9-BH1	—	592603-2

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Military Cross Reference (Continued)

Military Part Numbers Feedthru Modules	AMP MIL Qualified Part Numbers Feedthru Modules	AMP Commercial Part Numbers Feedthru Modules
(Class C) Size 22		
M81714/6-CA1	—	592614-6
M81714/6-CB1	—	592614-4
M81714/6-CB2	—	1-592614-4
M81714/6-CB3	—	1-592614-8
M81714/6-CC1	—	1-592614-6
M81714/6-CC2	—	1-592614-2
M81714/6-CD1	—	1-592614-0
M81714/6-CE1	—	592614-8
M81714/6-CJ1	—	592614-2
(Class C) Size 20		
M81714/7-CA1	—	592610-6
M81714/7-CB1	—	592610-4
M81714/7-CB2	—	1-592610-5
M81714/7-CB3	—	1-592610-9
M81714/7-CC1	—	1-592610-7
M81714/7-CC2	—	1-592610-3
M81714/7-CD1	—	1-592610-1
M81714/7-CE1	—	592610-8
M81714/7-CJ1	—	592610-2
(Class C) Size 16		
M81714/8-CA1	—	592606-8
M81714/8-CB1	—	592606-6
M81714/8-CB2	—	1-592606-2
M81714/8-CC1	—	1-592606-4
M81714/8-CC2	—	1-592606-0
M81714/8-CD1	—	592606-4
M81714/8-CH1	—	592606-2
(Class C) Size 12		
M81714/9-CA1	—	592602-8
M81714/9-CB1	—	592602-6
M81714/9-CB2	—	1-592602-2
M81714/9-CC1	—	1-592602-4
M81714/9-CC2	—	1-592602-0
M81714/9-CD1	—	592602-4
M81714/9-CH1	—	592602-2

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Introduction

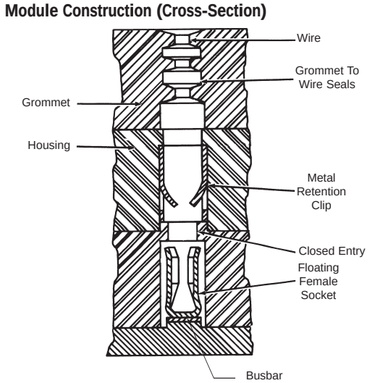
Product Facts

- **The TJS connections are inherently more reliable than conventional threaded and solder terminations**
- **The user's wiring is crimped to gold plated pin contacts, conforming the MIL-C-39029/1, which are individually mated to probe-proof gold plated pre-bussed sockets contained within the module and splice**
- **Modules and Splices — environment proof conforming to the requirements of MIL-T-81714. These modules can be assembled into MIL-T-81714 rails and are individually removable. Brackets are also available to mount individual or triads of modules. The splices are designed to terminate from two to four wires.**
- **Commercial TJS consists of module blocks (either environmental or non-environmental) designed for custom assembled installations. These can be furnished in pre-assembled arrays in rails or individually with rail kits to accommodate various rows and lengths of modules.**
- **TJS Connectors also qualified to German Army Standard VG 95212-31/ VG 95231-102/103/105**

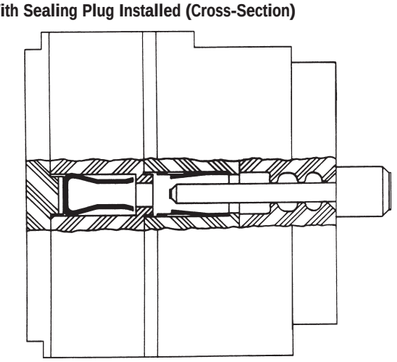
The Terminal Junction System (TJS) provides design engineers with a compact family of modules and splices for interconnecting wires. Both the modules and splices facilitate interconnecting with pre-bussed configurations to which the user's 22 thru 12 AWG wires are terminated with crimped removable pin contacts. Servicing tools required are the commonly available MIL-C-81969/14, plastic tool and MIL-C-22520 crimping tool used for rear release connector contacts.

The TJS eliminates many shortcomings of the conventional lug and threaded termination. The TJS has no loose attaching hardware, such as nuts, screws and lock-washers to complete the termination. The TJS saves space and weight over threaded terminations while reducing installation cost. There is complete electrical isolation and optional environmental sealing grommet in the TJS without user installed busses, barriers, insulating strips, potting and enclosures. The TJS module pre-bussed integral sockets are permanently connected in a variety of bussing arrangements to suit the most exacting circuit requirements. These modules can be user assembled into any required bussing arrangement and contact size permutation.

Typical Module Construction (Cross-Section)



Module With Sealing Plug Installed (Cross-Section)



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Performance Specifications

Voltage Rating —

Sizes 22, 20, 16, 12

Altitude	DWV*	Working Voltage
Sea level	1,500 V	600 V
70,000 Feet**	600 V	300 V

Size 21 (22HD)

Altitude	DWV*	Working Voltage
Sea Level	1,000 V	600 V
70,000 Feet**	325 V	300 V

* DWV = Dielectric Withstanding Voltage
** [21,336m]

Contact Voltage Drop (Max.) —

Contact Size	Test Current	Initial	After Conditioning
21 (22HD)	5.0 A	55 V	65 V
22	5.0 A	45 V	50 V
20	7.5 A	45 V	50 V
16	13.0 A	50 V	55 V
12	23.0 A	40 V	45 V

The MV drop is measured across an adjacent bussed pair of wire contacts.

Operating Temperature Range —

Class	Minimum	Maximum
D	-65°C (-85°F)	+200°C (+392°F)

Altitude Immersion —
Insulation resistance shall not fall below 5,000 megohms after being subjected to three, 70,000-foot [21,336m] altitude immersion cycles in salt water.

Fluid Immersion —
Class D—Extended fluid type

Fluid	
MIL-H-5606	Hydraulic fluid
MIL-L-23699	Lubricating oil
MIL-T-5624	Aviation fuel
MIL-L-7808	Lubrication oil
MIL-A-8243	Anti-ice fluid
MIL-C-25769	Cleaning fluid
Skydrol	500A & 500B
Aerosafe	2300 & 2300W
Flyjet	III
Esso Oil	Turbo 25

Moisture Resistance —
High Humidity (95% RH) 100 megohms min.
After Drying—24 hours 1,000 megohms min.

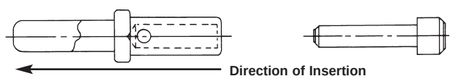
Durability —
No performance degradation after 10 cycles of contact insertion/removal.

Vibration —
Class D
Sine, MIL-STD-202, method 204 condition G
Random, MIL-STD-1344, method 2005.

Shock —
Class D
MIL-STD-1344, Method 2004
(300 G, 3 milliseconds duration, half-sine).

Contacts, Sealing Plugs and Assembly Tools

Contacts and Sealing Plugs



Size	Part Numbers			
	Pin Contacts		Sealing Plugs	
	Commercial	Military	Commercial	Military
21(22HD)	592413-1	M39029/1-507	592104-4	MS27488-22
22	3-592404-1	M39029/1-100	592104-1	MS27488-20
20	2-592404-1	M39029/1-101	592104-1	MS27488-20
16	1-592404-1	M39029/1-102	592104-2	MS27488-16
12	592404-1	M39029/1-103	592104-3	MS27488-12

Insertion/Removal Tools

Size	Part Numbers		Color*	Wire Gage	Contact Wire Dia. Min./Max.	Finished Crimp Tool	Turret or Positioner
	Commercial	Military					
21(22HD)	—	M81969/14-01	Grn/Wh	28-22	**.030-.054** [.76-1.37]	M22520/2-01	M22520/2-32
22	592105-1	M81969/14-11	Rd/Wh	26-22	**.034-.066** [.86-1.68]	M22520/2-01	M22520/2-11
20	592105-1	M81969/14-11	Rd/Wh	24-20	**.038-.083** [.97-2.11]	M22520/1-01 or /2-01	M22520/1-02 or /2-02
16	—	M81969/14-03	Blue/Wh	20-16	**.060-.101** [1.52-2.57]	M22520/1-01	M22520/1-02
12	—	M81969/14-04	Yel/Wh	14-12	**.087-.147** [2.21-3.73]	M22520/1-01	M22520/1-02

* Colored end for contact insertion; white end for release/removal.

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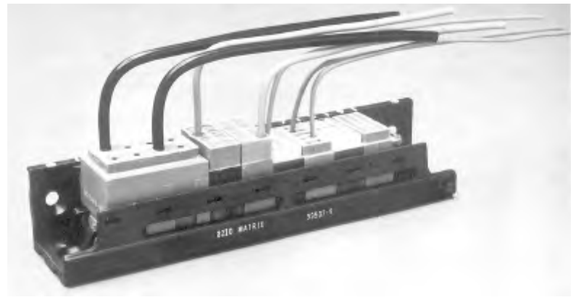
Feedback and Feedthru Terminal Junction Modules

MIL-T-81714 Terminal Junction module blocks are available in sizes 12, 16, 20, 22 and 22HD. The size 12 and 16 feedback blocks have eight cavities each. The size 20 and 22 feedback blocks have 10 cavities each (size 22HD has 21 cavities). The feedthru blocks have the same number of cavities situated on both sides of the block.

Military bussing arrangements are available with each size block.

These module blocks and mounting rail assemblies are qualified to MIL-T-81714. The pin contacts are qualified to MIL-C-39029/1.



Notes: Tyco Electronics has not qualified the Feedthru Modules to MIL-T-81714. The Military part number is shown for reference only.

Feedthru

Military Part Numbers Feedthru Modules	AMP Commercial Part Numbers Feedthru Modules
(Class D) Size 20	
M81714/7-DA1	592608-3
M81714/7-DB1	592608-1
M81714/7-DB2	—
M81714/7-DB3	—
M81714/7-DC1	592608-8
M81714/7-DC2	—
M81714/7-DD1	592608-6
M81714/7-DE1	592608-5
M81714/7-DJ1	—
(Class D) Size 16	
M81714/8-DA1	592604-5
M81714/8-DB1	592604-3
M81714/8-DB2	592604-7

Military Part Numbers Feedthru Modules	AMP Commercial Part Numbers Feedthru Modules
(Class D) Size 16 (Continued)	
M81714/8-DC1	592604-9
M81714/8-DC2	—
M81714/8-DD1	592604-1
M81714/8-DH1	—
(Class D) Size 12	
M81714/9-DA1	592600-9
M81714/9-DB1	592600-7
M81714/9-DB2	1-592600-3
M81714/9-DC1	592600-1
M81714/9-DC2	1-592600-1
M81714/9-DD1	592600-5
M81714/9-DH1	592600-3

Feedback

Military Part Numbers Feedback Modules	AMP MIL Qualified Part Numbers Feedback Modules	AMP Commercial Part Numbers Feedback Modules
(Class D) Size 22	**(Class D) Size 22**	**(Class D) Size 22**
M81714/1-DA1	—	592633-4
M81714/1-DB1	—	592633-2
M81714/1-DB2	—	1-592633-2
M81714/1-DB3	—	2-592633-0
M81714/1-DC1	—	1-592633-4
M81714/1-DC2	—	1-592633-0
M81714/1-DD1	—	592633-8
M81714/1-DE1	—	592633-6
(Class D) Size 21	**(Class D) Size 21**	**(Class D) Size 21**
M81714/17-D31	592629-1	592629-2
M81714/17-D32	592629-3	592629-4
M81714/17-D33	592629-5	592629-6
M81714/17-D34	592629-7	592629-8
M81714/17-D35	592629-9	1-592629-0
M81714/17-D36	4-592629-4	—
M81714/17-D37	1-529629-1	1-592629-2
M81714/17-D38	1-592629-3	1-592629-4
M81714/17-D39	1-592629-5	1-592629-6
M81714/17-D40	1-592629-7	1-592629-8
M81714/17-D42	4-592629-2	4-592629-0
M81714/17-D43	4-592629-3	—
M81714/17-D44	1-592629-9	2-592629-0
M81714/17-D45	4-592629-5	2-592629-2

Military Part Numbers Feedback Modules	AMP MIL Qualified Part Numbers Feedback Modules	AMP Commercial Part Numbers Feedback Modules
(Class D) SIZE 20	**(Class D) SIZE 20**	**(Class D) SIZE 20**
M81714/2-DA1	592624-3	592624-4
M81714/2-DB1	592624-1	592624-2
M81714/2-DB2	1-592624-0	1-592624-1
M81714/2-DB3	1-592624-8	1-592624-9
M81714/2-DC1	1-592624-2	1-592624-3
M81714/2-DC2	2-592624-2	592624-9
M81714/2-DD1	592624-7	592624-8
M81714/2-DE1	592624-5	592624-6
(Class D) SIZE 16	**(Class D) SIZE 16**	**(Class D) SIZE 16**
M81714/3-DA1	592620-5	592620-6
M81714/3-DB1	592620-3	592620-4
M81714/3-DB2	592620-9	1-592620-0
M81714/3-DC1	1-592620-1	1-592620-2
M81714/3-DC2	592620-7	592620-8
M81714/3-DD1	592620-1	592620-2
(Class D) SIZE 12	**(Class D) SIZE 12**	**(Class D) SIZE 12**
M81714/4-DA1		592616-6
M81714/4-DB1	—	592616-4
M81714/4-DB2	—	1-592616-0
M81714/4-DC1	—	1-592616-2
M81714/4-DC2	—	592616-8
M81714/4-DD1	—	592616-1

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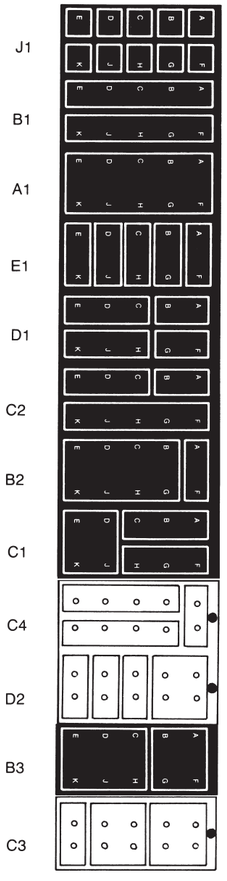
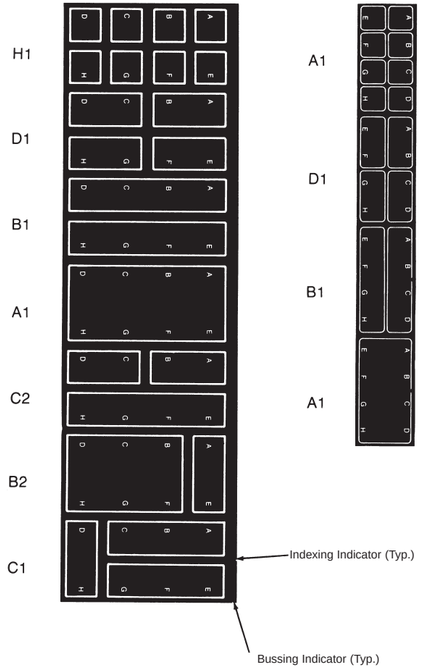
UK: 44-208-420-8341

Typical Bussing Arrangements

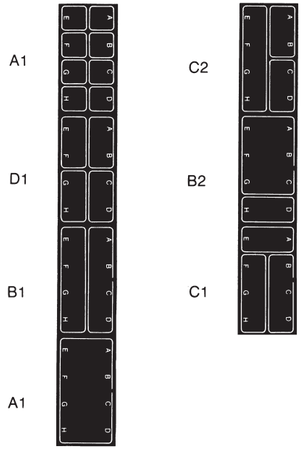
Size 20 and 22 Modules



Size 16 Modules



Size 12 Modules



Consult Tyco Electronics for additional bussing arrangements.

Military Part Numbering (Example)

M81714 / * - D **

Basic Military Prefix

Bussing Arrangement Per MIL-T-81714/*

Class D

Feedback Module	Size 22HD	**17**
	Size 22	**1**
	Size 20	**2**
	Size 16	**3**
	Size 12	**4**
Feedthru Module*	Size 22	**6**
	Size 20	**7**
	Size 16	**8**
	Size 12	**9**

* For Reference Only

Notes: 1. When ordered to military part number, contacts and sealing plugs are included.
2. Mounting hardware is not included; order separately. (See pages 5-285 and 5-286.)
3. Size 16 Module Dim. (Typ.) — (Feedback) .850 [21.59] L x .390 [9.91] W x 1.000 [25.40] H
(Feedthru) .850 [21.59] L x .390 [9.91] W x 1.830 [46.48] H

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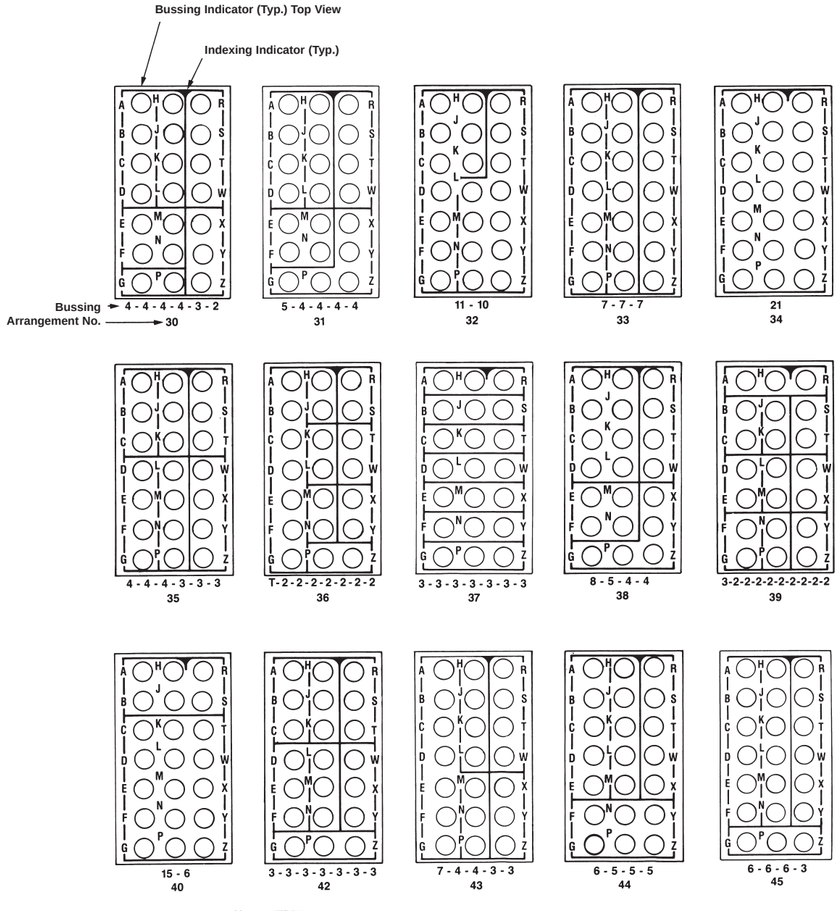
Feedback Terminal Junction Modules (Continued)

Typical Bussing Arrangements

Size 22HD Military, Size 21 Commercial Modules



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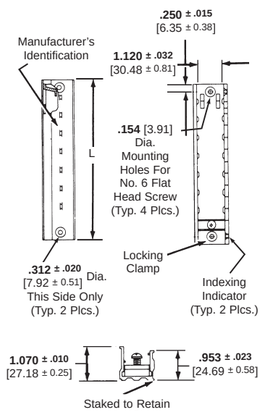
Feedback Terminal Junction Modules (Continued)

Mounting Hardware

Standard Weight Rail Assembly Part Number 591613

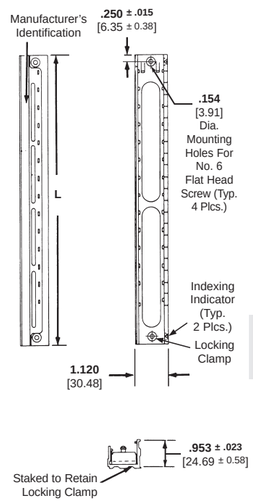


Rail Assembly Dimensions

Length L	591613 and 591621 Part Numbers			
	Standard Weight		Lightweight	
	Commercial	Military	Commercial	Military
	591613	M81714/5	591621	M81714/16
1.781 [45.24]	-1	—	-1	—
2.171 [55.14]	-2	—	-2	—
2.561 [65.05]	-3	-2	-3	-2
2.951 [74.96]	-4	-3	-4	-3
3.341 [84.86]	-5	-4	-5	-4
3.371 [85.62]	-6	-5	-6	-5
4.121 [104.67]	-7	-6	-7	-6
4.511 [114.58]	-8	-7	-8	-7
4.901 [124.49]	-9	-8	-9	-8
5.291 [134.39]	-10	-1	-10	-1
5.681 [144.30]	-11	-9	-11	-9
6.071 [154.20]	-12	-10	-12	-10
6.461 [164.11]	-13	-11	-13	-11
6.851 [174.02]	-14	-12	-14	-12
7.241 [183.92]	-15	-13	-15	-13
7.631 [193.83]	-16	—	-16	—
8.021 [203.73]	-17	—	-17	—
8.411 [213.64]	-18	—	-18	—
8.801 [223.54]	-19	—	-19	—
9.191 [233.45]	-20	—	-20	—

Rail Assemblies are made of black anodized aluminum alloy. Locking clamp screw is corrosion resistant steel (passivated). Rails will accommodate all sizes and various quantities of feedback modules in any combination.

Lightweight Rail Assembly Part Number 591621 (weight savings of up to 40%)



Rail Part Numbering

Military

M81714 / * - *

- **Non-Significant Length Number**
  - **5** = Standard Weight
  - **16** = Lightweight
- **Military Prefix**

Note: Rail Assemblies do not contain module blocks. Order separately. (See page 5-282.)

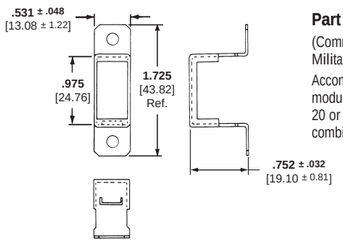
†(based on Size 22, 20, and 16 dimensions)

Individual Module Mounting Brackets

Part Number 591637-1

(Commercial equiv. to Military M81714/29-1)

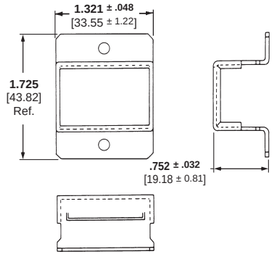
Accommodates one Size 21, 22, 20 or 16 module.



Part Number 591638-1

(Commercial equiv. to Military M81714/29-2)

Accommodates one Size 12 module or three Size 21, 22, 20 or 16 modules in any combination.



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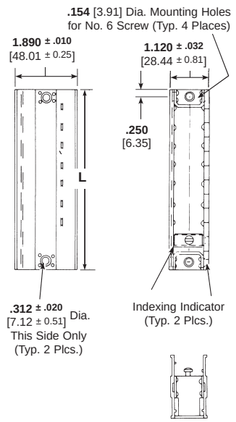
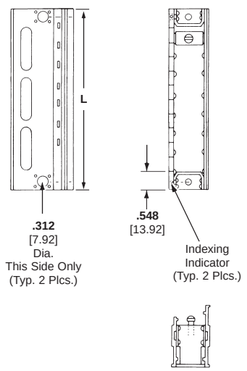
Mounting Hardware

Standard Weight Rail Assembly Part Number 591601



Lightweight Rail Assembly Part Number 591603



Rail Assembly Dimensions

Length L	591601 and 591603 Part Numbers	
	Standard Weight	Lightweight
	Commercial*	Commercial**
	591601	591603
2.041 [51.84]	-1	—
2.431 [61.75]	-2	—
2.821 [71.65]	-3	—
3.211 [81.56]	-4	—
3.601 [91.46]	-5	-4
3.991 [101.37]	-6	-5
4.381 [111.28]	-7	—
4.771 [121.18]	-8	—
5.161 [131.09]	-9	—
5.551 [141.00]	-10	—
5.941 [150.90]	-11	-1
6.331 [160.81]	-12	—
6.721 [170.71]	-13	—
7.111 [180.62]	-14	-2
7.501 [190.52]	-15	-3
7.891 [200.43]	-16	—
8.281 [210.34]	-17	—
8.671 [220.24]	-18	—
9.061 [230.15]	-19	—
9.451 [240.06]	-20	—

Rail Assemblies are made of black anodized aluminum alloy. Locking clamp screw is corrosion resistant steel (passivated). Rails will accommodate all sizes and various quantities of feed thru modules in any combination.

* Commercial equivalent to M81714/10–*
** Commercial equivalent to M81714/14–*

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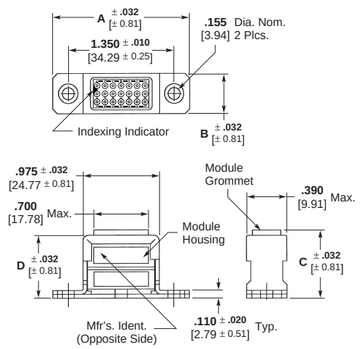
Feedback

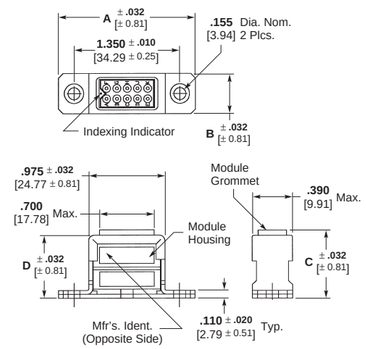
Grounding Flange Modules

AMP Grounding Flange Blocks are available in Sizes 22, 20, 16 and 12. All contacts are bussed together and connected to a ground plate made of nickel plated aluminum.

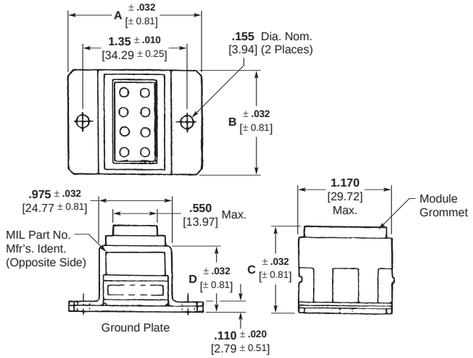
HD22
Part Number 592840



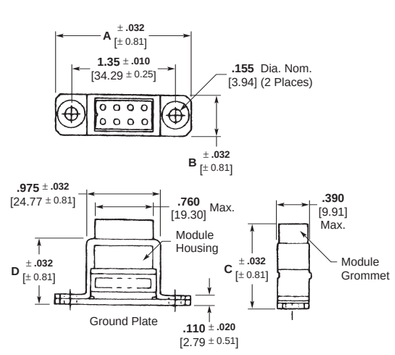
Size 20, 22
Part Number 592836



Size 12
Part Number 592820-1



Size 16
Part Number 592830-1



Commercial Equivalent to Military M81714/28-* **

Contact Size	Dimensions				Part Number
	A	B	C	D	
HD22	**1.725** 43.82	**0.515** 13.08	**0.880** 22.35	**0.817** 20.75	592840-2
22	**1.725** 43.82	**0.515** 13.08	**0.880** 22.35	**0.817** 20.75	592836-3
20	**1.725** 43.82	**0.515** 13.08	**0.880** 22.35	**0.817** 20.75	592836-1
16	**1.725** 43.82	**0.515** 13.08	**1.060** 26.92	**0.817** 20.75	592830-1
12	**1.725** 43.82	**1.305** 33.15	**1.060** 26.92	**0.817** 20.75	592820-1

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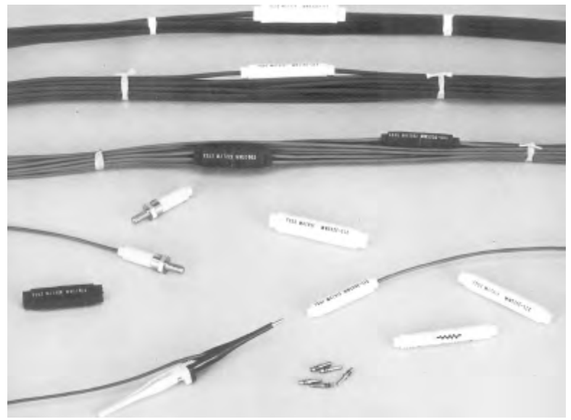
Wire Splices

Single Splice

Built and qualified to MIL-T-81714, the commercial Single Wire Splice provides an environmentally reliable, positive and maintainable in-line disconnect between single wires. Their small diameter permits placement within a wire bundle or electrical harness. The standard M39029/1 pin contact is utilized. Single wire splices are available per MIL-T-81714.

Double Splice

Provides an environmental in-line disconnect for joining up to four wires. Bussed or unbussed contacts are available permitting the versatility of joining wires in double, triple or quadruple combinations.



Part Numbering

Military

M81714/ ** - ** * - *

- **Bussing**
  Blank = Single Wire Splice
- **Class A, B, C or D**
- **Contact Size**
- **11 =** Single Wire Splice
- **Basic Military Prefix**

Double Spliced

Contact Size	Bussed Part Number	Unbussed Part Number
22	592588-6	—
20	592588-5	592589-1
16	592588-4	—

Single Splice

Contact Size	Part Number	MIL Part No. M81714/11
20	592583-3	-20D
16	592583-2	-16D
12	592583-1	-12D

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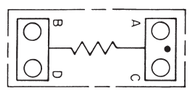
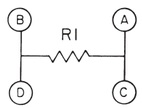
Electronic Module Blocks and Splices

Electronic Modules, Splices and Mounting Hardware are custom engineered to suit the user's application. During design, specific part numbers will be assigned. (see page 5-293.)

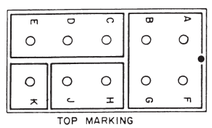


TOP MARKING (TYP)

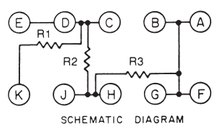


SCHEMATIC DIAGRAM

Fig. 1A

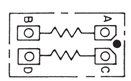


TOP MARKING

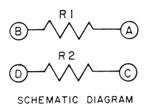


SCHEMATIC DIAGRAM

Fig. 5A

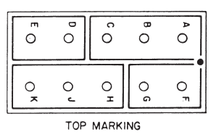


TOP MARKING (TYP)



SCHEMATIC DIAGRAM

Fig. 2A



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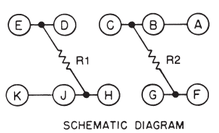
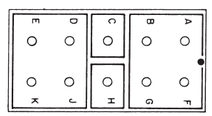


SCHEMATIC DIAGRAM

Fig. 6A



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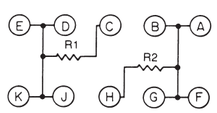
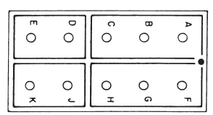


SCHEMATIC DIAGRAM

Fig. 3A



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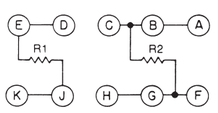
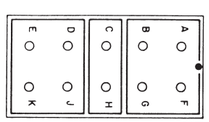


SCHEMATIC DIAGRAM

Fig. 7A



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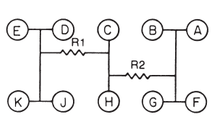
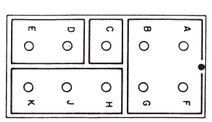


SCHEMATIC DIAGRAM

Fig. 4A



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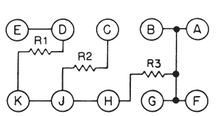

SCHEMATIC DIAGRAM

Fig. 8A

Consult Tyco Electronics for additional circuit arrangements.

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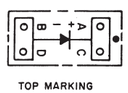
Electronic Module Blocks (Continued)

Typical Diode Circuit Arrangements

(See page 5-293 for Part Numbers.)



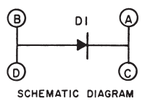
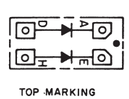


Fig. 1B



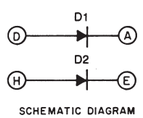
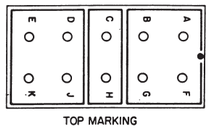


Fig. 2B



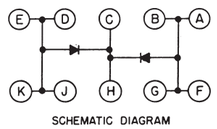


Fig. 3B

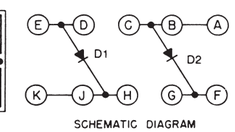
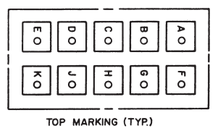


Fig. 4B



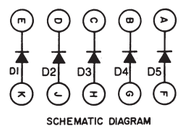
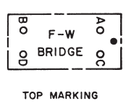


Fig. 5B



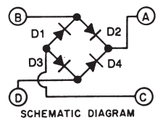
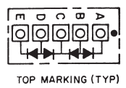


Fig. 6B



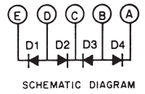


Fig. 7B

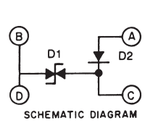


Fig. 8B

Consult Tyco Electronics for additional circuit arrangements.

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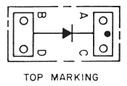
Typical Combination Circuit Arrangements



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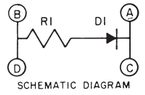
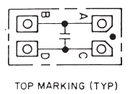


SCHEMATIC DIAGRAM

Fig. 1C



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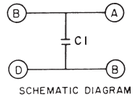
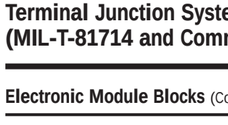


SCHEMATIC DIAGRAM

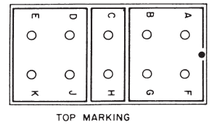
Fig. 2C

TOP MARKING



SCHEMATIC DIAGRAM

Fig. 3C



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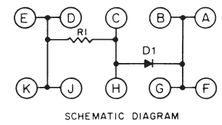
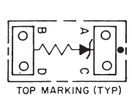


SCHEMATIC DIAGRAM

Fig. 4C



SCHEMATIC DIAGRAM

Fig. 5C

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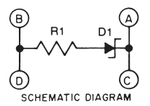
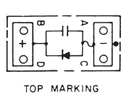


SCHEMATIC DIAGRAM

Fig. 6C



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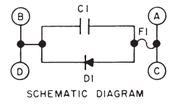
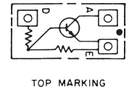


SCHEMATIC DIAGRAM

Fig. 7C



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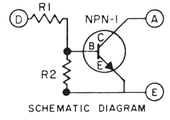

SCHEMATIC DIAGRAM

Fig. 8C

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Various Component Types

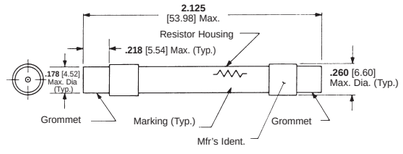

Fig. 1D

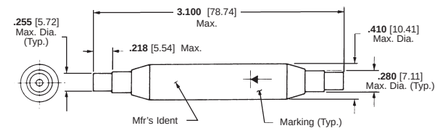

Fig. 2D

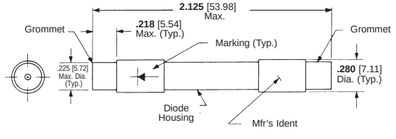

Fig. 3D

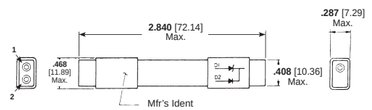

Fig. 4D

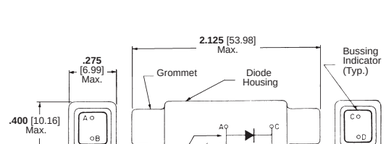

Fig. 5D

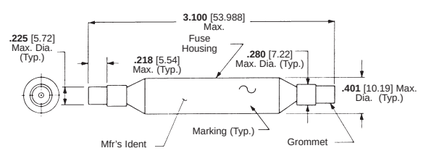

Fig. 8D

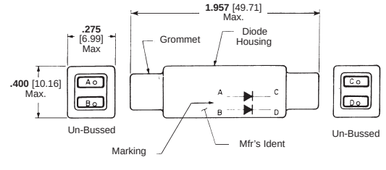

Fig. 9D

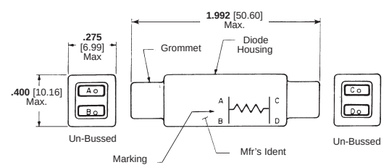

Fig. 9D

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Electronic Module Blocks and Splices Part Numbering Information

Description	Figure	Part Number	RoHS Compliant Part Number	Electrical Information
Module Blocks	Fig. 1A	591872-1	—	R1=1500 Ω RCR07G152J˝S
		591873-1	—	R1=9100 Ω RLR07C9101GS
		591829-3	—	R1=150 Ω
		591899-1	—	R=RLR20C10R0GS 10 Ω
	Fig. 2A	591892-1	—	R1=R2=127 Ω RNC55H1270FS
		591898-1	5-591898-1	R1=R2=10 Ω RLR20C10R0GS
		591876-1	—	R1=180 Ω RLR07C1800GS R2=487 Ω RLR07C4870FS
		591871-1	5-591871-1	R1=R2=2200 Ω RCR07G222JS
		591875-1	—	R1=180 Ω RLR07C1800GS R2=348 Ω RLR07C3480FS
	Fig. 4A	591911-1	—	R1=34.8 kΩ R2=21.5 kΩ
	Fig. 5B	591854-1	—	D1=D2=D3=D4=D5=JAN1N5618
		591855-1	—	D1=D2=D3=D4=D5=JANTX1N5618
		591857-2	—	D1=D2=D3=D4=D5=JANTX1N5618
	Fig. 7B	592887-1	—	D1=D2=D3=D4=1N4007
Module Blocks (Diode Circuits)	Fig. 1B	591893-2	—	D1=JANTX1N5624
		591894-2	—	D1=JANTX1N751A
		591896-2	—	D1=JANTX1N5552
		591893-2	—	D1=JANTX1N5624
		591894-2	—	D1=JANTX1N751A
		591895-2	5-591895-2	D1=JANTX1N5618
		591864-1	5-591864-1	D1=JAN1N5618
	Fig. 5B	591866-1	—	D1=D2=D3=D4=D5=JANTX1N5554
		591863-1	5-591863-1	D1=D2=D3=D4=D5=JANTX1N5552
		591863-4	—	D1=D2=D3=D4=D5=1N4007
		591865-1	—	D1=D2=D3=D4=D5=JANTX1N5618 Class A
		591855-1	—	D1=D2=D3=D4=D5=JANTX1N5618
Splices	Fig. 2D	591917-1	5-591917-1	R1=RN65C1270F 127 Ω
		591917-3	—	R1=RNC60J1002FS 10 Ω
		591917-4	—	R1=RC20GF681J 680 Ω
		591917-5	—	R1=RLR32C1201GM 1200 Ω
		591917-7	—	R1=RLR32C1000GS 100 Ω
		1-591917-2	—	R1=RLR07C1001GR 1000 Ω
		1-591917-3	—	R1=RLR32C1000GR 100 Ω
		591846-2	—	D1=1N5199
	Fig. 3D	591847-3	—	D1=JAN1N5618
	Fig. 4D	591992-1	—	D1=JANTX1N4972 D2=JANTX1N5618
	Fig. 5D	591841-1	5-591841-1	D1=JAN1N5618
		591889-1	5-591889-1	D1=1N3981
		591890-1	5-591890-1	D1=1N5367B
	Fig. 6D	591842-1	5-591842-1	D1=D2=JAN1N5618

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Military Cross Reference

Note: Products are also qualified to VG 95212-31/ VG 95231-102/103/105. Please contact Tyco Electronics for cross reference.

Military Part Numbers Feedback Modules	AMP MIL Qualified Part Numbers Feedback Modules	AMP Commercial Part Numbers Feedback Modules
(Class A) Size 22		
M81714/1-AA1	—	592634-4
M81714/1-AB1	—	592634-2
M81714/1-AB2	—	1-592634-2
M81714/1-AB3	—	1-592634-7
M81714/1-AC1	—	1-592634-4
M81714/1-AC2	—	1-592634-0
M81714/1-AD1	—	592634-8
M81714/1-AE1	—	592634-6
(Class A) Size 21		
M81714/17-A31	592630-3	592630-4
M81714/17-A32	592630-5	592630-6
M81714/17-A33	592630-7	592630-8
M81714/17-A34	592630-9	1-592630-0
M81714/17-A35	1-592630-1	1-592630-2
M81714/17-A36	1-592630-3	1-592630-4
M81714/17-A37	1-592630-5	1-592630-6
M81714/17-A38	1-592630-7	1-592630-8
M81714/17-A39	1-592630-9	2-592630-0
M81714/17-A40	2-592630-1	2-592630-2
M81714/17-A42	2-592630-3	2-592630-4
M81714/17-A43	4-592630-3	4-592630-4
M81714/17-A44	2-592630-5	2-592630-6
M81714/17-A45	2-592630-7	2-592630-8
(Class A) Size 20		
M81714/2-AA1	592625-5	592625-6
M81714/2-AB1	592625-3	592625-4
M81714/2-AB2	1-592625-3	1-592625-4
M81714/2-AB3	2-592625-1	2-592625-2
M81714/2-AC1	1-592625-5	1-592625-6
M81714/2-AC2	1-592625-1	1-592625-2
M81714/2-AD1	592625-9	1-592625-0
M81714/2-AE1	592625-7	592625-8
(Class A) Size 16		
M81714/3-AA1	592621-7	592621-8
M81714/3-AB1	592621-5	592621-6
M81714/3-AB2	1-592621-1	1-592621-2
M81714/3-AC1	1-592621-3	1-592621-4
M81714/3-AC2	592621-9	1-592621-0
M81714/3-AD1	592621-3	592621-4
(Class A) Size 12		
M81714/4-AA1	—	592617-8
M81714/4-AB1	—	592617-6
M81714/4-AB2	—	1-592617-2
M81714/4-AC1	—	1-592617-4
M81714/4-AC2	—	1-592617-0
M81714/4-AD1	—	592617-4
(Class B) Size 22		
M81714/1-BA1	—	592636-4
M81714/1-BB1	—	592636-2
M81714/1-BB2	—	1-592636-2
M81714/1-BB3	—	1-592636-6
M81714/1-BC1	—	1-592636-4
M81714/1-BC2	—	1-592636-0
M81714/1-BD1	—	592636-8
M81714/1-BE1	—	592636-6
(Class B) Size 21		
M81714/17-B31	592631-3	592631-4
M81714/17-B32	592631-5	592631-6
M81714/17-B33	592631-7	592631-8

Feedback Modules (Class B) Size 21 Continued on page 5-295

Military Cross Reference (Continued)

Military Part Numbers Feedback Modules	AMP MIL Qualified Part Numbers Feedback Modules	AMP Commercial Part Numbers Feedback Modules
(Class B) Size 21 (Continued)		
M81714/17-B34	592631-9	1-592631-0
M81714/17-B35	1-592631-1	1-592631-2
M81714/17-B36	1-592631-3	1-592631-4
M81714/17-B37	1-592631-5	1-592631-6
M81714/17-B38	4-592631-4	—
M81714/17-B39	1-592631-7	1-592631-8
M81714/17-B40	4-592631-2	—
M81714/17-B42	1-592631-9	2-592631-0
M81714/17-B43	2-592631-1	2-592631-2
M81714/17-B44	2-592631-4	2-592631-5
M81714/17-B45	4-592631-3	—
(Class B) Size 20		
M81714/2-BA1	592627-3	592627-4
M81714/2-BB1	592627-1	592627-2
M81714/2-BB2	1-592627-1	1-592627-2
M81714/2-BB3	1-592627-5	1-592627-6
M81714/2-BC1	1-592627-3	1-592627-4
M81714/2-BC2	592627-9	1-592627-0
M81714/2-BD1	592627-7	592627-8
M81714/2-BE1	592627-5	592627-6
(Class B) Size 16		
M81714/3-BA1	592623-5	592623-6
M81714/3-BB1	592623-3	592623-4
M81714/3-BB2	592623-9	1-592623-0
M81714/3-BC1	1-592623-1	1-592623-2
M81714/3-BC2	592623-7	592623-8
M81714/3-BD1	592623-1	592623-2
(Class B) Size 12		
M81714/4-BA1	—	592619-6
M81714/4-BB1	—	592619-4
M81714/4-BB2	—	1-592619-0
M81714/4-BC1	—	1-592619-2
M81714/4-BC2	—	592619-8
M81714/4-BD1	—	592619-2
(Class C) Size 22		
M81714/1-CA1	—	592635-4
M81714/1-CB1	—	592635-2
M81714/1-CB2	—	1-592635-2
M81714/1-CB3	—	1-592635-6
M81714/1-CC1	—	1-592635-4
M81714/1-CC2	—	1-592635-0
M81714/1-CD1	—	592635-8
M81714/1-CE1	—	592635-6
(Class C) Size 21		
M81714/17-C31	592632-1	592632-2
M81714/17-C32	4-592632-3	—
M81714/17-C33	592632-3	592632-4
M81714/17-C34	592632-5	—
M81714/17-C35	592632-6	592632-7
M81714/17-C36	592632-8	592632-9
M81714/17-C37	1-592632-1	1-592632-2
M81714/17-C38	1-592632-3	—
M81714/17-C39	4-592632-4	—
M81714/17-C40	1-592632-4	1-592632-5
M81714/17-C41	4-592632-1	—
M81714/17-C42	4-592632-5	—
M81714/17-C43	1-592632-6	1-592632-7
M81714/17-C44	1-592632-8	1-592632-9
M81714/17-C45	4-592632-6	—

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Military Cross Reference (Continued)

Military Part Numbers Feedback Modules	AMP MIL Qualified Part Numbers Feedback Modules	AMP Commercial Part Numbers Feedback Modules
(Class C) Size 20		
M81714/2-CA1	592626-3	592626-4
M81714/2-CB1	592626-1	592626-2
M81714/2-CB2	1-592626-1	1-592626-2
M81714/2-CB3	2-592626-4	1-592626-5
M81714/2-CC1	1-592626-3	1-592626-4
M81714/2-CC2	592626-9	1-592626-0
M81714/2-CD1	592626-7	592626-8
M81714/2-CE1	592626-5	592626-6
(Class C) Size 16		
M81714/3-CA1	592622-5	592622-6
M81714/3-CB1	592622-3	592622-4
M81714/3-CB2	592622-9	1-592622-0
M81714/3-CC1	1-592622-1	1-592622-2
M81714/3-CC2	592622-7	592622-8
M81714/3-CD1	592622-1	592622-2
(Class C) Size 12		
M81714/4-CA1	—	592618-6
M81714/4-CB1	—	592618-4
M81714/4-CB2	—	1-592618-0
M81714/4-CC1	—	1-592618-2
M81714/4-CC2	—	592618-8
M81714/4-CD1	—	592618-2
(Class D) Size 22		
M81714/1-DA1	—	592633-4
M81714/1-DB1	—	592633-2
M81714/1-DB2	—	1-592633-2
M81714/1-DB3	—	2-592633-0
M81714/1-DC1	—	1-592633-4
M81714/1-DC2	—	1-592633-0
M81714/1-DD1	—	592633-8
M81714/1-DE1	—	592633-6
(Class D) Size 21		
M81714/17-D31	592629-1	592629-2
M81714/17-D32	592629-3	592629-4
M81714/17-D33	592629-5	592629-6
M81714/17-D34	592629-7	592629-8
M81714/17-D35	592629-9	1-592629-0
M81714/17-D36	4-592629-4	—
M81714/17-D37	1-592629-1	1-592629-2
M81714/17-D38	1-592629-3	1-592629-4
M81714/17-D39	1-592629-5	1-592629-6
M81714/17-D40	1-592629-7	1-592629-8
M81714/17-D42	4-592629-2	4-592629-0
M81714/17-D43	4-592629-3	—
M81714/17-D44	1-592629-9	2-592629-0
M81714/17-D45	4-592629-5	2-592629-2
(Class D) Size 20		
M81714/2-DA1	592624-3	592624-4
M81714/2-DB1	592624-1	592624-2
M81714/2-DB2	1-592624-0	1-592624-1
M81714/2-DB3	1-592624-8	1-592624-9
M81714/2-DC1	1-592624-2	1-592624-3
M81714/2-DC2	2-592624-2	592624-9
M81714/2-DD1	592624-7	592624-8
M81714/2-DE1	592624-5	592624-6

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Military Cross Reference (Continued)

Military Part Numbers Feedback Modules	AMP MIL Qualified Part Numbers Feedback Modules	AMP Commercial Part Numbers Feedback Modules
(Class D) Size 16		
M81714/3-DA1	592620-5	592620-6
M81714/3-DB1	592620-3	592620-4
M81714/3-DB2	592620-9	1-592620-0
M81714/3-DC1	1-592620-1	1-592620-2
M81714/3-DC2	592620-7	592620-8
M81714/3-DD1	592620-1	592620-2
M81714/4-DA1	—	592616-6
M81714/4-DB1	—	592616-4
M81714/4-DB2	—	1-592616-0
M81714/4-DC1	—	1-592616-2
M81714/4-DC2	—	592616-8
M81714/4-DD1	—	592616-1

Military Part Numbers Wire Splice	AMP MIL Qualified Part Numbers Wire Splice	AMP Commercial Part Numbers Wire Splice
(Class A) Size 22		
M81714/11-22A	—	1-592575-9
(Class A) Size 20		
M81714/11-20A	592575-7	1-592575-8
(Class A) Size 16		
M81714/11-16A	592575-4	1-592575-4
(Class A) Size 12		
M81714/11-12A	592575-1	1-592575-3
(Class B) Size 22		
M81714/11-22B	—	1-592575-6
(Class B) Size 20		
M81714/11-20B	592575-9	2-592575-2
(Class B) Size 16		
M81714/11-16B	592575-6	2-592575-0
(Class B) Size 12		
M81714/11-12B	592575-3	—
(Class C) Size 22		
M81714/11-22C	—	1-592575-5
(Class C) Size 20		
M81714/11-20C	592575-8	2-592575-1
(Class C) Size 16		
M81714/11-16C	592575-5	1-592575-9
(Class C) Size 12		
M81714/11-12C	592575-2	—
(Class D) Size 22		
M81714/11-22D	—	592583-7
(Class D) Size 20		
M81714/11-20D	592583-3	592583-6
(Class D) Size 16		
M81714/11-16D	592583-2	592583-5
(Class D) Size 12		
M81714/11-12D	592583-1	—

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Military Cross Reference (Continued)

Military Part Numbers Lightweight Feedback Rail Assembly	AMP MIL Qualified Part Numbers Lightweight Feedback Rail Assembly	AMP Commercial Part Numbers Lightweight Feedback Rail Assembly
M81714/16-1	1-591621-0	—
M81714/16-2	591621-3	—
M81714/16-3	591621-4	—
M81714/16-4	591621-5	—
M81714/16-5	591621-6	—
M81714/16-6	591621-7	—
M81714/16-7	591621-8	—
M81714/16-8	591621-9	—
M81714/16-9	1-591621-1	—
M81714/16-10	1-591621-2	—
M81714/16-11	1-591621-3	—
M81714/16-12	1-591621-4	—

Military Part Numbers Feedback Rail Assembly	AMP MIL Qualified Part Numbers Feedback Rail Assembly	AMP Commercial Part Numbers Feedback Rail Assembly
M81714/5-1	1-591613-0	—
M81714/5-2	591613-3	—
M81714/5-3	591613-4	—
M81714/5-4	591613-5	—
M81714/5-5	591613-6	—
M81714/5-6	591613-7	—
M81714/5-7	591613-8	—
M81714/5-8	591613-9	—
M81714/5-9	1-591613-1	—
M81714/5-10	1-591613-2	—
M81714/5-11	1-591613-3	—
M81714/5-12	1-591613-4	—
M81714/5-13	1-591613-5	—

Military Part Numbers Feedthru Modules	AMP MIL Qualified Part Numbers Feedthru Modules	AMP Commercial Part Numbers Feedthru Modules
(Class A) Size 22		
M81714/6-AA1	—	592613-6
M81714/6-AB1	—	592613-4
M81714/6-AB2	—	1-592613-6
M81714/6-AB3	—	2-592613-0
M81714/6-AC1	—	1-592613-8
M81714/6-AC2	—	1-592613-4
M81714/6-AD1	—	1-592613-2
M81714/6-AE1	—	592613-8
M81714/6-AJ1	—	592613-2
(Class A) Size 20		
M81714/7-AA1	—	592609-6
M81714/7-AB1	—	592609-4
M81714/7-AB2	—	1-592609-4
M81714/7-AB3	—	1-592609-8
M81714/7-AC1	—	1-592609-6
M81714/7-AC2	—	1-592609-2
M81714/7-AD1	—	1-592609-0
M81714/7-AE1	—	592609-8
M81714/7-AJ1	—	592609-2

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Military Cross Reference (Continued)

Military Part Numbers Feedthru Modules	AMP MIL Qualified Part Numbers Feedthru Modules	AMP Commercial Part Numbers Feedthru Modules
(Class A) Size 16		
M81714/8-AA1	—	592605-8
M81714/8-AB1	—	592605-6
M81714/8-AB2	—	1-592605-2
M81714/8-AC1	—	1-592605-4
M81714/8-AC2	—	1-592605-0
M81714/8-AD1	—	592605-4
M81714/8-AH1	—	592605-2
(Class A) Size 12		
M81714/9-AA1	—	592601-8
M81714/9-AB1	—	592601-6
M81714/9-AB2	—	1-592601-2
M81714/9-AC1	—	1-592601-4
M81714/9-AC2	—	1-592601-0
M81714/9-AD1	—	592601-4
M81714/9-AH1	—	592601-2
(Class B) Size 22		
M81714/6-BA1	—	592615-6
M81714/6-BB1	—	592615-4
M81714/6-BB2	—	1-592615-4
M81714/6-BB3	—	1-592615-8
M81714/6-BC1	—	1-592615-6
M81714/6-BC2	—	1-592615-2
M81714/6-BD1	—	1-592615-0
M81714/6-BE1	—	592615-8
M81714/6-BJ1	—	592615-2
(Class B) Size 20		
M81714/7-BA1	—	592611-6
M81714/7-BB1	—	592611-4
M81714/7-BB2	—	1-592611-4
M81714/7-BB3	—	1-592611-8
M81714/7-BC1	—	1-592611-6
M81714/7-BC2	—	1-592611-2
M81714/7-BD1	—	1-592611-0
M81714/7-BE1	—	592611-8
M81714/7-BJ1	—	592611-2
(Class B) Size 16		
M81714/8-BA1	—	592607-8
M81714/8-BB1	—	592607-6
M81714/8-BB2	—	1-592607-2
M81714/8-BC1	—	1-592607-4
M81714/8-BC2	—	1-592607-0
M81714/8-BD1	—	592607-4
M81714/8-BH1	—	592607-2
(Class B) Size 12		
M81714/9-BA1	—	592603-8
M81714/9-BB1	—	592603-6
M81714/9-BB2	—	1-592603-2
M81714/9-BC1	—	1-592603-4
M81714/9-BC2	—	1-592603-0
M81714/9-BD1	—	592603-4
M81714/9-BH1	—	592603-2

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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Military Cross Reference (Continued)

Military Part Numbers Feedthru Modules	AMP MIL Qualified Part Numbers Feedthru Modules	AMP Commercial Part Numbers Feedthru Modules
(Class C) Size 22		
M81714/6-CA1	—	592614-6
M81714/6-CB1	—	592614-4
M81714/6-CB2	—	1-592614-4
M81714/6-CB3	—	1-592614-8
M81714/6-CC1	—	1-592614-6
M81714/6-CC2	—	1-592614-2
M81714/6-CD1	—	1-592614-0
M81714/6-CE1	—	592614-8
M81714/6-CJ1	—	592614-2
(Class C) Size 20		
M81714/7-CA1	—	592610-6
M81714/7-CB1	—	592610-4
M81714/7-CB2	—	1-592610-5
M81714/7-CB3	—	1-592610-9
M81714/7-CC1	—	1-592610-7
M81714/7-CC2	—	1-592610-3
M81714/7-CD1	—	1-592610-1
M81714/7-CE1	—	592610-8
M81714/7-CJ1	—	592610-2
(Class C) Size 16		
M81714/8-CA1	—	592606-8
M81714/8-CB1	—	592606-6
M81714/8-CB2	—	1-592606-2
M81714/8-CC1	—	1-592606-4
M81714/8-CC2	—	1-592606-0
M81714/8-CD1	—	592606-4
M81714/8-CH1	—	592606-2
(Class C) Size 12		
M81714/9-CA1	—	592602-8
M81714/9-CB1	—	592602-6
M81714/9-CB2	—	1-592602-2
M81714/9-CC1	—	1-592602-4
M81714/9-CC2	—	1-592602-0
M81714/9-CD1	—	592602-4
M81714/9-CH1	—	592602-2

Catalog 1308940
Revised 8-06

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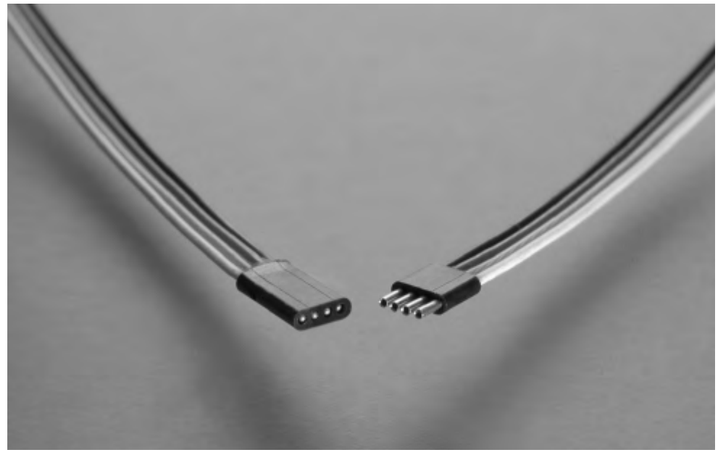
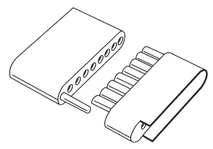
Introduction



The NANONICS strip connectors are the smallest connectors in the NANONICS product line. They are molded from LCP and are ideal for applications where the height and weight of the connector is a serious design parameter. Just .040" in height, these connectors are well suited for low-profile applications. Standard sizes are 4, 9, and 15, while 25, 37, and 51 are also available upon request. Standard configurations include wired, surface mount, or thru-hole terminations. Guide pins are available for polarization. Harness assemblies and custom configurations can also be accommodated.

Polarization

Polarization of the strips is accomplished with the use of optional polarizing guide posts.



Polarization Position "T" Shown

Catalog 1308940
Revised 8-06

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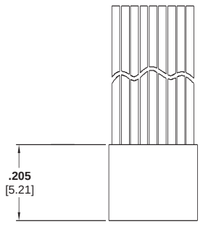
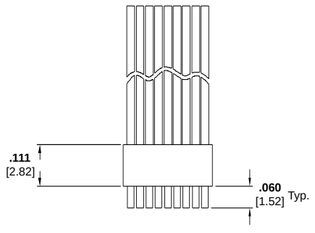
UK: 44-208-420-8341

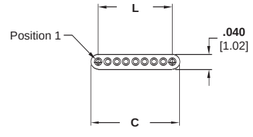
Wired Connectors — Unshrouded, Flying Leads

Product Facts

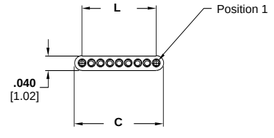
- Plastic Shell
- Standard Sizes: 4, 9, 15, 25, 37 and 51
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations







Plug Assembly
Drawing Number 1589448



Receptacle Assembly
Drawing Number 1589449

Size	Dimensions	
	C	L
4	**0.115** [2.92]	**0.075** [1.91]
9	**0.240** [6.10]	**0.200** [5.08]
15	**0.390** [9.91]	**0.350** [8.89]
25	**0.640** [16.26]	**0.600** [15.24]
37	**0.940** [23.88]	**0.900** [22.86]
51	**1.290** [32.77]	**1.250** [31.75]

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

Part Numbering Guideline for Strip Wired Connectors

Strip Connectors - Wire Terminations

USS XXX XX X XX XXX X

Class/Row/Type
USS Unshrouded, 1 row, strip

Positions
004 4 Position
009 9 Position
015 15 Position
025 25 Position

Configuration
PC Plug
SC Receptacle

Conductor Size/Strands
0 28 AWG Solid
1 30 AWG Solid
2 30 AWG 7 Strand
3 32 AWG 7 Strand
4 34 AWG 7 Strand

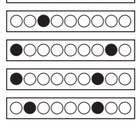
Conductor Type
DX White Teflon
DY White PTFE per M16878/6
DC Color Coded Teflon
DM Color Coded Teflon per MIL-STD-681
DT White Tefzel per M22759/33

Conductor Length
XXX Three numbers only, length is in inches (i.e. 012 = twelve inches)
CXX A "C" followed by two numbers, length is in centimeters (i.e. C06 = 6 centimeters)
MXX An "M" followed by two numbers, length is in meters (i.e. M02 = 2 meters)

Polarization (optional)
Plug contains guide post
Receptacle accepts guide post

Polarization (Strip Type Only)

T = One Pin
U = One Pin
V = One Pin
W = Two Pin
Y = Two Pin
Z = Two Pin



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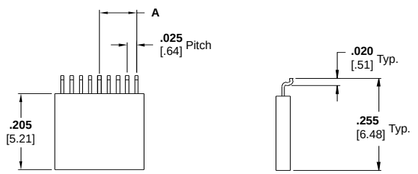
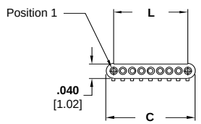
Surface Mount Connectors — Unshrouded

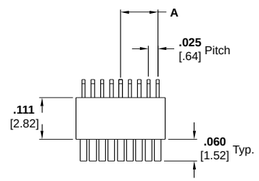
Product Facts

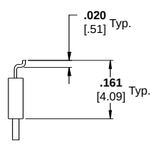
- Plastic Shell
- Standard Sizes: 4, 9, 15, 25, 37 and 51
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations
- Suggested Pad Layouts are available on the referenced drawings on the Tyco Electronics website

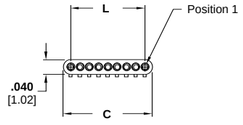




Plug Assembly
Drawing Number 1589451







Receptacle Assembly
Drawing Number 1589452

Size	Dimensions		
	A	C	L
4	**0.0375** [.95]	**0.115** [2.92]	**0.075** [1.91]
9	**0.1000** [2.54]	**0.240** [6.10]	**0.200** [5.08]
15	**0.1750** [4.45]	**0.390** [9.91]	**0.350** [8.89]
25	**0.3000** [7.62]	**0.640** [16.26]	**0.600** [15.24]
37	**0.4500** [11.43]	**0.940** [23.88]	**0.900** [22.86]
51	**0.6250** [15.88]	**1.290** [32.77]	**1.250** [31.75]

Catalog 1308940
Revised 8-06

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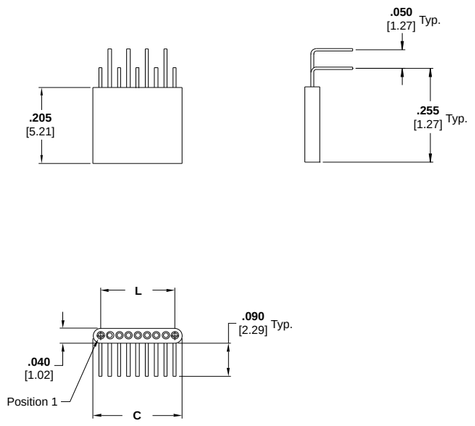
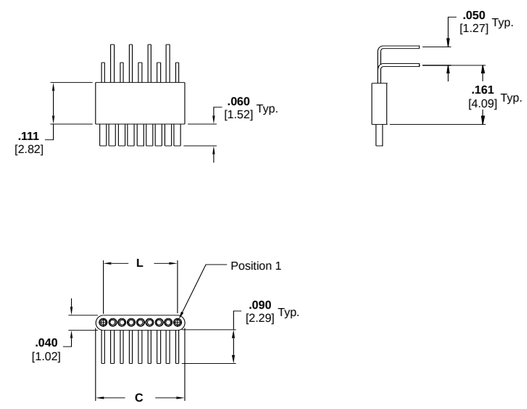
Thru-Hole Connectors — Unshrouded, Horizontal, 1 Row to 2 Row, .050 Spacing

Product Facts

- Plastic Shell
- Standard Sizes: 4, 9, 15, 25, 37 and 51
- Factory wired to your specifications
- Contact Tyco Electronics for custom configurations
- Suggested Thru-Hole Layouts are available on the referenced drawings on the Tyco Electronics website



Plug Assembly
Drawing Number 1589453



Receptacle Assembly
Drawing Number 1589454

Size	Dimensions	
	C	L
4	**0.115** [2.92]	**0.075** [1.91]
9	**0.240** [6.10]	**0.200** [5.08]
15	**0.390** [9.91]	**0.350** [8.89]
25	**0.640** [16.26]	**0.600** [15.24]
37	**0.940** [23.88]	**0.900** [22.86]
51	**1.290** [32.77]	**1.250** [31.75]

Catalog 1308940
Revised 8-06

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Part Numbering Guideline for Surface Mount and Thru Hole Termination

Strip Connectors - Surface Mount and Thru Hole Terminations

USS XXX XX X

Class/Row/Type

USS Unshrouded, 1 row, strip

Positions

004 4 Position
009 9 Position
015 15 Position
025 25 Position

Configuration

B2 Plug, Horizontal SMT
L2 Receptacle, Horizontal SMT
C6 Plug, Horizontal Mount, Thru Hole
M6 Receptacle, Horizontal Mount, Thru Hole

Polarization (optional)

Plug contains guide post
Receptacle accepts guide post

Polarization (Strip Type Only)

T = One Pin
U = One Pin
V = One Pin
W = Two Pin
Y = Two Pin
Z = Two Pin

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Part Number Cross Reference

NANONICS Part Number	Tyco Electronics Part Number
Wire Terminations	
USS004PC2DC003	0-1589448-1
USS004PC2DC006	0-1589448-2
USS004PC2DC006T	5-1589448-5
USS004PC2DC008	6-1589448-8
USS004PC2DC012	0-1589448-3
USS004PC2DC012T	0-1589448-4
USS004PC2DC012U	0-1589448-5
USS004PC2DC024	0-1589448-6
USS004PC2DC036	0-1589448-7
USS004PC2DC036T	0-1589448-8
USS004PC2DCC20T	5-1589448-9
USS004PC2DCC30	0-1589448-9
USS004PC2DCM01	5-1589448-7
USS004PC2DM012T	7-1589448-2
USS004PC2DM024T	7-1589448-6
USS004PC2DMC30	6-1589448-9
USS004PC2DMC40	7-1589448-1
USS004PC2DMC50	6-1589448-7
USS004PC2DMM01	6-1589448-0
USS004PC2DMM02	6-1589448-1
USS004PC2DNC40	1-1589448-0
USS004PC2DX006	1-1589448-1
USS004PC2DX012	1-1589448-2
USS004PC2GX006	1-1589448-3
USS004PC2GX024	1-1589448-4
USS004PC3DC018	1-1589448-5
USS004PC4DXC10	7-1589448-0
USS004SC2DC002	0-1589449-1
USS004SC2DC003	0-1589449-2
USS004SC2DC003T	0-1589449-3
USS004SC2DC004	0-1589449-4
USS004SC2DC006	0-1589449-5
USS004SC2DC006T	6-1589449-2
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USS004SC2DNC40	1-1589449-3
USS004SC2DTC20T	8-1589449-5
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USS004SC2DX012T	1-1589449-5
USS004SC2GX006	1-1589449-6
USS004SC2GX024	1-1589449-7
USS004SC3DC018	1-1589449-8
USS004SC3DX004T	1-1589449-9
USS004SC4DXC30	8-1589449-2
USS009PC0DC006T	1-1589448-6
USS009PC2DC006	1-1589448-7
USS009PC2DC006W	1-1589448-8
USS009PC2DC008U	5-1589448-2
USS009PC2DC012	1-1589448-9
USS009PC2DC012T	2-1589448-0
USS009PC2DC012V	2-1589448-1
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USS009PC2DC024	2-1589448-3
USS009PC2DC036	2-1589448-4
USS009PC2DC036T	2-1589448-5
USS009PC2DC036U	2-1589448-6
USS009PC2DC036V	2-1589448-7
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USS009PC2DCM01	5-1589448-8
USS009PC2DM012T	7-1589448-5
USS009PC2DM024T	7-1589448-7
USS009PC2DX001	2-1589448-9
USS009PC2DX004T	3-1589448-0
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USS009SC2DC018	2-1589449-8
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USS009SC2DC036T	3-1589449-2
USS009SC2DC036U	3-1589449-3
USS009SC2DC036V	3-1589449-4
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USS009SC2DC060T	3-1589449-6
USS009SC2DCC05T	3-1589449-7
USS009SC2DCM01	6-1589449-8
USS009SC2DCM01T	3-1589449-8
USS009SC2DM012T	8-1589449-8
USS009SC2DM024T	9-1589449-0
USS009SC2DT012T	9-1589449-1
USS009SC2DX004T	3-1589449-9
USS009SC2DX006T	4-1589449-0
USS009SC2DX012	4-1589449-1
USS009SC2GX006	4-1589449-2
USS009SC2GX012	4-1589449-3
USS009SC3DC036	7-1589449-6
USS009SC3DX004T	4-1589449-4
USS015PC1DC036T	7-1589448-3
USS015PC1DC036W	7-1589448-4
USS015PC2DC006	3-1589448-5
USS015PC2DC012	3-1589448-6
USS015PC2DC012T	3-1589448-7
USS015PC2DC012V	3-1589448-8
USS015PC2DC018	3-1589448-9
USS015PC2DC018V	5-1589448-6
USS015PC2DMC60T	4-1589448-0
USS015PC2DX004T	4-1589448-1
USS015PC2DX012	4-1589448-2
USS015PC2DX024T	4-1589448-3
USS015PC3DC036	6-1589448-6
USS015SC1DC036T	8-1589449-6
USS015SC1DC036W	8-1589449-7
USS015SC2DC006	4-1589449-6
USS015SC2DC012	4-1589449-7
USS015SC2DC012T	4-1589449-8
USS015SC2DC018V	6-1589449-4
USS015SC2DC024T	6-1589449-1
USS015SC2DC036	7-1589449-8
USS015SC2DC036T	4-1589449-9
USS015SC2DMC60T	5-1589449-0
USS015SC2DX004T	5-1589449-1
USS015SC2DX006T	6-1589449-5
USS015SC2DX018T	5-1589449-2
USS015SC3DC036	7-1589449-7
USS015SC3DX004T	5-1589449-3
USS025PC2DC006	4-1589448-4
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USS025PC2DT006T	5-1589448-3
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USS025SC2DT006T	5-1589449-9
USS037PC1DXC20	4-1589448-6
USS037PC2DC006	4-1589448-7
USS037PC2DC012	6-1589448-4
USS037PC2DC020T	4-1589448-8
USS037PC2DNC50	4-1589448-9
USS037PC2DT006T	5-1589448-4
USS037SC1DXC20	5-1589449-5
USS037SC1DY006	6-1589449-6
USS037SC2DC006	5-1589449-6
USS037SC2DC012	7-1589449-5
USS037SC2DC036T	6-1589449-9
USS037SC2DT006T	6-1589449-0
USS037SC2DX006T	5-1589449-7
USS051PC2DC012	5-1589448-0
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USS004B2T	0-1589451-2
USS004B4	0-1589775-1
USS004B45T	0-1589450-1
USS004B4T	3-1589683-2
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USS009B2	0-1589451-3
USS009B2T	0-1589451-5
USS009B2TE	1-1589451-5
USS009B2Z	0-1589451-6
USS009B43T	5-1589683-6
USS009B4T	5-1589683-7
USS009L2	0-1589452-3
USS009L2T	0-1589452-4
USS009L2U	0-1589452-5
USS009L2V	0-1589452-6
USS015B2	0-1589451-8
USS015B2T	0-1589451-9
USS015B4T	7-1589683-6
USS015L2	0-1589452-7
USS015L2T	0-1589452-8
USS015L2V	0-1589452-9
USS025B2	1-1589451-0
USS025B4T	8-1589683-6
USS025L2	1-1589452-0
USS025L4T	8-1589683-7
USS037B2	1-1589451-1
USS037B2T	1-1589451-4
USS037L2	1-1589452-1
USS037L2T	1-1589452-2
USS051B2	1-1589451-3
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Thru-Hole	
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USS015C6	0-1589453-5

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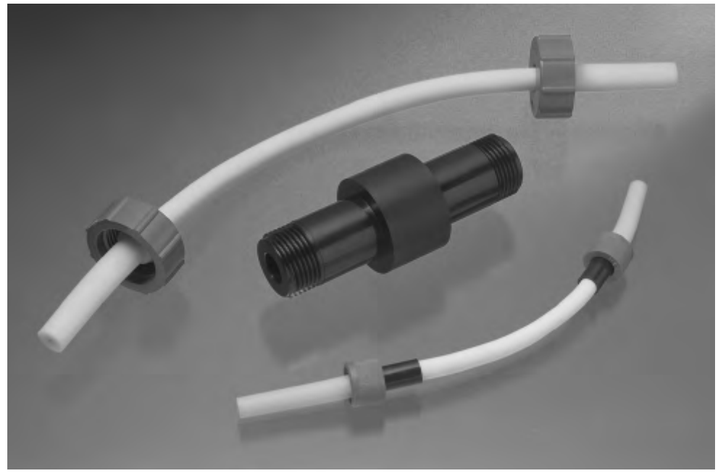
Introduction

Product Facts

- **No exposed high voltage parts**
- **Space saving — maximum performance from small size and weight**
- **Fast connect and disconnect**
- **Wide temperature range — -67°F to +257°F [-55°C to +125°C], continuous**
- **Positive mating of lead into receptacle**
- **Hermetically sealed**
- **RFI shielding — optional**
- **Fungus, moisture, oil, and chemical resistant**
- **High altitude operation — at any altitude without voltage derating**
- **Excellent mechanical strength — resists vibration and shock**
- **High dielectric strength**
- **Preassembled — no tools required**
- **High reliability — operates under extreme environmental conditions**
- **Unaffected by ultra-violet light**
- **Corona resistant — virtually unaffected by ozone or corona**
- **Radiation resistant**
- **Lead wire remains flexible to -67°F [-55°C]**
- **Non-toxic insulation — does not give off toxic fumes when burned**
- **Excellent shelf life**
- **Meets applicable military specifications**
- **Color coded for easy identification**
- **Quick, easy installation**



The development of high voltage hermetically sealed connectors and LGH High Voltage Lead Assemblies and Receptacles represented two major advances in the science of high voltage application — both pioneered by Tyco Electronics. As a result of this technological advantage, Tyco Electronics is the leading manufacturer of high voltage, high altitude, high temperature lead assemblies and connectors.

In the field of high voltage application, Tyco Electronics has conducted extensive research, development, quality studies and reliability programs yielding numerous standard products for military and industrial high voltage applications.

LGH High Voltage Lead Assemblies and Receptacles are used in many systems' designed to meet or exceed military specifications. A sampling of specifications to which samples of these products have been tested, is listed to the right.

For more information contact Tyco Electronics.

LGH Test Methods and Conditions

LGH Leads and Receptacles, LGH ¼ through LGH 4

Product Spec. — 108-36033
EIA RS-364

Electrical

Dielectric Withstanding Voltage — EIA-364-20 Condition I (MS202, Method 301)

Insulation Resistance — EIA-364-21, (MS202, Method 302)

Mechanical

Vibration, Sinusoidal — EIA-364-28, Test Condition I, (MS202, Method 201)

Shock — EIA-364-27, Method H

Environmental

Barometric Pressure — Sea Level to 70,000 feet, MIL-Std-202, Method 105, Condition C

Thermal Shock — EIA-364-32, 5 cycles -67°F to +257°F [-55°C to +125°C]

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Introduction (Continued)

Lead Assemblies and Receptacles

LGH leads and receptacles find wide application where high voltage is used in harsh environments. LGH leads and receptacles are lightweight, miniature, extremely reliable and they maintain peak performance under high temperature, high altitude applications. They are equally applicable to low temperature, low altitude devices.

Leads and receptacles shown on the following pages are commonly used items. Hundreds of variations of these products are available, as well as custom-made units. Consult Tyco Electronics for information on high voltage connectors for applications not satisfied by components listed here.

When ordering LGH items: identify item, list Tyco Electronics part number, and specify quantity. Note: Special packaging, special marking and/or special testing of LGH leads and receptacles are available on request, as well as custom-made assemblies. Consult Tyco Electronics for details.

Voltage Ratings

The voltage ratings tabulated here and noted elsewhere apply to LGH molded-end lead assemblies properly mated with appropriate LGH receptacles, which are properly potted or otherwise protected on the back end.

LGH Series	Mating Length/Depth	Normal Capacitance pF/ft.	Normal Capacitance pF/m	Wire Size	Operating Voltage* Kilovolts DC	3 Min. Hipot** Kilovolts DC
LGH ¼	**.25** [6.35]	***	—	22 AWG	5	7.5
LGH ½	**.53** [13.46]	55	180	16 AWG	10	15
LGH ½ L	**.89** [22.61]	55	180	16 AWG	15	23
LGH 1	**.88** [22.35]	35	115	16 AWG	20	30
LGH 1L	**1.69** [42.93]	35	115	16 AWG	25	38
LGH 2	**1.44** [36.58]	28	144	16 AWG	30	45
LGH 3	**1.81** [45.97]	35	115	16 AWG	40	55
LGH 4	**2.00** [50.80]	28	144	16 AWG	50	60

*Sea level to 70,000 ft. [21,336 m], -55°C to +125°C [-67°F to +257°F].
**Sea level at 25°C (77°F).
***LGH ¼ is not shielded

Specifications

LGH Lead Assemblies are manufactured with a silicone rubber end having a specified mating length (see above table) molded onto a 16 AWG white silicone rubber wire. These assemblies provide extreme reliability and safety for high voltage applications in severe environments.

Lead Length Tolerance (including pigtail) — Lengths to 24 [609.6], ±.125 [3.28]: 24 [609.6] and longer, ±1% of length.

Lead Insulation — Silicone rubber, durometer reading 60 to 70 (reference MIL-W-16878/8, Type FF); color, white. Lead assemblies with other colors and insulation materials such as PVC and Teflon can be manufactured on request.

Conductors (per MIL-W-16878/8) — LGH ½, LGH ½ L, LGH 1, LGH 1L and LGH 3 lead assemblies contain 41 strands minimum of 32 AWG [0.03 mm²] wire, silver plated, to compose a 16 AWG [1.25 mm²] stranded conductor .06 nominal O.D. [1.5]; LGH 2 and LGH 4 lead assemblies contain 19 strands minimum of 29 AWG [0.07 mm²] wire, silver plated, to compose a 16 AWG [1.25 mm²] stranded conductor .06 nominal O.D. [1.5]. Silver plating is per ASTM-B298-58T.

Pigtail — Solder dipped

Socket — Bronze per ASTM-140, alloy B, gold plated per MIL-G-45204, Type II, (0.000030 [0.00076] gold over 0.000030 [0.00076] nickel per QQ-N-290). Socket is crimped to lead wire.

Cap Materials — Polycarbonate glass-filled polyester or glass-filled epoxy.

Molded End — Silicone rubber per ZZ-R-765, Class IIa and IIb, grade 60.

Positive Stop Ferrule — Glass-filled polyester

Marking — Per MIL-STD-130

Washer — TFE, electrical grade

Minimum Bend Radii, nominal, for cables without additional covering over silicone insulation and for shielded cable.

LGH Series	Insulation Type Standard	Insulation Type Shielded
¼, ½, ½ L	**.25** 6.4	**.75** 19.0
1, 1L, 3	**.50** 12.7	**1.00** 25.4
2, 4	**1.00** 25.4	**1.50** 38.1

Maximum Conductor Resistance

All Series	4.75 ohms/1000 ft. 15.6 ohms/1000m.

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LGH ¼ — 22 AWG (19/34)

Single End Lead Assembly

Single End Lead Assembly with Positive Stop Ferrule

Shielded Lead Assembly

RFI Shielded Lead Assembly

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Introduction (Continued)

LGH Receptacles are manufactured in molded glass epoxy having a specified mating depth (see table on previous page). When used with LGH lead assemblies they offer the ultimate in dependability, even under harsh environmental conditions. Typical receptacles are shown here. Specific units, with part numbers, are shown by series in the following pages.

LGH Receptacles for Canned Units

These receptacles are for hermetically sealed, gas- or oil-filled units, and they are recommended for canned units filled with potting compound.**

**CAUTION: Follow manufacturer's instructions on preparing and handling potting. LGH voltage ratings apply only when a proper bond is achieved between the back end of the receptacle and the compound.

LGH Receptacles for Cast or Encapsulated Units

These units are for use where no metal can is required.

Specifications (All units)

Pin Assembly — Brass per ASTM-B-16 and QQ-B-626; tin plated per MIL-T-10727, Type I or II, .00010" min. thickness.*

Body — Molded glass-filled epoxy

Marking — Per MIL-STD-130

(Canned units only)

Solder Flange — Brass per ASTM-B-16 and QQ-B-626; tin plated per MIL-T-10727, Type I or II, .00010" min. thickness

Hermeticity — Leak rate less than 1 x 10^{-8} cc He/sec. per MIL-STD-202, Method 112B, Cond. C.

*Hermetically sealed receptacles are plated after molding therefore we cannot guarantee the minimum thickness of copper under plating .000100 [0.00254] on the mating end of the pin contact.

Glass-epoxy receptacle for encapsulated units

Glass-epoxy receptacle for splice application

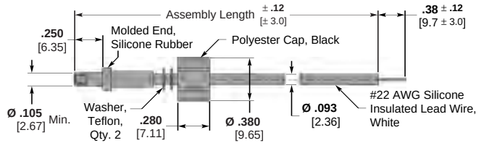
Hermetically sealed, glass-epoxy receptacle for canned units

Glass-epoxy, flanged receptacle for bulkhead splice applications

Glass-epoxy, flanged receptacle for bulkhead applications

LGH Lead Assemblies and Receptacles, 5 KVDC, LGH ¼

Single End Lead Assemblies

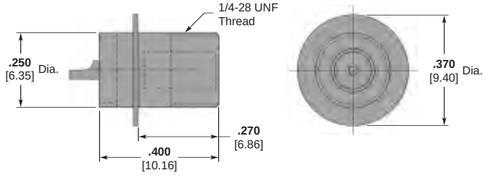


Part Number 445162

Assembly Length	Part Number
6.0 152.4	445162-1
12.0 304.8	445162-2 5-445162-2*
18.0 457.2	445162-3
24.0 609.6	445162-4

*RoHS compliant Part Number.

Receptacle, Metal Flange



Part Number 445159-1 and Part Number 5-445159-1 (RoHS)

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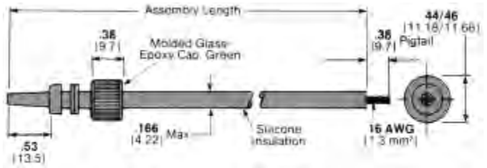
LGH Lead Assemblies and Receptacles, 10 KVDC, LGH ½

Single End Lead Assemblies

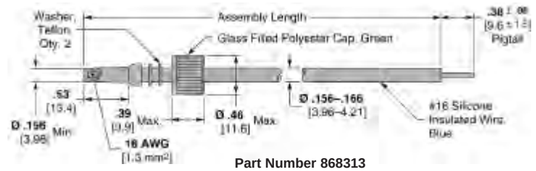


Part Number 830611

Assembly Length	Part Number
6.0 152.4	2-830611-1 2-5830611-1*
12.0 304.8	4-830611-8 4-5830611-8*
18.0 457.2	2-830611-5 2-5830611-5*
24.0 609.6	830611-1 5830611-1*
36.0 914.4	1-830611-0 1-5830611-0*
48.0 1219.2	2-830611-3 2-5830611-3*

*RoHS compliant Part Number.

Single Molded End Lead Assemblies

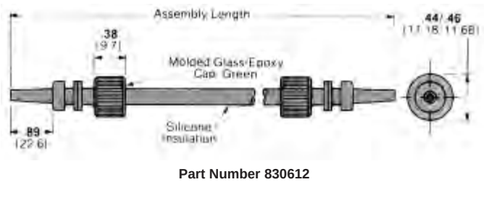


Part Number 868313

Assembly Length	Part Number
24.0 609.6	868313-3 5-868313-3*

*RoHS compliant Part Number.

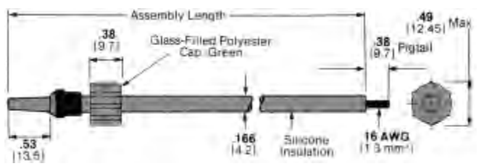
Double End Lead Assemblies



Part Number 830612

Assembly Length	Part Number
6.0 152.4	830612-3
12.0 304.8	830612-2
18.0 457.2	830612-8
24.0 609.6	830612-1
36.0 914.4	2-830612-6
48.0 1219.2	830612-4

Single End Lead Assemblies with Positive Stop Ferrules

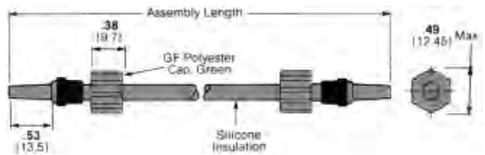


Part Number 862545

Assembly Length	Part Number
6.0 152.4	862545-1 5-862545-1*
12.0 304.8	862545-4 5-862545-4*
18.0 457.2	862545-6 5-862545-6*
24.0 609.6	862545-8 5-862545-8*
36.0 914.4	1-862545-8 6-862545-8*
48.0 1219.2	1-862545-1

*RoHS compliant Part Number.

Double End Lead Assemblies with Positive Stop Ferrules



Part Number 862546

Assembly Length	Part Number
6.0 152.4	862546-1
12.0 304.8	862546-4
18.0 457.2	862546-6
24.0 609.6	862546-8
36.0 914.4	1-862546-0
48.0 1219.2	1-862546-5

Note: Standard length leads are tabulated here. Tyco Electronics can make available numerous variations in lengths and material to suit almost any application. Choices of insulation materials include TEFLON, UL listed silicone and UL listed PVC. Other materials, colors, wire and configurations can be used in manufacture. For more information, consult Tyco Electronics.

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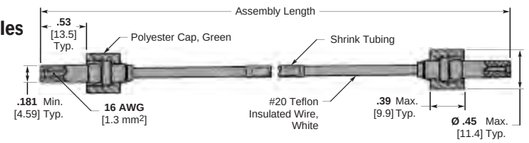
LGH Lead Assemblies and Receptacles, 10 KVDC, LGH ½ (Continued)

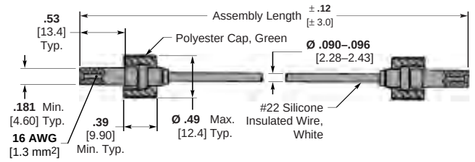
Double End Lead Assemblies with Positive Stop Ferrules with Teflon Wire



Part Number 860529

Assembly Length	Part Number
6.0 152.4	860529-2
7.0 177.8	860529-6
10.0 254.0	860529-8
13.0 330.2	1-860529-0
16.0 406.4	860529-4

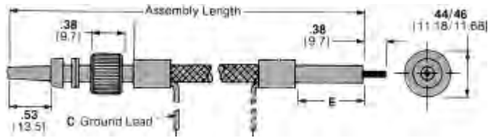
Double End Lead Assemblies with Positive Stop Ferrules with #22 Wire



Part Number 449578

Assembly Length	Part Number
11.0 ± .12 279.4 ± 3.0	449578-1

Shielded Single End Lead Assemblies with Ground Lead

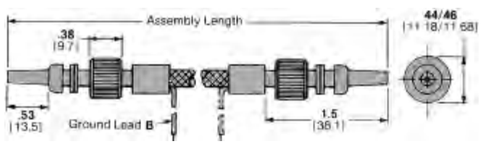


Part Number 846985

Assembly Length	Dims. C	Dims. E	Part Number
12.0 304.8	**6.0** 152.4	**2.0** 50.8	846985-9 5-846985-9*
18.0 457.2	**6.0** 152.4	**1.5** 38.1	2-846985-2
24.0 609.6	**6.0** 152.4	**1.5** 38.1	2-846985-3
36.0 914.4	**12.0** 304.8	**2.0** 50.8	1-846985-8

*RoHS compliant Part Number.

Shielded Double End Lead Assemblies with Ground Lead



Part Number 858885

Assembly Length	Dim. B	Part Number
12.0 304.8	**8.0** 203.2	858885-3
18.0 457.2	**6.0** 152.4	2-858885-7
24.0 609.6	**8.0** 203.2	858885-4
36.0 914.4	**6.0** 152.4	2-858885-5 7-858885-5*
48.0 1219.2	**6.0** 152.4	858885-6

*RoHS compliant Part Number.

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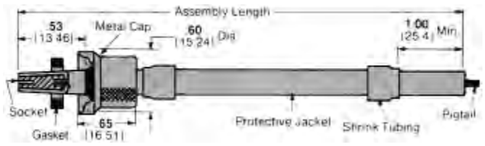
UK: 44-208-420-8341

LGH Lead Assemblies and Receptacles, 10 KVDC, LGH ½ (Continued)

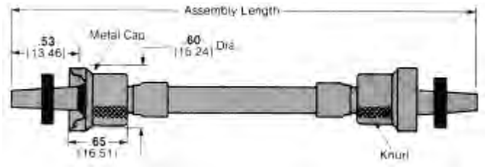
RFI Shielded Single End Lead Assemblies*



Part Number 861807

Assembly Length	Part Number
12.0 304.8	861807-1
18.0 457.2	861807-2
24.0 609.6	861807-7
36.0 914.4	861807-9

RFI Shielded Double End Lead Assemblies*



Part Number 861808

Assembly Length	Part Number
12.0 304.8	861808-1
18.0 457.2	861808-9
24.0 609.6	1-861808-0
36.0 914.4	1-861808-2
48.0 1219.2	1-861808-6

Part Number 863330-1

Assembly Length	Part Number
18.0 457.2	863330-1

* These RFI Shielded Lead Assemblies mate with Receptacle Part Number 861252-1.

Catalog 1308940
Revised 8-06

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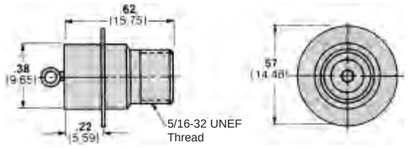
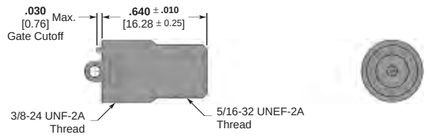
LGH Lead Assemblies and Receptacles, 10 KVDC, LGH ½ (Continued)

Glass-Epoxy Receptacles with .53 [13.46] Barrel Depth

Flanged, for Hermetic Seal
Part Number 861252-1
RoHS Part Number 5-861252-1
Weight — 2 grams



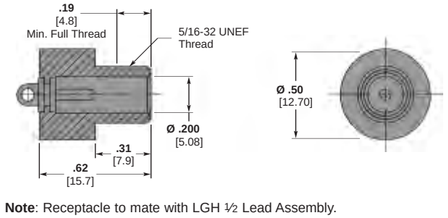
Special Receptacle
Part Number 448462-1



Note: Receptacle will accept a LGH ½ lead with a .53 [13.5] molded end length.

Flanged, Bolt Mount
Part Number 830395-1
RoHS Part Number 5-830395-1
Weight — 4.2 grams

Receptacle
Part Number 830200-1
RoHS Part Number 5-830200-1

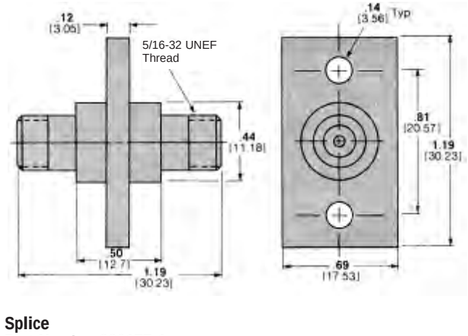


Note: Receptacle to mate with LGH ½ Lead Assembly.

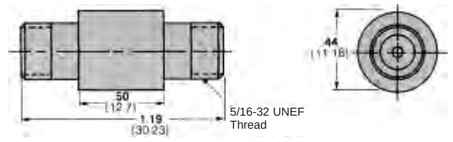
For Encapsulated Units
Part Number 830178-1
RoHS Part Number 5-830178-1
Weight — 1.2 grams

Receptacles are available with gold plated contacts.

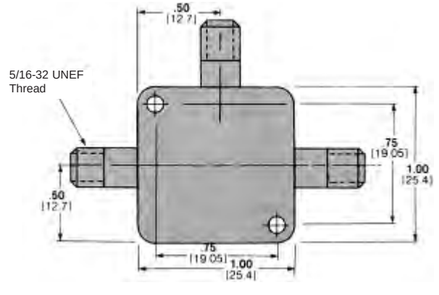
Bolt-mount, Feed-through
Part Number 830174-1
Weight — 5.8 grams



Splice
Part Number 830177-1
Weight — 3.5 grams



T Connector
Part Number 849418-1
Weight — 15 grams



Catalog 1308940
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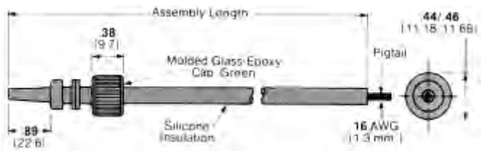
LGH Lead Assemblies and Receptacles, 15 KVDC, LGH ½ L

Single End Lead Assemblies

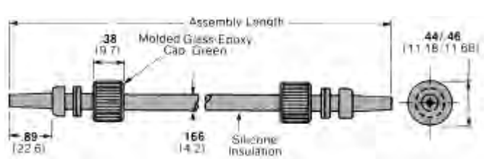


Part Number 830613

Assembly Length	Part Number
6.0 152.4	1-830613-0
12.0 304.8	830613-2 5830613-2*
18.0 457.2	1-830613-2 1-5830613-2*
24.0 609.6	830613-1 5830613-1*
36.0 914.4	830613-7 5830613-7*
48.0 1219.2	1-830613-4 1-5830613-4*

RoHS compliant Part Number.

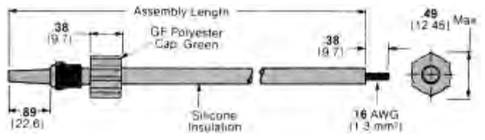
Double End Lead Assemblies



Part Number 830614

Assembly Length	Part Number
6.0 152.4	1-830614-5
12.0 304.8	830614-2
18.0 457.2	830614-3
24.0 609.6	830614-1
36.0 914.4	1-830614-6
48.0 1219.2	2-830614-5

Single End Lead Assemblies with Positive Stop Ferrules

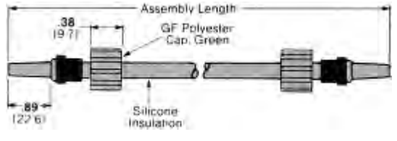


Part Number 862547

Assembly Length	Part Number
6.0 152.4	862547-1
12.0 304.8	862547-4 5-862547-4*
18.0 457.2	862547-6 5-862547-6*
24.0 609.6	862547-8
36.0 914.4	862547-9
48.0 1219.2	1-862547-9 6-862547-9*

RoHS compliant Part Number.

Double End Lead Assemblies with Positive Stop Ferrules



Part Number 862548

Assembly Length	Part Number
6.0 152.4	862548-1
12.0 304.8	862548-4
18.0 457.2	862548-6
24.0 609.6	862548-8
36.0 914.4	1-862548-6
48.0 1219.2	1-862548-4

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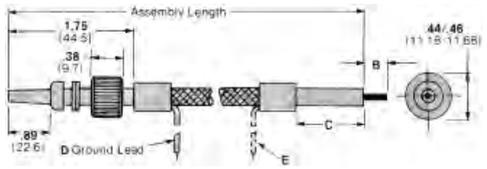
LGH Lead Assemblies and Receptacles, 15 KVDC, LGH ½ L (Continued)

Shielded Single End Lead Assemblies

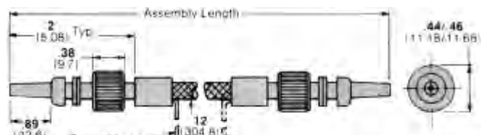


Part Number 858886

Assembly Length	Terminated End	Pigtail End		Part Number	RoHS Part Number
	Ground Lead Length(s) D & E	C	Pigtail Length B		
12.0 304.8	**8.0** 203.2†	**1.5** 38.1	**.25** 6.4	858886-2	5-858886-2
18.0 457.2	**8.0** 203.2	**3.0** 76.2	**.38** 9.7	1-858886-4	—
24.0 609.6	**12.0** 304.8	**3.0** 76.2	**.38** 9.7	1-858886-8	—
36.0 914.4	**12.0** 304.8*	**6.0** 152.4	**.38** 9.7	858886-1	—
	8.0 203.2†	**3.0** 76.2	**.38** 9.7	858886-6	—

*One ground lead, pigtail end only.
†One ground lead, terminated end only.

Shielded Double End Lead Assemblies

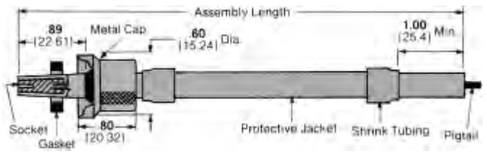


Part Number 858945

Assembly Length	Part Number
12.0 304.8	1-858945-6
18.0 457.2	1-858945-5*
24.0 609.6	2-858945-1
36.0 914.4	858945-3
48.0 1219.2	1-858945-4

*Two ground leads, 12.0 [304.8] each.

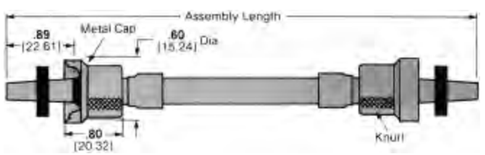
RFI Shielded Single End Lead Assemblies*



Part Number 861809

Assembly Length	Part Number
12.0 304.8	861809-1
18.0 457.2	861809-4
24.0 609.6	861809-5
36.0 914.4	861809-6

RFI Shielded Double End Lead Assemblies*



Part Number 861810

Assembly Length	Part Number
12.0 304.8	861810-1
18.0 457.2	861810-6
24.0 609.6	861810-7
36.0 914.4	861810-9

* These RFI Shielded Lead Assemblies mate with Receptacle Part Number 861253-1.

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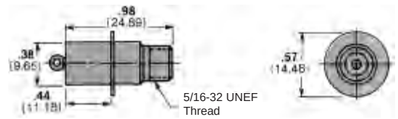
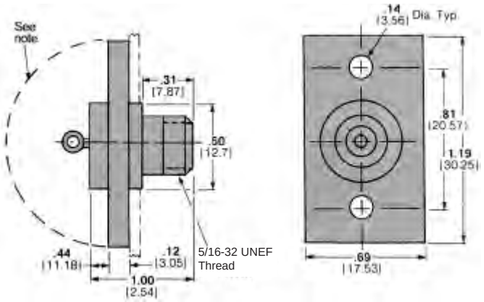
LGH Lead Assemblies and Receptacles, 15 KVDC, LGH ½ L (Continued)

Glass-Epoxy Receptacles with .89 [22.61] Barrel Depth

Flanged, For Hermetic Seal
Part Number 861253-1
RoHS Part Number 5-861253-1
Weight — 3 grams

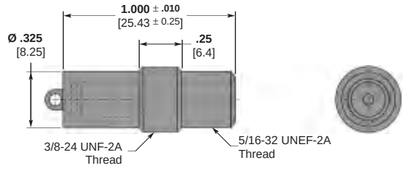


Flanged, Bolt Mount
Part Number 858857-1
RoHS Part Number 5-858857-1
Weight — 6 grams



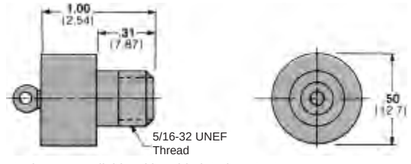
Note: If the panel or mounting hardware is at ground potential, guard against arc-over and breakdown within the area defined by this line.

Special Receptacle
Part Number 448464-1



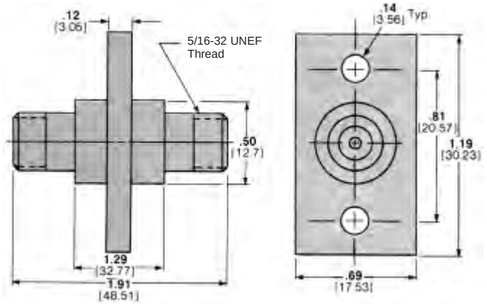
Note: Receptacle will accept a LGH ½ L lead with a .89 [22.6] molded end length.

For Encapsulated Units
Part Number 858855-1
RoHS Part Number 5-858855-1
Weight — 3 grams

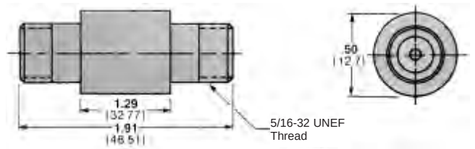


Receptacles are available with gold plated contacts.

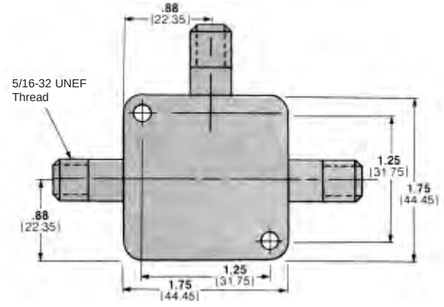
Bolt-Mount, Feed-Through
Part Number 858856-1
Weight — 14 grams



Splice
Part Number 858082-1
Weight — 10.5 grams



T Connector
Part Number 850736-1
RoHS Part Number 5-850736-1
Weight — 23 grams



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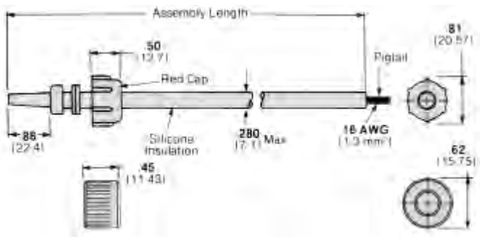
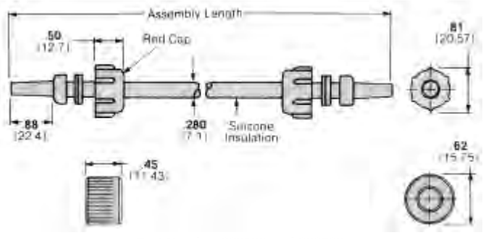
Single End Lead Assemblies



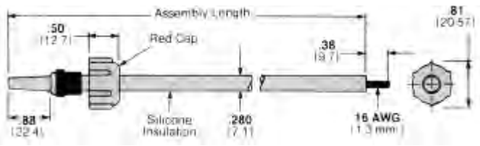
Part Number 837655 and 863701

Double End Lead Assemblies



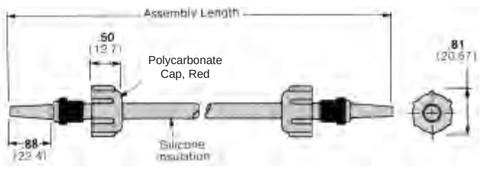
Part Number 830126 and 863702

Single End Lead Assemblies with Positive Stop Ferrules



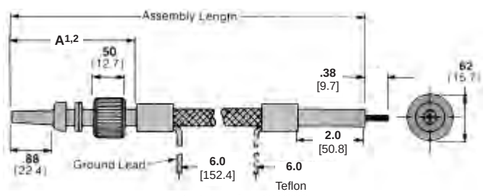
Part Number 862549 and 863703

Double End Lead Assemblies with Positive Stop Ferrules



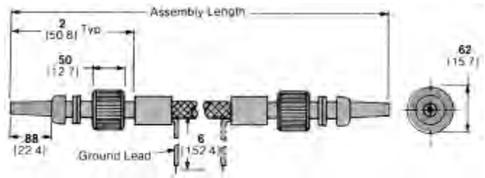
Part Number 862550

Shielded Single End Lead Assemblies



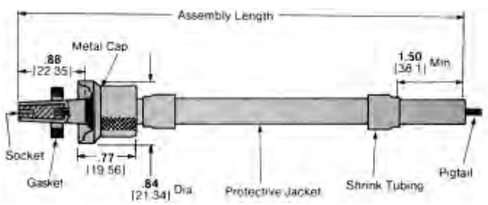
Part Number 849099

Shielded Double End Lead Assemblies



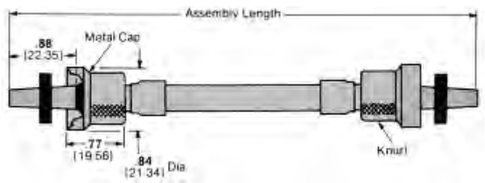
Part Number 849104

RFI Shielded Single End Lead Assemblies*



Part Number 861811

RFI Shielded Double End Lead Assemblies*



Part Number 861812

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* These RFI Shielded Lead Assemblies mate with Receptacle Part Number 861254-1.

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LGH Lead Assemblies and Receptacles, 20 KVDC, LGH 1 (Continued)

Lead Assemblies (Continued)

Description	Assembly Length	Part Numbers						
		Polycarbonate Cap		Glass-Filled Polyester Cap		Glass Epoxy Cap		Metal Cap
		Non-RoHS	RoHS	Non-RoHS	RoHS	Non-RoHS	RoHS	Non-RoHS
Single End Lead Assemblies	6 152.4	837655-7	5837655-7	863701-7	—	—	—	—
	12 304.8	1-837655-1	1-5837655-1	1-863701-1	1-5863701-1	—	—	—
	18 457.2	1-837655-0	1-5837655-0	1-863701-0	—	—	—	—
	24 609.6	837655-8	—	863701-8	5863701-8	—	—	—
	36 914.4	837655-5	5837655-5	863701-5	5863701-5	—	—	—
	48 1219.2	1-837655-3	1-5837655-3	1-863701-3	1-5863701-3	—	—	—
Double End Lead Assemblies	6 152.4	—	—	863702-2	—	830126-2	—	—
	12 304.8	1-830126-3	—	1-863702-3	—	—	—	—
	18 457.2	1-830126-2	—	1-863702-2	—	—	—	—
	24 609.6	1-830126-6	—	1-863702-6	—	—	—	—
	36 914.4	1-830126-7	—	1-863702-7	—	—	—	—
	48 1219.2	2-830126-1	—	2-863702-1	—	—	—	—
Single End Lead Assemblies (with Positive Stop Ferrules)	6 152.4	862549-1	—	863703-1	—	—	—	—
	12 304.8	862549-4	5-862549-4	863703-4	—	—	—	—
	18 457.2	862549-6	—	863703-6	—	—	—	—
	24 609.6	862549-8	—	863703-8	—	—	—	—
	36 914.4	862549-9	5-862549-9	863703-9	—	—	—	—
Double End Lead Assemblies (with Positive Stop Ferrules)	6 152.4	862550-1	—	—	—	—	—	—
	12 304.8	862550-4	—	—	—	—	—	—
	18 457.2	862550-6	—	—	—	—	—	—
	24 609.6	862550-8	—	—	—	—	—	—
	36 914.4	862550-9	—	—	—	—	—	—
	48 1219.2	1-862550-3	—	—	—	—	—	—
Shielded Single End Lead Assemblies	6 152.4	—	—	—	—	849099-7[1]	—	—
	12 304.8	—	—	—	—	1-849099-2[1]	—	—
	18 457.2	—	—	—	—	849103-5[2]	5-849103-5[2]	—
	24 609.6	—	—	—	—	849099-9[1]	—	—
						849103-1†[2]	—	—
	36 914.41	—	—	—	—	849099-4[1]	—	—
	48 1219.2	—	—	—	—	1-849103-9[2]	—	—
Shielded Double End Lead Assemblies	18 457.2	—	—	—	—	1-849104-5	—	—
	24 609.6	—	—	—	—	849104-1	—	—
						1-849104-6*	—	—
	36 914.4	—	—	—	—	1-849104-7	6-849104-7	—
						1-849104-9*	—	—
	48 1219.2	—	—	—	—	849104-3	5-849104-3	—
RFI Shielded Single End Lead Assemblies**	12 304.8	—	—	—	—	—	—	861811-1
	18 457.2	—	—	—	—	—	—	861811-4
	24 609.6	—	—	—	—	—	—	861811-5
RFI Shielded Double End Lead Assemblies**	12 304.8	—	—	—	—	—	—	861812-1
	18 457.2	—	—	—	—	—	—	861812-4
	24 609.6	—	—	—	—	—	—	861812-3
	48 1219.2	—	—	—	—	—	—	861812-2

*Two ground leads, 6 [152.4] each.
**These RFI Shielded Lead Assemblies mate with Receptacle Part Number 861254-1.
†One ground lead, terminated end only. [1]A dim. 3.0 [76.2]. [2]A dim. 2.0 [50.8].

Catalog 1308940
Revised 8-06

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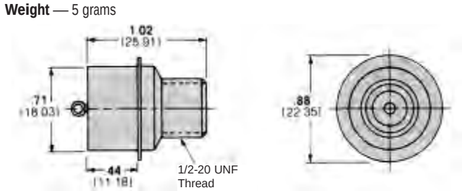
LGH Lead Assemblies and Receptacles, 20 KVDC, LGH 1 (Continued)

Glass-Epoxy Receptacles with .88 [22.35] Barrel Depth

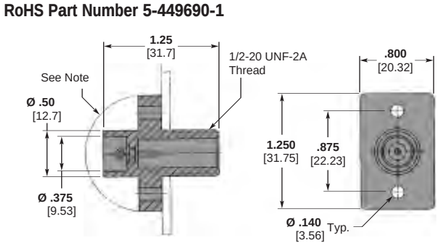
Flanged, for Hermetic Seal
Part Number 861254-1
RoHS Part Number 5-861254-1

Weight — 5 grams



These receptacles are for use with RFI Shielded Lead Assemblies shown on the preceding page.

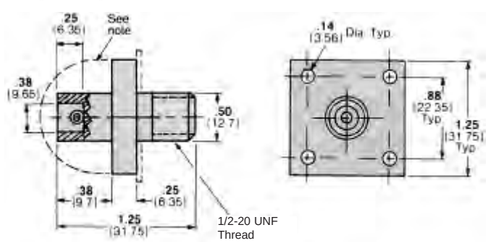
Bulkhead Receptacle
Part Number 449690-1
RoHS Part Number 5-449690-1



Note: Customer must protect back end against arc-over and breakdown if bulkhead and mounting hardware are metallic and at ground potential.

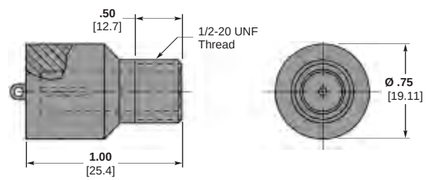
Flanged, Bolt Mount
Part Number 858827-1
RoHS Part Number 5-858827-1

Weight — 16 grams



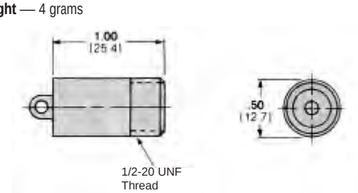
Note: If the panel or mounting hardware is at ground potential, guard against arc-over and breakdown within the area defined by this line.

Molded Receptacle
Part Number 850306-3
RoHS Part Number 5-850306-3

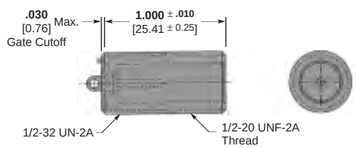


For Encapsulated Units
Part Number 834333-2
RoHS Part Number 5-834333-2

Weight — 4 grams

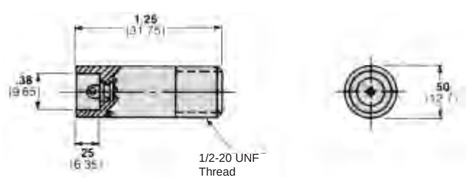


Special Receptacle
Part Number 448463-1



With Recessed Terminal for Encapsulated Units
Part Number 849610-3
RoHS Part Number 5-849610-3

Weight — 5 grams



Receptacles are available with gold plated contacts.

Catalog 1308940
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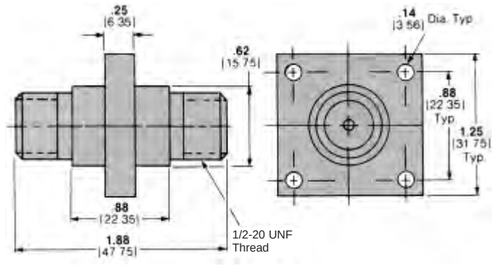
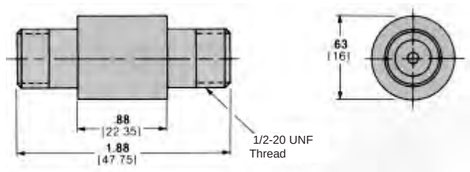
LGH Lead Assemblies and Receptacles, 20 KVDC, LGH 1 (Continued)

Glass-Epoxy Receptacles with .88 [22.35] Barrel Depth (Continued)

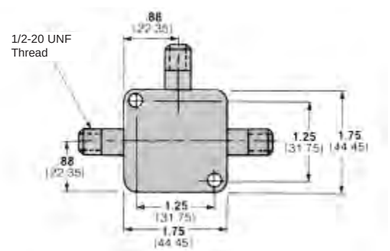
Bolt Mount, Feed-Through
Part Number 846793-1
Weight — 23 grams



Splice
Part Number 830149-1
Weight — 10 grams



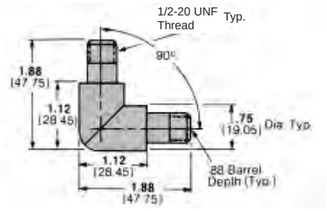
T-Shape Connector
Part Number 836674-1
RoHS Part Number 5-836674-1
Weight — 100 grams



Receptacles are available with gold plated contacts.

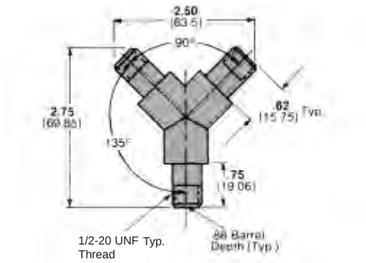
L-Shape Receptacles with .88 [22.35] Barrel Depth

Splice
Part Number 849662-1 —
Tin Plated Pins



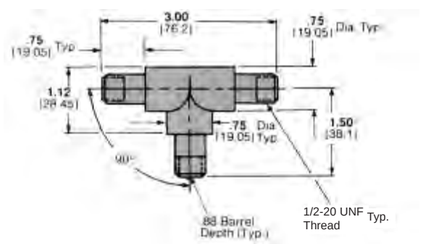
Y-Shape Receptacles with .88 [22.35] Barrel Depth

Splice
Part Number 849693-1 —
Tin Plated Pins



T-Shape Receptacles with .88 [22.35] Barrel Depth

Splice
Part Number 849671-1 —
Tin Plated Pins



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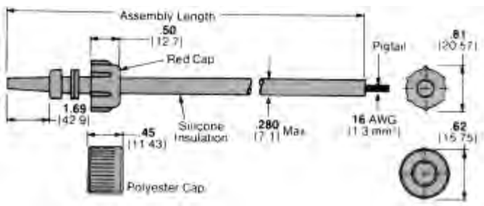
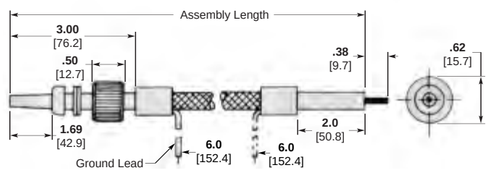
LGH Lead Assemblies and Receptacles, 25 KVDC, LGH 1 L

Single End Lead Assemblies



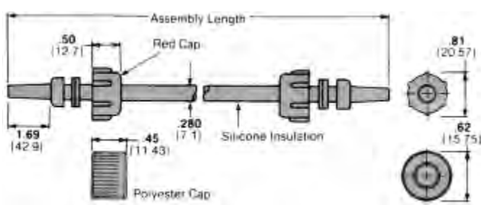
Part Number 830637

Shielded Single End Lead Assemblies



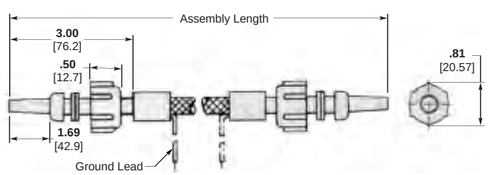
Part Number 846938

Double End Lead Assemblies



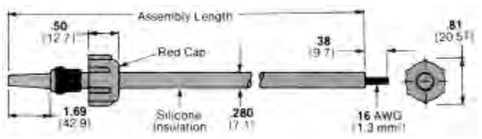
Part Number 830638

Shielded Double End Lead Assemblies



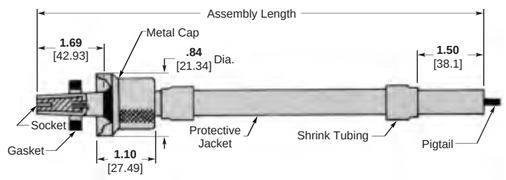
Part Number 849616

Single End Lead Assemblies with Positive Stop Ferrules



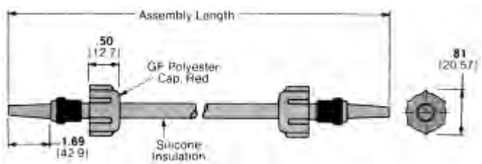
Part Number 862551

RFI Shielded Single End Lead Assemblies



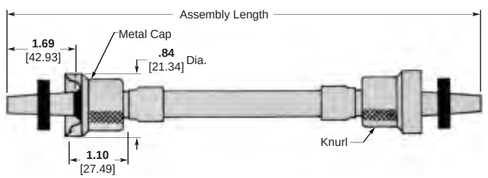
Part Number 861813

Double End Lead Assemblies with Positive Stop Ferrules



Part Number 862552

RFI Shielded Double End Lead Assemblies



Part Number 861814

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LGH Lead Assemblies and Receptacles, 25 KVDC, LGH 1 L (Continued)

Lead Assemblies (Continued)

Description	Assembly Length	Part Numbers						
		Polycarbonate Cap		Glass-Filled Polyester Cap		Glass Epoxy Cap		Metal Cap
		Non-RoHS	RoHS	Non-RoHS	RoHS	Non-RoHS	RoHS	Non-RoHS
Single End Lead Assemblies	**6** 152.4	2-830637-1	—	2-863705-1	—	—	—	—
	12 304.8	1-830637-2	1-5830637-2	1-863705-2	—	—	—	—
	18 457.2	1-830637-3	1-5830637-3	1-863705-3	—	—	—	—
	24 609.6	2-830637-8	2-5830637-8	2-863705-8	7-863705-8	—	—	—
	36 914.4	830637-5	5830637-5	863705-5	—	—	—	—
	48 1219.2	2-830637-4	2-5830637-4	2-863705-4	—	—	—	—
Double End Lead Assemblies	**6** 152.4	—	—	863706-2	—	830638-2	—	—
	12 304.8	1-830638-5	—	1-863706-5	—	—	—	—
	18 457.2	2-830638-0	—	2-863706-0	—	—	—	—
	24 609.6	830638-9	—	863706-9	—	—	—	—
	36 914.4	830638-6	—	863706-6	—	—	—	—
	48 1219.2	1-830638-9	—	1-863706-9	—	—	—	—
Single End Lead Assemblies (with Positive Stop Ferrules)	**6** 152.4	862551-1	—	863707-1	—	—	—	—
	12 304.8	862551-4	5-862551-4	863707-4	—	—	—	—
	18 457.2	862551-6	—	863707-6	—	—	—	—
	24 609.6	862551-8	—	863707-8	5-863707-8	—	—	—
	36 914.4	1-862551-5	—	1-863707-5	—	—	—	—
	48 1219.2	1-862551-2	—	1-863707-2	6-863707-2	—	—	—
Double End Lead Assemblies (with Positive Stop Ferrules)	**6** 152.4	—	—	—	—	862552-1	—	—
	12 304.8	862552-4	—	—	—	—	—	—
	18 457.2	862552-6	—	—	—	—	—	—
	24 609.6	862552-8	—	—	—	—	—	—
	36 914.4	1-862552-3	—	—	—	—	—	—
	48 1219.2	1-862552-0	—	—	—	—	—	—
Shielded Single End Lead Assemblies	**18** 457.2	—	—	—	—	2-846938-0	—	—
	24 609.6	—	—	—	—	2-846938-1	—	—
	36 914.4	—	—	—	—	1-846938-6††	—	—
	48 1219.2	—	—	—	—	846938-8†	—	—
Shielded Double End Lead Assemblies	**12** 304.8	—	—	—	—	849616-7	—	—
	18 457.2	—	—	—	—	1-849616-5	—	—
	36 914.4	—	—	—	—	1-849616-0*	—	—
	60 1524.0	—	—	—	—	2-849616-2*	7-849616-2*	—
RFI Shielded Single End Lead Assemblies**	**12** 304.8	—	—	—	—	—	—	861813-1
	24 609.6	—	—	—	—	—	—	861813-2
	48 1219.2	—	—	—	—	—	—	861813-5
RFI Shielded Double End Lead Assemblies	**12** 304.8	—	—	—	—	—	—	861814-1
	18 457.2	—	—	—	—	—	—	1-861814-9
	24 609.6	—	—	—	—	—	—	2-861814-1
	36 914.4	—	—	—	—	—	—	1-861814-5
	48 1219.9	—	—	—	—	—	—	861814-1

*Two equal length ground leads.
**These RFI Shielded Lead Assemblies mate with Receptacle Part Number 861255-1.
†One ground lead, pigtail end only.
††One ground lead, terminated end only. Pigtail End 13 [330.2].

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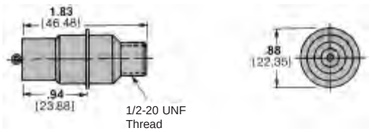
LGH Lead Assemblies and Receptacles, 25 KVDC, LGH 1 L (Continued)

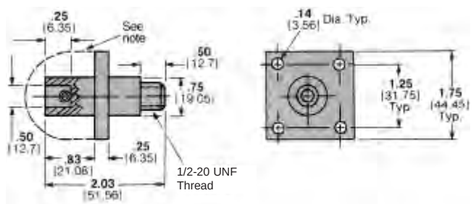
Glass-Epoxy Receptacles with 1.69 [42.93] Barrel Depth

Flanged, for Hermetic Seal
Part Number 861255-1
RoHS Part Number 5-861255-1
Weight — 17 grams

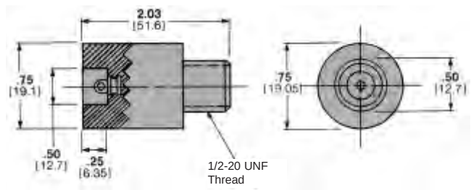


These receptacles are for use with RFI Shielded Leads shown on the preceding page.

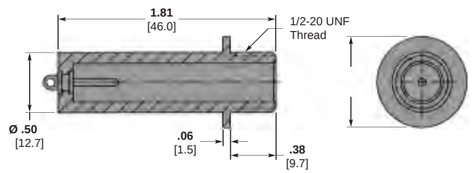
Flanged, Bolt Mount
Part Number 846814-1
RoHS Part Number 5-846814-1
Weight — 32 grams



With Recessed Terminal for Encapsulated Units
Part Number 859058-3
Weight — 16 grams

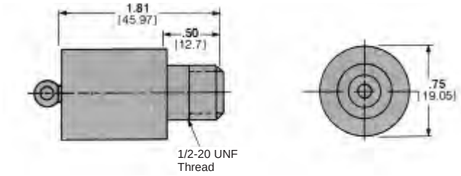


Flanged Receptacle
Part Number 449925-1
Color — Red

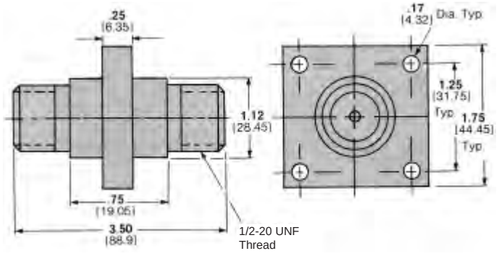


Note: If the panel or mounting hardware is at ground potential, guard against arc-over and breakdown within the area defined by this line.

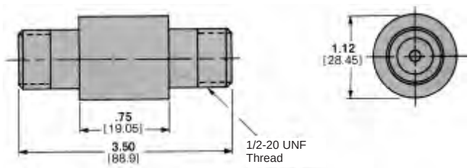
For Encapsulated Units
Part Number 858868-1
RoHS Part Number 5-858868-1
Weight — 15 grams



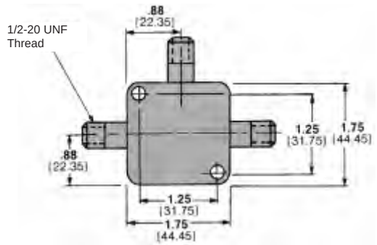
Bolt-mount, Feed-through
Part Number 858873-1
Weight — 70 grams



Splice
Part Number 858030-1
Weight — 52 grams



T-Shape Connector
Part Number 830699-1
RoHS Part Number 5-830699-1
Weight — 110 grams



Receptacles are available with gold plated contacts.

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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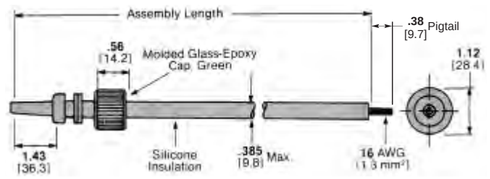
Japan: 81-44-844-8013
UK: 44-208-420-8341

LGH Lead Assemblies and Receptacles, 30 KVDC, LGH 2

Single End Lead Assemblies

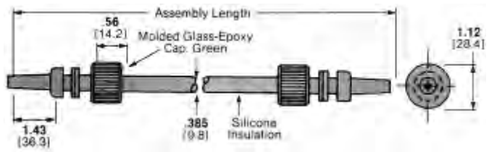


Part Number 839564

Assembly Length	Part Number
6.0 152.4	1-839564-8
12.0 304.8	839564-1 5-839564-1*
18.0 457.2	2-839564-9
24.0 609.6	839564-2 5-839564-2*
36.0 914.4	1-839564-9 6-839564-9*
48.0 1219.2	1-839564-3 6-839564-3*

*RoHS compliant Part Number.

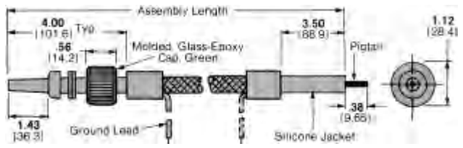
Double End Lead Assemblies



Part Number 839565

Assembly Length	Part Number
8.0 203.2	1-839565-3
12.0 304.8	839565-1
18.0 457.2	2-839565-9
24.0 609.6	839565-9
36.0 914.4	2-839565-5
48.0 1219.2	839565-6

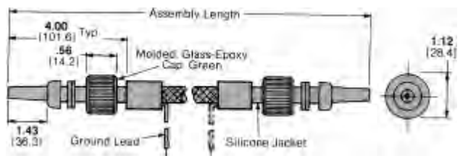
Shielded Single End Lead Assemblies



Part Number 849371

Assembly Length	Part Number
12.0 304.8	849371-2
18.0 457.2	849371-8
24.0 609.6	849371-3
48.0 1219.2	849371-9

Shielded Double End Lead Assemblies

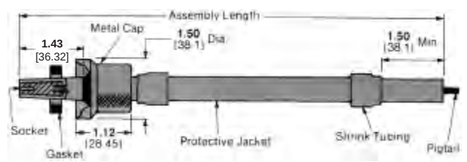


Part Number 848075

Assembly Length	Part Number
24.0 609.6	1-848075-5
36.0 914.4	1-848075-6
48.0 1219.2	2-848075-2**

**Two ground leads, 6.0 [152.4] each

RFI Shielded Single End Lead Assemblies***



Part Number 867447

Assembly Length	Part Number
12.0 304.8	867447-1
24.0 609.6	867447-2
36.0 914.4	867447-3
48.0 1219.2	867447-4

Note: Standard length leads are tabulated here. Tyco Electronics can make available numerous variations in length and material to suit almost any application. Choices of insulation materials include TEFLON, UL listed silicone and UL listed PVC. Other materials, colors, wire and configurations can be used in manufacture. For more information, consult Tyco Electronics.

*** These RFI Shielded Lead Assemblies mate with Receptacle Part Number 861256-1.

TEFLON is a trademark of E. I. DuPont de Nemours and Company.

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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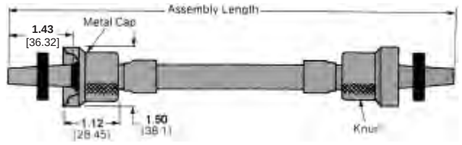
UK: 44-208-420-8341

LGH Lead Assemblies and Receptacles, 30 KVDC, LGH 2 (Continued)

RFI Shielded Double End Lead Assemblies*



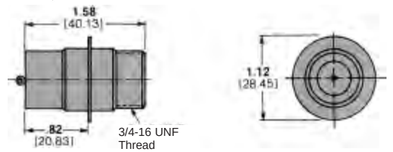
Part Number 867448

Assembly Length	Part Number
12.0 304.8	867448-1
24.0 609.6	867448-2
36.0 914.4	867448-3
48.0 1219.2	867448-4

Note: Standard length leads are tabulated here. Tyco Electronics can make available numerous variations in length and material to suit almost any application. Choices of insulation materials include TEFLON, UL listed silicone and UL listed PVC. Other materials, colors, wire and configurations can be used in manufacture. For more information, consult Tyco Electronics.
* These RFI Shielded Lead Assemblies mate with receptacle 861256-1.

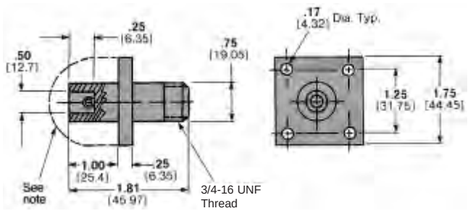
Glass-Epoxy Receptacles with 1.44 [36.58] Barrel Depth

Flanged, for Hermetic Seal
Part Number 861256-1
RoHS Part Number 5-861256-1
Weight — 20 grams



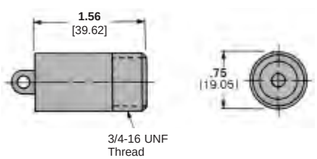
These receptacles are for use with RFI Shielded Leads shown on the preceding page.

Flanged, Bolt Mount
Part Number 850910-1
RoHS Part Number 5-850910-1
Weight — 42 grams



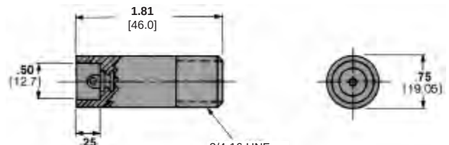
Note: If the panel or mounting hardware is at ground potential, guard against arc-over and breakdown within the area defined by this line.

For Encapsulated Units
Part Number 1-849587-1
RoHS Part Number 1-5849587-1
Weight — 17 grams

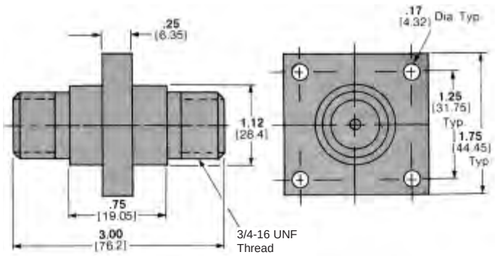


TEFLON is a trademark of E. I. DuPont de Nemours and Company.

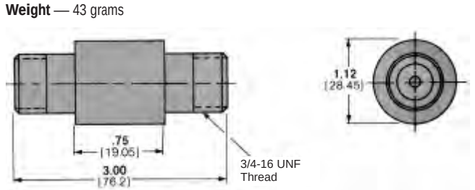
With Recessed Terminal for Encapsulated Units
Part Number 849588-1
RoHS Part Number 5-849588-1
Weight — 20 grams



Bolt-mount, Feed-through
Part Number 850735-1
Weight — 70 grams



Splice
Part Number 850555-1
Weight — 43 grams



Receptacles are available with gold plated contacts.

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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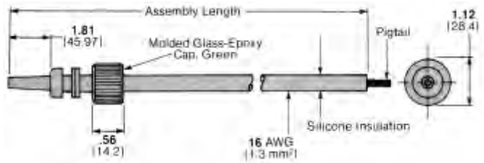
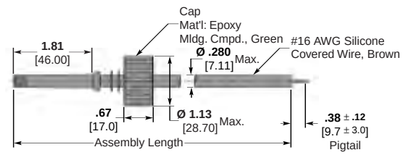
LGH Lead Assemblies and Receptacles, 40 KVDC, LGH 3

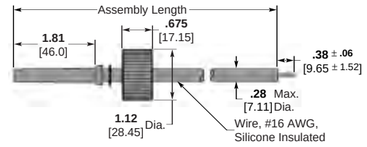
Single End Lead Assemblies



Part Number 837975



Part Number 868354

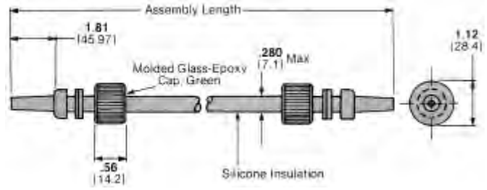


Part Number 869084

Assembly Length	Wire Color	Part Number
6.0 152.4	—	837975-6
12.0 304.8	—	837975-8
18.0 457.2	—	837975-3 5-837975-3*
24.0 609.6	—	1-837975-6 6-837975-6*
36.0 914.4	—	837975-2
48.0 1219.2	—	837975-9 5-837975-9*
60.0 ± 1.00 1524.0 ± 25.4	Brown	868354-2
18.0 ± .25 457.2 ± 6.35	Brown	869084-1
18.0 ± .25 457.2 ± 6.35	Red	869084-2
18.0 ± .25 457.2 ± 6.35	Yellow	869084-3
18.0 ± .25 457.2 ± 6.35	Green	869084-4
18.0 ± .25 457.2 ± 6.35	White	869084-5
24.0 ± .25 609.6 ± 6.35	Brown	869084-6 5-869084-6*
24.0 ± .25 609.6 ± 6.35	Yellow	869084-7 5-869084-7*
24.0 ± .25 609.6 ± 6.35	Green	869084-8 5-869084-8*
24.0 ± .25 609.6 ± 6.35	White	869084-9 5-869084-9*
36.0 ± .25 914.4 ± 6.35	Brown	1-869084-0
48.0 ± .25 1219.2 ± 6.35	Red	1-869084-1
36.0 ± .25 914.4 ± 6.35	Yellow	1-869084-2 6-869084-2*
36.0 ± .25 914.4 ± 6.35	Green	1-869084-3 6-869084-3*

*RoHS compliant Part Number.

Double End Lead Assemblies



Part Number 830649

Assembly Length	Part Number
12.0 304.8	830649-1
18.0 457.2	830649-3
24.0 609.6	1-830649-0
36.0 914.4	830649-2
48.0 1219.2	830649-6

Catalog 1308940
Revised 8-06

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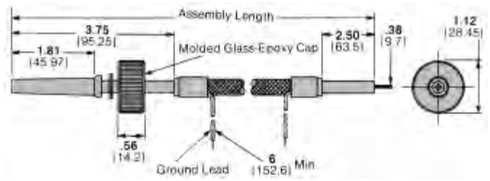
LGH Lead Assemblies and Receptacles, 40 KVDC, LGH 3 (Continued)

Shielded Single End Lead Assemblies

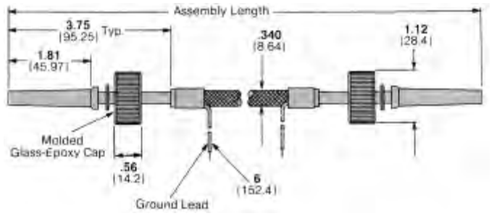


Part Number 848076

Assembly Length	Part Number
12.0 304.8	1-848076-1
18.0 457.2	848076-5
24.0 609.6	848076-1
36.0 914.4	848076-8**
48.0 1219.2	848076-3 5-848076-3*
360.0 9144.0	2-848076-1
16.25 412.8	2-848076-2 7-848076-2*
29.75 755.7	2-848076-3 7-848076-3*
20.25 514.4	2-848076-4
21.75 552.5	2-848076-5 7-848076-5*
16.25 412.8	2-848076-6 7-848076-6*

All leads are shielded and glass braid covered.
*RoHS compliant Part Number.
**Two ground leads each 7" long.

Shielded Double End Lead Assemblies



Part Number 848077

Assembly Length	Part Number
12.0 304.8	848077-4
24.0 609.6	848077-1
48.0 1219.2	848077-3 5-848077-3*

*RoHS compliant Part Number.

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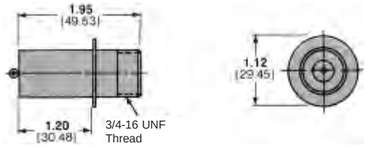
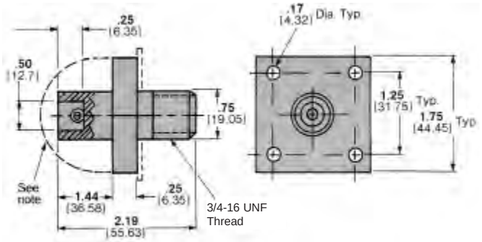
LGH Lead Assemblies and Receptacles, 40 KVDC, LGH 3 (Continued)

Glass-Epoxy Receptacles with 1.81 [45.97] Barrel Depth

Flanged, For Hermetic Seal
Part Number 861257-1
RoHS Part Number 5-861257-1
Weight — 32 grams

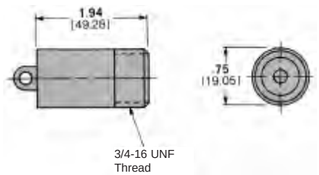


Flanged, Bolt Mount
Part Number 850911-1
RoHS Part Number 5-850911-1
Weight — 53 grams

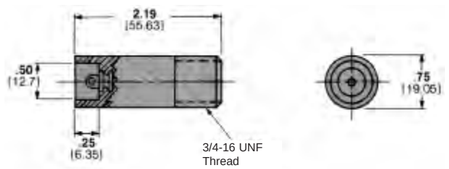


Note: If the panel or mounting hardware is at ground potential, guard against arc-over and breakdown within the area defined by this line.

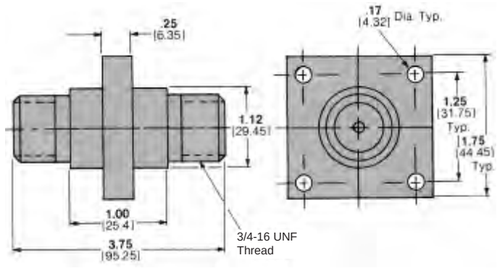
For Encapsulated Units
Part Number 849587-9
RoHS Part Number 5849587-9
Weight — 28 grams



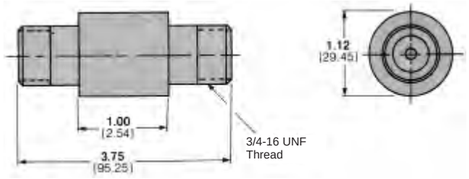
With Recessed Terminal
For Encapsulated Units
Part Number 849588-3
RoHS Part Number 5-849588-3
Weight — 34 grams



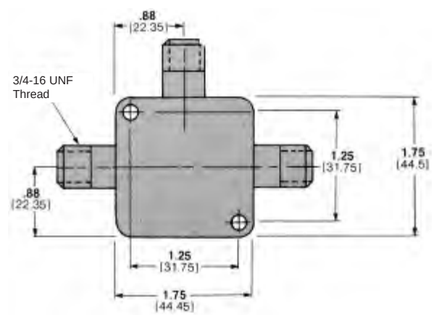
Bolt-Mount, Feed-Through
Part Number 850909-1
Weight — 91 grams



Splice
Part Number 850908-1
Weight — 65 grams



T-Shape Connector
Part Number 860708-1
RoHS Part Number 5-860708-1
Weight — 135 grams



Receptacles are available with gold plated contacts.

Catalog 1308940
Revised 8-06

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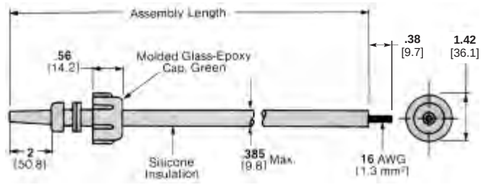
LGH Lead Assemblies and Receptacles, 50 KVDC, LGH 4

Single End Lead Assemblies

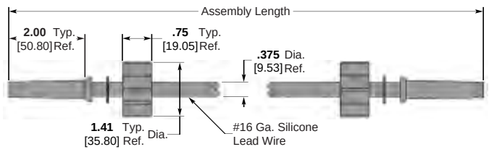


Part Number 846290

Assembly Length	Part Number
6.0 152.4	1-846290-7
12.0 304.8	846290-1 5-846290-1*
18.0 457.2	1-846290-6 6-846290-6*
24.0 609.6	846290-3 5-846290-3*
36.0 914.4	846290-6 5-846290-6*
48.0 1219.2	846290-4 5-846290-4*

*RoHS compliant Part Number.

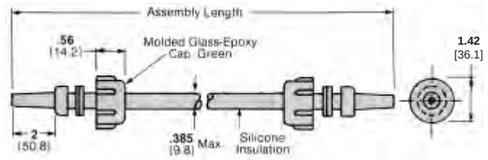
Double End Lead Assemblies (White Wire)



Part Number 445217

Assembly Length	Part Number
18.0 ± .12 457.2 ± 3.05	445217-2
24.0 ± .24 609.6 ± 6.10	445217-1

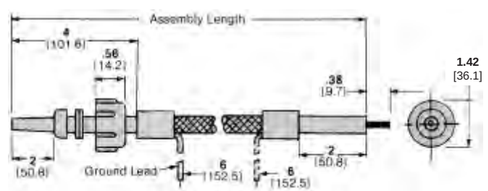
Double End Lead Assemblies



Part Number 846291

Assembly Length	Part Number
12.0 304.8	846291-1
18.0 457.2	1-846291-1
24.0 609.6	846291-3
36.0 914.4	846291-4

Shielded Single End Lead Assemblies



Part Number 848078

Assembly Length	Part Number
24.0 609.6	848078-1
36.0 914.4	2-848078-0
48.0 1219.2	848078-2

Note: Standard length leads are tabulated here. Tyco Electronics can make available numerous variations in length and material to suit almost any application. Choices of insulation materials include TEFLON, UL listed silicone and UL listed PVC. Other materials, colors, wire and configurations can be used in manufacture. For more information, consult Tyco Electronics.

TEFLON is a trademark of E. I. DuPont de Nemours and Company.

Catalog 1308940
Revised 8-06

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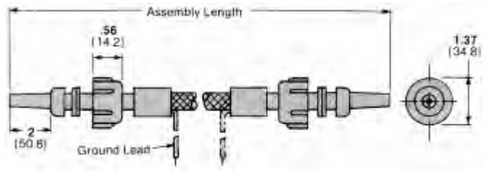
UK: 44-208-420-8341

LGH Lead Assemblies and Receptacles, 50 KVDC, LGH 4 (Continued)

Shielded Double End Lead Assemblies

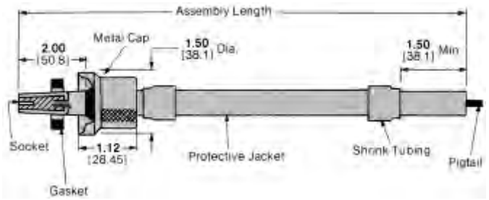


Part Number 846950

Assembly Length	Part Number
12.0 304.8	846950-6
	846950-7
48.0 1219.2	1-846950-0 6-846950-0*

*RoHS compliant Part Number.

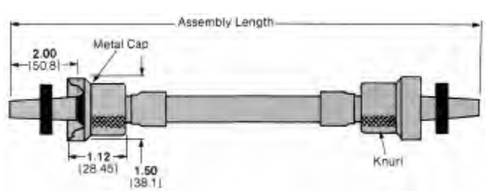
RFI Shielded Single End Lead Assemblies*



Part Number 865089

Assembly Length	Part Number
12.0 304.8	865089-4
18.0 457.2	865089-5
24.0 609.6	865089-6
36.0 914.4	865089-7
48.0 1219.2	865089-8

RFI Shielded Double End Lead Assemblies*



Part Number 865090

Assembly Length	Part Number
12.0 304.8	865090-4
18.0 457.2	865090-7
24.0 609.6	865090-1
36.0 914.4	865090-5 5-865090-5*

*RoHS compliant Part Number.

Note: Standard length leads are tabulated here. Tyco Electronics can make available numerous variations in length and material to suit almost any application. Choices of insulation materials include TEFLON, UL listed silicone and UL listed PVC. Other materials, colors, wire and configurations can be used in manufacture. For more information, consult Tyco Electronics.

* These RFI Shielded Lead Assemblies mate with receptacle 861258-1.

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Catalog 1308940
Revised 8-06

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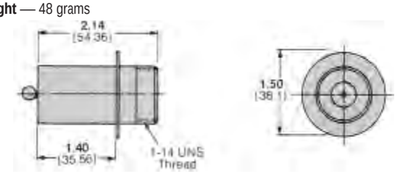
Japan: 81-44-844-8013
UK: 44-208-420-8341

LGH Lead Assemblies and Receptacles, 50 KVDC, LGH 4 (Continued)

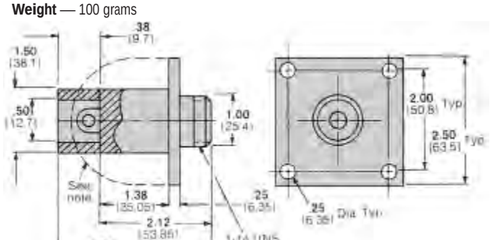
Glass-Epoxy Receptacles with 2.00 [50.8] Barrel Depth

Flanged, For Hermetic Seal
Part Number 861258-1
RoHS Part Number 5-861258-1
Weight — 48 grams



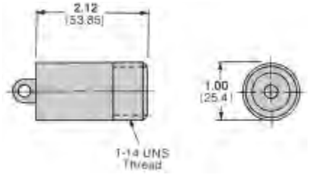
These receptacles are for use with RFI Shielded Leads shown on the preceding page.

Flanged, Bolt Mount
Part Number 850912-1
RoHS Part Number 5-850912-1
Weight — 100 grams

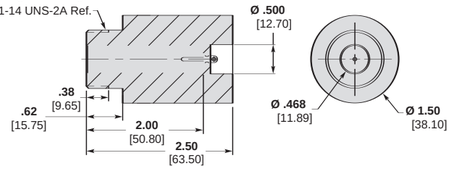


Note: If the panel or mounting hardware is at ground potential, guard against arc-over and breakdown within the area defined by this line.

For Encapsulated Units
Part Number 836567-1
RoHS Part Number 5-836567-1
Weight — 42 grams

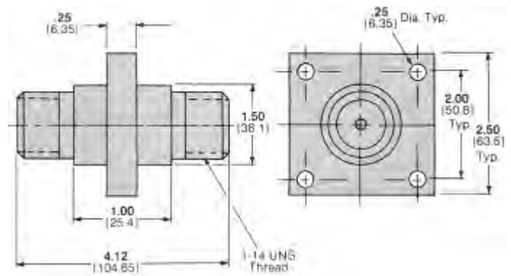


With Recessed Terminal
For Encapsulated Units
Part Number 849853-1
RoHS Part Number 5-849853-1
Weight — 55 grams



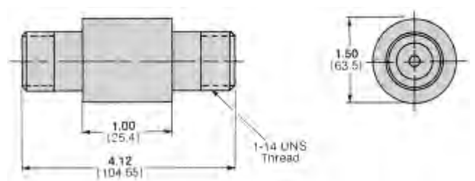
Bolt-Mount, Feed-Through

Part Number 840468-1
Weight — 137 grams



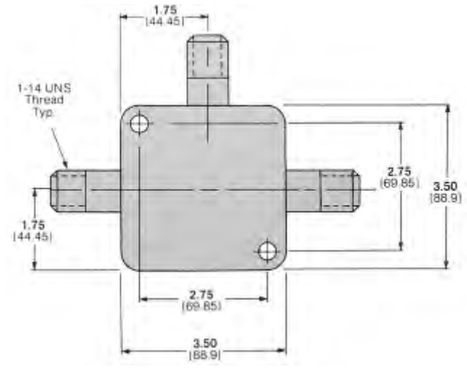
Splice

Part Number 840467-1
Weight — 105 grams



T-Shape Connector

Part Number 850554-1
RoHS Part Number 5-850554-1
Weight — 315 grams



Receptacles are available with gold plated contacts.

Catalog 1308940
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UK: 44-208-420-8341

Commercial Single Line Connectors

Product Facts

- All parts made of UL Recognized, 94V-0 rated, plastic material
- Designed to exceed minimum creepage and clearance for specified voltages per applicable international specifications
- Available with or without leads
- Maximum flexibility of application through elimination of predetermined lead lengths
- Machine applied terminations provide for lowest applied cost

The AMP family of Commercial Single Line Connectors provides solutions to high-voltage connection problems at low applied cost. The connectors are excellent for commercial application in industrial environments. Ease of application makes them suitable for large-volume production applications. Crimp, snap-in contacts can be machine terminated or hand-tool crimped.

Housings are self-extinguishing plastic, UL rated 94V-0. 10 KVDC connectors accept 20–24 AWG [0.2–0.6 mm²] wires. 20 KVDC connectors have contacts which accept 22–20 AWG [0.3–0.6 mm²] and 18–16 AWG [0.8–1.4 mm²] conductors. Connectors rated for 30 KVDC offer three choices of contact sizes to cover the 16-8 AWG [1.25–8 mm²] range.

Performance Specifications

All Series

Altitude — Sea level to 10,000 feet [3048 m]

Temperature — 59°F to +185°F [15°C to +85°C]

Product Specification — 108-36034

10 KVDC Connectors

Voltage — 10 KVDC

Current — 5 amperes, continuous, rms

Dielectric Withstanding Test — 15 KVDC for 3 minutes at sea level, 77°F [25°C]

Instruction Sheet — Part Number 867443-1

20 KVDC Connectors

Voltage — 8 KVAC, rms, 60 Hz; 20 KVDC

Current — 7.5 amperes, continuous, rms

Dielectric Withstanding Test — 12 KVAC, rms, 60 Hz for 3 minutes at sea level, 77°F [25°C]; 30 KVDC for 3 minutes at sea level, 77°F [25°C]

Instruction Sheets — Plugs — Part Number 862749-1 Receptacles — Part Number 862755-1

30 KVDC Connectors

Voltage — 12 KVAC, rms, 60 Hz; 30 KVDC

Current — 25 amperes, continuous, rms

Dielectric Withstanding Test — 16 KVAC, rms, 60 Hz for 3 minutes at sea level, 77°F [25°C]; 40 KVDC for 3 minutes at sea level, 77°F [25°C]

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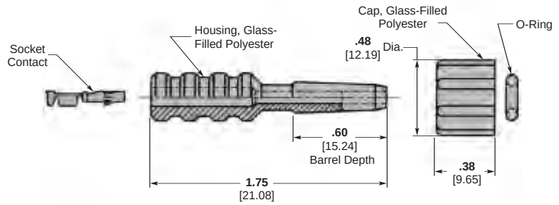
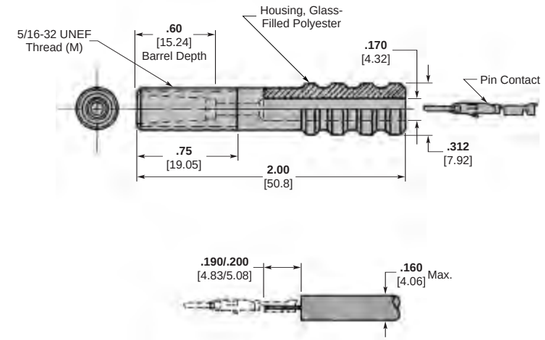
Commercial Single Line 10 KVDC Connectors

Plug Kits



Recommended Wire Preparation
(Ref. Socket Contact Part Number 203802-6)

Receptacle Kit



Recommended Wire Preparation
(Ref. Pin Contact Part Number 203816-6)

Voltage Rating	Description	Wire Size AWG	Wire Size mm²	Max. Ins. Dia.	Contact Type	Kit Part Number	Tooling Part Number Hand Tool	Tooling Part Number Extraction Tool
10 KVDC	Plug Kits*	20-24	0.2-0.6	.105 2.66	Type XI Socket	867157-1	91544-1	91038-3
				.160 4.06	Type XI Socket	867157-2	91544-1	91038-3
	Receptacle Kit*	20-24	0.2-0.6	.160 4.06	Type XI Pin	867156-1	91544-1	91038-3

* Contact included with kit.

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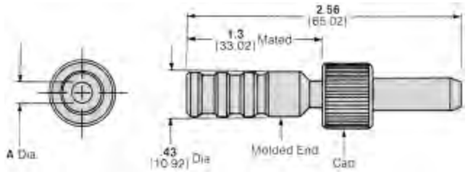
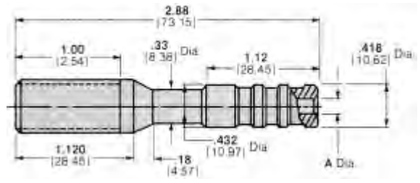
Commercial Single Line 20 KVDC Connectors

Plug Kits

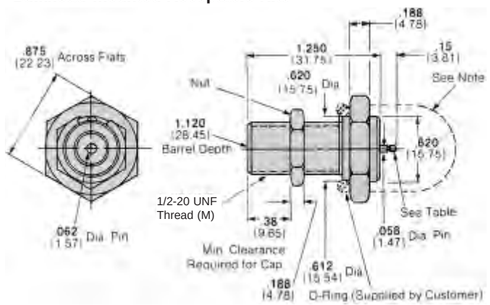


These plugs mate with receptacles shown on this page.

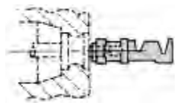
Free-Hanging Receptacle Kits



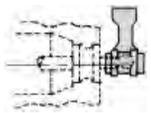
Bulkhead-Mounted Receptacle Kits



Note: If bulkhead and mounting hardware are metal at ground potential, the back end of the receptacle must be protected against arc-over and break-down.

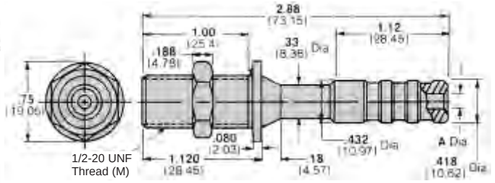


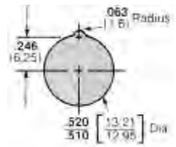
Straight Socket
Part Number 60789-1



Right-Angle Socket
Part Number 61276-2

Bulkhead-Mounted Receptacle Kits With Rear Insulation Collar





Recommended Panel Cutout for Bulkhead Mounting

Voltage Rating	Description	Wire Size AWG	Wire Size mm²	Max. Ins. Dia.	Contact Part Number	Kit Part Number	RoHS Kit Part Number	Tooling Part Number: Hand Tool	Tooling Part Number: Extraction Tool
20 KVDC	Plug Kits*	22-20	0.3-0.6	.185 4.7	66399-1	861610-1	5-861610-1	91523-1	861751-1
		18-16	0.8-1.4		66101-2	861610-3	5-861610-3	91505-1	861751-1
		—	—		none	861610-5	5-861610-5	—	861751-1
		22-20	0.3-0.6	.302 7.67	66399-1	861610-4	5-861610-4	91523-1	861751-1
		18-16	0.8-1.4		66101-2	861610-2	5-861610-2	91505-1	861751-1
		—	—		none	861610-6	—	—	861751-1
	Free-Hanging Receptacle Kits*	22-20	0.3-0.6	.185 4.7	66400-1	861753-1	5-861753-1	91523-1	861751-1
		18-16	0.8-1.4		66099-2	861753-3	—	91505-1	861751-1
		22-20	0.3-0.6	.302 7.67	66400-1	861753-4	5-861753-4	91523-1	861751-1
		18-16	0.8-1.4		66099-2	861753-2	5-861753-2	91505-1	861751-1
	Bulkhead-Mounted Receptacle Kits*	—	—	—	none	861611-1	—	—	—
		—	—	—	60789-1 (Straight)**	861611-2	—	91507-1	—
		—	—	—	61276-2 (Right-Angle)**	861611-3	—	91507-1	—
	Bulkhead-Mounted Receptacle Kits* (with Rear Insulation Collar)	22-20	0.3-0.6	.185 4.7	66400-1	862197-1	—	91523-1	861751-1
		18-16	0.8-1.4		66099-2	862197-3	—	91505-1	861751-1
		—	—		none	862197-5	—	—	861751-1
		22-20	0.3-0.6	.302 7.67	66400-1	862197-4	—	91523-1	861751-1
		18-16	0.8-1.4		66099-2	862197-2	—	91505-1	861751-1
		—	—		none	862197-6	—	—	861751-1

* Contact included with kit. ** Crimp-on Contacts.

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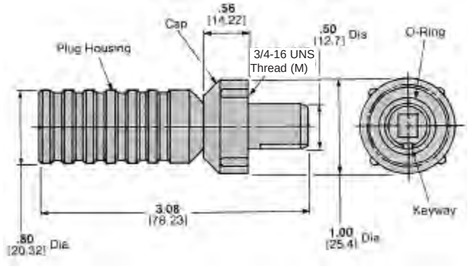
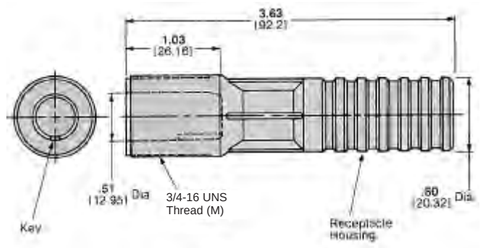
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Commercial Single Line 30 KVDC Connectors

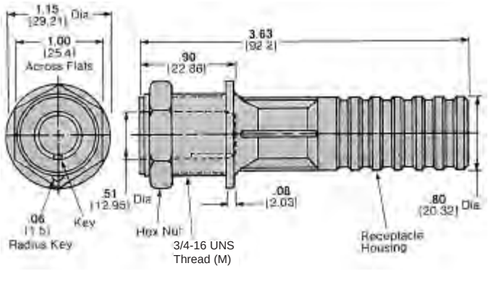
Plug Kits

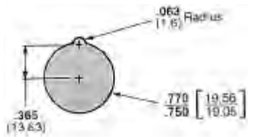


Free-Hanging Receptacle Kit



Bulkhead-Mounted Receptacle Kits With Rear Insulation Collar





Recommended Panel Cutout for Bulkhead Mounting

Voltage Rating	Description	Wire Size		Max. Ins. Dia.	Contact Part Number		Kit Part Number		Tooling Part Number	
		AWG	mm²		Non-RoHS	RoHS	Non-RoHS	RoHS	Die Set**	Extraction Tool
30 KVDC	Plug Kits*	10	5-6	.50 12.7	66741-8 (Type XII)	2-66741-1	863103-1	5-863103-1	90140-1	863558-1
		14-12	2-3		66740-8 (Type XII)	2-66740-1	863103-2	5-863103-2	90145-1	863558-1
		16	1.4		66740-8 (Type XII)	2-66740-1	863103-3	5-863103-3	90145-2	863558-1
	Free Hanging Receptacle Kits*	10	5-6	.50 12.7	66259-1 (Type XII)	66259-5	863104-1	5-863104-1	90140-1	863558-1
		16	1.4		66261-1 (Type XII)	—	863104-3	—	90145-2	863558-1
	Bulkhead-Mounted Receptacle Kits*	10	5-6	.50 12.7	66259-1 (Type XII)	66259-5	863350-1	5-863350-1	90140-1	863558-1
		14-12	2-3		66261-1 (Type XII)	66261-5	863350-2	5-863350-2	90145-1	863558-1
		16	1.4		66261-1 (Type XII)	66261-5	863350-3	5-863350-3	90145-2	863558-1

* Contact included with kit.
** Die Set for Hand Tool Part Number 69710-1 or 626 Pneumatic Tool System.

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Two-Position Connectors, 10 KVDC

Product Facts

- UL recognized 94V-0 rated glass-filled polyester housing
- Standard housing color is black — other colors available
- Operates up to 10 KVDC
- Will withstand a 15 KVDC hipot 3-minute test
- Safe handling of high voltage — deeply recessed contacts and staggered pins
- Lightweight, compact design
- Preassembled connectors furnished with attached leads of virtually any color/length combination
- Connector kits for shielded and unshielded applications include plug, receptacle and contacts
- Crimp, snap-in contacts; pin diameter .062 [1.57]
- Snap-in panel mount receptacle housings — no mounting hardware required
- Temperature range: 5°F to 185°F [-15°C to +85°C]

The AMP Rectangular Two Position LGH connector is designed for high voltage applications where quick bulkhead mounting is desired; the receptacle half has molded wings which allow it to be snapped into a mounting hole. Operating voltage is 10 KVDC; however, increased voltage ratings and ac operating capabilities are possible for specific applications.

These connectors incorporate many outstanding design features for their complete electrical, mechanical and environmental integrity. Such features include: housings made of UL recognized 94V-0 glass-filled polyester; contacts with a 10-ampere rating which will accommodate wire sizes of No. 22–20 AWG [0.3–0.6 mm²] and No. 18–16 AWG [0.8–1.4 mm²]; polarized plugs and receptacles for proper connector mating; flanged receptacles to facilitate panel and bulkhead mounting; fully protected pins in the plug half and recessed sockets in the receptacle half for safe high-voltage handling; and quick connect/disconnect capability with ramp-type detent mating. Also for maximum handling safety, the pins in the plug housing are stagger-mounted so that the ground or return line makes before and breaks after the hot line mates and unmates.

The connectors are supplied preassembled (with attached leads) and in kits for shielded or unshielded applications. Each conveniently packaged kit includes a plug, receptacle and pins and sockets that can be hand-tool or machine crimped or soldered to wire. Preassembled connectors can be furnished with leads of virtually any length and color. All are fully tested so that they are of the highest quality and meet all performance specifications.

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Two-Position Connectors, 10 KVDC (Continued)

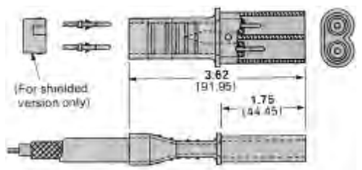
Connector Kits Shielded and Unshielded

Material:

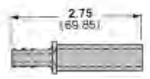
Housings and End Plate — Glass filled polyester

Contacts — Type III+, tin-plated brass

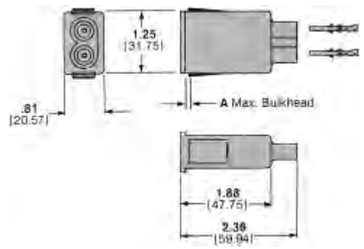
Plug Housing **Shielded**



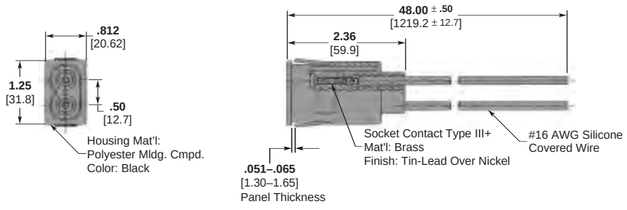
Unshielded



Receptacle Housing, Unshielded

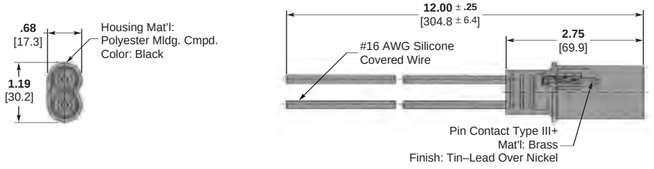


Receptacle Pre-Wired



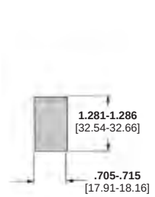
Part Number 443903-1 White Wire
Part Number 443903-2 UL 3239 Wire, Black
RoHS Part Number 5-443903-2 UL 3239 Wire, Black

Plug Pre-Wired

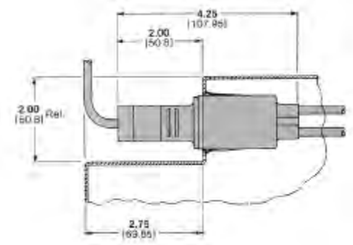


Part Number 443904-1 White Wire
Part Number 443904-2 UL 3239 Wire, Black
RoHS Part Number 5-443904-2 UL 3239 Wire, Black

Mated Dimensions



Recommended Panel Cutout



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UK: 44-208-420-8341

Two-Position Connectors, 10 KVDC (Continued)

Connector Type	Bulkhead Thickness	Wire Range (AWG)	Insulation Diameter (Max.)	Plug Part Numbers			Receptacle Part Numbers		
				Assembly	Housing	Pin (Type III+) (2 required)	Assembly	Housing	Socket (Type III+) (2 required)
Shielded	**.030** .762	18-16 [0.8-1.4]	**.125** [3.18]	862528-1 5-862528-1*	862498-1	66099-2 1-66099-5*	1-862435-2	862382-2	66101-2
			.200 [5.08]	862528-1 5-862528-1*	862498-1	66099-2 1-66099-5*	1-862435-0	862382-5	66101-2
		22-20 [0.3-0.6]	**.125** [3.18]	862528-2	862498-1	66400-1	1-862435-3	862382-2	66399-1
			.200 [5.08]	862528-2	862498-1	66400-1	1-862435-1	862382-5	66399-1
	.062 1.57	18-16 [0.8-1.4]	**.125** [3.18]	862528-1 5-862528-1*	862498-1	66099-2 1-66099-5*	862435-1	862382-1	66101-2
			.200 [5.08]	862528-1 5-862528-1*	862498-1	66099-2 1-66099-5*	862435-3 1-862435-5*	862382-4	66101-2 1-66101-9*
		22-20 [0.3-0.6]	**.125** [3.18]	862528-2	862498-1	66400-1	862435-2	862382-1	66399-1
			.200 [5.08]	862528-2	862498-1	66400-1	862435-4	862382-4	66399-1
	.090 2.29	18-16 [0.8-1.4]	**.125** [3.18]	862528-1 5-862528-1*	862498-1	66099-2 1-66099-5*	862435-8	862382-3	66101-2
			.200 [5.08]	862528-1 5-862528-1*	862498-1	66099-2 1-66099-5*	862435-6	862382-6	66101-2
		22-20 [0.3-0.6]	**.125** [3.18]	862528-2	862498-1	66400-1	862435-9	862382-3	66399-1
			.200 [5.08]	862528-2	862498-1	66400-1	862435-7	862382-6	66399-1
Unshielded	**.030** .762	18-16 [0.8-1.4]	**.125** [3.18]	862434-1	862383-1	66099-2	1-862435-2	862382-2	66101-2
			.200 [5.08]	862434-3 862434-7*	862383-2	66099-2 1-66099-5*	1-862435-0	862382-5	66101-2
		22-20 [0.3-0.6]	**.125** [3.18]	862434-2 862434-6*	862383-1	66400-1	1-862435-3	862382-2	66399-1
			.200 [5.08]	862434-4	862383-2	66400-1	1-862435-1	862382-5	66399-1
	.062 1.57	18-16 [0.8-1.4]	**.125** [3.18]	862434-1	862383-1	66099-2	862435-1	862382-1	66101-2
			.200 [5.08]	862434-3 862434-7*	862383-2	66099-2 1-66099-5*	862435-3 1-862435-5*	862382-4	66101-2 1-66101-9*
		22-20 [0.3-0.6]	**.125** [3.18]	862434-2 862434-6*	862383-1	66400-1	862435-2	862382-1	66399-1
			.200 [5.08]	862434-4	862383-2	66400-1	862435-4	862382-4	66399-1
	.090 2.29	18-16 [0.8-1.4]	**.125** [3.18]	862434-1	862383-1	66099-2	862435-8	862382-3	66101-2
			.200 [5.08]	862434-3 862434-7*	862383-2	66099-2 1-66099-5*	862435-6	862382-6	66101-2
		22-20 [0.3-0.6]	**.125** [3.18]	862434-2 862434-6*	862383-1	66400-1	862435-9	862382-3	66399-1
			.200 [5.08]	862434-4	862383-2	66400-1	862435-7	862382-6	66399-1

Notes: 1. Hand Tool Part Number 90067-2 and Extraction Tool Part Number 861751-1 are recommended for all contacts; contacts can be machine-applied.
2. Fully assembled connectors terminated on specified length leads are available. Consult Tyco Electronics.
3. Receptacle Housing Dim. (Typ.)—1.25 [31.75] L x 2.36 [59.94] W x .81 [20.57] H.

*RoHS compliant Part Number.

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Revised 8-06

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Multi-Pin Circular Commercial Connectors, 27 KVDC

Product Facts

- **Housing made of UL recognized, 94V-0 rated, self-extinguishing polyester materials**
- **Standard housing color is black — other colors available**
- **Operating and storage temperature range: -55°C to +125°C [-67°F to +257°F]**
- **Operates up to 27 KVDC**
- **Will withstand a 35 KVDC hipot test**
- **Safe handling of high-voltage — no exposed contacts**
- **Lightweight, compact design**
- **Threaded coupling provides positive, quick connect/disconnect**
- **Resilient silicone rubber "O" rings provide positive sealing for mated connectors**
- **Can be panel or bulkhead mounted or used in free-hanging applications**
- **Size 16 gold-plated contacts with 13 ampere rating accommodate wide range of wire sizes — 24-20 AWG and 18-16-14 AWG — may be hand tool or machine crimped or soldered**
- **Two shell sizes available: smaller size offers 2-, 3- and 4-contact configurations; larger diameter shell contains 6 or 7 contacts**

AMP Multi-Pin Circular Connectors provide reliable, safe, low cost means of connecting high voltages in critical applications and environments. They are lightweight, extremely compact and can be operated within a temperature range of -67°F to 257°F [-55°C to +125°C] and to 27 KVDC.

Circular multi-pin high voltage connectors are available in two basic shell sizes offering 2-, 3-, 4-, 6- and 7-contact configurations. All are equipped with threaded couplings for positive, quick connect/disconnect capability and can be panel or bulkhead mounted or used as free-hanging connectors. They incorporate many outstanding design features to assure their complete electrical, mechanical and environmental integrity.

To satisfy customer requirements, the connectors are supplied pre-assembled (with attached leads) or in kit form. Each kit includes a plug, receptacle and an appropriate number of pins and sockets that can be hand tool or machine crimped or soldered to wire. Pre-assembled connectors can be furnished with leads of virtually any length and color. All are fully potted and tested so that they are of high quality and meet performance specifications.

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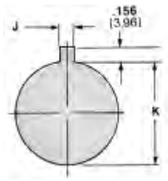
Multi-Pin Circular Commercial Connectors, 27 KVDC (Continued)



Recommended Panel Cutout for Bulkhead Mounting

Mounting Nut — maximum torque is 20 in.-lb. [.225 Nm].

Material

Housing, Cap Nut and Strain Relief — Glass-reinforced polyester

O-Ring — Silicone rubber

Contacts — Type II, gold plated per MIL-G-45204

Instruction Sheet — IS 408-9169

Hand Tools

24-20 AWG [0.2-0.6 mm²] — Part Number 58305-1

18-16 AWG [0.8-1.4 mm²] — Part Number 45098

14 AWG [2 mm²] — Part Number 45098

Extraction Tool

Part Number 861751-1

Component Parts

Pin (loose piece) —
24-20 AWG [0.2-0.6 mm²]
Part Number 200679-1
18-16 AWG [0.8-1.4 mm²]
Part Number 200681-1
14 AWG [2 mm²]
Part Number 201645-1

Socket (loose piece) —
24-20 AWG [0.2-0.6 mm²]
Part Number 201328-1
18-16 AWG [0.8-1.4 mm²]
Part Number 200333-1
14 AWG [2 mm²]
Part Number 201568-1
O-ring (package of 50)
Part Number 862798-1

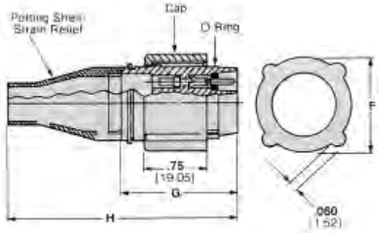
Potting shell/strain relief (2, 3 and 4 contact plugs) —
Part Number 862544-1

Potting shell/strain relief (6 and 7 contact plugs) —
Part Number 862695-1

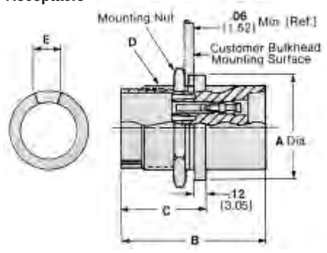
Potting shell (short, for 6 and 7 contact plugs, 1.125 [28.58] long) —
Part Number 863995-1

TEFLON is a trademark of E. I. DuPont de Nemours and Company.

Plug



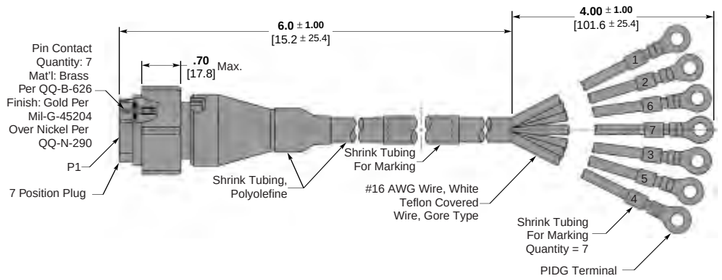
Receptacle



Dimensions

Contacts	A	B	C	D	E	F	G	H	J	K
2, 3, 4	**1.25** 31.75	**1.75** 44.45	**1.00** 25.4	**1** (28 UN) 25.4	**.125** 3.18	**1.31** 33.27	**1.38** 35.05	**2.00** 50.8	**1.56** 3.96	**1.015–1.031** 25.78–26.19
6, 7	**1.50** 38.1	**2.00** 50.8	**1.06** 26.92	**1.25** (20 UN) 31.75	**.190** 4.85	**1.56** 39.62	**1.48** 37.59	**3.30** 83.82	**.203** 5.16	**1.260–1.270** 32.00–32.26

Cable Assembly, 7 Pos. Plug



Part Number 447288-1

Note: 4-Pos. Receptacle Housing Dim. (Typ.)—1.75 [44.45] L x 1.25 [31.75] Dia.

Number of Contacts	Wire Range AWG	Wire Range mm²	Receptacle Kit (with sockets)	Plug Kit (with pins)	Plug (with Strain Relief) and Receptacle Kit
2	24-20	0.2-0.6	859529-4	860261-4	863015-1
	18-16	0.8-1.4	859529-5	860261-5	863015-2
	14*	2	859529-6	860261-6	863015-3
3	24-20	0.2-0.6	859528-4	860263-4	863016-1
	18-16	0.8-1.4	859528-5	860263-5	863016-2
	14*	2	859528-6	860263-6	863016-3
4	24-20	0.2-0.6	859526-4	860265-4	863017-1
	18-16	0.8-1.4	859526-5	860265-5	863017-2
	14*	2	859526-6	860265-6	863017-3
6	24-20	0.2-0.6	859527-4	860267-4	863018-1
	18-16	0.8-1.4	859527-5	860267-5	863018-2
	14*	2	859527-6	860267-6	863018-3
7	24-20	0.2-0.6	861647-7	861648-7	863019-1
	18-16	0.8-1.4	861647-8	861648-8	863019-2
	14*	2	861647-9	861648-9	863019-3

Note: Contacts are packaged separately within the connector kit for shipment. Connectors are available with leads attached.
*Use Type II, Size 16 contacts, with a wire barrel sized to accept 14 AWG conductor.

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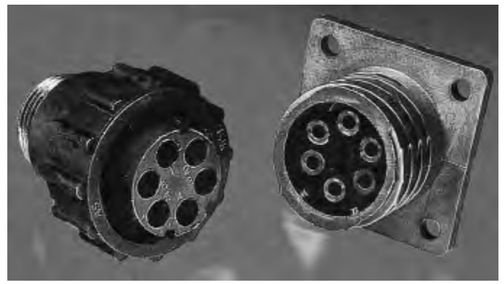
Multi-Line High Voltage Connectors

Product Facts

- **User configurable high voltage connector**
- **Cost effective, 6-position**
- **Operating voltage: 5,000 volts DC**
- **Operating current: 3 Amps max.**
- **Quick-turn threaded coupling**
- **Accepts Type XI size 20 contacts**



A cost-effective approach in a plastic circular connector with crimp snap-in contacts. Wherever high voltage is required, this user friendly configuration can operate up to 5,000 volts DC.

This 6 position connector can be selectively loaded for various high voltage applications such as:

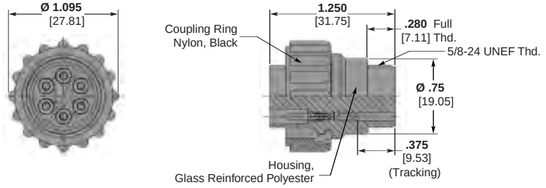
- Materials Handling Equipment
- Medical Equipment
- Computer and Peripheral Equipment
- HV Power Supplies
- Automated Manufacturing Equipment
- Test Equipment

This LGH connector offers an economical solution for your high voltage requirements. This quick-turn coupling connector will also accommodate standard Tyco Electronics Circular Plastic Connector backshell accessories.

Material and Mechanical Characteristics

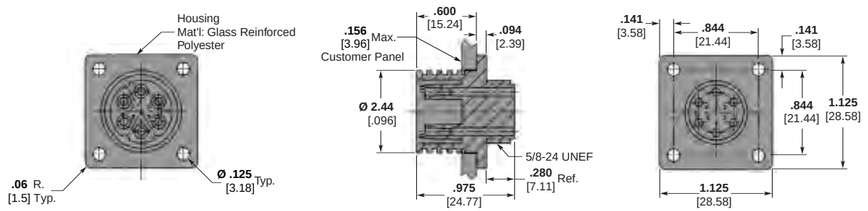
Housings — UL 94V-0

Operating Temperature — -5°F to 185°F [-15° C to 85°C]



Part Number 867534-1

Accepts Pin Contact
Part Number 203816-6 for 20-24 AWG wire
(Not Supplied with Plug Kit)



Part Number 867535-1

Accepts Socket Contact
Part Number 203802-6 for 20-24 AWG wire
(Not Supplied with Receptacle)

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5-Pin, Metal-Shell Circular Connectors, Military-Type

Product Facts

- **Field installable and repairable**
- **Environmentally sealed**
- **Bayonet locking cap**
- **Single dot polarization helps prevent mismating**
- **Accepts any MIL-C-38999 backshell arrangement**
- **Three insert polarizations available**
- **Rated for 10 KVDC and 10 amps**
- **Withstands 15 KVDC hipot test**
- **Safe handling of high voltage — no exposed contacts**
- **Lightweight, compact design**
- **Size 16 gold plated contacts with 10 ampere rating accommodates wire range 24-16 AWG [0.2-1.4 mm²] and may be hand tool crimped, machine crimped, or soldered**
- **Can be panel or bulkhead mounted or used in free-hanging applications**
- **Preassembled connectors furnished with attached leads of virtually any color/length combination**
- **Removable inserts interchangeable between shell halves**
- **Positions numbered for easy circuit identification**
- **Backshell available for bundle shielding**
- **Operating and storage temperature range: -67°F to +257°F [-55°C to +125°C]**

Material and Finish

Shells — Aluminum chromate coating over nickel plating

Inserts — Glass reinforced polyester

Bayonet Coupling Rings — Glass reinforced polyester

O Ring Seals — Silicone rubber

Pin and Socket Contacts — Brass; .00050 [0.013] min. gold plated per MIL-G-45204

Backshell — Brass; plated chromate over nickel

AMP 5-Pin Metal Shell Connectors are designed for high voltage circuits, especially in critical applications and harsh environments, such as shipboard applications. The connector is exceptionally lightweight and compact and can be used within a temperature range of -67°F to +257°F [-55°C to +125°C].

The connector incorporates many features for electrical, mechanical and environmental integrity. Such features include: flame retardant, glass-filled thermoplastic polyester inserts; two sets of gold plated size 16 contacts which have a 10 ampere rating and will accommodate a wire size range of 24–16 AWG [0.2–1.4mm²]; three insert polarizations; full protection of pins and sockets to permit safer high voltage handling; and resilient seals inside each pin shroud which provide positive sealing for the mated connector.

Tyco Electronics supplies the connector either preassembled or in kit form. Each conveniently packaged kit includes an appropriate number of pins and sockets that can be hand tool crimped, machine crimped or soldered to wire. Pre-assembled connectors can be furnished with leads of virtually any length. All are tested for highest quality and meets applicable performance specifications.

Kits

Description	Part Numbers			
	Kit with Contacts for 16 AWG [1.25-1.4 mm²]		Kit with Contacts for 20 AWG [0.5-0.6 mm²]	
	Non-RoHS	RoHS	Non-RoHS	RoHS
Receptacle, Flange-Mount with Socket Contacts	863754-1	5-863754-1	864062-1	5-864062-1
Plug with Pin Contacts	863753-1	—	864063-1	5-864063-1
Receptacle, Flange-Mount with Pin Contacts	863755-1	5-863755-1	864064-1	—
Plug with Socket Contacts	863752-1	5-863752-1	864065-1	—

Note: Backshell is not included with any kits; any MIL-C-38999 backshell may be used or AMP Part Number 864639-2.

Tooling

Tool Application	Manufacturer's Name	Part Numbers
Insert Removal	AMP	864437-1
Contact Removal	AMP	305183
Crimp Tool Contact Positioner	Daniels	TP-581
Crimp Tool	Daniels	M22520/1-01
Instruction Sheet	AMP	864886

For more information on 5-Pin Metal Shell Circular Connector to meet your specific requirements, consult Tyco Electronics.

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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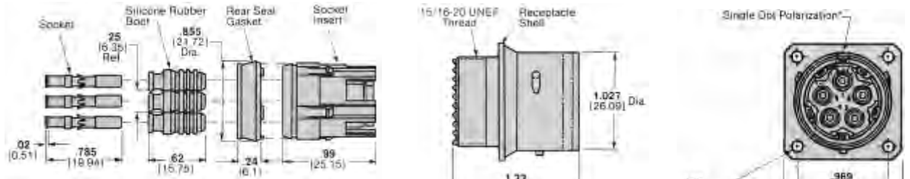
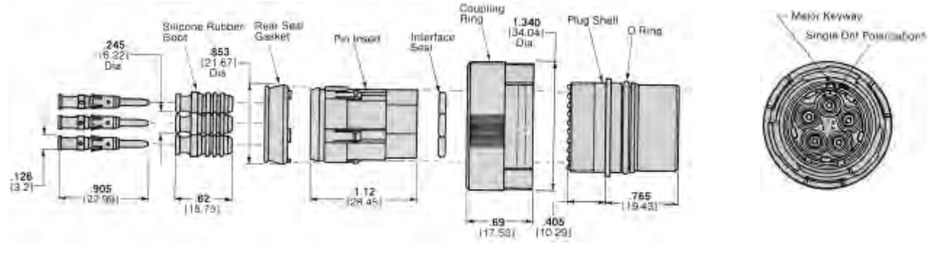
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

5-Pin, Metal-Shell Circular Connectors, Military-Type (Continued)

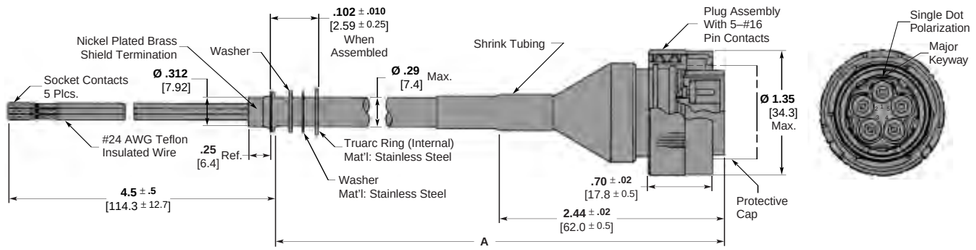
Receptacle



Plug



Shielded Cable Assembly



Dim. A	Part Number
12.60 ± .25 320.0 ± 6.4	864019-1
50.00 + 3.00 – 0.00 1270.0 + 76.2 – 0.0	864019-2
17.50 ± .50 444.5 ± 12.7	864019-3

Contact No.	Wire Color
1	Yellow
2	Black
3	Yellow
4	Brown
5	Red

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7-Pin, Metal-Shell Circular Connectors, Military-Type

Product Facts

- 15 KVDC operating voltage, up to 70,000 feet [21,336 m]
- Current carrying capacity — 7.5 A continuous per line for 20 AWG wire
- Metal shell available for complete shielding and rugged operation
- Molded-in Size 20 contacts are fully shrouded
- Molded glass epoxy and silicone rubber interface for positive sealing
- Polarized plug and receptacle housings help prevent mismating
- Designed to meet applicable specifications
- Hermetically sealed receptacles available
- Operating temperature range from -67°F to +257°F [-55°C to +125°C]
- Moisture resistant
- Corona resistant

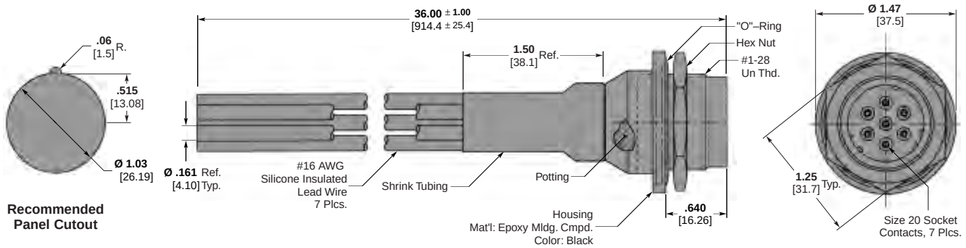
Product Specification — 108-36030

AMP 7-Pin Miniature Circular Connectors, when properly assembled and mated, safely carry 15 KVDC (pin-to-pin and pin-to-ground) through a full range of military environmental requirements. The connectors can carry a continuous current of 7.5 amperes per line when terminated to 20 AWG wire. The receptacle is hermetic and can be mounted with an O-ring flange or solder flange for various industrial and military applications.

This connector family features size 20 gold-plated pins and sockets which are fully shrouded for safe handling, polarized housings to assure proper mating, and a molded glass epoxy and silicone rubber interface for positive sealing.

AMP 7-Pin Miniature Circular Connectors are available in a wide variety of configurations, including a metal shell version for RFI shielding and rugged handling.

Receptacle Lead Assembly



Part Number 867862-1
RoHS Part Number 5-867862-1

Catalog 1308940
Revised 8-06

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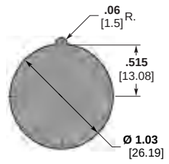
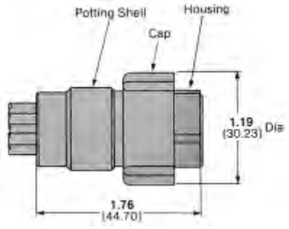
7-Pin, Metal-Shell Circular Connectors, Military-Type (Continued)

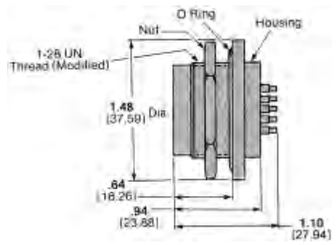
Plastic Shell



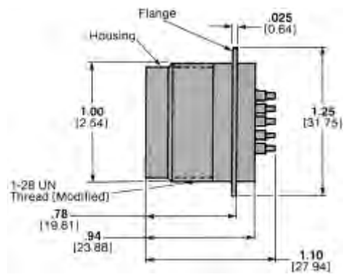
Panel Cutout for Receptacles



Potted Plug Kit
Part Number 865594-1

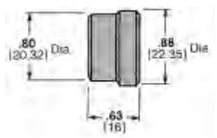


Potted Receptacle
Part Number 861999-1 (Non-hermetic)
Part Number 862794-1 (Hermetic Seal)

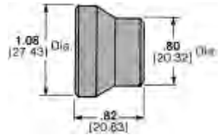


Receptacle for Hermetic Seal,
Solder-Flange-Mount
Part Number 862005-1

Potting Shells

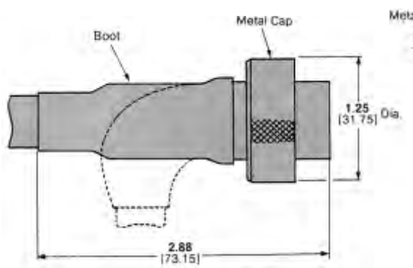


Plug Potting Shell
Part Number 862544-1

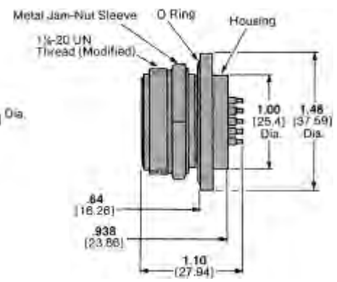


Receptacle Potting Shell
Part Number 862256-1

Metal Shell



Plug Kit
Part Number 865656-1 (Straight Boot)
Part Number 865656-2 (Right-Angle Boot)
Part Number 865656-3 (No Boot)



Receptacle
Part Number 862004-1 (Non-hermetic)
Part Number 866182-1 (Hermetic Seal)

Catalog 1308940
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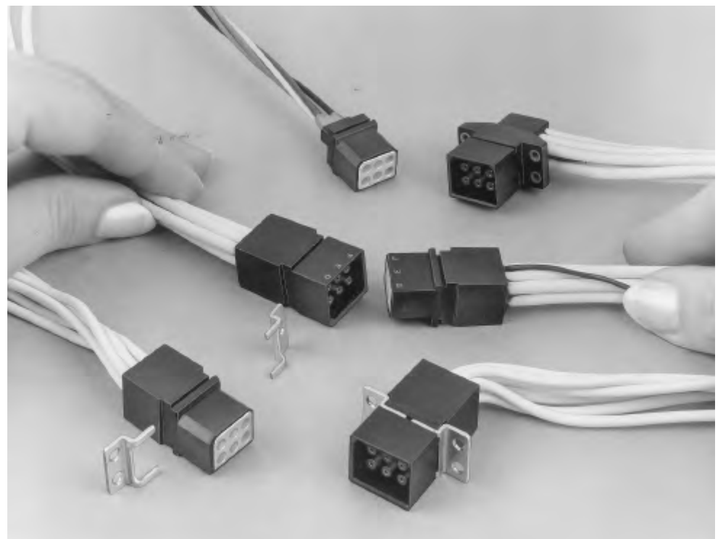
6-Pin, Subminiature Rectangular Connectors



Product Facts

- **Extremely lightweight — total weight of mated pair is less than 14 grams**
- **Compact design — requires less than .6 square inch [387 mm²] of mounting surface; occupies less than .750 cubic inch [.229 mm³] of volume per mated pair**
- **Quick connect/disconnect design**
- **Resilient silicone rubber insert in plug half provides positive interfacial seal for mated connector**
- **Withstands 10 KVDC hipot test**
- **Housing styles for potting, chassis slot (channel) mounting, panel mounting and free-hanging applications**
- **Lettered positions for easy circuit identification**
- **Size 22, gold plated contacts with 5 ampere rating accommodate 28 to 22 AWG [0.08 to 0.4 mm²] wire**
- **Connectors pre-assembled with leads, fully potted and tested**
- **6 KVDC at 70,000 ft. [21,336m]; -67°F to +257°F [-55°C to +125°C]operating storage temperature**
- **Flame retardant, glass reinforced thermoplastic polyester housings standard color, black**

Mounting Brackets, Slip-on (For Commercial or Military Assemblies with slotted housings)

Part Number 861214-2 —
Two, .106 [2.69] Dia. Mounting Holes

Part Number 861215-2 —
One, .106 [2.69] Dia. Mounting Hole

AMP Subminiature High Voltage Connectors are designed for use in electronic high voltage circuits, especially in critical applications and harsh environments. It is exceptionally lightweight and compact. Can be operated within a temperature range of -67°F to 257°F [-55°C to +125°C] and up to 6 KVDC at an altitude of 70,000 feet [21,336 meters].

The connector incorporates many features for electrical, mechanical and environmental integrity.

Tyco Electronics supplies the Subminiature High Voltage Connector in a 6-position size, pre-assembled with silicone or TEFLON insulation. For optimum versatility, connector housings are available for 180° (straight) or 90° (right-angle) rear-entry wiring and in a choice of styles for potting, chassis-slot (channel) mounting, panel mounting and free-hanging applications. Panel-mounted versions can be furnished either with separate “slip-on” metal mounting brackets or with a molded mounting flange that is an integral part of the connector. All connector styles are fully potted (and have been tested for environmental integrity and reliability of performance).

Material and Finish

Housings and Potting Shells — Thermoplastic polyester, glass-filled, flame retardant; standard color, black

Contacts — Beryllium copper; plated .000030 [0.00076] min. gold per MIL-G-45204, over .000030 [0.00076] min. nickel per QQ-N-290

Mounting Brackets — Carbon steel, nickel plated

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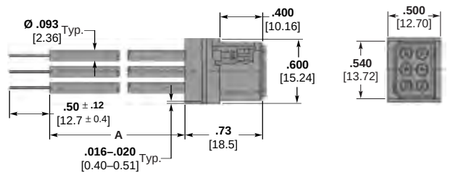
6-Pin, Subminiature Rectangular Connectors (Continued)

Plug Assemblies and Kits

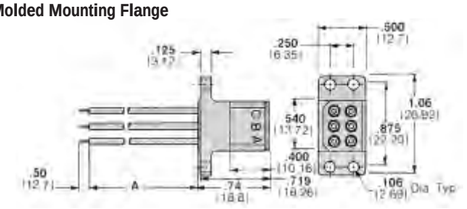
Flying Leads

Assembly A Lead Length	Assembly with 22 AWG Silicone
15.00 ± .50 381.0 ± 12.7	867622-1
24.00 ± .50 609.6 ± 12.7	867622-2



Pin No.	Wire Color
A	Yellow
B	Red
C	Brown
D	Blue
E	Green
F	Black

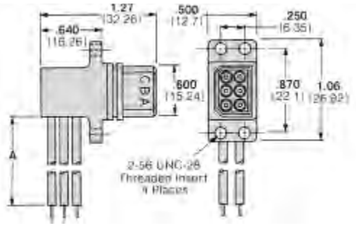
Molded Mounting Flange



Assembly Lead Length A	Assembly with 22 AWG Silicone	Assembly with 24 AWG TEFLON
12 304.8	867465-1 5-867465-1*	867464-1
24 609.6	867465-2 5-867465-2*	867464-2
36 914.4	867465-3 5-867465-3*	867464-3 5-867464-3*

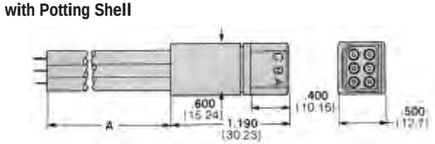
*RoHS compliant Part Number.

Right-Angle



Kit Part Number	Assembly Lead Length A	Assembly with 22 AWG Silicone	Assembly with 24 AWG TEFLON
448479-1 Kit with Flange	**12** 304.8	867467-1	867466-1
	24 609.6	867467-2	867466-2
	36 914.4	867467-3	867466-3

Slotted Version with Potting Shell



Kit Part Number	Assembly Lead Length A	Assembly with 22 AWG Silicone	Assembly with 24 AWG TEFLON
867482-1	**12** 304.8	867463-1	867462-1
	24 609.6	867463-2 5-867463-2*	867462-2
	36 914.4	867463-3	867462-3

*RoHS compliant Part Number.

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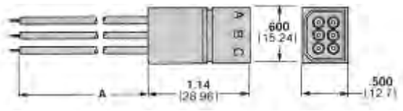
6-Pin, Subminiature Rectangular Connectors (Continued)

Receptacle Assemblies and Kits

Slotted



Kit Part Number	Assembly Lead Length A	Assembly with 22 AWG Silicone	Assembly with 24 AWG TEFLON
867483-1	**12** 304.8	867469-1	867468-1 5-867468-1*
	24 609.6	867469-2	867468-2
	36 914.4	867469-3	867468-3 5-867468-3*

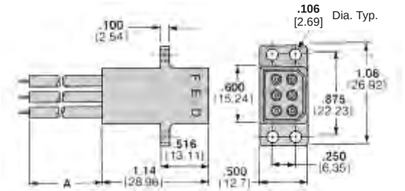
*RoHS compliant Part Number.

Color Coding

Leads are color coded as tabulated here. Other color leads can be used in custom assemblies.

Pin No.	Wire Color
A	Brown
B	Red
C	Green
D	Blue
E	Black
F	White

Molded Mounting Flange

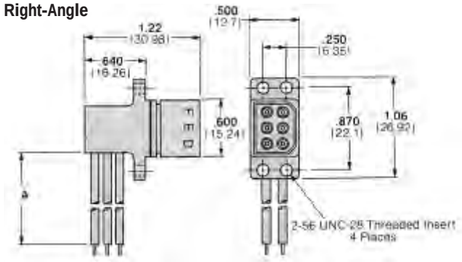


Flange can be placed elsewhere on housing. Consult Tyco Electronics.

Kit Part Number	Assembly Lead Length A	Assembly with 22 AWG Silicone	Assembly with 24 AWG TEFLON
867484-1	**12** 304.8	867473-1	867472-1 5-867472-1*
	24 609.6	867473-2 5-867473-2*	867472-2 5-867472-2*
	36 914.4	867473-3	867472-3

*RoHS compliant Part Number.

Right-Angle



Kit Part Number	Assembly Lead Length A	Assembly with 22 AWG Silicone
866047-1	**12** 304.8	867477-1
	24 609.6	867477-2
	36 914.4	867477-3

Color Coding

Leads are color coded as tabulated here. Other color leads can be used in custom assemblies.

Pin No.	Wire Color
A	Brown
B	Red
C	Green
D	Blue
E	Black
F	White

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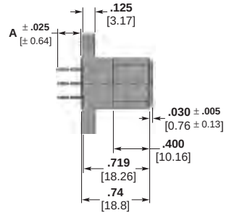
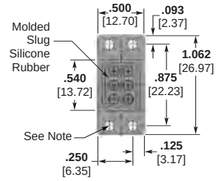
6-Pin, Subminiature Rectangular Connectors (Continued)

Plug Assemblies

Posts Dia. .025 [0.64]

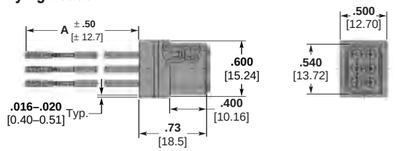




Dim. A	Part Number
.245 6.22	449810-1
.245 6.22	449810-2
.750 19.05	449810-3

Note: 449810-1 Dia. .106 [2.69], -2 and -3 inserts are #2-56.

Plug Assemblies with Flying Leads

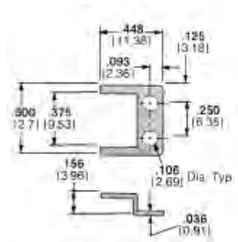


Dim. A	Lead Color	Letter Cavity	Part Number
4.00 101.6	Yellow	A	868021-1 5-868021-1*
4.00 101.6	Red	B	
4.00 101.6	Brown	C	
4.00 101.6	Blue	D	
4.00 101.6	Green	E	
13.00 330.2	Black	F	

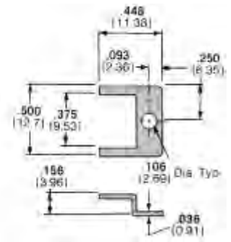
*RoHS compliant Part Number.

Mounting Brackets

These brackets are for mounting commercial or military assemblies with slotted housings. They are not included in connector kits, nor with assemblies, and they must be ordered separately.

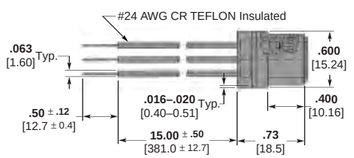


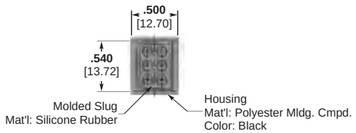
Part Number 861214-2



Part Number 861215-2

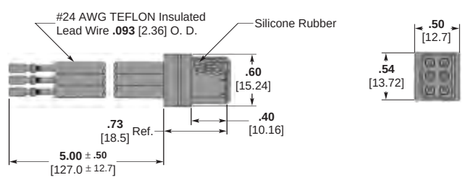
Flying Leads





Part Number 867761-1

Pin No.	Wire Color
A	Yellow
B	Red
C	Brown
D	Blue
E	Green
F	Black



Part Number 445181-1

Socket No.	Wire Color
A	Black
B	Red
C	Brown
D	No Lead
E	Yellow
F	Green

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Catalog 1308940
Revised 8-06

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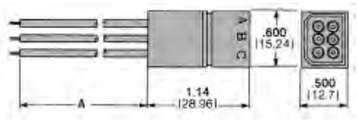
Japan: 81-44-844-8013
UK: 44-208-420-8341

6-Pin, Subminiature Rectangular Connectors (Continued)

Receptacle Assemblies

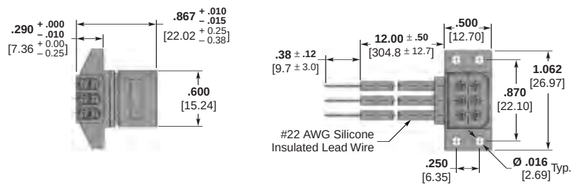
Slotted



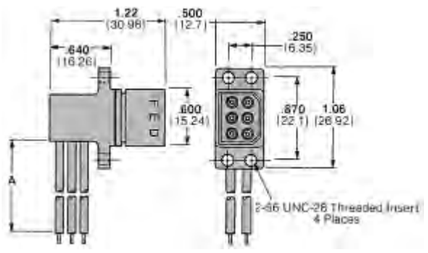
Assembly Lead Length A	Assembly with 22 AWG Silicone	Assembly with 24 AWG TEFLON
12 304.8	867471-1 5-867471-1*	867470-1
24 609.6	867471-2	867470-2
36 914.4	867471-3	867470-3

*RoHS compliant Part Number.

Right-Angle



Part Number 443832-1
RoHS Part Number 5-443832-1



Assembly Lead Length A	Assembly with 22 AWG Silicone	Assembly with 24 AWG TEFLON
12 304.8	867479-1 5-867479-1*	867478-1
24 609.6	867479-2 5-867479-2*	867478-2
36 914.4	867479-3	867478-3

*RoHS compliant Part Number.

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LGH Micro-Miniature Connectors and Cable Assemblies

Product Facts

- LGH leads and receptacles find wide application where high voltage is used in harsh environments
- Small high voltage power supplies
- Back lighting for LCD flat panel displays
- High voltage for flat panel FED (Field Emissive Displays)
- Small CRT's (Cathode Ray Tubes)
- Commercial and Military Avionics
- A series of miniature high voltage connectors for applications where space is limited
- HV performance in a small lightweight connector
- Operating voltages up to 12 KVDC
- Operation to 100,000 ft. [30,480 m] altitude
- Lead wire remains flexible to - 67°F [-55°C]
- Color coded for easy identification
- Leads are available with silicone, TEFLON or silicone coated TEFLON
- Connector is fully insulated
- Connectors are available with 26 thru 22 AWG wire

Materials

Molded silicone rubber

Thermoset and thermoplastic polymers

Socket contacts size 22 per MIL-C-39029 size 22

Electrical Characteristics

Operating Voltage — up to 12 KVDC

Current Rating — 5 amps max. with 22 GA wire

Mechanical Characteristics

Small size outside Dia. of .135 [3.43]

Leads are preassembled

Quick disconnect, push/pull mating

Operating Temperature — -67°F to +257°F [-55°C to +125°C]

Approvals

Meets applicable military specifications

AMP product specifications listed below

Technical Documents

135 Series (.135 [3.43] Dia.) — 108-1788

170 Series (.179 [4.55] Dia.) — 108-1802

240 Series (.240 [6.10] Dia.) — 108-1853

Surface Mount/Plug Assembly — 108-1880

1, 2, and 3 Position — 108-1812

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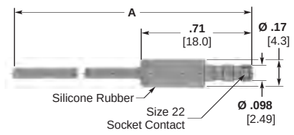
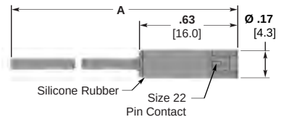
LGH Micro-Miniature Connectors and Cable Assemblies (Continued)

170 Series

Product Specification — 108-1802
Operating Voltage — 6 KVDC
Test Voltage — 10 KVDC at 10,000 feet [3,046 m] and -67°F to +257°F [-55°C to +125°C]
Durability — 50 matings and unmating



Plug

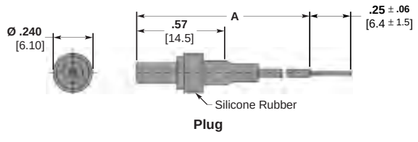


Receptacle

Wire Description	Wire Color	Plug		Receptacle	
		Dim. A	Part Number	Dim. A	Part Number
24 AWG Silicone Coated TEFLON	Red	**12.5 ± .12** 317.5 ± 3.0	1218147-1	**12.0 ± .12** 304.8 ± 3.0	1218148-1
				48.0 ± .48 1219.2 ± 12.2	1218148-2
24 AWG Corona Resistant TEFLON	Yellow	**18.5 ± .12** 469.9 ± 3.0	1218149-1	**18.5 ± .12** 469.9 ± 3.0	1218150-1

240 Series

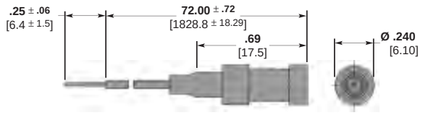
Product Specification — 108-1853
Operating Voltage — 12 KVDC
Test Voltage — 18 KVDC at sea level 70,000 feet [21,336 m] and -67°F to +257°F [-55°C to +125°C]



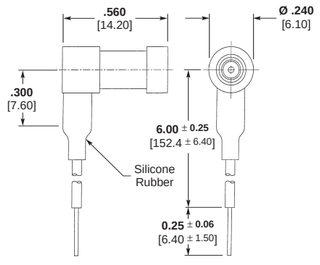
Plug

Dim. A	Plug Part Number
7.0 ± .025 177.8 ± 6.4	448660-1 (straight) 5-448660-1*
72.0 ± 1.0 1828.8 ± 25.4	448660-2 (straight)

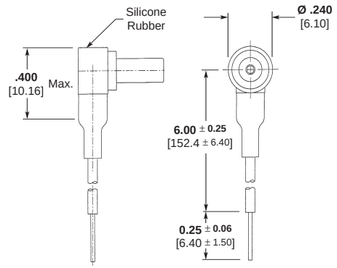
*RoHS compliant Part Number.



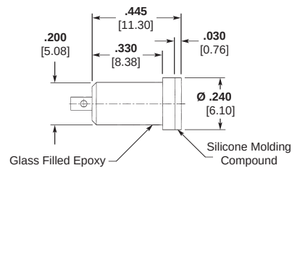
Receptacle
Part Number 448658-1
RoHS Part Number 5-448658-1



Receptacle (Right-Angle)
Part Number 448659-1



Plug (Right-Angle)
Part Number 448661-1



Receptacle Housing
Part Number 1484882-1

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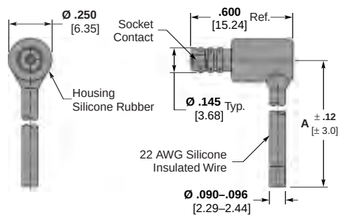
LGH Micro-Miniature Connectors and Cable Assemblies (Continued)

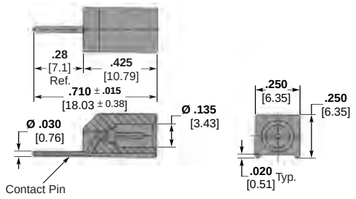
Surface Mount/ Plug Assembly

Product Specification — 108-1880
Operating Voltage — 7 KVDC
Test Voltage — 13 KVDC at 20,000 feet [6,096 m] at -13°F to +167°F [-25°C to +75°C] and 3 KVDC at 70,000 feet [21,336 m] at -67°F and 257°F [-55°C and 125°C]

Dim. A	Part Number
10.0 254.0	1218134-1
6.63 168.4	1218134-2
8.0 203.2	1218134-3
4.0 101.6	1218134-4



Plug
Right-Angle Silicone



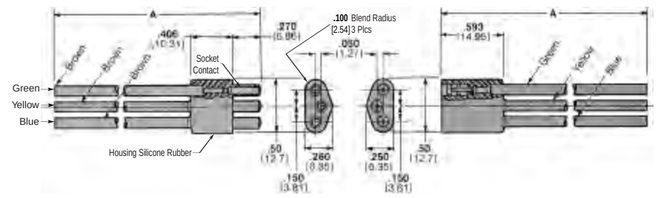
Receptacle, Surface Mount
Glass Filled Epoxy, Black
Part Number 1218055-1
RoHS Part Number 5-1218055-1

Receptacle, Surface Mount
PPS Thermoplastic Polymer, Brown
Part Number 1218055-2
RoHS Part Number 5-1218055-2

1, 2 and 3 Position

Product Specification — 108-1812
Operating Voltage — 7.5 KVDC
Test Voltage — 12 KVDC at 10,000 feet [3,048 m] and 5°F to +185°F [-15°C to +85°C]

3-Position Connectors



Plug

Dim. A	Wire Color	Part Number
12 305	Brown Brown Brown	863743-1
16 406		863743-2
12 305	Green Yellow Blue	862424-1
18 457		862424-2
48 1219		862424-4

Receptacle

Dim. A	Part Number
12 305	862425-1
18 457	862425-2
24 610	862425-3
48 1219	862425-4

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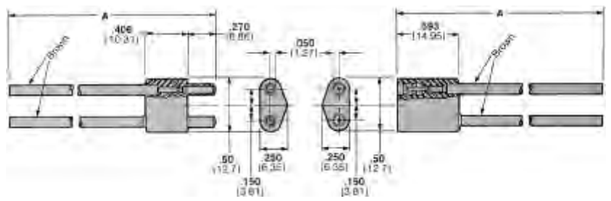
LGH Micro-Miniature Connectors and Cable Assemblies (Continued)

1, 2 and 3 Position (Continued)

Product Specification — 108-1812
Operating Voltage — 7.5 KVDC
Test Voltage — 12 KVDC at 10,000 feet [3,048 m] and -5°F to +185°F [-15°C to +85°C]

2-Position Connectors



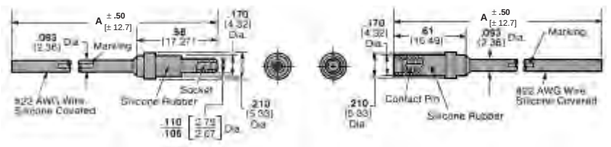
Plug

Dim. A	Part Number
12 305	866559-1
16 406	866559-5
18 457	866559-2
24 610	866559-3
48 1219	866559-4

Receptacle

Dim. A	Part Number
12 305	866196-1
16 406	866196-5
18 457	866196-2
24 610	866196-3
48 1219	866196-4

1-Position Connectors



Plug

Dim. A	Wire Color	Part Number
15 381	White	867823-1
30 762	White	867823-2
36 914	Green	867823-3
36 914	White	867823-4
6 152	White	867823-5
40 1016	White	867823-6

Receptacle

Dim. A	Wire Color	Part Number
24 610	White	867824-1
24 610	Green	867824-2
6 152	White	867824-3
40 1016	White	867824-4

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Medical Receptacles (Used Primarily for Patient Monitoring)

Product Facts

- Quick connect/disconnect
- 6 and 7 position connector
- Mates to standard medical cable interface
- Operating Voltage — up to 5,000 volts DC
- Operating Temperature — -5°F to 185°F [-15°C to 85°C]
- Operating Current — 10 Amps max.
- Accepts AMP Multi-Mate Pins and Sockets (size 16)
- Four hole flange mount
- Housings made from UL 94V-0 polyester material
- Different colors available
- Polarized for proper mating of connector halves
- Tyco Electronics does not manufacture mating plugs or cable assemblies for these receptacles

The AMP line of LGH high voltage products is meeting today's need for medical instrumentation connectors and is prepared for tomorrow's medical breakthroughs.

In use today in a wide variety of medical monitoring equipment, this versatile LGH circular connector offers the industry a wide choice of application options.

Typical Applications

- Medical monitoring equipment
- Mates with "standard" medical cable assemblies

Versatility

- Choice of crimp or posted, size 16 gold over nickel plated contacts
- Flange mounted for easy installation
- Polarized for safe, positive mating
- Housings available in choice of colors to meet your application

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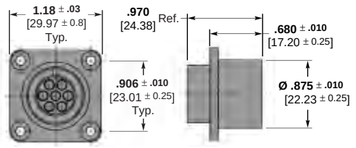
Medical Receptacles (Used Primarily for Patient Monitoring) (Continued)

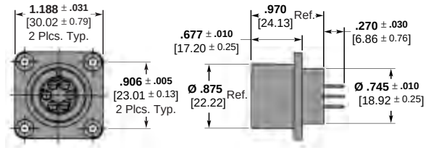
7 Position
Housing only no contacts



Housing Color	Part Number
Black	443065-1
Special Aqua Blue*	443065-3

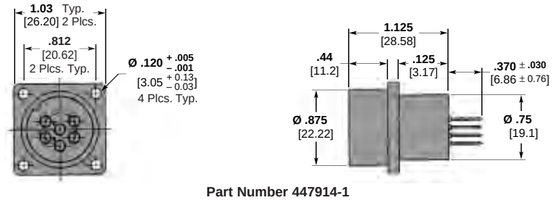
*PMS (Pantone Matching System) #3145 Uncoated.

6 Position
Socket contacts with .025 [0.63] Square Posts



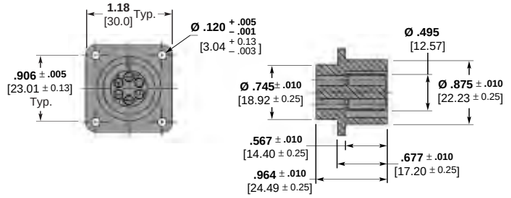
Part Number 447913-1
RoHS Part Number 5-447913-1

6 Position
Pin contacts with .025 [0.63] Square Posts



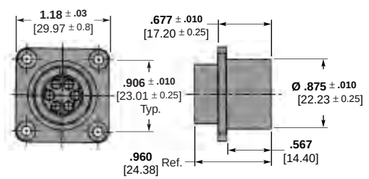
Part Number 447914-1
RoHS Part Number 5-447914-1

6 Position
14S–6S



Part Number 449652-1

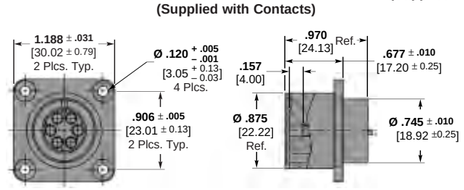
6 Position
MS3102A-14S-6S Configuration



Part Number 864900-1
RoHS Part Number 5-864900-1
(Supplied with Contacts)

Part Number 864900-2
(Supplied without Contacts)

6 Position
Special 4mm Recess



Part Number 1218081-1

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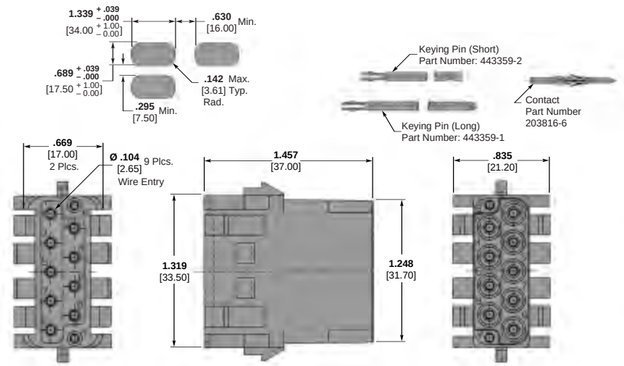
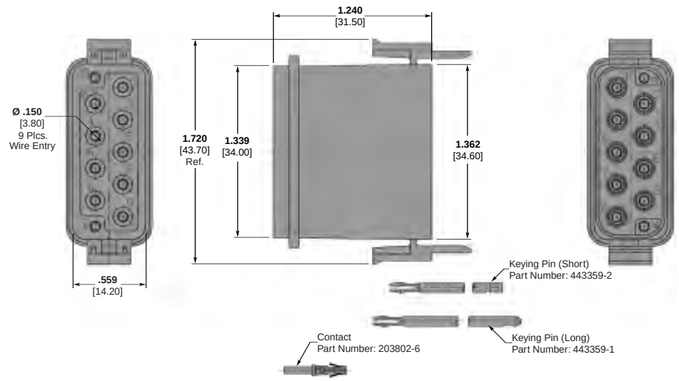
9 Position LGH MATE-N-LOK Style Connectors

Receptacle Kit



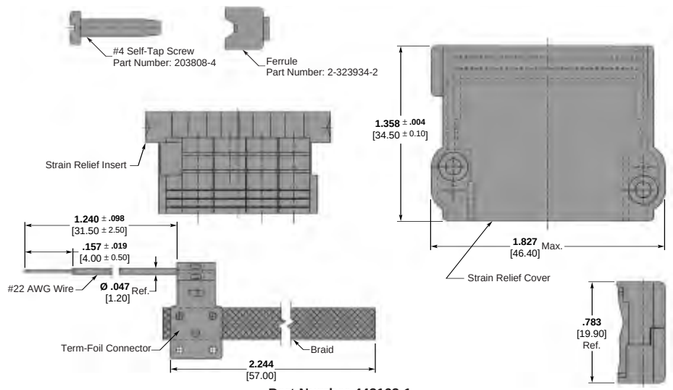
Part Number 443160-1
Color: Pale Blue

Plug Kit



Part Number 443161-1
Color: Pale Blue

Strain Relief Kit



Part Number 443162-1

Technical Documents

Instruction Sheets —
408-3382
408-4436
408-4368

Design Objective —
108-1711

Application Specification —
114-1110

Catalog 1308940
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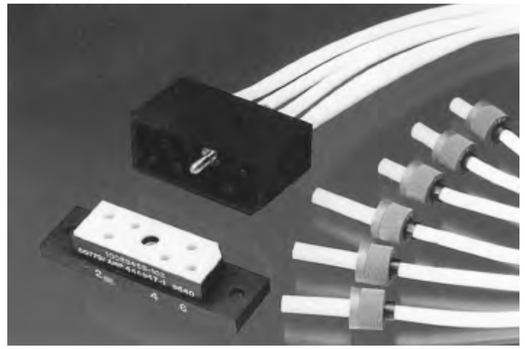
Various Specials

Product Facts

6 Position LGH Connector

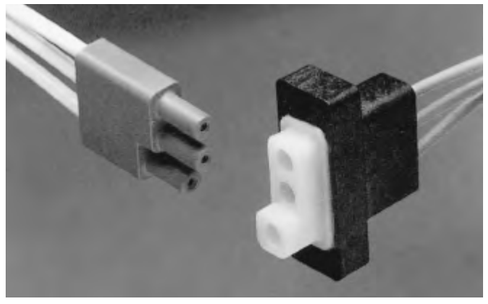
- Laser gyro inertial reference systems application
- Extremely rugged construction
- High flexibility silicone leads
- Size 22 contacts
- No adhesives or potting materials used
- 10,000 volts DC max. operating voltage



6 Position LGH Connector

3 Position LGH Compact Flange Mounted Connector

- Military counter measure systems application
- Missile guidance systems application
- Ultra small diameter silicone coated TEFLON wire insulation
- Size 22 contacts
- Plug is available as a kit or with flying leads
- 5,000 volts DC max. operating voltage



3 Position LGH Connector

6 Position LGH Connector brings high voltage to the circuit board

6 LGH leads, insert molded into a glass epoxy housing with a sturdy, center male screwlock form the plug of this extraordinary printed circuit connector system.

3 Position LGH Compact Flange Mounted Connector

Three molded in flying leads in an extremely tough liquid crystal polymer flanged housing make up the receptacle of this compact high performance high voltage connector.

Performance Specifications

Operating Temperature Range — -67°F to +257°F [-55°C to +125°C]

Operating Altitude Range — Sea level to 70,000 ft [21336 m].

Operating Current — 5 amps max.

Polarized interface to assure correct mating

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Catalog 1308940
Revised 8-06

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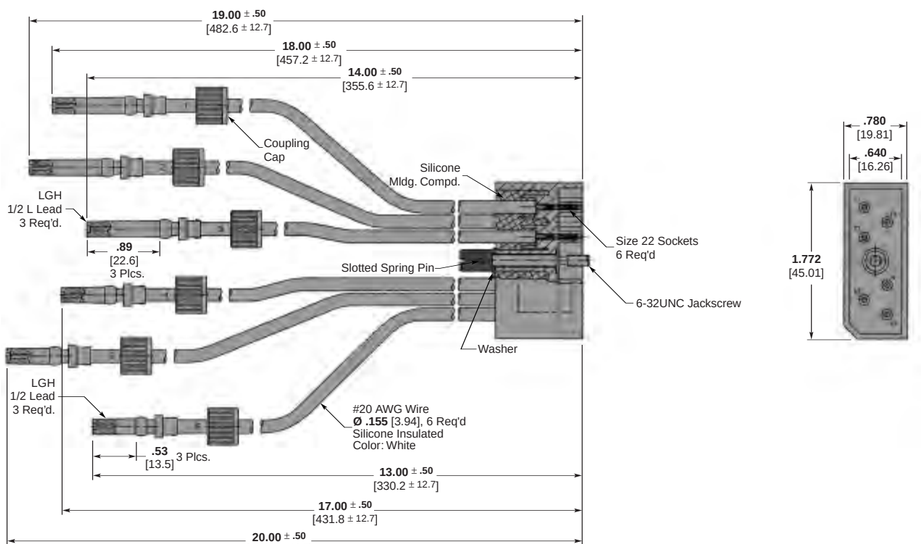
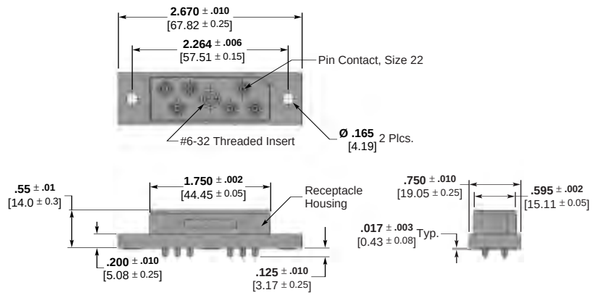
Japan: 81-44-844-8013
UK: 44-208-420-8341

6 Position, 10 KVDC Receptacle, with LGH 1/2 L and LGH 1/2 Positive Stop Leads



Part Number 446775-1

6 Position, Rectangular Receptacle



Part Number 446947-1

Catalog 1308940
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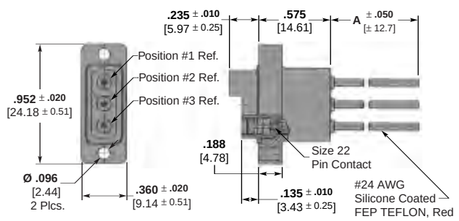
Various Specials (Continued)

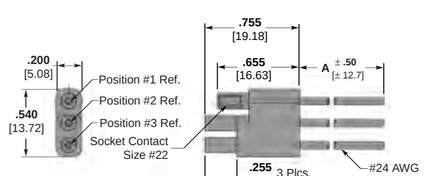
3 Position Receptacles



Part Numbers 443915-1, -2

Dim. A	Part Number
24.00 609.6	443915-1
18.50 469.9	443915-2

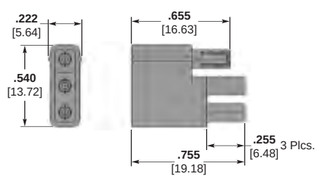
3 Position Plug



Part Numbers 443916-1, -2

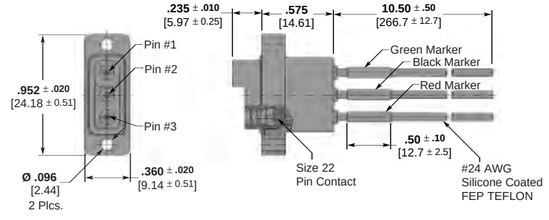
Dim. A	Part Number
24.00 609.6	443916-1
48.00 1219.2	443916-2

3 Position Plug Kit with 3 Size 22 Socket Contacts



Part Numbers 446900-1 and 446900-2 with Slot

3 Position Receptacle



Part Number 443815-1

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UK: 44-208-420-8341

Various Specials (Continued)

Printed Circuit Board Receptacles

Product Facts

- Molded epoxy housings per MIL-M-24357 (GEI-5)
- Small, lightweight, leakproof
- 10 KV, LGH 1/2
  Part Number 866803-1
  (with mounting holes)
  Part Number 866804-1
  (with threaded mounting holes and potting shell)
- 15 KV, LGH 1/2L
  Part Number 866806-1
  (with mounting holes)
  Part Number 866805-1
  (with threaded mounting holes and potting shell)
- 20 KV, LGH 1
  Part Number 830632-3
  (with mounting holes)

Multiple Receptacle with Integral, Molded Flange for Bulkhead Applications (Gold Pins)

Single, Part Number 867606-4

Dual, Part Number 861662-4

Triple, Part Number 861660-4

Quadruple,
Part Number 861658-4

Quintuple,
Part Number 861657-4

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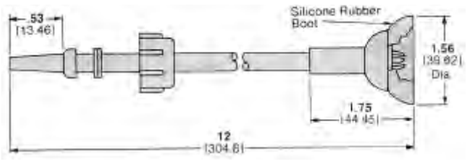
Various Specials (Continued)

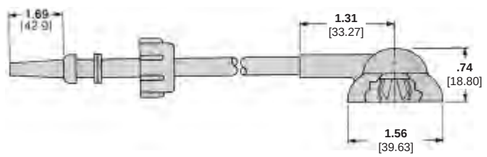
CRT Lead Assemblies

J1-21, 10 KV, LGH 1/2



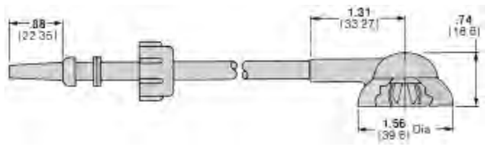
Part Number 848816-2

J1-21, 25 KV, LGH 1L



Assembly Length	Part Number
12 304.8	846977-8
18 457.2	1-846977-1

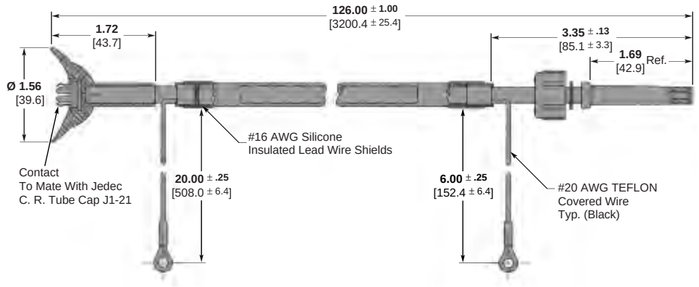
J1-21, 20 KV, LGH 1



Part Number 848588

Assembly Length	Part Number
6 152.4	848588-7
12 304.8	848588-1
18 457.2	848588-4
24 609.6	848588-2
36 914.4	848588-3
48 1219.2	848588-8

J1-21, CRT, LGH 1L



Part Number 867615-2

Note: Standard length leads are tabulated here. Tyco Electronics can make available numerous variations in lengths and material to suit almost any application. Choices of insulation materials include TEFLON, UL listed silicone and UL listed PVC. Other materials, colors, wire and configurations can be used in manufacture. For more information, consult Tyco Electronics.

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Catalog 1308940
Revised 8-06

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Various Specials (Continued)

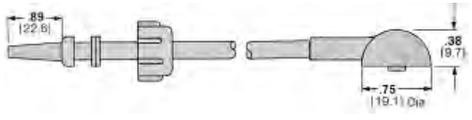
CRT Lead Assemblies
(Continued)

J1-22, 10 KV, LGH 1/2 Right-Angle

Part Number 846556

Assembly Length	Part Number
12 304.8	846556-3
18 457.2	846556-5
24 609.6	846556-4

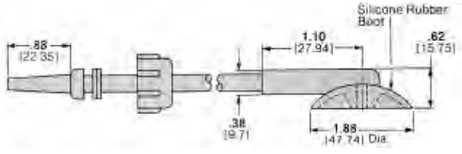
J1-22, 15 KV, LGH 1/2L



Part Number 862345

Assembly Length	Part Number
12 304.8	862345-2
18 457.2	862345-1

J1-22, 20 KV, LGH 1

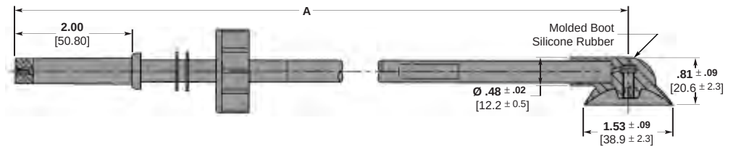


Part Number 849424

Assembly Length	Part Number
12 304.8	849424-7
18 457.2	849424-4 5-849424-4*

*RoHS compliant Part Number.

J1-22, 50 KV, LGH 4



Part Numbers 868373-1, -2

Assembly Length	Part Number
36.0 ± .36 914.4 ± 9.1	868373-1
24.0 ± .36 609.6 ± 9.1	868373-2

Note: Standard length leads are tabulated here. Tyco Electronics can make available numerous variations in lengths and material to suit almost any application. Choices of insulation materials include TEFLON, UL listed silicone and UL listed PVC. Other materials, colors, wire and configurations can be used in manufacture. For more information, consult Tyco Electronics.

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UK: 44-208-420-8341

Various Specials (Continued)

CRT-Base Connectors

Product Facts

- Base connections without potting
- Right-angle and straight connections available
- One-piece molded construction
- Environmentally sealed for trouble-free performance
- Operates at rated DC voltages at 70,000 ft. [21,336 m]
- Operating temperature range: -67°F to +257°F [-55°C to +125°C]
- Withstands shock tests per MIL-STD-202, Test Method 102, Condition C
- Excellent system serviceability
- High reliability
- Fully tested harnesses
- Lower applied cost

AMP molded silicone rubber CRT-base connectors are designed to better eliminate the hand wiring approach for CRT-base connections. These connectors offer greater system serviceability and feature highly reliable performance with complete versatility. They have integrally molded high and low voltage leads, as dictated by particular applications, and a molded boot design which promotes dust and moisture resistance over a long operational life span.

The versatility of the connector design allows customers to purchase either fully wired connectors, or connectors which can be terminated and potted at their plant. Currently, LGH molded silicone rubber CRT-base connectors are available for a variety of standard 9, 12 and 14 pin tubes. Options include a choice of wire, both low and high voltage, as well as the direction of wire exiting from the connector. Each harness is fully tested prior to shipment.

In addition to the connectors listed here, Tyco Electronics can furnish a wide variety of CRT-base connectors. Consult Tyco Electronics for details.

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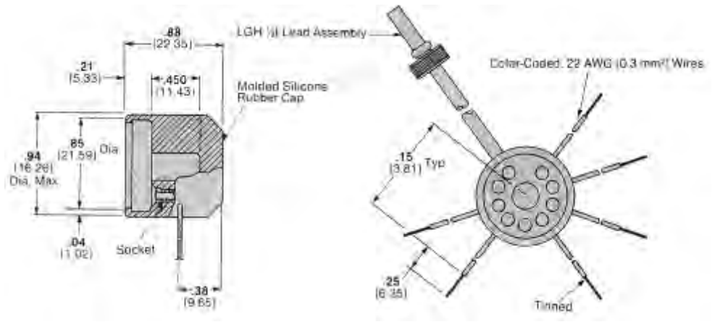
Various Specials (Continued)

CRT-Base Connectors
(Continued)

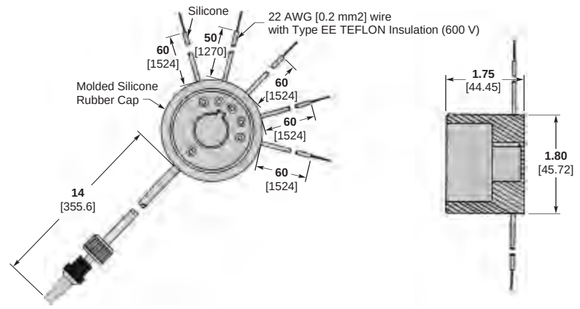
9 Position CRT-Base Connector



Part Number 862481-1

This connector is one of many available from Tyco Electronics for mating with standard JEDEC tube base E9-37.

Typical Right-Angle Lead Exit CRT-Base Connector



B6-63 —
Part Number 867121-1

This connector is typical of those available from Tyco Electronics for mating with standard JEDEC tube base B5-57, B6-63, B7-51, B10-75, and B12-43.

11 Position CRT-Base Connector

Part Number 443118-2

This connector is one of several available from Tyco Electronics for mating with standard JEDEC tube base B9-290. In addition to the connectors listed here, Tyco Electronics can furnish a wide variety of CRT-base connectors. Consult Tyco Electronics for details.

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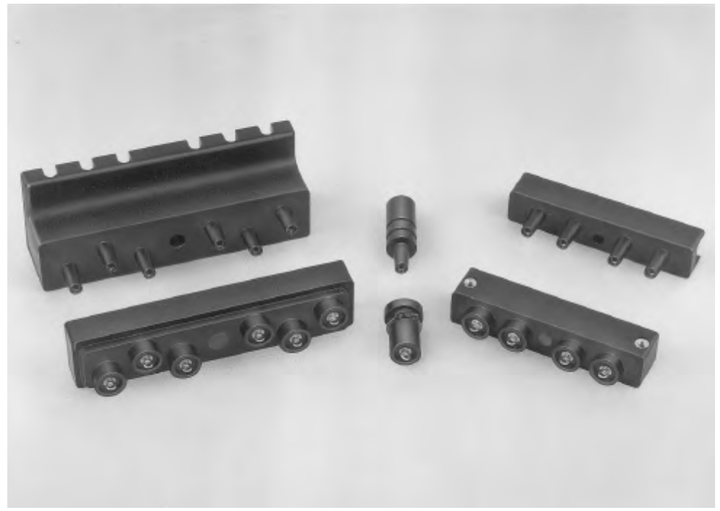
Various Specials (Continued)

Rack and Panel Connectors

Product Facts

- 10 KVDC rating up to 10,000 feet [3,048 m] (continuous)
- Extremely compact
- All plastic design
- Housings can be molded from a variety of materials
- Provides highly reliable drawer-type connections
- Low insertion and extraction forces
- Hipot — 20 KVDC at sea level, two minutes
- Pins and sockets (10-amp rating) are recessed for maximum safety; will accept conductor sizes to 16 AWG [1.25 mm²]
- Hermetically sealed version available for soldering to metal bulkhead on single pin connector
- Available with or without leads
- No tools required for field use
- Can be readily adapted for in-line splice applications



This AMP High Voltage Connector family is specifically designed for military applications. It is extremely compact and has a continuous 15 KVDC rating from sea level to an altitude of up to 10,000 feet [3,048 m].

The connector assembly is a rack and panel type especially suited for drawer mounting or free-hanging plug applications. It incorporates many design features for electrical, mechanical and environmental integrity. Such features include: use of a tapered plug to make exact alignment unnecessary; recessed pin and socket contacts to better prevent high voltage exposure; and a resilient silicone rubber "O" ring in the receptacle for an interfacial seal for the mated connector.

Plug and receptacle housings are molded from durable glass epoxy; pin and socket contacts are made of fine grade brass, gold plated in the mating areas for maximum conductivity. The solder eyelets are capable of accommodating leads with conductor sizes up to 16 AWG [1.25 mm²].

To meet customer's exact requirements, we can supply the High Voltage Rack and Panel Connectors with or without leads. Also, because of the basic design of the connectors, slight modifications can be made for in-line space applications.

Materials

Housings — Molded glass epoxy per MIL-M-24325 (Ships), GEI-5

Pin and Socket Contacts — Brass; gold plated per MIL-G-45204

Solder Eyelets — Pre-tinned per MIL-T-10727

"O" Ring (Receptacle Only) — Silicone Rubber

Retaining Ring (Receptacle Only) — Stainless steel per MS 16624

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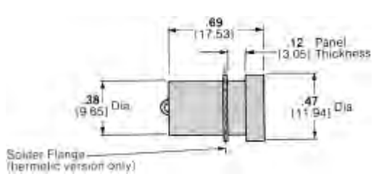
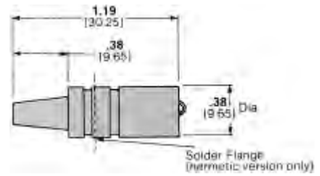
Various Specials (Continued)

Rack and Panel Connectors
(Continued)

Single Pin

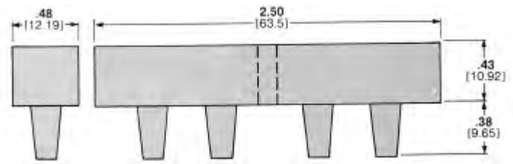


Receptacle
Standard Part Number 859111-1
Hermetic Part Number 862123-1

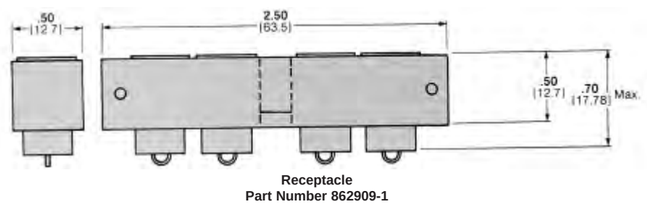


Plug
Standard Part Number 859113-1
Hermetic Part Number 862124-1

Four Pin

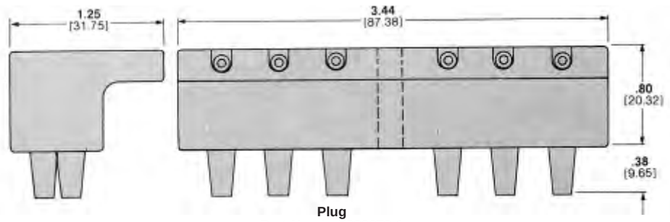


Plug
Part Number 862908-1

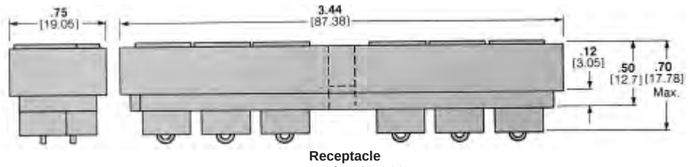


Receptacle
Part Number 862909-1

Six Pin



Plug
Part Number 862672-1



Receptacle
Part Number 862536-1

Notes: 1. If bulkhead and mounting hardware are metallic and at ground potential, provisions must be made to protect the back end of the receptacle against arc-over and breakdown.
2. Connectors are available with or without leads. Leads can be furnished in virtually any length, with various insulation materials, in either standard white or a variety of optional colors, and with conductor sizes to 16 AWG [1.25 mm^2].

For the High Voltage Rack and Panel Connector to meet your specific requirements, consult Tyco Electronics.

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Revised 8-06

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Various Specials (Continued)

Heavy Duty (VRL) RFI-Shielded Lead Assemblies and Receptacles

Product Facts

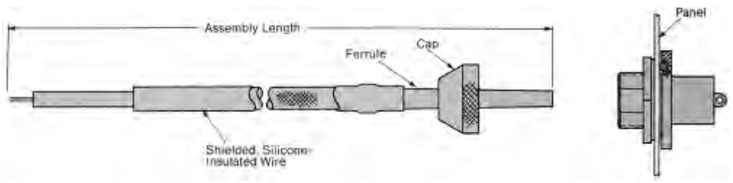
- Extremely rugged design
- Fully shielded against RFI
- Operating and storage temperature range: -67°F to +257°F [–55°C to +125°C]
- Meets wide range of military requirements
- Metal housings can be readily altered to meet a wide variety of mounting and operational requirements

Versatile ruggedized LGH High Voltage Lead Assemblies and Receptacles are designed specifically for use where vibration, shock and handling conditions exist and are ideally suited for both industrial and military applications. This line of lead assemblies and receptacles carries the same voltage, current and altitude ratings as the corresponding standard LGH connector series when properly mated.

VRL cable assemblies feature the integrally molded end to provide positive mating and an excellent seal. They are completely shielded for RFI when mated with the appropriate receptacle.

The receptacles are of the molded glass epoxy type with a protective metal shroud that is hermetically sealed between plastic and metal. These receptacles mate with the single-end ruggedized lead assemblies shown in the same series.

Special designs also are available upon request if the standard VRL lead assembly and receptacle designs will not fulfill your immediate needs.



LGH Connector Series	Lead Assemblies			Receptacles		
	Length	Single End	Double End	Jam Nut	Square Flange	Dimensions
1/2 L 15 KVDC	**6** 152.4	862485-8	—	862295-1	862363-1	1/2-28 UNEF Thread .60 [15.24] Behind Panel .98 [24.89] Overall Length
	12 304.6	862485-3	862294-4			
	18 457.2	—	862294-3			
	36 914.4	—	1-862294-0			
1 L 25 KVDC	**12** 304.6	862484-7	862444-3	862443-1 5-862443-1*	862362-1	5/8-18 UNEF Thread 1.10 [27.94] Behind Panel 1.84 [46.74] Overall Length
	24 609.6	862484-4	—			
	36 914.4	862484-8	—			
4 50 KVDC	**12** 304.6	863124-1	863254-1	863125-1	863253-1	1-3/16-18 UNEF Thread 1.55 [39.37] Behind Panel 2.15 [54.61] Overall Length
	24 609.6	863124-2	863254-3			
	36 914.4	863124-3	—			
	48 1219.2	—	863254-4 5-863254-4*			

*RoHS compliant Part Number.

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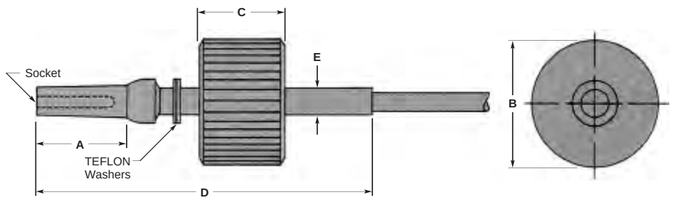
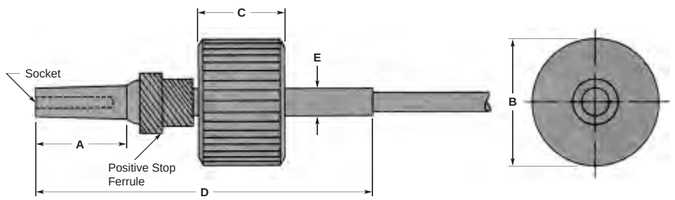
Field Installable Connectors
Kits for TEFLON Insulated Wire

Various Specials (Continued)



Standard Molded End



Positive Stop Molded End

Connector Description	Dimensions					Wire Diameter	Part Numbers	
	A	B	C	D	E		Molded End	Positive Stop
LGH 1/2 I	**.53** 13.5	**.49** 12.5	**.38** 9.7	**2.00** 50.8	**.160** 40.6	**.107–.113** 2.72–3.37	861076-1	—
						.081–.087 2.06–2.21	861076-2	—
						.107–.113 2.72–3.37	—	862514-1
LGH 1/2 LI	**.89** 22.6	**.49** 12.5	**.38** 9.7	**2.00** 50.8	**.160** 40.6	**.107–.113** 2.72–3.37	—	862515-1
LGH 1 I	**.88** 22.4	**.81** 20.57	**.50** 12.7	**3.00** 76.2	**.280** 71.1	**.155–.165** 3.94–4.19	—	862128-1
						.200–.210 5.08–5.33	—	862128-2
						.122–.132 3.10–3.35	—	862128-3
LGH 1 LI	**1.69** 42.9	**.81** 20.57	**.50** 12.7	**3.38** 85.9	**.280** 71.1	**.155–.165** 3.94–4.19	—	862518-1

TEFLON is a trademark of E. I. DuPont de Nemours and Company.

Note: These connectors mate with standard LGH receptacles. Recommended cable is W.L. Gore High Voltage Wire or equivalent.

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Accessories

Removable Cap Kits

These kits provide a quick and easy means of replacing damaged caps on standard LGH molded-end lead assemblies. Removing leads from bulkheads, enlarging holes in bulkheads or disconnecting leads from potted connections is unnecessary. Simple disconnection of the lead with the damaged cap is the only required step before installing the replacement. These cap kits also can be useful for applications which require threading leads through small openings in bulkheads, as illustrated at right.

Dirt-Protective Caps

These caps protect LGH receptacles against damage to the threads and provide protection against accumulation of foreign matter on the insulator barrel and male contact. They are especially useful when receptacles are being shipped or stored.

Molded glass-epoxy caps meet specifications for MIL-M-24325 (Ships), GEI-5.

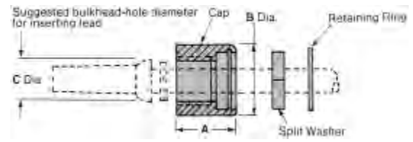
Aluminum caps, anodized black per MIL-A-8625, Type I, has an attached retaining chain. A silicone rubber gasket within provides a moisture and dust-proof seal.

These protective caps do not replace caps provided with LGH lead assemblies.

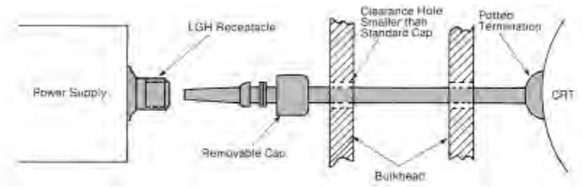
Arcing-Protective Caps

A multiple output power supply with vacant receptacles can be operated safely at high altitudes without fear of breakdown if floating receptacles are sealed with protective caps shown here.

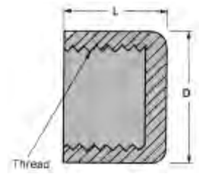
Removable Caps



LGH Series	Dimensions A	B	C	Kit Part Number
1/2 I 1/2 LI	**.50** 12.7	**.50** 12.7	**.28** 7.11	849275-1
1 I 1 LI	**.62** 15.75	**.75** 19.05	**.44** 11.18	849267-1

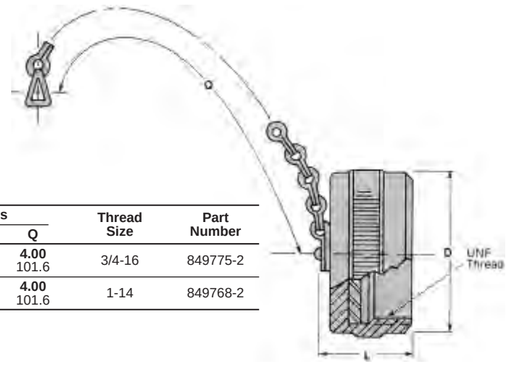


Glass-Epoxy Cap



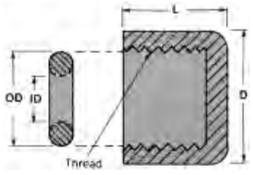
LGH Series	Dimensions L	D	Thread Size	Part Number
1/2 I 1/2 LI	**.25** 6.35	**.44** 11.18	5/16-32 (M)	850512-1
1 I 1 LI	**.50** 12.7	**.63** 16	1/2-20 (M)	850513-1
2 I	**.56** 14.22	**1.12** 28.45	3/4-16 (M)	850514-1
4 I	**.56** 14.22	**1.37** 34.8	1-14 (M)	850515-1

Aluminum Cap



LGH Series	Dimensions L	D	Q	Thread Size	Part Number
2 I	**.71** 18.03	**.91** 23.11	**4.00** 101.6	3/4-16	849775-2
4 I	**.76** 19.3	**1.21** 30.73	**4.00** 101.6	1-14	849768-2

Arcing-Protective Cap



LGH Series	Dimensions L	D	O.D.	I.D.	Thread Size	Part Number
1/2 I 1/2 LI	**.25** 6.35	**.44** 11.18	**.28** 7.11	**.14** 3.56	5/16-32	849055-1
1 I 1 LI	**.50** 12.7	**.62** 15.75	**.44** 11.18	**.23** 5.84	1/2-20	849252-1
2 I	**.56** 14.22	**1.12** 28.45	**.69** 17.53	**.50** 12.7	3/4-16	849253-1
4 I	**.56** 14.22	**1.37** 34.8	**.94** 23.88	**.75** 19.05	1-14	849254-1

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LGH Product Worksheet for Ordering Custom Designs

1. Customer name and location _____

2. Military application? _____ Commercial application? _____

3. Voltage: Working _____ DC _____ AC _____
   Test (High Potential) _____ DC _____ AC _____
   If AC, what frequency? _____ Hz.
   If pulsed DC, what repetition rate and duty cycle? _____

4. Current _____

5. Temperature: Operating _____ °C min. _____ °C max.
   Storage _____ °C min. _____ °C max.

6. Environment: Air _____ Oil (specify type) _____
   Water/humidity _____ Chemical _____
   Other (explain) _____

7. Altitude: Operating _____
   Storage _____

8. Hermetic seal required? _____ If yes, specify leakage rate: _____ ppm

9. What other mechanical or electrical features are required? _____

10. Plating desired? _____

11. Is a customer specification or drawing attached? _____
    If not, what dimensional restrictions apply? _____

12. Number of mating cycles needed: _____

13. For quoting purposes, what is the initial order quantity? _____
    Quantity for first year? _____
    Quantity for second year? _____

14. When are initial parts required? _____

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METRIC
Dimensions in the **Raychem Solder & Crimp Style section** are millimeters over inches. All others are inches over millimeters.

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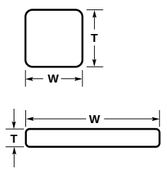
How to Compute Circular Mil Area of Various Wire Shapes

Square or Rectangular Wire



U.S. Customary Dimensions

Multiply the width of the wire cross section in mils by the thickness of the wire cross section in mils by 1.2732 and subtract the radius factor shown below.

CMA = W x T x 1.2732 – radius factor

Metric Dimensions

Multiply the width of the wire cross section in millimeters by the thickness of the wire cross section in millimeters by 1973.525 and subtract the radius factor shown below.

CMA = W x T x 1973.525 – radius factor

Round Solid Wire AWG

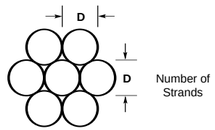
Multiply the diameter in mils by itself.

CMA = D^2

Multiply the diameter in millimeters by itself by 1550.003

CMA = D^2 x 1550.003

Stranded Wire AWG



Multiply the diameter of one strand (in mils) by itself, and then multiply the result by the total number of strands.

CMA = D^2 x N

Multiply the diameter of one strand in millimeters by itself by the number of strands by 1550.003.

CMA = D^2 x N x 1550.003

Conversion Table

To Convert From	To	Multiply By
CMA	mm^2	.0005067075
CMA	in^2	.0000007854
mm^2	in^2	.001550003
mm^2	CMA	1973.525

Note: Refer to table listing for circular mil area for common wire sizes.

Radius Factor, U.S. Customary

Radius (in.)	Radius Factor To Subtract (CMA)
.010	110
.012	158
.016	280
.020	438
.026	740
.032	1121
.040	1752
.063	4346
.094	9675

Radius must be measured.

Radius Factor, Metric

Radius (mm)	Radius Factor To Subtract (CMA)
0.25	106
0.3	153
0.35	208
0.4	272
0.5	424
0.6	611
0.8	1086
1.2	2444

Radius must be measured.

Cross Reference AMP Closed Barrel Sizes/Metric Cable

Wire Size in^2 [mm^2]	Typical cables (metric)		AMP Code
.00078 [0.5]	16/0.20		22-16
.00116 [0.75]	24/0.20		22-16
.00155 [1.0]	32/0.20	1/1.13	22-16
.00233 [1.5]	30/0.25	1/1.38	22-16, 16-14
.00388 [2.5]	50/0.25	1/1.78	16-14
.00620 [4.0]	56/0.30	7/0.85	12-10
.00930 [6.0]	84/0.30	7/1.04	12-10
.01550 [10]	80/0.40	7/1.35	8
.02480 [16]	126/0.40	7/1.70	6
.03875 [25]	196/0.40	7/2.14	4
.05425 [35]	276/0.40	19/1.53	2
.07750 [50]	396/0.40	19/1.78	1/0
.10850 [70]	360/0.50	19/2.14	2/0
.14725 [95]	475/0.50	19/2.52	3/0
.18600 [120]	608/0.50	37/2.93	231-300 MCM
.23250 [150]	756/0.50	37/2.25	231-300 MCM
.28675 [185]	925/0.50	37/2.52	300-380 MCM
.37200 [240]	1221/0.50	61/2.25	380-478 MCM

Cross Reference AMP Closed Barrel Sizes/Metric Aircraft Cables

Wire Size in^2 [mm^2]	Typical cables (metric)		AMP Code
.00023 [0.15]	19/0.10		26-22
.00033 [0.21]	19/0.12	7/0.20	26-22, 24-22
.00053 [0.34]	19/0.15		24-22
.00093 [0.60]	19/0.20		22-16, 20
.00144 [0.93]	19/0.25		22-16, 18-16
.00207 [1.34]	19/0.30		16-14, 18-16
.00282 [1.82]	37/0.25		16-14, 18-16
.00465 [3.00]	37/0.32	19/0.45	12-10, 14-12
.00721 [4.65]	37/0.40		12-10
.01304 [8.41]	119/0.30		8
.01993 [12.86]	182/0.30		6
.03221 [20.78]	294/0.30		4
.05005 [32.29]	203/0.45		2
.06040 [38.97]	245/0.45 (Size 1)		2
.07938 [51.21]	322/0.45		1/0
.10354 [66.80]	420/0.45		2/0
.12769 [82.38]	518/0.45		3/0
.16393 [105.76]	665/0.45		4/0

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Terminal Stud Hole Size

Use to Select Proper Size Terminal

The chart shows sizes and dimensions of various studs and the corresponding terminal stud hole sizes used with AMP devices.

For example, with stud #5 (.125 [3.18] Diameter), use AMP device listed for #5 stud (.129 [3.28] Hole Diameter).

Terminal stud hole sizes may easily be checked by fitting sample terminal to black circle. Chart shows cross reference from BA-US-Metric stud sizes.

Stud Size			Stud Dia.	Minimum Terminal Hole Diameter
Imperial	U.S. Cust.	Metric		
	#0		.060	.064
	#1		.073	.077
	#2	M2	.086	.090
8BA	#3		.099	.103
6BA	#4	M2.5	.112	.116
	#5	M3	.125	.129
4BA	#6	M3.5	.138	.142
	#8	M4	.164	.168
2BA	#10		.190	.194
	#12		.216	.220
	#14		.242	.245
0BA	1/4"	M6	.250	.260
	5/16"	M8	.312	.323
	3/8"	M9.5	.375	.385
	7/16"		.437	.448
	1/2"	M12	.500	.510

Stud Size		Stud Dia.	Minimum Terminal Hole Diameter
U.S. Cust.	Metric		
5/8"	M16	.625	.651
3/4"		.750	.776
7/8"	M22	.875	.901
1"		1.000	1.026
1 1/8"		1.125	1.151
1 1/4"		1.250	1.276

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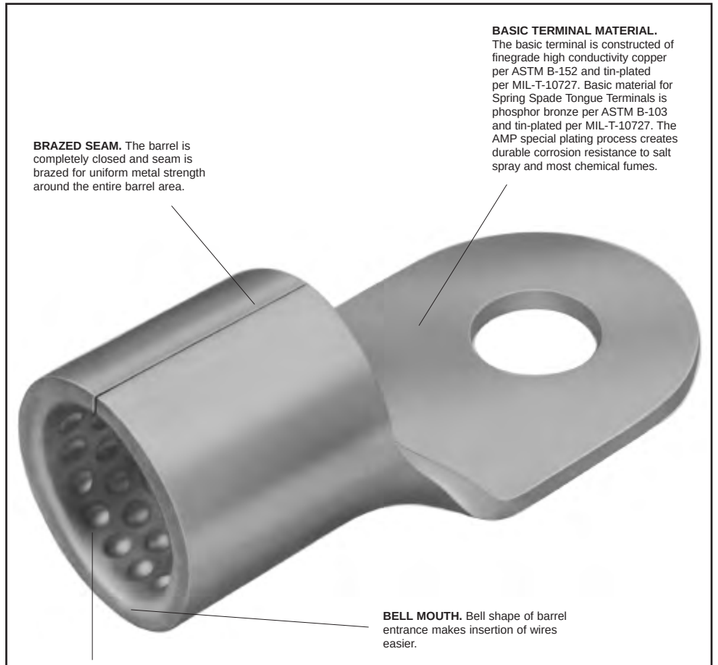
Introduction

SOLISTRAND terminals and splices are specially designed to terminate solid and stranded wire, irregular shaped conductors, and combinations of these—still retaining the superior performance characteristics of single-purpose terminals and splices. Because we match the terminal to the tool each termination is uniform, making quality control easy and performance consistent. Corrosion resistance, vibration resistance and tensile strength of these terminals and splices are well within the limits of commercial and military specifications. The SOLISTRAND terminals and splice line includes parallel and butt splices, and flag, ring, spade, hooked, and flanged tongue terminals in sizes from 26 AWG [0.1 mm^2] through 600 MCM [304 mm^2].



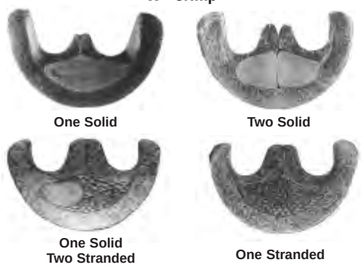
SOLISTRAND Terminals meet or exceed the requirements of MIL-T-7928, Type I, Class 1 and 2.

The Crimp

The "W" Crimp is one of several time-proven crimp types developed by Tyco Electronics. It is not just a "kink" in a metal barrel; not something pinched over electrical wire ends. The "W" Crimp is actually two longitudinal crimps applied with precisely controlled pressure so that the conductor within the barrel flows together into the dimples or serrations of the terminal barrel creating one homogeneous mass of metal.
The two indents also help to center conductors within the barrel for uniform crimping of the barrel around the wire. Furthermore, the "W" Crimp permits the use of a shorter terminal barrel, an excellent feature for confined area termination.

The "W" Crimp creates terminations of optimum electrical properties and is completely reliable, giving long service in harsh environments.

"W" Crimp



Temperature Rating: 338°F [170°C] Max.

AMP SOLISTRAND Terminals and Splices (Use SOLISTRAND Tooling)

AMP Wire Size	Listed File No. E13288	LR 7189 Certified
22–16 Solid or Stranded	22–16 Solid or Stranded	22–16 Solid or Stranded
16–14 Solid or Stranded	16–14 Solid or Stranded	16–14 Solid or Stranded
16–14 Heavy Duty Solid or Stranded	16–14 Heavy Duty Stranded	16–14 Heavy Duty Solid or Stranded
14–12 Solid or Stranded	14–12 Stranded	14–12 Solid or Stranded
12–10 Solid or Stranded	12–10 Stranded	12–10 Solid or Stranded
8 thru 600 MCM Solid or Stranded	8 thru 600 MCM Stranded	8 thru 600 MCM Solid or Stranded

Note: 22-16 terminals and splices are stamped 22-18 in accordance with MIL-T-7928. Commercial wire range is 22-16.

Catalog 1308940
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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

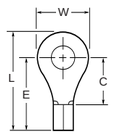
Ring Tongue Terminals

Material and Finish

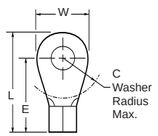
Terminal Body — Copper per ASTM B-152

Plating — Tin per MIL-T-10727

A



C



Military Specification M7928/7

Wire Size Circular Mils [mm²]	Stud Size	Style	Dimensions L Max.	Dimensions E Max.	Dimensions C Min.	Dimensions W	Material Thickness Max.	Wire Barrel I.D. Min.	Class	M7928/7 Dash Number	Part Number
22–16 509–3,260 [0.26–1.65]	2 M2	A	**.449** 11.40	**.337** 8.56	**.156** 3.96	**.218** 5.54	**.033** 0.84	**.061** 1.55	2	1	34103 2-34103-1
	4	A	**.449** 11.40	**.337** 8.56	**.156** 3.96	**.218** 5.54	**.033** 0.84	**.061** 1.55	2	2	34104* 2-34104-6
	6 M3.5	A	**.621** 15.77	**.462** 11.73	**.281** 7.14	**.312** 7.92	**.033** 0.84	**.061** 1.55	2	3	34110* 2-34110-3
	10	A	**.621** 15.77	**.462** 11.73	**.281** 7.14	**.312** 7.92	**.033** 0.84	**.061** 1.55	2	4	34112* 2-34112-2
	5/16 M8	A	**.856** 21.74	**.618** 15.70	**.437** 11.10	**.469** 11.91	**.033** 0.84	**.061** 1.55	2	5	34114* 2-34114-2
	3/8	A	**.995** 25.27	**.727** 18.47	**.546** 13.87	**.531** 13.49	**.033** 0.84	**.061** 1.55	2	6	34115* 2-34115-2
16–14 2,050–5,180 [1.04–2.62]	4	A	**.480** 12.19	**.352** 8.94	**.171** 4.34	**.250** 6.35	**.033** 0.84	**.085** 2.16	2	11	34119* 2-34119-1
	6 M3.5	A	**.590** 14.99	**.431** 10.95	**.250** 6.35	**.312** 7.92	**.033** 0.84	**.085** 2.16	2	7	321684* 2-321684-1
	10	A	**.669** 16.99	**.510** 12.95	**.250** 6.35	**.312** 7.92	**.033** 0.84	**.085** 2.16	1 & 2	8	320093 2-320093-1
	5/16 M8	A	**.855** 21.72	**.618** 15.70	**.437** 11.10	**.469** 11.91	**.033** 0.84	**.085** 2.16	2	9	34125* 2-34125-6
	3/8	A	**.995** 25.27	**.727** 18.47	**.546** 13.87	**.531** 13.49	**.033** 0.84	**.085** 2.16	2	10	34126* 2-34126-2

Note: Part numbers are shown as loose piece over tape mounted product.
* Part numbers are available in small quantity packages.

Military Specification MS20659

Wire Size Circular Mils [mm²]	Stud Size	Style	Dimensions L Max.	Dimensions E Max.	Dimensions C	Dimensions W	Material Thickness Max.	Wire Barrel I.D. Min.	Class	MS20659 Dash Number	Part Number
12–10 5,180–13,100 [2.62–6.64]	6 M3.5	A	**.630** 16.00	**.487** 12.37	**.219** 5.56	**.281** 7.14	**.042** 1.07	**.129** 3.28	2	165	35476* 2-35476-1
	10	A	**.765** 19.43	**.575** 14.61	**.302** 7.67	**.375** 9.53	**.042** 1.07	**.129** 3.28	1 & 2 2	105	33457* 2-33457-2
	5/16 M8	A	**1.004** 25.50	**.736** 18.69	**.468** 11.89	**.531** 13.49	**.042** 1.07	**.129** 3.28	1 & 2 2	106	33459* 2-33459-6
	3/8	A	**1.098** 27.89	**.799** 20.29	**.531** 13.49	**.593** 15.06	**.042** 1.07	**.129** 3.28	1 & 2	128	33220*
	1/2 M12	A	**1.271** 32.28	**.893** 22.68	**.625** 15.88	**.750** 19.05	**.042** 1.07	**.129** 3.28	2	166	35135
8 13,100–20,800 [6.64–10.5]	8 M4	C	**.949** 24.10	**.743** 18.87	**.359** 9.12	**.406** 10.31	**.051** 1.30	**.172** 4.37	2	140	324061*
	10	C	**.949** 24.10	**.743** 18.87	**.359** 9.12	**.406** 10.31	**0.51** 1.30	**.172** 4.37	2	107	31807 2-31807-2*[2]
	1/4 M6	C	**.933** 23.70	**.696** 17.68	**.359** 9.12	**.469** 11.91	**.051** 1.30	**.172** 4.37	2	141	33461* 2-33461-2*[1]
	5/16 M8	A	**1.074** 27.28	**.790** 20.07	**.406** 10.31	**.562** 14.27	**.051** 1.30	**.172** 4.37	2	108	31808*
	3/8	A	**1.168** 29.67	**.868** 22.05	**.531** 13.49	**.594** 15.09	**.051** 1.30	**.172** 4.37	2	129	33463*
6 20,800–33,100 [10.5–16.8]	10	C	**1.168** 29.67	**.931** 23.65	**.531** 13.49	**.468** 11.89	**.060** 1.52	**.232** 5.89	2	130	321298*
	1/4 M6	C	**1.168** 29.67	**.931** 23.65	**.531** 13.49	**.468** 11.89	**.060** 1.52	**.232** 5.89	2	109	321598*
	5/16 M8	C	**1.246** 31.65	**.931** 23.65	**.531** 13.49	**.625** 15.88	**.060** 1.52	**.232** 5.89	2	131	33466* 2-33466-3
	3/8	C	**1.246** 31.65	**.931** 23.65	**.531** 13.49	**.625** 15.88	**.060** 1.52	**.232** 5.89	2	110	33467*
	1/2 M12	C	**1.840** 46.74	**1.400** 35.56	**1.000** 25.40	**.875** 22.23	**.060** 1.52	**.232** 5.89	2	143	320344*

Note: Part numbers are shown as loose piece over tape mounted product.
* Part numbers are available in small quantity packages.
[1] Requires a 69875 standard AMP-TAPETRONIC machine for application.
[2] Requires a 68250-1 Heavy Duty AMP-TAPETRONIC machine for application.

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Ring Tongue Terminals (Continued)

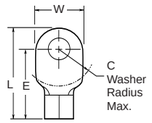
Material and Finish

Terminal Body — Copper per ASTM B-152

Plating — Tin per MIL-T-10727

Military Specification MS20659 (Continued)

B



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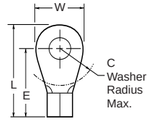
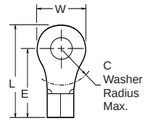


D



Wire Size Circular Mils [mm²]	Stud Size	Style	Dimensions L Max.	Dimensions E Max.	Dimensions C	Dimensions W	Material Thickness Max.	Wire Barrel I.D. Min.	Class	MS20659 Dash Number	Part Number
4 33,100–52,600 [16.8–26.7]	10	C	**1.199** 30.45	**.946** 24.03	**.437** 11.10	**.500** 12.70	**.073** 1.85	**.280** 7.11	2	144	33114
	1/4 M6	C	**1.199** 30.45	**.946** 24.03	**.437** 11.10	**.500** 12.70	**.073** 1.85	**.280** 7.11	2	111	31811†
	5/16 M8	C	**1.324** 33.63	**1.009** 25.63	**.500** 12.70	**.625** 15.88	**.073** 1.85	**.280** 7.11	2	132	33115
	3/8	C	**1.324** 33.63	**1.009** 25.63	**.500** 12.70	**.625** 15.88	**.073** 1.85	**.280** 7.11	2	112	31812
	1/2 M12	B	**1.902** 48.31	**1.462** 37.13	**1.000** 25.40	**.875** 22.23	**.073** 1.85	**.296** 7.52	2	145	327175*
2 52,600–83,700 [26.7–42.4]	10	B	**1.527** 38.79	**1.212** 30.78	**.531** 13.49	**.625** 15.88	**.073** 1.85	**.370** 9.40	2	146	330301
	1/4 M6	B	**1.527** 38.79	**1.212** 30.78	**.531** 13.49	**.625** 15.88	**.073** 1.85	**.370** 9.40	2	113	320383*
	5/16 M8	B	**1.527** 38.79	**1.212** 30.78	**.531** 13.49	**.625** 15.88	**.073** 1.85	**.370** 9.40	2	147	322870*
	3/8	B	**1.527** 38.79	**1.212** 30.78	**.531** 13.49	**.625** 15.88	**.073** 1.85	**.370** 9.40	2	114	321600*
	7/16	D	**1.657** 42.09	**1.212** 30.78	**.531** 13.49	**.890** 22.61	**.073** 1.85	**.370** 9.40	2	148	320741
1/0 83,700–119,500 [42.4–60.6]	1/4 M6	C	**1.925** 48.90	**1.532** 38.91	**.625** 15.88	**.807** 20.50	**.073** 1.85	**.444** 11.28	2	117	321866
	5/16 M8	C	**1.925** 48.90	**1.532** 38.91	**.625** 15.88	**.807** 20.50	**.073** 1.85	**.444** 11.28	2	151	321867*
	3/8	C	**1.925** 48.90	**1.532** 38.91	**.625** 15.88	**.807** 20.50	**.073** 1.85	**.444** 11.28	2	118	321868
	7/16	C	**1.956** 49.68	**1.529** 38.84	**.625** 15.88	**.875** 22.23	**.073** 1.85	**.444** 11.28	2	152	36918
	1/2 M12	C	**1.956** 49.68	**1.529** 38.84	**.625** 15.88	**.875** 22.23	**.073** 1.85	**.444** 11.28	2	135	36919*
2/0 119,500–150,500 [60.6–76.3]	1/4 M6	C	**1.930** 49.02	**1.550** 39.37	**.625** 15.88	**.926** 23.52	**.083** 2.11	**.504** 12.80	2	153	321869
	5/16 M8	C	**1.930** 49.02	**1.550** 39.37	**.625** 15.88	**.926** 23.52	**.083** 2.11	**.504** 12.80	2	119	321870*
	3/8	C	**1.930** 49.02	**1.550** 39.37	**.625** 15.88	**.926** 23.52	**.083** 2.11	**.504** 12.80	2	120	321871*
	7/16	C	**1.930** 49.02	**1.550** 39.37	**.625** 15.88	**.926** 23.52	**.083** 2.11	**.504** 12.80	2	154	321872
	1/2 M12	C	**1.930** 49.02	**1.550** 39.37	**.625** 15.88	**.926** 23.52	**.083** 2.11	**.504** 12.80	2	136	321873*
3/0 150,500–190,000 [76.3–96.3]	5/16 M8	B	**2.112** 53.64	**1.622** 41.20	**.625** 15.88	**1.020** 25.91	**.094** 2.39	**.565** 14.35	2	155	321874
	3/8	B	**2.112** 53.64	**1.622** 41.20	**.625** 15.88	**1.020** 25.91	**.094** 2.39	**.565** 14.35	2	121	321875*
	7/16	B	**2.112** 53.64	**1.622** 41.20	**.625** 15.88	**1.020** 25.91	**.094** 2.39	**.565** 14.35	2	156	321876
	1/2 M12	B	**2.112** 53.64	**1.622** 41.20	**.625** 15.88	**1.020** 25.91	**.094** 2.39	**.565** 14.35	2	122	321877*
4/0 190,000–231,000 [96.3–117]	5/16 M8	B	**2.537** 64.44	**1.985** 50.42	**1.078** 27.38	**1.150** 29.21	**.105** 2.67	**.635** 16.13	2	157	321271
	3/8	B	**2.178** 55.32	**1.657** 42.09	**.625** 15.88	**1.087** 27.61	**.105** 2.67	**.635** 16.13	2	123	321878*
	7/16	B	**2.178** 55.32	**1.657** 42.09	**.625** 15.88	**1.087** 27.61	**.105** 2.67	**.635** 16.13	2	158	321879
	1/2 M12	B	**2.178** 55.32	**1.657** 42.09	**.625** 15.88	**1.087** 27.61	**.105** 2.67	**.635** 16.13	2	124	321880*
	5/8 M16	B	**2.206** 56.03	**1.644** 41.76	**.625** 15.88	**1.150** 29.21	**.105** 2.67	**.635** 16.13	2	159	36935
	3/4	C	**2.732** 69.39	**2.117** 53.77	**1.078** 27.38	**1.275** 32.39	**.105** 2.67	**.635** 16.13	2	160	322228
	7/8 M22	C	**2.732** 69.39	**2.117** 53.77	**1.078** 27.38	**1.275** 32.39	**.105** 2.67	**.635** 16.13	2	137	321625

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Application Tooling

Wire Size Range
AWG 26 to 6

Product Type	Wire Size	Hand Tools	Pneumatic Tooling: Crimping Heads for 6-26, Tool 189721-1 — Single Wire Range	Pneumatic Tooling: Crimping Heads for 6-26, Tool 189721-1 — Multiple Wire Range	Dies for 6-26, Tool 189721-1 Requires Straight Action Adapter 217200-1 or 318161-1 Dies Also Fit 69710-1 Hand Tool	Tooling For Tape Mounted Products: Dies for 69875 AMP-TAPETRONIC / AMP-O-LECTRIC Requires Applicator / AMPOMATOR CLS IV Requires Applicators
SOLISTRAND terminals	26-22	69363[2]	—	—	—	768625-1
	24-20					—
	22-16	49935[2] 58546-1[3]	314516-1	—	47812, 314925-1[4]	68240-1
	16-14		314517-1	679301-1	47813, 314926-1[4]	68241-1
	12-10 & 16-14 HD		—	—	47814[1]	68242-1
	14-12	49592[2]	314518-1	—	—	90566-1
	8	—	1338757-1	—	—	68243-1
	6	—	1338758-1	—	—	—

[1] For standard wire only.
[2] CERTI-CRIMP Hand Tool.
[3] Contains die set 58545-1. PRO-CRIMPER II commercial tool not approved for UL applications.
[4] With locator, for terminals only.

Wire Size Range
AWG 8 to 600 MCM

Product Type	Wire Size	Hand Tool	Pneumatic Tooling 69015	Hydraulic Tools With Self Contained Dies: Hand Tool	Hydraulic Tools With Self Contained Dies: Latch Head	Hydraulic and Battery Powered Tools With Interchangeable Dies: 59973-1 Hand Tool, 69065[2] & 69067[2] Latch Heads — Nest	59973-1 Hand Tool, 69065[2] & 69067[2] Latch Heads — Indent	69097[2] "C" Head — Nest	69097[2] "C" Head — Indent	58445-1[2] Latch Head	69082[2] "C" Head	69099[2] "C" Head	Tooling For Tape Mounted Product: Dies for 69875 AMP-TAPETRONIC	Dies for 68250-1 HD AMP-TAPETRONIC
													Listed dies are single indent. See product information for preptape application tooling selection	
Standard Terminals	8	69355[1]	49956	59975-1	69006	48216	48355	46146	46145	48816	69911	69216	68321	68312-1
	6	59083 No CERTI-CRIMP	48172			48218	48327	46113	48813			69217	—	68313-1
	4	59131	48173			48219		46113		48817	69912	69218	—	—
	2		48174			48310		46113		48818	69913	45433	—	—
	1/0		48181			48320		46113	48813	48819	69914	45468	—	—
	2/0					48321	48331					45499	—	—
	3/0					48341						45442	—	—
	4/0					30003						45445	—	—
	250-300 MCM									48816	69911			
	350-500 MCM									48817	69912			
	400 MCM									48818	69913			
	500-600 MCM									48819	69914			

[1] CERTI-CRIMP Hand Tool.
[2] These crimping heads are recommended for use only with AMP Hydraulic Hand Pump 314979-1, DYNA-CRIMP Hydraulic Power Units 69120-1 (115 VAC) and 69120-2 (230 VAC).

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Introduction

Product Facts

- Product available in temperature ranges of 500°F [260°C], 550°F [288°C], 650°F [343°C] and 1200°F [649°C]
- Product employs the famous “W” and “C” crimp
- Wide range of wire sizes
- Complete line of related application tooling
- Accommodates solid and/or stranded conductors

Heat…extreme heat… searing temperatures up to 1200°F [649°C]. This is one of the most challenging environments that electrical/electronic circuitry has ever entered.

If heat is an unavoidable dimension in your circuit design and production, this product is an important ally. In this line of STRATO-THERM terminals and splices, you’ll find high temperature circuit hardware. You’ll also find solutions to other more familiar circuit problems such as vibration, corrosion and flash-over, when they occur at high temperatures.

Different types of high temperature terminals and splices found in this catalog are as follows:

PIDG Terminals and Splices, and Pre-Insulated Spare Wire Caps — 550°F [288°C] Range

PIDG Insulation Restriction Terminals — 550°F [288°C] Range

Post-Insulated Terminals and Splices — 550°F [288°C] Range

Uninsulated Terminals and Splices — 650°F [343°C] Range

Uninsulated Terminals and Splices — 1200°F [649°C] Range

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Introduction (Continued)

PIDG Terminals and Splices, and Pre-Insulated Spare Wire Caps 550°F [288°C] Range

Designed for reliable performance up to 550°F [288°C], this line of ring-tongue terminals, butt splices and spare wire caps features a pre-insulation sleeve of TEFLON TFE insulation material. A special funnel entry feature has been added to promote easy entry and proper seating of wire. The body is copper with a choice of gold over nickel plating or nickel plating. The terminal and splice barrel accommodates stranded wire conductors only. The spare wire caps are designed for unstripped wire.

Because of features such as a one-piece constructed inner sleeve and a wide funnel entry design which facilitates wire entry, standard STRATO-THERM PIDG tooling may be used to terminate this product.

Post-Insulated Terminals and Splices 550°F [288°C] Range

The temperature range of these terminals and splices is 550°F [288°C] for nickel plating and gold over nickel plated copper, and 500°F [260°C] for silver plating, These terminals and splices accommodate solid and/or stranded conductors.

Uninsulated Terminals and Splices 650°F [343°C] Range

These terminals and splices are available with and without wire insulation support. Both types are manufactured from electrolytic copper, plated with nickel. In the insulation support type, the support sleeve is fabricated from nickel-silver alloy. Both types accommodate solid or stranded conductors in various combinations. Wire size range is listed in the tabular data section.

PIDG Insulation Restriction Terminals 550°F [288°C] Range

These pre-insulated insulation restriction terminals better prevent the insulation of thin-wall insulation wire from entering the terminal's wire crimp area during the crimping process.

Designed for reliable performance up to 550°F [288°C], these terminals feature a pre-insulation sleeve of TEFLON (TFE) insulation material.

Uninsulated Terminals and Splices 1200°F [649°C] Range

Nickel material is used for the body of both the terminal and splice. They are available with or without wire insulation support sleeve of nickel-silver alloy material. Accommodating either solid or stranded conductors in different combinations, these terminals and splices are made to cover a broad wire size range, listed in the tabular data section.

Terminals made of alumel and chromel material with nickel-silver alloy sleeves are available for thermocouple applications. When using either alumel or chromel conductors, a terminal of the same material should be selected.

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Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Introduction (Continued)

Ordering Information

All terminals and splices are listed according to wire size and type of terminal or splice. If the part number of the terminal or splice is known, refer to the Numerical Index, at the back of this catalog, for page location of tabular data.

In the Tabular Data Section, part numbers are available in either loose piece or tape mounted form.

When ordering tape mounted part numbers, specify the terminal or splice part number, the total quantity of parts desired (if applicable). The chart to the right lists by wire size the type of packaging available and the quantity per package.

Wire Range	Standard Quantities	
AWG	Loose Piece	Tape Mounted
26 – 14	1,000	5,000
26 – 22	—	2,500
12 – 10	500	2,500
8, 6, 4	100	—
2, 1/0	50	—

Note: Package quantities may vary with specific part numbers.

The Crimp

All five types of STRATO-THERM terminals and splices provide optimum corrosion and vibration resistance plus outstanding tensile characteristics.

All types, except the STRATO-THERM PIDG terminals, splices and pre-insulated spare wire caps, employ the famous “W” crimp which creates the precise electromechanical properties necessary for solid and/or stranded conductor combinations. A proper crimp will provide a uniform attachment. When mechanical pressure is applied to the terminal barrel, the wire inside is forced into the serrations or dimples of the barrel. Shown are four typical photomacrographs of the “W” crimp, illustrating the results of crimping various conductor combinations. In each case, the action of the crimp has compressed the conductors and the barrel into a homogenous mass.

“W” Crimp

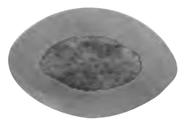
One Solid

One Solid
Two Stranded

Two Solid

STRATO-THERM PIDG terminals and splices employ the equally reliable confined “C” crimp plus multiple position insulation support crimp for today's smaller insulated wires. This “C” crimp is especially suited to crimping the terminal barrel and insulation sleeve to stranded wire conductors. The photomacrograph shows the results of “C” crimping. Virtually the same electromechanical properties are obtained as in the “W” crimp. Pre-insulated spare wire caps and post-insulated splices are crimped with an “O” crimp configuration.

Confined C



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Insulated Terminals and Splices

PIDG (Pre-Insulated DIAMOND GRIP) Ring Tongue Terminals

Temperature Rating, Material and Finish

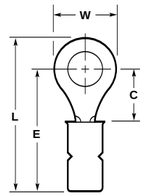
Insulation — TEFLON

Terminal Body — Copper per ASTM B152

Plating — Nickel per QQ-N-290, 550°F [288°C]. Gold per MIL-G-45204 over Nickel per QQ-N-290 500°F [260°C]

Metallic Sleeve — Copper per ASTM B152

Plating — Nickel per QQ-N-290, 550°F [288°C]



Related Product Data

Application Tooling — pages 7-22 and 7-23

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Dimensions W	C Min.	E Max.	L Max.	Terminal Insulation Color	Wire Insulation Diameter Max.	Body Plating[1]	Part Number Loose Piece
18-16 1,600-2,800 [0.81-1.42]	**.033** 0.84	4	**.218** 5.54	**.156** 3.96	**.560** 14.22	**.672** 17.07	Orange	**.135** 3.43	Nickel	50834
		8 M4	**.312** 7.92	**.281** 7.14	**.685** 17.40	**.844** 21.44	Orange	**.135** 3.43	Nickel	50836
		10	**.312** 7.92	**.281** 7.14	**.685** 17.40	**.844** 21.44	Orange	**.135** 3.43	Nickel	50836-1
12-10 5,180-13,100 [2.62-6.64]	**.042** 1.07	8 M4	**.375** 9.53	**.302** 7.67	**.893** 22.68	**1.083** 27.51	Black	**.214** 5.44	Nickel	50845-1
		10	**.375** 9.53	**.302** 7.67	**.893** 22.68	**1.083** 27.51	Black	**.214** 5.44	Nickel	50845-2
		1/4 M6	**.531** 13.49	**.437** 11.10	**1.012** 25.70	**1.280** 32.51	Black	**.214** 5.44	Nickel	50846

[1] Nickel plated parts are to be used with nickel plated wire. Gold plated parts are to be used with silver plated wire.
Note: "C" dimension applies from edge of metal wire barrel to center of stud hole.

Pre-Insulated Spare Wire Caps (For Unstripped Wire)

Temperature Rating, Material and Finish

Insulation — TEFLON

Ring — Copper per ASTM B152

Plating — Nickel per QQ-N-290, 550°F [288°C]

Related Product Data

Application Tooling — shown to the right

Tool Part Number 69272-1

Wire Insulation Diameter Range	Dimension L Max.	Ring Color	Tool Color Guide	Part Number
.075 – .087 1.91 – 2.21	**.500** 12.70	Black and Orange	Orange	328859

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Uninsulated Terminals and Splices

SOLISTRAND
Heat Resistant
Ring Tongue Terminals

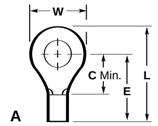
Temperature Rating, Material and Finish

Terminal Body — Copper per ASTM B152

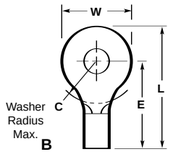
Plating — Nickel per QQ-N-290, 650°F [343°C]

Related Product Data

Application Tooling — pages 7-22 and 7-23



Non-Insulation Support



Non-Insulation Support (Wire Range 2 & 1/0)

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Style	Dimensions W	C	E Max.	L Max.	Part Number Loose Piece
22-16 509-3,260 [0.26-1.65]	.033 0.84	6 M3.5	A	**.218** 5.54	**.156** 3.96	**.337** 8.56	**.449** 11.40	322797
			A	**.281** 7.14	**.250** 6.35	**.436** 11.07	**.574** 14.58	323219
		8 M4	A	**.281** 7.14	**.250** 6.35	**.436** 11.07	**.574** 14.58	322798
		10	A	**.281** 7.14	**.250** 6.35	**.436** 11.07	**.574** 14.58	322799
16-14 2,050-5,180 [1.04-2.62]	.033 0.84	10	A	**.343** 8.71	**.281** 7.14	**.462** 11.73	**.636** 16.15	322695*
		1/4 M6	A	**.469** 11.91	**.437** 11.10	**.618** 15.70	**.855** 21.72	322733
12-10 5,180-13,100 [2.62-6.64]	.042 1.07	10	A	**.375** 9.53	**.302** 7.67	**.575** 14.61	**.765** 19.43	323062
		5/16 M8	A	**.531** 13.49	**.468** 11.89	**.736** 18.69	**1.004** 25.50	323064
8 13,100-20,800 [6.64-10.5]	.051 1.30	10	A	**.406** 10.31	**.359** 9.12	**.743** 18.87	**.949** 24.10	323165
		1/4 M6	A	**.469** 11.91	**.359** 9.12	**.696** 17.68	**.933** 23.70	323166
		5/16 M8	A	**.562** 14.27	**.406** 10.31	**.790** 20.07	**1.074** 27.28	323167
6 20,800-33,100 [10.5-16.8]	.060 1.52	10	A	**.468** 11.89	**.531** 13.49	**.931** 23.65	**1.168** 29.67	323169
		3/8	A	**.625** 15.88	**.531** 13.49	**.931** 23.65	**1.246** 31.65	323172
4 33,100-52,600 [16.8-26.7]	.073 1.85	1/4 M6	A	**.500** 12.70	**.437** 11.10	**.946** 24.03	**1.199** 30.45	323173
2 52,600-83,700 [26.7-42.4]	.073 1.85	3/8	B	**.625** 15.88	**.540** 13.72	**1.212** 30.78	**1.527** 38.79	323177

*Available in small packaging quantities.

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UK: 44-208-420-8341

Uninsulated Terminals and Splices (Continued)

SOLISTRAND Heat Resistant Splices

Temperature Rating, Material and Finish

Splice Body — Copper per ASTM B152

Plating — Nickel per QQ-N-290, 650°F [343°C]

Related Product Data

Application Tooling — pages 7-22 and 7-23

Style-A Non-Insulation Support Butt Splice

Style-B Non-Insulation Support Parallel Splice

Style-C Non-Insulation Support Butt Splice

Wire Size Circular Mils [mm²]	Material Thickness Max.	Style	Dimensions L Max.	Dimensions ID Min.	Dimensions OD Max.	Part Number Loose Piece
22-16 509-3,260 [0.26-1.65]	**.033** 0.84	A	**.578** 14.68	**.061** 1.55	**.141** 3.58	323796
		B	**.301** 7.65	**.061** 1.55	**.141** 3.58	323030
		C	**.591** 15.01	**.061** 1.55	**.141** 3.58	322822
16-14 2,050-5,180 [1.04-2.62]	**.033** 0.84	A	**.567** 14.40	**.085** 2.16	**.165** 4.19	323795
		B	**.301** 7.65	**.085** 2.16	**.165** 4.19	323794
12-10 5,180-13,100 [2.62-6.64]	**.042** 1.07	A	**.565** 14.35	**.129** 3.28	**.226** 5.74	323755
		B	**.333** 8.46	**.129** 3.28	**.226** 5.74	323754
8 13,100-20,800 [6.64-10.5]	**.051** 1.30	B	**.375** 9.53	**.172** 4.37	**.296** 7.52	2-34318-1

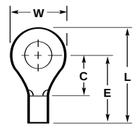
SOLISTRAND High Temperature Ring Tongue Terminals

Temperature Rating and Material

Terminal Body — Nickel per ASTM B162, 1200°F [649°C]

Related Product Data

Application Tooling — pages 7-22 and 7-23



Non-Insulation Support

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Color Code	Stud Size	Dimensions W	Dimensions C Min.	Dimensions E Max.	Dimensions L Max.	Part Number Loose Piece
22-16 509-3,260 [0.26-1.65]	**.033** 0.84	Orange	4	**.218** 5.54	**.156** 3.96	**.337** 8.56	**.449** 11.40	321884
			5 M3	**.218** 5.54	**.156** 3.96	**.337** 8.56	**.449** 11.40	321885
			6 M3.5	**.281** 7.14	**.250** 6.35	**.431** 10.95	**.574** 14.58	321889*
			8 M4	**.281** 7.14	**.250** 6.35	**.431** 10.95	**.574** 14.58	321890*
			10	**.281** 7.14	**.250** 6.35	**.431** 10.95	**.574** 14.58	321891*
16-14 2,050-5,180 [1.04-2.62]	**.033** 0.84	Orange	6 M3.5	**.250** 6.35	**.171** 4.34	**.352** 8.94	**.480** 12.19	322329
			8 M4	**.343** 8.71	**.281** 7.14	**.462** 11.73	**.636** 16.15	322334*
			10	**.343** 8.71	**.281** 7.14	**.462** 11.73	**.636** 16.15	322335*
			1/4 M6	**.468** 11.89	**.437** 11.10	**.618** 15.70	**.855** 21.72	322339

*Available in small packaging quantities.

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Uninsulated Terminals and Splices (Continued)

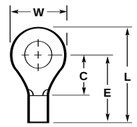
SOLISTRAND High Temperature Ring Tongue Terminals

Temperature Rating and Material

Terminal Body — Nickel per ASTM B162, 1200°F [649°C]

Related Product Data

Application Tooling — pages 7-22 and 7-23



Non-Insulation Support

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Color Code	Stud Size	Dimensions W	C Min.	E Max.	L Max.	Part Number Loose Piece
12-10 5,180-13,100 [2.62-6.64]	**.042** 1.07	Orange	8 M4	**.375** 9.53	**.281** 7.14	**.549** 13.94	**.739** 18.77	323745*
			10	**.375** 9.53	**.281** 7.14	**.549** 13.94	**.739** 18.77	323680*
			1/4 M6	**.531** 13.49	**.468** 11.89	**.736** 18.69	**1.004** 25.50	323683*
8 13,100-20,800 [6.64-10.5]	**.051** 1.30	Orange	10	**.406** 10.31	**.359** 9.12	**.743** 18.87	**.949** 24.10	328822

*Available in small packaging quantities.

SOLISTRAND High Temperature Splices

Temperature Rating and Material

Splice Body — Nickel per ASTM B162, 1200°F [649°C]

Related Product Data

Application Tooling — pages 7-22 and 7-23

Style-A Non-Insulation Support Butt Splice

Style-B Non-Insulation Support Parallel Splice

Style-C Non-Insulation Support Butt Splice

Wire Size Circular Mils [mm²]	Material Thickness Max.	Color Code	Style	Dimensions L Max.	ID Min.	OD Max.	Part Number Loose Piece
22-16 509-3,260 [0.26-1.65]	**.033** 0.84	Orange	A	**.578** 14.68	**.061** 1.55	**.141** 3.58	322324*
			B	**.301** 7.65	**.061** 1.55	**.141** 3.58	322326
16-14 2,050-5,180 [1.04-2.62]	**.033** 0.84	Orange	A	**.567** 14.40	**.085** 2.16	**.165** 4.19	322345
			B	**.301** 7.65	**.085** 2.16	**.165** 4.19	322347
			C	**.529** 13.44	**.085** 2.16	**.165** 4.19	323878
12-10 5,180-13,100 [2.62-6.64]	**.042** 1.07	Orange	A	**.567** 14.40	**.129** 3.28	**.226** 5.74	323696*
			B	**.333** 8.46	**.129** 3.28	**.226** 5.74	323672
			C	**.703** 17.86	**.129** 3.28	**.226** 5.74	323698

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Uninsulated Terminals and Splices (Continued)

DIAMOND GRIP Heat Resistant Ring Tongue Terminals

Temperature Rating, Material and Finish

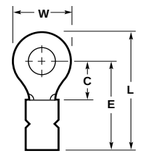
Terminal Body — Copper per ASTM B152

Plating — Nickel per QQ-N-290, 650°F [343°C]

Metallic Sleeve — Nickel Silver per ASTM B122

Related Product Data

Application Tooling — pages 7-22 and 7-23

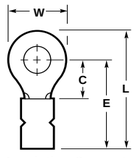


Insulation Support

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Dimensions W	C Min.	E Max.	L Max.	Wire Insulation Diameter Max.	Part Numbers Loose Piece	Part Numbers Tape Mounted
22-16 509-3,260 [0.26-1.65]	.033 0.84	4	.218 5.54	.156 3.96	.512 13.00	.624 15.85	.140 3.56	322363	—
		6 M3.5	.218 5.54	.156 3.96	.530 13.46	.645 16.38	.110 2.79	323151	—
			.281 7.14	.250 6.35	.611 15.52	.749 19.02	.140 3.56	323199	—
		8 M4	.281 7.14	.250 6.35	.611 15.52	.749 19.02	.140 3.56	322365	—
			.281 7.14	.250 6.35	.629 15.98	.770 19.56	.110 2.79	323152	—
		10	.281 7.14	.250 6.35	.611 15.52	.749 19.02	.140 3.56	322366	—
			.281 7.14	.250 6.35	.629 15.98	.770 19.56	.110 2.79	323153	—
16-14 2,050-5,180 [1.04-2.62]	.033 0.84	10	.343 8.71	.281 7.14	.637 16.18	.811 20.60	.170 4.32	322375	—
			.343 8.71	.281 7.14	.659 16.74	.836 21.23	.130 3.30	323161	—
12-10 5,180-13,100 [2.62-6.64]	.042 1.07	6 M3.5	.375 9.53	.302 7.67	.841 21.36	1.034 26.26	.230 5.84	323066	—
		10	.375 9.53	.302 7.67	.841 21.36	1.034 26.26	.230 5.84	323068	323068-1
		1/4 M6	.531 13.49	.468 11.89	1.002 25.45	1.273 32.33	.230 5.84	323069	—

Note: "C" dimension applies from edge of metal wire barrel to center of stud hole.

DIAMOND GRIP High Temperature Ring Tongue Terminals



Insulation Support

Temperature Rating and Material

Terminal Body — See table, 1200°F [649°C], Nickel per ASTM B162, Alumel —, Chromel —

Metallic Sleeve — Nickel Silver per ASTM B122

Related Product Data

Application Tooling — pages 7-22 and 7-23

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Dimensions W	C Min.	E Max.	L Max.	Body Material	Sleeve Color Code	Wire Insulation Diameter Max.	Part Number Loose Piece
22-16 509-3,260 [0.26-1.65]	.033 0.84	6 M3.5	.281 7.14	.250 6.35	.611 15.52	.749 19.02	Nickel	Orange	.140 3.56	321892
		8 M4	.281 7.14	.250 6.35	.611 15.52	.749 19.02	Nickel	Orange	.140 3.56	321893
			.312 7.92	.281 7.14	.637 16.18	.796 20.22	Nickel	Orange	.140 3.56	321897
			.312 7.92	.281 7.14	.637 16.18	.796 20.22	Chromel	Gray	.140 3.56	1-321897-0
		10	.281 7.14	.250 6.35	.611 15.52	.749 19.02	Nickel	Orange	.140 3.56	321894
			.312 7.92	.281 7.14	.637 16.18	.796 20.22	Nickel	Orange	.140 3.56	321898
			.312 7.92	.281 7.14	.637 16.18	.796 20.22	Alumel	Green	.140 3.56	1-321898-0
		1/4 M6	.468 11.89	.437 11.10	.793 20.14	1.031 26.19	Nickel	Orange	.140 3.56	322320

Note: "C" dimension applies from edge of metal wire barrel to center of stud hole.

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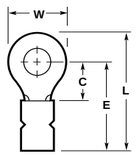
Uninsulated Terminals and Splices (Continued)

DIAMOND GRIP High Temperature Ring Tongue Terminals



Insulation Support

Temperature Rating and Material

Terminal Body — See table, 1200°F [649°C], Nickel per ASTM B162, Alumel —, Chromel —

Metallic Sleeve — Nickel Silver per ASTM B122

Related Product Data

Application Tooling — pages 7-22 and 7-23

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Dimensions W	C Min.	E Max.	L Max.	Body Material	Sleeve Color Code	Wire Insulation Diameter Max	Part Number Loose Piece
16-14 2,050-5,180 [1.04-2.62]	**.033** 0.84	8 M4	**.343** 8.71	**.281** 7.14	**.637** 16.18	**.811** 20.60	Nickel	Orange	**.170** 4.32	322337
		10	**.343** 8.71	**.281** 7.14	**.637** 16.18	**.811** 20.60	Nickel	Orange	**.170** 4.32	322338
12-10 5,180-13,100 [2.62-6.64]	**.042** 1.07	8 M4	**.375** 9.53	**.281** 7.14	**.815** 20.70	**1.008** 25.60	Nickel	Orange	**.230** 5.84	323749
			.375 9.53	**.281** 7.14	**.815** 20.70	**1.008** 25.60	Chromel	Gray	**.230** 5.84	2-323749-1
		10	**.375** 9.53	**.281** 7.14	**.815** 20.70	**1.008** 25.60	Nickel	Orange	**.230** 5.84	323750
			.375 9.53	**.281** 7.14	**.815** 20.70	**1.008** 25.60	Alumel	Green	**.230** 5.84	2-323750-1
		1/4 M6	**.531** 13.49	**.468** 11.89	**1.002** 25.45	**1.273** 32.33	Nickel	Orange	**.230** 5.84	323751

Note: "C" dimension applies from edge of metal wire barrel to center of stud hole.

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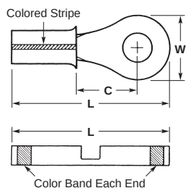
PIDG Terminals and Splices for Thin Wall Cables

Product Facts

- All high and low temperature PIDG STRATO-THERM Terminals and Splices conform to BS 2G 178 — crimped joints for aircraft cables and wires — and meets the requirements of BS G 204, class II
- Temperature Range — -67° to +221°/+302°F [-55° to +105°/+150°C]
- European military & civil program cross references available, i.e. Pannavia, Eurofighter, Concorde, Airbus and other customer platforms
- 302°F [150°C] — High temperature
  - D.D.P. No.: GP 10 D
  - Nickel plating over copper barrel
  - TEFLON sleeve
  - Not tested up to 190°C and 260°C as set out in BS 2G 178
- 221°F [105°C] — Low temperature
  - D.D.P. No.: GP 17
  - Tin plating over copper barrel
  - Nylon sleeve
  - Compatible with all BS 2G 178 fluids, except BS 3150 and BS M 26
- Dot code feature for additional visual verification of correct cavity to terminal association after crimp possible
- Instruction Sheet — 408-1049
- Insulated sleeves are color coded for easy identification
- Used for thin wall cable with tin or nickel plated conductors
- Nickel plated Terminals and Splices are not recommended to crimp with silver plated conductors. Gold plating is recommended for silver plated conductors.
- Inner serrated wire barrel for improved electrical conductivity and high tensile strength

The special PIDG STRATO-THERM Terminal & Splice line for thin wall aircraft cables and wires is used in nearly every Aerospace & Defense platform in Europe. We do offer this line in a low temperature 221°F [105°C] and high temperature 302°F [150°C] profile.



Low Temperature Range

Related Product Data

Application Tooling — page 7-23

Wire Size	Stud Size +/- .03 [+/- 0.8]	Stud Size Metric	Stud Size BA #	Stud Size UN #	Dimensions (Max.) W	Dimensions (Max.) L	Dimensions (Max.) C	Color Code	Wire Insulation Outside Dia.	Part Number
22-24	**.093** 2.36	M2	8	2	**.218** 5.54	**.652** 16.56	**.166** 4.22	Black	**.035-.075** 0.90-1.90	151435
					.218 5.54	**.652** 16.56	**.166** 4.22			151436
	.119 3.02	M2.5	6	4	**.281** 7.14	**.780** 19.80	**.25** 6.35			151438
					.218 5.54	**.746** 18.94	**.265** 6.73			151458
	.145 3.68	M3	4	6	**.218** 5.54	**.652** 16.56	**.166** 4.22			151437
					.281 7.14	**.780** 19.80	**.25** 6.35			151439
	.171 4.34	M4	3	8	**.281** 7.14	**.780** 19.80	**.25** 6.35			151440
	.197 5.00	—	2	10	**.281** 7.14	**.780** 19.80	**.25** 6.35			151441
20	**.093** 2.36	M2	8	2	**.218** 5.54	**.662** 16.81	**.166** 4.22	Purple w/ Red Stripe	**.043-.079** 1.10-2.00	152899
	.122 3.10	M2.5	6	4	**.218** 5.54	**.662** 16.81	**.166** 4.22			152898
	.119 3.02	M2.5	6	4	**.240** 6.09	**.882** 22.40	**.36** 9.14			154924
	.148 3.76	M3	4	6	**.281** 7.14	**.787** 20.00	**.25** 6.35			152895
	.145 3.68	M3	4	6	**.250** 6.35	**.882** 22.40	**.36** 9.14			152896
	.148 3.76	M3	4	6	**.218** 5.54	**.662** 16.81	**.166** 4.22			152897
	.171 4.34	M4	3	8	**.281** 7.14	**.787** 20.00	**.26** 6.60			152894
					.312 7.92	**.834** 21.18	**.291** 7.39			152893
	.200 5.08	—	2	10	**.312** 7.92	**.834** 21.18	**.291** 7.39			152891
	.199 5.06	—	2	10	**.281** 7.14	**.787** 20.00	**.26** 6.60			152892
	.268 6.81	M6	0	1/4	**.469** 11.91	**1.07** 27.13	**.447** 11.35			152890
	.331 8.41	M8	5/15	5/16	**.469** 11.91	**1.07** 27.13	**.447** 11.35			152889
	.393 9.98	M9.5	3/8	3/8	**.469** 11.91	**1.07** 27.13	**.447** 11.35			152888

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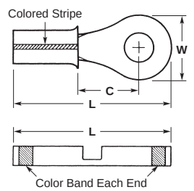
PIDG Terminals and Splices for Thin Wall Cables (Continued)

Low Temperature Range
(Continued)

Related Product Data
Application Tooling — page 7-23



Wire Size	Stud Size				Dimensions (Max.)			Color Code	Wire Insulation Outside Dia.	Part Number
	+/- .03 [+/- 0.8]	Metric	BA #	UN #	W	L	C			
18-16	**.122** 3.10	M2.5	6	4	**.218** 5.54	**.680** 17.27	**.166** 4.22	Orange w/ Red Stripe	**.055-.106** 1.40-2.70	152887
	.125 3.18	M2.5	6	4	**.240** 6.09	**.90** 22.86	**.360** 9.14			154927
	.145 3.68	M3	4	6	**.281** 7.14	**.805** 20.44	**.26** 6.60			152884
					.132 3.35	**.90** 22.86	**.37** 9.39			152885
					.218 5.54	**.680** 17.27	**.166** 4.22			152886
	.171 4.34	M4	3	8	**.312** 7.92	**.852** 21.64	**.291** 7.39			152882
					.281 7.14	**.805** 20.44	**.268** 6.80			152883
	.197 5.00	—	2	10	**.312** 7.92	**.852** 21.64	**.291** 7.39			152880
					.281 7.14	**.805** 20.44	**.26** 6.60			152881
	.265 6.73	M6	0	1/4	**.469** 11.91	**1.09** 27.58	**.447** 11.35			152879
	.328 8.33	M8	5/16	5/16	**.469** 11.91	**1.09** 27.58	**.447** 11.35			152878
	.390 9.90	M9.5	3/8	3/8	**.531** 13.48	**1.23** 31.14	**.556** 14.12			152877
14-12	**.199** 3.02	M2.5	6	4	**.240** 6.09	**.974** 24.73	**.447** 11.35	White w/ Red Stripe	**.091-.126** 2.30-3.20	154930
					.250 6.35	**.711** 18.05	**.181** 4.59			152876
	.145 3.68	M3	4	6	**.343** 8.71	**.867** 22.02	**.291** 7.39			152874
					.250 6.35	**.711** 18.05	**.181** 4.59			152875
	.171 4.34	M4	3	8	**.343** 8.71	**.867** 22.02	**.291** 7.39			152873
	.197 5.00	—	2	10	**.343** 8.71	**.867** 22.02	**.291** 7.39			152872
	.265 6.73	M6	0	1/4	**.469** 11.91	**1.09** 27.58	**.447** 11.35			152871
	.328 8.33	M8	5/16	5/16	**.469** 11.91	**1.09** 27.58	**.447** 11.35			152870
	.390 9.90	M9.5	3/8	3/8	**.531** 13.48	**1.22** 31.04	**.556** 14.12			152869

Splices

Wire Size	Stud Size				Dimensions (Max.)			Color Code	Wire Insulation Outside Dia.	Part Number
	+/- .03 [+/- 0.8]	Metric	BA #	UN #	W	L	C			
24-22	—	—	—	—	—	**1.125** 28.58	—	Black	**.035-.075** 0.90-1.90	153400
20	—	—	—	—	—	**1.135** 28.82	—	Purple w/ Red Stripe	**.043-.079** 1.10-2.00	153401
18-16	—	—	—	—	—	**.996** 25.30	—	Orange w/ Red Stripe	**.055-.106** 1.40-2.70	153402
14-12	—	—	—	—	—	**.996** 25.30	—	White w/ Red Stripe	**.091-.126** 2.30-3.20	153403

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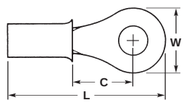
PIDG Ring Tongue Terminals for Thin Wall Cables

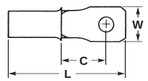
High Temperature Range

Related Product Data

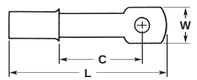
Application Tooling — page 7-23



Style A



Style B



Style C

Wire Size	Stud Size				Dimensions (Max.)			Color Code	Wire Insulation Outside Dia.	Style	Part Number
	+/- .03 [+/- 0.8]	Metric	BA #	UN #	W	L	C				
22-24	**.119** 3.02	M2.5	6	4	**.218** 5.54	**.657** 16.68	**.166** 4.22	Brown	**.035-.075** 0.90-1.90	A	152642
					.281 7.14	**.787** 19.98	**.25** 6.35				152644
					.218 5.54	**.751** 19.08	**.25** 6.35				152648
	.145 3.68	M3	4	6	**.218** 5.54	**.657** 16.68	**.166** 4.22				152643
					.281 7.14	**.787** 19.98	**.25** 6.35				152645
	.171 4.34	M4	3	8	**.281** 7.14	**.787** 19.98	**.25** 6.35				152646
	1.97 5.00	—	2	10	**.281** 7.14	**.787** 20.0	**.244** 6.20				152647
20	**0.93** 2.36	M2	8	2	**.218** 5.54	**.680** 17.27	**.166** 4.22	Grey	**.043-.079** 1.10-2.00	A	152660
	.122 3.10	M2.5	6	4	**.281** 7.14	**.787** 19.98	**.26** 6.60				152654
					.218 5.54	**.680** 17.27	**.166** 4.22				152659
	.148 3.76	M3	4	6	**.281** 7.14	**.787** 19.98	**.25** 6.35				152655
					.218 5.54	**.680** 17.27	**.166** 4.22				152658
	.171 4.34	M4	3	8	**.281** 7.14	**.787** 19.98	**.26** 6.60				152656
	.199 5.06	—	2	10	**.281** 7.14	**.787** 19.98	**.26** 6.60				152657
	.268 6.81	M6	0	1/4	**.469** 11.91	**1.08** 27.58	**.447** 11.35				152661
	.331 8.41	M8	5/16	5/16	**.469** 11.91	**1.08** 27.58	**.447** 11.35				152662
	.393 9.98	M9.5	3/8	3/8	**.469** 11.91	**1.08** 27.58	**.447** 11.35				152663
	.122 3.10	M2.5	6	4	**.218** 5.54	**.746** 18.94	**.26** 6.60			B	153493
18-16	**.122** 3.10	M3	6	4	**.218** 5.54	**.681** 17.30	**.166** 4.22	Orange	**.055-.106** 1.40-2.70	A	153103
	.145 3.68	M3	4	6	**.281** 7.10	**.807** 20.50	**.26** 6.60				153104
	.171 4.34	M4	3	8	**.312** 7.92	**.854** 21.70	**.291** 7.39				153105
	.197 5.00	—	2	10	**.312** 7.92	**.854** 21.70	**.291** 7.39				153106
	.265 6.73	M6	0	1/4	**.469** 11.91	**1.09** 27.70	**.447** 11.35				153107
	.328 8.33	M8	5/16	5/16	**.469** 11.91	**1.09** 27.70	**.447** 11.35				153108
	.390 9.90	M9.5	3/8	3/8	**.531** 13.48	**1.21** 30.79	**.531** 13.48				153109
	.125 3.17	—	—	—	**.223** 5.66	**.902** 22.90	**.359** 9.11			C	153475

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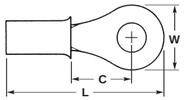
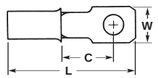
PIDG Ring Tongue Terminals for Thin Wall Cables (Continued)

High Temperature Range
(Continued)

Related Product Data
Application Tooling — page 7-23



Style A



Style D

Wire Size	Stud Size				Dimensions (Max.)			Color Code	Wire Insulation Outside Dia.	Style	Part Number
	+/- .03 [+/- 0.8]	Metric	BA #	UN #	W	L	C				
14-12	**.119** 3.02	M2.5	6	4	**.25** 6.35	**.711** 18.06	**.181** 4.59	White	**.091-.126** 2.30-3.20	A	153110
	.145 3.68	M3	4	6	**.25** 6.35	**.711** 18.06	**.181** 4.59				153111
	.171 4.34	M4	3	8	**.343** 8.71	**.867** 22.02	**.291** 7.39				153112
	.197 5.00	—	2	10	**.343** 8.71	**.867** 22.02	**.291** 7.39				153113
	.265 6.73	M6	0	1/4	**.469** 11.91	**1.08** 27.58	**.448** 11.39				153114
	.328 8.33	M8	5/16	5/16	**.469** 11.91	**1.08** 27.58	**.448** 11.39				153115
	.390 9.90	M9.5	3/8	3/8	**.531** 13.48	**1.21** 30.76	**.531** 13.48				153116
	.119 3.02	M2.5	6	4	**.218** 5.44	**.798** 20.26	**.291** 7.39			D	153476
10	**.119** 3.02	M2.5	6	4	**.280** 7.10	**.937** 23.79	**.213** 5.40	Black	**.102-.150** 2.60-3.80	A	50844
	.145 3.68	M3	4	6	**.374** 9.50	**1.08** 27.50	**.295** 7.50				50845
	.171 4.34	M4	3	8	**.374** 9.50	**1.08** 27.50	**.295** 7.50				50845-1
	.197 5.00	—	2	10	**.374** 9.50	**1.08** 27.50	**.295** 7.50				50845-2
	.265 6.73	M6	0	1/4	**.531** 13.48	**1.28** 32.51	**.429** 10.90				50846
	.328 8.33	M8	5/16	5/16	**.531** 13.48	**1.33** 33.70	**.461** 11.70				50847
	.390 9.90	M9.5	3/8	3/8	**.593** 15.06	**1.40** 35.68	**.531** 13.48				50848

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Application Tooling

Wire Size Range AWG 26-10

Product Type	Wire Size	Hand Tools	Pneumatic Tooling: Dies for 626 Pneumatic Tools 189721-[ ] and 189722-[ ] require Straight Action Adapter[1] 217200-1 or "C" Head Adapter 318161-1 Dies also fit 69710-1 Hand Tool	Tooling For Tape Mounted Products: Dies for 69875 AMP-TAPETRONIC / AMP-O-LECTRIC[2] Requires Applicator / AMPOMATOR CLS IV[2] Requires Applicators
Pre-Insulated Terminals	26-24	69692-1	69731	—
	22-20		69732	69936
	18-16	69693-1	69733	69937
	14		69734	—
	12-10	—	69735	—
Pre-Insulated Splices	22-20	—	69327	—
	18-16	—	69328	—
	14-12	—	69329	—

[1] Straight Action Adapter 217200-1 is used with Tools 189721-1 or 189722-1. "C" Head Adapter 318161-1 is used with Tools 189721-2 or 189722-2. Both adapters require the use of non-ratchet tool holder 189928-1 or ratchet tool holder 356304-1.
[2] Call Technical Support for Machine and Applicator part numbers.

Wire Size Range AWG 26-6

Product Type	Wire Size	Hand Tools	Hydraulic Tools With Interchangeable Dies: 69097[2] "C" Head Nest	69097[2] "C" Head Indent	69099[2] "C" Head
Post Insulated Terminals and Splices	26-24	45730	—	—	—
	22-20	46467, 46468[1]	—	—	—
	18-16	46468	—	—	—
	8	—	46146	46145	69216
	6	—	46134	46133	69217

[1] Part Number 55235-1 only
[2] These crimping heads are recommended for use only with AMP Hydraulic Hand Pump 314979-1, DYNA-CRIMP Hydraulic Power Units 69120-1 (115 VAC) and 69120-2 (230 VAC).

Wire Size Range AWG 22-10

Product Type	Wire Size	Hand Tools	Pneumatic Tooling: Crimping Heads for 626 Pneumatic Tool 189721-1 and 189722-1[1]	Tooling For Tape Mounted Products: Dies for 69875 AMP-TAPETRONIC / AMP-O-LECTRIC[2] Requires Applicator / AMPOMATOR CLS IV[2] Requires Applicators
Uninsulated Terminals and Splices with Insulation Support	22-16	46673 46673-1	356744-1	69930
	16-14	46988 59294	356744-2	69931
	12-10	59461	904870-1	69932
Uninsulated Terminals and Splices with Non-Insulation Support	22-16	46447	217206-1	69954
	16-14			69955
	12-10			69956

[1] Crimping Heads require the use of non-ratchet tool holder 189767-1 or ratchet tool holder 356302-1.
[2] Call Technical Support for Machine and Applicator part numbers.

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Application Tooling (Continued)

Wire Size Range AWG 8-1/0

Product Type	Wire Size	Hand Tools	Pneumatic Tooling	Hydraulic Tools With Self Contained Dies		Hydraulic Tools with Interchangeable Dies				
			69015 Head	Hand Tool	Latch Head	59973-1 Hand Tool, 69065[2] & 69067[2] Latch Heads		69097[2] "C" Head		69099[2] "C" Head
						Nest	Indent	Nest	Indent	
Uninsulated Terminals and Splices with Non-Insulation Support	8	69355[1]	49956	59975-1	69069[2]	48126	48355	—	—	69216
	6	59083 No CERTI-CRIMP	48172			48128		—	—	69217
	4	—	48173			48129	48127	46135		69218
	2	—	48174			48130		46136	46133	45433
	1/0	—	48183	—	—	48132	48131	46138	46137	45436

[1] CERTI-CRIMP Hand Tool.
[2] These crimping heads are recommended for use only with AMP Hydraulic Hand Pump 314979-1, DYNA-CRIMP Hydraulic Power Units 69120-1 (115 VAC) and 69120-2 (230 VAC).

Tooling for Insulated Terminals

In order to obtain the best results from AMP terminals and splices, it is important to choose the correct tooling. Each terminal manufactured is matched to a compatible tool. By using the guidelines, it's easy to select the correct tool for your application. Different types of tooling are available including hand, pneumatic, or hydraulic. So whether you are involved in large production runs or just maintenance and repair there is a matched tool ideal for your application.

Heavy Head Tool

Hand Tooling

For repair, general maintenance or small production runs, hand tooling is the best way to a reliable termination. Easy to use, requiring no external power source, they can be easily carried from job to job. Precision crimp dies ensure a perfect termination.

AMP hand tooling meets all these requirements and more. Our un-surpassed expertise in connection technology has been used to benefit our complete range of tooling. Take for example the CERTI-CRIMP hand tool. There is a CERTI-CRIMP tool available for each terminal range. Every precision die has been constructed to the finest engineering standards and is strong enough to be used through thousands of crimp terminations. Our ratchet device provides that the crimp cycle is completed before releasing, so it is not either under, or over-crimp any terminal.

For larger terminals a heavy duty hand tool is available which also features a similar patented ratchet device.

Terminal Type	Wire Size mm[2]	Single Die		
		AWG	Hand Tool	Dot Code
PIDG Terminals for Thin Wall Cables High and Low Temperature	0.25-0.4	24-22	576778	2 dots
	0.6	20	576779	1 dot
	1.0	18	576780	2 dots
	1.2	16	576781	1 dot
	2.0	14	576782	2 dots
	3.0	12	576783	1 dot
	6.0	10	576784	1 dot

Catalog 1308940
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Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Introduction

Product Facts

- No need for inhibitor agents, thanks to our “dry crimp” technique
- Terminating/splicing capabilities for stranded aluminum wire, plus splicing of aluminum wire to copper wire conductors
- Wide wire-size range — aluminum 8 to 4/0 [8.6 to 110.9 mm^2] and copper 10 to 3/0 [4.8 to 85.9 mm^2]
- Efficient production rates, uniform reliability, at low cost — all because of AMP electro-hydraulic DYNA-CRIMP Tooling
- Optimum electrical, environmental, and mechanical performance crimps from AMP three-stage dies
- Portable battery powered hydraulic unit is available and low pressure crimp dies for 2/0 size

Technical Documents

Instruction Sheets

408-2281— Application Terminals and Splices Tooling

408-2453 — Tool 69066/Crimping Die

408-9535 — Tool 58422-1

Product Specifications

108-11011 — Overall Aluminum Wires

108-11011-1 — Copper Wires

108-11011-2 — High Temp. Wires with Flag Terminals

Application Specifications

114-2134

AMP COPALUM Sealed Terminals and Splices are designed especially for solving the inherent problems of terminating aluminum conductors. These connectors are terminated to stranded aluminum wire using a “dry crimp.” This technique eliminates the need for an inhibitor agent to break down the highly tenacious and inert oxides that form on aluminum conductors. An extremely efficient and reliable crimping method, the dry crimp also produces a sealed connection that better prevents re-oxidation and corrosion when intimate terminal/conductor contact is achieved.

AMP COPALUM Sealed Terminals and Splices are available for terminating and splicing stranded aluminum wire in sizes ranging from 8 to 4/0 [8.6 to 110.9 mm^2] and copper 10 to 3/0 [4.8 to 85.9 mm^2]. With the capability of splicing aluminum wire to copper wire, these connectors are generally applicable wherever aluminum wire or cable is used. AMP COPALUM Sealed Terminals and Splices are especially suited for the aerospace industry.

Each connector body is constructed of tin-plated copper and houses a nickel-plated brass insert and funnel. The funnel is designed to better prevent wire strands from hanging up when inserted into the wire barrel. The perforated insert enhances reliability for the terminal and splice when crimped to the aluminum/copper conductors.

During the crimping operation, the relatively soft conductor material extrudes through the insert holes, causing the brittle oxide to be sheared, and clean conductor metal to be brought into intimate contact with the inner surfaces of the body and insert. These areas of extrusion form an air- and moisture-tight seal, minimizing oxidation and corrosion.

Stranded-wire crimping also produces “cold welding” or solid-phase bonding between each wire strand. During the crimping process, deformation pressure is applied from several planes, causing sufficient plastic flow of the conductor material. This fractures the oxide film on each wire strand and induces different rates of extrusion. The resulting wiping action under pressure produces interstrand bonding, yielding many contact surfaces and a substantial increase in the contact area. Excellent electrical characteristics are thus achieved.

The increase in contact area also decreases the chances of electrical malfunction due to creep, differences in thermal expansion, and corrosion. Also the insert grips the conductor securely, providing a good mechanical connection.

Economical termination of these connectors becomes a reality with the use of the AMP electro-hydraulic DYNA-CRIMP Tool. This tool is equipped with a uniquely designed die that simultaneously produces three distinct crimps.

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Introduction (Continued)

Product Evolution

The AMP Sealed COPALUM terminal and splice product line was established in the 1950's. Originally it had two separate product lines, one for aluminum wire and one for copper wire. Each line had butt connectors and terminals.

The Aluminum wire connector bodies were made of stamped and formed aluminum strip stock and COPALUM terminal connector bodies were made of stamped and formed copper strip stock.

Both products contained a closed cup (cartridge) installed within each wire barrel. This cartridge contained an oxide inhibiting compound with abrasive particles that flowed during crimping into the strand voids (interstices) and mechanically abraded the wire and barrel oxide surfaces. The oxide inhibitor protected the contact surfaces from further oxidation and formed a temporary partial seal between the conductor and the crimped insulation support.

The crimp dies were the two stage type and of the confined crescent design. The first stage crimped the wire barrel and cartridge, while the second stage crimped only the flared cartridge end. This second stage crimp produced the insulation support which was designed as a strain relief.

In the 60's, all copper bodies and perforated inserts were introduced. The industry wanted a dry crimp with a fully sealed body. Some important advantages of the copper design are:

1. Almost all buss contacts are copper. The plated terminal tongue needs no special contact surface treatment against the bolted copper buss. This is the (dynamic), disconnectable part of the connection.
2. The copper wire barrel allows for a natural two step down capacity from an equivalent aluminum wire to copper wire.
   Example—#4 aluminum down to #6 copper.
3. The more dense copper has 100% electrical conductivity compared to aluminum at 61% maximum. Copper compared to aluminum has hardly any mechanical creep; therefore, with the proper crimp, it provides a much more stable crimped (static), permanently sealed connection.
4. Within the circuit design there is always a need to change from high temperature copper wires to lower temperature aluminum wires. With the copper connector, we have the choices of "optional" (4 AL-6 CU) or "primary" (4 AL-4 AL) or "secondary" (6 CU-6CU) all within the same wire barrel and crimp die envelope.
5. During crimping, the hard nickel plated perforated insert digs into and intimately connects the wire and copper body while at the same time increasing the fresh surface contact areas via the holes and extrusion. With this feature, we now have a preferred "dry" connection with the copper to aluminum transition occurring inside the connector body where it is protected and controlled.
6. The barrier walls of the terminal and splice body provide the blind hole required for an environmentally-sealed crimp.
7. The product has a three stage simultaneous crimp design which allows for a very secure electrical crimp, a smooth transition crimp which goes up to the full round sealing crimp. It also has an identification feature and maintains maximum connector wall thickness after crimp.

We made several changes to the product line in the 80's and also changed the part numbers as listed below.

1. The perforated insert was modified without causing a change in connector performance.
2. The internal components were oriented and permanently locked in place during manufacture.
3. Clearer, more permanent marking was introduced with the straight knurl stripes replacing the blue ink stripe guides used to show crimp location.

Tyco Electronics continually monitors incoming material for material conformance. Consolidation of production facilities and improved equipment produce more accurate component parts which, after heat treatment and plating, yield an overall higher quality assembly. All customer drawings are now on new formats and are on CAD. Catalog and instructional materials are regularly updated.

In April 1993, a new application sheet 114-2134 was completed. Also in 1993, we released a whole line of two stud hole terminals, silver plated with high temperature terminals, two 4/0 AL style terminals, a new crimp die, and various sheared tongue styles.

Using engineering tools like CAE/CAD/CAM, thermography, and computer driven image analysis on crimp cross-sections, we are able to arrive at and maintain optimum product integrity and reliability.

As with all AMP products, we have a continuing program of product and process improvements to promote maximum performance to meet customer's needs.

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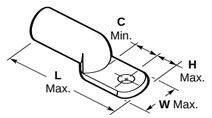
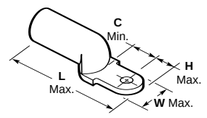
Single Hole Ring Tongue Terminals

Standard Tongue



Sheared Tongue



Wire Size Circular Mils mm²		Insul. Dia. Range	Tongue Thickness (Nom.)	Stud Size	Tongue Type	Dimensions				Part Number	Weight Grams*	Tooling for Power Unit 69120-1 or -2	
						H Max.	L Max.	W Max.	C Min.			Heads	Die
Aluminum	Copper												
8 **16564** 8.6	**10** **9354** 4.8	**.182–.200** 4.62–5.08	**.069** 1.75	**10**	—	**.291** 7.39	**1.66** 42.16	**.592** 15.04	**.50** 12.70	277147-1	11.0	69066 or 58422-1	68006
				1/4 6.35						277147-3	—		
				3/8 9.52						277147-2	10.0		
				10	Sheared	**.250** 6.35	**1.63** 41.40	**.492** 12.50	**.54** 13.72	277147-5	10.3		
6 **28280** 14.6	**8** **16983** 8.8	**.225–.250** 5.72–6.35	**.088** 2.24	**10**	—	**.310** 7.88	**1.90** 48.26	**.627** 15.92	**.47** 11.94	277148-1	16.8	69066 or 58422-1	68007
				1/4 6.35						277148-2	16.6		
				5/16 7.92						277148-3	16.2		
				3/8 9.52						277148-4	15.3		
				10	Sheared	**.250** 6.35	**1.84** 46.74	**.492** 12.50	**.54** 13.72	277154-1	15.2		
				1/4 6.35						277148-7	15.0		
4 **42420** 21.9	**6** **26818** 13.8	**.276–.305** 7.01–7.75	**.082** 2.08	**8**	—	**.310** 7.88	**2.00** 50.8	**.627** 15.92	**.53** 13.46	277149-5	—	69066 or 58422-1	68008
				1/4 6.35						277149-2	19.4		
				5/16 7.92						277149-3	18.9		
				3/8 9.52						277149-4	18.5		
				1/4 6.35	Sheared	**.310** 7.88	**2.00** 50.8	**.627** 15.92	**.53** 13.46	277149-8	18.5		
2 **67872** 35.0	**4** **42615** 22.0	**.340–.380** 8.64–9.65	**.093** 2.36	**1/4** 6.35	—	**.335** 8.51	**2.37** 60.20	**.675** 17.15	**.54** 13.72	277150-1	36.0	69066 or 58422-1	68009
				3/8 9.52						277150-3	34.0		
				1/4 6.35	Sheared	**.250** 6.35	**2.30** 58.42	**.492** 12.50	**.60** 15.24	277155-1	33.5		
1/0 **107464** 55.5	**2** **66500** 34.3	**.425–.470** 10.79–11.94	**.101** 2.57	**1/4** 6.35	Short	**.401** 10.19	**2.51** 63.75	**.812** 20.62	**.49** 12.45	277151-3	—	69066 or 58422-1	68010-1
				3/8 9.52						277151-1	53.3		
				5/16 7.92						277151-7	—		
				1/4 6.35	Long	**.448** 11.38	**2.73** 69.34	**.812** 20.62	**.72** 18.29	277151-5	57.0		
2/0 **138168** 71.3	**1/0** **104500** 53.9	**.500–.550** 12.7–13.97	**.128** 3.25	**1/4** 6.35	Short	**.451** 11.46	**2.81** 71.37	**.911** 23.14	**.51** 12.95	277152-1	—	69066 or 58422-1	314964-1 or 68011-1
				3/8 9.52						277152-2	76.3		
				5/16 7.92	Long	**.451** 11.46	**3.05** 77.47	**.911** 23.14	**.75** 19.05	277152-3	80.0		
				3/8 9.52						277152-4	81.0		
				1/2 12.7						277152-5	78.0		
				3/8 9.52	Long (Narrow)	**.430** 10.93	**3.05** 77.47	**.850** 21.59	**.75** 19.05	55944-1	81.0		
3/0 **168872** 87.2	**2/0** **133000** 68.6	**.520–.645** 13.21–16.38	**.132** 3.35	**3/8** 9.52	—	**.440** 11.18	**3.21** 81.53	**1.00** 25.4	**.73** 18.54	277153-1	103.0	58422-1	59877-1
4/0 **214928** 110.94	**3/0** **166500** 85.94	**.590–.680** 14.99–17.27	**.177** 4.50	**3/8** 9.52	—	**.440** 11.18	**3.11** 79.00	**1.00** 25.4	**.73** 18.54	55995-1 (55995-2)	100	58422-1	314948-1
				1/2 12.7						184113-1	98.0		

*Aluminum 8 to 2 = ±3 grams; aluminum 1/0 to 3/0 = ±5 grams

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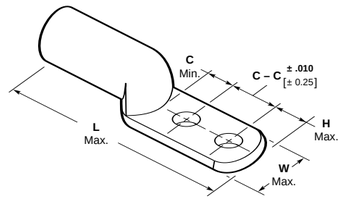
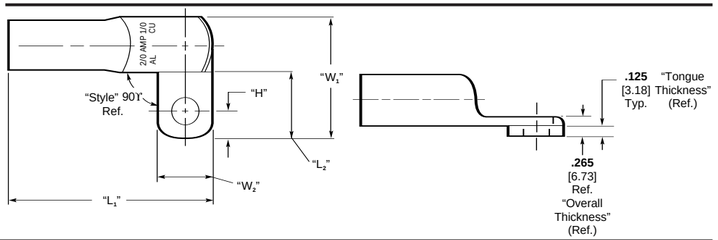
Double Hole Ring Tongue Terminals



Wire Size Circular Mils mm² Aluminum	Wire Size Circular Mils mm² Copper	Insul. Dia. Range	Tongue Thickness (Nom.)	Stud Size	Tongue Type	Dimensions H Max.	Dimensions L Max.	Dimensions W Max.	Dimensions C – C	Dimensions C Min.	Part Number	Weight Grams*	Tooling for Power Unit 69120-1 or -2 Heads	Tooling for Power Unit 69120-1 or -2 Die
6 **28280** 14.6	**8** **16983** 8.8	**.225–.250** 5.72–6.35	**.088** 2.24	**1/4** 6.35 **3/8** 9.52	Two Hole	**.38** 9.65	**2.89** 73.41	**.63** 16.00	**1.00** 25.4	**.44** 11.18	55832-1 55832-2	24 23	69066 or 58422-1	68007
4 **42420** 21.9	**6** **26818** 13.8	**.276–.305** 7.01–7.75	**.082** 2.08	**1/4** 6.35 **3/8** 9.52	Two Hole	**.38** 9.65	**2.94** 74.68	**.63** 16.00	**1.00** 25.4	**.44** 11.18	55833-1 (55834-1) 55833-2 (55834-2)	26 25	69066 or 58422-1	68008
2 **67872** 35.0	**4** **42615** 22.0	**.340–.380** 8.64–9.65	**.093** 2.36	**1/4** 6.35 **3/8** 9.52	Two Hole	**.38** 9.65	**3.27** 83.06	**.68** 17.27	**1.00** 25.4	**.44** 11.18	55835-1 (55836-1) 55835-2 (55836-2)	44 43	69066 or 58422-1	68009
1/0 **107464** 55.5	**2** **66500** 34.3	**.425–.470** 10.79–11.94	**.101** 2.57	**3/8** 9.52	Two Hole	**.38** 9.65	**3.39** 86.11	**.81** 20.57	**1.00** 25.4	**.44** 11.18	55837-1 (55838-1)	62	69066 or 58422-1	68010-1
2/0 **138168** 71.3	**1/0** **104500** 53.9	**.500–.550** 12.7–13.97	**.128** 3.25	**3/8** 9.52	Two Hole	**.38** 9.65	**3.66** 92.96	**.91** 23.11	**1.00** 25.4	**.44** 11.18	55839-1 (55844-1)	91	69066 or 58422-1	314964-1 or 68011-1
3/0 **168872** 87.2	**2/0** **133000** 68.6	**.520–.645** 13.21–16.38	**.132** 3.35	**3/8** 9.52	Two Hole	**.38** 9.65	**3.82** 97.03	**1.00** 25.4	**1.00** 25.4	**.44** 11.18	55840-1	113	58422-1	59877-1
4/0 **214928** 110.94	**3/0** **166500** 85.94	**.590–.680** 14.99–17.27	**.177** 4.50	**3/8** 9.52	Two Hole	**.38** 9.65	**3.72** 94.49	**1.00** 25.4	**1.00** 25.4	**.44** 11.18	(55841-1)	113	58422-1	314948-1

Note: Part numbers with ( ) are silver plated, part numbers without are tin plated.
* Aluminum 8 to 2 = ±3 grams; aluminum 1/0 to 4/0 = ±5 grams.

Flag Terminals



Wire Size Circular Mils mm² Aluminum	Wire Size Circular Mils mm² Copper	Insul. Dia. Range	Tongue Thickness (Ref.)	Stud Size	Tongue Style	Dimensions H Max.	Dimensions L_2 Max.	Dimensions L_2 Min.	Dimensions W_1 Max.	Dimensions W_2 Max.	Part Number	Weight Grams*	Tooling for Power Unit 69120-1 or -2 Heads	Tooling for Power Unit 69120-1 or -2 Die
2/0 **138168** 71.3	**1/0** **104500** 53.9	**.500–.550** 12.7–13.97	**.125** 3.18	**3/8** 9.52	One Hole 90° Right Hand	**.43** 10.9	**3.185** 80.90	**.970** 24.64	**1.870** 47.50	**.850** 21.59	55982-1	109	69066 or 58422-1	314964-1 or 68011-1

* Aluminum 8 to 2 = ±3 grams; aluminum 1/0 to 4/0 = ±5 grams.

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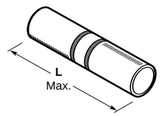
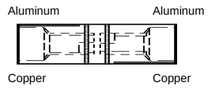
Standard Butt Splices

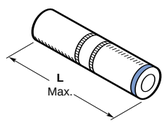


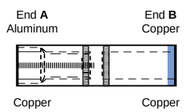


Wire Size* Circular Mils mm²		Insul. Dia. Range	L Max.	Part Number	Weight Grams**	Tooling for Power Unit 69120-1 or -2	
Aluminum	Copper					Heads	Die
8 **16564** 8.6	**10** **9354** 4.8	**.182–.200** 4.62–5.08	**1.41** 35.81	277156-1	10.2	69066 or 58422-1	68006
6 **28280** 14.6	**8** **16983** 8.8	**.225–.250** 5.72–6.35	**1.80** 45.72	277157-1	16.9	69066 or 58422-1	68007
4 **42420** 21.9	**6** **26818** 13.8	**.276–.305** 7.01–7.75	**2.17** 55.12	277158-1	26.8	69066 or 58422-1	68008
2 **67872** 35.0	**4** **42615** 22.0	**.340–.380** 8.64–9.65	**2.54** 64.52	277159-1	50.3	69066 or 58422-1	68009
1/0 **107464** 55.5	**2** **66500** 34.3	**.425–.470** 10.79–11.94	**2.67** 67.82	277160-1	76.0	69066 or 58422-1	68010-1
2/0 **138168** 71.3	**1/0** **104500** 53.9	**.500–.550** 12.70–13.97	**3.01** 76.45	277161-1	107.7	58422-1 or 69066	68011-1 or 314964-1
3/0 **168872** 87.2	**2/0** **133000** 68.6	**.520–.645** 13.21–16.38	**3.26** 82.80	277162-1	127.5	58422-1	59877-1

* For aluminum-to-aluminum applications, splices will accept the same wire size at either end. For aluminum-to-copper applications, however, the size of the copper wire must be “stepped down” two wire sizes to compensate for differences in the electrical ratings of copper and aluminum.
** Aluminum 8 to 2 = ±3 grams; aluminum 1/0 to 3/0 = ±5 grams

Transitional Butt Splices





Wire Size Circular Mils mm²		Insul. Dia. Range		L Max.	Part Numbers	Weight Grams*	Tooling for Power Unit 69120-1 or -2	
End A	End B	End A	End B				Heads	Die
6 **28280** 14.6	**6** **26818** 13.8	**.225–.250** 5.72–6.35	**.225–.250** 5.72–6.35	**1.80** 45.72	55984-1**	16	69066 or 58422-1	68007
4 **42420** 21.9	**8** **16983** 8.8	**.276–.305** 7.01–7.75	**.210–.255** 5.33–6.48	**1.91** 48.51	277164-1	26.5	69066 or 58422-1	68008
4 **42420** 21.9	**4** **42615** 22.0	**.276–.305** 7.01–7.75	**.276–.305** 7.01–7.75	**2.17** 55.12	277165-1**	26.0	69066 or 58422-1	68008
1/0 **107464** 55.5	**4** **42615** 22.0	**.425–.470** 10.80–11.94	**.276–.305** 7.01–7.75	**2.70** 68.58	277163-1	92.5	69066 or 58422-1	68010-1
3/0 **168872** 87.2	**1/0** **104500** 53.9	**.520–.645** 13.21–16.38	**.430–.495** 10.92–12.57	**3.26** 82.80	277168-1	128.5	58422-1	59877-1

* ±10 grams
** Transitional splice test amperage is for aluminum wire.

Catalog 1308940
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UK: 44-208-420-8341

Application Tooling

The AMP COPALUM Sealed Terminals and Splices are designed to be terminated with precision die sets, crimping heads, and hydraulic power units. The die set to use will depend on the conductor material size to be terminated. Both crimping heads can be used for the smaller conductor sizes. The largest conductor sizes will require the use of the heavier head. Hydraulic power can be provided by either the Electric/Hydraulic Power Unit or the Hydraulic Foot Pump.

Crimping Head
58422-1
(408-9535)

Crimping Head
69066
(408-2453)

Typical Die Set
(408-2281)

DYNA-CRIMP Electric-Hydraulic Power Unit

The DYNA-CRIMP Power Unit is an electric hydraulic tool. It can accommodate various heads and dies for terminating AMP terminals and splices ranging in size from 8 to 1500 MCM. A complete accessory line is also available with the tool for use in portable and stationary applications as well as for multiple-head crimping.

Hydraulic Foot Pump
314979-1
(409-1980)
†Reference Hose Assembly

DYNA-CRIMP Electric-Hydraulic Power Unit
(Includes Pressure Release)
115 Volts (60 Hz) — 69120-1
230 Volts (50/60 Hz) — 69120-2
(409-1950)

Wire Size AWG		Crimp Tool Components		
Aluminum	Copper	Die Sets	Heads	Power Units
8	10	68006	69066* or 58422-1**	69120-1 or 69120-2 or 314979-1
6	8	68007		
4	6	68008		
2	4	68009		
1/0	2	68010-1		
2/0	1/0	68011-1		
		314964-1		
3/0	2/0	59877-1		
4/0	3/0	314948-1		

*For aluminum conductor range of 8 through 1/0 and copper conductor range of 10 through 2.
**For aluminum conductor range of 8 through 4/0 and copper conductor range of 10 through 3/0.
***Portable–low pressure crimp die.

Accessory Power Controls and Hoses For DYNA-CRIMP Electric-Hydraulic Power Unit

Consult the table to the right for accessory power controls and hoses. Control and hose accessories must be ordered separately.

If electric hydraulic tool is to be used in portable applications, a handle control and hose assembly should be used.

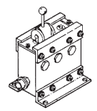
For stationary applications, a foot switch assembly and hose assembly will be necessary.

Multidirectional valves are used when more than one crimping head is permanently attached to the tool.

Handle Control

Hose Assembly

Foot Control



Multidirectional Valve

For use with Power Unit No.	Accessory Description	Accessory Part Number	Remarks
69120-1 69120-2	7 ft. [2.13 m] Handle Control Assembly — Hose and Cord	59907-7	Pressure Release included with handle control
	15 ft. [4.57 m] Handle Control Assembly — Hose and Cord	1-59907-5	
	15 ft. [4.57 m] Handle Control Assembly — Cord (Less Hose)	1-59908-5	
	21 ft. [6.4 m] Handle Control Assembly — Hose and Cord	2-59907-1	
	21 ft. [6.4 m] Handle Control Assembly — Cord (Less Hose)	2-59908-1	
	28 ft. [8.53 m] Handle Control Assembly — Hose and Cord	2-59907-8	
	15 ft. [4.57 m] Foot Switch Assembly	68284-1	Needs Hose Assembly
	3 ft. [0.91 m] Hose Assembly	59909-3	68284-1 Foot Switch or Foot Pump Assembly needed with these Hose Assemblies
	7 ft. [2.13 m] Hose Assembly	59909-7	
	15 ft. [4.57 m] Hose Assembly†	1-59909-5	
	21 ft. [6.4 m] Hose Assembly	2-59909-1	
69120-1 69120-2	3-Way Multi-Directional Valve	59220	For use with Foot Switch only
	3-Way Multi-Directional Valve (Elec. Control)	59220-2	

Catalog 1308940
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tyco Electronics

PIDG (Pre-Insulated DIAMOND GRIP) Terminals and Splices

AMP

Introduction

Product Facts

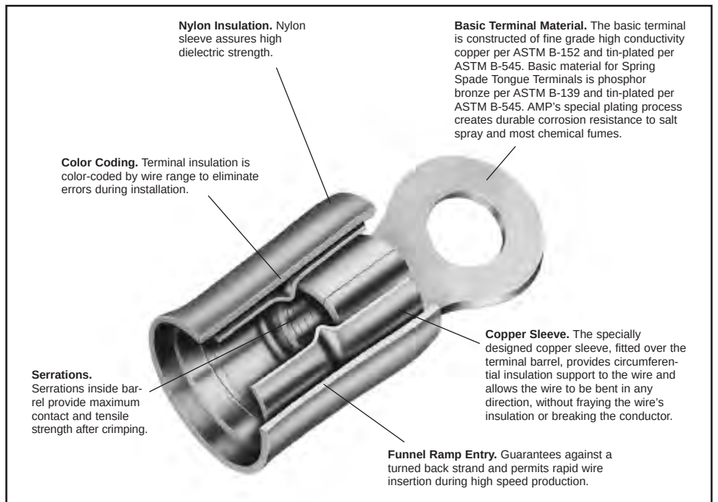
- **Pre-insulated terminal designed for complete and uniform reliability in difficult circuit environments**
- **PIDG Terminals consist of tin plated copper or tin plated phosphor bronze body for spring spades with a copper sleeve and insulation sleeve fitted over terminal barrel**
- **Design of the tool dies and construction of the terminal ensures uniform insulation thickness under crimping pressure, transmitting this pressure evenly to the center of the crimp area**

The AMP Mated Tool/Terminal Concept

- **AMP compression crimping produces crimps for a given size wire and terminal that are precisely alike in appearance and performance**
- **Terminal and crimping tool are designed as precisely matched devices**
- **Dies are precision-engineered from the finest hard-metal alloys**
- **Crimping pressure is controlled by a ratchet device on the hand tool or a corresponding pre-calibration in the crimping jaws of AMP automated crimping machines**

The Crimp

- **Crimping pressure can neither overstress nor understress the terminal barrel — machined dies fully bottom to the precise crimp height**
- **Resulting termination is free of contamination**
- **Resistant to shock and critical environments**
- **Tensile strength approaches that of the wire itself**
- **PIDG Terminals meet or exceed the requirements of MIL-T-7928, Type II, Class 1 and 2**



Note: Over size expansions are provided in vinyl insulation only.

Temperature Rating: 221°F [105°C] Max.

AMP PIDG Terminals (Use PIDG Tooling)

AMP Wire Range	Listed	LR7189 Certified
22-16	22-16 Solid or Stranded	300 V Max.,
16-14	16-14 Solid or Stranded	221°F [105°C]. Max.[1]
12-10	12-10 Solid or Stranded	

Note: 22-16 terminals are stamped 22-18 in accordance with MIL-T-7928.

[1]UL & CSA — Nylon

AMP PIDG Nylon Butt Window Splice (Use PIDG Tooling)

AMP Wire Range	Listed	LR7189 Certified
22-16	22-16 Stranded or Solid	300 V Max.,
16-14	16-14 Stranded or Solid	221°F [105°C]. Max.
12-10	12-10 Stranded or Solid	

Note: 22-16 splices are stamped 22-18 in accordance with MIL-T-7928.

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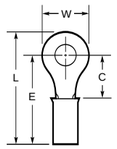
Ring Tongue Terminals — Nylon

Material and Finish

Insulation — Nylon
Terminal Body and Metallic Sleeve — Copper per ASTM B-152
Plating — Tin per ASTM B-545



Military Specifications MS25036

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Dimensions W	C Min.	E Max.	L Max.	Terminal Insulation Color	Wire Insulation Diameter Max.	Class	MS25036 Dash Numbers	Part Numbers Loose Piece	Part Numbers Tape Mounted
26-24 238-475 [0.12-0.24]	.029 0.74	2 M2	.203 5.16	.211 5.36	.632 16.05	.739 18.77	Yellow	.105 2.67	1 & 2	143	54310-1†	—
		4	.203 5.16	.211 5.36	.632 16.05	.736 18.69	Yellow	.105 2.67	1 & 2	144	52189†	—
		6 M3.5	.250 6.35	.243 6.17	.664 16.87	.792 20.12	Yellow	.105 2.67	1 & 2	145	53073†	—
		8 M4	.281 7.14	.250 6.35	.671 17.04	.814 20.68	Yellow	.105 2.67	1 & 2	146	54311-1†	—
		10	.312 7.92	.281 7.14	.702 17.83	.868 22.05	Yellow	.105 2.67	1 & 2	147	54312-1†	—
									2		—	54312-2†
26-22 202-810 [0.10-0.41]	.020 0.51	2 M2	.203 5.16	.211 5.36	.542 13.77	.646 16.41	Yellow	.082 2.08	2	143	323913	—
		4	.203 5.16	.211 5.36	.542 13.77	.646 16.41	Yellow	.082 2.08	2	144	323914*	2-323914-1
		8 M4	.250 6.35	.281 7.14	.612 15.54	.740 18.80	Yellow	.082 2.08	2	146	323916	2-323916-1
		10	.250 6.35	.281 7.14	.612 15.54	.740 18.80	Yellow	.082 2.08	2	147	324075*	2-324075-1
22-16 509-3,260 [0.26-1.65]	.033 0.84	4	.218 5.54	.156 3.96	.560 14.22	.672 17.07	Red	.125 3.18	1 & 2	148	320553	—
									2		—	2-320553-2
			.218 5.54	.156 3.96	.560 14.22	.672 17.07	Red	.140 3.56	1 & 2	148	31880*	—
									2		—	2-31880-1
		6 M3.5	.218 5.54	.156 3.96	.560 14.22	.672 17.07	Red	.125 3.18	1 & 2	101	36149*	—
									2		—	2-36149-2
			.218 5.54	.156 3.96	.560 14.22	.672 17.07	Red	.140 3.56	1 & 2	101	36150*	—
									2		—	2-36150-1
			.250 6.35	.250 6.35	.654 16.61	.782 19.86	Red	.125 3.18	1 & 2	102	51863*	—
									2		—	51863-1
		8 M4	.312 7.92	.281 7.14	.685 17.40	.844 21.44	Red	.125 3.18	1 & 2	149	320551*	—
									2		—	2-320551-1
			.312 7.92	.281 7.14	.685 17.40	.844 21.44	Red	.140 3.56	1 & 2	149	31890*	—
									2		—	2-31890-2
		10	.312 7.92	.281 7.14	.685 17.40	.844 21.44	Red	.125 3.18	1 & 2	103	36153*	—
									2		—	2-36153-2
			.312 7.92	.281 7.14	.685 17.40	.844 21.44	Red	.140 3.56	1 & 2	103	36154*	—
									2		—	2-36154-2
		1/4 M6	.469 11.91	.437 11.10	.841 21.36	1.078 27.38	Red	.125 3.18	1 & 2	150	320571*	—
									2		—	2-320571-2
			.469 11.91	.437 11.10	.841 21.36	1.078 27.38	Red	.140 3.56	1 & 2	150	31894*	—
									2		—	2-31894-2
		5/16 M8	.469 11.91	.437 11.10	.841 21.36	1.078 27.38	Red	.125 3.18	1 & 2	104	320572*	—
									2		—	2-320572-1
			.469 11.91	.437 11.10	.841 21.36	1.078 27.38	Red	.140 3.56	1 & 2	104	31895*	—
									2		—	2-31895-1
		3/8	.531 13.49	.546 13.87	.950 24.13	1.218 30.94	Red	.125 3.18	1 & 2	105	320573*	—
									2		—	2-320573-4
			.531 13.49	.546 13.87	.950 24.13	1.218 30.94	Red	.140 3.56	1 & 2	105	31897*	—
									2		—	2-31897-2
		1/2 M12	.713 18.11	.530 13.46	.934 23.72	1.293 32.84	Red	.125 3.18	1 & 2	151	328975*	—

*Available in small packaging quantities.
Note: "C" dimension applies from edge of metal wire barrel to center of stud hole.
†Must be crimped with 22-18 or 22-16 PIDG (red) Tooling.

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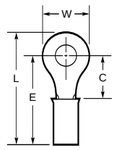
Ring Tongue Terminals — Nylon (Continued)

Material and Finish

Insulation — Nylon
Terminal Body and Metallic Sleeve — Copper per ASTM B-152
Plating — Tin per ASTM B-545



Military Specifications MS25036 (Continued)

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Dimensions W	C Min.	E Max.	L Max.	Terminal Insulation Color	Wire Insulation Diameter Max.	Class	MS25036 Dash Numbers	Part Numbers Loose Piece	Part Numbers Tape Mounted
16-14 2,050-5,180 [1.04-2.62]	.033 0.84	4	**.250** 6.35	**.171** 4.34	**.575** 14.61	**.703** 17.86	Blue	**.150** 3.81	1 & 2	152	324159*	—
		6 M3.5	**.250** 6.35	**.171** 4.34	**.575** 14.61	**.703** 17.86	Blue	**.150** 3.81	1 & 2	106	320561	—
									2		—	2-320561-2
			.312 7.92	**.281** 7.14	**.685** 17.40	**.844** 21.44	Blue	**.150** 3.81	1 & 2	107	51864*	—
									2		—	51864-3
		8 M4	**.312** 7.92	**.281** 7.14	**.685** 17.40	**.844** 21.44	Blue	**.150** 3.81	1 & 2	153	51864-1*	—
									2		—	51864-5
		10	**.312** 7.92	**.281** 7.14	**.685** 17.40	**.844** 21.44	Blue	**.150** 3.81	1 & 2	108	51864-2*	—
									2		—	51864-4
		1/4 M6	**.469** 11.91	**.437** 11.10	**.841** 21.36	**1.078** 27.38	Blue	**.150** 3.81	1 & 2	154	320563*	—
									2		—	2-320563-2
		5/16 M8	**.469** 11.91	**.437** 11.10	**.841** 21.36	**1.078** 27.38	Blue	**.150** 3.81	1 & 2	109	320575*	—
									2		—	2-320575-1
		3/8	**.531** 13.49	**.546** 13.87	**.950** 24.13	**1.218** 30.94	Blue	**.150** 3.81	1 & 2	110	320564*	—
									2		—	2-320564-3
		1/2 M12	**.713** 18.11	**.530** 13.46	**.934** 23.72	**1.293** 32.84	Blue	**.150** 3.81	1 & 2	155	328976	—
12-10 5,180-13,100 [2.62-6.64]	.042 1.07	6 M3.5	**.375** 9.53	**.302** 7.67	**.893** 22.68	**1.083** 27.51	Yellow	**.230** 5.84	1 & 2	111	320567*	—
									2		—	2-320567-2
			.375 9.53	**.302** 7.67	**.893** 22.68	**1.083** 27.51	Yellow	**.250** 6.35	1 & 2	111	35107	—
									2		—	2-35107-1
		8 M4	**.375** 9.53	**.302** 7.67	**.893** 22.68	**1.083** 27.51	Yellow	**.230** 5.84	1 & 2	156	320568*	—
									2		—	2-320568-1
			.375 9.53	**.302** 7.67	**.893** 22.68	**1.083** 27.51	Yellow	**.250** 6.35	1 & 2	156	35108*	—
									2		—	2-35108-1
		10	**.375** 9.53	**.302** 7.67	**.893** 22.68	**1.083** 27.51	Yellow	**.230** 5.84	1 & 2	112	36161*	—
									2		—	2-36161-2
		10	**.375** 9.53	**.302** 7.67	**.893** 22.68	**1.083** 27.51	Yellow	**.250** 6.35	1 & 2	112	35109*	—
									2		—	2-35109-1
		1/4 M6	**.531** 13.49	**.468** 11.89	**1.054** 26.77	**1.322** 33.58	Yellow	**.230** 5.84	1 & 2	157	320569*	—
									2		—	2-320569-3
			.531 13.49	**.468** 11.89	**1.054** 26.77	**1.322** 33.58	Yellow	**.250** 6.35	1 & 2	157	35110*	—
									2		—	2-35110-1
		5/16 M8	**.531** 13.49	**.468** 11.89	**1.054** 26.77	**1.322** 33.58	Yellow	**.230** 5.84	1 & 2	113	320576*	—
									2		—	2-320576-1
			.531 13.49	**.468** 11.89	**1.054** 26.77	**1.322** 33.58	Yellow	**.250** 6.35	1 & 2	113	35111*	—
									2		—	2-35111-1
		3/8	**.593** 15.06	**.531** 13.49	**1.115** 28.32	**1.414** 35.92	Yellow	**.230** 5.84	1 & 2	114	320577*	—
									2		—	2-320577-3
			.593 15.06	**.531** 13.49	**1.115** 28.32	**1.414** 35.92	Yellow	**.250** 6.35	1 & 2	114	35112*	—
		1/2 M12	**.715** 18.16	**.474** 12.04	**1.065** 27.05	**1.414** 35.92	Yellow	**.230** 5.84	2	158	52077	—

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Note: "C" dimension applies from edge of metal wire barrel to center of stud hole.

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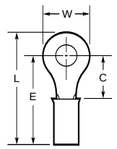
Ring Tongue Terminals –– Insulation Restricting

Material and Finish

Insulation — Nylon
Terminal Body — Copper per ASTM B-152
Plating — Tin per ASTM B-545

Metallic Sleeve — Copper per ASTM B-152
Plating — Nickel per QQ-N-290 or Tin per ASTM B-545



Military Specifications M7928/1

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Dimensions W	C Min.	E Max.	L Max.	Terminal Insulation Color Solid/Stripe	Wire Insulation Diameter Max.	Class	M7928/1 Dash Numbers	Part Numbers Loose Piece	Part Numbers Tape Mounted
26 304 [0.15]	**.029** 0.74	2 M2	**.203** 5.16	**.211** 5.36	**.632** 16.05	**.739** 18.77	Yellow/Black	**.026-.055** 0.66-1.40	1 & 2	1	53078†	—
		4	**.203** 5.16	**.211** 5.36	**.632** 16.05	**.736** 18.69	Yellow/Black	**.026-.055** 0.66-1.40	1 & 2	2	53049†	—
		6 M3.5	**.250** 6.35	**.243** 6.17	**.664** 16.87	**.792** 20.12	Yellow/Black	**.026-.055** 0.66-1.40	1 & 2	3	53050†	—
		8 M4	**.281** 7.14	**.250** 6.35	**.671** 17.04	**.814** 20.68	Yellow/Black	**.026-.055** 0.66-1.40	1 & 2	4	53051†	—
		10	**.312** 7.92	**.281** 7.14	**.702** 17.83	**.863** 21.92	Yellow/Black	**.026-.055** 0.66-1.40	1 & 2	5	53057†	—
24 475 [0.24]	**.029** 0.74	2 M2	**.203** 5.16	**.211** 5.36	**.632** 16.05	**.739** 18.77	Yellow/Blue	**.031-.055** 0.79-1.40	1 & 2	6	53053†	—
		4	**.203** 5.16	**.211** 5.36	**.632** 16.05	**.736** 18.69	Yellow/Blue	**.031-.055** 0.79-1.40	1 & 2	7	53054†	—
		6 M3.5	**.250** 6.35	**.243** 6.17	**.664** 16.87	**.792** 20.12	Yellow/Blue	**.031-.055** 0.79-1.40	1 & 2	8	53055†	—
		8 M4	**.281** 7.14	**.250** 6.35	**.671** 17.04	**.814** 20.68	Yellow/Blue	**.031-.055** 0.79-1.40	1 & 2	9	53056†	—
		10	**.312** 7.92	**.281** 7.14	**.702** 17.83	**.860** 21.84	Yellow/Blue	**.031-.055** 0.79-1.40	1 & 2	10	53057†	—
22 754 [0.38]	**.033** 0.84	4	**.218** 5.54	**.156** 3.96	**.622** 15.80	**.734** 18.64	Red/Green	**.038-.110** 0.97-2.79	1 & 2	11	52273*	—
		6 M3.5	**.218** 5.54	**.156** 3.96	**.622** 15.80	**.734** 18.64	Red/Green	**.038-.110** 0.97-2.79	1 & 2	12	2-36149-3*	—
			.250 6.35	**.250** 6.35	**.716** 18.19	**.844** 21.44	Red/Green	**.038-.110** 0.97-2.79	1 & 2 / 2	13	51863-2* / —	— / 51863-5
		8 M4	**.312** 7.92	**.281** 7.14	**.747** 18.97	**.906** 23.01	Red/Green	**.038-.110** 0.97-2.79	1 & 2 / 2	14	1-320551-2* / —	— / 1-320551-5
		1/4 M6	**.469** 11.91	**.437** 11.10	**.903** 22.94	**1.140** 28.96	Red/Green	**.038-.110** 0.97-2.79	1 & 2	16	2-320571-3	—
		5/16 M8	**.469** 11.91	**.437** 11.10	**.903** 22.94	**1.140** 28.96	Red/Green	**.038-.110** 0.97-2.79	1 & 2	17	2-320572-2	—
		3/8	**.531** 13.49	**.546** 13.87	**1.012** 25.70	**1.280** 32.51	Red/Green	**.038-.110** 0.97-2.79	1 & 2	18	2-320573-1	—
		1/2 M12	**.713** 18.11	**.530** 13.46	**.996** 25.30	**1.355** 34.42	Red/Green	**.038-.110** 0.97-2.79	1 & 2	19	2-328975-1	—
	.031 0.79	10	**.312** 7.92	**.281** 7.14	**.747** 18.97	**.906** 23.01	Red/Green	**.038-.110** 0.97-2.79	1 & 2 / 2	15	2-36153-3* / —	— / 2-36153-6
20 1,186 [0.60]	**.033** 0.84	4	**.218** 5.54	**.156** 3.96	**.622** 15.80	**.734** 18.64	Red/Red	**.046-.110** 1.17-2.79	1 & 2	20	52273-1*	—
		6 M3.5	**.218** 5.54	**.156** 3.96	**.622** 15.80	**.734** 18.64	Red/Red	**.046-.110** 1.17-2.79	1 & 2	21	2-36149-4*	—
			.250 6.35	**.250** 6.35	**.716** 18.19	**.844** 21.44	Red/Red	**.046-.110** 1.17-2.79	1 & 2 / 2	22	51863-3 / —	— / 51863-6
		8 M4	**.312** 7.92	**.281** 7.14	**.747** 18.97	**.906** 23.01	Red/Red	**.046-.110** 1.17-2.79	1 & 2	23	1-320551-3*	—
		10	**.312** 7.92	**.281** 7.14	**.747** 18.97	**.906** 23.01	Red/Red	**.046-.110** 1.17-2.79	1 & 2 / 2	24	2-36153-4* / —	— / 2-36153-8
		1/4 M6	**.469** 11.91	**.437** 11.10	**.903** 22.94	**1.140** 28.96	Red/Red	**.046-.110** 1.17-2.79	1 & 2	25	2-320571-4	—
		5/16 M8	**.469** 11.91	**.437** 11.10	**.903** 22.94	**1.140** 28.96	Red/Red	**.046-.110** 1.17-2.79	1 & 2	26	2-320572-3	—
		3/8	**.531** 13.49	**.546** 13.87	**1.012** 25.70	**1.280** 32.51	Red/Red	**.046-.110** 1.17-2.79	1 & 2	27	2-320573-2	—
		1/2 M12	**.713** 18.11	**.530** 13.46	**.996** 25.30	**1.355** 34.42	Red/Red	**.046-.110** 1.17-2.79	1 & 2	28	2-328975-2	—

*Available in small packaging quantities.
†Must be crimped with 22-18 or 22-16 PIDG (red) Tooling.
Note: "C" dimension applies from edge of metal wire barrel to center of stud hole.

Catalog 1308940
Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

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USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

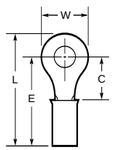
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Ring Tongue Terminals –– Insulation Restricting (Continued)

Material and Finish

Insulation — Nylon
Terminal Body — Copper per ASTM B-152
Plating — Tin per ASTM B-545

Metallic Sleeve — Copper per ASTM B-152
Plating — Nickel per QQ-N-290 or Tin per ASTM B-545



Military Specifications M7928/1 (Continued)

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Dimensions W	C Min.	E Max.	L Max.	Terminal Insulation Color Solid/Stripe	Wire Insulation Diameter Max.	Class	M7928/1 Dash Numbers	Part Numbers Loose Piece	Tape Mounted
18 1,900 [0.96]	**.033** 0.84	4	**.218** 5.54	**.156** 3.96	**.622** 15.80	**.734** 18.64	Red/White	**.056-.110** 1.42-2.79	1 & 2	29	52273-2*	—
		6 M3.5	**.218** 5.54	**.156** 3.96	**.622** 15.80	**.734** 18.64	Red/White	**.056-.110** 1.42-2.79	1 & 2	30	2-36149-5*	—
			.250 6.35	**.250** 6.35	**.716** 18.19	**.844** 21.44	Red/White	**.056-.110** 1.42-2.79	1 & 2	31	51863-4*	—
									2		—	51863-7
		8 M4	**.312** 7.92	**.281** 7.14	**.747** 18.97	**.906** 23.01	Red/White	**.056-.110** 1.42-2.79	1 & 2	32	1-320551-4*	—
									2		—	1-320551-8
		10	**.312** 7.92	**.281** 7.14	**.747** 18.97	**.906** 23.01	Red/White	**.056-.110** 1.42-2.79	1 & 2	33	2-36153-5*	—
									2		—	2-36153-9
		1/4 M6	**.469** 11.91	**.437** 11.10	**.903** 22.94	**1.140** 28.96	Red/White	**.056-.110** 1.42-2.79	1 & 2	34	2-320571-5	—
		5/16 M8	**.469** 11.91	**.437** 11.10	**.903** 22.94	**1.140** 28.96	Red/White	**.056-.110** 1.42-2.79	1 & 2	35	2-320572-4	—
		3/8	**.531** 13.49	**.546** 13.87	**1.012** 25.70	**1.280** 32.51	Red/White	**.056-.110** 1.42-2.79	1 & 2	36	2-320573-3	—
		1/2 M12	**.713** 18.11	**.530** 13.46	**.996** 25.30	**1.355** 34.42	Red/White	**.056-.110** 1.42-2.79	1 & 2	37	2-328975-3	—
16 2,800 [1.42]	**.033** 0.84	4	**.250** 6.35	**.171** 4.34	**.637** 16.18	**.765** 19.43	Blue/Blue	**.063-.130** 1.60-3.30	1 & 2	38	52274	—
		6 M3.5	**.250** 6.35	**.171** 4.34	**.637** 16.18	**.765** 19.43	Blue/Blue	**.063-.130** 1.60-3.30	1 & 2	39	2-320561-3*	—
			.312 7.92	**.281** 7.14	**.747** 18.97	**.906** 23.01	Blue/Blue	**.063-.130** 1.60-3.30	1 & 2	40	51864-6*	—
									2		—	1-51864-2
		8 M4	**.312** 7.92	**.281** 7.14	**.747** 18.97	**.906** 23.01	Blue/Blue	**.063-.130** 1.60-3.30	1 & 2	41	1-51864-0*	—
		10	**.312** 7.92	**.281** 7.14	**.747** 18.97	**.906** 23.01	Blue/Blue	**.063-.130** 1.60-3.30	1 & 2	42	51864-7*	—
									2		—	1-51864-3
		1/4 M6	**.469** 11.91	**.437** 11.10	**.903** 22.94	**1.140** 28.96	Blue/Blue	**.063-.130** 1.60-3.30	1 & 2	43	2-320563-3	—
		5/16 M8	**.469** 11.91	**.437** 11.10	**.903** 22.94	**1.140** 28.96	Blue/Blue	**.063-.130** 1.60-3.30	1 & 2	44	2-320575-2	—
		3/8	**.531** 13.49	**.546** 13.87	**1.012** 25.70	**1.280** 32.51	Blue/Blue	**.063-.130** 1.60-3.30	1 & 2	45	2-320564-1	—
		1/2 M12	**.713** 18.11	**.530** 13.46	**.996** 25.30	**1.355** 34.42	Blue/Blue	**.063-.130** 1.60-3.30	1 & 2	46	2-328976-1	—
14 4,234 [2.15]	**.033** 0.84	4	**.250** 6.35	**.171** 4.34	**.637** 16.18	**.765** 19.43	Blue/Green	**.078-.130** 1.98-3.30	1 & 2	47	52274-1	—
		6 M3.5	**.250** 6.35	**.171** 4.34	**.637** 16.18	**.765** 19.43	Blue/Green	**.078-.130** 1.98-3.30	1 & 2	48	2-320561-4	—
			.312 7.92	**.281** 7.14	**.747** 18.97	**.906** 23.01	Blue/Green	**.078-.130** 1.98-3.30	1 & 2	49	51864-8*	—
		8 M4	**.312** 7.92	**.281** 7.14	**.747** 18.97	**.906** 23.01	Blue/Green	**.078-.130** 1.98-3.30	1 & 2	50	1-51864-1*	—
									2		—	1-51864-7
		10	**.312** 7.92	**.281** 7.14	**.747** 18.97	**.906** 23.01	Blue/Green	**.078-.130** 1.98-3.30	1 & 2	51	51864-9*	—
									2		—	1-51864-5
		1/4 M6	**.469** 11.91	**.437** 11.10	**.903** 22.94	**1.140** 28.96	Blue/Green	**.078-.130** 1.98-3.30	1 & 2	52	2-320563-4	—
		5/16 M8	**.469** 11.91	**.437** 11.10	**.903** 22.94	**1.140** 28.96	Blue/Green	**.078-.130** 1.98-3.30	1 & 2	53	2-320575-3	—
		3/8	**.531** 13.49	**.546** 13.87	**1.012** 25.70	**1.280** 32.51	Blue/Green	**.078-.130** 1.98-3.30	1 & 2	54	2-320564-2	—
		1/2 M12	**.713** 18.11	**.530** 13.46	**.996** 25.30	**1.355** 34.42	Blue/Green	**.078-.130** 1.98-3.30	1 & 2	55	2-328976-2	—

*Available in small packaging quantities.
Note: "C" dimension applies from edge of metal wire barrel to center of stud hole.

Catalog 1308940
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Canada: 1-905-470-4425
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C. America: 57-1-254-4444

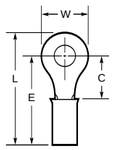
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Ring Tongue Terminals –– Insulation Restricting (Continued)

Material and Finish

Insulation — Nylon
Terminal Body — Copper per ASTM B-152
Plating — Tin per ASTM B-545

Metallic Sleeve — Copper per ASTM B-152
Plating — Nickel per QQ-N-290 or Tin per ASTM B-545



Military Specifications M7928/1 (Continued)

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Dimensions W	C Min.	E Max.	L Max.	Terminal Insulation Color Solid/Stripe	Wire Insulation Diameter Max.	Class	M7928/1 Dash Numbers	Part Numbers Loose Piece	Part Numbers Tape Mounted
12 6,654 [3.37]	.042 1.07	6 M3.5	.375 9.53	.302 7.67	.958 24.33	1.148 29.16	Yellow/Yellow	.095-.200 2.41-5.08	1 & 2	56	2-36161-5	—
		8 M4	.375 9.53	.302 7.67	.958 24.33	1.148 29.16	Yellow/Yellow	.095-.200 2.41-5.08	1 & 2	57	2-320568-2*	—
		10	.375 9.53	.302 7.67	.958 24.33	1.148 29.16	Yellow/Yellow	.095-.200 2.41-5.08	1 & 2	58	2-36161-3*	—
		1/4 M6	.531 13.49	.468 11.89	1.124 28.55	1.392 35.36	Yellow/Yellow	.095-.200 2.41-5.08	1 & 2	59	2-320569-5	—
		5/16 M8	.531 13.49	.468 11.89	1.124 28.55	1.392 35.36	Yellow/Yellow	.095-.200 2.41-5.08	1 & 2	60	2-320576-2	—
		3/8	.593 15.06	.531 13.49	1.187 30.15	1.486 37.74	Yellow/Yellow	.095-.200 2.41-5.08	1 & 2	61	2-320577-1	—
		1/2 M12	.715 18.16	.474 12.04	1.130 28.70	1.490 37.85	Yellow/Yellow	.095-.200 2.41-5.08	2	62	52077-1	—
10 12,066 [6.11]	.042 1.07	6 M3.5	.375 9.53	.302 7.67	.958 24.33	1.148 29.16	Yellow/Brown	.119-.200 3.02-5.08	1 & 2	63	2-36161-6	—
		8 M4	.375 9.53	.302 7.67	.958 24.33	1.148 29.16	Yellow/Brown	.119-.200 3.02-5.08	1 & 2	64	2-320568-3* —	— 2-36161-8
		10	.375 9.53	.302 7.67	.958 24.33	1.148 29.16	Yellow/Brown	.119-.200 3.02-5.08	1 & 2 2	65	2-36161-4 —	—
		1/4 M6	.531 13.49	.468 11.89	1.124 28.55	1.392 35.36	Yellow/Brown	.119-.200 3.02-5.08	1 & 2 2	66	2-320569-6 —	— 2-320569-8
		5/16 M8	.531 13.49	.468 11.89	1.124 28.55	1.392 35.36	Yellow/Brown	.119-.200 3.02-5.08	1 & 2	67	2-320576-3	—
		3/8	.593 15.06	.531 13.49	1.187 30.15	1.486 37.74	Yellow/Brown	.119-.200 3.02-5.08	1 & 2	68	2-320577-2	—
		1/2 M12	.715 18.16	.474 12.04	1.130 28.70	1.490 37.85	Yellow/Brown	.119-.200 3.02-5.08	2	69	52077-2	—

*Available in small packaging quantities.
Note: "C" dimension applies from edge of metal wire barrel to center of stud hole.

Catalog 1308940
Revised 8-06

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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

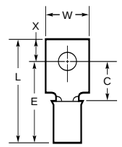
Rectangular Tongue Terminals

Material and Finish

Insulation — Nylon

Terminal Body and Metallic Sleeve — Copper per ASTM B-152 except where noted.

Plating — Tin per ASTM B-545



Military Specifications MS17143

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Dimensions W	C Min.	E Max.	L Max.	X	Terminal Insulation Color	Wire Insulation Diameter Max.	Class	M17143 Dash Numbers	Part Numbers Loose Piece	Part Numbers Tape Mounted
22-16 500 [0.26-1.65]	.033 0.84	4	.237 6.02	.237 6.02	.643 16.33	.796 20.22	.143 3.63	Red	.140 3.56	1 & 2	19	2-327968-1	—
			.237 6.02	.404 10.26	.810 20.57	1.015 25.78	.195 4.95	Red	.140 3.56	1 & 2	16	327962	—
		5 M3	.277 7.04	.277 7.04	.702 17.83	.855 21.72	.143 3.63	Red	.140 3.56	1 & 2	10	2-327950-1	—
		6 M3.5	.237 6.02	.404 10.26	.810 20.57	1.015 25.78	.195 4.95	Red	.140 3.56	1 & 2	13	2-327956-1	—
			.302 7.67	.465 11.81	.872 22.15	1.109 28.17	.227 5.77	Red	.140 3.56	1 & 2	4	2-327938-1	—
										2		—	2-327938-2
		8 M4	.302 7.67	.465 11.81	.872 22.15	1.109 28.17	.227 5.77	Red	.140 3.56	1 & 2	7	327944*	—
										2		—	2-327944-2
			.390 9.91	.621 15.77	1.039 26.39	1.359 34.52	.310 7.87	Red	.140 3.56	1 & 2	1	327932	—
16-14 2,050-5,180 [1.04-2.62]	.033 0.84	4	.237 6.02	.237 6.02	.643 16.33	.796 20.22	.143 3.63	Blue	.150 3.81	1 & 2	20	2-327970-4	—
			.237 6.02	.404 10.26	.810 20.57	1.015 25.78	.195 4.95	Blue	.150 3.81	1 & 2	17	2-327964-4	—
		5 M3	.277 7.04	.277 7.04	.702 17.83	.855 21.72	.143 3.63	Blue	.150 3.81	1 & 2	11	2-327952-2	—
										2		—	2-327952-6
		6 M3.5	.237 6.02	.404 10.26	.810 20.57	1.015 25.78	.195 4.95	Blue	.150 3.81	1 & 2	14	2-327958-4	—
			.302 7.67	.465 11.81	.872 22.15	1.109 28.17	.227 5.77	Blue	.150 3.81	1 & 2	5	2-327940-4	—
		8 M4	.302 7.67	.465 11.81	.872 22.15	1.109 28.17	.227 5.77	Blue	.150 3.81	1 & 2	8	2-327946-4	—
			.390 9.91	.621 15.77	1.039 26.39	1.359 34.52	.310 7.87	Blue	.150 3.81	1 & 2	2	2-327934-2	—
12-10 5,180-13,100 [2.62-6.64]	.042 1.07	4	.237 6.02	.237 6.02	.831 21.11	.984 24.99	.143 3.63	Yellow	.230 5.84	1 & 2	21	327972	—
			.237 6.02	.404 10.26	.998 25.35	1.203 30.56	.195 4.95	Yellow	.230 5.84	1 & 2	18	327966	—
		5 M3	.277 7.04	.277 7.04	.889 22.58	1.042 26.47	.143 3.63	Yellow	.230 5.84	1 & 2	12	327954	—
										2		—	2-327954-2
		6 M3.5	.237 6.02	.404 10.26	.998 25.35	1.203 30.56	.195 4.95	Yellow	.230 5.84	1 & 2	15	2-327960-1	—
										2		—	2-327960-2
			.302 7.67	.465 11.81	1.044 26.52	1.281 32.54	.227 5.77	Yellow	.230 5.84	1 & 2	6	327942	—
		8 M4	.302 7.67	.465 11.81	1.044 26.52	1.281 32.54	.227 5.77	Yellow	.230 5.84	1 & 2	9	327948	—
			.390 9.91	.621 15.77	1.211 30.76	1.531 38.89	.310 7.87	Yellow	.230 5.84	1 & 2	3	327936	—

*Available in small packaging quantities.

Note: "C" dimension applies from edge of metal wire barrel to center of stud hole.

Butt Splices

Material and Finish

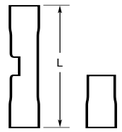
Insulation Sleeve — Standard, Step Down Assembly and Nylon

Radiation Resistant — Polyvinylidene Fluoride (PVF_2)

Splice Body and Insulation Support Sleeve — Copper per ASTM B-152

Plating — Tin per ASTM B-545

Standard and Radiation Resistant



Step Down Assembly[1]

Military Specifications M7928/5

Wire Size Circular Mils[1] [mm²]	Style	Dimension L Max.	Splice Insulation Color	Wire Insulation Diameter Max.	Class	M7928/5 Dash Numbers	Part Numbers Loose Piece	Part Numbers Tape Mounted
26-24[2] 238-475 [0.12-0.24]	Standard	**.890** 22.61	Yellow	**.082** 2.08	1 & 2	1	323994	—
24-20 320-1,290 [0.16-0.65]		**1.035** 26.29	Natural	**.100** 2.54	1 & 2	2	323975	—
					2		—	2-323975-3
22-16[3] 509-3,260 [0.26-1.65]		**1.265** 32.13	Red	**.125** 3.18	1 & 2	3	320559*	—
					2		—	2-320559-4
16-14 2,050-5,180 [1.04-2.62]		**1.265** 32.13	Blue	**.150** 3.81	1 & 2	4	320562*	—
					2		—	2-320562-3
12-10 5,180-13,100 [2.62-6.64]		**1.656** 42.06	Yellow	**.220** 5.59	1 & 2	5	320570*	—

*Available in small packaging quantities.
[1] When using two or more wires in either end of a butt splice, the combined cross sectional area must be within the (CMA) circular mil area range listed.
[2] 26-24 range in accordance with MIL-T-7928.
[3] 22-16 splices are 22-18 range in accordance with MIL-T-7928.

Military Specifications M7928/6

Wire Size Circular Mils[1] [mm²]	Style	Dimension L Max.	Splice Insulation Color	Wire Insulation Diameter Max.	Class	M7928/6 Dash Numbers	Part Numbers Loose Piece	Part Numbers Tape Mounted
26-24[2] 238-475 [0.12-0.24]	Radiation Resistant	**.890** 22.61	Natural w/ Yellow Stripes	**.082** 2.08	1 & 2	1	53546-1	—
24-20 320-1,290 [0.16-0.65]		**1.035** 26.29	Natural w/ White Stripes	**.100** 2.54	1 & 2	2	53547-1	—
					2		—	53547-2
22-16[3] 509-3,260 [0.26-1.65]		**1.265** 32.13	Natural w/ Red Stripes	**.125** 3.18	1 & 2	3	53548-1*	—
					2		—	53548-2
16-14 2,050-5,180 [1.04-2.62]		**1.265** 32.13	Natural w/ Blue Stripes	**.150** 3.81	1 & 2	4	53549-1*	—

*Available in small packaging quantities.
[1] When using two or more wires in either end of a butt splice, the combined cross sectional area must be within the (CMA) circular mil area range listed.
[2] 26-24 range in accordance with MIL-T-7928.
[3] 22-16 splices are 22-18 range in accordance with MIL-T-7928.

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

tyco Electronics

Radiation Resistant/302°F [150°C] Pre-Insulated Terminals and Splices

AMP

Introduction

Product Facts

- Select items have MIL-T-7928 approval under M7928/4 and /6
- Insulation is polyvinylidene fluoride (PVF_2) for high radiation resistance (to 200 megarads)
- Withstands 4 days of steam/chemical spray washdown which simulates LOCA (loss of coolant accident) conditions
- Temperature range of -85°G to +302°F [-65°C to +150°C]
- Uses AMP standard PIDG and PLASTI-GRIP Terminal tooling
- Color coded for easy wire and tool match
- Covers wide range of wire sizes — AWG 26-2/0 [0.12-70 mm^2]
- Tin-plated per MIL-T-10727
- Butt splice for wire sizes — AWG 26-10 [0.12-6 mm^2]

The line of AMP Radiation Resistant/302°F [150°C] Pre-Insulated Terminals and Splices includes terminals and splices of the well-known PIDG terminal designs. Radiation Resistant Terminals are made of fine grade, high conductivity copper with bright tin-plating and feature polyvinylidene fluoride (PVF_2) insulation for high resistance to radiation and solvents. PIDG terminals meet the performance requirements of MIL-T-7928. They are also tested by Tyco Electronics and an independent test facility and have fulfilled all requirements including radiation testing to 200 megarads, operating temperature range from 509°F to 2102°F [265°C to 1150°C] and resistance to steam and various chemical solvents to simulate LOCA (loss of coolant accident) conditions.

These terminals and splices feature the outstanding qualities of standard AMP terminals such as tapered entry ramps to help better eliminate bent wire strands and insulation support for stronger, more reliable connections. Serrated or dimpled wire barrels provide maximum contact and tensile strength after crimping, and color coded insulation with wire size stamped on the terminal tongue identifies the product and assists in proper terminal-wire match.

AMP Radiation Resistant/302°F [150°C] Terminals are designed and engineered to successfully withstand extreme vibration, shock and structural stresses, and other conditions which can adversely affect the critical circuit requirements in complex equipment.

The matching AMP tooling precisely crimps all terminations. This uniformity increases reliability and also serves as a built-in quality control factor.

Technical Documents

Instruction Sheets —

408-1559	DAHT's for 26-10 AWG connectors
408-1724	Crimping dies for 8-2/0 AWG connectors

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PIDG Terminal Style

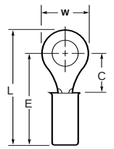
Ring Tongue Terminals

Material and Finish

Terminal Body — Copper per QQ-C-576 with tin plating per MIL-T-10727 or gold plating per MIL-G-45204 over nickel per QQ-N-290

Insulation Support Sleeve — Copper per QQ-C-576 with tin plating per MIL-T-10727

Insulation Sleeve — PVF_2, natural color



Military Specifications M7928/4

Wire Range AWG	Wire Range CMA	Tongue Thickness Max.	Wire Insulation Diameter Max.	Stripe Color Code	Stud Size	Dimensions C Min.	Dimensions W	Dimensions E Max.	Dimensions L Max.	Class	M7928/4 Dash Numbers	Part Numbers Tin Plate Loose	Part Numbers Tape Mounted
26-24	202-509	**.029** 0.74	**.082** 2.09	Yellow	2 M2	**.211** 5.36	**.203** 5.16	**.632** 16.05	**.736** 18.69	1 & 2	143	53400-1	—
					4	**.211** 5.36	**.203** 5.16	**.632** 16.05	**.736** 18.69	1 & 2	144	53401-1	—
					6 M3.5	**.243** 6.17	**.250** 6.35	**.664** 16.87	**.792** 20.12	1 & 2	145	53402-1	—
					8 M4	**.250** 6.35	**.281** 7.13	**.671** 17.05	**.814** 20.68	1 & 2	146	53403-1	—
					10	**.281** 7.14	**.312** 7.92	**.702** 17.83	**.861** 21.87	1 & 2	147	53404-1	—
22-16	509-3,250	**.033** 0.84	**.125** 3.18	Red	4	**.156** 3.96	**.218** 5.54	**.560** 14.23	**.672** 17.07	1 & 2	148	53405-1	—
					6 M3.5	**.156** 3.96	**.218** 5.54	**.560** 14.23	**.672** 17.07	1 & 2	101	53406-1	—
						.250 6.35	**.250** 6.35	**.654** 16.62	**.782** 19.87	1 & 2	102	53407-1	—
										2		—	53407-2
					8 M4	**.281** 7.13	**.312** 7.91	**.685** 17.4	**.844** 21.44	1 & 2	149	53408-1	—
										2		53408-2	—
					10	**.281** 7.13	**.312** 7.92	**.685** 17.4	**.844** 21.44	1 & 2	103	53409-1	—
					1/4 M6	**.437** 11.10	**.469** 11.91	**.841** 21.36	**1.078** 27.38	1 & 2	150	53410-1	—
										2		—	53410-2
					5/16 M8	**.437** 11.10	**.469** 11.91	**.841** 21.36	**1.078** 27.38	1 & 2	104	53411-1	—
					3/8	**.546** 13.87	**.531** 13.49	**.950** 24.13	**1.218** 30.94	1 & 2	105	53412-1	—
					1/2 M12	**.530** 13.46	**.713** 18.11	**.934** 23.72	**1.293** 32.84	1 & 2	151	53413-1	—
16-14	2,050-5,180	**.033** 0.84	**.150** 3.81	Blue	4	**.171** 4.34	**.250** 6.35	**.575** 14.61	**.703** 17.86	1 & 2	152	53414-1	—
					6 M3.5	**.171** 4.34	**.250** 6.35	**.575** 14.61	**.703** 17.86	1 & 2	106	53415-1	—
						.281 7.13	**.312** 7.92	**.685** 17.4	**.844** 21.44	1 & 2	107	53416-1	—
										2		—	53416-2
					8 M4	**.281** 7.13	**.312** 7.92	**.685** 17.4	**.844** 21.44	1 & 2	153	53417-1	—
					10	**.281** 7.13	**.312** 7.92	**.685** 17.4	**.844** 21.44	1 & 2	108	53418-1	—
										2		—	53418-2
					1/4 M6	**.437** 11.09	**.469** 11.91	**.841** 21.37	**1.078** 27.39	1 & 2	154	53419-1	—
					5/16 M8	**.437** 11.09	**.469** 11.91	**.841** 21.37	**1.078** 27.39	1 & 2	109	53420-1	—
					3/8	**.546** 13.87	**.531** 13.49	**.950** 24.13	**1.218** 30.94	1 & 2	110	53421-1	—
					1/2 M12	**.530** 13.46	**.713** 18.11	**.934** 23.72	**1.293** 32.84	1 & 2	155	53422-1	—
12-10	5,180-13,100	**.042** 1.07	**.230** 5.84	Yellow	6 M3.5	**.302** 7.67	**.375** 9.53	**.893** 22.69	**1.083** 27.51	1 & 2	111	53423-1*	—
					8 M4	**.302** 7.67	**.375** 9.53	**.893** 22.69	**1.083** 27.51	1 & 2	156	53424-1*	—
										2		—	53424-2
					10	**.302** 7.67	**.375** 9.53	**.893** 22.69	**1.083** 27.51	1 & 2	112	53425-1*	—
										2		—	53425-2
					1/4 M6	**.468** 11.88	**.531** 13.48	**1.054** 26.78	**1.322** 33.58	1 & 2	157	53426-1*	—
					5/16 M8	**.468** 11.88	**.531** 13.48	**1.054** 26.78	**1.322** 33.58	1 & 2	113	53427-1*	—
					3/8	**.531** 13.48	**.593** 15.06	**1.115** 28.32	**1.414** 35.92	1 & 2	114	53428-1	—
					1/2 M12	**.474** 12.04	**.715** 18.16	**1.054** 26.78	**1.414** 35.92	2	158	53429-1	—

* Brazed body

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Application Tooling

Long Handle Tool

T-HEAD Tool

Heavy Head Tool

Wire Size Range		Hand Tools		Pneumatic Tools		
AWG	mm²	Style	Part Number	Heads for 6-26 Single Wire Range	Heads for 6-26 Multi-Wire Range	Dies for 69710-1[1] 217200-1[2]
26-24 & 22-16	0.1-0.2 & 0.26-1.65	Long Handle T-HEAD Tool T-HEAD Tool	47386 59250 59300	314270-3	679305-1	47806-2
22-16	0.26-1.65	Long Handle	69151-1**	—	—	—
16-14	1.04-2.62	Long Handle Long Handle T-HEAD Tool	69152-1** 47387 59250	314269-1	679305-1	47807-1
12-10	2.62-6.64	Heavy Head Heavy Head	59239-4 69150-1**	679300-1	679305-1	47808-6

** Maximum tongue width of terminals for use with these dies is .469 [11.91] when used in tool 46110-2. Flat tongues only.
** For wires with thin wall insulation.
1 69710-1 hand tool
2 6-26 Pneumatic Tool Adapter

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Introduction

Product Facts

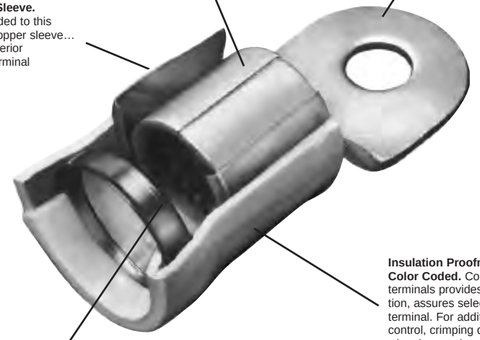
- **Designed to accommodate wire gauges 8 AWG through 4/0 AWG**
- **The first large wire terminal to feature vinyl insulation bonded to the terminal sleeve**
- **Terminals for wire sizes 8 AWG through 4/0 AWG meet the requirements of MIL-T-7928, Type II, Class 2**
- **Precision-engineered terminal offering the heavy-duty wire user uniformly high quality connections with permanent insulation support and complete protection against flash over**
- **Applied in a single effortless operation with the AMP DYNA-CRIMP tool**

Why Bonding?

- **Terminal insulators must withstand intense crimping pressures necessary for today's high wire-to-terminal contact requirements**
- **Bonded insulation transmits this pressure evenly to the center of the crimp area**
- **A positive bond promotes uniform insulation thickness, maintains proper dielectric and tensile values and controls the extrusion of plastic under the crimping dies in the finished connection**

The Crimp

- **Because both wire and terminal are confined over a greater area during the crimp, a homogeneous mass is achieved**
- **Crimp is applied gradually to encourage full movement of the wire with minimum extrusion**
- **Compare this Tyco Electronics method of applying pre-insulated solderless terminals to large gauge wires with the cumbersome mechanical fitting, brazing and manual insulating techniques still used in many plants**



Barrel with Brazed Seam, Dimpled Inner Surface. Each AMPLI-BOND terminal body is individually brazed for ruggedness and deformation control during the crimping operation. Dimpling on inner barrel surface provides more contact area of wire to terminal and additional tensile strength.

Basic Terminal Material. The basic terminal is constructed of fine grade high conductivity copper per ASTM B-152 and tin-plated per ASTM B-545. AMP's special plating process creates durable corrosion resistance to salt spray and most chemical fumes.

Inner Bonding Sleeve. Insulation is bonded to this (ASTM B-152) copper sleeve… the secret of superior AMPLI-BOND terminal construction.

Insulation Proofmarked and Color Coded. Color coding of terminals provides rapid identification, assures selection of proper terminal. For additional quality control, crimping die embosses wire size number on insulation.

Vinyl insulation extends minimum distance beyond terminal barrel to prevent exposure of conductor during stress and vibration.

Fully Protected Rear Insulation Support Ring. Separate metal ring provides insulation support to dampen vibration and prevent sharp bends on conductor. Steel (ASTM A-109, Tin plated per ASTM B-545).

Temperature Rating: 221°F [105°C] Max.

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Ring Tongue Terminals

Material and Finish

Insulation — Vinyl

Terminal Body — Copper per ASTM B-152

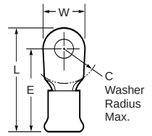
Insulation Support Ring — Steel per ASTM A-109

Plating — Tin per ASTM B-545 except where noted.

Related Product Data

Application Tooling — page 7-45

A



Military Specifications MS25036

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Style	Dimensions W	Dimensions C	Dimensions E Max.	Dimensions L Max.	Terminal Insulation Color	Wire Insulation Diameter Max.	Class	MS25036 Dash Numbers	Part Numbers Loose Piece	Part Numbers Tape Mounted
8 13,100-20,800 [6.64-10.5]	**.043** 1.09	10	A	**.431** 10.95	**.437** 11.10	**1.344** 34.14	**1.562** 39.67	Red	**.298** 7.57	2	115	322128	2-322128-2
		1/4 M6	A	**.478** 12.14	**.437** 11.10	**1.344** 34.14	**1.586** 40.28	Red	**.298** 7.57	2	116	322049	2-322049-5
		5/16 M8	A	**.587** 14.91	**.500** 12.70	**1.406** 35.71	**1.702** 43.23	Red	**.298** 7.57	2	117	322003	—
		3/8	A	**.587** 14.91	**.500** 12.70	**1.406** 35.71	**1.702** 43.23	Red	**.298** 7.57	2	118	322004	—
6 20,800-33,100 [10.5-16.8]	**.048** 1.22	10	A	**.468** 11.89	**.421** 10.69	**1.490** 37.85	**1.727** 43.87	Blue	**.377** 9.58	2	119	322153	—
		1/4 M6	A	**.500** 12.70	**.515** 13.08	**1.599** 40.61	**1.852** 47.04	Blue	**.377** 9.58	2	120	322051	2-322051-2
		5/16 M8	A	**.625** 15.88	**.515** 13.08	**1.599** 40.61	**1.914** 48.62	Blue	**.377** 9.58	2	121	322006*	2-322006-3
		3/8	A	**.625** 15.88	**.515** 13.08	**1.599** 40.61	**1.914** 48.62	Blue	**.377** 9.58	2	122	322007	2-322007-2
4 33,100-52,600 [16.8-26.7]	**.051** 1.30	1/4 M6	A	**.546** 13.87	**.531** 13.49	**1.632** 41.45	**1.908** 48.46	Yellow	**.436** 11.07	2	123	322053	—
		5/16 M8	A	**.679** 17.25	**.531** 13.49	**1.632** 41.45	**1.974** 50.14	Yellow	**.436** 11.07	2	124	322010	2-322010-4
		3/8	A	**.679** 17.25	**.531** 13.49	**1.632** 41.45	**1.974** 50.14	Yellow	**.436** 11.07	2	125	322011	2-322011-5
2 52,600-83,700 [26.7-42.4]	**.060** 1.52	1/4 M6	A	**.675** 17.15	**.578** 14.68	**1.710** 43.43	**2.050** 52.07	Red	**.505** 12.83	2	126	322125	—
		3/8	A	**.711** 18.06	**.578** 14.68	**1.710** 43.43	**2.068** 52.53	Red	**.505** 12.83	2	127	322055	—
		1/2 M12	A	**.855** 21.72	**.578** 14.68	**1.710** 43.43	**2.140** 54.36	Red	**.505** 12.83	2	128	322016	—
1[1] 83,700-119,500 [42.4-60.6]	**.073** 1.85	1/4 M6	A	**.807** 20.50	**.625** 15.88	**2.063** 52.40	**2.469** 62.71	Blue	**.632** 16.05	2	129	322085	—
		3/8	A	**.807** 20.50	**.625** 15.88	**2.063** 52.40	**2.469** 62.71	Blue	**.632** 16.05	2	130	322087	—
		1/2 M12	A	**.875** 22.23	**.625** 15.88	**2.063** 52.40	**2.501** 63.53	Blue	**.632** 16.05	2	131	321677	—
1/0 83,700-119,500 [42.4-60.6]	**.073** 1.85	1/4 M6	A	**.807** 20.50	**.625** 15.88	**2.063** 52.40	**2.469** 62.71	Blue	**.632** 16.05	2	132	322085	—
		3/8	A	**.807** 20.50	**.625** 15.88	**2.063** 52.40	**2.469** 62.71	Blue	**.632** 16.05	2	133	322087	—
		1/2 M12	A	**.875** 22.23	**.625** 15.88	**2.063** 52.40	**2.501** 63.53	Blue	**.632** 16.05	2	134	321677	—
2/0 119,500-150,500 [60.6-76.3]	**.083** 2.11	5/16 M8	A	**.926** 23.52	**.625** 15.88	**2.084** 52.93	**2.540** 64.52	Yellow	**.684** 17.37	2	135	322089	—
		3/8	A	**.926** 23.52	**.625** 15.88	**2.084** 52.93	**2.540** 64.52	Yellow	**.684** 17.37	2	136	322090	—
		1/2 M12	A	**.926** 23.52	**.625** 15.88	**2.084** 52.93	**2.540** 64.52	Yellow	**.684** 17.37	2	137	322092	—
3/0 150,500-190,000 [76.3-96.3]	**.094** 2.39	3/8	A	**1.062** 26.97	**.625** 15.88	**2.166** 55.02	**2.697** 68.50	Red	**.737** 18.72	2	138	322059	—
		1/2 M12	A	**1.062** 26.97	**.625** 15.88	**2.166** 55.02	**2.697** 68.50	Red	**.737** 18.7	2	139	322060	—
4/0 190,000-231,000 [96.3-117]	**.105** 2.67	3/8	A	**1.140** 28.96	**.625** 15.88	**2.203** 55.96	**2.766** 70.26	Blue	**.799** 20.29	2	140	322061	—
		1/2 M12	A	**1.062** 26.97	**.625** 15.88	**2.166** 55.02	**2.697** 68.50	Blue	**.799** 20.29	2	141	322062	—

* Available in small packaging quantities.

[1] Tyco Electronics recommends #1/0 AWG terminals for #1 AWG application.

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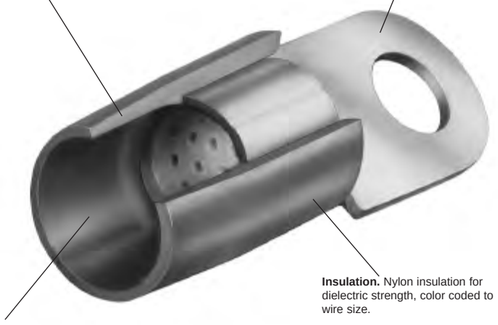
Introduction

Product Facts

- **Designed to provide insulated terminals and splices for large wire sizes, many of which are used in airborne and ground support applications**
- **Tested under the procedures stipulated by MIL Spec. MIL-T-7928, they meet and exceed requirements**
- **Designed and engineered to successfully withstand many vibration, shock and structural stresses, elevated temperatures and other conditions which can adversely affect the circuit requirements in complex air and space flight equipment**
- **The use of matching AMP tooling for precision crimping which makes all terminations identical**
- **This uniformity promotes maximum reliability and, coupled with tool die marks on the barrel indicating the wire size and color coding of the insulation sleeve, also serves as a built-in quality control factor**
- **Pre-insulated with color coded nylon which also acts as insulation support**
- **Wire size range of terminals is 8 AWG through 4/0 AWG**



Funnel Entry. Molded insulation for ease of wire insertion and snug fit over MIL-standard wire diameters.

Basic Terminal Material. The basic terminal is constructed of fine grade high conductivity copper per ASTM B-152 and tin-plated per ASTM B-545. AMP's special plating process creates durable corrosion resistance to salt spray and most chemical fumes.

Insulation. Nylon insulation for dielectric strength, color coded to wire size.

Dimples. Dimples afford maximum contact of barrel and wire and maximum tensile strength.

Temperature Rating: 221°F [105°C] Max.

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Ring Tongue Terminals

Material and Finish

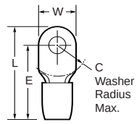
Insulation — Nylon

Terminal Body — Copper per ASTM B-152

Plating — Tin per ASTM B-545

Related Product Data

Application Tooling — page 7-45



Military Specifications MS25036

Wire Size Circular Mils [mm²]	Tongue Material Thickness Max.	Stud Size	Dimensions W	Dimensions C	Dimensions E Max.	Dimensions L Max.	Terminal Insulation Color	Wire Insulation Diameter Max.	Class	MS25036 Dash Numbers	Part Number Loose Piece
8 13,100-20,800 [6.64-10.5]	**.043** 1.09	10	**.431** 10.95	**.437** 11.10	**1.183** 30.05	**1.402** 35.61	Red	**.256** 6.50	2	115	324043
		1/4 M6	**.478** 12.14	**.437** 11.10	**1.183** 30.05	**1.425** 36.20	Red	**.256** 6.50	2	116	324082
		5/16 M8	**.587** 14.91	**.500** 12.70	**1.246** 31.65	**1.542** 39.17	Red	**.256** 6.50	2	117	324044
		3/8	**.587** 14.91	**.500** 12.70	**1.246** 31.65	**1.542** 39.17	Red	**.256** 6.50	2	118	324045
6 20,800-33,100 [10.5-16.8]	**.048** 1.22	10	**.468** 11.89	**.421** 10.69	**1.338** 33.99	**1.575** 40.01	Blue	**.314** 7.98	2	119	324046
		1/4 M6	**.500** 12.70	**.515** 13.08	**1.447** 36.75	**1.700** 43.18	Blue	**.314** 7.98	2	120	324047
		5/16 M8	**.625** 15.88	**.515** 13.08	**1.447** 36.75	**1.762** 44.75	Blue	**.314** 7.98	2	121	324048
		3/8	**.625** 15.88	**.515** 13.08	**1.447** 36.75	**1.762** 44.75	Blue	**.314** 7.98	2	122	324049
4 33,100-52,600 [16.8-26.7]	**.051** 1.30	1/4 M6	**.546** 13.87	**.531** 13.49	**1.536** 39.01	**1.812** 46.02	Yellow	**.382** 9.70	2	123	324050
		5/16 M8	**.679** 17.25	**.531** 13.49	**1.536** 39.01	**1.878** 47.70	Yellow	**.382** 9.70	2	124	324051
		3/8	**.679** 17.25	**.531** 13.49	**1.536** 39.01	**1.878** 47.70	Yellow	**.382** 9.70	2	125	324052*
2 52,600-83,700 [26.7-42.4]	**.060** 1.52	1/4 M6	**.679** 17.25	**.578** 14.68	**1.705** 43.31	**2.045** 51.94	Red	**.468** 11.89	2	126	324053
		3/8	**.711** 18.06	**.578** 14.68	**1.705** 43.31	**2.063** 52.40	Red	**.468** 11.89	2	127	324054
		1/2 M12	**.855** 21.72	**.578** 14.68	**1.705** 43.31	**2.135** 54.23	Red	**.468** 11.89	2	128	324055
1[1] 83,700-119,500 [42.4-60.6]	**.073** 1.85	1/4 M6	**.807** 20.50	**.625** 15.88	**2.033** 51.64	**2.426** 61.62	Blue	**.580** 14.73	2	129	324056
		3/8	**.807** 20.50	**.625** 15.88	**2.033** 51.64	**2.426** 61.62	Blue	**.580** 14.73	2	130	324057
		1/2 M12	**.875** 22.23	**.625** 15.88	**2.017** 51.23	**2.454** 62.33	Blue	**.580** 14.73	2	131	324058
1/0 83,700-119,500 [42.4-60.6]	**.073** 1.85	1/4 M6	**.807** 20.50	**.625** 15.88	**2.033** 51.64	**2.426** 61.62	Blue	**.580** 14.73	2	132	324113
		3/8	**.807** 20.50	**.625** 15.88	**2.033** 51.64	**2.426** 61.62	Blue	**.580** 14.73	2	133	324057
		1/2 M12	**.875** 22.23	**.625** 15.88	**2.017** 51.23	**2.454** 62.33	Blue	**.580** 14.73	2	134	324058
2/0 119,500-150,500 [60.6-76.3]	**.083** 2.11	5/16 M8	**.926** 23.52	**.625** 15.88	**2.026** 51.46	**2.416** 61.37	Yellow	**.610** 15.49	2	135	324083
		3/8	**.926** 23.52	**.625** 15.88	**2.026** 51.46	**2.416** 61.37	Yellow	**.610** 15.49	2	136	324084
		1/2 M12	**.926** 23.52	**.625** 15.88	**2.026** 51.46	**2.416** 61.37	Yellow	**.610** 15.49	2	137	324085
3/0 150,000-190,000 [76.3-96.3]	**.094** 2.39	3/8	**1.082** 27.48	**.625** 15.88	**2.294** 58.27	**2.794** 70.97	Red	**.680** 17.27	2	138	324185
4/0 190,000-231,000 [96.3-117]	**.105** 2.67	3/8	**1.150** 29.21	**.625** 15.88	**2.295** 58.29	**2.858** 75.59	Blue	**.765** 19.43	2	140	324187
		1/2 M12	**1.150** 29.21	**.625** 15.88	**2.295** 58.29	**2.858** 75.59	Blue	**.765** 19.43	2	141	324188

* Available in small packaging quantities.

[1] Tyco Electronics recommends #1/0 AWG terminals for #1 AWG application.

Insulated Terminals and Splices — 30 to 10 AWG Wire Range

Description	Wire Range	Tools for Loose Piece Termination					Tools for Tape Mounted Terminations			
		Hand Tools		Pneumatic Tools						
		Single Wire Range	Multi-Wire Range	Heads for 6-26 Single Wire Range	Heads for 6-26 Multi-Wire Range	Dies for 69710-1[3] 217200-1[4]	Tape Dies for 69875 TAPETRONIC No Applicator Required	Tape Dies for 354500-1 AMP-O-LECTRIC Model "G" Applicator 567200-3	Tape Dies for AMPOMATOR CLS IV* Applicator 687658-1	Tape Dies for 565435-5 AMP-O-LECTRIC Model "K" Applicator 567200-2
PIDG Terminals & Splices	30-26	69163–uses 26-22 Terms.	—	—	—	—	—	—	—	—
	26-22	46121†	59275†	314537-1	—	69344	69877	69877	69877	69877
	22-16	47386†	59250† 59824-1[1] 58433-3[2]	314270-3	679305-1	47806-2	69872* 59826-1[1]	69872* 59826-1[1]	69872* 59826-1[1]	69872* 59826-1[1]
	16-14	68343-1 (.250 exp.) 47387	59250† 59824-1[1] 58433-3[2]	314269-1	679305-1	47807-1	69873* 59827-1[1]	69873* 59827-1[1]	69873* 59827-1[1]	69873* 59827-1[1]
	12-10 16-14 HD	59239-4† 59287-2 (.300 exp.)	59824-1[1] 58433-3[2]	679300-1	679305-1	47808-6 Std. 47808-5 (.300 exp.)	69874* 69897 (.300 exp.) 59828-1[1]	69874* 69897 (.300 exp.) 59828-1[1]	69874* 69897 (.300 exp.) 59828-1[1]	69874* 69897 (.300 exp.) 59828-1[1]

†Tooling with adjustable insulation crimp.
*Same die set/configuration as in hand tools.
[1]TETRA-CRIMP die configuration.
[2]PRO-CRIMPER II commercial tool not approved for UL applications.
[3]69710-1 hand tool.
[4]6-26 Pneumatic Tool Adapter

Insulated Terminals and Splices — 8 to 4/0 AWG Wire Range

Description	Wire Size	Tools for Loose Piece Terminations			
		Hand Tools	Dies for Crimp Head 69051[1] & Hydraulic Hand Tool 59974-1	Dies for Crimp Head 69066[1] & 58422-1[1]	Head for Pneumatic Hand Tool 69015
AMPLI-BOND Terminals	8	69959	48752-1	47236-1[2]	—
	6	—	48753-1	47237-1[2]	68325-1
	4	—	48754-1	47238-1[2]	—
	2	—	48755-1	47239-1[2]	—
	1/0	—	—	48756-1 47378-1[2]	—
	2/0	—	—	48757-1	—
	3/0	—	—	48758-1	—
	4/0	—	—	48759-1	—
TERMINYL Terminals and Splices	8	—	47820	—	68285-1
	6	—	47821	—	—
	4	—	47822	—	—
	2	—	47823	—	—
	1/0	—	—	47824	—
	2/0	—	—	47825	—
	3/0	—	—	47915	—
	4/0	—	—	47918	—
	4 HD	—	—	69463	—

[1] Heads for Power Units 69120-1, 69120-2, or 314979-1.
[2] Large expansion dies.

Catalog 1308940
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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Introduction

Tyco Electronics' dependable, economical wire and cable termination products provide solutions for hundreds of wire and cable interconnect requirements. All Raychem wire termination products are housed inside transparent heat-shrinkable insulation sleeves, which provide inspectability and can provide various levels of environmental protection. Most Raychem termination products incorporate a fluxed solder preform, which is essential for a highly controlled soldering process. Other products incorporate controlled crimping or a unique process of combining a twist-on coil with controlled soldering to provide high-reliability joints on the widest variety of conductor types and platings.

SolderSleeve technology ensures high-quality electrical and mechanical performance time after time. Premeasured solder and flux create repeatable, reliable terminations, reducing rejects and field failures. When the SolderSleeve device is heated, the tubing shrinks and the solder preform melts to make a fully insulated, strain-relieved, protected solder connection. Heat-shrinkable tubing provides the benefits of insulation, strain relief, and protection for our controlled crimp products. Many Raychem interconnect products have earned UL recognition or MIL-Spec approval.

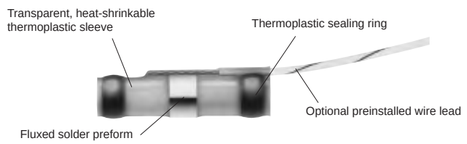
Many SolderSleeve and related devices are made from polyvinylidene fluoride tubings that meet the requirements of AMS-DTL-23053/8 (formerly MIL-DTL-23053/8).

Raychem interconnect devices combine high-strength materials with innovative design for consistent, long-life performance. And because the insulation sleeve is transparent, operators can easily inspect the connection.

Raychem shrink-to-fit technology even helps reduce inventory, because one device size will fit a wide range of wire gauges, cable diameters, and component shapes.

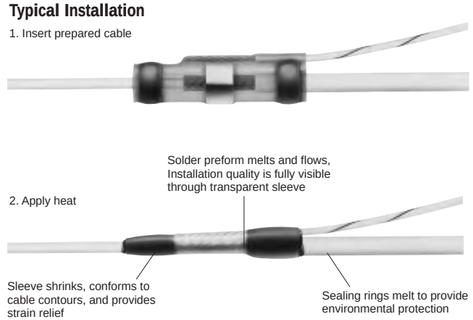
Raychem interconnect products are designed for many applications, from simple splices to terminators for sophisticated electronic systems, either sealed or unsealed, and for high- or low-temperature environments.

Typical SolderSleeve Device (illustration of shield terminator concept)



METRIC
Dimensions in this section are millimeters over inches

Typical Installation



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Product Selection

Application Type	Max. Operating Temp.	Connection Type	Product Description	Series	Page Number
Wire-to-wire splicing	125°C [257°F]	Solder	SolderSleeve wire splices	CWT-900X	7-50
	150°C [302°F]	Solder	SolderSleeve wire splices	D-110, D-1744	7-50
	125°C [257°F]	Coil and solder	SolderGrip closed end connector splices (stub)	SGRP, SGRS	7-56
	125°C [257°F]	Crimp	DuraSeal crimp splices	D-406	7-62
	125°C [257°F]	Crimp	PolyCrimp wire splices	C-203	7-64
	150°C [302°F]	Crimp	MiniSeal crimp splices	D-436 (M81824)	7-66
Terminals and disconnects	125°C [257°F]	Crimp	DuraSeal crimp terminals and disconnects	B-106	7-71
	150°C [302°F]	Coil and solder	SolderGrip terminals	SGRT	7-77
Wire termination to pin/post/tab	125°C [257°F]	Solder	SolderSleeve wire terminators	CWT-15XX	7-83
	150°C [302°F]	Solder	SolderSleeve wire terminators	D-129, D-141, D-71X	7-83
Shield termination	125°C [257°F]	Solder	SolderSleeve shield terminators	CWT-X	7-88
	150°C [302°F]	Solder	SolderSleeve shield terminators	S01, S02, M83519, SO63	7-88
	175°C [347°F]	Solder	SolderSleeve shield terminators	SO96	7-88
Coaxial cable termination	125°C [257°F]	Solder	SolderSleeve coaxial cable terminators	CWT-4XXX	7-95
	150°C [302°F]	Solder	SolderSleeve coaxial cable terminators	B-02X, B-04X	7-95
	150°C [302°F]	Solder	SolderSleeve PCB/coaxial cable terminators	D-607, B-046	7-97
	135°C [275°F]	Solder	RF one-step BNC/TNC connectors	RBD, RTD	2-35
Cable-to-cable splicing	150°C [302°F]	Solder/Crimp	SolderShield cable splices	D-150	7-100
Shielded contacts	150°C [302°F]	Solder	SolderTacts shielded contacts	D-602	8-2
Triax connectors	150°C [302°F]	Solder	Triax discrete connectors	D-621, DK-621	14-13
MIL-STD-1553	150°C [302°F]	Solder	Triax discrete connectors	D-621, DK-621	14-13
Data bus connectors	150°C [302°F]	Solder	Triax discrete connectors	D-621, DK-621	14-13
MIL-STD-1553 In-line couplers	150°C [302°F]	Solder or connectorized	In-line data bus microcoupler	D-500-04	14-5
MIL-STD-1533	150°C [302°F]	Connectorized	Data bus box couplers	D-500-025	14-11
Triaxial size 8 contacts	150°C [302°F]	Solder	Size 8, triaxial MIL-C-38999 contacts	D-602, DK-602	14-20
Data bus cables	150°C [302°F]	Crimp or solder	MIL-STD-1553 B shielded cable	1061X	14-4
Data bus terminators	150°C [302°F]	Solder or connectorized	MIL-STD-1553 78 Ohms and 3000 Ohms terminators	D-621, D-500	14-16
Data bus accessories	150°C [302°F]	Solder or mechanical	Dust caps, braid terminators, splices	D-600,D-150	14-16

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Product Selection (Continued)

Application Type	Connection Type	Max. Operating Temp.	Product Description	Series	Page Number
Wire-to-Wire Splicing	Solder	125°C	SolderSleeve wire splices	CWT-900X	7-50
		150°C	SolderSleeve wire splices	D-110, D-1744	7-50
	Crimp	125°C	DuraSeal crimp splices	D-406	7-62
		125°C	PolyCrimp crimp splices	C-203	7-64
		150°C	MiniSeal crimp splices	D-436 (M81824)	7-66
	Coil and Solder	125°C	SolderGrip closed end connector splices (stub)	SGRP, SGRS	7-56
Terminals and Disconnects	Crimp	125°C	DuraSeal crimp terminals and disconnects	B-106	7-71
	Coil and Solder	150°C	SolderGrip terminals	SGRT	7-77
Wire Termination to pin/post/tab	Solder	125°C	SolderSleeve wire terminators	CWT-15XX	7-83
		150°C	SolderSleeve wire terminators	D-129, D-141, D-71X	7-83
Shield Termination	Solder	125°C	SolderSleeve shield terminators	CWT-X	7-88
		150°C	SolderSleeve shield terminators	S01, S02, M83519, SO63	7-88
		175°C	SolderSleeve shield terminators	SO96	7-88
Coax Cable Termination	Solder	125°C	SolderSleeve coaxial cable terminators	CWT-4XXX	7-95
		135°C	RF one-step BNC/TNC connector	RBD, RTD	2-35
		150°C	SolderSleeve coaxial cable terminators	B-02X/04X	7-95
			SolderSleeve PCB/coaxial cable terminators	D-607, B-046	7-97
Cable-to-Cable Splicing	Solder/Crimp	150°C	SolderShield cable splices	D-150, B-202	7-100
Shielded Contacts	Solder	150°C	SolderTacts shielded contacts	D-602	8-2
MIL-STD-1553B Data Bus Components	Solder	150°C	Data bus couplers, connectors, terminators, accessories	D-500, D-600, D(K)-621	14-5

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UK: 44-208-420-8341

Introduction

Tyco Electronics offers many products for wire-to-wire splicing: Raychem SolderSleeve splicing devices; SolderGrip splices; and DuraSeal and MiniSeal crimp splices. Like all Raychem interconnect products, the wire-to-wire splicing devices are rugged and reliable, yet easy to install.

Designed for applications with temperatures up to 150°C [302°F], products in this section include:

- SolderSleeve splicing devices, which can be used to make sealed or unsealed splices. In a single step, they solder, insulate, encapsulate, and strain-relieve a wide range of wire sizes.
- DuraSeal heat-shrinkable nylon crimp splices are easy to use in factory or repair applications. DuraSeal crimp splices provide watertight sealing and superior protection against corrosion, abrasion, and vibration.
- Small, lightweight, and low-profile MiniSeal high-performance crimp splices, which substantially reduce wire bundle size and weight, are QPL-listed to the MIL-S-81824 specification, and are required by the MIL-W-5088 specification.
- SolderGrip splices, which are closed-end connectors utilizing a spiral copper coil that grips and compresses the conductors and allows a prefluxed solder ring to flow to the center of the splicing area, resulting in a high-reliability, repeatable solder joint.
- PolyCrimp heat-shrinkable polyethylene crimp splices offer a one-piece design and translucent tubing which allows for visual inspection of the splice. The dual wall polyethylene tubing provides strain relief and protection against the environment.

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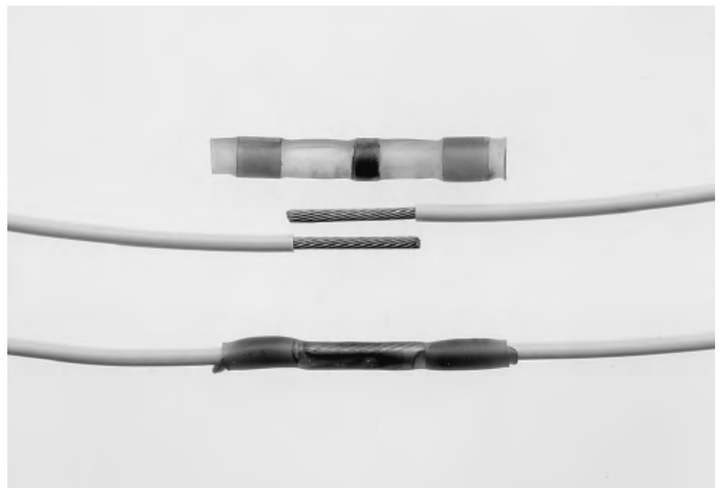
SolderSleeve Wire Splices

Product Facts

- Transparent polyvinylidene fluoride or polyolefin sleeve provides encapsulation, inspectability, strain relief, and insulation
- Prefluxed solder preform provides a controlled soldering process
- One-piece design makes installation easy and lowers the installed cost
- With one or two wires per end, the NAS 1744 splices meet 75,000 ft [22,000 m] altitude immersion requirement
- Thermochromic temperature indicator in the NAS splices facilitates termination and inspection
- UL and CUL recognized



Applications

In-line wire splices.

Product Options

Product Series	Minimum Wire Temperature Rating	Maximum Operating Temperature	Intended Application Environment
CWT	85°C [185°F]	125°C [257°F]	Splashproof
D-110	125°C [257°F]	150°C [302°F]	Splashproof
D-1744 (NAS 1744)	125°C [257°F]	150°C [302°F]	Immersion sealed

Note: Cadmium-free option (B-152 series) is available for operating temperature of 125˚C [257˚F]. Consult Tyco Electronics for details.

Product Selection Process

From the Product Options table above, select the product series appropriate for your application based on the temperature rating and sealing performance required.

If the application has only one size of wire per side and no more than two wires on either side:

1. Determine wire gauge sizes for both sides of splice.
2. Determine number of wires (one or two wires) for each side of splice.
3. Select part numbers from the appropriate table:
   - For CWT series (low temperature): Use Table A on page 7-51.
   - For D-110 series (splashproof): Use Table B on page 7-52.
   - For D-1744 series (immersion sealed): Use Table C on page 7-53.

If the application has more than one size of wire per side or more than two wires on either side (or if you prefer to work with CMA or mm^2 sizes):

1. Turn to "CMA/mm^2 Calculation" on page 7-54 and use the workspace there to calculate the total cross section to be spliced.
2. Use Table E on page 7-55 to select the sleeve recommended for that cross section.

Notes:

While all combinations listed will provide satisfactory solder joints, the degree of strain relief obtained depends on the outer diameter of the wires being joined. Refer to Table E for the recommended size ranges for the sleeves.

Wires 16 AWG (1.21 mm^2) and larger, and wires having more than 19 strands, should be pretinned prior to splicing, to obtain the optimum solder joint quality.

Part selection for wires 26 AWG (0.15 mm^2) and smaller is covered on page 7-52.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Table A:
CWT Series Selection

Side A: Size and Number of Conductors		Side B: 26 AWG 1	Side B: 26 AWG 2	Side B: 24 AWG 1	Side B: 24 AWG 2	Side B: 22 AWG 1	Side B: 22 AWG 2	Side B: 20 AWG 1	Side B: 20 AWG 2
26 AWG	1	CWT-9001	CWT-9001	CWT-9001	CWT-9001	CWT-9001	CWT-9002	CWT-9002	CWT-9002
	2	CWT-9001	CWT-9001	CWT-9001	CWT-9002	CWT-9001	CWT-9002	CWT-9002	CWT-9002
24 AWG	1	CWT-9001	CWT-9001	CWT-9001	CWT-9001	CWT-9001	CWT-9002	CWT-9002	CWT-9002
	2	CWT-9001	CWT-9002	CWT-9001	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002
22 AWG	1	CWT-9001	CWT-9001	CWT-9001	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002
	2	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9003
20 AWG	1	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9003
	2	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9003	CWT-9003	CWT-9003
18 AWG	1	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9003
	2	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003
16 AWG	1	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9003	CWT-9003	CWT-9003
	2	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003
14 AWG	1	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003
	2	CWT-9004	CWT-9004	CWT-9004	CWT-9004	CWT-9004	CWT-9004	CWT-9004	CWT-9004
12 AWG	1	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9004
	2	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005
10 AWG	1	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005

Side A: Size and Number of Conductors		Side B: 18 AWG 1	Side B: 18 AWG 2	Side B: 16 AWG 1	Side B: 16 AWG 2	Side B: 14 AWG 1	Side B: 14 AWG 2	Side B: 12 AWG 1	Side B: 12 AWG 2	Side B: 10 AWG 1
26 AWG	1	CWT-9002	CWT-9003	CWT-9002	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9005	CWT-9005
	2	CWT-9002	CWT-9003	CWT-9002	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9005	CWT-9005
24 AWG	1	CWT-9002	CWT-9003	CWT-9002	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9005	CWT-9005
	2	CWT-9002	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9005	CWT-9005
22 AWG	1	CWT-9002	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9005	CWT-9005
	2	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9004	CWT-9005	CWT-9005
20 AWG	1	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9004	CWT-9005	CWT-9005
	2	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9004	CWT-9004	CWT-9005	CWT-9005
18 AWG	1	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9004	CWT-9005	CWT-9005
	2	CWT-9003	CWT-9004	CWT-9003	CWT-9004	CWT-9004	CWT-9005	CWT-9004	CWT-9005	CWT-9005
16 AWG	1	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9004	CWT-9004	CWT-9005	CWT-9005
	2	CWT-9004	CWT-9004	CWT-9004	CWT-9005	CWT-9004	CWT-9005	CWT-9005	CWT-9005	CWT-9005
14 AWG	1	CWT-9004	CWT-9004	CWT-9004	CWT-9004	CWT-9004	CWT-9005	CWT-9004	CWT-9005	CWT-9005
	2	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005
12 AWG	1	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005
	2	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005
10 AWG	1	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005

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Table B: D-110 Series Selection

Side A: Size and Number of Conductors		Side B: 26 AWG 1	Side B: 26 AWG 2	Side B: 24 AWG 1	Side B: 24 AWG 2	Side B: 22 AWG 1	Side B: 22 AWG 2	Side B: 20 AWG 1	Side B: 20 AWG 2
26 AWG	1	D-110-35	D-110-35	D-110-35	D-110-35	D-110-35	D-110-41	D-110-41	D-110-41
	2	D-110-35	D-110-35	D-110-35	D-110-41	D-110-35	D-110-41	D-110-41	D-110-41
24 AWG	1	D-110-35	D-110-35	D-110-35	D-110-35	D-110-35	D-110-41	D-110-41	D-110-41
	2	D-110-35	D-110-41	D-110-35	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41
22 AWG	1	D-110-35	D-110-35	D-110-35	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41
	2	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-0181
20 AWG	1	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-0181
	2	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-0181	D-110-0181	D-110-0181
18 AWG	1	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-0181
	2	D-110-0181	D-110-0181	D-110-0181	D-110-0181	D-110-0181	D-110-0101	D-110-0101	D-110-0101
16 AWG	1	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-0181	D-110-0181	D-110-0181
	2	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0101
14 AWG	1	D-110-0181	D-110-0181	D-110-0181	D-110-0181	D-110-0181	D-110-0101	D-110-0101	D-110-0101
	2	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0090
12 AWG	1	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101
	2	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090
10 AWG	1	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0083	D-110-0083	D-110-0083

Side A: Size and Number of Conductors		Side B: 18 AWG 1	Side B: 18 AWG 2	Side B: 16 AWG 1	Side B: 16 AWG 2	Side B: 14 AWG 1	Side B: 14 AWG 2	Side B: 12 AWG 1	Side B: 12 AWG 2	Side B: 10 AWG 1
26 AWG	1	D-110-41	D-110-0181	D-110-41	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0090
	2	D-110-41	D-110-0181	D-110-41	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0090
24 AWG	1	D-110-41	D-110-0181	D-110-41	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0090
	2	D-110-41	D-110-0181	D-110-41	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0090
22 AWG	1	D-110-41	D-110-0181	D-110-41	D-110-0181	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0090
	2	D-110-41	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0090	D-110-0090
20 AWG	1	D-110-41	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0090	D-110-0090
	2	D-110-0181	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0090	D-110-0090
18 AWG	1	D-110-0181	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0090	D-110-0090
	2	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0090	D-110-0090	D-110-0090	D-110-0083
16 AWG	1	D-110-0181	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0090	D-110-0090
	2	D-110-0101	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0090	D-110-0090	D-110-0083	D-110-0083
14 AWG	1	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0090	D-110-0090	D-110-0090	D-110-0083
	2	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0083	D-110-0083
12 AWG	1	D-110-0101	D-110-0090	D-110-0101	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0083	D-110-0083
	2	D-110-0090	D-110-0090	D-110-0090	D-110-0083	D-110-0090	D-110-0083	D-110-0083	D-110-0083	D-110-0083
10 AWG	1	D-110-0083	D-110-0083	D-110-0083	D-110-0083	D-110-0083	D-110-0083	D-110-0083	D-110-0083	D-110-0083

Fine Wire Splices 26 AWG (0.15 mm²) and Smaller

Part Number	Inside Diameter As Supplied*	Inside Diameter Fully Recovered**	Length***
D-110-0071	0.9 [0.035]	0.6 [0.025]	4.7 [0.185]
D-110-0213	0.9 [0.035]	0.6 [0.025]	4.2 [0.165]
D-110-0214	0.6 [0.025]	0.3 [0.013]	6.3 [0.250]
D-110-0217	1.0 [0.040]	0.6 [0.025]	9.1 [0.360]
D-110-40	0.6 [0.025]	0.5 [0.021]	5.1 [0.200]

Note: Micro SolderSleeve terminations are used for splicing wires smaller than 26 AWG [0.15 mm²].
* Minimum. Wire insulation must be smaller than this.
** Maximum. Wire insulation and combined conductor diameters must be greater than this.
*** Nominal. Wire strip length must be approximately one-half of this.

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Table C:
D-1744 Series Selection

Side A: Size and Number of Conductors		Side B: Size and Number of Conductors							
		26 AWG		24 AWG		22 AWG		20 AWG	
		1	2	1	2	1	2	1	2
26 AWG	1	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-02
	2	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-02	D-1744-01	D-1744-02
24 AWG	1	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-02
	2	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-02	D-1744-02	D-1744-02
22 AWG	1	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-02	D-1744-01	D-1744-02
	2	D-1744-01	D-1744-02	D-1744-01	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02
20 AWG	1	D-1744-01	D-1744-01	D-1744-01	D-1744-02	D-1744-01	D-1744-02	D-1744-02	D-1744-02
	2	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-03
18 AWG	1	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-03
	2	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03
16 AWG	1	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-03
	2	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03
14 AWG	1	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03
	2	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04
12 AWG	1	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-04
	2	D-1744-04	D-1744-04	D-1744-04	—	D-1744-04	—	—	—

Side A: Size and Number of Conductors		Side B: Size and Number of Conductors							
		18 AWG		16 AWG		14 AWG		12 AWG	
		1	2	1	2	1	2	1	2
26 AWG	1	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04
	2	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04
24 AWG	1	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04
	2	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	—
22 AWG	1	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04
	2	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	—
20 AWG	1	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-04	—
	2	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-04	—
18 AWG	1	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	—
	2	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-03	—
16 AWG	1	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-03	—
	2	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-04	—
14 AWG	1	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-03	—
	2	D-1744-03	D-1744-04	D-1744-04	D-1744-04	D-1744-04	—	—	—
12 AWG	1	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-03	—	D-1744-04	—

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SolderSleeve Wire Splices (Continued)

CMA/mm² Calculation

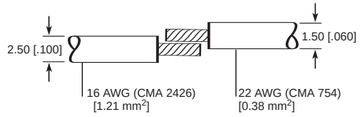
To calculate the total circular mil or mm² area of the conductors to be terminated in a single splice, follow these steps:

1. Choose either CMA or mm² as your unit of measure for selection purposes and continue to use it for all your selection criteria.
2. In the workspace below, list the CMA or mm² for each conductor that will go into the same splice. (To assist you, Table D on this page provides the CMA of typical conductors.)
3. Add together the values listed in the workspace below to obtain the total area.
4. From Table E on the next page, select the part number recommended for the total CMA or mm² you have calculated.
5. Refer to the examples on this page for further clarification.

Wire Number	CMA	mm²	
1			
2			
3			
4			
5			Part Number:
Total			

CMA/mm² Examples

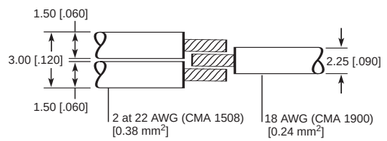
One-to-One Wire Splice



Total CMA = 3180
Total mm² = 1.59

Correct part number selection from Table E (based on CMA/mm² and nominal jacket wire OD) = CWT-9002 or D-110-41 or D-1744-02.

Multiwire Splice



Total CMA = 3408
Total mm² = 1.71

Correct part number selection from Table E (based on CMA/mm² and nominal jacket wire OD) = CWT-9003 or D-110-0181 or D-1744-03.

Table D.

CMA of Typical AWG Conductors

AWG	28	26	24	22	20	18	16	14	12
CMA	177	304	475	754	1216	1900	2426	3831	5874
mm²	0.09	0.15	0.24	0.38	0.61	0.95	1.21	1.92	2.94

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SolderSleeve Wire Splices (Continued)

Installation Requirements

For proper installation of these devices the correct heating tool and reflector attachment must be used. Any one of the following Raychem heating tools is recommended:

- HL1802E
- IR-1759 MiniRay
- AA-400 Super Heater
- CV-1981

Refer to Raychem installation procedure RPIP 850-00 for D-1744 Series and RPIP 824-00 for CWT Series.

You will find ordering information for these tools on pages 7-104 to 7-111.

Table E: Multiwire Splice Selection

Product Series	Wire Jacket OD		CMA Combined Total		mm² Combined Total	
	Min.	Max.	Min.	Max.	Min.	Max.
CWT-9001	0.4 [0.015]	1.7 [0.066]	450	1500	0.3	0.8
CWT-9002	1.3 [0.05]	2.7 [0.106]	1500	4000	0.8	2.0
CWT-9003	1.8 [0.07]	4.5 [0.18]	4000	7800	2.0	4.0
CWT-9004	2.8 [0.11]	6.0 [0.236]	7800	12000	4.0	6.0
CWT-9005	3.2 [0.125]	7.0 [0.275]	12000	19000	6.0	10.0
D-1744-01	0.50 [0.020]	1.90 [0.075]	350	2000	–	–
D-1744-02	0.80 [0.031]	2.80 [0.110]	2000	4000	–	–
D-1744-03	1.30 [0.050]	4.57 [0.180]	4000	10000	–	–
D-1744-04	2.00 [0.080]	7.11 [0.280]	10000	13000	–	–
D-110-35	0.51 [0.020]	1.78 [0.070]	500	1500	–	–
D-110-41	1.27 [0.050]	2.54 [1.00]	1200	3500	–	–
D-110-0181	1.9 [0.075]	4.5 [0.177]	3600	6000	–	–
D-110-0101	2.41 [0.095]	4.32 [0.17]	4800	9000	–	–
D-110-0090	3.56 [0.140]	7.11 [0.28]	8500	16200	–	–
D-110-0083	4.0 [0.160]	8.76 [0.345]	16200	25000	–	–

Product Characteristics

Material		
Insulation (D-110, D-1744)	Radiation-crosslinked, heat-shrinkable polyvinylidene fluoride	
Insulation (CWT)	Radiation-crosslinked, heat-shrinkable polyolefin	
Solder and flux (D-110, D-1744)	Solder: Sn63 Pb37	Flux: ROL1 per ANSI-J-004 (RMA flux)
Solder and flux (CWT)	Solder: Sn50 Pb32 Cd18	Flux: ROM1 per ASNS-J-004 (RA flux)
Meltable inserts (CWT, D-1744)	Meltable thermoplastic	
Typical Performance		
Voltage drop	2.0 mV	
Tensile strength	Exceeds strength of conductor	
Dielectric strength	2.0 kV	
Temperature rating (CWT)	-55°C to +125°C [-67°F to +257°F]	
Temperature rating (D-110, D-1744)	-55°C to +150°C [-67°F to +302°F]	
Insulation resistance	1000 megohms	

Specifications/Approvals

Series	Agency	Raychem
CWT	UL E87681	D-5023
D-110	UL E87681	RT-1404
D-1744	NAS-1744	RT-1404

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C. America: 57-1-254-4444

South America: 55-11-2103-6000
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UK: 44-208-420-8341

SolderGrip Closed End Connector Splices

Product Facts

- Soldered connection
- Electrical insulation
- Sealed for immersion (SGRS)
- Excellent strain relief
- Simple installation

Applications

SolderGrip heat-shrinkable solder-type closed-end connectors are designed for electrical termination of multiple-wire combinations. They provide a reliable alternative to crimping, welding, or conventional twist-on-style closed-end connectors.

Their unique combination of wire fixturing and controlled-soldering technology provides dependable electrical termination of multiple wire combinations.

SolderGrip terminators consist of a heat-shrinkable thermoplastic sleeve containing a spiral-wound copper insert. The insert is fitted with a prefluxed solder band.

This innovation design allows SolderGrip products to reliably terminate as many as 10 wires of different sizes and types in a single device.

The capability of SolderGrip terminators encompasses single or multistranded, bare or tinned copper wires with low- or high-temperature insulation.

The termination is environmentally protected and strain relieved.

SolderGrip splice terminators are color-coded for easy identification.

Product Options

Product Series	Environmental Protection	Max. Operating Temp.
SGRP	Splashproof	125°C [257°F]
SGRS	Sealed	125°C [257°F]

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SolderGrip Closed End Connector Splices (Continued)

Product Selection Process

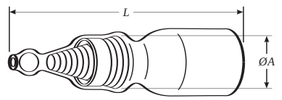
1. From the Product Options table on the previous page, select the product series appropriate for your application.
2. Determine the wire combination (number of wires and size) of the wire bundle you wish to splice.
3. Use Table C (page 7-59) to select the correct connector for AWG wire combinations.*
   For mm² wire combinations use Table A to select a SolderGrip part number.

Example: For connecting a bundle with one 12 AWG wire (1 #12) and two 14 AWG wires (+2 #14), you need an SGRP-3 connector. For sealed parts, select the SGRS series.

*If the wire combination is not listed in Table C, use the CMA (mm²) method of determining wire bundle size (see "CMA/mm² Calculation" on page 7-58). Using Table B (page 7-58, select the smallest size connector that will fit your total wire CMA (mm²) value.

4. Verify that the wire bundle (with wire insulation) does not exceed the maximum diameter allowed for the connector you selected. Simply check the bundle's diameter against the maximum diameter that Table A (below) lists for that part.
5. Verify that the total amperage to be applied does not exceed the maximum amp rating for the part.

Insulated Closed-End Connectors (SGRP series)



Insulated and Sealed Closed-End Connectors (SGRS series)

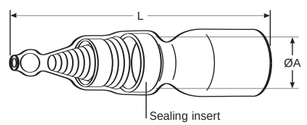


Table A - Product Dimensions and Part Number Descriptions

Part Number	Color Code	Product Dimensions (Min.)		
		L	ØA	Wire Range (Min.-Max.) CMA/mm²
SGRP-1	Green	1.370 [34.8]	.120 [2.9]	1400 - 4800 [0.7 - 2.4]
SGRP-2	Red	1.350 [34.2]	.150 [3.7]	4000 - 8000 [2.0 - 4.0]
SGRP-3	Blue	1.610 [41.0]	.200 [5.1]	7000 - 18000 [3.5 - 8.0]
SGRP-4	Yellow	1.650 [42.0]	.270 [6.8]	15000 - 30000 [7.5 - 12.0]

Part Number	Color Code	Product Dimensions (Min.)		
		L	ØA	Wire Range (Min.-Max.) CMA/mm²
SGRS-1	Green	1.370 [34.8]	0.130 [3.4]	1400 - 4800 [0.7 - 2.4]
SGRS-2	Red	1.350 [34.2]	0.190 [4.8]	4000 - 8000 [2.0 - 4.0]
SGRS-3	Blue	1.650 [42.0]	0.290 [7.3]	7000 - 16000 [3.5 - 8.0]
SGRS-4	Yellow	1.630 [41.5]	0.360 [9.1]	15000 - 24000 [7.5 - 12.0]

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SolderGrip Closed End Connector Splices (Continued)

CMA/mm² Calculation

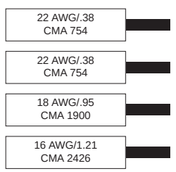
To calculate the total circular mil or mm² area of the wire bundle to be terminated, follow these steps:

1. Choose either CMA or mm² as your unit of measure for selection purposes and continue to use it for all your selection criteria. (Both measures provide the same results.)
2. In the workspace below, list the CMA or mm² for each conductor in the bundle. (Table B provides the CMA of typical conductors.)
3. Add together the values listed in the workspace below to obtain the total area.
4. Use Table A to select the smallest terminator that will fit the total CMA (mm²).

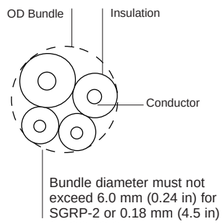
Wire Number	CMA	mm²
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
Total		

Solder Grip Part No. _____

CMA/mm² Example



Total CMA = 5834
Total mm2 = 2.92
Correct part number (based on CMA of 5834 or mm² of 2.92): SGRP-2or SGRS-2



Bundle diameter must not exceed 6.0 mm (0.24 in) for SGRP-2 or 0.18 mm (4.5 in) for SGRS-2.

Table B. CMA of Typical Copper Conductors

AWG	30	28	26	24	22	20	18	16	14	12	10	8
CMA	112	177	304	475	754	1216	1900	2426	3831	5874	9354	16983
mm²	0.05	0.09	0.15	0.24	0.38	0.61	0.95	1.21	1.92	2.94	4.74	8.61

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Table C. SolderGrip Wire Combinations

Wire Combinations	Splash-proof	Sealed
1 # 8 + 1 # 12	SGRP-4	SGRS-4
1 # 8 + 1 # 16	SGRP-4	SGRS-4
2 # 8 + 2 # 16	SGRP-4	SGRS-4
1 # 8 + 1 # 14	SGRP-4	SGRS-4
1 # 8 + 1 # 14 + 1 # 16	SGRP-4	SGRS-4
1 # 10 + 1 # 18	SGRP-3	SGRS-3
1 # 10 + 2 # 18	SGRP-3	SGRS-3
1 # 10 + 3 # 18	SGRP-3	SGRS-3
1 # 10 + 1 # 16	SGRP-3	SGRS-3
1 # 10 + 1 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 10 + 1 # 16 + 2 # 18	SGRP-3	SGRS-3
1 # 10 + 2 # 16	SGRP-3	SGRS-3
1 # 10 + 3 # 16	SGRP-4	SGRS-4
1 # 10 + 4 # 16	SGRP-4	SGRS-4
1 # 10 + 5 # 16	SGRP-4	SGRS-4
1 # 10 + 1 # 14	SGRP-3	SGRS-3
1 # 10 + 1 # 14 + 1 # 18	SGRP-3	SGRS-3
1 # 10 + 1 # 14 + 1 # 16	SGRP-3	SGRS-3
1 # 10 + 1 # 14 + 2 # 16	SGRP-3	SGRS-3
1 # 10 + 1 # 14 + 3 # 16	SGRP-4	SGRS-4
1 # 10 + 2 # 14	SGRP-4	SGRS-4
1 # 10 + 3 # 14	SGRP-4	SGRS-4
1 # 10 + 1 # 12	SGRP-3	SGRS-3
1 # 10 + 1 # 12 + 1 # 14	SGRP-4	SGRS-4
1 # 10 + 2 # 12	SGRP-4	SGRS-4
2 # 10	SGRP-4	SGRS-4
2 # 10 + 1 # 16	SGRP-4	SGRS-4
1 # 12 + 1 # 18	SGRP-2	SGRS-2
1 # 12 + 2 # 18	SGRP-3	SGRS-3
1 # 12 + 3 # 18	SGRP-3	SGRS-3
1 # 12 + 4 # 18	SGRP-3	SGRS-3
1 # 12 + 5 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 16	SGRP-3	SGRS-3
1 # 12 + 1 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 16 + 2 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 16 + 3 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 16 + 4 # 18	SGRP-4	SGRS-4
1 # 12 + 2 # 16	SGRP-3	SGRS-3
1 # 14 + 3 # 20	SGRP-2	SGRS-2
1 # 14 + 4 # 20	SGRP-3	SGRS-3
1 # 14 + 1 # 18	SGRP-2	SGRS-2
1 # 14 + 1 # 18 + 1 # 20	SGRP-2	SGRS-2
1 # 14 + 2 # 18	SGRP-2	SGRS-2
1 # 14 + 3 # 18	SGRP-3	SGRS-3
1 # 14 + 4 # 18	SGRP-3	SGRS-3
1 # 14 + 5 # 18	SGRP-3	SGRS-3
1 # 14 + 1 # 16	SGRP-2	SGRS-3
1 # 14 + 1 # 16 + 1 # 20	SGRP-2	SGRS-2
1 # 14 + 1 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 14 + 1 # 16 + 2 # 18	SGRP-3	SGRS-3
1 # 14 + 1 # 16 + 3 # 18	SGRP-3	SGRS-3
1 # 14 + 1 # 16 + 4 # 18	SGRP-3	SGRS-3
1 # 14 + 2 # 16	SGRP-3	SGRS-3
1 # 14 + 2 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 14 + 2 # 16 + 2 # 18	SGRP-3	SGRS-3
1 # 14 + 2 # 16 + 3 # 18	SGRP-3	SGRS-3
1 # 14 + 3 # 16	SGRP-3	SGRS-3
1 # 14 + 3 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 14 + 3 # 16 + 2 # 18	SGRP-3	SGRS-3
1 # 14 + 4 # 16	SGRP-3	SGRS-3
1 # 14 + 4 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 14 + 5 # 16	SGRP-3	SGRS-3
2 # 14	SGRP-2	SGRS-2
2 # 14 + 1 # 16	SGRP-3	SGRS-3
2 # 14 + 1 # 16	SGRP-3	SGRS-3
2 # 14 + 1 # 16	SGRP-3	SGRS-3
2 # 14 + 2 # 16	SGRP-3	SGRS-3
2 # 14 + 2 # 16	SGRP-3	SGRS-3
2 # 14 + 3 # 16	SGRP-3	SGRS-3
2 # 14 + 4 # 16	SGRP-4	SGRS-4
3 # 14	SGRP-3	SGRS-3
3 # 14 + 1 # 16	SGRP-3	SGRS-3
3 # 14 + 2 # 16	SGRP-4	SGRS-4
3 # 14 + 3 # 16	SGRP-4	SGRS-4
4 # 14	SGRP-3	SGRS-3
2 # 16 + 1 # 18 + 3 # 20	SGRP-3	SGRS-3
2 # 16 + 1 # 18 + 2 # 20	SGRP-3	SGRS-3
2 # 16 + 1 # 18 + 1 # 20	SGRP-2	SGRS-2
2 # 16 + 1 # 18	SGRP-2	SGRS-2
2 # 16 + 4 # 20	SGRP-3	SGRS-3
2 # 16 + 3 # 20	SGRP-3	SGRS-3
2 # 16 + 2 # 20	SGRP-2	SGRS-2
2 # 16 + 1 # 20	SGRP-2	SGRS-2
2 # 16	SGRP-2	SGRS-2
1 # 16 + 5 # 18	SGRP-3	SGRS-3
1 # 16 + 4 # 18 + 1 # 20	SGRP-3	SGRS-3
1 # 16 + 4 # 18	SGRP-3	SGRS-3
1 # 16 + 3 # 18 + 2 # 20	SGRP-3	SGRS-3
1 # 16 + 3 # 18 + 1 # 20	SGRP-3	SGRS-3
1 # 16 + 2 # 18 + 3 # 20	SGRP-3	SGRS-3
1 # 16 + 2 # 18 + 1 # 20	SGRP-2	SGRS-2
1 # 16 + 2 # 18	SGRP-2	SGRS-2
1 # 16 + 1 # 18 + 4 # 20	SGRP-3	SGRS-3
1 # 16 + 1 # 18 + 3 # 20	SGRP-2	SGRS-2
1 # 16 + 1 # 18 + 2 # 20	SGRP-2	SGRS-2
1 # 16 + 1 # 18 + 1 # 20	SGRP-2	SGRS-2
1 # 16 + 1 # 18	SGRP-1	SGRS-1
1 # 16 + 4 # 20	SGRP-2	SGRS-2
1 # 16 + 3 # 20	SGRP-2	SGRS-2
1 # 16 + 1 # 20 + 1 # 22	SGRP-1	SGRS-1
1 # 16 + 1 # 20	SGRP-1	SGRS-1
1 # 16 + 3 # 22	SGRP-1	SGRS-1
1 # 16 + 2 # 22	SGRP-1	SGRS-1
1 # 16 + 1 # 22	SGRP-1	SGRS-1
1 # 18 + 1 # 22	SGRP-1	SGRS-1
1 # 18 + 2 # 22	SGRP-1	SGRS-1
1 # 18 + 3 # 22	SGRP-1	SGRS-1
1 # 18 + 1 # 20	SGRP-1	SGRS-1
1 # 18 + 1 # 20 + 1 # 22	SGRP-1	SGRS-1
1 # 18 + 1 # 20 + 2 # 22	SGRP-1	SGRS-1
1 # 18 + 2 # 20	SGRP-1	SGRS-1
1 # 18 + 3 # 20	SGRP-2	SGRS-2
1 # 18 + 4 # 20	SGRP-2	SGRS-2

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Table C. SolderGrip Wire Combinations (Continued)

Wire Combinations	Splash-proof	Sealed
1 # 12 + 2 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 12 + 2 # 16 + 2 # 18	SGRP-3	SGRS-3
1 # 12 + 3 # 16	SGRP-3	SGRS-3
1 # 12 + 4 # 16	SGRP-3	SGRS-3
1 # 12 + 5 # 16	SGRP-4	SGRS-4
1 # 12 + 1 # 14 + 1 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 14 + 2 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 14 + 3 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 14 + 1 # 16	SGRP-3	SGRS-3
1 # 12 + 1 # 14 + 2 # 16	SGRP-3	SGRS-3
1 # 12 + 1 # 14 + 3 # 16	SGRP-4	SGRS-4
1 # 12 + 1 # 14 + 4 # 16	SGRP-4	SGRS-4
1 # 12 + 2 # 14	SGRP-3	SGRS-3
1 # 12 + 2 # 14 + 1 # 18	SGRP-3	SGRS-3
1 # 12 + 2 # 14 + 1 # 16	SGRP-4	SGRS-4
1 # 12 + 2 # 14 + 2 # 16	SGRP-4	SGRS-4
1 # 12 + 2 # 14 + 3 # 16	SGRP-4	SGRS-4
1 # 12 + 3 # 14	SGRP-4	SGRS-4
1 # 12 + 3 # 14 + 1 # 16	SGRP-4	SGRS-4
1 # 12 + 4 # 14	SGRP-4	SGRS-4
2 # 12	SGRP-4	SGRS-4
2 # 12 + 1 # 18	SGRP-3	SGRS-3
2 # 12 + 1 # 18	SGRP-3	SGRS-3
2 # 12 + 1 # 16	SGRP-3	SGRS-3
2 # 12 + 2 # 16 + 1 # 18	SGRP-4	SGRS-4
2 # 12 + 3 # 16	SGRP-4	SGRS-4
2 # 12 + 1 # 14 + 1 # 18	SGRP-4	SGRS-4
2 # 12 + 1 # 14 + 1 # 16	SGRP-4	SGRS-4
3 # 12 + 1 # 14	SGRP-4	SGRS-4
2 # 12 + 2 # 14	SGRP-4	SGRS-4
3 # 12 + 1 # 18	SGRP-4	SGRS-4
3 # 12 + 1 # 16	SGRP-4	SGRS-4
1 # 14 + 1 # 22	SGRP-1	SGRS-1
1 # 14 + 1 # 20	SGRP-2	SGRS-2
1 # 14 + 2 # 20	SGRP-2	SGRS-2
4 # 14 + 1 # 16	SGRP-4	SGRS-4
4 # 14 + 2 # 16	SGRP-4	SGRS-4
5 # 14	SGRP-4	SGRS-4
5 # 14 + 1 # 16	SGRP-4	SGRS-4
1 # 16 + 3 # 18	SGRP-3	SGRS-3
1 # 16 + 2 # 18 + 2 # 20	SGRP-3	SGRS-3
1 # 16 + 5 # 20	SGRP-3	SGRS-3
1 # 16 + 2 # 20	SGRP-2	SGRS-2
6 # 16	SGRP-3	SGRS-3
5 # 16 + 1 # 18	SGRP-3	SGRS-3
5 # 16 + 1 # 20	SGRP-3	SGRS-3
5 # 16	SGRP-3	SGRS-3
4 # 16 + 2 # 18	SGRP-3	SGRS-3
4 # 16 + 1 # 18 + 1 # 20	SGRP-3	SGRS-3
4 # 16 + 1 # 18	SGRP-3	SGRS-3
4 # 16 + 2 # 20	SGRP-3	SGRS-3
4 # 16 + 1 # 20	SGRP-3	SGRS-3
4 # 16	SGRP-3	SGRS-3
3 # 16 + 3 # 18	SGRP-3	SGRS-3
3 # 16 + 2 # 18 + 1 # 20	SGRP-3	SGRS-3
3 # 16 + 2 # 18	SGRP-3	SGRS-3
3 # 16 + 1 # 18 + 2 # 20	SGRP-3	SGRS-3
3 # 16 + 1 # 18 + 1 # 20	SGRP-3	SGRS-3
3 # 16 + 1 # 18	SGRP-3	SGRS-3
3 # 16 + 3 # 20	SGRP-3	SGRS-3
3 # 16 + 2 # 20	SGRP-3	SGRS-3
3 # 16 + 1 # 20	SGRP-3	SGRS-3
3 # 16	SGRP-2	SGRS-2
2 # 16 + 4 # 18	SGRP-3	SGRS-3
2 # 16 + 3 # 18 + 1 # 20	SGRP-3	SGRS-3
2 # 16 + 3 # 18	SGRP-3	SGRS-3
2 # 16 + 2 # 18 + 2 # 20	SGRP-3	SGRS-3
2 # 16 + 2 # 18 + 1 # 20	SGRP-3	SGRS-3
2 # 16 + 2 # 18	SGRP-3	SGRS-3
—	—	—
1 # 18 + 5 # 20	SGRP-2	SGRS-2
2 # 18	SGRP-1	SGRS-1
2 # 18 + 1 # 22	SGRP-1	SGRS-1
2 # 18 + 1 # 20	SGRP-2	SGRS-2
2 # 18 + 2 # 20	SGRP-2	SGRS-2
2 # 18 + 3 # 20	SGRP-2	SGRS-2
2 # 18 + 4 # 20	SGRP-3	SGRS-3
3 # 18	SGRP-2	SGRS-2
3 # 18 + 1 # 20	SGRP-2	SGRS-2
3 # 18 + 2 # 20	SGRP-3	SGRS-3
3 # 18 + 3 # 20	SGRP-3	SGRS-3
4 # 18	SGRP-2	SGRS-2
4 # 18 + 1 # 20	SGRP-3	SGRS-3
4 # 18 + 2 # 20	SGRP-3	SGRS-3
5 # 18	SGRP-3	SGRS-3
5 # 18 + 1 # 20	SGRP-3	SGRS-3
6 # 18	SGRP-3	SGRS-3
1 # 20 + 1 # 22	SGRP-1	SGRS-1
1 # 20 + 2 # 22	SGRP-1	SGRS-1
1 # 20 + 3 # 22	SGRP-1	SGRS-1
1 # 20 + 4 # 22	SGRP-1	SGRS-1
2 # 20	SGRP-1	SGRS-1
2 # 20 + 1 # 22	SGRP-1	SGRS-1
2 # 20 + 2 # 22	SGRP-1	SGRS-1
2 # 20 + 3 # 22	SGRP-1	SGRS-1
3 # 20	SGRP-1	SGRS-1
3 # 20 + 1 # 22	SGRP-1	SGRS-1
4 # 20	SGRP-2	SGRS-2
5 # 20	SGRP-2	SGRS-2
6 # 20	SGRP-2	SGRS-2
3 # 22	SGRP-1	SGRS-1
4 # 22	SGRP-1	SGRS-1
5 # 22	SGRP-1	SGRS-1
6 # 22	SGRP-1	SGRS-1
—	—	—

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

SolderGrip Closed End Connector Splices (Continued)

Product Characteristics

Material			
Insulation	Radiation-crosslinked, transparent heat-shrinkable polyvinylidene fluoride		
Solder preform with flux	Sn 60, Pb 40, ROM1 flux per ANSI-J-STD-004 (RA flux).		
Sealing insert (SGRS)	Hot melt adhesive		
Spiral wound insert	Copper alloy		
Physical	**Unit**	**Method of test**	**Requirement**
Dimensions	inches	RB-109	See product dimensions.
Electromechanical	**Unit**	**Method of test**	**Typical values**
Dielectric withstand voltage	kilovolts	RB-109	2.0
Static heating	degrees	RB-109	Less than 50°C rise
Environmental*	**Unit**	**Method of test**	**Requirement**
Insulation resistance after water immersion (SGRS only)	megohms	RB-109	100
Contact resistance after testing	milliohms	RB-109	Less than 6 milliohms
Operating condition	**Unit**	**Method of test**	**Value**
Temperature rating	—	—	-55°C to 125°C [-67°F to 257°F]
Voltage rating	volts	—	600

* Immersion resistance sealing is dependent on the wire combinations used. The user should test specific wire combinations. Refer to RB-109 Raychem specification for procedures.

Approvals and Documents

Agency Approvals	UL, CUL E87681
Reference documents	Raychem Specification RB-109 for splices Specification Control Drawings Splices—Non Sealed (SGRP-X), Splices—Sealed (SGRS-X)

Installation

The SolderGrip product is pushed onto the conductors with a twisting motion. With the product in place, installation can be completed with the proper selection and use of heating tools and reflectors. Either of the following Raychem heating tools is recommended:

- HL1802E
- CV-1981

Refer to Raychem installation procedure RPIP 820-00 for detailed instructions and recommended reflector attachments.

You will find ordering information for these tools on pages 7-104 to 7-111.

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DuraSeal Heat-Shrinkable, Environmentally-Sealed, Nylon-Insulated Crimp Splices

Product Facts

- Protects splices from water, condensation, salt, and corrosion
- Provides strain relief
- Protects against vibration in rugged environments
- Completely insulates and protects electrical connections
- Has adhesive lining for protection that is more reliable than conventional splices
- UL, CUL, and Lloyd's listed

Applications

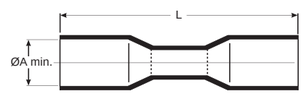
- Automotive/truck wiring repair and maintenance
- Automotive accessory installations
- OEM automotive/truck/RV wire harness fabrication
- Marine electronics
- Fleet maintenance
- Commercial wiring (pumps/pools/spas)
- Appliances

Specifications/Approvals

Series	Agency	Raychem
D-406	UL and CUL listed 91J4, File E87681	RB-107
—	Lloyd's listed, File 65 247 HH 02-93	—

Product Dimensions

Butt Splices



Part Number	Butt Splice Dimensions A Min.	Butt Splice Dimensions L Nom.	Color	Conductor	Wire Dimensions Insulation O.D. (Max.)	Wire Dimensions Insulation O.D. (Min.)
D-406-0001	3.68 [.145]	31.75 [1.25]	Red	22–18	3.56 [.140]	1.40 [.055]
D-406-0002	4.57 [.180]	31.75 [1.25]	Blue	16–14	4.45 [.175]	2.03 [.080]
D-406-0003	6.35 [.250]	38.10 [1.50]	Yellow	12–10	6.22 [.245]	2.79 [.110]

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DuraSeal Heat-Shrinkable, Environmentally-Sealed, Nylon-Insulated Crimp Splices (Continued)

Product Selection Process

1. Determine wire size.
2. Select part number.

Wire Size AWG	mm²	Part Number	Color
22–18	0.38–0.95	D-406-0001	Red
16–14	1.2–2.5	D-406-0002	Blue
12–10	3–6	D-406-0003	Yellow

Product Characteristics (Typical)

Operating temperature	-55°C to 125°C [-67°F to 257°F]
Shrink ratio	Approximately 2:1
Physical properties	Cut-through resistance: 31 kg [70 lb] Wire pullout after crimping and recovery: red: 11.3 kg [25 lb]; blue: 22.7 kg [50 lb]; yellow: 27.2 kg [60 lb] Not flame-retardant No cracking after heat aging for 168 h at 160°C [320°F]
Chemical properties	Solvent resistance: isopropyl alcohol, trichloroethylene, gasoline, battery acid, diesel fuel, motor oil, antifreeze, brake fluid, 5% salt water
Electrical properties	Dielectric strength: 2500 Vac Insulation resistance: 1000 megohms at 100 Vdc

Installation Requirements

For proper installation of these devices, the correct crimp tool and a heating tool with a reflector attachment must be used. The Raychem AD-1522 crimp tool and HL1802E heating tool are recommended. You will find ordering information for these tools on pages 7-104 to 7-111.

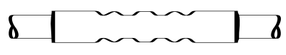
Refer to Raychem installation procedure RPIP 821-00 for detailed instructions.

Installation

1. Select splice of appropriate size. Strip wire 7.5 mm (5/16 in). Insert into crimp barrel.

2. Crimp using Raychem AD-1522 crimp tool for preinsulated crimps.

3. Heat crimped splice with heat gun until tubing recovers and adhesive flows.



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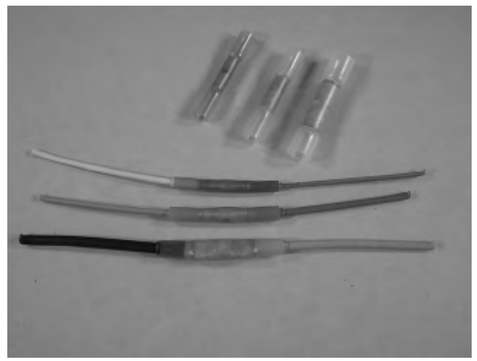
PolyCrimp Heat-Shrinkable Polyethylene Crimp Splices

Product Facts

- One-piece product reduces inventory management
- Translucent tubing allows visual inspection
- Color coded for easy selection of correct AWG
- Dual wall polyethylene tubing provides strain relief and protection against environment



Applications

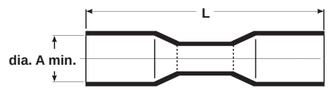
- Alarms
- Marine electronics
- Mass transit signal wire
- Telecom aerial splices
- Traffic light junction boxes
- Commercial wiring (pumps)
- Heavy industrial environments

Specifications/Approvals

Series	Raychem
C203	D5203

Product Dimensions

Butt Splices



Part Number	Butt Splice Dimensions		Color	Conductor	Wire Dimensions	
	A Min.	L Nom.			Insulation O.D. (Max.)	Insulation O.D. (Min.)
C-203-01	3.68 [.145]	31.75 [1.25]	Red	22–18	3.56 [.140]	1.40 [.055]
C-203-02	4.57 [.180]	31.75 [1.25]	Blue	16–14	4.45 [.175]	2.03 [.080]
C-203-03	6.35 [.250]	38.10 [1.50]	Yellow	12–10	6.22 [.245]	—

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UK: 44-208-420-8341

PolyCrimp Heat-Shrinkable Polyethylene Crimp Splices (Continued)

Product Selection Process

1. Determine wire size.
2. Select part number.

Wire Size AWG	mm²	Part Number	Color
22–18	0.38–0.95	C-203-01	Red
16–14	1.2–2.5	C-203-02	Blue
12–10	3–6	C-203-03	Yellow

Product Characteristics (Typical)

Operating temperature	-55°C to 125°C [-67°F to 257°F]
Shrink ratio	Approximately 2:1
Physical properties	Wire pullout after crimping and recovery: red: 6.8 kg [15 lb]; blue: 18.14 kg [40 lb]; yellow: 22.7 kg [50 lb]
Chemical properties	Meets electrical test after conditioning in diesel fuel, brake fluid, ASTM fuel C and engine degreaser.
Electrical properties	Dielectric strength: 2500 Vac Insulation resistance: 1000 megohms at 100 Vdc Voltage rating: 600 Volts max.

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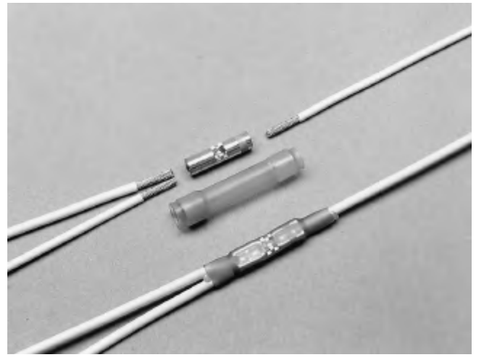
MiniSeal High-Performance, Immersion-Resistant Crimp Splices

Product Facts

- **Immersion-resistant crimp splices are on QPL for MIL-S-81824**
- **MIL-Spec approval**
- **Small size**
- **Light weight**
- **Insulation and strain relief**
- **Easy installation**



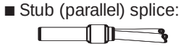
Applications

MiniSeal wire-to-wire splicing products offer solutions for hundreds of aerospace and defense applications. These environment-resistant splices provide excellent reliability, long term performance, MIL-S-81824/1 qualification, and a low installed cost.

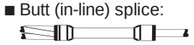
MiniSeal crimp splices consist of a plated copper crimp barrel and a separate, heat-shrinkable, transparent sealing sleeve. They can be used on a combination of wires, from 1:1 to 10:10. MiniSeal splices are one of the smallest, lightest, and most environment-resistant splices available. They preserve the electrical integrity of the splice by preventing the penetration of liquids and the resulting chemical and galvanic corrosion.

Product Selection Process

1. Determine the type of splice required.
   - Stub (parallel) splice:

   - Butt (in-line) splice:

2. Determine which crimp barrel plating is required:
   - Tin plating, recommended for tin or silverplated wire
   - Nickel plating, recommended for nickel-plated wire, or silver-plated wire in applications above 150°C [302°F].
3. Calculate the size of crimp barrel required.

   Using the CMA/mm^2 worksheet on the next page, calculate the total cross section to be spliced by adding the circular mil area (CMA) or square millimeters (mm^2) of each wire.

   Stub splice: Add the CMA or mm^2 of all wires together.

   Butt splice: Calculate each side separately (see example on the worksheet).

   Table A provides the CMA of typical conductors. (Both CMA and mm^2 give the same results, so choose either CMA or mm^2 as your unit of measure for selection purposes and continue to use it for all your selection criteria.)
4. Select the color code for the size crimp barrel required. Using Table B (page 7-67), select the crimp barrel—color-coded red, blue, or yellow—for the CMA or mm^2 you calculated.

   Stub splice: Select the barrel that will accommodate the total cross section.

   Butt splice: Select the smallest barrel that will accommodate the largest CMA/mm^2 required. (Refer to the example in the worksheet for a more specific description.) If the CMA/mm^2 of the smaller side of a butt splice is too small for the size barrel required to fit the larger side, increase the CMA/mm^2 —either by doubling back one wire (stripping the conductor twice the length you would ordinarily strip it and then folding it back) or by adding a filler wire.
5. Determine the type of sealing sleeve required. Some wire insulations will not fit in the holes of the sealing sleeve inserts, so be sure to compare the internal diameter of each hole with the outer diameter of the wire(s) you intend to insert in that hole. To create a reliable seal, place a maximum of two wires in any hole of the sealing sleeve.
6. Select the part number. Turn to the MiniSeal part number selection tables (Tables C and D, pages 7-67 and 7-68) and find the table for the type of splice (stub or butt) required.

   Using the appropriate table, find the crimp barrel size range and the size and number of wires for your application. Then select the part number for the type of plating required. The color code accompanying that part number should match the color code you arrived at in Table B, confirming that the part number you have selected is correct.

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MiniSeal High-Performance, Immersion-Resistant Crimp Splices (Continued)

Table A. CMA of Typical Conductors

Strands	7	19	19	19	19	19	19	19	37
AWG	28	26	24	22	20	18	16	14	12
CMA	177	304	475	754	1216	1900	2426	3831	5874
mm^2	0.09	0.15	0.24	0.38	0.61	0.95	1.21	1.92	2.94

Table B. Crimp Barrel Color Code Selection

CMA Range	mm^2 Range	1:1 Splice (AWG Size)	Color Code
304–1510	0.15–0.75	26–20	Red
779–2680	0.39–1.34	20–16	Blue
1900–6755	0.95–3.37	18–12	Yellow

CMA/mm^2 Worksheet

Example:

Application: A butt splice with three AWG 22 wires in one side and one AWG 18 wire in the other side:

The CMA for AWG 22 wire in Table A is 754 (0.38 mm^2).

Side one is therefore calculated as follows:

CMA = 3 x 754 = 2262
(mm^2 = 3 x 0.38 = 1.14)

The other side, where the CMA for AWG 18 is 1900, is calculated as:

CMA = 1 x 1900 = 1900
(mm^2 = 1 x 0.95 = 0.95)

Using Table B to select the smallest crimp barrel that will easily fit 2262 CMA (0.95 mm^2), the blue barrel is the correct choice.

Wire Number	CMA	mm^2
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
Total		

Part Number: _____

Table C. Stub (Parallel) Splices

Illustration	Part Number		Crimp Barrel Size Range CMA [mm^2] Min.–Max.	I.D. Dimensions			
				Side 1		Side 2	
	Tin Plated	Nickel Plated		Sealing Insert	Max. No. of Wires	Sealing Insert	Max. No. of Wires
	D-436-0128 Red	D-436-0119 Red	304–1510 [0.15–0.75]	2.16 [.085]	2	1.01 [.040]	2
	D-436-58 Blue	D-436-75 Blue	779–2680 [0.39–1.34]	4.56 [.180]	2	2.28 [.090]	2
	D-436-59 Yellow	D-436-76 Yellow	1900—6755 [0.95–3.37]	4.56 [.180]	2	2.28 [.090]	2
	D-436-60 Blue	D-436-77 Blue	779–2680 [0.39–1.34]	2.03 [.080]	10 (2 per hole)	6.35 [.250]	2
	D-436-61 Yellow	D-436-78 Yellow	1900–6755 [0.95–3.37]	2.03 [.080]	10 (2 per hole)	6.35 [.250]	2

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MiniSeal High-Performance, Immersion-Resistant Crimp Splices (Continued)

Table D. Butt (in-line) splices

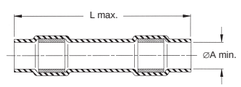
Illustration	Part Number		Crimp Barrel Size Range CMA [mm²] Min.–Max.	I.D. Dimensions			
				Side 1		Side 2	
	Tin Plated	Nickel Plated		Sealing Insert	Max. No. of Wires	Sealing Insert	Max. No. of Wires
	D-436-36* Red	D-436-82 Red	304–1510 [0.15–0.75]	2.16 [.085]	2	2.16 [.085]	2
	D-436-37* Blue	D-436-83 Blue	779–2680 [0.39–1.34]	2.79 [.110]	2	2.79 [.110]	2
	D-436-38* Yellow	D-436-84 Yellow	1900–6755 [0.95–3.37]	4.32 [.170]	2	4.32 [.170]	2
	D-436-0110 Red	D-436-85 Red	304–1510 [0.15–0.75]	2.36 [.093]	6	4.06 [.160]	2
	D-436-52 Blue	D-436-86 Blue	779–2680 [0.39–1.34]	2.36 [.093]	6 (2 per hole)	4.06 [.160]	2
	D-436-53 Yellow	D-436-87 Yellow	1900–6755 [0.95–3.37]	2.36 [.093]	6 (2 per hole)	4.06 [.160]	2
	D-436-0115 Red	D-436-88 Red	304–1510 [0.15–0.75]	2.36 [.093]	6 (2 per hole)	2.36 [.093]	6 (2 per hole)
	D-436-42 Blue	D-436-89 Blue	779–2680 [0.39–1.34]	2.36 [.093]	6 (2 per hole)	2.36 [.093]	6 (2 per hole)
	D-436-43 Yellow	D-436-90 Yellow	1900–6755 [0.95–3.37]	2.36 [.093]	6 (2 per hole)	2.36 [.093]	6 (2 per hole)

*Qualified to MIL-S-81824/1.

Table E. Crimp Barrel Only

Type	Color Code	Tin-Plated	Nickel Plated	Crimp Barrel Size Range CMA [mm²] Min. - Max.
Butt (in-line)	Red	D-609-06	D-609-09	304-1510 [0.15-0.75]
Butt (in-line)	Blue	D-609-07	D-609-10	779-2680 [0.39-1.34]
Butt (in-line)	Yellow	D-609-08	D-609-11	1900-6755 [0.95-3.37]
Stub (Parrel)	Red	D-609-03	D-609-12	304-1510 [0.15-0.75]
Stub (Parrel)	Blue	D-609-04	D-609-13	779-2680 [0.39-1.34]
Stub (Parrel)	Yellow	D-609-05	D-609-14	1900-6755 [0.95-3.37]

Table F. Sealing Sleeve Only



Part Number	Color Code	L Max.	A Min.
D-436-0096	Red	29.2 [1.15]	2.16 [0.085]
D-436-0097	Blue	29.2 [1.15]	2.8 [0.110]
D-436-0098	Yellow	29.2 [1.15]	4.32 [0.170]

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MiniSeal High-Performance, Immersion-Resistant Crimp Splices (Continued)

Product Characteristics

Material	
Insulation	Radiation-crosslinked, heat-shrinkable polyvinylidene fluoride
Crimp barrel	Tin- or nickel-plated copper
Meltable inserts	Meltable thermoplastic
Typical Performance	
Voltage drop	6.9 mV at 4.5 A vs 8.1 mV for an equal length of wire
Tensile strength	Exceeds strength of conductor
Dielectric strength	2.5 kV
Temperature rating	-55°C to 150°C [-67°F to 302°F]
Insulation resistance	5000 megohms

Specifications/Approvals

Series	Military
D-436	MIL-S-81824/1 for D-436-36/37/38

Installation

For proper installation of these devices, the correct crimp tool (Raychem part number AD-1377) and a heating tool and reflector attachment must be used.

Refer to Raychem installation procedure RCPS 200-20 for detailed instructions and recommended reflector attachments.

Any one of the following Raychem heating tools is recommended:

- HL1802E
- AA-400 Super Heater

You will find ordering information for these tools on pages 7-104 to 7-111.

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Introduction

Raychem insulated electrical terminal products provide reliable, repeatable, and rugged examples of terminals available. We start on the front end with terminal sizes and configurations that meet or exceed industry standards in terms of material selection, surface treatment, and electrical performance.

Here the comparison stops. What separates Raychem products from the rest of the industry are the materials and termination techniques used on the back end of the products, which provide unparalleled value.

Products include:

- DuraSeal heat-shrinkable nylon crimp products, which protect against water, condensation, salt, and corrosion. Their tough, heat-shrinkable nylon tubing resists abrasion and cut-through damage, provides strain relief, and protects against vibration damage. DuraSeal products are simple and quick to install using a crimp tool and a heat source. They accommodate a wide range of wire sizes and are color-coded for easy identification, yet are transparent for visual inspection of the finished splice.
- SolderGrip heat-shrinkable twist-on products, which utilize a spiral copper coil that grips and compresses the conductors and allows a prefluxed solder ring to flow to the center of the splicing area, resulting in a highly reliable, repeatable joint. SolderGrip terminals use a durable polyvinylidene fluoride heat-shrinkable tubing that protects the electrical joint and provides insulation and strain relief. The SolderGrip technology is a reliable means of terminating more than two conductors time after time. SolderGrip terminals can terminate a variety of conductor types (solid and stranded) and platings. Terminations on more than eight individual conductors in a single joint have been successfully demonstrated using this product.

DuraSeal product delivers protected electrical joints on industry standard terminals and is suitable for harsh environments.

Catalog 1308940
Revised 8-06

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USA: 1-800-522-6752
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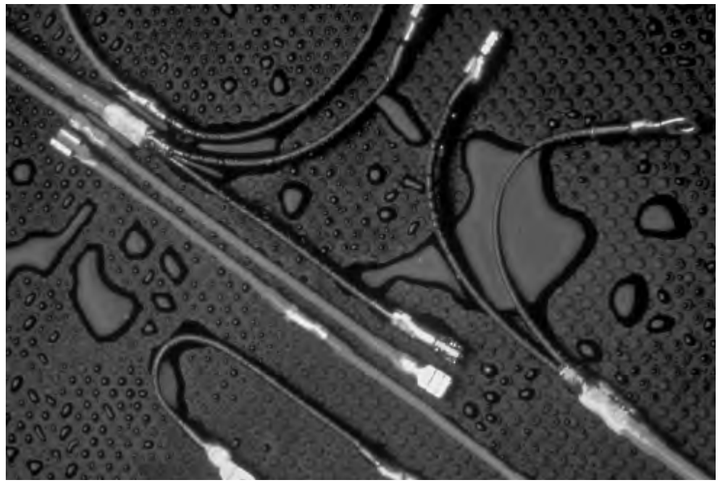
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DuraSeal Heat-Shrinkable, Environmentally-Sealed, Nylon-Insulated Crimp Terminals and Disconnects

Product Facts

- Resistance to moisture and abrasion
- Strain relief
- Protection from wire pull-out
- Easy installation
- UL and CUL listed



Applications

DuraSeal products insulate and protect electrical connections from mechanical abuse, wire pull-out, and abrasion while resisting water, salt, and other contaminants.

DuraSeal devices provide a tough, environmentally-sealed wire connection. Their crimp barrel or terminal, encased in rugged, heat-shrinkable nylon tubing lined with a special hot-melt adhesive, resists damage from abrasions and cuts.

DuraSeal devices retain flexibility and impact-resistance long after similar products have become brittle.

DuraSeal devices accommodate wire gauge sizes 22 to 10. They are color-coded for easy identification of gauge sizes, yet transparent for inspection of the finished splice.

Approvals and Reference Documents

Agency approvals	UL listed component, file E87681, terminals except quick connect terminals; file E157833, quick connect terminals
Reference documents	Raychem specifications RB-108, Specification DuraSeal crimp terminals DuraSeal selection guide (H54153) DuraSeal installation guidelines (H54154)

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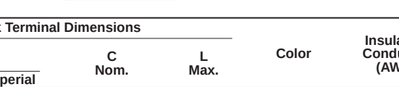
DuraSeal Heat-Shrinkable, Environmentally-Sealed, Nylon-Insulated Crimp Terminals and Disconnects (Continued)

Product Characteristics

	Property	Unit	Requirement	Method of Test
Physical	Dimensions Tensile strength	Inches Pounds	None 8 to 40 lbs depending on AWG	See product dimensions UL486C, IEC512-8
	Property	**Unit**	**Typical value**	**Method of Test**
Electrical	Voltage drop Insulation resistance Dielectric withstand voltage	Millivolts Megohms Kilovolts	Less than equal length of wire 103 min. 2.5	MIL-S-81824, IEC512-2 MIL-STD-202 method 302 MIL-STD-202F method 301, IEC512-2
	Property	**Unit**	**Requirement**	**Method of Test**
Chemical	Diesel fuel Brake fluid Antifreeze 5% salt water Motor oil	—	Meet electrical test listed above after conditioning.	ASTM D 3032, ESA-603D
Environmental (Fluid)	Humidity Immersion Vibration Bending Thermal shock Heat aging (168h @ 85°C [185°F) Salt spray	—	Meet electrical test listed above after conditioning.	MIL-STD-202F method 106, IEC68-2-30 MIL-STD-202F condition C, IEC68-2-14 test NC MIL-STD-202F method 201, IEC68-2-6 UL486C, IEC512-8 MIL-STD-202F method 107, IEC68-2-14 test N MIL-STD-202F, IEC68-2-2 MIL-STD-202F method 101, IEC68-2-11
Operating conditions	Temperature rating Minimum shrink temperature Voltage rating	— — —	-55°C to +125°C [-67°F to -257°F] 180°C [356°F] 600 Volt max	None None None

Fork Terminals



Part Number	Fork Terminal Dimensions					Color	Insulation Conductor (AWG)	Wire Dimensions	
	A Min.	Stud Size		C Nom.	L Max.			Insulation O.D. (Max.)	O.D. (Min.)
		Metric	Imperial						
B-106-2401	3.81 [.15]	M4	8	7.87 [.31]	32.00 [1.26]	Red	22–18	3.81 [.150]	1.40 [.055]
B-106-2402	4.57 [.18]	M4	8	7.87 [.31]	35.05 [1.38]	Blue	16–14	4.45 [.175]	2.00 [.080]
B-106-2403	6.35 [.25]	M4	8	7.87 [.31]	38.10 [1.50]	Yellow	12–10	6.35 [.250]	2.79 [.110]
B-106-2502	4.57 [.18]	M5	10	9.91 [.39]	35.05 [1.38]	Blue	16–14	4.45 [.175]	2.00 [.080]
B-106-2503	6.35 [.25]	M5	10	9.91 [.39]	40.15 [1.58]	Yellow	12–10	6.35 [.250]	2.79 [.110]

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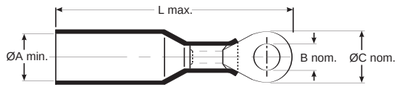
DuraSeal Heat-Shrinkable, Environmentally-Sealed, Nylon-Insulated Crimp Terminals and Disconnects (Continued)

Ring Terminals



Part Number	Fork Terminal Dimensions					Color	Insulation Conductor (AWG)	Wire Dimensions	
	A Min.	Stud Size		C Nom.	L Max.			Insulation O.D. (Max.)	O.D. (Min.)
		Metric	Imperial						
B-106-1401	3.81 [.15]	M4	8	7.88 [.31]	32.00 [1.26]	Red	22–18	3.81 [.150]	1.40 [.055]
B-106-1501	3.81 [.15]	M5	10	9.91 [.39]	34.04 [1.34]	Red	22–18	3.81 [.150]	1.40 [.055]
B-106-1601	3.81 [.15]	M6	1/4	11.94 [.47]	36.07 [1.42]	Red	22–18	3.81 [.150]	1.40 [.055]
B-106-1801	3.81 [.15]	M8	5/16	13.97 [.55]	39.12 [1.54]	Red	22–18	3.81 [.150]	1.40 [.055]
B-106-1991	3.81 [.15]	M10	3/8	17.78 [.70]	43.18 [1.70]	Red	22–18	3.81 [.150]	1.40 [.055]
B-106-1402	4.57 [.18]	M4	8	7.88 [.31]	33.02 [1.30]	Blue	16–14	4.45 [.175]	2.00 [.080]
B-106-1502	4.57 [.18]	M5	10	9.91 [.39]	35.05 [1.38]	Blue	16–14	4.45 [.175]	2.00 [.080]
B-106-1602	4.57 [.18]	M6	1/4	11.94 [.47]	36.58 [1.44]	Blue	16–14	4.45 [.175]	2.00 [.080]
B-106-1802	4.57 [.18]	M8	5/16	13.97 [.55]	40.13 [1.58]	Blue	16–14	4.45 [.175]	2.00 [.080]
B-106-1992	4.57 [.18]	M10	3/8	17.78 [.70]	43.94 [1.73]	Blue	16–14	4.45 [.175]	2.00 [.080]
B-106-1403	6.35 [.25]	M4	8	7.88 [.31]	38.10 [1.50]	Yellow	12–10	6.35 [.250]	2.79 [.110]
B-106-1503	6.35 [.25]	M5	10	9.91 [.39]	40.13 [1.58]	Yellow	12–10	6.35 [.250]	2.79 [.110]
B-106-1603	6.35 [.25]	M6	1/4	11.94 [.47]	41.66 [1.64]	Yellow	12–10	6.35 [.250]	2.79 [.110]
B-106-1803	6.35 [.25]	M8	5/16	13.97 [.55]	45.21 [1.78]	Yellow	12–10	6.35 [.250]	2.79 [.110]
B-106-1993	6.35 [.25]	M10	3/8	17.78 [.70]	46.99 [1.85]	Yellow	12–10	6.35 [.250]	2.79 [.110]

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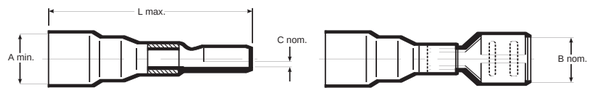
DuraSeal Heat-Shrinkable, Environmentally-Sealed, Nylon-Insulated Crimp Terminals and Disconnects (Continued)

Push-on Terminals



Part Number	Tab Size (inches)	Push-on Terminal Dimensions				Color	Insulation Conductor (AWG)	Wire Dimensions	
		A Min.	B Nom.	C Nom.	L Max.			Insulation O.D. (Max.)	O.D. (Min.)
B-106-3631	.250 x .032	3.81 [.150]	6.35 [.250]	.81 [.032]	30.48 [1.200]	Red	22–18	3.81 [.150]	1.40 [.055]
B-106-3632	.250 x .032	4.57 [.180]	6.35 [.250]	.81 [.032]	32.00 [1.260]	Blue	16–14	4.45 [.175]	2.00 [.080]
B-106-3633	.250 x .032	6.35 [.250]	6.35 [.250]	.81 [.032]	33.02 [1.300]	Yellow	12–10	6.35 [.250]	2.79 [.110]
B-106-3281	.110 x .020	3.81 [.150]	2.79 [.110]	.51 [.020]	22.86 [.900]	Red	22–18	3.81 [.150]	1.40 [.055]
B-106-3481	.187 x .020	3.81 [.150]	4.75 [.187]	.51 [.020]	30.48 [1.200]	Red	22–18	3.81 [.150]	1.40 [.055]

Tab Terminals

Part Number	Tab Size (inches)	Tab Terminal Dimensions				Color	Insulation Conductor (AWG)	Wire Dimensions	
		A Min.	B Nom.	C Nom.	L Max.			Insulation O.D. (Max.)	O.D. (Min.)
B-106-4631	.250 x .032	3.81 [.150]	6.35 [.250]	.81 [.032]	30.48 [1.20]	Red	22–18	3.81 [.150]	1.40 [.055]
B-106-4632	.250 x .032	4.57 [.180]	6.35 [.250]	.81 [.032]	32.00 [1.26]	Blue	16–14	4.45 [.175]	2.00 [.080]

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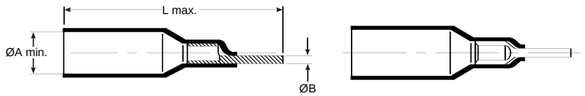
DuraSeal Heat-Shrinkable, Environmentally-Sealed, Nylon-Insulated Crimp Terminals and Disconnects (Continued)

Pin Terminals



Part Number	Pin Terminal Dimensions			Color	Wire Dimensions		
	A Min.	B Nom.	L Max.		Conductor (AWG)	Insulation O.D. (Max.)	Insulation O.D. (Min.)
B-106-6201	3.81 [.150]	2.00 [.080]	30.99 [1.220]	Red	22–18	3.81 [.150]	1.40 [.055]

Bullet Terminals

Fig. 1

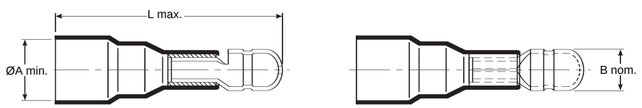
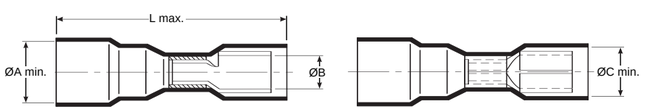


Fig. 2



Part Number	Fig.	Type	Bullet Terminal Dimensions				Color	Conductor (AWG)	Wire Dimensions	
			A Min.	B Nom.	C Min.	L Max.			Insulation O.D. (Max.)	Insulation O.D. (Min.)
B-106-7401	1	M	3.81 [.150]	3.81 [.150]	—	33.53 [1.32]	Red	22–18	3.81 [.150]	1.40 [.055]
B-106-7502	1	M	4.57 [.180]	5.08 [.200]	—	34.54 [1.36]	Blue	16–14	4.45 [.175]	2.00 [.080]
B-106-8401	2	F	3.81 [.150]	3.81 [.150]	5.59 [.220]	30.48 [1.20]	Red	22–18	3.81 [.150]	1.40 [.055]
B-106-8502	2	F	4.57 [.180]	5.08 [.200]	6.10 [.240]	32.51 [1.28]	Blue	16–14	4.45 [.175]	2.00 [.080]

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DuraSeal Heat-Shrinkable, Environmentally-Sealed, Nylon-Insulated Crimp Terminals and Disconnects (Continued)

Product Characteristics (Typical)

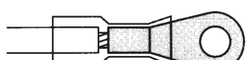
Operating temperature	-55°C to 125°C [-67°F to 257°F]
Shrink ratio	Approximately 2:1
Physical properties	Cut-through resistance: 31.7 kg [70 lb] Wire pullout after crimping and recovery: red: 11.3 kg [25 lb]; blue: 22.7 kg [50 lb]; yellow: 27.2 kg [60 lb] Not flame-retardant No cracking after heat aging for 168 hr at 160°C [320°F]
Chemical properties	Solvent resistance: isopropyl alcohol, trichloroethylene, gasoline, battery acid, diesel fuel, motor oil, antifreeze, brake fluid, 5% salt water
Electrical properties	Dielectric strength: 1000 V Insulation resistance: 10 megohms

Specifications/Approvals

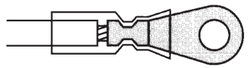
Series	Agency	Raychem
B-106	UL and CUL 91J4, File E87681 Lloyd's listed, File 65 247 HH 02-93 UL and CUL E157833 (B-106-3XXX/B-106-4XXX)	RB-108

Installation

1. Select appropriate size. For terminal and disconnect terminations, strip wire 6.5 mm (1/4 inch).



2. Crimp using Raychem AD-1522 crimp tool for preinsulated crimps.



3. Heat terminal or disconnect with heat gun until tubing recovers and adhesive flows. Avoid heating ring or fork metallic parts.

For proper installation of these devices, the correct crimp tool and heating tool with reflector attachment must be used. The Raychem AD-1522 crimp tool and HL1802E heating tool are recommended. You will find ordering information for these tools on pages 7-104 to 7-111. Refer to Raychem installation procedure RPIP 684-00 for detailed instructions.

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SolderGrip Self-Fixturing Insulated Terminals

Product Facts

- Transparent insulation sleeve provides encapsulation, inspectability, strain relief, and insulation
- Spiral copper coil grips and compresses the conductors for optimum solder connection
- Prefluxed solder preform provides a controlled soldering process
- One-piece design for easy installation
- Accommodates a wide variety of conductor types, quantities, sizes, and plating types unmatched by any other termination technique
- Parts meet the performance requirements of MIL-T-7928G

Applications

Used for terminating multiple wires to terminals.

Product Option

Product Series	Environmental Protection
SGRT	Splashproof

Product Selection Process

1. Determine the wire combination (number of wires and size) of the wire bundle you wish to terminate.
2. Use Table C to select the correct terminal for AWG wire combination.* Example: For connecting a bundle with one 12 AWG wire (1 #12) and two 18 AWG wires (+ 2 #18) to a terminal, you need an SGRT-4-XX terminal.
3. Determine the correct stud size.
4. Select the correct part number from Table A for that stud size in the terminal series and size you selected in Step 2. Example: If the stud size is 1/4, select part number SGRT-4-06.
5. Verify that the wire bundle (with wire insulation) does not exceed the maximum diameter allowed for the part you selected. Simply check the bundle's diameter against the maximum diameter that Table A lists for that part.
6. Verify that the total amperage to be applied does not exceed the maximum amp rating for the part as specified in Table A.

*If the wire combination is not listed in Table B, use the CMA (mm^2) method of determining wire bundle size (see "CMA/mm^2 Calculation" on page 7-78).

Using Table B, select the smallest size part that will fit your total wire CMA (mm^2) value.

Table A. Part Number Selection

SolderGrip Part Number	Stud Size	Maximum Bundle Diameter†	Maximum Amp Rating	Wire Range (Min.–Max.) CMA [mm^2]	Typical Length
SGRT-1-02	2 [2]	4.1 [.161]	12.5 A	1400–5000 [0.7–2.5]	38 [1 1/2]
SGRT-2-03	3 [6]	5.0 [.195]	15 A	2400–6000 [1.2–3.0]	38 [1 1/2]
SGRT-2-04	4 [8]	—	15 A	2400–6000 [1.2–3.0]	38 [1 1/2]
SGRT-2-05	5 [10]	—	15 A	2400–6000 [1.2–3.0]	38 [1 1/2]
SGRT-2-06	6 [1/4]	—	15 A	2400–6000 [1.2–3.0]	38 [1 1/2]
SGRT-3-06	6 [1/4]	6.5 [.255]	33 A	5000–13,200 [2.5–6.6]	44.5 [1 3/4]
SGRT-3-08	8 [5/16]	—	33 A	5000–13,200 [2.5–6.6]	51.0 [2]
SGRT-4-06	6 [1/4]	9.0 [.355]	56 A	12,000–22,400 [6.0–11.2]	44.5 [1 3/4]
SGRT-4-08	8 [5/16]	—	56 A	12,000–22,400 [6.0–11.2]	51 [2]

† Maximum bundle diameter is measured over wire insulation.

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SolderGrip Self-Fixturing Insulated Terminals (Continued)

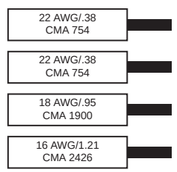
CMA/mm² Calculation

To calculate the total circular mil or mm² area of the wire bundle to be terminated, follow these steps:

1. Choose either CMA or mm² as your unit of measure for selection purposes and continue to use it for all your selection criteria. (Both measures provide the same results.)
2. In the workspace below, list the CMA or mm² for each conductor in the bundle. (Table B provides the CMA of typical conductors.)
3. Add together the values listed in the workspace below to obtain the total area.
4. Use Table A to select the smallest terminator that will fit the total CMA (mm²).

Wire Number	CMA	mm²	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			Solder Grip Part Number
Total			

CMA/mm² Example



Total CMA = 5834
Total mm² = 2.92
Correct part number (based on CMA of 5834 or mm² of 2.92):
SGRT-2-XX if bundle OD is less than 5.0 mm (0.195 in).

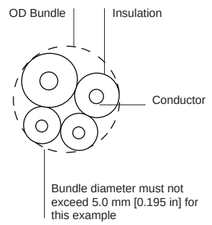


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Table B. CMA of Typical Copper Conductors

Strands	7	19	19	19	19	19	19	19	37
AWG	28	26	24	22	20	18	16	14	12
CMA	177	304	475	754	1216	1900	2426	3831	5874
mm^2	0.09	0.15	0.24	0.38	0.61	0.95	1.21	1.92	2.94

Table C. SolderGrip Wire Combinations (see Table A for Terminal Size [-XX])

Wire Combinations	Part Number	Wire Combinations	Part Number	Wire Combinations	Part Number
1 # 8	SGRT-4-XX	1 # 12 + 1 # 16 + 4 # 18	SGRT-4-XX	1 # 14 + 4 # 20	SGRT-3-XX
1 # 8 + 1 # 16	SGRT-4-XX	1 # 12 + 2 # 16	SGRT-3-XX	1 # 14 + 1 # 18	SGRT-2-XX
2 # 8 + 2 # 16	SGRT-4-XX	1 # 12 + 2 # 16 + 1 # 18	SGRT-3-XX	1 # 14 + 1 # 18 + 1 # 20	SGRT-3-XX
1 # 8 + 1 # 14	SGRT-4-XX	1 # 12 + 2 # 16 + 2 # 18	SGRT-4-XX	1 # 14 + 2 # 18	SGRT-3-XX
1 # 10	SGRT-3-XX	1 # 12 + 3 # 16	SGRT-4-XX	1 # 14 + 3 # 18	SGRT-3-XX
1 # 10 + 1 to 3 # 18	SGRT-3-XX	1 # 12 + 4 # 16	SGRT-4-XX	1 # 14 + 4 # 18	SGRT-3-XX
1 # 10 + 2 # 18	SGRT-3-XX	1 # 12 + 5 # 16	SGRT-4-XX	1 # 14 + 5 # 18	SGRT-4-XX
1 # 10 + 3 # 18	SGRT-4-XX	1 # 12 + 1 # 14 + 1 # 18	SGRT-3-XX	1 # 14 + 1 # 16	SGRT-3-XX
1 # 10 + 1 # 16	SGRT-3-XX	1 # 12 + 1 # 14 + 2 # 18	SGRT-4-XX	1 # 14 + 1 # 16 + 1 # 20	SGRT-3-XX
1 # 10 + 1 # 16 + 1 # 18	SGRT-4-XX	1 # 12 + 1 # 14 + 3 # 18	SGRT-4-XX	1 # 14 + 1 # 16 + 1 # 18	SGRT-3-XX
1 # 10 + 1 # 16 + 2 # 18	SGRT-4-XX	1 # 12 + 1 # 14 + 1 # 16	SGRT-3-XX	1 # 14 + 1 # 16 + 2 # 18	SGRT-3-XX
1 # 10 + 2 # 16	SGRT-4-XX	1 # 12 + 1 # 14 + 2 # 16	SGRT-4-XX	1 # 14 + 1 # 16 + 3 # 18	SGRT-3-XX
1 # 10 + 3 # 16	SGRT-4-XX	1 # 12 + 1 # 14 + 3 # 16	SGRT-4-XX	1 # 14 + 1 # 16 + 4 # 18	SGRT-4-XX
1 # 10 + 4 # 16	SGRT-4-XX	1 # 12 + 1 # 14 + 4 # 16	SGRT-4-XX	1 # 14 + 2 # 16	SGRT-3-XX
1 # 10 + 5 # 16	SGRT-4-XX	1 # 12 + 2 # 14	SGRT-4-XX	1 # 14 + 2 # 16 + 1 # 18	SGRT-3-XX
1 # 10 + 1 # 14	SGRT-3-XX	1 # 12 + 2 # 14 + 1 # 18	SGRT-4-XX	1 # 14 + 2 # 16 + 2 # 18	SGRT-3-XX
1 # 10 + 1 # 14 + 1 # 18	SGRT-4-XX	1 # 12 + 2 # 14 + 1 # 16	SGRT-4-XX	1 # 14 + 2 # 16 + 3 # 18	SGRT-4-XX
1 # 10 + 1 # 14 + 1 # 16	SGRT-4-XX	1 # 12 + 2 # 14 + 2 # 16	SGRT-4-XX	1 # 14 + 3 # 16	SGRT-3-XX
1 # 10 + 1 # 14 + 2 # 16	SGRT-3-XX	1 # 12 + 2 # 14 + 3 # 16	SGRT-4-XX	1 # 14 + 3 # 16 + 1 # 18	SGRT-3-XX
1 # 10 + 1 # 14 + 3 # 16	SGRT-4-XX	1 # 12 + 3 # 14	SGRT-4-XX	1 # 14 + 3 # 16 + 2 # 18	SGRT-4-XX
1 # 10 + 2 # 14	SGRT-4-XX	1 # 12 + 3 # 14 + 1 # 16	SGRT-4-XX	1 # 14 + 4 # 16	SGRT-4-XX
1 # 10 + 3 # 14	SGRT-4-XX	1 # 12 + 4 # 14	SGRT-4-XX	1 # 14 + 4 # 16 + 1 # 18	SGRT-4-XX
1 # 10 + 1 # 12	SGRT-4-XX	2 # 12 + 1 # 18	SGRT-4-XX	1 # 14 + 5 # 16	SGRT-4-XX
1 # 10 + 1 # 12 + 1 # 14	SGRT-4-XX	2 # 12 + 1 # 16	SGRT-4-XX	2 # 14	SGRT-3-XX
1 # 10 + 2 # 12	SGRT-4-XX	2 # 12 + 2 # 16 + 1 # 18	SGRT-4-XX	2 # 14	SGRT-3-XX
2 # 10	SGRT-4-XX	2 # 12 + 3 # 16	SGRT-4-XX	2 # 14	SGRT-3-XX
2 # 10 + 1 # 16	SGRT-4-XX	2 # 12 + 1 # 14 + 1 # 18	SGRT-4-XX	2 # 14	SGRT-3-XX
1 # 12	SGRT-3-XX	2 # 12 + 1 # 14 + 1 # 16	SGRT-4-XX	2 # 14	SGRT-3-XX
1 # 12 + 1 # 18	SGRT-3-XX	2 # 12 + 2 # 14	SGRT-4-XX	2 # 14 + 1 # 16	SGRT-3-XX
1 # 12 + 2 # 18	SGRT-3-XX	3 # 12 + 1 # 18	SGRT-4-XX	2 # 14 + 1 # 16	SGRT-3-XX
1 # 12 + 3 # 18	SGRT-3-XX	3 # 12 + 1 # 16	SGRT-4-XX	2 # 14 + 1 # 16	SGRT-3-XX
1 # 12 + 4 # 18	SGRT-4-XX	3 # 12 + 1 # 14	SGRT-4-XX	2 # 14 + 1 # 16	SGRT-3-XX
1 # 12 + 5 # 18	SGRT-4-XX	1 # 14	SGRT-2-XX	2 # 14 + 2 # 16	SGRT-3-XX
1 # 12 + 1 # 16	SGRT-3-XX	1 # 14 + 1 # 22	SGRT-2-XX	2 # 14 + 2 # 16	SGRT-3-XX
1 # 12 + 1 # 16 + 1 # 18	SGRT-3-XX	1 # 14 + 1 # 20	SGRT-2-XX	2 # 14 + 3 # 16	SGRT-4-XX
1 # 12 + 1 # 16 + 2 # 18	SGRT-3-XX	1 # 14 + 2 # 20	SGRT-3-XX	2 # 14 + 4 # 16	SGRT-4-XX
1 # 12 + 1 # 16 + 3 # 18	SGRT-4-XX	1 # 14 + 3 # 20	SGRT-3-XX	3 # 14	SGRT-3-XX

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Table C. SolderGrip Wire Combinations (see Table A for Terminal Size [-XX]) (Continued)

Wire Combinations	Part Number
3 # 14 + 1 # 16	SGRT-4-XX
3 # 14 + 2 # 16	SGRT-4-XX
3 # 14 + 3 # 16	SGRT-4-XX
4 # 14	SGRT-4-XX
4 # 14 + 1 # 16	SGRT-4-XX
4 # 14 + 2 # 16	SGRT-4-XX
5 # 14	SGRT-4-XX
5 # 14 + 1 # 16	SGRT-4-XX
1 # 16	SGRT-2-XX
1 # 16 + 1 # 22	SGRT-2-XX
1 # 16 + 2 # 22	SGRT-2-XX
1 # 16 + 3 # 22	SGRT-2-XX
1 # 16 + 1 # 20	SGRT-2-XX
1 # 16 + 1 # 20 + 1 # 22	SGRT-2-XX
1 # 16 + 2 # 20	SGRT-2-XX
1 # 16 + 3 # 20	SGRT-3-XX
1 # 16 + 4 # 20	SGRT-3-XX
1 # 16 + 5 # 20	SGRT-3-XX
1 # 16 + 1 # 18	SGRT-2-XX
1 # 16 + 1 # 18 + 1 # 20	SGRT-2-XX
1 # 16 + 1 # 18 + 2 # 20	SGRT-3-XX
1 # 16 + 1 # 18 + 3 # 20	SGRT-3-XX
1 # 16 + 1 # 18 + 4 # 20	SGRT-3-XX
1 # 16 + 2 # 18	SGRT-3-XX
1 # 16 + 2 # 18 + 1 # 20	SGRT-3-XX
1 # 16 + 2 # 18 + 2 # 20	SGRT-3-XX
1 # 16 + 2 # 18 + 3 # 20	SGRT-3-XX
1 # 16 + 3 # 18	SGRT-3-XX
1 # 16 + 3 # 18 + 1 # 20	SGRT-3-XX
1 # 16 + 3 # 18 + 2 # 20	SGRT-3-XX
1 # 16 + 4 # 18	SGRT-3-XX
1 # 16 + 4 # 18 + 1 # 20	SGRT-3-XX
1 # 16 + 5 # 18	SGRT-3-XX
2 # 16	SGRT-2-XX
2 # 16 + 1 # 20	SGRT-3-XX
2 # 16 + 2 # 20	SGRT-3-XX
2 # 16 + 3 # 20	SGRT-3-XX
2 # 16 + 4 # 20	SGRT-3-XX
2 # 16 + 1 # 18	SGRT-3-XX
2 # 16 + 1 # 18 + 1 # 20	SGRT-3-XX
2 # 16 + 1 # 18 + 2 # 20	SGRT-3-XX
2 # 16 + 2 # 18	SGRT-3-XX
2 # 16 + 2 # 18 + 1 # 20	SGRT-3-XX
2 # 16 + 2 # 18 + 2 # 20	SGRT-3-XX
2 # 16 + 3 # 18	SGRT-3-XX
2 # 16 + 3 # 18 + 1 # 20	SGRT-3-XX
2 # 16 + 4 # 18	SGRT-3-XX
3 # 16	SGRT-3-XX
3 # 16 + 1 # 20	SGRT-3-XX
3 # 16 + 2 # 20	SGRT-3-XX
3 # 16 + 3 # 20	SGRT-3-XX
3 # 16 + 1 # 18	SGRT-3-XX
3 # 16 + 1 # 18 + 1 # 20	SGRT-3-XX
3 # 16 + 1 # 18 + 2 # 20	SGRT-3-XX
3 # 16 + 2 # 18	SGRT-3-XX
3 # 16 + 2 # 18 + 1 # 20	SGRT-3-XX
3 # 16 + 3 # 18	SGRT-3-XX
4 # 16	SGRT-3-XX
4 # 16 + 1 # 20	SGRT-3-XX
4 # 16 + 2 # 20	SGRT-3-XX
4 # 16 + 1 # 18	SGRT-3-XX
4 # 16 + 1 # 18 + 1 # 20	SGRT-3-XX
4 # 16 + 2 # 18	SGRT-4-XX
5 # 16	SGRT-3-XX
5 # 16 + 1 # 20	SGRT-4-XX
5 # 16 + 1 # 18	SGRT-4-XX
6 # 16	SGRT-4-XX
1 # 18 + 1 # 22	SGRT-2-XX
1 # 18 + 2 # 22	SGRT-2-XX
1 # 18 + 3 # 22	SGRT-2-XX
1 # 18 + 1 # 20	SGRT-2-XX
1 # 18 + 1 # 20 + 1 # 22	SGRT-2-XX
—	—
1 # 18 + 1 # 20 + 2 # 22	SGRT-2-XX
1 # 18 + 2 # 20	SGRT-2-XX
1 # 18 + 3 # 20	SGRT-2-XX
1 # 18 + 4 # 20	SGRT-3-XX
1 # 18 + 5 # 20	SGRT-3-XX
2 # 18	SGRT-2-XX
2 # 18 + 1 # 22	SGRT-2-XX
2 # 18 + 1 # 20	SGRT-2-XX
2 # 18 + 2 # 20	SGRT-3-XX
2 # 18 + 3 # 20	SGRT-3-XX
2 # 18 + 4 # 20	SGRT-3-XX
3 # 18	SGRT-2-XX
3 # 18 + 1 # 20	SGRT-3-XX
3 # 18 + 2 # 20	SGRT-3-XX
3 # 18 + 3 # 20	SGRT-3-XX
4 # 18	SGRT-3-XX
4 # 18 + 1 # 20	SGRT-3-XX
4 # 18 + 2 # 20	SGRT-3-XX
5 # 18	SGRT-3-XX
5 # 18 + 1 # 20	SGRT-3-XX
6 # 18	SGRT-3-XX
1 # 20 + 2 # 22	SGRT-2-XX
1 # 20 + 3 # 22	SGRT-2-XX
1 # 20 + 4 # 22	SGRT-2-XX
2 # 20	SGRT-2-XX
2 # 20 + 1 # 22	SGRT-2-XX
2 # 20 + 2 # 22	SGRT-2-XX
2 # 20 + 3 # 22	SGRT-2-XX
3 # 20	SGRT-2-XX
3 # 20 + 1 # 22	SGRT-2-XX
4 # 20	SGRT-2-XX
5 # 20	SGRT-3-XX
6 # 20	SGRT-3-XX
4 # 22	SGRT-2-XX
5 # 22	SGRT-2-XX
6 # 22	SGRT-2-XX
—	—

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SolderGrip Self-Fixturing Insulated Terminals (Continued)

Installation

The SolderGrip product is pushed onto the conductors with a twisting motion. With the product in place, installation can be completed with the proper selection and use of heating tools and reflectors.

Either of the following Raychem heating tools is recommended:

- HL1802E
- CV-1981

Refer to Raychem installation procedure RPIP 820-01 for detailed instructions and recommended reflector attachments.

You will find ordering information for these tools on pages 7-104 to 7-111.

Product Characteristics

Material	
Insulation	Radiation-crosslinked, heat-shrinkable polyvinylidene fluoride (Kynar)
Solder and flux	Sn60 Pb40 with RA flux

Typical Performance	
Tensile strength	Exceeds strength of individual wires
Temperature rating	-55°C to +150°C [-67°F to +302°F]
Voltage Drop	Not to exceed that of equivalent length of wire by more than 1 mV
Dielectric Withstanding Voltage	Current leakage less than 2 mA (1.5 kV)

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Introduction

Raychem SolderSleeve terminators offer easy, one-step solutions for wire connections to pins, posts, and tabs and for mass wire terminations.

Designed for applications with temperatures up to 150°C [302°F], the products in this section include SolderSleeve discrete wire terminators, which are heat-shrinkable thermoplastic sleeves containing a precisely engineered fluxed solder preform.

SolderSleeve terminators are also available on carrier tape, spaced precisely to match connector terminal spacing, enabling termination of an entire row of wires at one time.

SolderSleeve wire-to-pin, wire-to-post, and wire-to-tab terminators, like all Raychem termination products, provide reliability and economical installation for greater productivity. They can be supplied either in bulk or on carrier tape.

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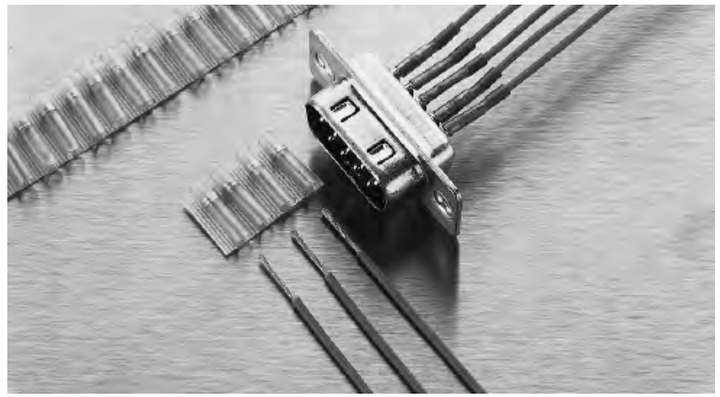
SolderSleeve Discrete Wire Terminators

Product Facts

- Transparent polyvinylidene fluoride or polyolefin insulation sleeve provides encapsulation, inspectability, strain relief, and insulation
- Prefluxed solder preform offers a controlled soldering process
- One-piece design means easy installation and low installed cost
- Optional tape carrier provides convenience and ease of installation
- UL and CUL Recognized



Applications

Used for terminating wires to component terminals, such as motor tabs, connector pins, and switch terminals.

Product selection process

1. Determine the application operating temperature.
2. From the Product Options table on the next page, select the product series appropriate for the application, based on the temperature required.
3. Determine your component connection point type (pin, post, or tab) and dimensions.
4. Determine your wire gauge.
5. Optional: Select tape carrier center-to-center spacing (D-71X series only). This should match center spacing of component terminals.
6. Select part number from the appropriate table:
   - For CWT series (applications with low-temperature wires—below 125°C [257°F]), use Table A.
   - For D-129/141/71X series (applications with wires rated higher than 125°C [257°F]), use Table B.

Installation

For proper installation of these devices, the correct heating tool and reflector attachment must be used. Either of the following Raychem heating tools are recommended:

- HL1802E
- AA-400 Super Heater

Refer to Raychem installation procedure RCPS 200-12 (for D-129, D-141, D-71X) or RPIP 824-00 (for CWT) for detailed instructions and recommended reflector attachment.

You will find ordering information for these tools on pages 7-104 to 7-111.

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SolderSleeve Discrete Wire Terminators (Continued)

Product Options

Product Series	Max. Operating Temperature	Min. Wire Temperature Rating
CWT	125°C [257°F]	85°C [185°F]
D-129, D-141, D-71X	150°C [302°F]	125°C [257°F]

Note: Cadmium-free option (B-152 series) is available for operating temperature of 125˚C [257˚F]. Consult Tyco Electronics for details.

Table A. CWT Series (125°C [257°F] rated)

Connection-point Type and Size	Terminal Dimensions	Wire AWG/mm²	Part Number
	W = up to 0.63 [.025]	24 [0.24] 20 [0.61]	CWT-1501 CWT-1502
	W = 0.63 [.025] to 0.89 [0.035]	24 [0.24] 22 [0.38] 20 [0.61]	CWT-1501 CWT-1502 CWT-1503
	W = 0.89 [0.035] to 1.14 [.045]	24–22 [0.24–0.38] 20–18 [0.61–0.95]	CWT-1502 CWT-1503
	W = 1.14 [.045] to 1.52 [.060]	24–22 [0.24–0.38] 20–18 [0.61–0.95]	CWT-1503 CWT-1504
	W = up to1.52 [.060]	24–20 [0.24–0.61]	CWT-1501
	W = 1.27 [.050] to 2.28 [.090]	24-18 [0.24–0.95]	CWT-1502
	W = 1.77 [.070] to 2.79 [.110]	24-18 [0.24–0.95]	CWT-1503
	W = 2.54 [.100] to 3.80 [.150]	24-18 [0.24–0.95]	CWT-1504
	W = 2.28 [.090] to 4.70 [.187]	22-16 [0.38–1.21]	CWT-1505

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Table B. D-129/141/71X Series (up to 150°C [302°F] rated)

Connection-point Type and Size

Terminal Dimensions		Wire		Tape Carrier Spacing of Sleeves (Center-to-Center)				
		AWG	mm²	None	1.27 [0.050]	2.54 [0.100]	3.17 [0.125]	4.0 [0.156]
W — pin	W = up to 0.61 [.024]	30–26	[0.05–0.15]	D-141-30	D-713-03	—	—	—
		24–22	[0.24–0.38]	D-141-07	—	D-711-00	—	—
	W = 0.63 [.025] to 0.81 [.032]	20	[0.61]	D-141-31	—	D-711-04	D-711-07	D-711-08
W — post	W = 0.76 [.030] to 1.27 [.050]	24–20	[0.24–0.61]	D-141-56	—	—	—	—
	W = up to 1.52 [.060]	24–20	[0.24–0.61]	D-129-05	—	D-714-01	—	—
W — tab	W = 1.27 [.050] to 2.28 [.090]	24–20	[0.24–0.61]	D-129-03	—	—	—	D-714-00
	W = 2.28 [.090] to 3.55 [.140]	24–20	[0.24–0.61]	D-129-0043	—	—	—	—

For Fine Wire Terminations 0.15 mm² (26 AWG) and Smaller*

Part Number*	Inside Diameter As Supplied**	Fully Recovered†	Length††
D-110-0062	1.0 [0.040]	0.6 [0.025]	16.0 [0.630]
D-110-0217	1.0 [0.040]	0.6 [0.025]	9.0 [0.360]
D-141-13	0.75 x 1.65 [0.030 X 0.065]	0.75 [0.030]	4.7 [0.185]
D-141-22	0.75 x 1.65 [0.030 X 0.065]	0.75 [0.030]	6.0 [0.240]
D-141-30	0.75 x 1.65 [0.030 X 0.065]	0.75 [0.030]	9.5 [0.375]

Note: Micro SolderSleeve terminators are used for attaching leads smaller than 26 AWG (0.15 mm²) to terminals less than 0.6 [.025] wide.

*The D-110 series sleeves are primarily for single wire terminations and do not have a wire stop. The D-141 series will accept either one or two wires; the parts have a built-in wire stop that will locate the wire approximately 0.76 [0.03] from bottom of terminal.

**Minimum. Wire insulation must be smaller than this. When using the D-141 parts for two-wire terminations, the combined wire insulation diameters must be less than 1.5 [.060].

†Maximum. The combination of conductor diameter and terminal width and the wire insulation must be greater than this.

††The terminal length should be at least 1.2 [0.05] shorter than this. The wire strip length must be adjusted so that, when terminated, the exposed conductor is covered by the sleeve.

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SolderSleeve Discrete Wire Terminators (Continued)

Product Characteristics

Material		
Insulation [D-129, D-141, D-71X]	Radiation-crosslinked, heat-shrinkable polyvinylidene fluoride	
Insulation [CWT]	Radiation-crosslinked, heat-shrinkable polyolefin	
Solder and flux [D-129, D-141, D-71X]	Solder: Sn63 Pb37	Flux: ROL1 per ANSI -J - 004 [RMA flux]
Solder and flux [CWT]	Solder: Sn50 Pb32 Cd 18	Flux: ROM1 per ANSI -J - 004 [RA flux]
Typical Performance		
Voltage drop	2.0 mV	
Tensile strength	Exceeds strength of conductor	
Dielectric strength	2.0 kV	
Temperature rating [CWT]	-55°C to 125°C [-67°F to 257°F]	
Temperature rating [D-129, D-141, D-71X]	-55°C to 150°C [-67°F to 302°F]	
Insulation resistance	1000 megohms	

Specifications/Approvals

Series	Agency	Raychem
CWT	UL and CUL E87681	D-5023
D-129, D-141	UL and CUL E87681	RT-1404

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C. America: 57-1-254-4444

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Hong Kong: 852-2735-1628
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Introduction

Raychem SolderSleeve shield grounding terminators provide an environmentally sealed, insulated, and encapsulated solder connection for a variety of applications. SolderSleeve terminators are available in many styles.

Designed for a wide variety of temperature applications ranging from -65°C to 200°C [-85°F to 392°F], the products in this section include:

- CWT-X SolderSleeve terminators, designed for low-temperature cables with operating temperatures up to 125°C [257°F] and suitable for most commercial environments.
- MIL-S-83519 SolderSleeve terminators, which are immersion resistant and available with or without a preinstalled ground lead.
- SO Series SolderSleeve terminators, which also are immersion resistant and feature the Raychem BiAlloy temperature indication system.

All SolderSleeve products are reliable, versatile, and easy to install, resulting in lower installed costs.

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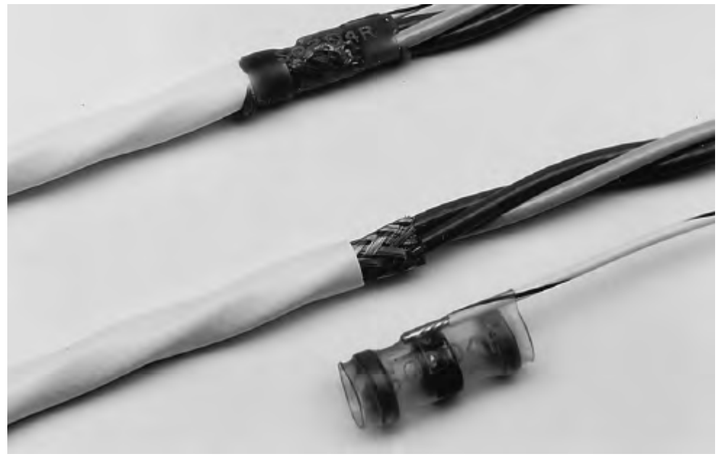
SolderSleeve Shield Terminators

Product Facts

- Transparent insulation sleeve provides encapsulation, inspectability, strain relief, and insulation
- Prefluxed solder preform provides a controlled soldering process
- One-piece design offers easy installation and lower installed cost
- Optional preinstalled ground leads provide convenience and ease of installation

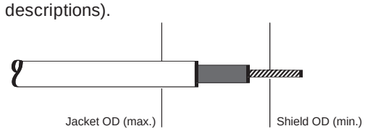


Applications

Used for shield-to-ground termination.

Product Selection Process

1. Select product series from the Product Options table below.
2. Determine cable dimensions.
3. Optional: Select preinstalled wire lead type (see Table G on page 7-91 for type descriptions).
4. Select part number (use the selection table indicated for your product series in the Product Options table below).
5. Refer to Table H on page 7-93 for cross-reference information.



Product Options (Refer to Table G on page 7-91 for Additional Information)

Product Series	System Oper. Temperature (Max.)	Used on Cables Rated (Min.)	Environmental Protection	Solder Alloy	Flux Type	Insulation Material	Part Number Selection Table
CWT	125°C [257°F]	85°C [185°F]	Splash resistant	Cd18	RA	Polyolefin	A
SO63*	150°C [302°F]	125°C [257°F]	Immersion resistant	Sn63	RMA	Polyvinylidene fluoride	B
S01/S02**, S03	150°C [302°F]	125°C [257°F]	Immersion resistant	Sn63	RMA	Polyvinylidene fluoride	C, D
SO96***	175°C [347°F]	150°C [302°F]	Immersion resistant	Sn96	RA	Polyvinylidene fluoride	E
SO175****	175°C [347°F]	150°C [302°F]	Immersion resistant	Sn96	RA	Polyvinylidene fluoride	F

*Meets performance requirements of SAE-AS83519 (formerly MIL-S-83519) and NAS 1747, supplied with BiAlloy temperature indicator.
**Qualified to SAE-AS83519 (formerly MIL-S-83519), supplied with thermochromic temperature indicator.
***Meets performance requirements of SAE-AS83519 (formerly MIL-S-83519) and NAS 1747, supplied with thermochromic temperature indicator.
****Meets performance requirements of SAE-AS83519 (formerly MIL-S-83519), supplied with BiAlloy temperature indicator.
Note: Cadmium-free option (B-152 series) is available for operating temperature of 125°C [257°F]. Consult Tyco Electronics for details.

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SolderSleeve Shield Terminators (Continued)

Table A. CWT Series (125°C [257°F] rated)

Cable OD		Part Numbers	
Jacket OD Max.	Shield OD Min.	No Preinstalled Lead	With Preinstalled Lead (22AWG/0.38 mm² green)
1.7 [.065]	0.9 [.035]	CWT-3801	—
1.95 [.075]	1.1 [.043]	CWT-3802	—
2.7 [.105]	1.5 [.059]	CWT-3	CWT-3-W122-5
4.5 [.180]	2.0 [.079]	CWT-5	CWT-5-W122-5
6.0 [.235]	3.3 [.130]	CWT-6	CWT-6-W122-5
7.0 [.275]	3.3 [.130]	CWT-7	CWT-7-W122-5
8.7 [.340]	4.5 [.177]	CWT-9	CWT-9-W122-5
10.7 [.420]	4.5 [.177]	CWT-11	CWT-11-W122-5
13.0 [.510]	7.0 [.276]	CWT-13	CWT-13-W122-5

*See Table G on page 7-91 for lead description.
Note: The CWT series is suitable for applications using low-temperature wires (typically rated at 85°C [185°F] to 125°C [257°F]) with bare copper or tin plating.

Table B. SO63 Series

BiAlloy Temperature Indication System

This system greatly enhances the reliability and repeatability of SO63 series terminators while reducing installed cost. The heat-shrinkable thermoplastic sleeve contains a precisely engineered, fluxed solder band that is visible through the sleeve. The band provides exactly the amount of solder and flux required to terminate the ground lead to the cable shield. Encircling the band is a small temperature indicator ring. This ring melts only when the surfaces to be joined have reached the correct soldering temperature, thus ensuring a properly soldered connection. Process control is built into each sleeve.

Cable OD			Part Numbers					
			Preinstalled Lead Option*				Braid Strap	
Jacket OD Max.	Shield OD Min.	No Preinstalled Lead	20 AWG	22 AWG	24 AWG	26 AWG	Nickel Plated	Tin Plated
1.95 [0.075]	0.90 [.035]	SO63-1-00	SO63-1-55-20-90	SO63-1-55-22-90	SO63-1-55-24-90	SO63-1-55-26-90	SO63-1-01	SO63-1-9030
2.7 [0.105]	1.40 [.055]	SO63-2-00	SO63-2-55-20-90	SO63-2-55-22-90	SO63-2-55-24-90	SO63-2-55-26-90	SO63-2-01	SO63-2-9030
4.3 [0.170]	2.15 [.085]	SO63-3-00	SO63-3-55-20-90	SO63-3-55-22-90	SO63-3-55-24-90	SO63-3-55-26-90	SO63-3-01	SO63-3-9030
6.0 [0.235]	3.30 [.130]	SO63-4-00	SO63-4-55-20-90	SO63-4-55-22-90	SO63-4-55-24-90	SO63-4-55-26-90	SO63-4-01	SO63-4-9030
7.0 [0.275]	4.30 [.170]	SO63-5-00	SO63-5-55-20-90	SO63-5-55-22-90	SO63-5-55-24-90	SO63-5-55-26-90	SO63-5-01	SO63-5-9030

*See Table G on page 7-91 for lead description. Color of wire lead is denoted by the last two digits of the part number as follows:
90 = White with a black stripe 9 = White 0 = Black 6 = Blue (24 AWG only) 5 = Green (20, 22, 24 AWG)
The SO63 series is immersion resistant, features the Raychem BiAlloy temperature indication system, and meets the performance requirements of SAE-AS83519 (formerly MIL-S-83519) .

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SolderSleeve Shield Terminators (Continued)

Table C. S01/S02 M83519 Series

Thermochromic Temperature Indicator

The M83519 (S01 and S02) series terminators contain a colored thermochromic temperature indicator that exhibits a distinct color change when surfaces have reached wetting temperature. This color change gives both manufacturing and Quality Control an aid in the inspection of the completed termination.

Cable OD		Part Number (MIL Part Number and Raychem Part Number) by Lead Option					
		No Preinstalled Lead		Preinstalled Lead Option*			
				20 AWG		22 AWG	
Jacket OD Max	Shield OD Min	MIL	Raychem	MIL	Raychem	MIL	Raychem
1.95 [0.075]	0.9 [.035]	M83519/1-1	S01-01-R	M83519/2-1	S02-01-R	M83519/2-6	S02-06-R
2.7[0.105]	1.40 [.055]	M83519/1-2	S01-02-R	M83519/2-2	S02-02-R	M83519/2-7	S02-07-R
4.3 [0.170]	2.15 [.085]	M83519/1-3	S01-03-R	M83519/2-3	S02-03-R	M83519/2-8	S02-08-R
6.0 [0.235]	3.30 [.130]	M83519/1-4	S01-04-R	M83519/2-4	S02-04-R	M83519/2-9	S02-09-R
7.0 [0.275]	4.30 [.170]	M83519/1-5	S01-05-R	M83519/2-5	S02-05-R	M83519/2-10	S02-10-R
Jacket OD Max.	Shield OD Min.			Preinstalled Lead Option*			
				24 AWG		26 AWG	
1.95 [0.075]	0.9 [.035]			M83519/2-11	S02-11-R	M83519/2-16	S02-16-R
2.7 [0.105]	1.40 [.055]			M83519/2-12	S02-12-R	M83519/2-17	S02-17-R
4.3[0.170]	2.15 [.085]			M83519/2-13	S02-13-R	M83519/2-18	S02-18-R
6.0 [0.235]	3.30 [.130]			M83519/2-14	S02-14-R	M83519/2-19	S02-19-R
7.0 [0.275]	4.30 [.170]			M83519/2-15	S02-15-R	M83519/2-20	S02-20-R

*See Table G for lead description.

M83519 is the qualified product listed in SAE-AS83519 (formerly MIL-S-83519) . The series features a thermochromic temperature indicator to assist in termination and inspection. The Raychem part number is permanently marked on the sleeve.

Table D. S03 Series

Thermochromic Temperature Indicator

The S03 series terminators contain a colored thermochromic temperature indicator that exhibits a distinct color change when surfaces have reached wetting temperature. This color change gives both Manufacturing and Quality Control an aid in the inspection of the completed termination.

Cable OD		Part Number	
		Preinstalled Lead Option*	
Jacket OD Max.	Shield OD Min.	Tin plated Braid Strap	Nickel plated Braid Strap
1.95 [0.075]	0.9 [.035]	S03-01-R	S03-06-R
2.7 [0.105]	1.40 [.055]	S03-02-R	S03-07-R
4.3 [0.170]	2.15 [.085]	S03-03-R	S03-08-R
6.0 [0.235]	3.30 [.130]	S03-04-R	S03-09-R
7.0 [0.275]	4.30 [.170]	S03-05-R	S03-10-R

*See Table G for lead description.

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SolderSleeve Shield Terminators (Continued)

Table E. SO96 Series (175°C [347°F] rated)

Thermochromic Temperature Indicator

The SO96 series terminators contain a colored thermochromic temperature indicator that exhibits a distinct color change when surfaces have reached wetting temperature. This color change gives both manufacturing and Quality Control an aid in the inspection of the completed termination.

Cable OD		Part Number		
			Preinstalled Lead Option*	
Jacket OD Max.	Shield OD Min.	No Preinstalled Lead	22 AWG	Braid Strap
1.95 [0.075]	0.9 [.035]	SO96-1-00	SO96-1-55-22-90	SO96-1-01
2.7 [0.105]	1.40 [.055]	SO96-2-00	SO96-2-55-22-90	SO96-2-01
4.3 [0.170]	2.15 [.085]	SO96-3-00	SO96-3-55-22-90	SO96-3-01
6.0 [0.235]	3.30 [.130]	SO96-4-00	SO96-4-55-22-90	SO96-4-01
7.0 [0.275]	4.30 [.170]	SO96-5-00	SO96-5-55-22-90	SO96-5-01

*See Table G for lead description.
The SO96 series is designed for high-temperature applications with operating temperature requirements up to 200°C [392°F]. This series features a thermochromic temperature indicator and meets performance requirements of SAE-AS83519 (formerly MIL-S-83519) . The solder is Sn96 with RA flux compatible with nickel-plated shields.

Table F. SO175 Series (175°C [347°F] rated)

BiAlloy Temperature Indication System

This system greatly enhances the reliability and repeatability of SO175 series terminators while reducing installed cost. The temperature indicator ring, encircling the solder preform, melts to indicate the very minimum amount of heat.

Cable OD		Part Number		
			Preinstalled Lead Option*	
Jacket OD Max.	Shield OD Min.	No Preinstalled Lead	22 AWG	Braid Strap
1.95 [0.075]	0.90 [0.035]	SO175-1-00	SO175-1-1-55-22-90	SO175-1-01
2.7 [0.105]	1.40 [0.055]	SO175-2-00	SO175-2-1-55-22-90	SO175-2-01
4.3 [0.170]	2.15 [0.085]	SO175-3-00	SO175-3-1-55-22-90	SO175-3-01
6.0 [0.235]	3.30 [0.130]	SO175-4-00	SO175-4-1-55-22-90	SO175-4-01
7.0 [0.275]	4.30 [0.170]	SO175-5-00	SO175-5-1-55-22-90	SO175-5-01

*See Table G for lead description.

Table G. Preinstalled Lead Description

Series	Lead Type	Remarks	Plating	Stranding	Min. Length
M83519, SO63	55A0111	MIL-W-22759/32	Tin	Stranded	150 [6.00]
SO96, SO175	55A0813	MIL-W-22759/41	Nickel	Stranded	150 [6.00]
SO63, SO96, S03	Braid strap	Uninsulated	Nickel	40 x 38 AWG	150 [6.00]
CWT	XL polyethylene	UL Listed	Tin	Stranded (W1)	150 [6.00]
SO63, S03	Braid Strap	Uninsulated	Tin	Stranded	150 [6.00]

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SolderSleeve Shield Terminators (Continued)

Product Characteristics

Material		
Insulation		
SO, M83519	Radiation-crosslinked, heat-shrinkable polyvinylidene fluoride	
CWT	Radiation-crosslinked, heat-shrinkable polyolefin	
Solder and flux		
SO63, M83519, S03	Solder: Sn63 Pb37	Flux: ROL1 per ANSI - J - 004 (RMA Flux)
SO96, SO175 series	Solder: Sn96 Ag4	Flux: ROM1 per ANSI - J - 004 (RA Flux)
CWT	Solder: Sn50 Pb32 Cd18	Flux: ROM1 per ANSI - J - 004 (RA Flux)
Ground lead		
CWT series	XL polyethylene	
SO, M83519, SO175	MIL-W-22759/32 or /41	
Typical Performance		
Voltage drop	2.5 mV	
Tensile strength	Exceeds strength of ground lead	
Dielectric strength	1.0 kV immersed	
Temperature rating		
CWT	-55°C to 125°C [-67°F to 257°F]	
SO63/M83519/S03	-55°C to 150°C [-67°F to 302°F]	
SO96/SO175 series	-55°C to 175°C [-67°F to 347°F]	
Insulation resistance	1000 megohms	

Specifications/Approvals

Series	Agency	Raychem
CWT	—	D-5023
SO63*	NAS 1747	RT-1404
M83519**	MIL-S-83519/1&/2	RT-1404
SO96***	NAS 1747	RT-1404
SO175		RT-1404

* Meets performance requirements of SAE-AS83519 (formerly MIL-S-83519) and NAS 1747, supplied with BiAlloy temperature indicator.

** Qualified to SAE-AS83519 (formerly MIL-S-83519), supplied with thermochromic temperature indicator.

***Meets performance requirements of SAE-AS83519 (formerly MIL-S-83519) and NAS 1747, supplied with thermochromic temperature indicator.

Installation

For proper installation of these devices, the correct heating tool and reflector attachment must be used. Any one of the following Raychem heating tools is recommended:

- HL1802E
- AA-400 Super Heater
- CV-1981
- MiniRay
- IR-1759

For detailed instructions and recommended reflector attachments, refer to the appropriate Raychem installation procedure:

Series	Procedure
CWT	**RPIP 655-00-D**
SO63	**RCPS 100-70**
M83519 (S01/S02)	**RCPS 100-70**
SO96	**RCPS 100-70**
S03	**RCPS 100-70**
SO175	**RCPS-100-70**

You will find ordering information for these tools on pages 7-104 to 7-111.

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SolderSleeve Shield Terminators (Continued)

Table H. NAS, M83519, and Raychem Cross-Reference

NAS Part Number	Raychem D Series Part Number	NAS Comment
1744-1	D-1744-01	
1744-2	D-1744-02	
1744-3	D-1744-03	
1744-4	D-1744-04	
1744-5	D-1744-05	
1744-6	D-1744-06	
1744-7	D-1744-07	
1744-8	D-1744-08	
1745-1	D-144-25	Inactive, Use SAE-AS83519/1-1 (formerly MIL-S-83519)
1745-2	D-100-00	Inactive, Use SAE-AS83519/1-2 (formerly MIL-S-83519)
1745-3	D-101-00	Inactive, Use SAE-AS83519/1-3 (formerly MIL-S-83519)
1745-4	D-103-00	Inactive, Use SAE-AS83519/1-5 (formerly MIL-S-83519)
1745-5	D-144-26	
1745-6	D-100-31	
1745-7	D-101-31	
1745-8	D-103-31	
1745-9		Obsolete - Use NAS1745-13
1745-10		Obsolete - Use NAS1745-14
1745-11		Obsolete - Use NAS1745-15
1745-12		Obsolete - Use NAS1745-16
1745-13	D-142-83	Inactive, Use SAE-AS83519/1-1 (formerly MIL-S-83519)
1745-14	D-142-50	Inactive, Use SAE-AS83519/1-2(formerly MIL-S-83519)
1745-15	D-142-51	Inactive, Use SAE-AS83519/1-3 (formerly MIL-S-83519)
1745-16	D-142-52	Inactive, Use SAE-AS83519/1-5 (formerly MIL-S-83519)
1745-17	D-107-00	Inactive, Use SAE-AS83519/1-4 (formerly MIL-S-83519)
1745-18	D-104-00	
1745-19	D-105-00	
1745-20	D-107-31	
1745-21	D-104-31	
1745-22	D-105-31	
1745-23	D-142-56	Inactive, Use SAE-AS83519/1-4 (formerly MIL-S-83519)
1745-24	D-142-65	
1745-25	D-142-66	
1746-1	D-144-25	Inactive, Use SAE-AS83519/1-1 (formerly MIL-S-83519)
1746-2	D-144-00	Inactive, Use SAE-AS83519/1-2 (formerly MIL-S-83519)
1746-3	D-144-01	Inactive, Use SAE-AS83519/1-3 (formerly MIL-S-83519)
1746-4	D-144-02	Inactive, Use SAE-AS83519/1-5 (formerly MIL-S-83519)
1746-5	D-144-26	
1746-6	D-144-03	
1746-7	D-144-04	
1746-8	D-144-05	
1746-9	D-144-46	Inactive, Use SAE-AS83519/1-4 (formerly MIL-S-83519)
1746-10	D-144-37	

Military Part Number	Raychem S01/S02 Series* Part Number	Raychem SO63 Series** Part Number
M83519/1-1	S01-01-R	SO63-1-00
M83519/1-2	S01-02-R	SO63-2-00
M83519/1-3	S01-03-R	SO63-3-00
M83519/1-4	S01-04-R	SO63-4-00
M83519/1-5	S01-05-R	SO63-5-00
M83519/2-1	S02-01-R	SO63-1-55-20-90
M83519/2-2	S02-02-R	SO63-2-55-20-90
M83519/2-3	S02-03-R	SO63-3-55-20-90
M83519/2-4	S02-04-R	SO63-4-55-20-90
M83519/2-5	S02-05-R	SO63-5-55-20-90
M83519/2-6	S02-06-R	SO63-1-55-22-90
M83519/2-7	S02-07-R	SO63-2-55-22-90
M83519/2-8	S02-08-R	SO63-3-55-22-90
M83519/2-9	S02-09-R	SO63-4-55-22-90
M83519/2-10	S02-10-R	SO63-5-55-22-90
M83519/2-11	S02-11-R	SO63-1-55-24-90
M83519/2-12	S02-12-R	SO63-2-55-24-90
M83519/2-13	S02-13-R	SO63-3-55-24-90
M83519/2-14	S02-14-R	SO63-4-55-24-90
M83519/2-15	S02-15-R	SO63-5-55-24-90
M83519/2-16	S02-16-R	SO63-1-55-26-90
M83519/2-17	S02-17-R	SO63-2-55-26-90
M83519/2-18	S02-18-R	SO63-3-55-26-90
M83519/2-19	S02-19-R	SO63-4-55-26-90
M83519/2-20	S02-20-R	SO63-5-55-26-90

* QPL listed to SAE-AS83519 (formerly MIL-S-83519)

** Meets performance requirements of SAE-AS83519 (formerly MIL-S-83519)

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Introduction

Raychem SolderSleeve coaxial cable terminators allow reliable, easy terminations in a variety of coaxial cable applications, including printed circuit boards (PCBs). The insulating and strain-relieving capabilities of SolderSleeve terminators provide the ideal solution to center-conductor breakage problems.

Designed for applications with temperatures up to 150°C [302°F], the products in this section include:

- SolderSleeve coaxial cable terminators, which allow reliable, economical attachment of coaxial cable to connector terminals, printed wiring assemblies, or solderless wrap terminals.
- One-piece SolderSleeve PCB coaxial cable terminators, which permit quick, easy, and cost-effective terminations of coaxial cable to printed circuit boards.
- RF one-step BNC/TNC connectors, which are single-piece assemblies for terminating the center conductor and the braid of a broad range of coaxial cables. They are fully intermateable with MIL-C-39012C connectors and are available in 50-ohm and 75-ohm versions (refer to pages 2-35 to 2-40 for product information).

With precisely measured solder and flux, SolderSleeve products provide exact process control of terminations. The SolderSleeve method means strong connections with the lowest possible voltage drop. Small, lightweight SolderSleeve terminators are also the ideal solution for high-density packaging problems.

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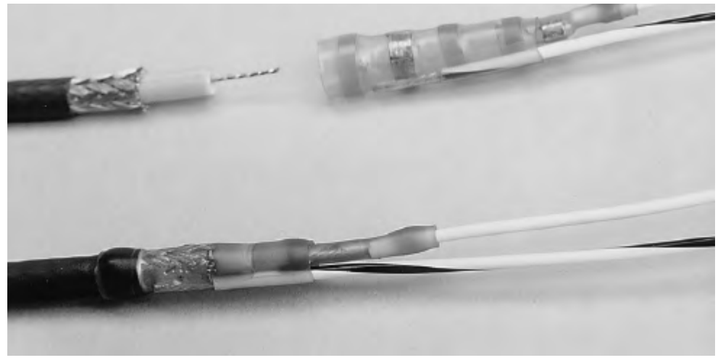
SolderSleeve Coaxial Cable Terminators

Product Facts

- **Transparent polyvinylidene fluoride or polyolefin insulation sleeve provides encapsulation, inspectability, strain relief (eliminates center conductor breakage), and insulation**
- **Prefluxed solder preform provides a controlled soldering process**
- **One-piece design provides easy installation and lower installed cost**
- **Preinstalled termination leads provide convenience and ease of installation**



Applications

Used for terminating coaxial cable to component terminals, contacts, printed circuit boards, and solderless wrap terminals.

Product Selection Process

1. Select product series from the product options table below.
2. Select preinstalled lead type from the table below.
3. Determine cable RG number or dimensions.
4. Select part number from Table A (CWT series) or Table B (B-02X/B-04X series) on the next page.

Product Options

Product Series	Max. Operating Temp.	Use on Cables Rated (Min)	Cable Shield Plating	Part No. Selection Table	Design
CWT	125°C [257°F]	85°C [185°F]	Tin, copper	A	2-pc.
B-02X/B-04X	150°C [302°F]	125°C [257°F]	Tin, silver	B	1-pc.
D-181	150°C [302°F]	125°C [257°F]	Tin, silver	C	2-pc.
D-184	125°C [257°F]	85°C [185°F]	Tin	D	2-pc.

Preinstalled Lead Descriptions

Series	Lead Type	Plating	Stranding	AWG	Length	Color
CWT	XL polyethelene	Tin	Stranded (W1)	22	150 [6.000]	White (cntr), green (grnd)
B-021	M81822/13 (solderless wrap)	Silver	Solid-OFHC	24—30	150 [6.000]	White (cntr), blue (grnd)
B-041	M81822/13 (solderless wrap)	Silver	Solid-OFHC	24—30	150 [6.000]	White (cntr), blue (grnd)
B-043	M81822/13 (solderless wrap)	Silver	Solid-OFHC	24—30	150 [6.000]	White (cntr), blue (grnd)
B-020	55A0111 (MIL-W-22759/32)	Tin	Stranded	20—30	150 [6.000]	White (cntr), blue (grnd)
B-040	55A0111 (MIL-W-22759/32)	Tin	Stranded	20—30	150 [6.000]	White (cntr), blue (grnd)
B-044	55A0111 (MIL-W-22759/32)	Tin	Stranded	20—30	150 [6.000]	White (cntr), blue (grnd)
D-181-12XX	55A0111 (MIL-W-22759/32)	Tin	Stranded	20—30	150 [6.000]	White (cntr), white w/black stripe (grnd)
D-181-22XX	55A0111 (MIL-W-22759/32)	Tin	Stranded	20—30	150 [6.000]	White (cntr), white w/black stripe (grnd)
D-181-32XX	55A0111 (MIL-W-22759/32)	Tin	Stranded	20—30	150 [6.000]	White (cntr), white w/black stripe (grnd)
D-181-18XX	M81822/13	Silver	Solid	26 – 30	150 [6.000]	White (cntr), blue (grnd)
D-181-28XX	M81822/13	Silver	Solid	26 – 30	150 [6.000]	White (cntr), blue (grnd)
D-184	55A0111 (MIL-W-22759/32)	Tin	Stranded	20 – 26	150 [6.000]	White (cntr), white w/black stripe (grnd)

Product Characteristics

Material		
Insulation (B-02X/B-04X, D-181, D-184)	Radiation-crosslinked, heat-shrinkable polyvinylidene fluoride	
Insulation (CWT series)	Radiation-crosslinked, heat-shrinkable polyolefin	
Solder and flux (B-02X/B-04X, D-181)	Solder: Sn63 Pb37	Flux: ROL1 per ANSI-J-004 (RMA Flux)
Solder and flux (CWT series, D-184)	Solder: Sn50 Pb32 Cd18	Flux: ROM1 per ANSI-J-004 (RA Flux)
Typical Performance		
Voltage drop	2.0 mV	
Tensile strength	Exceeds strength of conductor	
Dielectric strength	2.0 kV	
Temperature rating (CWT, D-184)	-55°C to 125°C [-67°F to 257°F]	
Temperature rating (B-02X/B-04X, D-181)	-55°C to 150°C [-67°F to 302°F]	
Insulation resistance	1000 megohms	

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SolderSleeve Coaxial Cable Terminators (Continued)

Table A. CWT Series Part Numbers

Cable RG Number	Dimensions		Part Number With Preinstalled Lead AWG/0.38 mm² Green/White)
	Dielectric OD	Jacket OD	
174	0.80–2.30 [.032–.091]	1.30–2.80 [.051–.110]	CWT-4174-W122-5/9
58, 122	2.00–2.80 [.079–.110]	2.50–4.40 [.100–.173]	CWT-4058-W122-5/9
59	2.80–3.30 [.110–.130]	3.20–6.00 [.125–.235]	CWT-4059-W122-5/9

Table B. B-02X/B-04X Series Part Numbers

Part 1: Coaxial Product Group Selection

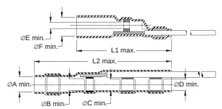
Typical Compatible Part Number		Dimension Range				
RG Cable Number	Raychem Cable Description	Jacket OD (Max.)	Shield OD	Dielectric OD	Conductor OD	One-Piece Coaxial Product Group
RG178, RG404	5030A13XX 5028A13XX	**3.40** [.134]	**1.30–2.30** [.051–.091]	**0.50–1.70** [.019–.067]	**0.30–0.80** [.011–.032]	Group 1
RG179, RG316	5024A13XX 7530A13XX 7526A13XX 9530A13XX	**4.40** [.173]	**1.50–2.80** [.060–.110]	**1.20–2.50** [.047–.100]	**0.30–1.60** [.011–.063]	Group 2
RG180, RG302, RG303	9527A13XX 9528A13XX	**6.30** [.248]	**2.40–4.60** [.094–.181]	**1.40–4.30** [.055–.169]	**0.30–2.80** [.011–.110]	Group 3

Part 2: Product Part Number Selection

One-Piece Coaxial Product Group	Preinstalled Wire Type	Preinstalled Wire Size					
		20 AWG	22 AWG	24 AWG	26 AWG	28 AWG	30 AWG
Group 1	Stranded (M22759)	—	B-044-22-N	B-044-24-N	B-044-26-N	—	—
	Solid (M81822)	—	—	B-043-24-N	B-043-26-N	B-043-28-N	B-043-30-N
Group 2	Stranded (M22759)	B-040-20-N	B-040-22-N	B-040-24-N	B-040-26-N	B-040-28-N	B-040-30-N
	Solid (M81822)	—	—	B-041-24-N	B-041-26-N	B-041-28-N	B-041-30-N
Group 3	Stranded (M22759)	B-020-20-N	B-020-22-N	B-020-24-N	B-020-26-N	—	—
	Solid (M81822)	—	—	—	B-021-26-N	—	—

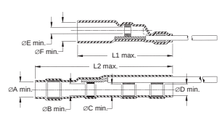
1. The B-02X/B-04X series uses a one-piece design to terminate coaxial cables rated at 125°C minimum.
2. Using Part 1 of this table, select the appropriate coaxial product group (1, 2, or 3) based on your RG cable number, Raychem cable description, or cable dimensions.
3. Using Part 2 of this table, select the product part number based on the coaxial product group you selected in Part 1 and the appropriate preinstalled lead type you selected on the previous page.

Table C. D-181 Series Part Numbers



Product Name	Product Dimensions								Wire AWG
	ØA Min.	ØB Min.	ØC Min.	ØD Min.	ØE Min.	ØF Min.	L1 Max.	L2 Max.	
D-181-1220-90/9									20
D-181-1222-90/9									22
D-181-1224-90/9	**3.7**	**3.2**	**2.7**	**2.4**	**2.3**	**0.71**	**17**	**21.5**	24
D-181-1226-90/9	[0.145]	[0.125]	[0.105]	[0.095]	[0.09]	[0.028]	[0.67]	[0.85]	26
D-181-1826-6/9									26
D-181-1830-6/9									30
D-181-2220-90/9									20
D-181-2222-90/9									22
D-181-2224-90/9	**4.5**	**4**	**3.45**	**2.9**	**3**	**1.1**	**17**	**22.7**	24
D-181-2226-90/9	[0.18]	[0.16]	[0.135]	[0.115]	[0.12]	[0.045]	[0.67]	[0.895]	26
D-181-2826-6/9									26
D-181-2830-6/9									30
D-181-3220-90/9									20
D-181-3222-90/9									22
D-181-3224-90/9	**5.2**	**4.7**	**4.45**	**3.95**	**4**	**1.3**	**17**	**21.5**	24
D-181-3226-90/9	[0.205]	[0.185]	[0.175]	[0.155]	[0.16]	[0.055]	[0.67]	[0.85]	26
D-181-3826-6/9									26
D-181-3830-6/9									30

Table D. D-184 Series Part Numbers



Product Name	Product Dimensions								Wire AWG
	ØA Min.	ØB Min.	ØC Min.	ØD Min.	ØE Min.	ØF Min.	L1 Max.	L2 Max.	
D-184-1220-90/9									20
D-184-1222-90/9	3.7	3.2	2.7	2.4	2.3	0.71	17	21.5	22
D-184-1224-90/9	[0.145]	[0.125]	[0.105]	[0.095]	[0.09]	[0.028]	[0.67]	[0.85]	24
D-184-1226-90/9									26
D-184-2220-90/9									20
D-184-2222-90/9	4.5	4	3.45	2.9	3	1.1	17	22.7	22
D-184-2224-90/9	[0.18]	[0.16]	[0.135]	[0.115]	[0.12]	[0.045]	[0.67]	[0.895]	24
D-184-2226-90/9									26

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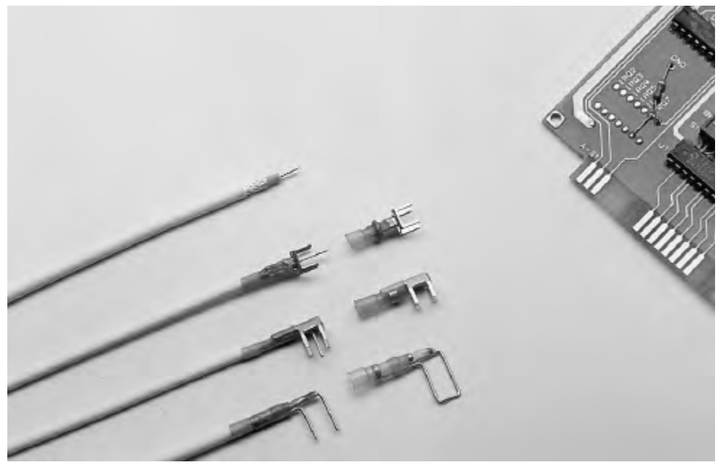
SolderSleeve PCB/Coaxial Cable Terminators

Product Facts

- Provides a completely shielded, low-resistance, matched-impedance termination with very low VSWR (D-607 series only)
- Transparent polyvinylidene fluoride insulation sleeve provides encapsulation, inspectability, strain relief, and insulation
- Prefluxed solder preform provides a controlled soldering process
- One-piece design offers easy installation and lower installed cost
- Preinstalled PCB termination body provides convenience and ease of installation



Applications

Used for terminating coaxial cable to printed circuit boards.

Installation

For proper installation of these devices, the correct heating tool and reflector attachment must be used. Any one of the following Raychem heating tools is recommended:

- HL1802E
- AA-400 Super Heater
- IR-1759 MiniRay
- CV-1981

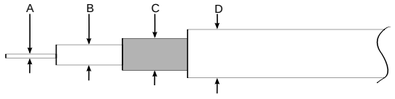
Refer to Raychem installation procedure ES61139 for detailed instructions and recommended reflector attachments.

You will find ordering information for these tools on pages 7-104 to 7-111.

Product Selection Process

1. Select product series from the Product Options table below.
2. Determine cable RG number or outside diameter dimensions.
3. Select the appropriate part number from Table A (D-607 series) or Table B (B-046 series).

- For D-607 (matched impedance) series, determine straight or right-angle entry to PCB and grid pattern, then select the appropriate part number from Table A on the next page.
- For B-046 (PinPak, or pin to ground) series, determine hole spacing and diameter. Refer to Table B for product selection (see illustration below for cable dimensions).



Product Options

Product Series	Typical Application Performance	Shield Method	Part Number Selection Table
D-607	Matched impedance up to 2.3 GHz	Metal body	A
B-046	Effective transmission up to 100 MHz	Pin to ground	B

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SolderSleeve PCB/Coaxial Cable Terminators (Continued)

Specifications/Approvals

Series	Raychem
D-607	RT-1404
B-046	RT-1404

Table A. D-607 Series Part Numbers

RG Cable No.	Cable Dimensions (mm/in) Max. Outside Diameter			Part Number Entry to PCB		
	Jacket	Shield	Dielectric	Straight grid 5.08 [.200]	Right-Angle Grid 5.08 [.200]	Straight Grid 2.54 [.100]
174, 178, 179, 316, 404	1.5–3.55 [.060–.140]	1.1–3.15 [.045–.125]	0.60–2.25 [.025–.090]	D-607-09	D-607-10	D-607-40*

Table B. B-046 Series Part Numbers

RG Cable Number	Cable Dimensions				Pin Diameter	Part Number		
	A	B	C	D Max.		Spacing Between Pins 2.54 [.100]	5.08 [.200]	6.35 [.250]
178, 404	0.30–0.80 [.011–.032]	0.5–1.7 [.019–.067]	1.3–2.3 [.050–.091]	3.4 [.134]	0.6 [.023] 0.8 [.031]	B-046-14-N	B-046-10-N	B-046-12-N
							B-046-11-N	B-046-13-N
179, 316	0.3–1.6 [.011–.063]	1.2–2.5 [.047–.100]	.1.5–2.8 [.060–.110]	4.4 [.173]	0.6 [.023] 0.8 [.031]	B-046-15-N	B-046-66-N	B-046-16-N
							B-046-68-N	B-046-18-N

Product Characteristics

Material		
Insulation	Radiation-crosslinked, heat-shrinkable polyvinylidene fluoride	
Solder and flux	Solder: Sn63 Pb37	Flux: ROL1 per ANSI - J - 004 (RMA flux)
Termination body/pin	Copper alloy, solder-plated	
Typical Performance		
Voltage drop	2.0 mV	
Tensile strength	Exceeds strength of conductor	
Dielectric strength	2.0 kV	
Temperature rating	-55°C to 150°C [-67°F to 302°F]	
Insulation resistance	1000 megohms	
Electrical Performance (typical) D-607 Series Only		
Frequency	**VSWR (D-607-09, -40)**	**VSWR (D-607-10)**
350 MHz	1.04 max.	1.04 max.
700 MHz	1.05 max.	1.09 max.
2.3 GHz	1.09 max.	1.12 max.

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Introduction

The question is, how to meet growing performance requirements for shielded cable system fabrication and maintenance while minimizing electromagnetic interference (EMI). The answer is Raychem SolderShield cable splices. SolderShield devices are one-piece products consisting of a flux-coated, solder-impregnated copper shield braid encased in a heat-shrinkable insulation sleeve.

SolderShield cable-to-cable splice kits, designed for single-conductor or multi-conductor shielded cables, are ideal for fabrication/repair/rework while restoring the electrical integrity of the cable.

SolderShield devices perform even in demanding environments. They are reliable, versatile, and easy to install.

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SolderShield Shielded and Coaxial Cable Splices

Product Facts

- Flux-coated, solder-impregnated copper shield braid encased in a transparent heat-shrinkable insulation sleeve provides a controlled soldering process, encapsulation, inspectability, strain relief, and insulation
- One-piece design provides easy installation and lower installed cost
- Circumferential (360°) shielding results in EMI protection and shield continuity equal to or better than the original cable
- Conductor splices are made using Raychem MiniSeal crimp products, which are recognized by MIL-S-81824 and MIL-W-5088

Applications

Used for splicing a wide range of cables, including coaxial and multiconductor cables.

SolderShield devices can be used to repair or splice shielded or coaxial cables. These products consist of a MiniSeal crimp splice plus a flux-coated, solder-impregnated copper shield encased in a heat-shrinkable sealing sleeve, for splicing the shields. SolderShield kits terminate single- or multiple-conductor cables, eliminate EMI problems at the splice, and provide strain relief for the cable.

Product Selection Process

For splicing multiconductor cables refer to Table A.

For splicing coaxial cables refer to Table B.

Installation

For proper installation of these devices, the correct heating tool and reflector attachment must be used. Any one of the following Raychem heating tools is recommended:

- HL1802E
- IR-1759 MiniRay
- CV-1981

Refer to Raychem installation procedure RCPS 150-02 (D-150 series) and RPIP 699-00 (B-202 series) for detailed instructions and recommended reflector attachment.

You will find ordering information for most of these tools on pages 7-104 to 7-111.

Specifications/Approvals

Series	Military	Raychem
D-150	US: M81824 (conductor splice only) UK: RAF AP 1130-2008-1	RT-1404

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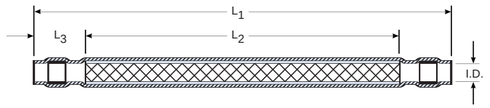
SolderShield Shielded and Coaxial Cable Splices (Continued)

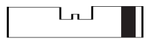
Table A. Multiconductor Cable Splices

Each SolderShield part consists of a SolderShield splice and one or more conductor splices. Refer to information below for description and numbers of conductor splices.

SolderShield Splice



Crimp Splice



SolderShield Product Dimensions

Part Number		Dimensions				Conductor Splice Size Range CMA [mm²] Min.–Max.	Color Code	Quantity Per Kit
Tin Plated	Nickel Plated	L1 Max.	L2 Nom.	L3 Min.	ID Min.			
D-150-0168	D-150-0228	80.50 [3.17]	50.00 [1.97]	10.20 [.400]	3.00 [.118]	304–1510 [0.15–0.75]	Red	1
D-150-0169	D-150-0229	80.50 [3.17]	50.00 [1.97]	10.20 [.400]	4.00 [.157]	779–2680 [0.39–1.34]	Blue	1
D-150-0170	D-150-0230	80.50 [3.17]	50.00 [1.97]	10.20 [.400]	5.00 [.197]	1900–6755 [0.95–3.37]	Yellow	1
D-150-0174	D-150-0231	10.60 [4.17]	75.00 [2.95]	10.20 [.400]	4.00 [.157]	304–1510 [0.15–0.75]	Red	2
D-150-0175	D-150-0232	10.60 [4.17]	75.00 [2.95]	10.20 [.400]	5.00 [.197]	779–2680 [0.39–1.34]	Blue	2
D-150-0176	D-150-0233	10.60 [4.17]	75.00 [2.95]	10.20 [.400]	6.00 [.236]	1900–6755 [0.95–3.37]	Yellow	2
D-150-0177	D-150-0234	10.60 [4.17]	75.00 [2.95]	10.20 [.400]	9.00 [.356]	304–1510 [0.15–0.75]	Yellow	2
D-150-0178	D-150-0235	10.60 [4.17]	75.00 [2.95]	10.20 [.400]	4.00 [.157]	304–1510 [0.15–0.75]	Red	4
D-150-0179	D-150-0236	10.60 [4.17]	75.00 [2.95]	10.20 [.400]	5.00 [.197]	779–2680 [0.39–1.34]	Red	4
D-150-0180	D-150-0237	10.60 [4.17]	75.00 [2.95]	10.20 [.400]	6.00 [.236]	1900–6755 [0.95–3.37]	Blue	4
D-150-0181	D-150-0238	10.60 [4.17]	75.00 [2.95]	10.20 [.400]	9.00 [.353]	1900–6755 [0.95–3.37]	Yellow	4

Note: The SolderShield splice kits listed in this table are for 1:1 cable splices. The kits can be used on cables with tin-, silver-, and nickel-plated copper conductors. All the kits have environmental-sealing capability. The cable temperature rating must be 125°C minimum.

To find the splice kit part number for your application:
1. Determine the number of conductors in the cable to be spliced.
2. Determine the gauge of each conductor or the maximum jacket OD.
3. Determine the conductor plating.
4. Select the appropriate part number from the table above.

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C. America: 57-1-254-4444

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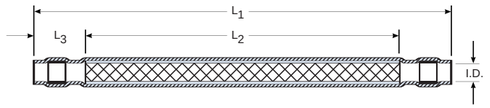
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

SolderShield Shielded and Coaxial Cable Splices (Continued)

Table B. Coaxial Cable Splices

Each SolderShield part consists of a SolderShield splice and one or more conductor splices. Refer to information below for description and numbers of conductor splices.

SolderShield Splice



Crimp Splice

RG Cable No.	Raychem Cable Description	Conductor Splice Qty/Kit	Part Number	SolderShield Dimensions		
				L1 Max	L2 Min	ID Min
8A, 9B, 11	5012A3311	1	D-150-0214	80.50 [3.170]	50.00 [1.970]	12.00 [.472]
13, 26, 31	5012E1339					
115, 144, 149	7518A1311					
165, 213, 214	—					
216, 235, 391	—					
393, 397	—					
178, 196,	5028A1317	1	D-150-0094	80.50 [3.170]	50.00 [1.970]	3.00 [.118]
179, 187, 188,	7528A1317					
316, 404, M17/138-00001,	5030A1317					
M17/136-00001	7530A1317					
180, 195	5024A1311	1	D-150-0095	80.50 [3.170]	50.00 [1.970]	4.00 [.157]
M17/137-00001	7526A1311					
M17/139-00001	9527A1318					
—	9530E1014					
124, 140, 141	5020A1311	1	D-150-0096	80.50 [3.170]	50.00 [1.970]	5.00 [.236]
159, 302, 303	5022A1311					
—	7522A1311					
—	7523D1331					
—	7524A1311					
29, 30, 55B	5019D3318	1	B-202-81*	56.00 [2.200]	23.00 [.900]	7.00 [.275]
58, 223	5021D1331					
—	5022A1311					
59, 62, 71	7523D1331	1	B-202-82*	56.00 [2.200]	23.00 [.900]	7.00 [.275]
—	7524A1311					
—	9524A1311					

*These kits use solder to terminate the center conductors. All other kits use crimp.
All kits are for one-to-one coaxial cable splices, and all kits have environmental sealing capability. Each kit contains products to splice conductors, build up dielectric, splice the shield, and provide insulation.

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SolderShield Shielded and Coaxial Cable Splices (Continued)

Product Characteristics

Materials	
Insulation sleeve	Radiation-crosslinked polyvinylidene fluoride
Meltable inserts	Fluorocarbon-based thermoplastic
MiniSeal crimp splice	Base metal: Copper alloy C10200 per ASTM B75 Plating: Tin per MIL-T-10727 or nickel per QQ-N-290
SolderShield shield splice	Base metal: Tin-plated copper wire braid per ASTM B3 Solder and flux coating: Type Sn63 Pb37. Flux: ROM1 per ANSI - J - STD - 004 (RA flux)

Parameter	Test Method	Requirement
Electromechanical Performance		
Dielectric strength (shield connection)	—	No breakdown or arcing at 1000 Vac (RMS)
Dielectric strength (conductor connection)	—	2.5 kV
Voltage drop	MIL-S-81824	Less than 2.0-millivolt increase
Insulation resistance (shield connection)	—	1000 megohms minimum at 500 Vdc
Insulation resistance (conductor connection)	—	5000 megohms
Tensile strength for MiniSeal	MIL-S-81824	Exceed yield strength (pounds) of wire.
Tensile strength for SolderShield	MIL-S-81824	75% of strength (pounds) of unspliced cable
Temperature rating	—	-55°C to 150°C [-67°F to 302°F]
Environmental Resistance		
Salt spray	MIL-STD-202 M101	Meet voltage drop requirement.
Heat aging	750 hours at 150°C [302°F]	Meet all electromechanical requirements.
Temperature cycling	MIL-STD-202 M107C	Meet all electromechanical requirements.
Altitude immersion	Immersion at 22,860m [75,000 ft]	Meet insulation-resistance requirement.
Corrosion resistance	—	No evidence of corrosion after testing in accordance with MIL-STD-202, Method 101, Test Condition A

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Holding Fixture Tool AD-1319-9

Product Facts

- **AD-1319-9 comes with two lateral wire clamps as standard**
- **Secures wire or cable, enabling easy installation of products**

Applications

Simplifies and speeds installation of Raychem SolderSleeve terminators or splices and SolderTacts shielded contacts.

Specifications and Dimensions

Dimensions	18 cm [7.07 in] W x 15 cm [5.91 in] L
Weight	300 g [.67 lb]

Product Range Covered	
SolderSleeve splices	MiniSeal, CWT-9XXX, D-1744, D-110
Shield terminators	D-100-XX
SolderTacts contacts	D-602-XX

Ordering Information

Model	Description	Part Number
Holding fixture	AD-1319-9	993850-000
38999 size 8 SolderTacts adapter	AT-1319-22	395241-000
38999 size 16 SolderTacts adapter	AT-1319-78	413186-000
Submin SolderTacts adapter	AT-1319-12	993872-000
748 SolderTacts adapter	AT-1319-14	993877-000
723 SolderTacts adapter	AT-1319-19	993938-000
482 size 16 SolderTacts adapter	AT-1319-17	993917-000

Note: Additional tooling for SolderTacts can be found under SolderTacts contacts, see Section 8.

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Hand-Operated Crimp Tools AD-1377, AD-1522

AD-1377 Crimp Tool

The Raychem AD-1377 crimp tool fits all MiniSeal crimp barrels. It also meets MIL specification M22520/37-01. A calibration verification gauge, AD-1386, is also available for the AD-1377. The gauge meets MIL specification M22520/39-01

AD-1522 Crimp Tool

The Raychem AD-1522 crimp tool crimps all DuraSeal crimp and PolyCrimp products. It has a preset crimp depth that provides the optimum combination of tensile strength and insulation integrity in the finished splice.

Ordering Information

Model	Description	Part Number
AD-1377 MiniSeal crimp tool	AD-1377-CRIMP-TOOL	992008-000
AD-1386 Calibration gauge	AD-1386-CALIBRATION-GAUGE	992013-000
AD-1522 DuraSeal crimp tool	AD-1522-1-CRIMPING TOOL	047011-000

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AD-3050-SEAL-TEST-EQUIP

Seal Test Equipment Splice Sealing and Connector Sealing Evaluation – Various Products

Product Facts

- Simple fixture design allows fast sealing test result assisting determination of installation conditions for splice sealing products
- Connector fixture adapter allows connector sealing verification
- Strong portable container allows use in various locations

Applications

The AD-3050-SEAL-TEST-EQ-NC is a manually operated pneumatic device, intended for use as a convenient 'in-process' sampling technique for checking sealed splices. Different combinations of in-line or stub splices can be pressure tested in any of the combination of fixtures (8 in total). There is also a facility to allow leak testing of various connectors.

Tyco Electronics UK has seen good correlation between results obtained with the AD-3050 and those obtained through water immersion testing. However testing in accordance with the OEM specification is the only guaranteed way of confirming that the OEM spec is being met. The splice products are located in clamps which deliver the test pressure. The product is immersed in water and pressure is delivered down the wire(s) to the sealed area.The test result is determined visually by looking for bubbles in the area of the sealing product.

Use of this equipment is described in Tyco Electronics UK procedure, reference No. PIP/017/95. This equipment can also check for poke through i.e. where individual wire strands poke through the installed heat-shrinkable sleeve by using the AD-3050-SEAL-POKE-IND. Poke through is eliminated by ensuring correct welding and subsequent handling conditions.

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AD-3050-SEAL-TEST-EQUIP (Continued)

Seal Test Equipment Splice Sealing and Connector Sealing Evaluation – Various Products

(Continued)

Technical Specification

Pneumatic Supply	6 bar maximum, filtered supply. 2 bar test pressure maximum. (Test pressure typically 0.5 bar)
Machine Cycle Times for seal testing:	Typically 1 minute
Total System Noise:	Negligible noise from air test
Dimensions:	550 x 350 x 215 [22 x 14 x 8 in] (Excludes packing case)
Weight:	4 Kg (8.80 lb) (Excludes packing case)
	9.6 Kg (21.20 lb) (Includes packing case)

Ordering Information

	Description	Part Number
Seal Test Equipment	AD-3050-SEAL-TEST-EQ-NC	C82893-000

Accessories

	Description	Part Number
Tool Case	AD-3050-SEAL-TEST-CASE-ONLY	F66989-000
Splice Poke-through Indicator	AD-3050-SEAL-POKE-IND	E63259-000

Recommended Spares

	Description	Part Number
Set of 8 Seals**	AD-3050-SEAL-8-KIT	299155-000
Clamp assembly including seals	AD-3050-SEAL-CLAMP-ASSY	168927-000
Sealing tape	EPDM foam, 6 mm x 9 mm, with acrylic adhesive backing.	—

** Full set of seals

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Infrared Heating Tool IR-550 Mark II

Product Facts

- Lightweight, portable unit with pedestal base for benchtop operation
- Foot switch, so both hands can be free to hold parts
- Commercially available tungsten-halogen lamp
- Fan-cooled housing
- Instant on/off heat
- Viewing window that allows parts to be inspected during installation
- Quiet, focused IR operation

Applications

Used for installing small and large SolderSleeve devices and SolderTacts contacts.

Specifications

Input power	105–120 V, 50–60 Hz, 4.5 A
Normal lamp life	More than 1000 hours of intermittent use
Weight	Approximately 2.5 Kg [5.5 lb]
Duty cycle	80%, 90-second max. heating times

Ordering Information

Model	Description	Part Number
IR-550 heating tool* (120 V) with RG-2 reflector, viewing window, and foot switch	IR-550-50-MARKII-HT-TOOL	994350-000

Note: For 230V CE-approved version, contact Tyco Electronics

Accessories and Replacement Parts

IR-550 foot switch (included with tool assembly 994350)	IR-550-216	994375-000
RG-6 reflector for large-diameter SolderSleeve terminations; aperture is 25.4 mm [1.0 in] wide	IR-550-19	994590-000
RG-11 reflector; aperture is 12.7 mm [.5 in] wide	IR-550-41	993695-000
RG-9 reflector; aperture is 9.525 mm [.375 in] wide	IR-550-39	993693-000
RG-2 reflector, included with 994350; aperture is 19.05 mm [.75 in] wide	IR-550-24	993770-000
Lamp (120 V)	IR-1000-P-N-13	993020-000
Optical filter	IR-550-237	118902-000
Viewing window (frame not included)	IR-550-238	007510-000
IR-550 upgrade kit: filter, viewing window, inner reflector, outer reflector	IR-550-240-Refurb	529600-000

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IR-1759 MiniRay Infrared Heating Tool

Product Facts

- **Small, lightweight, fan-cooled unit**
- **Small profile for installation where space is restricted**
- **Handheld operation**
- **Focused heat**
- **Quiet, efficient IR operation**
- **CE approved**

Applications

Used for installing SolderSleeve devices and SolderTacts contacts.

* Control box not shown

Specifications and Dimensions

Lamp	Tungsten-halogen Nominal power 250 W, 24 Vac, 50–60 Hz
Fan	12 Vac (supplied through control unit)
Weight	.73 kg [1.6 lb]
Cable length	2 m [6.5 ft]
Electronic Control Unit	
Main supply	110/230 Vac, 50/60 Hz, 11 A/5.5A universal
Weight	3.4 kg [7.6 lb]
Dimensions	16.3 x 12.2 x 12.2 cm [6.4 x 4.8 x 4.8 in]

Ordering Information

	Description	Part Number
Complete kit consisting of: Handtool/Reflector/Control Box (Manual control, Dual voltage)	IR1759-MK3-AT3130-EDCont	898738-000

Accessories and Replacement Parts

Handtool, standard aperture	IR-1759-MK3/A	986899-000
Handtool, large aperture	IR-3104-MK3/A	035343-000
Control box with time control-230 V	ED-7-001-MK2-230V-50HZ	869233-000
Control box with time control-110 V	ED-7-002-MK2-110V-60HZ	903553-000
Control box with manual control-110/230V	ED-7-CONT-230/110V	684886-000
Battery powered control box	ED-7-Batterybox-230/110V	448969-000
Conversion kit (AE-897) for adapting standard-aperture MiniRay heating tool to wide-aperture MiniRay tool (includes reflector)	AT-313/AE-897	934630-000
Inner reflector (standard aperture)	AE-424	547918-000
Inner reflector (wide aperture)	AE-153	988285-000
Lamp (250 W, 24 V)	NAE-143-3	988208-000
Filter (standard aperture)	AES-IR1759-100-FILTER-DUL	431468-000
Filter (large aperture)	AES-IR1759-300-FLTR-LRG	F52511-000

* IR tools are not recommended for use with black wire or cable insulations.

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RBK-ILS-Processor MkII

Installation of Splice Sealing Products Adjacent to Ultrasonic Welder

Product Facts

- Increased heating element life
- Installation times, temperatures and product size information (individual selection)
- Sequenced installations
- Operator key lock/password protection levels
- Automatic heater retraction on mains failure
- Automatic calibration (single cycle)
- RS232 interface allows time, temperature and product sizes for the next installation to be transferred from a remote machine (e.g. an ultrasonic welding tool)
- Machine hours and installation cycle counters
- Software upgradeable to support special applications
- Air cooling can be provided to an optional stub splice fixture in the RBK-Proc-MK2-Proc-Aircool version

Applications

The RBK-ILS-Processor MkII is a semi-automatic unit designed specifically to install splice sealing products onto ultrasonically welded or crimped splice joints used in automotive harnesses.

The tool can operate in several modes:

- Stand-alone — operator sets time and temperature.
- Sequenced — preset times and temperatures can be sequenced automatically (and can also be randomly selected from sequence stored.)
- Automatic — communication with upstream ultrasonic welder can allow time and temperature to be automatically set without operator intervention.

The operator is able to efficiently load both machines and so minimize ‘dead time’. Installing Raychem splice sealing products immediately after welding gives reduced installation time and earliest possible mechanical protection for the welded joint. The operator positions the splice sealing product centrally over the splice joint and then locates the assembly into the gripper mechanism.

The wire assembly is automatically ejected, with the splice sealing product installed and the joint area sealed, insulated and strain relieved. In-line or stub-type splices can be installed.

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RBK-ILS-Processor MkII (Continued)

Installation of Splice Sealing Products Adjacent to Ultrasonic Welder (Continued)

Technical Specification

Electrical Supply	220V-240V-50Hz
Power Consumption	1.7 Amps (Max)
Operating Temperature	550°C [1022°F] (Max) (500°C [932°F] recommended)
Machine Cycle Times for splice sealing products used on typical range of automotive splices	6 to 20 seconds depending on wire size and the number or wires used
Total System Noise	<80dB
Dimensions	390 x 365 x 225 mm [15 x 14 x 9 in.]
Weight	18 Kg [40 lb]

Product Range

RBK-ILS-125 Products	Sizes 1 to 3A
RBK-ILS-85 Products	Sizes 6/1 to 12/3
For Other Raychem Products (eg. RBK-VWS, RBK-ESS….)	Contact Tyco Electronics

Ordering Information

	Description	Part Number
Equipment	RBK-Proc-Mk2-Processor RBK-Proc-MK2-Proc-Aircool	740331-000 A96930-000
Accessories	Stub splice fixture - RBK-ILS-Proc-Stub-Sp-Fix Air cooled stub splice fixture - RBK-ILS-Proc-Air-Cool-Kit 8 mm ring terminal fixture - RBK-ILS-Proc-Termfix-08mm	981721-000 843800-000 049857-000

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Shielded Contacts

Table of Contents

Raychem SolderTacts shielded contacts are designed to provide reliable, one-piece solder terminations for use with circular and rectangular connectors. These controlled soldering contacts help speed installation and reduce installed costs while eliminating the variables associated with hard-to-handle crimped terminations.

With Tyco Electronics' controlled soldering technology, the connections typically exceed the strength of the wire. Transparent insulation and inspection windows permit fully inspectable terminations.

SolderTacts products are available to terminate coaxial cable and twisted wire pairs in both military and commercial applications.

SolderTacts Shielded One-Piece Solder Contacts . . . . . 8-1 to 8-10
Application Tooling . . . . . .8-11 to 8-13

METRIC
Dimensions in this section are millimeters over inches

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SolderTacts Shielded One-Piece Solder Contacts

Product Facts

- Reliable one-piece solder contacts: through-connector shielding reduces cross-talk, and improves signal transmission
- One-step installation
- Solder joints are strong and reliable
- Terminations are fully inspectable
- Termination for coax cables, shielded wires, twisted pairs, triaxial cables, for a variety of commercial and military connectors

Applications

One-piece controlled-soldering SolderTacts contacts connectors are designed to terminate coaxial cables, shielded wires, and twisted pairs faster and more reliably than any other method. SolderTacts contacts eliminate the variables associated with hard-to-handle crimping. Their one-step installation accelerates production while reducing handling and installed costs.

Controlled Soldering

SolderTacts contacts provide the optimum amount and type of solder and flux in prefluxed solder preforms to control soldering and reduce operator sensitivity. The geometry of the coaxial cable is carried through the connector to eliminate separate pins, help reduce cross talk, and improve shielding effectiveness and signal transmission.

SolderTacts contacts provide simultaneous electrical connection and strain relief. Heat-shrinkable tubing insulations eliminate stress concentration on the wire within the contact. Because the insulation is transparent and inspection windows are provided, terminations are fully inspectable.

Compatibility

The design versatility of SolderTacts contacts makes them exceptionally well suited to military applications, along with commercial aerospace, instrumentation and computers. SolderTacts products are compatible with most standard connector cavities. SolderTacts contacts are intermateable and intermountable with contacts qualified to the indicated specification.

SolderTacts shielded contacts can be terminated with standard Raychem heating tools. Once terminated, they can be installed into connector cavities with standard insertion and extraction tools. They are replaceable without cutting and restripping or shortening the cable.

Specifications/Approvals

Series	Raychem
D-602	D-6002

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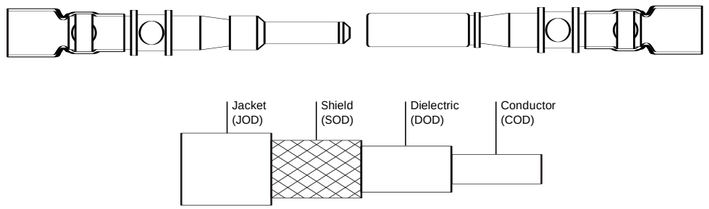
UK: 44-208-420-8341

SolderTacts Shielded One-Piece Solder Contacts (Continued)



SolderTacts Product Construction, MIL-C-26482 Series

SolderTacts Series: MIL-C-26482

Contact Military Specification	Cable Diameter				Wire (AWG)	Raychem SolderTacts Part No.	Size	Polarity	Cable Type
	JOD	SOD	DOD	COD					
MIS-20067/5-001†	1.78–4.70 [.070–.185]	1.65–2.79 [.065–.110]	.76–2.03 [.030–.080]	.23–.51 [.009–.020]	24–32	D-602-16	12	S	Coaxial
MIS-20067/6-001†	1.78–4.70 [.070–.185]	1.65–2.79 [.065–.110]	.76–2.03 [.030–.080]	.23–.51 [.009–.020]	24–32	D-602-17	12	P	Coaxial
—	1.52–3.30 [.060–.130]	1.68–2.13 [.066–.089]	.91–1.75 [.036–.069]	.30–.66 [.012–.026]	24–30	D-602-46	16	P	Coaxial
—	1.52–3.30 [.060–.130]	1.68–2.13 [.066–.089]	.91–1.75 [.036–.069]	.30–.66 [.012–.026]	26–32	D-602-47	16	S	Coaxial
—	—	—	.76–1.24 [.030–.049]	.28–.79 [.011–.031]	24–30	D-602-56	16	P	Twinax
—	—	—	.76–1.24 [.030–.049]	.28–.79 [.011–.031]	24–30	D-602-57	16	S	Twinax

† These SolderTacts contacts are on qualified parts list for indicated specification.

Tooling Selection Guide

Part Numbers	Engineering Standard (Termination Instructions)	Convection (Hot Air) Heating AT-1319 Adapter	Repair Wand	Contact Insertion Tool	Contact Removal Tool
D-602-46/47	ES61137	AT-1319-17	*	AD-1525	AD-1526
D-602-56/57	ES61138	—	—	(M81969/17-04)	(M81969/19-08)
D-602-16/17	ES61161	—	—	—	—

* Could be developed.

Note:
AA-400 SuperHeater Compressed Air Heating Tool shown on page 12-212 can be used for installation. Another option is the Steinel® General Purpose Hot-Air Heating Tool shown on page 12-215.

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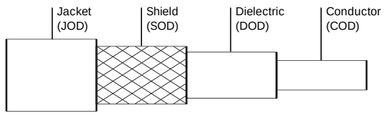
UK: 44-208-420-8341

SolderTacts Shielded One-Piece Solder Contacts (Continued)

SolderTacts Series:
MIL-C-28748 Series



SolderTacts Product Construction, MIL-C-28748 Series

Contact Military Specification	Cable Diameter				Wire (AWG)	Raychem SolderTacts Part Number	Size	Polarity	Cable Type
	JOD	SOD	DOD	COD					
MIS-20067/2-002[a]	1.52–3.35 [.060-.132]	1.68–2.13 [.066-.084]	.91–1.78 [.036-.070]	.23–.89 [.009-.035]	26–32	D-602-44	16	P	Coaxial
MIS-20067/1-001[a]	1.52–3.35 [.060-.132]	1.68–2.13 [.066-.084]	.91–1.78 [.036-.070]	.23–.89 [.009-.035]	26–32	D-602-45	16	S	Coaxial
MIS-20067/4-001[a]	—	—	.76–1.24 [.030-.049]	.28–.79 [.011-.031]	24–30	D-602-54	16	P	Twisted pair
MIS-20067/3-001[a]	—	—	.76–1.24 [.030-.049]	.28–.79 [.011-.031]	24–30	D-602-55	16	S	Twisted pair
M39029/79[b]	1.52–3.35 [.060-.132]	1.68–2.13 [.066-.084]	.91–1.68 [.036-.066]	.30–.66 [.012-.026]	26–32	D-602-72	16	P	Coaxial
M39029/80[b]	1.52–3.35 [.060-.132]	1.68–2.13 [.066-.084]	.91–1.68 [.036-.066]	.30–.66 [.012-.026]	26–32	D-602-73	16	S	Coaxial
M39029/40[b]	1.52–3.35 [.060-.132]	1.68–2.13 [.066-.084]	.91–1.68 [.036-.066]	.30–.66 [.012-.026]	26–32	D-602-76	16	P	Coaxial
M39029/41[b]	1.52–3.35 [.060-.132]	1.68–2.13 [.066-.084]	.91–1.68 [.036-.066]	.30–.66 [.012-.026]	26–32	D-602-77	16	S	Coaxial
—	—	—	.76–1.24 [.030-.049]	.28–.79 [.011-.031]	24–30	D-602-0126	16	P	Twisted pair[c]
—	—	—	.76–1.24 [.030-.049]	.28–.79 [.011-.031]	24–30	D-602-0127	16	S	Twisted pair[c]
—	1.52–3.35 [.060-.132]	1.68–2.13 [.066-.084]	.91–1.78 [.036-.070]	.23–.46 [.009-.018]	28–32	D-602-0172	16	P	Coaxial
MIS-20067/2-001, 003[a]	1.52–3.35 [.060-.132]	1.68–2.13 [.066-.084]	.91–1.78 [.036-.070]	.23–.46 [.009-.018]	28–32	D-602-0173	16	S	Coaxial
MIS-20067/8-001[a]	—	—	1.40–3.15 [.055-.124]	.64–1.57 [.025-.062]	16–20	D-610-09	16	P	Power
MIS-20067/7-001[a]	—	—	1.40–3.15 [.055-.124]	.64–1.57 [.025-.062]	16–20	D-610-10	16	S	Power

a These SolderTacts contacts are on the qualified parts list for indicated specification.
b These SolderTacts contacts are intermateable and intermountable with contacts qualified to the indicated specification; they replace crimp-style termination.
c These SolderTacts contacts are designed for twisted-pair cable per MIL-STD-1553B.

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SolderTacts Shielded One-Piece Solder Contacts (Continued)

Tooling Selection Guide: MIL-C-28748 Series

SolderTacts Series	Part Number	Engineering Standard (Termination Instructions)	Convection (Hot Air) Heating	
			AT-1319 Adapter	Repair Wand
748	D-602-44/45	ES61133	AT-1319-14	AD-1480
	D-602-0172/0173	ES61240	—	—
	D-602-54/55	ES61132	—	—
	D-602-0126/0127	ES61199	—	—
	D-610-09/10	ES61187	AT-1319-15	AD-1571
	D-602-72/73	ES61135	AT-1319-18	AD-1486
	D-602-76/77	ES61164	AT-1319-20	AD-1554

SolderTacts Series	Contact Insertion Tool	Contact Removal Tool		Special Tools
748	*	AD-1447	AD-1457A (bushing tool)	AD-1464 (flex tip removal tool)

* Not applicable.

Note:
AA-400 SuperHeater Compressed Air Heating Tool shown on page 12-212 can be used for installation. Another option is the Steinel® General Purpose Hot-Air Heating Tool shown on page 12-215.

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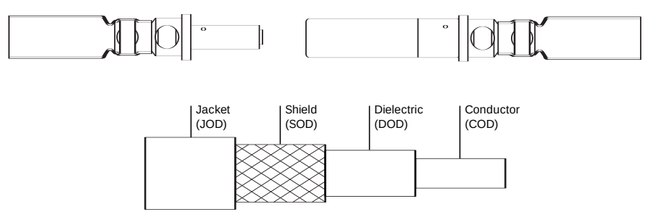
SolderTacts Shielded One-Piece Solder Contacts (Continued)

SolderTacts Series: MIL-C-38999, Series I, II, III, IV Circular Connectors

SolderTacts Product Construction, MIL-C-38999 Series



Contact Military Specification	United States Air Force Drawing No.	Cable Diameter				Wire (AWG)	Raychem SolderTacts Part Number	Size	Polarity	Cable Type
		JOD	SOD	DOD	COD					
Series I, III, and IV										
M39029/60[a]	—	3.81–5.94 [.150-.234]	3.10–4.32 [.150-.170]	1.52–3.84 [.060-.151]	.48–1.09 [.019-.043]	22–24	D-602-0122	8	P	Coaxial
M39029/59[a]	—	3.81–5.94 [.150-.234]	3.10–4.32 [.150-.170]	1.52–3.84 [.060-.151]	.48–1.09 [.019-.043]	22–24	D-602-0123	8	S	Coaxial
M39029/76[a]	915304-1	1.27–2.62 [.050-.103]	1.68–2.13 [.066-.084]	.91–1.73 [.036-.068]	.23–.58 [.009-.023]	26–30	D-602-0140	16	P	Coaxial
M39029/77[a]	915305-1	1.27–2.62 [.050-.103]	1.68–2.13 [.066-.084]	.91–1.73 [.036-.068]	.23–.58 [.009-.023]	26–30	D-602-0141	16	S	Coaxial
M39029/76[a]	915304-2	—	—	.64–1.09 [.025-.043]	.23–.58 [.009-.023]	26–30	D-602-0142	16	P	Twisted pair
M39029/77[a]	915305-2	—	—	.64–1.09 [.025-.043]	.23–.58 [.009-.023]	26–30	D-602-0143	16	S	Twisted pair
M39029/28[a]	915307-1	1.47–3.10 [.058-.122]	1.68–2.39 [.066-.094]	1.12–2.03 [.044-.080]	.48–.89 [.019-.035]	24–32	D-602-0144	12	P	Coaxial
M39029/75[a]	915308-1	1.47–3.10 [.058-.122]	1.68–2.39 [.066-.094]	1.12–2.03 [.044-.080]	.48–.89 [.019-.035]	24–32	D-602-0145	12	S	Coaxial
M39029/28[a]	915307-3	—	—	.74–1.45 [.029-.057]	.48–.89 [.019-.035]	22–26	D-602-0146	12	P	Twisted pair
M39029/75[a]	915308-3	—	—	.74–1.45 [.029-.057]	.48–.89 [.019-.035]	22–26	D-602-0147	12	S	Twisted pair
M39029/28[a]	915307-2	1.90–3.81 [.075-.150]	2.54–2.97 [.100-.117]	1.27–2.62 [.050-.103]	.48–.89 [.019-.035]	22, 28	D-602-0150	12	P	Coaxial
M39029/75[a]	915308-2	1.90–3.81 [.075-.150]	2.54–2.97 [.100-.117]	1.27–2.62 [.050-.103]	.48–.89 [.019-.035]	22, 28	D-602-0151	12	S	Coaxial
—	8340712-OS-01	2.49–3.42 [.098-.135]	1.68–3.05 [.066-.120]	.76–1.24 [.030-.049]	.27–.79 [.011-.031]	24–26	D-602-1108	8	S	Twisted pair[b]
—	8340713-OS-01	2.49–3.42 [.098-.135]	1.68–3.05 [.066-.120]	.76–1.24 [.030-.049]	.27–.79 [.011-.031]	24–26	D-602-1109	8	P	Twisted pair[b]
—	—	2.49–3.76 [.098-.148]	1.68–3.30 [.066-.130]	.91–1.78 [.036-.070]	.23–.89 [.009-.035]	22–26	D-602-1110	8	S	Triaxial
—	—	2.49–3.76 [.098-.148]	1.68–3.30 [.066-.130]	.91–1.78 [.036-.070]	.23–.89 [.009-.035]	22–26	D-602-1111	8	P	Triaxial
—	8340712-OL-01	2.49–3.42 [.098-.135]	1.68–3.05 [.066-.120]	.76–1.24 [.030-.049]	.27–.79 [.011-.031]	24–26	D-602-1112	8	S	Twisted pair[b]
—	8340713-OL-01	2.49–3.42 [.098-.135]	1.68–3.05 [.066-.120]	.76–1.24 [.030-.049]	.27–.79 [.011-.031]	24–26	D-602-1113	8	P	Twisted pair[b]
M39029/90[a]	8912020-OS-01	3.68 [.145] Max.	—	.64–1.29 [.029-.051]	.27–.74 [.011-.029]	24–26	DK-602-0156-N-1	8	P	Twinaxial[c]
M39029/90[a]	8912020-DL-01	4.11 [.162] Max.	—	.64–1.29 [.029-.051]	.27–.74 [.011-.029]	24–26	DK-602-0156-N-2	8	P	Twinaxial[c]

a These SolderTacts contacts are intermateable and intermountable with contacts qualified to indicated specification; they replace crimp-style termination.
b These SolderTacts contacts are designed for shielded twisted pair cable per MIL-STD-1553B.
c These SolderTacts contacts are designed for databus contacts per MIL-STD-1553B.

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SolderTacts Shielded One-Piece Solder Contacts (Continued)

SolderTacts Series: MIL-C-38999, Series I, II, III, IV Circular Connectors (Continued)

Contact Military Specification	United States Air Force Drawing No.	Cable Diameter (in inches) JOD	SOD	DOD	COD	Wire (AWG)	Raychem SolderTacts Part Number	Size	Polarity	Cable Type
Series I, III, and IV										
M39029/90[a]	8912020-EL-01	4.50 max. [.177]	—	.74-1.30 [.029–.051]	.24-.74 [.011–.029]	24–26	DK-602-0156-N-3	8	P	Twinaxial[c]
M39029/91[a]	8912019-OS-01	3.68 max. [.145]	—	.74-1.30 [.029–.051]	.24-.74 [.011–.029]	24–26	DK-602-0157-N-1	8	S	Twinaxial[c]
M39029/91[a]	8912019-DL-01	4.12 max. [.162]	—	.74-1.30 [.029–.051]	.24-.74 [.011–.029]	24–26	DK-602-0157-N-2	8	S	Twinaxial[c]
M39029/91[a]	8912019-EL-01	4.50 max. [.177]	—	.74-1.30 [.029–.051]	.24-.74 [.011–.029]	24–26	DK-602-0157-N-3	8	S	Twinaxial[c]
M39029/90[a]	8912020-OL-01	4.67 max. [.184]	—	—	—	20	DK-602-0169-1	8	P	Twinaxial[c]
M39029/91[a]	8912019-OL-01	4.67 max. [.184]	—	—	—	20	DK-602-0170-1	8	S	Twinaxial[c]
Series II										
M39029/76[a]	915304-1	1.27-2.62 [.050–.103]	1.68-2.13 [.066–.084]	.91-1.73 [.036–.068]	.23-.58 [.009–.023]	26–30	D-602-0140	16	P	Coaxial
M39029/77[a]	915306-1	1.27-2.62 [.050–.103]	1.68-2.13 [.066–.084]	.91-1.73 [.036–.068]	.23-.58 [.009–.023]	26–30	D-602-0171	16	S	Coaxial
M39029/76[a]	915304-2	—	—	.64-1.09 [.025–.043]	.23-.58 [.009–.023]	26–30	D-602-0142	16	P	Twisted pair
M39029/77[a]	915306-2	—	—	.64-1.07 [.025–.042]	.23-.58 [.009–.023]	26–30	D-602-0174	16	S	Twisted pair

a These SolderTacts contacts are intermateable and intermountable with contacts qualified to indicated specification; they replace crimp-style termination.
b These SolderTacts contacts are designed for shielded twisted pair cable per MIL-STD-1553B.
c These SolderTacts contacts are designed for databus contacts per MIL-STD-1553B.

Tooling Selection Guide

SolderTacts Series	Part Numbers (D-602-)	Engineering Standard (Termination Instructions)	Convection (Hot Air) Heating AT-1319 Adapter	Repair Wand	Contact Insertion Tool	Contact Removal Tool*
999 Size 16	0140/0141	ES61226	AT-1319-78	AD-1565	M81969/8-07 or M81969/14-03	M81869/8-08 or M81969/14-03
	0142/0143	ES61224	—	—		
	0171	ES61226	AT-1319-27	AD-1572		
	0174	ES61224	—	—		
999 Size 12	0144/0145	ES61206	AT-1319-24	AD-1566	M81969/8-09 or M81969/14-04	M81969/8-10 or M81969/14-04
	0146/0147	ES61218	—	—		
	0150/0151	ES61223	—	—		
999 Size 8	0122/0123	ES61179	AT-1319-22	AD-1568	—	M81969/14-06 or Astro ATBX-2277
	1108/1109	ES61172	AT-1319-22 and AT-1319-14	—		
	1110/1111	ES61172		AD-1568 and AD-1480		
	1112/1113	ES61184				
	0156/0157-X	ES61231				
	0169/0170-X	ES61235				

* Tyco Electronics does not provide this tool. See connector manufacturer.

Note:
AA-400 SuperHeater Compressed Air Heating Tool shown on page 12-212 can be used for installation. Another option is the Steinel® General Purpose Hot-Air Heating Tool shown on page 12-215.

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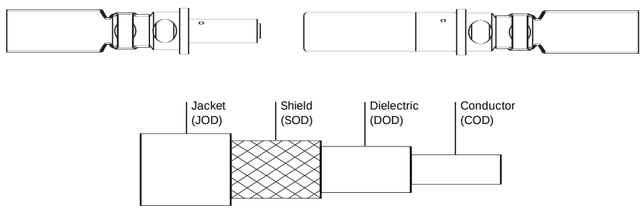
SolderTacts Shielded One-Piece Solder Contacts (Continued)

SolderTacts Series: Subminiature*

SolderTacts Product Construction, Submin Series



Raychem Cable Diameter

SolderTacts	Size	Polarity	Cable Type	Cable Diameter				
				JOD	SOD	DOD	COD	(AWG)
D-602-0278	16	P	Coaxial	1.52–2.92 [.060-.115]	1.85–2.18 [.073-.086]	.64–1.91 [.025-.075]	.23–.74 [.009-.029]	24–32
D-602-0279	16	S	Coaxial	1.52–2.92 [.060-.115]	1.85–2.18 [.073-.086]	.64–1.91 [.025-.075]	.23–.74 [.009-.029]	24–32
D-602-0288	16	P	Twisted pair	—	—	.74–1.40 [.029-.055]	.23–.74 [.009-.029]	24–32
D-602-0289	16	S	Twisted pair	—	—	.74–1.40 [.029-.055]	.23–.74 [.009-.029]	24–32

* These SolderTacts contacts belong to the Raychem “Subminiature” series of contacts, which are designed for use in commercial connectors.

Tooling Selection Guide

SolderTacts Series	Part Numbers (D-602-)	Engineering Standard (Termination Instructions)	Convection (hot air) Heating AT-1319 Adapter	Repair Wand	Contact Insertion Tool	Contact Removal Tool
Submin	0278/0279	ES61170	AT-1319-12	AD-1481	**	AD-1447
—	0288/0289	ES61414	—	—	—	—

** Not applicable.

Note:
AA-400 SuperHeater Compressed Air Heating Tool shown on page 12-212 can be used for installation. Another option is the Steinel® General Purpose Hot-Air Heating Tool shown on page 12-215.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

SolderTacts Shielded One-Piece Solder Contacts (Continued)

SolderTacts Series: MIL-C-83723

Contact Military Specification*	Cable Diameter				Wire (AWG)	Raychem SolderTacts	Size	Polarity	Cable Type
	JOD	SOD	DOD	COD					
M39029/74-400	2.39–3.56 [.094-.140]	1.96–2.49 [.077-.098]	1.32–2.06 [.052-.081]	.28–.74 [.011-.029]	24–32	D-602-0094	12	P	Coaxial
M39029/73-397	2.39–3.56 [.094-.140]	1.96–2.49 [.077-.098]	1.32–2.06 [.052-.081]	.28–.74 [.011-.029]	24–32	D-602-0095	12	S	Coaxial
M39029/74-401	—	—	.74–1.45 [.029-.057]	.28–.74 [.011-.029]	24–32	D-602-0104	12	P	Twisted pair
M39029/73-398	—	—	.74–1.45 [.029-.057]	.28–.74 [.011-.029]	24–32	D-602-0105	12	S	Twisted pair
M39029/74-399	3.05–3.68 [.120-.145]	3.10–3.15 [.122-.124]	2.36–2.67 [.093-.105]	.28–.74 [.011-.029]	24–32	D-602-0106	12	P	Large coaxial
M39029/73-396	3.05–3.68 [.120-.145]	3.10–3.15 [.122-.124]	2.36–2.67 [.093-.105]	.28–.74 [.011-.029]	24–32	D-602-0107	12	S	Large coaxial

* These SolderTacts contacts are on qualified parts list for indicated specification.

Tooling Selection Guide

Raychem SolderTacts Part Number	Engineering Standard (Termination Instructions)	Convection (Hot Air) Heating AT-1319 Adapter	Repair Wand	Contact Insertion Tool	Contact Removal Tool	Special Tools
D-602-0094/0095	ES61128	AT-1319-19	AD-1494	AD-1527	AD-1527	AD-1496
D-602-0106/0107	ES61134	Rev. D	Rev. C	(M81969/14-04)	(M81969/14-04)	(twisted)
D-602-0104/0105	ES61129	—	—	—	—	—

Note:
AA-400 SuperHeater Compressed Air Heating Tool shown on page 12-212 can be used for installation. Another option is the Steinel® General Purpose Hot-Air Heating Tool shown on page 12-215.

SolderTacts Series: DOD-C-83527

Raychem SolderTacts Reference	Size	Polarity	Cable Type	Contact Military Specification
D-602-0185	16	socket	Coaxial	—
D-602-0094	12	pin	Coaxial	M39029/74
D-602-0093**	12	socket	Coaxial	M39029/73
D-602-0106	12	pin	Coax (large)	M39029/74
D-602-0189**	12	socket	Coax (large)	M39029/73

** These SolderTacts contacts are intermateable with M39029/73, but are not on QPL.

SolderTacts Series: DOD-C-83527 (data bus contacts)***

Raychem SolderTacts Reference	Size	Polarity	Cable Type	Contact Military Specification
D-602-0186	8	pin	Twisted pair	M39029/96
D-602-0187	8	socket	Twisted pair	M39029/95
DK-602-0186-2	8	pin	Sh. twisted pair	M39029/96
DK-602-0187-2	8	socket	Sh. twisted pair	M39029/95

*** These SolderTacts contacts are designed for shielded twisted pair cable per MIL-STD-1553B.

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SolderTacts Shielded One-Piece Solder Contacts (Continued)

Raychem SolderTacts Reference	Size	Polarity
D-600-0071	—	For shielded twisted pair
D-600-0116	For size 8 DOD-C-83527 series	—
D-600-0125	For size 8 MIL-C-38999 series, for twisted pair	—

SolderTacts Series: Grommets

Performance

The performance of SolderTacts contacts is defined by the applicable Raychem specification control drawing (SCD) and Raychem Specification D-6002. Products on qualified product lists meet the requirements of the base specification.

Termination

Termination of SolderTacts contacts is defined in the appropriate Raychem Engineering Standard. To obtain a copy, contact Tyco Electronics.

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Holding Fixture Tool AD-1319-9

Product Facts

- **AD-1319-9 comes with two lateral wire clamps as standard**
- **Secures wire or cable, enabling easy installation of products**

Applications

Simplifies and speeds installation of Raychem SolderSleeve terminators or splices and SolderTacts shielded contacts.

Specifications and Dimensions

Dimensions	18 cm [7.07 in] W x 15 cm [5.91 in] L
Weight	300 g [.67 lb]

Product Range Covered	
SolderSleeve splices	MiniSeal, CWT-9XXX, D-1744, D-110
Shield terminators	D-100-XX
SolderTacts contacts	D-602-XX

Ordering Information

Model	Description	Part Number
Holding fixture	AD-1319-9	993850-000
38999 size 8 SolderTacts adapter	AT-1319-22	395241-000
38999 size 16 SolderTacts adapter	AT-1319-78	413186-000
Submin SolderTacts adapter	AT-1319-12	993872-000
748 SolderTacts adapter	AT-1319-14	993877-000
723 SolderTacts adapter	AT-1319-19	993938-000
482 size 16 SolderTacts adapter	AT-1319-17	993917-000

Note: Additional tooling for SolderTacts can be found under SolderTacts contacts, see pages 8-3, 8-5, 8-7 to 8-9.

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Infrared Heating Tool IR-550 Mark II

Product Facts

- Lightweight, portable unit with pedestal base for benchtop operation
- Foot switch, so both hands can be free to hold parts
- Commercially available tungsten-halogen lamp
- Fan-cooled housing
- Instant on/off heat
- Viewing window that allows parts to be inspected during installation
- Quiet, focused IR operation

Applications

Used for installing small and large SolderSleeve devices and SolderTacts contacts.

Specifications

Input power	105–120 V, 50–60 Hz, 4.5 A
Normal lamp life	More than 1000 hours of intermittent use
Weight	Approximately 2.5 Kg [5.5 lb]
Duty cycle	80%, 90-second max. heating times

Ordering Information

Model	Description	Part Number
IR-550 heating tool* (120 V) with RG-2 reflector, viewing window, and foot switch	IR-550-50-MARKII-HT-TOOL	994350-000

Note: For 230V CE-approved version, contact Tyco Electronics

Accessories and Replacement Parts

Model	Description	Part Number
IR-550 foot switch (included with tool assembly 994350)	IR-550-216	994375-000
RG-6 reflector for large-diameter SolderSleeve terminations; aperture is 25.4 mm [1.0 in] wide	IR-550-19	994590-000
RG-11 reflector; aperture is 12.7 mm [.5 in] wide	IR-550-41	993695-000
RG-9 reflector; aperture is 9.525 mm [.375 in] wide	IR-550-39	993693-000
RG-2 reflector, included with 994350; aperture is 19.05 mm [.75 in] wide	IR-550-24	993770-000
Lamp (120 V)	IR-1000-P-N-13	993020-000
Optical filter	IR-550-237	118902-000
Viewing window (frame not included)	IR-550-238	007510-000
IR-550 upgrade kit: filter, viewing window, inner reflector, outer reflector	IR-550-240-Refurb	529600-000

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IR-1759 MiniRay Infrared Heating Tool

Product Facts

- **Small, lightweight, fan-cooled unit**
- **Small profile for installation where space is restricted**
- **Handheld operation**
- **Focused heat**
- **Quiet, efficient IR operation**
- **CE approved**

Applications

Used for installing SolderSleeve devices and SolderTacts contacts.

* Control box not shown

Specifications and Dimensions

Lamp	Tungsten-halogen Nominal power 250 W, 24 Vac, 50–60 Hz
Fan	12 Vac (supplied through control unit)
Weight	.73 kg [1.6 lb]
Cable length	2 m [6.5 ft]
Electronic Control Unit	
Main supply	110/230 Vac, 50/60 Hz, 11 A/5.5A universal
Weight	3.4 kg [7.6 lb]
Dimensions	16.3 x 12.2 x 12.2 cm [6.4 x 4.8 x 4.8 in]

Ordering Information

	Description	Part Number
Complete kit consisting of: Handtool/Reflector/Control Box (Manual control, Dual voltage)	IR1759-MK3-AT3130-EDCont	898738-000

Accessories and Replacement Parts

	Description	Part Number
Handtool, standard aperture	IR-1759-MK3/A	986899-000
Handtool, large aperture	IR-3104-MK3/A	035343-000
Control box with time control-230 V	ED-7-001-MK2-230V-50HZ	869233-000
Control box with time control-110 V	ED-7-002-MK2-110V-60HZ	903553-000
Control box with manual control-110/230V	ED-7-CONT-230/110V	684886-000
Battery powered control box	ED-7-Batterybox-230/110V	448969-000
Conversion kit (AE-897) for adapting standard-aperture MiniRay heating tool to wide-aperture MiniRay tool (includes reflector)	AT-313/AE-897	934630-000
Inner reflector (standard aperture)	AE-424	547918-000
Inner reflector (wide aperture)	AE-153	988285-000
Lamp (250 W, 24 V)	NAE-143-3	988208-000
Filter (standard aperture)	AES-IR1759-100-FILTER-DUL	431468-000
Filter (large aperture)	AES-IR1759-300-FLTR-LRG	F52511-000

*IR tools are not recommended for use with black wire or cable insulations.

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Electronics

Electrical Interconnection System Design

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This section attempts to provide assistance with most of the considerations applicable to the design of cable and harness assemblies. Caution must be used to ensure that the design is appropriate for a particular application.

Tyco Electronics provides this information as a design aid and assumes no responsibility for and makes no representation regarding the suitability of a design for a specific application.

METRIC
Dimensions in this section are millimeters over inches

Note: Users should independently evaluate the suitability of the product for their application. Before ordering, check with Tyco Electronics for most current data.

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Harness Design

A Raychem molded part provides strain relief on the back end of a connector.

Tyco Electronics offers a range of Raychem components for wiring harnesses and cable assemblies in commercial, industrial, automotive, and defense and allied industries. Our components are approved to widely recognized standards (UL, CSA, CE, SAE) and to the military specifications of various governments.

A variety of component material systems can be used to design a rugged, reliable, repairable, shielded, and environmentally sealed harness. We also offer individual components that can be used independently to meet a specific sealing, insulation, strain relief, protection, identification, or electrical interconnection need.

Harnessing system components include:

- Heat-shrinkable tubing
- Heat-shrinkable molded shapes
- Adhesives
- Adapters
- Assemblies
- Electrical interconnect components
- Wire and cable
- Solder termination devices
- Application equipment

In many cases, properly selected components can raise the performance of a harness to acceptable levels compatible with even very demanding environments where cables are exposed to water, temperature extremes, EMI-radiated fields, or fluids.

Tyco Electronics is the established leader in automotive, aerospace, marine, mass transit, industrial, and military harnessing. Call us for ideas on protecting your harness—whether it's a typical UL wiring system or a harness assembly for demanding environments.

Harness Design

Designing wiring harnesses for demanding applications such as defense and aerospace is a complex business:

- Many different parts need to be selected while taking account of various environmental factors and mating part conditions. There can be a large number of alternative design solutions to analyze and the constraints imposed upon harness design are becoming more demanding.
- Weight and space are especially important in missile and aerospace applications. With the additional electrical equipment now in products such as cars, these factors are becoming a bigger issue in these industries.
- Electromagnetic interference (EMI). Harnesses can either radiate interference to, or pick up interference from, nearby equipment. With the increasing use of sensitive electronics in cars, aircraft and military equipment this is a major problem.
- Resistance to environmental hazards including corrosion, high temperature or fire, chemical and nuclear agents. The additional costs of totally sealed wiring harness systems are becoming easier to justify as products and the lives of those who use them, become more dependent upon the fault free operation of electrical systems.
- Repair and maintainability. Electrical and electronic systems in military vehicles and naval vessels now need to be upgraded or modified several times during the life of the main mechanical platform. There are now parts and harness design techniques that make this work easier to accomplish.

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Harness Design (Continued)

This section provides information about the basic components in a harness design, the factors to consider in designing a harness, and the Tyco Electronics Harn*Ware* Harness Design CAD software. With this information and the selection tables that follow, you will be able to choose from this catalog the right components for an integrated military or high-performance industrial harnessing system.

The checklist on page 9-4 covers some of the factors to consider in the design of a harness.

Harness Components

Connectors and wires are the two basic components of a harness that need to be specified. Once they have been chosen, compatible protection, shielding and identification follow.

Connectors

Connectors come in two opposite types: plugs and receptacles. Both contain contacts, usually made of plated copper. The contacts, called pins or sockets, are joined to the conductors and are designed to mate or join with contacts of the opposite type.

The front or joining end of the connector is designed to mate only with a connector having the right configuration. The back end of the connector is where the wires are terminated to the metal contacts.

Connectors for indoor or internal use are generally not designed to resist moisture. Connectors that will be exposed to moisture are generally sealed to meet a specific requirement.

Wires

In this discussion, a wire is defined as an insulated conductor and a cable is defined as two or more wires with or without a common jacket or shield. Conductors are usually made from copper.

A copper conductor can be solid or, when flexibility is important, can consist of smaller strands of copper wire twisted together. The strands can be coated with tin, nickel, or silver to make them easier to terminate or more resistant to corrosion.

Conductors are sized in metric units (mm^2) or by AWG (American Wire Gauge), a holdover from the days when wire was made of steel in steel mills.

The AWG refers to the number of passes it takes to draw the wire down to the required size - the larger the AWG, the smaller the wire. Making a 26 AWG wire, for example, requires more passes through reduction dies than are required for a 4 AWG wire.

A 26 AWG stranded wire, however, is made of many smaller wires, such as seven strands of 32 AWG wire (sometimes shown as 7/32 or 7x32).

The choice of insulation for a conductor depends on a number of factors:

- Operating, design, and excursion temperatures of the system
- Size and weight limitations
- Mechanical performance desired
- Flexibility requirements
- Resistance to various fluids
- Specialized requirements, such as:
  - low fire hazard or low halogen
  - low outgassing

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Harness Design Checklist

Harness Design (Continued)

Connectors

- ☐ Sealed or unsealed?
- ☐ Made of plastic or metal?
- ☐ Crimp or solder contacts?
- ☐ Pins or sockets?
- ☐ Mating frequency?
- ☐ Keyway angle?
- ☐ Exposed to electrical noise (EMI)?

Geometry

- ☐ Dimensions?
- ☐ Point to point or branched?
- ☐ Configuration of ends - straight, 90°, 45°?

Environment

- ☐ Exposed to sunlight?
- ☐ Exposed to moisture?
- ☐ Immersed?
- ☐ Temperature extremes?
- ☐ Temperature cycling?
- ☐ Normal operating temperature?
- ☐ Exposed to abrasion?
- ☐ Exposed to mechanical abuse?
- ☐ Exposed to dust?
- ☐ Exposed to corrosive fluids?
- ☐ Exposed to flexing?
- ☐ Repairable?
- ☐ Circuit identification?
- ☐ Cable identification?*
- ☐ Shielding effectiveness?
- ☐ Magnetic-field–induced signals?

Circuit

- ☐ Voltage?
- ☐ Current?
- ☐ Signal transmission (impedance, velocity, frequency, etc.)?
- ☐ Circuit layout?
- ☐ Is circuit integrity critical? What if the circuit fails?

*Tyco Electronics Identification products information available at www.tycoelectronics.com

Protection

Once the connectors and wires have been specified, the method of protection must be considered. Various jacket materials are available to protect the wires and these can be extruded or heat-shrink. Jacket material formulations are compounded to meet a wide range of environmental demands.

Similarly, protection for the wire termination must be considered. In general, the wires will be terminated to connector contacts. Protection products must protect the joints from damage caused by mechanical stress such as flex, torque and tensile load, and corrosion or electrical breakdown from fluid ingress, while retaining the ability to be repaired. All these influences and more must be considered when choosing the termination protection method.

Shielding and Shield Termination

Step 3 of the component selection process discussed later in this section gives advice on choosing the appropriate shielding products for the gross shield. Consideration must also be given to the individual cable shield terminations. Can they be pigtailed together with a common termination to a contact or to earth, or should they have individual terminations? If using a solder device, the correct choice is based, not only on size, but also temperature rating or compatibility with the cable braid.

Identification

Circuit identification is important, both in manufacture, where an assembly operator must ensure correct wire to contact termination, and in repair, where a damaged connector may need replacing in difficult circumstances and contact positions have to be easily identified. Individual wire markers help with these two circumstances. Where a cable is severed and access to the ends is prevented, unique identification on the wires, or wire color coding aids repair.

Consideration given to the identification of harness legs is also important. Connectors will normally be chosen with unique keying to prevent incorrect mating but end identification will speed up plugging, particularly for multi-connector harnesses.

It is also good practice to label the harness with its part numbers and other relevant information for traceability purposes.

The Tyco Electronics Identification Products Group offers a variety of products that are compatible to the Harn*Ware* software design process.

For complete information regarding these products visit our website at www.tycoelectronics.com.

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Protection of Harness Components

A salt deposit can be seen beneath the end of this 18-AWG, 19-strand wire. The other end of the wire has been immersed in salt water for 24 hours.

Harness components are vulnerable to corrosion, stress, strain, and electromagnetic interference (EMI).

Corrosion

Humidity, moisture, salt, and corrosive fluids can corrode conductors and contacts. What is worse, the corrosion can take place well beyond the point of penetration because of the small tube-like voids—capillaries—between the individual strands of copper that make up the conductor. Called "capillary action," the penetration of a fluid can "wick" many feet in a relatively short time (see photo above), depending on the specific characteristics of the affected wire. As the copper in the conductor is depleted by corrosion, the conductor can no longer sustain mechanical or electrical loads and the metal will fail. Mechanical failure can thus occur anywhere in the wiring system.

Even before mechanical failure occurs, electrical performance can be adversely affected by the presence of nonconductive by-products from galvanic or aqueous corrosion. Moisture within a connector body may cause an impedance mismatch, increase noise in a signal circuit, or modify the waveform. Even small amounts of corrosion or other contaminants can have a significant impact on contact surfaces and the efficiency with which signals flow through them.

If a chemical solution contacting the electrical connection is itself conductive it can cause a short circuit between conductors. Pure water, not itself a conductor, can also facilitate a short circuit by providing a medium into which conductive salts can dissolve. These salts may be the by-products of corrosion or the result of earlier contamination.

High humidity and temperature cycling in some situations cause condensation, the accumulation of which can also result in a short circuit. Depending on circumstances, the resulting short circuit may be intermittent, significantly complicating the process of identifying the underlying cause.

To prevent corrosion, sealing may have to meet the performance requirements of applicable military specifications or the International Protection (IP) Code.

Stress and Strain

Wires that are attached to the connector pins need help to withstand stresses and strain from the cable, which could break the wires from the pins. It is almost always necessary to prevent strain from occurring in a weak spot, such as where the wire is attached to the contact. This is called strain relief and can be provided in a variety of ways, from mechanical devices, such as adapters, to molded boots and heat-shrinkable tubings.

EMI (Electromagnetic Interference)

EMI is similar to the noise heard on an AM radio when the radio is close to high-voltage lines. EMI causes the wire or cable to act like an antenna and pick up electrical signals, which interfere with the signals on the wire and can cause malfunctions in sensitive electronic circuits.

Wiring systems are susceptible to two types of EMI:

- *Radiated emissions* (the electromagnetic energy a wiring system radiates to its surrounding environment), such as the EMI a high-voltage line radiates to its surroundings. (There are regulations on the amount of radiated energy a circuit is allowed to produce.)
- *External radiated emissions* (the electromagnetic energy in the environment), such as the EMI an AM radio picks up from a high-voltage line, causing distortions in the conducted signal. Conducted EMI is noise carried by the cable into the receiving circuit and needs to be filtered.

To reduce susceptibility to radiated emissions from the cable or from external sources, the harness must be grounded, shielded, and/or filtered, depending on the sensitivity of the equipment and the strength and frequency of the EMI.

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HarnWare Harness Design Software

HarnWare Design Software is Tyco Electronics' harness design CAD software. Originally developed for use by our own harness designers it is now offered to our customers so they can benefit from this powerful tool.

From a simple input of geometry, dimensions, connector and wiring details, HarnWare software can suggest a design sequence and help with many aspects of wiring harness design (see diagram).

HarnWare software is used interactively by harness design engineers. The choices and calculations made by the system can always be modified to suit specific requirements. Design data is saved with each shape in the harness drawing. This data can be reviewed simply by moving the mouse over the parts listed in the Design Wizard. It is, therefore, very easy to incorporate design changes, modify design constraints or analyze alternative design solutions. Moreover a design checker can be used to search for deviations from 'best practice'.

Some HarnWare Software Outputs

The following are some examples of the outputs that HarnWare software can generate:

- High quality engineering drawings. Clear and reliable drawings play a crucial role in the success of any design project.
- Point-to-point wiring lists, including calculated wire lengths.
- Fully detailed parts lists. HarnWare software automatically generates the parts list table and adds item number balloons into the drawing. Parts lists can also be exported to a spread sheet, database or word processor.
- Assembly time estimates. HarnWare software automatically adds the design details into a 'spread sheet' containing standard assembly time synthetics.
- Wiring schematics and schedules are quickly produced using connector plan form data and wiring details from the wire list.
- Lists of codes of practice describing harness assembly techniques and other issues that are relevant to the parts included in the design.
- Files containing cable marker details can be exported ready for use in marker printing systems such as the Tyco Electronics WinTotal* system. A drawing page showing these cable marker details can also be generated.

A sample set of documents produced by HarnWare software is shown at the end of this section.

*Tyco Electronics Identification product information available at www.tycoelectronics.com

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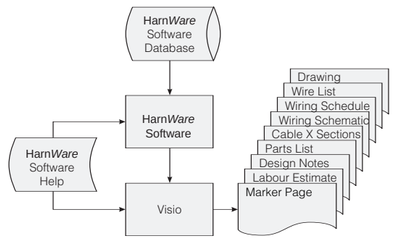
UK: 44-208-420-8341

Harn*Ware* Harness Design Software (Continued)

System Building Blocks

Some key features of Harn*Ware* software are:

- Runs under Microsoft Windows on affordable PC's.
- The user interface is similar to that of commonly used software such as Microsoft Word and Excel.
- Uses the Visio drag and drop drawing system for creating harness drawings more quickly and more easily than with other computer aided design (CAD) systems.



- A growing library of 400 intelligent drawing shapes and a 110,000 record design database which can generate 100,000s of part descriptions for Raychem wiring harness products in their various material and finish permutations.
- Software that traces wire routes through harnesses and automatically creates wiring schematics and calculates wire lengths.
- Analysis options to determine the optimum lay of cables containing mixed diameter wires and to suggest the most appropriate wire gauge for specified current and temperature rise limits.
- Software to help identify the parts most suitable for use within the given design constraints and to fit the mating parts, cables, etc.
- On-line help systems for guidance on using the system and on Raychem wiring harness products.

Designing a Harness With Harn*Ware* Software

Shapes, representing Raychem harnessing products, are dragged and dropped into the harness assembly drawing. The shapes automatically snap and glue together and it takes very little time to produce a high quality drawing. Pages from a sample Harn*Ware* software document set can be seen on page 9-14. Dimensions and connector references are entered by clicking a shape and typing in the numbers and references.

The Harn*Ware* Software Design Wizard analyzes the drawing and lists the parts and operations in the suggested design sequence. The wizard also provides quick access to details on each part in the harness and the connections between parts. When the mouse is moved over the parts listed by the wizard, Harn*Ware* software outputs such details as part dimensions, materials, finishes, etc.

Harn*Ware* software indicates the Raychem harness material system that is most suited to the given application, operating temperature range and required defense specifications.

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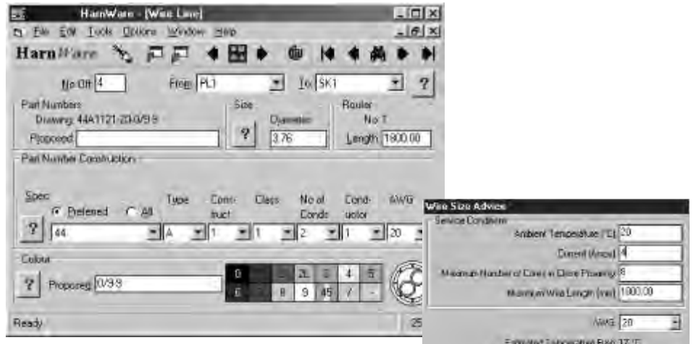
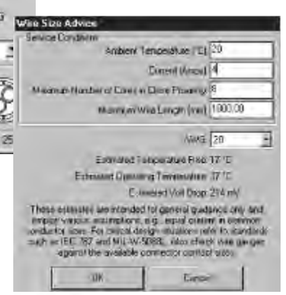
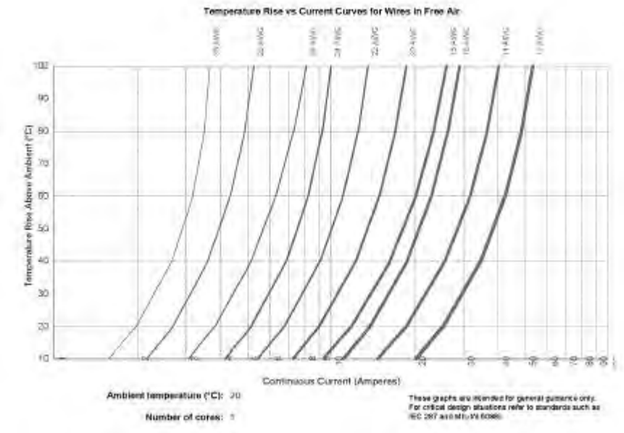
Harn*Ware* Harness Design Software (Continued)







Wire Selection

The wire most suited to the particular environment and service conditions is selected using design rules encoded in the Harn*Ware* software and database. If the wire selected is a non-preferred option, alternative types and colors can be identified which may also suit the design requirements and be available on shorter delivery times.

Guidance is also available for choosing the wire gauge most suited to given current loading, ambient temperature, length, number of conductors, etc. For each available wire size Harn*Ware* software estimates temperature rises, operating temperatures and voltage drops.

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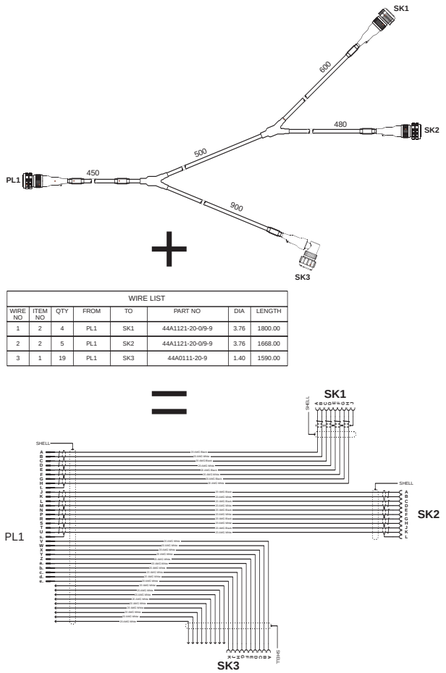
HarnWare Harness Design Software (Continued)



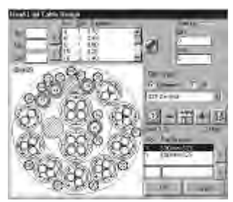
WIRE LIST							
WIRE NO	ITEM NO	QTY	FROM	TO	PART NO	DIA	LENGTH
1	2	4	PL1	SK1	44A1121-20-0/9-9	3.76	1800.00
2	2	5	PL1	SK2	44A1121-20-0/9-9	3.76	1668.00
3	1	19	PL1	SK3	44A0111-20-9	1.40	1590.00

Wire Selection (Continued)

From-To connector references are specified to form a point-to-point wiring list. Wiring schematics can be generated automatically from the information included in the wire list. These schematic diagrams show the pin to pin wiring for all the connectors and wires in a harness design.

HarnWare software automatically:

- Traces the route of each wire in the point-to-point wire list through the harness geometry contained in the drawing.
- Calculates wire lengths by summing the lengths of the harness legs through which each wire is routed. Adjustments are applied based on a variety of design rules relating to the parts through which wires pass.
- Determines the cable sub-assembly structure that would save the maximum amount of labor in assembling the harness.
- Determines the optimum lay of wires in each harness leg and produces a cable cross-section drawing. Alternative lays of cables containing mixed diameter wires are automatically analyzed to identify the smallest diameter and most even construction. In the example below, the listbox contains the quantity of each wire diameter for which HarnWare software has automatically developed 29 alternative design solutions. The minimum diameter alternative is shown which is 17.72 [.698] diameter and uses 2 fillers to achieve a sufficiently round lay.



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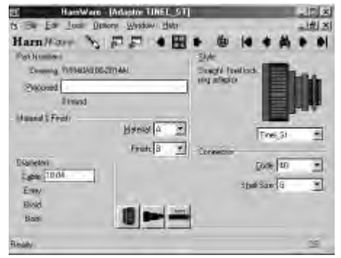
Harn*Ware* Harness Design Software (Continued)



Part Selection

All the parts in a harness can be specified. The key steps in selecting parts include:

- Clicking a shape in the harness drawing or the design wizard.
- Harn*Ware* software automatically obtains design data and dimensions from the shape and from mating parts in the harness assembly drawing. In the case of a Raychem boot, for example, Harn*Ware* software extracts the required style of boot from the shape and the diameters from the mating harness leg and adapter.
- The database is searched for parts suited to the dimensional constraints. The choice is further refined by the service conditions which determine the best materials, finishes and adhesives. When alternative parts are found in the database, Harn*Ware* software offers the best option first, which the designer can compare with the other alternatives. The on-line help systems contain details and advice on the various types of parts, materials and finishes and their suitability to different service conditions.

Among the parts that Harn*Ware* software helps to select are:

- Adapters
- Braid
- Connectors
- Databus couplers, etc.
- Feedthroughs
- Heat-shrinkable tubing
- Marker sleeves*
- Molded parts
- Adhesives
- Solder sleeves
- Wire

*Tyco Electronics Identification product information available at www.tycoelectronics.com

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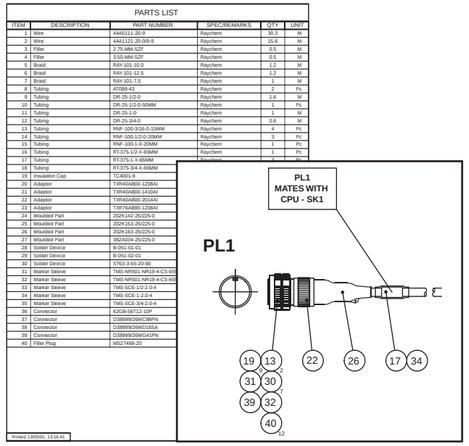
HarnWare Harness Design Software (Continued)



PARTS LIST

ITEM	DESCRIPTION	PART NUMBER	SPEC/REMARKS	QTY	UNIT
1	Wire	44A0111-20-9	Raychem	30.3	M
2	Wire	44A1121-20-9/9-3	Raychem	15.6	M
3	Filler	2.75-MM-SZF	Raychem	0.5	M
4	Filler	3.50-MM-SZF	Raychem	0.5	M
5	Braid	RAY-101-10-S	Raychem	1.2	M
6	Braid	RAY-101-12.5	Raychem	1.2	M
7	Braid	RAY-101-7.5	Raychem	1	M
8	Tubing	AT099-43	Raychem	2	PC
9	Tubing	DR-25-1/2-0	Raychem	1.8	M
10	Tubing	DR-25-1/2-0-50MM	Raychem	1	PC
11	Tubing	DR-25-1-0	Raychem	1	M
12	Tubing	DR-25-3/4-0	Raychem	0.6	M
13	Tubing	RNF-100-3/16-0-15MM	Raychem	4	PC
14	Tubing	RNF-100-1/2-0-20MM	Raychem	3	PC
15	Tubing	RNF-100-1-0-20MM	Raychem	1	PC
16	Tubing	RT375-1/2-X-65MM	Raychem	1	PC
17	Tubing	RT375-1-X-65MM	Raychem	1	PC
18	Tubing	RT375-3/4-X-65MM	Raychem	1	PC
19	Insulation Cap	TC4001-9			
20	Adaptor	TXR40A800-1208A/			
21	Adaptor	TXR40A800-1410A/			
22	Adaptor	TXR40A800-2014A/			
23	Adaptor	TXR70A800-1208A/			
24	Moulded Part	202K142-25/225-0			
25	Moulded Part	202K153-25/225-0			
26	Moulded Part	202K163-25/225-0			
27	Moulded Part	382A034-25/225-0			
28	Solder Device	B-051-01-01			
29	Solder Device	B-051-02-01			
30	Solder Device	ST63-3-SS-20-90			
31	Marker Sleeve	TMS-NR501-NR19-4-CS-6/9			
32	Marker Sleeve	TMS-NR501-NR19-4-CS-6/9			
33	Marker Sleeve	TMS-SCE-1/2-2.0-4			
34	Marker Sleeve	TMS-SCE-1-2.0-4			
35	Marker Sleeve	TMS-SCE-3/4-2.0-4			
36	Connector	62GB-5871J-10P			
37	Connector	D38999/26WC36PN			
38	Connector	D38999/26WG16SA			
39	Connector	D38999/26WG41PN			
40	Filler Plug	MS27488-20			

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Parts Listing

During the parts listing process HarnWare software automatically:

- Extracts part details from the drawing
- Generates a sorted and totalized parts list table
- Adds item number balloons to the drawing cross referencing the parts to the parts list table.

HarnWare software parts list data can be written to a structured text file ready for use in a variety of other systems including spread sheets, databases or word processors. The parts lists for a number of harnesses can also be combined to form a composite parts list that totalizes all the parts for a set of harnesses on a project. Other parts listing options include the ability to:

- Retain existing item numbers when a design is modified.
- Include gaps in the item numbering sequence.
- Convert part numbers to customer numbers or to VG or other industry standard numbers.

Other Features

Among the other HarnWare software features and options are:

- 3D modelling system for visualizing harness designs. HarnWare software automatically generates to-scale 3D models which provide virtual prototypes of harnesses designed. The user can see what a harness will look like with lengths, diameters and parts shown to scale thus reducing the potential for errors.
- Lay-up (nail) board designs. Harness lay-up board design can be modeled with pegs automatically positioned along the harness legs. Drawn output can be used on the lay-up board.
- Weight calculation. Most components weights are stored in the HarnWare software database and this enables the software to estimate the weight of the harness.

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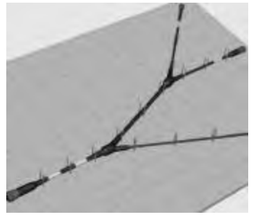
HarnWare Harness Design Software (Continued)



Other Features (Continued)

- Labor estimator. Harness drawings can be analyzed and details automatically added to a spread sheet containing assembly time standards. While estimating harness assembly times can never be an exact science, the estimates produced are sufficiently accurate for such purposes as comparing the cost effectiveness of alternative design solutions. A labor estimate is contained in the attached sample HarnWare software document set.
- Cable analyzer. This option analyzes the harness topology, wire lengths, etc. in order to suggest where machine, rather than hand, built cable sub-assemblies could result in the maximum cost savings.
- Drawing translator. Drawings can be translated into a number of foreign languages, including French and some Asian languages such as Korean and Japanese. Harnessing phrases, rather than individual words, are translated in order to achieve more meaningful and grammatically correct results.
- Design checker. This analyzes the contents and structure of a harness design against a set of rules. Where potential problems or deviations from 'best practice' are found, HarnWare software outputs a warning. The relevant parts in the harness design drawing can be flagged and the warning messages can also be listed in a table for use in design reviews. The warning flags and the messages are all linked to an on-line help system which contains further details on each specific problem.
- Codes of practice. A list can be generated of the codes of practice that are relevant to the parts included in the design. These describe harness assembly techniques and other issues.
- On-line help system. An extensive on-line help system covers system operating procedures and details on many aspects of harness design procedures and Raychem products. The help system is context sensitive and extensively cross-referenced using hyperlinks including links to the on-board manual or the Tyco Electronics website.
- User parts library for non-standard parts. A database to allow identification and retrieval of regularly used parts.
- Multi-core cable database. A database to allow selection of standard or regularly used cables.
- Databus module. Software for the design of MIL-C-1553 databus harness assemblies using Tyco Electronics components.
- Conduit module. Software for the design of Tyco Electronics conduit harnesses.

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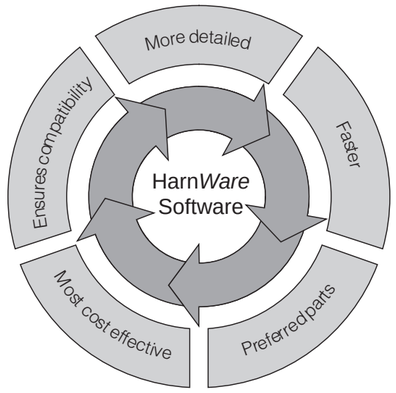
Harn*Ware* Harness Design Software (Continued)



System Integration

Harn*Ware* software can be linked to many other computer systems using a variety of interfaces including:

- Parts list data can be exported in structured text files suitable for reading by such systems as spread sheets, databases and word processors.
- Drawings can be imported and exported using industry standard formats such as DXF and IGES.
- Cable marker data can be transferred to marker printing systems such as Tyco Electronics WinTotal* system.
- Wiring connectivity data export for test equipment.
- X, Y coordinates of nail positions on lay-up (nail) board for NC drilling.

Benefits

The five key benefits of using Harn*Ware* software are:

1) More detailed and accurate design.
2) Up to 20 times faster design and quotation.
3) Preferred part selection, to ensure best delivery and price.
4) More cost effective design.
5) Ensures parts are compatible with the intended service conditions and with mating parts.

Hundreds of users around the world can confirm the benefits of using Harn*Ware*.

Harn*Ware* Software Document Set

The following partial set of drawings and associated documents is a simple example of what can be produced using Harn*Ware* software.

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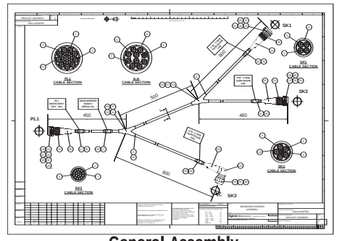
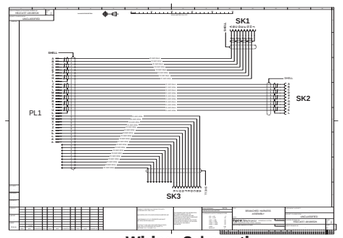
Harn*Ware* Harness Design Software (Continued)

General Assembly, Wiring Schematic, Parts List, Labor Estimate, Marker Sleeve and Codes of Practice Pages



General Assembly



Wiring Schematic

PARTS LIST

ITEM	DESCRIPTION	PART NUMBER	SPECIREMARKS	QTY	UNIT
1	Wire	44A0111-20-9	Raychem	30.3	M
2	Wire	44A1121-20-0/9-9	Raychem	15.6	M
3	Filler	2.75-MM-SZP	Raychem	0.5	M
4	Filler	3.50-MM-SZP	Raychem	0.5	M
5	Braid	RAY-101-10.0	Raychem	1.2	M
6	Braid	RAY-101-12.5	Raychem	1.2	M
7	Braid	RAY-101-7.5	Raychem	1	M
8	Tubing	AT209-43	Raychem	2	Pc
9	Tubing	DR-25-1/2-0	Raychem	1.6	M
10	Tubing	DR-25-1/2-0-50MM	Raychem	1	Pc
11	Tubing	DR-25-1-0	Raychem	1	M
12	Tubing	DR-25-3/4-0	Raychem	0.6	M
13	Tubing	RNF-100-3/16-X-15MM	Raychem	4	Pc
14	Tubing	RNF-100-1/2-0-20MM	Raychem	3	Pc
15	Tubing	RNF-100-1-0-20MM	Raychem	1	Pc
16	Tubing	RT-375-1/2-X-65MM	Raychem	1	Pc
17	Tubing	RT-375-1-X-65MM	Raychem	3	Pc
18	Tubing	RT-375-3/4-X-65MM	Raychem	1	Pc
19	Insulation Cap	TC4001-9	Raychem	18	Pc
20	Adaptor	TXR40AB00-1208AI	Raychem	1	Pc
21	Adaptor	TXR40AB00-1410AI	Raychem	1	Pc
22	Adaptor	TXR40AB00-2014AI	Raychem	1	Pc
23	Adaptor	TXRT40AB00-1208AI	Raychem	1	Pc
24	Moulded Part	252K142-25/225-0	Raychem	2	Pc
25	Moulded Part	252K153-25/225-0	Raychem	3	Pc
26	Moulded Part	252K163-25/225-0	Raychem	1	Pc
27	Moulded Part	382A034-25/225-0	Raychem	2	Pc
28	Solder Device	B-051-51-01	Raychem	1	Pc
29	Solder Device	B-051-02-01	Raychem	1	Pc
30	Solder Device	5763-3-SS-20-90	Raychem	14	Pc
31	Marker Sleeve	TMS-NR501-NR19-4-CS-65571	Raychem	4	KT
32	Marker Sleeve	TMS-NR501-NR19-4-CS-65572	Raychem	1	KT
33	Marker Sleeve	TMS-SCE-1/2-2.0-4	Raychem	1	Pc
34	Marker Sleeve	TMS-SCE-1-2.0-4	Raychem	2	Pc
35	Marker Sleeve	TMS-SCE-3/4-2.0-4	Raychem	2	Pc
36	Connector	62GB-56712-10P	Amphenol	1	Pc
37	Connector	D38999/26WC36PN	MIL-C-38999	1	Pc
38	Connector	D38999/26WD18SA	MIL-C-38999	1	Pc
39	Connector	D38999/26WG41PN	MIL-C-38999	1	Pc
40	Filler Plug	MS27488-20	-	20	Pc

tyco Electronics — HARNESS PROPOSAL DRAWING

TITLE:	BRANCHED HARNESS ASSEMBLY		
CREATOR:	D Hammond	DATE:	13/03/01
FILENAME:	PicHarn.vsd		Page 3 of 8

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LABOUR ESTIMATE

Element	Time (mins)		Qty / Length	Total mins
Unpack Check Kit	15	per kit	1	15
Cut EPD to Length	1	per metre	0	0
Jacket Stripping for Con. Ends. Remove EPD Jacket	5	per end	4	20
Identify Wires	5	per metre	0	0
Strip/Cr/Sn/Insert	1.3	per wire	60	78
	2.5	per cont.	50	125
Solder Wires				
Up to 16AWG (Tin/Strip/Insulate)	3.5	per term	10	35
16AWG to 4/0 (Tin/Strip/Insulate) Power Cable	5	per term	0	0
	15	per term	0	0
Lugs Crimp	10	per term	0	0
Lugs Solder	15	per term	0	0
Repair Loops Up to 50 Way Con.	0.5	per wire	60	30
Above 55 Way Con.	0.75	per wire	0	0
Soldersleeve	4	per term	0	0
Screen Termination				
Individual Term.	5	per term	14	42
Coaxial Term.	6	per term	9	9
Insulating Screens Filler Plugs	2	per term	4	8
	1	per 50/kg	20	20
Spare Wires	0.5	per wire	18	9
Ring Tags Crimp	2	per term	0	0
Ring Tags Solder	2.5	per term	0	0
RF one-step	3	per term	0	0
Adapters (Includes Braid Term / Torque)				
Spin Coupling	7.5	per term	0	0
Braided Adaptor	12	per term	0	0
Tined	10	per term	4	40
Whipping/Soldering	10	per term	0	0
Tubing				
DR25 < 1/4	4	per metre	0	0
1/4 to 1/2	10	per metre	1.50	10.5
1/2 to 1 1/2" +	15	per metre	1.43	14.3
Viton, VPB +25%	0.25	Enter	0	0
ZetTel -25%	-25	0 for No	0	0
CGPT & Versafit	-25	0 for No	0	0
Tubing Installation on Multi-Leg Harness	1	per metre	2.93	5.86
Wire Layup				
Legs <=4 Metres				
< 20 wires	1		27.38	27.38
20 - 30 wires	1.5		12.60	18.9
>30 wires	2		0	0
Legs >4 Metres				
< 20 wires	1.5		0	0
20 - 30 wires	2		0	0
> 30 wires	2.5		0	0
Enter 1 to add 30% for mixed wire sizes			1	

Enter 1 to Add Allowances for Prototypes:

20% for Straight or Branched < 4 Ends 0

35% for Branched 4+ Ends 0

Element	Time (mins)		Qty / Length	Total mins
Moulded Parts				
Raydex				
101 to 142	17	per piece	0	0
152 to 163	15	per piece	0	0
174	80	per piece	0	0
Standard				
11 to 42	12	per piece	2	24
52 to 63	15	per piece	2	30
74	20	per piece	0	0
85	25	per piece	0	0
Uniboot				
611 to 621	10	per piece	0	0
632 to 642	12	per piece	0	0
653 to 663	15	per piece	0	0
KTKK				
Small	5	per piece	0	0
Medium	6	per piece	0	0
Large	7	per piece	0	0
Transitions				
3 Outlets				
11 to 19	16	per piece	0	0
22 to 48	20	per piece	2	40
56 to 91	23	per piece	0	0
4 Outlets				
11 to 19	21	per piece	0	0
22 to 48	25	per piece	0	0
56 to 91	29	per piece	0	0
5 Outlets				
11 to 19	25	per piece	0	0
22 to 48	29	per piece	0	0
56 to 91	33	per piece	0	0
Raychem 224	25	11-24 No.	1	25
Raychem 224	25	11-24 No.	1	25
Raychem 224	5	per metre	0	0
Alumitherm	8	per piece	0	0
Raykraid / Insitab				
Straight	3.5	per metre	0	0
Branch	5	per metre	2.93	14.65
Transition Overlap	8	per piece	2	16
Bandage	63	per piece	0	0
Protection Cap Installation	5	per piece	0	0
Marker Sleeves	4	per piece	5	20
Protection Sleeves	1	per piece	5	5
Wire Cutting	1	per wire	37	37
Unravel / Count Cut Wires				
Common Size	0.1	per wire	37	3.7
Mixed Sizes	0.3	per wire	0	0

Enter 1 to add 5% allowance for QC 0

Special Requirements (mins) 0

Total Labour Time (mins) 679.67

Total Labour Time (hours) 11.33

Labour rate per hour 0.00

Total Labour Cost £ 0.00

tyco Electronics — HARNESS PROPOSAL DRAWING

TITLE:	BRANCHED HARNESS ASSEMBLY		
CREATOR:	D Hammond	DATE:	13/03/01
FILENAME:	PicHarn.vsd		Page 5 of 8

Printed 13/03/01, 13:16:41

MARKER PAGE

PL1
MATES WITH
CPU - SK1

Item:34 Quantity:1
Part Number:TMS-SCE-1-2.0-4
Colour:Yellow Font:10 cpi Standard

MAIN MARKER
ISSUE #
SERIAL No.

Item:34 Quantity:1
Part Number:TMS-SCE-1-2.0-4
Colour:Yellow Font:10 cpi Standard

SK1
MATES WITH
BOX 1 - PL1

Item:35 Quantity:1
Part Number:TMS-SCE-3/4-2.0-4
Colour:Yellow Font:10 cpi Standard

SK2
MATES WITH
BOX 1 - PL2

Item:35 Quantity:1
Part Number:TMS-SCE-3/4-2.0-4
Colour:Yellow Font:10 cpi Standard

SK3
MATES WITH
BOX 1 - PL3

Item:33 Quantity:1
Part Number:TMS-SCE-1/2-2.0-4
Colour:Yellow Font:10 cpi Standard

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CODES OF PRACTICE, FAX-ON-DEMAND AND DRAWING NOTES

Codes of Practice:

Code	Description
251	End stripping primary wire and cable
254	Stripping wire and cable jackets
256	Laying hand laid sections of harnesses
257	Applying Kevlar binder to hand-laid sections of harnesses
261	Preparing shielded and jacketed wire
301	Looping wire gauges 18 and below
368	Terminating a primary wire to a cable shield using a solder sleeve with a pre-installed lead
361	Applying a single layer of braid to a hand laid cable
363	Terminating overall shields formed by single layers of braid at a transition
551	Installing heat shrinkable tubing
610	Preparing cable jackets for the installation of pre-coated tubings
359	Installing Tinel-Lock rings with a resistance heater
366	Positioning Tinel-Lock rings
451	Applying Loctite sealants to Raychem adaptors
452	Torque tightening Raychem adaptors
553	Installing medium and large transitions
554	Installing straight lipped boots
557	Under jacket packing for moulded parts
559	Installing moulded parts using Unicure adhesive
603	Preparing cable jackets and adaptors for installing moulded parts
609	Preparing non-shielded moulded parts
556	Installing marker sleeves
454	Checking the retention of pins or sockets within a connector

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Integrated Military Harness Systems for Defense and Allied Industries

Assembled military harness.

Military harness system components.

Raychem integrated harness systems have been developed for a wide range of defense and industrial applications. Each system consists of compatible components, including cable jackets, heat-shrinkable components, and adhesives. Performance of these parts is assured because all components are tested separately and as part of an assembled system (see photo top left).

A typical designed harness consists of seven component parts (pictured at right):

1. Primary wire and cable
2. Heat-shrinkable tubing
3. Backshell adapter
4. Molded part
5. Adhesive
6. Cable jacket
7. Marker sleeve*

Additional components for harnessing systems include the following:

- A wide range of special devices, such as SolderSleeve devices for primary wire interconnection.
- A selection of electrical shielding (screening) options, including braids and termination assemblies.
- Multiconductor (multi-core) cables.
- Specialty adhesives and sealants for complete environmental sealing.**

Table 1 on the next page serves as both a summary of Raychem products for specific harnessing systems and a selection table for harnessing system components. An explanation of how to select components for a harness system follows.

*Tyco Electronics Identification products information available at www.tycoelectronics.com

**Tyco Electronics Sealant product information available at www.tycoelectronics.com

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Integrated Military Harness Systems for Defense and Allied Industries (Continued)

Table 1. Raychem Harnessing Systems and Their Components

Components	System 10	System 20	System 25	System 30	System 100	System 200	System 300
Wire	44	44	44	55	99, 100A, 100G	55	55
Tubing	Versafit	NT-FR	DR25	VPB	ZHTM	Viton	RT555
Adapter material and plating finish chosen for compatibility with the connectors.							
Molded part	-3, -4, -71	-51	-25	-50	-100	-12	-55/-125
Preinstalled Rayaten molded part	-35	—	-25S	—	-100S	—	—
Adhesive	S1017, S1030	S1124, S1048	S1048, S1125	S-1125, S-1255-04	S1030, S1125,	S1125, S1255	S1255-04
Precoated adhesive	/42, /180	/164,/86	/86, /225	—	/180	—	—
Conductive adhesive	—	—	S1184	—	S1184	—	—
Cable jacket	Thermorad	NT-FR	FDR-25	Thermorad VPB	Zerohal	Viton	RT555
Marker sleeve*	TMS-SCE	TMS-SCE	TMS-SCE	TMS-SCE	HX-SCE	HT-SCE	HT-SCE

*Tyco Electronics Identification products information available at www.tycoelectronics.com.

Selection Process

Selecting the components for a harnessing system is a four-step process:

Step 1: Select the material system appropriate for the operating conditions and environment to which the harness will be exposed.

Step 2: Select the adhesive system appropriate for the material system you select in Step 1.

Step 3: Determine the level of EMI shielding required.

Step 4: Select the components.

Each step is described on the pages that follow. A selection table accompanies each step. You can also use Harn*Ware* software to design your harness.

Step 1. Select the Material System.

Detailed in Table 2 on the next page are the major material systems for use in a wide range of operating conditions and environments.

Choose a material system that:

- Has the physical characteristics your harness requires.
- Will accommodate the operating temperature and the fluids and abuse to which the harness will be exposed.

VITON is a trademark of DuPont Performance Elastomers.

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Table 2. Material System Selection

	System 10	System 20	System 25
Operating temperature	-20°C to +60°C [-4°F to +140°F]	-55°C to +121°C [-67°F to +250°F]	-75°C to +150°C* [-103°F to +302°F]
Physical characteristics	• Environmentally sealable • Lightweight • Small diameter • Flexible	• Environmentally sealed • Tough • Flexible • Low profile	• Environmentally sealed • Rugged • Abrasion-resistant • Very flexible
Flammability	• Flame-retardant • Self-extinguishing	• Flame-retarded • Self-extinguishing	• Flame-resistant • Self-extinguishing
Fluid resistance	• Resists common industrial and military cleaning solvents and degreasers.	• Resists most commonly used military fuels, oils, and greases	• Resists most common military fuels, oils, and greases. up to 70°C [158°F].
Typical applications	• Used in high-performance industrial applications, and in military communication and test equipment.	• Specially suited to military vehicles and engine compartments, low profile shapes save space and weight.	• Specially suited to military vehicles, aerospace and marine applications, and communication and test equipment.

	System 30	System 100	System 200
Operating temperature	-55°C to +150°C [-67°F to +302°F]	-30°C to +105°C [-22°F to +221°F]	-55°C to +200°C [-67°F to +392°F]
Physical characteristics	• Environmentally sealed • Tough • Flexible • Low profile	• Environmentally sealed • Flexible	• Environmentally sealed • Very flexible
Flammability	• Flame-retarded • Self-extinguishing	• Low toxicity index (as defined by NES-13) • Low smoke emission (as defined by NES-711) • Low corrosive gas evolution	• Highly flame-retardant
Fluid resistance	• Resists most of commonly used military fuels, oils, and greases.	• Resistant to a range of military fuels, oils, and greases.	• Resists long-term immersion in military fuels, oils, and greases at elevated temperatures.
Typical applications	• Specifically suited to military vehicles and engine compartments for higher temperature applications, low profile shapes save space and weight.	• Specially suitable for confined habitat areas in military and civil applications. • Extensively used in surface and submarine vessels and underground railways	• Used where there is prolonged exposure to high temperatures. • Used where a harness may be permanently immersed in difficult fuels, such as in fuel tanks.

	System 300
Operating temperature	-55°C to +200°C [-67°F to +392°F]
Physical characteristics	• Environmentally sealed • Highly abrasion resistant • Low profile
Flammability	• Highly flame-retardant
Fluid resistance	• Performs in aggressive fluids at extremely high temperatures
Typical applications	• Permanent immersion in aggressive fluids

*Per VG 95343.

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Integrated Military Harness Systems for Defense and Allied Industries (Continued)

Raychem Harnessing Systems and Their Components — NBC Survivable Systems*

Components	System 770	System 780	System 790
Wire	44	55	55
Tubing	RT-770	RT-780	RT-790
Molded part	-770	-780	-790/-791
Adhesive	S-1264	S-1255-04	S-1255-04
Marker sleeve cover	RT-375	RT-375	RT-375
Marker sleeve**	TMS-SCE	NBC-SCE	NBC-SCE

**Tyco Electronics Identification products information available at www.tycoelectronics.com.

Material System Selection

	System 770	System 780	System 790
Operating temperature	-55°C to +125°C [-67°F to +257°F]	-65°C to +175°C [-85°F to +347°F]	-65°C to 200°C [-85°F to +392°F]
Physical characteristics	• Environmentally sealed • NBC resistant • Flexible	• Environmentally sealed • NBC resistant • Flexible	• Environmentally sealed • NBC resistant • Flexible
Flammability	• Flame retarded • Self-extinguishing	• Flame retarded • Self-extinguishing	• Flame retarded • Self-extinguishing
Fluid resistance	• Resistant to NBC uptake and decontamination	• Resistant to NBC uptake and decontamination	• Resistant to NBC uptake and decontamination
Typical applications	• Base-line system for NBC resistant applications	• High temperature system for NBC resistant applications	• Extreme high temperature system for NBC resistant applications

Adhesive Selection

Material System	Adhesive Type	Component Adhesive	Precoated Adhesive Designation	Service Temperature
System 770	Two-part Epoxy	S-1264	—	150°C
System 780	Thermoset tape	S-1255-04	—	200°C
System 790	Thermoset tape	S-1255-04	—	200°C

*Under Development - contact Tyco Electronics for additional information

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Integrated Military Harness Systems for Defense and Allied Industries (Continued)

Step 2. Select the Adhesive System.

Two types of adhesives are used to bond heat-shrinkable boots and transitions to tubing or wire jacketing:

- Thermosets, which include epoxies and other two-part systems.
- Thermoplastics, which include pre-coated meltable adhesives applied to parts during manufacture and those applied as meltable tapes during assembly.

Table 3 below outlines the differences between thermosets and thermoplastics.

Table 4 shows which adhesive type is appropriate for each harness material system.

Table 3. Comparison of Adhesive Types

	Thermoset	Thermoplastic
Method of adhesion	Cures through chemical reaction.	Melts, flows, and solidifies.
Application	Two-part types require mixing and application at assembly.	Precoated types require no preparation at assembly.
Cure time	Varies with cure temperature. Oven cure usually desirable.	Not required. Adhesive functional when cooled to room temperature.
Strength	Retains most strength at elevated temperatures.	Loses strength as melt temperature is approached.
Disassembly	Items can be forcibly peeled apart when heated sufficiently.	Items can be separated when heated to temperature of the adhesive.
Repair/reassembly	Requires new adhesive or hot rollback to reenter behind connector without affecting adhesive bonds.	Can be reheated to form new bond if sufficient adhesive remains.

Table 4. Adhesive Selection

Material System	Adhesive Type	Component Adhesive	Precoated Adhesive Designation	Service Temperature
System 10	Thermoplastic	S-1030	/180	80°C
		S-1017	/42	60°C
System 20	Thermoplastic	S-1124	/164	105°C
		S-1048	/86	120°C
System 25	Thermoplastic	S-1048	/86	120°C
	Two-part thermoset	S-1125	/225	150°C
System 30	Thermoset Tape	S-1255-04	—	200°C
	Two-part thermoset	S-1125	—	150°C
System 100	Thermoplastic	S-1030	/180	80°C
		S-1048	/86	120°C
	Two-part thermoset	S-1125	—	150°C
System 200	Two-part thermoset	S-1125	—	150°C
	Thermoset tape	S-1255-04	—	200°C
System 300	Thermoset tape	S-1255-04	—	200°C
System 770	—	S-1264	—	—
System 780	Thermoset tape	S-1255-04	—	200°C
System 790	Thermoset tape	S-1255-04	—	200°C

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Integrated Military Harness Systems for Defense and Allied Industries (Continued)

Step 3. Determine the Level of EMI Shielding Required.

Tyco Electronics offer several methods and technologies for controlling electromagnetic interference (EMI) and noise in cable harnesses. Developed in response to well-established threats in military and other harsh environments, these technologies can be employed in compatible shielding (screening) systems to achieve the level of shielding required for a harness system. Table 5 on page 9-22 outlines the shielding requirements for various types of threat and levels of interference.

Introduction

This section is intended as a guide for the use of harness designers who are required to achieve a level of EMI control in their design practices. It is not intended that it should be a definitive statement on all aspects of EMI control for harnesses. In case of difficulty contact us for further clarification or consultancy.

For well-designed EMI control of electrical systems it is essential that a detailed knowledge of the system requirements and susceptibility be obtained. The chosen level of shielding will be dependent on the:

- Susceptibility of electrical system.
- Types of components used.
- Physical layout of the system.
- Equipment practices adopted.
- Anticipated EMI threat.

For the most cost effective design of harnesses, which offer a long-term stability in performance, the system should be designed to achieve a balance of component characteristics. Components should only be used if they are qualified to a minimum level of EMI performance and the performance and test method should be applicable to the design technique being used.

For quality assurance purposes minimum EMI characteristics should always be specified and for critical harnesses the complete performance should be measured. The technique to be adopted should always be specified.

Finally the inter-relationship between harnesses and the protection, termination and grounding of equipment boxes is vital for good system performance against EMI. All components form part of the external shield on the system and therefore should be considered in the overall EMI design process.

Subjects covered in this topic are:

- Harness Types - point to point and branched
- Shielding Levels - calculations

Harness Types

Harnesses are divided into two types, point-to-point and branched. The advantages and disadvantages of each from an EMI control standpoint are described below. No attempt has been made to analyze their relative merits in mechanical or installation terms.

Point To Point:

The three major components of this type of harness are: connectors, cable, and connector accessories.

Connectors

There are many different types of circular military connectors. However, for a well-shielded harness only those connectors having a guaranteed performance level should be used e.g. MIL-C-26482 Series II and MIL-C-38999 series 1 and 2, and series 3 and 4.

Cable

Cable used in this type of harness is generally machine made. Hand laid cables may also be used but generally the shields incorporated in these harnesses vary in consistency of performance. In the case of machine made cables all shields should be designed for optimum shielding effectiveness at radio frequency.

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Integrated Military Harness Systems for Defense and Allied Industries (Continued)

Connector Accessories

Connector accessories, such as Raychem adapters, are available in many styles and therefore their performance varies with construction. For a level of consistency in performance it is essential that, as with connectors, a guarantee in performance level be achieved. Fittings not specified in this way may significantly degrade the overall system performance.

Branched

In addition to those components described above, branched harnesses include transitions. This type of harness is usually made by hand and it is therefore difficult to incorporate accurately made machine fabricated shields. The implications of this are:

Shields

Cable shields may be put on by hand or by feeding through a braiding machine. However, as braid optimization depends on all the constructional parameters of the braid being accurately specified, unless braid is well constructed the shielding performance can suffer dramatically. Reductions in shield performance of 20-40 dB have been measured on badly made branched harnesses. The alternative method is to use pull on braids. If the cable bundle diameter is known the braid may be designed for optimized performance.

Transitions

Transitions, as with accessories, are very susceptible to performance variability with construction type.

For high performance harnesses these components should also have a guaranteed performance.

In general the use of techniques such as hand soldering or the use of butted tape wraps are not recommended except where only a low performance of less that 40dB is required.

Shielding Levels and Component Performance

System Performance

To specify the overall requirements of a complete electronic system in terms of its EMI characteristics it is necessary to consider the performance of the individual components parts. The harnesses form one of the major entry points for interference and this as such can degrade a complete system performance by a significant amount. In general terms, assuming that a shielded harness system is used, with the available components on the market the overall harness system performance and typical applications may be as below.

- 40 to 50 dB Standard shielded systems for insensitive systems.
- 50 to 60 dB Military standard shielded systems for general applications.
- 60 to 80 dB As above but where full threat EMP & TEMPEST protection is required.
- 80 to 100 dB Severe TEMPEST and very sensitive systems.
- Over 100 dB Exceptional shielding requirements only.

Shield performance is specified in two ways, either as a power relationship in decibels (dB) or as an absolute measurement of the shield performance in terms of the surface transfer impedance. Except for very specific low frequency problems it is general to specify the performance at frequencies in the range 0.1MHz to 100MHz.

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Integrated Military Harness Systems for Defense and Allied Industries (Continued)

Safety Margins

As with all designs EMI system design should not be performed to the “limit of performance safety margin should always be incorporated when determining the minimum shielding level appropriate for consistent operation of the system.

The inter-relationship of shielding effectiveness measured in decibels and the surface transfer impedance in ohms presents the designer with a conversion difficulty. External harness circuits vary, as do the coupling characteristics and it is therefore only possible to give an approximate conversion. The normal conversion from decibels to ohms and vice versa is to a reasonable approximation:

Screening Effectiveness (dB) = $36 - 20 \log_{10} (Z_T \text{ (Ohms)})$

The constant term is developed from the expressions for the characteristic impedance of the line formed by the harness shield and the ground plane and the internal characteristic impedance of the inside of the harness. The translation from shielding effectiveness to surface transfer impedance is shown below in Table 5 for S.E. from 20 to 105dB.

Connectors

A study of those connector specifications having an EMI test shows that they are generally specified in the frequency band 100MHz to 1GHz. For an assessment at lower frequencies the low frequency performance as dictated by the d.c. resistance of the connector is required. These two parameters enable the EMI characteristic to be made of the complete connector performance. Typical values for standard connectors are 65dB (MIL-C-26482 Series II) and 90dB (MIL-C-38999 Series III) connectors.

Table 5 - Screening Effectiveness (SE)/Surface Transfer Impedance (Z_T) Relationships

S.E. (dB)	Z_T (ohms)	S.E. (dB)	Z_T (ohms)
20	6.309	65	0.0355
25	3.548	70	0.0200
30	1.995	75	0.0112
35	1.122	80	0.0063
40	0.631	85	0.0036
45	0.355	90	0.0020
50	0.200	95	0.0011
55	0.112	100	0.0006
60	0.063	105	0.0004

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Integrated Military Harness Systems for Defense and Allied Industries (Continued)

Cable

In accordance with most common cable specification the shielding performance of a cable is specified at 30MHz. It is also well into the band where inductive leakage is the primary penetration characteristic. For frequencies above or below 30Mhz, approximations, as for connectors, must be made. It should be noted that the performance specified at 30MHz in Table 6 for different cable types is the maximum that is allowed using Tyco Electronics' standard Q.C. values. Actual performance may be up to 20dB better.

Connector Accessories and Transitions

In constructional terms the performance of the connector accessory includes both the resistive terminations to the cable shield and the connector. However, it is most unusual to specify the performance of an accessory and this is a distinct weakness in the design of harnesses. The reason is that the performance is extremely variable as accessories have to fit a variety of different cable sizes and shapes. Where specified at all the relationship between the test method and the coupling mechanism for the EMI must be considered.

Table 6 - Cable Performances

Type of Screen	Diameter under screen (mm)	Surface transfer Impedance Z_T @ 30 Mhz (maximum)
Single optimized braid	Up to 7.5	100 milli ohms/metre
	7.6 and up	50 milli ohms/metre
Double optimized braid	Up to 7.5	10 milli ohms/metre
	7.6 and up	5 milli ohms/metre
Superscreened (2 braids + 1 wrap)	Up to 7.5	100 micro ohms/metre
	7.6 and up	50 micro ohms/metre

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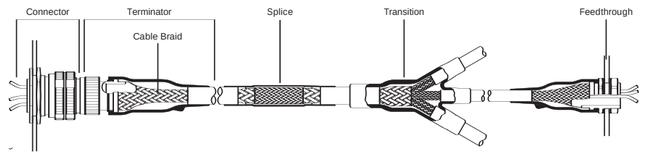
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341



Complete Harness

When considering the complete harness the coupling calculations are relatively simple. In general terms they are the addition of all the individual leakages within the system from connector to connector. The analysis route is therefore as follows:

1. Convert all decibel values at the desired frequency to surface transfer impedance.
2. Choose components for a 'balanced' system, i.e. the components should have approximately the same performance.
3. Add the values determined for surface transfer impedance of the components at the frequency chosen.
4. Reconvert to decibels if necessary. (Table 5 can be used for this purpose)

As a guide to the shielding performance that can be expected from a harness that is constructed using Raychem components, Table 7 on the next page has been compiled to help in the product selection process.

For branched harnesses it is necessary to determine whether every branch has the same susceptibility requirements or carries the same signals of power. The performance requirement of each branch is then determined and the matrix for the harness established. This is a more complex subject and not discussed here. System improvements may be achieved by changing either the connectors or cable. In general terms changing from a single to a double optimized braid improves the performance of that component by 20-25 dB. A similar advantage is achieved by changing from MIL-C-26482 Series II to MIL-C-38999 Series I connectors. However, the relative significance, as part of the system, of each component must be considered to determine the true weighting effect. For the optimum in system design a balance of component performances should be achieved wherever possible such that each of the components is of similar performance level.

General Considerations

Although cables and harnesses are considered to be the most significant in terms of coupling into systems the construction of equipment boxes can play an important part in the overall EMI performance of a system. With the increasing use of high speed digital circuits and the generation of harmonics having high energy content relatively short printed circuit board tracks can radiate or pick up energy as efficiently as cables. If the boxes themselves are not adequately protected these circuits may constitute an EMI threat. There is a further area of significance in the EMI protection of the boxes and this is the connector/box interface. The junction may be considered to be a part of the harness system and any degradation in it may cause an overall harness degradation.

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Integrated Military Harness Systems for Defense and Allied Industries (Continued)

Table 7 - Screen System Guide

Harness System Components													
Shielding Level Required	Connector	Adapter Styles		Termination		Cable Braid (max. length in m/ft) (by cable construction)					Transition	Splice	Feed-through
		Band Strap	Braided	Tinel-Lock System	Rayaten Assembly	NO	SO	DO	SSS	DSS			
<60 dB	VG95328 VG95234	■	■	■	—	<2/6.5	15/49	100/328	—	—	Shield tape & Solder-Sleeve device	Solder-Sleeve device	Tinel or solder devices
60 to 80 dB	MIL-C-26482 Series 2 VG96912 Series 1	—	—	■	—	—	<2/6.5	7/22.9	100/328	—	Shield tape & Solder-Sleeve device	Solder-Sleeve device	Tinel or Rayaten assembly
>80 dB	MIL-C-38999	—	—	—	■	—	—	<0.5/1.6	50/164	65/213	Not recom-mended	Solder-Sleeve device	Tinel or Rayaten assembly

NO = Non Optimized, SO = Single Optimized, DO = Double Optimized, SSS = Single Super Shield, DSS = (TYCO must provide info)
Note:
1. The cable lengths are to be used as a guide.
   Outside 30 MHz, the lengths that can be used will vary. For specific harness design outside 30 MHz, please consult Tyco Electronics.
2. Tinel-Lock use at shielding levels of 60–80 dB depends on the adapter entry, cable braid size, and design. For further details, contact Tyco Electronics.
3. Connectors commonly used but not mentioned in the table may not have a stated shielding performance in their specification. Contact the manufacturer for guidance.
4. This guide makes no allowance for the possible effects of resonance. Tyco Electronics should be consulted for advice on compensating for resonance.

Step 4. Select Components

Using the previous sections, you can now select all of the components for an integrated harness assembly.

Please refer to the sections listed for more detailed component information:

Molded Parts . . . . . .Section 12
Wire and Cable . . . . . .Section 10
Adapters . . . . . .Section 11
Assemblies . . . . . .Section 11
Electrical Interconnect Products . . . . . .Sections 7, 8, 14
Tubing . . . . . .Section 12

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METRIC
Dimensions in this section are millimeters over inches

Note: Users should independently evaluate the suitability of the product for their application. Before ordering, check with Tyco Electronics for most current data.

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Introduction

Tyco Electronics provides wire and cable solutions for challenging environments and demanding applications. The Raychem product range includes high-performance insulated wires, coaxial and data bus cables, power cables, electronics wire, and multicore cables.

- SPEC 44 wire is an economical yet rugged dual-wall insulation system rated at 150°C [221°F], with consistently low cost and reliable performance.
- SPEC 55 wire insulation provides high reliability in harsh environments from -65°C to +200°C [-85°F to +392°F]. Resistant to electrical arc tracking, it combines the easy handling of a flexible wire with excellent resistance to scrapes, abrasion, and cut-through.
- RCW is a small size, ultra light weight insulated wire with a temperature rating of -65°C to +260°C [-85°F to +500°F]. It is resistant to electrical arc tracking in wet or dry conditions and has excellent cut-through resistance.
- Type 99T dual-wall insulation system is a 105°C [221°F] rated wire that combines excellent chemical and mechanical resistance with limited fire hazard performance.
- ElectroLoss Filterline wire reduces the vulnerability of critical circuits to high-frequency electromagnetic interference.
- Cheminax coaxial and data bus cables allow system designers to optimize minimum size and weight with impedance and attenuation characteristics.
- Multiconductor (multicore) cables organize a variety of Raychem wire and cable products in controlled geometries for specific applications. Using a computer-aided design system, Tyco Electronics can quickly design multicore cables to meet your needs. A variety of cable jackets are available to suit most applications.

Raychem wire and cable products can meet your specific application needs. Here are just a few examples:

- Limited-fire-hazard wire and cable for mass transit and marine applications.
- High-performance, high temperature automotive wiring.
- Small, light hookup wires for high-temperature applications in commercial appliances, tools, and devices.
- Very flexible, rugged, thin-wall insulated power cables.
- Low-outgassing space-vehicle wiring.
- Lightweight, shielded wire and cable constructions for aerospace applications.
- Thermocouple extension cables with a range of our high-performance insulations materials.

Contact Tyco Electronics to find out more about wire and cable and our associated interconnection products.

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SPEC 44

Product Facts

- Dual wall construction
- 600, 1000 and 2500 voltage rating
- Small size, light weight
- Low smoke and low corrosive gas generation
- Resistant to most chemicals and electrical arc tracking

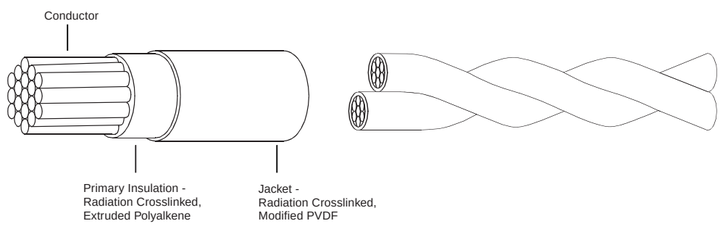
Applications

SPEC 44 wire has a dual wall construction which combines the outstanding physical and electrical characteristics of radiation crosslinked polyalkene with the excellent mechanical and chemical properties of radiation cross-linked polyvinylidene fluoride (PVDF).

The result is a wire insulation system that offers a 150°C [302°F] temperature rating, small size, light weight, solder iron resistance, and resistance to most solvents, fuels and lubricants.

SPEC 44 wire and cable is highly flame retardant, non-melting, does not cold flow, and though mechanically very tough, is easy to handle and install using conventional tools.

Originally developed for aerospace and military requirements in applications of high density and complex circuitry, SPEC 44 wire and cable now finds wide use throughout industry, in commercial and military electronics, avionics, on satellites, aircraft, helicopters, ships, trains, and offshore platforms where environmental conditions demand consistently reliable performance. In airframe applications SPEC 44 constructions can offer a modern dimensional replacement for PVC/Nylon/Glass braid type wire and cables. SPEC 44 wire is offered in a wide range of sizes in stranded conductors, standard materials available being tin or silver-plated copper and high strength copper alloy. Voltage ratings of 600, 1000 and 2500 volts are available as standard. Shielded and jacketed versions include single and multi-conductor constructions and flat braid shields where further size and weight savings are achieved.



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SPEC 44 (Continued)

Physical Characteristics

Small Size

SPEC 44 equipment wire, 600 volt rated has a 0.19 [.008] nominal wall thickness compared to 0.25 [.010] and 0.38 [.015] for equivalent PTFE and PVC wires in MIL-W-16878, MIL-W-22759 or BS G210.

Light Weight

Because of the thin wall and low density of the insulation materials considerable weight savings are made over similarly rated PTFE wires, eg:- 44A0111-22AWG equipment wire 4.62 grams/meter max
22 AWG PTFE equipment wire, MIL-W-81044
5.54 grams/meter max

General Handling

The flexibility of SPEC 44 and the ease with which it takes a 'set' makes it one of the easiest of the 'high performance' wires to install. Stripping is done with conventional die blade strippers.

For details of appropriate tools see separate wire handling guide. The tin-plated conductor usually specified is easily soldered or crimped. The insulation may be hot stamp marked or printed and does not need etching before potting.

Lengths

SPEC 44 is available in long continuous lengths and can be supplied for use on automatic cut and strip wire preparation machines.

Specifications/Approvals

MIL-W-81044, NEMA-WC-27500 (Cables)
Def Stan. 61-12 Part 18 Issue 4 - Type 1 pliable (Maintenance Range)
Def Stan. 61-12 Part 26 Issue 3 Type 2, 3, 8 & 9 & METS
VG 95218 Parts 20, 21, 22, 23 and 1000
NATO Stock Numbers (NSN's) exist for most standard constructions
Civil Aviation Authority Accessory Approval E11623
Lloyds Register of Shipping
NASA Preferred Product List
Raychem Specification 44

Typical Properties

Temperature rating	-65°C to +150°C [-85°F to +302°F]
Voltage rating (thin wall)	600 V
Voltage rating (thick wall)	2500 V
Tensile strength and elongation of insulation	28 N/mm^2 , 230%, 4000 PSI
Notch propagation, 0.05mm notch	Pass
Solder iron resistance (370°C, 1 minute)	Pass
Shrinkage, 200°C	<1%
Low temperature bend	-65°C [-85°F]
Voltage withstand (thin wall)	2500 V
Resistance: fuels, oils, solvents	Pass

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SPEC 44 (Continued)

Environmental Performance

Temperature Rating

SPEC 44 wire and cable is rated for continuous operation from -65°C to +150°C [-85°F to +302°F] and for short periods at temperatures as high as 300°C [572°F]. Heat ageing tests are routinely performed at temperatures of 200°C [392°F] (168 h) and 300°C [572°F] (6 h). In addition SPEC 44 insulation will not shrink back under repeated cycling.

Mechanical Performance

SPEC 44 wire provides better cut through resistance than some wires with much thicker walls. 600 volt equipment wire 44A0111 (0.19 mm wall) has 40% greater cut through resistance than 600 volt PTFE insulated wire (0.25 mm wall).

Solder Iron/Overload Resistance

The radiation crosslinking of the materials used in SPEC 44 makes them non-melting at high temperature. As a result SPEC 44 wire is resistant to prolonged contact with solder irons and is resistant to current overloads which would melt most thermoplastic insulations.

Chemical Resistance

The irradiated dual wall construction of SPEC 44 wire is highly resistant to many acids, alkalis, hydrocarbon solvents, fuels, lubricants, water, and many missile fuels and oxidizers.

Cold Flow

Radiation cross-linking of SPEC 44 prevents cold flow of the insulation — a recognized problem of some uncrosslinked materials.

Voltage Ratings

Standard available voltage ratings for SPEC 44 wire are 600 volts (0.19 mm wall thickness), 1000 volts (0.28 mm wall) and 2500 volts (0.48 mm wall).

Electrical Arc Track Resistance

SPEC 44 insulation demonstrates a total resistance to arc tracking under both wet and dry conditions at aircraft system voltages.

Low Outgassing

For use in space applications, special constructions of SPEC 44 wire are available with low outgassing characteristics, for use in an environment of high vacuum and high temperature.

Fire Hazard Performance

Flammability	Federal Aviation Reg FAR-25	Pass
	BS4066 vertical flammability	Pass
	S424 14751 (Swedish chimney)	Pass
	NFC 32070 (2) (French chimney)	Pass
	IEC 332 part 3 (Cable ladder)	Pass
Smoke/Toxicity Index	Smoke Index, Def Stan 61-12 (18)	6 per meter of wire
	Toxicity Index, Def Stan 61-12 (18)	0.8 per meter of wire
	Oxygen Index, NES 714	30% Oxygen
	Temperature Index, NES 715	>300°C [572°F]

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SPEC 44 (Continued)

Part Numbering System

44 X X X X X- AWG- X/X- X

Basic Product Number

Temperature Rating:
/ - 135˚C (XL-PVF2 cable jacket)
A - 150˚C (XL-PVF2 cable jacket)
AC - 150˚C (same as 44AM with 90% min. shield coverage)
AM - 150˚C (M27500, shielded and/or XL-PVF2 jacketed cable)
B - 150˚C (XL-ETFE cable jacket)

Construction
0 - Primary wire; or unshielded & unjacketed cable
1 - Round braid shielded and jacketed cable**
2 - Tin-coated copper flat braid shielded & jacketed cable
3 - Round braid shielded cable, no jacket**
4 - Jacketed cable, no shield
5 - Spiral braid shielded & jacketed cable**
7-9 - Special constructions

Class of Wire
1 - 600 V, general purpose
2 - 1000 V, general purpose
3 - 2500 V, general purpose
4 - 600 V, outerspace*
5 - 1000 V, outerspace*
6 - 2500 V, outerspace*
7 - 600 V, airframe
8 - 600 V, medium weight

Number of Conductors
1 through 10 (designator for 10 conductor = 0)

Conductor Type
1 - Tin-coated copper
2 - Silver-coated copper
3 - Nickel-coated copper
4 - Silver-coated high strength copper alloy
5 - Aluminum
6 - Nickel-coated high strength copper alloy
A - Silver-coated CS95
C - Silver-coated high strength copper alloy (cadmium-free)
D - Nickel-coated high strength copper alloy (cadmium-free)

Conductor Size (AWG)

Primary Wire Insulation Color
(code per MIL-STD-681)
0 - Black
1 - Brown
2 - Red
3 - Orange
4 - Yellow
5 - Green
6 - Blue
7 - Violet
8 - Gray
9 - White

Jacket Color
(codes same as for Primary Wire Insulation Color)

* Classes 4, 5 and 6 available only as “44/” constructions. 44/7xxx and 44A7xxx will be available as indicated on the applicable SCD.
**Shield coating same as conductor coating except: - for Conductor Type 4, 6, C and D, shield shall be tin-coated copper

Typical ordering example	3 conductors, brown, yellow with green stripe, blue, white jacket. If 600 volt, round braid, 20 AWG tinned conductor, 44A1131-20-1/45/6-9.
Ordering information	Other constructions and custom designed wire and cable are available on request.

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NEMA WC-27500 Cable Part Numbering System

M27500 X AWG XX X X XX

Basic Specification Number

Component Wire ID/Shield Coverage Code

Shield Coverage 85%	Shield Coverage 90%	Component Wire Identification
-	C	Colored Stripes on White Wire (9/96/93/95/92/90/94/97/98/91... etc.)
A	D	Solid Color Wires (9/6/3/5/2/0/4/7/8/1...etc.)
B	E	Band Marks on Solid Colors (by AWG)
F	H	Alternate Colored Stripes (92/96/94/95/9/90/91/93/97/98...etc)
G	J	Alternate Solid Colors (2/6/4/5/9/0/1/3/7/8...etc.)
K	M	Number Marking on Solid Colors (by AWG)
L	N	Number Marking on White Wires
P	R	Band Marks on Colored Stripes (by AWG)
S	T	Band Marks on White Wires

Conductor Size (AWG)

Basic Wire Spec Code (MIL-W-81044) and Slash Sheet

MD - M81044/5 (44A0712)
ME - M81044/6 (44A0711)
MF - M81044/7 (44A0714)
MG - M81044/8 (44A0812)
MH - M81044/9 (44A0811)
MJ - M81044/10 (44A0814)
MK - M81044/11 (44A0112)
ML - M81044/12 (44A0111)
MM - M81044/13 (44A0114)

Number of Component Wires

Shield Material and Style Code

U - No shield
T - Tin-coated copper, round
J - Tin-coated copper, flat
S - Silver-coated copper, round
G - Silver-coated copper, flat
N - Nickel-coated copper, round

Jacket Material and Style Code

00 - No jacket
08 - Crosslinked, white PVDF
23 - Crosslinked, white Modified ETFE

Example: **M27500-22ML3T08 = 44AM1131-22-9/96/93-9**

Raychem Part No.
Military Part No.

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SPEC 44 (Continued)

Primary Wires/Twisted Pair

44A011X (600 V) Primary Wire

44A021X (1000 V) Primary Wire

Wire Size (AWG)	Stranding (mm)	Stranding #/AWG	CSA (mm^2)	44A011X (600 V) Nom. OD	44A011X (600 V) Max. Weight (g/m) lb/kft	44A021X (1000 V) Nom. OD	44A021X (1000 V) Max. Weight (g/m) lb/kft
30	7/0.10	7/38	0.06	0.68 [0.027]	1.06 [0.71]	—	—
28	7/0.13	7/36	0.09	0.76 [0.030]	1.43 [0.96]	—	—
26*	19/0.10	19/38	0.15	0.86 [0.034]	2.08 [1.4]	1.02 [0.040]	2.38 [1.6]
24	19/0.13	19/36	0.25	1.02 [0.040]	2.98 [2.0]	1.17 [0.046]	3.57 [2.4]
22	19/0.16	19/34	0.40	1.19 [0.047]	4.46 [3.0]	1.37 [0.054]	5.20 [3.5]
20	19/0.20	19/32	0.60	1.40 [0.055]	6.70 [4.5]	1.57 [0.062]	7.59 [5.1]
18	19/0.25	19/30	1.00	1.65 [0.065]	10.12 [6.8]	1.85 [0.073]	11.46 [7.7]
16	19/0.29	19/29	1.25	1.83 [0.072]	12.80 [8.6]	2.06 [0.081]	14.58 [9.8]
14	19/0.36	19/27	2.00	2.26 [0.089]	19.64 [13.2]	2.49 [0.098]	21.88 [14.7]
12	37/0.32	37/28	3.00	2.74 [0.108]	30.06 [20.0]	2.97 [0.117]	32.89 [22.1]
10	37/0.40	37/26	5.00	3.28 [0.129]	46.28 [31.1]	3.71 [0.146]	52.98 [35.6]
8	133/0.29	133/29	—	—	—	5.23 [0.206]	91.97 [61.8]

*For 44A0211-26 the stranding is 7/0.16mm 7/34 AWG

44A031X (2500 V) Primary Wire

44A081X (600 V) Airframe Wire

44A012X (600 V) Twisted Pair

Wire Size (AWG)	Stranding (mm)	Stranding #/AWG	CSA (mm^2)	44A031X (2500 V) Nom. OD	44A031X (2500 V) Max. Weight (g/m) lb/kft	44A081X (600 V) Nom. OD	44A081X (600 V) Max. Weight (g/m) lb/kft	44A012X (1000 V) Nom. OD	44A012X (1000 V) Max. Weight (g/m) lb/kft
30	7/0.10	7/38	0.06	—	—	—	—	1.37 [0.054]	2.38 [1.6]
28	7/0.13	7/36	0.09	—	—	—	—	1.52 [0.060]	3.13 [2.1]
26*	19/0.10	19/38	0.15	1.35 [0.053]	3.13 [2.1]	1.22 [0.048]	2.98 [2.0]	1.73 [0.068]	4.47 [3.0]
24	19/0.13	19/36	0.25	1.44 [0.057]	4.46 [3.0]	1.37 [0.054]	3.87 [2.6]	2.03 [0.080]	6.69 [4.5]
22	19/0.16	19/34	0.40	1.75 [0.069]	6.40 [4.3]	1.57 [0.062]	5.65 [3.8]	2.38 [0.094]	9.82 [6.6]
20	19/0.20	19/32	0.60	1.98 [0.078]	9.08 [6.1]	1.78 [0.070]	8.04 [5.4]	2.79 [0.110]	14.73 [9.9]
18	19/0.25	19/30	1.00	2.23 [0.088]	12.95 [8.7]	2.03 [0.080]	11.91 [8.0]	3.30 [0.130]	22.32 [15.0]
16	19/0.29	19/29	1.25	2.46 [0.097]	16.22 [10.9]	2.26 [0.089]	14.73 [9.9]	3.65 [0.144]	28.42 [19.1]
14	19/0.36	19/27	2.00	2.92 [0.115]	24.10 [16.2]	2.74 [0.108]	22.17 [14.9]	4.52 [0.178]	44.35 [29.8]
12	37/0.32	37/28	3.00	3.32 [0.131]	36.01 [24.2]	3.20 [0.126]	32.59 [21.9]	5.48 [0.216]	69.00 [46.5]
10	37/0.40	37/26	5.00	4.09 [0.161]	54.32 [36.5]	3.94 [0.155]	52.08 [35.0]	—	—
8	133/0.29	133/29	—	96.20 [0.219]	96.73 [65.0]	92.94 [0.214]	93.46 [62.8]	—	—

*For 44A0211-26 the stranding is 7/0.16mm 7/34 AWG

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SPEC 44 (Continued)

Shielded and Jacketed Cable

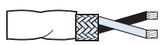
44A111X (600 V)
1 Conductor

44A121X (600 V)
1 Conductor

Wire Size (AWG)	Stranding (mm)	Stranding #/AWG	44A111X (600 V) Nom. OD	44A111X (600 V) Max. Weight (g/m) lb/kft	44A121X (600 V) Nom. OD	44A121X (600 V) Max. Weight (g/m) lb/kft
30	7/0.10	7/38	1.47 [0.058]	5.20 [3.5]	—	—
28	7/0.13	7/36	1.55 [0.061]	5.80 [3.9]	1.60 [0.063]	5.65 [3.8]
26	19/0.10	19/38	1.57 [0.065]	6.84 [4.6]	1.73 [0.068]	6.85 [4.6]
24	19/0.13	19/36	1.83 [0.072]	8.63 [5.8]	1.98 [0.078]	9.67 [6.5]
22	19/0.16	19/34	2.01 [0.079]	10.71 [7.2]	2.24 [0.088]	12.35 [8.3]
20	19/0.20	19/32	2.26 [0.089]	14.73 [9.9]	2.54 [0.100]	17.41 [11.7]
18	19/0.25	19/30	2.62 [0.103]	20.68[13.9]	2.82 [0.111]	22.62 [15.2]
16	19/0.29	19/29	2.79 [0.110]	24.55 [16.5]	3.02 [0.119]	26.64 [17.9]
14	19/0.36	19/27	3.22 [0.127]	34.08 [22.9]	3.45 [0.136]	36.16 [24.3]
12	37/0.32	37/28	3.70 [0.146]	47.77 [32.1]	4.14 [0.155]	49.56 [33.3]

Other sizes are also available in some constructions depending on conductor type and construction required.

44A181X (600 V)
1 Conductor



44A112X (600 V)
2 Conductor

Wire Size (AWG)	44A181X (600 V) Nom. OD	44A181X (600 V) Max. Weight (g/m) lb/kft	44A112X (600 V) Nom. OD	44A112X (600 V) Max. Weight (g/m) lb/kft
30	—	—	2.23 [0.088]	8.63 [5.8]
28	—	—	2.38 [0.094]	9.82 [6.6]
26	—	—	2.59 [0.102]	12.05 [8.1]
24	2.26 [0.089]	11.76 [7.9]	2.99 [0.118]	16.82 [11.3]
22	2.57 [0.101]	15.48 [10.4]	3.35 [0.132]	21.57 [14.5]
20	2.77 [0.109]	19.19 [12.9]	3.76 [0.148]	27.97 [18.8]
18	3.02 [0.119]	24.11 [16.2]	4.32 [0.170]	38.24 [25.7]
16	3.25 [0.128]	28.13 [18.9]	4.67 [0.184]	44.94 [30.2]
14	3.73 [0.147]	38.69 [26.0]	5.53 [0.218]	64.28 [43.2]
12	4.19 [0.165]	52.38 [35.2]	6.50 [0.256]	91.51 [61.5]

Other sizes are also available in some constructions depending on conductor type and construction required.

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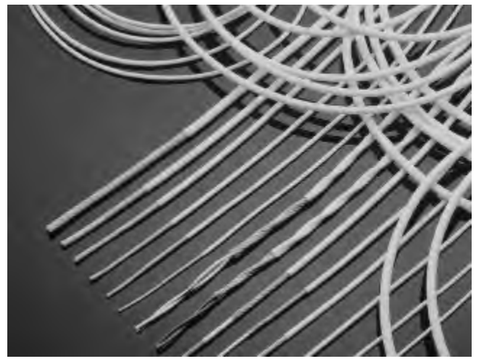
UK: 44-208-420-8341

SPEC 55

Product Facts

- Resistant to electrical arc tracking in wet or dry conditions
- Single or dual wall constructions
- Small size, ultra light weight
- Exceptional chemical resistance
- -65°C to 200°C [-85°F to 392°F]



Applications

SPEC 55 wire is insulated with modified radiation cross-linked ETFE polymer. It has a temperature rating of -65°C to 200°C [-85°F to 392°F] continuous using a silver plated copper conductor, and combines the easy handling of a flexible wire with excellent scrape abrasion and cut-through characteristics.

The dual wall airframe construction of SPEC 55 wire is currently used on numerous aircraft programs. It has a choice of two total wall thicknesses, 0.25 [.010] (55A08XX 10 mil) and 0.2 [.008] (55A02XX 8 mil). Both have a contrasting core color to act as a damage indicator. Chosen for its balance of properties, SPEC 55 wire has outstanding resistance to chemicals and solvents, excellent electrical arc track resistance, and is not susceptible to UV and moisture degradation. Single wall equipment wire constructions are available in 0.10 [.004] (55/03XX 4 mil) and 0.15 [.006] (6 mil) wall thicknesses for use inside black boxes where flexibility and soldering iron resistance make it a wire which is very easy to install reliably.

Both single and dual wall insulated wires are available in twisted pairs, triples, etc., and as shielded and jacketed cables.

Physical Characteristics

Size and Weight

SPEC 55 wire provides one of the most comprehensive wiring product ranges for aerospace users, with a wide choice of conductor sizes and insulation wall thicknesses.The dual wall airframe wire has an insulation wall thickness of either 0.2 [.008] or 0.25 [.010] for robustness in unprotected harnesses and has excellent wire to wire abrasion properties.

The single wall equipment wire has a 0.15 [.006] wall thickness for use inside equipment and protected harnesses. For high density, interconnect wiring, the 450 volt 55M041X series of equipment wire has a nominal 0.1 [.004] wall and provides considerable weight and size savings over other comparable wires.

Handling

The excellent flexibility and handleability makes SPEC 55 the ideal wire to install, both in new aircraft and equipment and for maintenance purposes. The wire is easily stripped with conventional tooling. The insulation is readily marked by hot stamp, ink jet or laser, and can be potted without pre-etching.

SPEC 55PC Wire and Cable Insulation System

This product was originally developed to meet Boeing's material standard BMS13-48 for the 777 airliner. SPEC 55PC provides lightweight, compact insulation that matches the proven performance of our SPEC 55 wire. Today, 55PC is specified and utilized on the majority of aerospace platforms worldwide.

Tyco Electronics' rigorous, statistical-process-controlled manufacturing has produced Raychem wiring that is rugged and versatile enough for a wide range of commercial and defense aerospace applications, including electronic hook-ups in harsh, open airframe environments.

SPEC 55PC wire and cable systems feature an 8-mil airframe wire that is lighter and smaller than typical 10-mil wire, with little reduction in key mechanical performance features. SPEC 55PC wire offers flame resistance superior to FAA standards and also resists scrape abrasion, notch, propagation, cut-through, and electrical arc tracking.

- Meets Boeing material standard BMS 13-48.
- Exceeds FAR 25 test requirements for flame resistance and smoke density.

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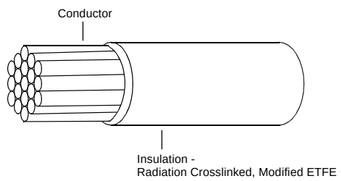
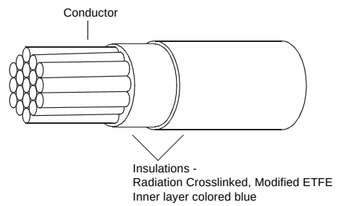
SPEC 55 (Continued)

Specifications



SPEC 55 Insulation System - Single Wall



SPEC 55 Insulation System - Dual Wall

MIL-W-22759/32-35 and /41 to /46 and NEMA-WC-27500 (Cables)
Defense Standard 61-12 Part 33 Issue 4
Part 1001 and Part 1002
VDE 9426, 9427, 9428
British Standard 3G233
Civil Aviation Authority Accessory Approval E11749
Boeing BMS 13-48
Airbus ABS 0820 to 0826
NASA preferred product list
European Space Agency 3901/012, 3901/020 and 3901/022
Raychem Specification 55

Typical Properties

Temperature rating (Tin plated conductor)		-65°C to +150°C [-85°F to +302°F]
	(Silver or nickel plated conductor)	-65°C to +200°C [-85°F to +392°F]
Thermal endurance		200 °C [392°F], 10000 h
Scrape abrasion (BS 3G233)		>100 cycles at 150°C [302°F]
Flexing endurance (Boeing BSS 7324)		>1000 cycles
Voltage rating		600 V, 450V
Tensile strength + elongation (core only)		(Dual wall wire) 35 N/mm², 125% min.
Tensile strength + total elongation (core & primary jacket)		(Dual wall wire) 35 N/mm², 75% min.
Notch propagation BS 3G230 0.05 mm notch		Pass
Solder iron resistance (370 °C, 1 minute)		Pass
Solderability -	Tin plated copper conductor BS 3G233 conditions	<0.8 secs to wet
Shrinkage		<1%
Long term water resistance		Will not hydrolyze
Permitivity 1 KHz (ASTM D150)		2.7
Dissipation factor (ASTM D150)		0.001
FAR 25 Afterburn (sec) Burn length		-0- 30 sec. max. 75 mm [3 in.] max.

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SPEC 55 (Continued)

Environmental Performance

Temperature Rating

SPEC 55 wire and cable is rated for continuous operation from -65°C to +200°C [-85°F to +392°F] and for short periods at temperatures as high as 400°C [752°F].

Mechanical Performance

Radiation crosslinking of the SPEC 55 insulation significantly improves the following mechanical characteristics; scrape (sharp edges), cross wire abrasion, cut-through resistance and creep resistance.

Solder Iron/Overload Resistance

Radiation crosslinking ensures that the insulation resists melting at high temperatures. As a result SPEC 55 wire is resistant to hot solder irons and current overloads which would melt most thermoplastic insulations.

Chemical Resistance

SPEC 55 is unaffected by all commonly used chemicals, eg. fuels, hydraulic fluids, defluxing agents, cleaners, coolants and de-icers. It also shows excellent resistance to weathering (UV, ozone, pollutants, water).

Space Wire

SPEC 55 is available in special versions suitable for use in outer space meeting both ESA and NASA requirements for outgassing.

Flammability

Special additives increase the flame retardance of SPEC 55 compared to unirradiated ETFE so that it meets the latest high performance tests, eg. BS 3G230 vertical test FAR 25.

Electrical Arc Tracking Resistance

SPEC 55 insulation demonstrates resistance to arc tracking under both wet and dry conditions at aircraft system voltages.

SPEC 55 Wire & Cable: Standard Constructions, Nominal Sizes, Strandings, Diameters and Weights

Conductor	Primary Wire	Twisted Pair	Shielded & Jacketed	
			Single	Pair

55PC - Extra Light Weight Constructions

For applications where weight is critical, light weight tight tolerance conductors and insulations are available. These are manufactured using statistical process control methods and achieve weights that are equal or lighter than the equivalent polyimide/PTFE constructions.

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SPEC 55 (Continued)

55A - AWG Conductor: Equipment/Interconnect Wires & Cables

Wire Size (AWG)	Stranding (mm)	55A011X		55A012X	
		Nom. OD	Max. Weight (g per m/lbs per kft)	Nom. OD	Max. Weight (g per m/lbs per kft)
30	7/0.102	0.61 [0.024]	0.98 [0.66]	1.27 [0.048]	1.94 [1.3]
28	7/127	0.68 [0.027]	1.35 [0.91]	1.42 [0.054]	2.68 [1.8]
26	19/102	0.81 [0.032]	2.08 [1.4]	1.67 [0.064]	4.16 [2.8]
24	19/127	0.94 [0.037]	2.98 [2.0]	1.93 [0.074]	5.96 [4.0]
22	19/0.16	1.09 [0.043]	4.17 [2.8]	2.23 [0.086]	8.63 [5.8]
20	19/0.203	1.27 [0.050]	6.40 [4.3]	2.66 [0.102]	13.24 [8.9]
18	19/0.25	1.52 [0.060]	9.67 [6.5]	3.20 [0.122]	20.09 [13.5]
16	19/287	1.73 [0.068]	12.35 [8.3]	3.58 [0.138]	25.75 [17.3]
14	19/0.36	2.20 [0.085]	19.34 [13.0]	4.47 [0.172]	39.58 [26.6]
12	37/0.32	2.62 [0.103]	29.32 [19.7]	5.38 [0.208]	59.97 [40.3]
10	37/0.403	3.25 [0.128]	47.32 [31.8]	6.65 [0.256]	96.58 [64.9]
8	133/0.287	4.77 [0.188]	87.50 [58.8]	9.80 [0.376]	178.58 [120.0]

Wire Size (AWG)	55A111X		55A112X	
	Nom. OD	Max. Weight (g per m/lbs per kft)	Nom. OD	Max. Weight (g per m/lbs per kft)
30	1.51 [0.057]	5.06 [3.4]	2.12 [0.081]	7.74 [5.2]
28	1.59 [0.060]	5.80 [3.9]	2.27 [0.087]	8.90 [6.0]
26	1.71 [0.065]	6.85 [4.6]	2.53 [0.097]	11.32 [7.6]
24	1.84 [0.070]	8.19 [5.5]	2.80 [0.107]	13.84 [9.3]
22	1.99 [0.076]	10.27 [6.9]	3.07 [0.119]	17.86 [12.0]
20	2.20 [0.084]	13.40 [9.0]	3.50 [0.135]	23.81 [16.0]
18	2.45 [0.094]	17.86 [12.0]	4.10 [0.155]	32.60 [21.9]
16	2.67 [0.102]	21.73 [14.6]	4.43 [0.171]	39.73 [26.7]
14	3.10 [0.119]	30.36 [20.4]	5.30 [0.205]	57.00 [38.3]
12	3.55 [0.137]	42.41 [28.5]	6.30 [0.243]	81.10 [54.5]
10	4.20 [0.161]	62.65 [42.1]	—	—
8	5.80 [0.223]	110.42 [74.2]	—	—

55A - AWG Conductor: Airframe Wires & Cables

Wire Size (AWG)	Stranding (mm)	55A081X		55A082X	
		Nom. OD	Max. Weight (g per m/lbs per kft)	Nom. OD	Max. Weight (g per m/lbs per kft)
26	19/102	1.01 [0.040]	2.5 [1.7]	2.10 [0.080]	5.06 [3.4]
24	19/127	1.14 [0.045]	3.4 [2.3]	2.33 [0.090]	6.84 [4.6]
22	19/0.16	1.27 [0.050]	4.8 [3.2]	2.64 [0.102]	9.98 [6.7]
20	19/0.203	1.47 [0.058]	7.0 [4.7]	3.07 [0.118]	14.73 [9.9]
18	19/0.25	1.78 [0.070]	10.7 [7.2]	3.63 [0.140]	21.88 [14.7]
16	19/287	1.96 [0.077]	13.4 [9.0]	4.06 [0.156]	27.53 [18.5]
14	19/0.36	2.40 [0.094]	20.5 [13.8]	4.90 [0.190]	42.26 [28.4]
12	37/0.32	2.82 [0.111]	30.5 [20.5]	5.80 [0.224]	63.00 [42.3]
10	37/0.403	3.40 [0.134]	48.3 [32.4]	7.10 [0.272]	98.96 [66.5]

Wire Size (AWG)	55A181X		55A182X	
	Nom. OD	Max. Weight (g per m/lbs per kft)	Nom. OD	Max. Weight (g per m/lbs per kft)
26	1.71 [0.073]	7.89 [5.3]	2.63 [0.113]	14.29 [9.6]
24	1.84 [0.078]	9.37 [6.3]	2.80 [0.123]	16.37 [11.0]
22	1.99 [0.084]	11.76 [7.9]	3.07 [0.135]	20.68 [13.9]
20	2.20 [0.092]	14.88 [10.0]	3.50 [0.151]	27.08[18.2]
18	2.45 [0.103]	19.79[13.3]	4.10 [0.173]	36.46 [24.5]
16	2.67 [0.111]	23.81[16.0]	4.43 [0.189]	42.86 [28.8]
14	3.10 [0.128]	33.03 [22.2]	6.30 [0.225]	61.61 [41.4]
12	3.55 [0.145]	45.09 [30.3]	6.30 [0.259]	85.42 [57.4]
10	4.20 [0.168]	66.97[45.0]	— [0.308]	127.54 [85.7]

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SPEC 55 (Continued)

55PC - AWG Conductor: Statistical Process Controlled Airframe Wires & Cables

Wire Size (AWG)	Stranding (mm)	55PC021X Nom. OD	55PC021X Max. Weight (g per m/lbs per kft)	55PC022X Nom. OD	55PC022X Max. Weight (g per m/lbs per kft)
26	19/102	0.087 [0.045]	2.05 [1.38]	—	—
24	19/127	1.00 [0.0395]	2.95 [1.98]	2.00 [0.079]	5.95 [4.00]
22	19/0.16	1.15 [0.0455]	4.31 [2.90]	2.31 [0.091]	8.74 [5.87]
20	19/0.203	1.37 [0.0540]	6.51 [4.38]	2.74 [0.108]	13.2 [8.87]
18	19/0.25	1.61 [0.0635]	9.81 [6.59]	3.22 [0.127]	19.84 [13.33]
16	19/287	1.80 [0.0710]	12.46 [8.37]	3.60 [0.142]	25.21 [16.94]
14	19/.036	2.18 [0.0860]	19.17 [12.88]	4.36 [0.172]	38.80 [26.07]
12	37/0.32	2.66 [0.1047]	29.36 [19.73]	5.30 [0.209]	59.42 [39.93]
10	37/0.403	3.27 [0.1290]	46.31 [31.12]	6.55 [0.258]	93.92 [63.11]

Wire Size (AWG)	55PC121X Nom. OD	55PC121X Max. Weight (g per m/lbs per kft)	55PC122X Nom. OD	55PC122X Max. Weight (g per m/lbs per kft)
26	1.52 [0.064]	6.54 [4.4]	2.33 [0.100]	11.34 [7.62]
24	1.65 [0.069]	7.86 [5.28]	2.89 [0.109]	13.90 [9.34]
22	1.80 [0.075]	9.81 [6.59]	2.89 [0.122]	17.89 [12.02]
20	2.00 [0.083]	12.83 [8.62]	3.30 [0.139]	23.84 [16.02]
18	2.23 [0.093]	17.01 [11.43]	3.78 [0.158]	32.10 [21.57]
16	2.44 [0.100]	20.36 [13.68]	4.16 [0.174]	39.00 [26.21]
14	2.79 [0.116]	28.69 [19.28]	4.92 [0.204]	55.21 [37.10]
12	3.30 [0.135]	40.73 [27.37]	5.92 [0.244]	80.23 [53.91]
10	3.98 [0.159]	59.90 [40.25]	7.39 [0.297]	123.65 [83.09]

X = 1 -Tin plated copper conductor.
4 -Silver plated high strength copper alloy conductor. (Recommended for size 24 & 26 in airframe applications and mandatory for CAA release.)

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Part Numbering System

55 X X X X X- Size- X/X- X

Jacket Color (in accordance with MIL-STD-681,white preferred)

Primary Wire Insulation Color
(in accordance with MIL-STD-681)

0 - Black	3 - Orange	7 - Violet
1 - Brown	4 - Yellow	8 - Gray
2 - Red	5 - Green	9 - White
2L - Pink	6 - Blue	

Additional number after base color indicates stripe

Conductor Size

Conductor Type
1 - Tin-plated copper
2 - Silver-plated copper
3 - Nickel-plated copper
4 - Silver-plated high strength copper alloy
6 - Nickel-plated high strength copper alloy

Number of Conductors
0 - 10 conductors

Class of Wire
1 - 600 V equipment wire, light weight
2 - 600 V airframe wire, light weight
3 - 600 V 55 space
4 - 450 V equipment wire (55M Only sizes 20-30)
7 - 1000 V heavy duty, airframe wire
8 - 600 V airframe wire, normal weight

Constructions
0 - Primary wire and unshielded, unjacketed cables
1 - Round braid screened & jacketed cable †
2 - Flat braid screened & jacketed cable †
3 - Round braid, screened cable, no jacket †
4 - Jacketed cable, no screen
5 - Spiral screened and jacketed cable †
8 - Special constructions (part numbers not coded)
9 - Special constructions including light weight

† Screen material same as conductor material except all flat screens and screen for conductor types 4 and 6 shall be tin-plated copper. Other combinations are special. (Refer to Wire and Cable Division).

Type
A - General purpose
M - Metric conductor
/ - Space wire
PC - Process control
D - Defense Standard 61-12 Part 33 Issue 4

Basic Specification Number

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SPEC 55 (Continued)

Typical Ordering Example	3 conductors, red, yellow, blue, 600 volt equipment wire with overall round braid, 20 AWG tinned conductor and white jacket: total part number is 55A1131-20-2/4/6-9.
Ordering Information	A list of stock policy items can be identified by contacting Tyco Electronics. Stock policy items are recognized by the use of a suffix, such as (300) defining the pack size, typically 55A0111-22-9(300). UK only.

SPEC 55 Part Numbering System

Temperature Rating	Conductor Material	AWG Range Available	Raychem Part No.	MIL-SPEC No.
600-V Lightweight Single-wall Hookup Wire, .152 [.006] Nominal Wall				
150°C [302°F]	Tin-coated copper	12–30	55A0111	M22759/32
200°C [392°F]	Silver-coated copper	12–28	55A0112	M22759/44
200°C [302°F]	Nickel-coated copper	12–28	55A0113	M22759/45
200°C [392°F]	Silver-coated high-strength alloy	20–30	55A0114	M22759/33
200°C [392°F]	Nickel-coated high-strength alloy	20–28	55A0116	M22759/46
600-V Lightweight Dual-wall Airframe Wire, .203 [.008] Nominal Wall				
150°C [302°F]	Tin-coated copper	6–26	55A0211	—
200°C [392°F]	Silver-coated copper	10–26	55A0212	—
200°C [392°F]	Nickel-coated copper	10–26	55A0213	—
200°C [392°F]	Silver-coated high-strength alloy	18–30	55A0214	—
200°C [392°F]	Nickel-coated high-strength alloy	16–26	55A0216	—
600-V Dual-wall Airframe Wire, .254 [.010] Nominal Wall				
150°C [302°F]	Tin-coated copper	00–24	55A0811	M22759/34
200°C [392°F]	Silver-coated copper	00–26	55A0812	M22759/43
200°C [392°F]	Nickel-coated copper	00–26	55A0813	M22759/41
200°C [392°F]	Silver-coated high-strength alloy	20–26	55A0814	M22759/35
200°C [392°F]	Nickel-coated high-strength alloy	20–26	55A0816	M22759/42
600-V Medium-Weight Dual-wall Airframe Wire, .381 [.015] Nominal Wall				
150°C [302°F]	Tin-coated copper	10–24	55A0711	—
200°C [392°F]	Silver-coated copper	16–24	55A0712	—
200°C [392°F]	Nickel-coated copper	16–24	55A0713	—
200°C [392°F]	Silver-coated high-strength alloy	16–24	55A0714	—
200°C [392°F]	Nickel-coated high-strength alloy	16–26	55A0716	—

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SPEC 55 Cable Constructions

Construction	Number of Components	Component Conductor[1]	Shield Material[1]	Part Number	
				Light Wt.[2]	Medium Wt.
Unshielded, unjacketed	2–10	1	—	55*01X1-AWG-Y	55*08X1-AWG-Y
		2	—	55*01X2-AWG-Y	55*08X2-AWG-Y
		3	—	55*01X3-AWG-Y	55*08X3-AWG-Y
		4	—	55*01X4-AWG-Y	55*08X4-AWG-Y
		6	—	55*01X6-AWG-Y	55*48X6-AWG-Y
Unshielded, jacketed	2–10	1	—	55*41X1-AWG-Y	55*48X1-AWG-Y
		2	—	55*41X2-AWG-Y	55*48X2-AWG-Y
		3	—	55*41X3-AWG-Y	55*48X3-AWG-Y
		4	—	55*41X4-AWG-Y	55*48X4-AWG-Y
		6	—	55*41X6-AWG-Y	55*48X6-AWG-Y
Shielded (round braid), jacketed	1–10	1	1	55*11X1-AWG-Y	55*18X1-AWG-Y
		2	2	55*11X2-AWG-Y	55*18X2-AWG-Y
		3	3	55*11X3-AWG-Y	55*18X3-AWG-Y
		4	1	55*11X4-AWG-Y	55*18X4-AWG-Y
		6	3	55*11X6-AWG-Y	55*18X6-AWG-Y
Shielded (flat braid), jacketed	1–10	1	1	55*21X1-AWG-Y	55*28X1-AWG-Y
		2	1	55*21X2-AWG-Y	55*28X2-AWG-Y
		3	1	55*21X3-AWG-Y	55*28X3-AWG-Y
		4	1	55*21X4-AWG-Y	55*28X4-AWG-Y
		6	1	55*21X6-AWG-Y	55*28X6-AWG-Y

[1]Type of conductor or shield material:
1 = tin-coated copper
2 = silver-coated copper
3 = nickel-coated copper
4 = silver-coated high-strength copper alloy
6 = nickel-coated high-strength copper alloy
* = A or PC

[2] X = no. of wire components
Y = color code
For complete part number, see Part Numbering System on page 10-15.

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SPEC 55 (Continued)

Nema WC-27500 Cable Part Numbering System

M27500 X AWG XX X X XX

Basic Specification Number

Component Wire ID/Shield Coverage Code

Shield Coverage 85%	Shield Coverage 90%	Component Wire Identification
-	C	Colored Stripes on White Wire (9/96/93/95/92/90/94/97/98/91... etc.)
A	D	Solid Color Wires (9/6/3/5/2/0/4/7/8/1...etc.)
B	E	Band Marks on Solid Colors (by AWG)
F	H	Alternate Colored Stripes (92/96/94/95/9/90/91/93/97/98...etc)
G	J	Alternate Solid Colors (2/6/4/5/9/0/1/3/7/8...etc.)
K	M	Number Marking on Solid Colors (by AWG)
L	N	Number Marking on White Wires
P	R	Band Marks on Colored Stripes (by AWG)
S	T	Band Marks on White Wires

Conductor Size (AWG)

Basic Wire Spec Code (MIL-W-22759) and Slash Sheet

SB - 32 = 55A0111
SC - 33 = 55A0114
SD - 34 = 55A0811
for 2 AWG and larger, use 55A8039
SE - 35 = 55A0814
SM - 41 = 55A0813
for 2 AWG and larger, use 55A8595
SN - 42 = 55A0816
SP - 43 = 55A0812
for 2 AWG and larger, use 55A6089
SR - 44 = 55A0112
SS - 45 = 55A0113
ST - 46 = 55A0116

Number of Component Wires

1 through 9; 10 Components = 0

Shield Material and Style Code

U - No shield
T - Tin-coated copper, round
J - Tin-coated copper, flat
S - Silver-coated copper, round
G - Silver-coated copper, flat
N - Nickel-coated copper, round
V - Tin-coated copper, round, double shield
W - Silver-coated copper, round, double shield

Jacket Material and Style Code

00 - No jacket
23 - Single jacket crosslinked, modified ETFE, white
73 - Double jacket crosslinked, modified ETFE, white

Example: **M27500-22SB3T23 = 55A1131-22-9/96/93-9**

Raychem Part No.
Military Part No.

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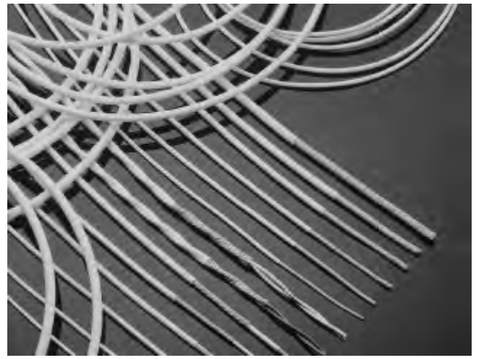
RCW

Product Facts

- -65°C to +260°C [-85°F to +500°F]
- Small size, ultra light weight
- Resistant to electrical arc tracking in wet or dry conditions
- Excellent cut-through resistance
- Exceptional chemical resistance



Applications

Raychem Composite Wire (RCW) is insulated with a combination of PTFE and Polyimide materials. It has a temperature rating of -65°C to +260°C [-85°F to +500°F] continuous using a nickel-plated conductor, and combines the easy handling of a flexible wire with excellent cut-through characteristics. Chosen for its balance of properties, RCW has outstanding resistance to chemicals and solvents, excellent arc track resistance, and is not susceptible to UV and moisture degradation.

RCW can be supplied in a thin wall, lightweight construction which provides considerable weight and size savings over comparable wires.

RCW is available in twisted pairs, triples, etc. and shielded and jacketed constructions.

Physical Characteristics

Size and Weight

RCW provides one of the most comprehensive wiring product ranges for aerospace users with a wide choice of conductor sizes and insulation wall thicknesses.

RCW airframe wire has an insulation wall thickness of either .006” or 0.008” for robustness in unprotected harnesses and has excellent wire-to-wire abrasion properties.

Handling

Excellent flexibility and handleability makes RCW ideal for installation in new aircraft and equipment, and is easily replaced during maintenance procedures.

RCW is easily stripped with conventional tooling, and readily marked by laser or ink jet.

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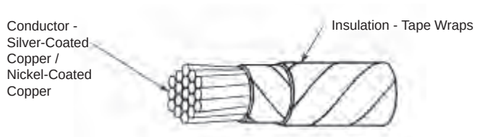
RCW (Continued)

Specifications



RCW insulation system

MIL-DTL-22759/81-92
Lockheed Martin Selected C-Specs

Typical Properties

	Lightweight / Normal Weight
Conductor	Silver Copper / Nickel Copper
Temperature	-65°C to +200°C [-85°F to +392°F] / -65°C to +260°C [85°F to +500°F]
Voltage Rating	600V
Dielectric Strength	4,000 volts/mil (avg. min.)
Wet Arc Propagation Resistance	MIL-STD-2223 Method 3006 *
Dry Arc Propagation Resistance	MIL-DTD-2223 Method 3007 *
Dynamic Cut-Through	ASTM D 3032 Section 22 *
Flammability	MIL-STD-2223, Method 1006, Procedure A *
Insulation Resistance	5000 megohms for 1000 ft. (min.)
Life Cycle	500 hours @ 230°C [446°F] / 500 hrs @ 290°C [554°F]
Low Temperature (Cold Bend)	-65°C [-85°F] (4 hrs)
Smoke	200°C [392°F] / 260°C [500°F] No visible smoke
Thermal Index	200°C [392°F] min. / 260°C min. [500°F] 10,000 hrs.

*as defined by the applicable MIL-Spec slash sheets

Environmental Performance

Temperature Rating

RCW wire and cable is rated for continuous operation from -65°C to +260°C [-85°F to +500°F] and for short periods at temperatures as high as 320°C [608°F].

Mechanical Performance

RCW incorporates superior abrasion protection and cut-through performance. Like all Raychem products, this latest addition is designed for electrical and electronic applications in tough environments.

Chemical Resistance

RCW is unaffected by all commonly used chemicals, eg. fuels, hydraulic fluids, defluxing agents, cleaners, coolants and de-icers. It also shows excellent resistance to weathering (UV, ozone, pollutants, water). RCW is highly resistant to hydrolysis.

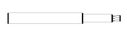
Flammability/Smoke

Advanced combination of materials allow superior performance in areas such as flammability and smoke generation properties. Exceeds FAR 25 test requirements for flame resistance and smoke density.

Electrical Arc Tracking Resistance

RCW insulation demonstrates resistance to arc tracking under both wet and dry conditions at aircraft system voltages.

RCW Wire & Cable: Standard Constructions, Nominal Sizes, Strandings, Diameters and Weights

Conductor	Primary Wire	Twisted Pair	Shielded & Jacketed	
			Single	Pair
				

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RCW (Continued)

RCW - AWG Conductor: Equipment/Interconnect Wires & Cables (Lightweight)

Wire Size (AWG)	Stranding (mm)	RCW59XX		RCWxWx2U00-AWG	
		Nom. OD (max.)	Max. Weight (g per m/lbs per kft)	Nom. OD (max.)	Max. Weight (g per m/lbs per kft)
26	19 x 38	0.48 [0.019]	2.13 [1.43]	1.73 [0.068]	4.35 [2.92]
24	19 x 36	0.61 [0.024]	2.87 [1.93]	1.93 [0.076]	5.86 [3.94]
22	19 x 34	0.76 [0.030]	4.24 [2.85]	2.18 [0.086]	8.65 [5.81]
20	19 x32	0.97 [0.038]	6.52 [4.38]	2.59 [0.102]	13.30 [8.94]
18	19 x 30	1.22 [0.048]	9.82 [6.60]	3.05 [0.120]	20.09 [13.5]
16	19 x29	1.37 [0.054]	12.35 [8.30]	3.40 [0.134]	25.15 [16.9]
14	19x 27	1.73 [0.068]	18.75 [12.6]	4.06 [0.160]	38.25 [25.7]
12	37 x 28	2.21 [0.087]	29.17 [19.6]	5.08 [0.200]	59.53 [40.0]
10	37 x 26	2.79 [0.110]	45.54 [30.6]	6.25 [0.246]	92.86 [62.4]

Wire Size (AWG)	Shield Size (AWG)	RCWxWx1xxx-AWG-x		RCWxWx2xxx-AWG-x	
		Nom. OD max.	Max. Weight@90% (g per m/lbs per kft)	Nom. OD max.	Max. Weight@90% (g per m/lbs per kft)
26	38	1.83 [0.072]	8.27 [5.56]	2.69 [0.106]	13.84 [9.30]
24	38	1.93 [0.076]	9.52 [6.40]	2.89 [0.114]	16.22 [10.9]
22	38	2.06 [0.081]	11.55 [7.76]	3.15 [0.124]	20.24 [13.6]
20	38	2.26 [0.089]	14.88 [10.0]	3.56 [0.140]	26.64 [17.9]
18	38	2.49 [0.098]	19.35 [13.0]	4.01 [0.158]	35.42 [23.8]
16	38	2.67 [0.105]	22.77 [15.3]	4.37 [0.172]	42.12 [28.3]
14	38	2.99 [0.118]	30.95 [20.8]	5.03 [0.198]	58.19 [39.1]
12	38	3.50 [0.138]	44.05 [29.6]	6.15 [0.242]	85.57 [57.5]
10	38	4.09 [0.161]	63.69 [42.8]	7.32[0.288]	124.41[83.6]

RCW - AWG Conductor: Airframe Wires & Cables (Normal Weight)

Wire Size (AWG)	Stranding (mm)	RCW59xx		RCWxWx2U00-AWG	
		Nom. OD max.	Max. Weight (g per m/lbs per kft)	Nom. OD max.	Max. Weight@90% (g per m/lbs per kft)
26	19 x 38	0.52 [0.0204]	2.31 [1.55]	1.88 [0.074]	4.70 [3.16]
24	19 x 36	0.62 [0.0244]	3.19 [2.15]	2.13 [0.084]	6.53 [4.39]
22	19 x 34	0.87 [0.0314]	4.46 [3.00]	2.39 [0.094]	9.11 [6.12]
20	19 x 32	1.00 [0.0394]	6.77 [4.55]	2.79 [0.110]	13.81 [9.28]
18	19 x 30	1.25 [0.0494]	9.97 [6.70]	3.30 [0.130]	20.39 [13.70]
16	19 x 29	1.41 [0.0554]	12.80 [8.60]	3.71 [0.146]	26.04 [17.50]
14	19 x 27	1.76 [0.0694]	19.27 [12.95]	4.37 [0.172]	39.29 [26.40]
12	37 x 28	2.27 [0.0894]	29.91 [20.10]	5.33 [0.210]	61.01 [41.00]
10	37 x 26	2.84 [0.112]	46.73 [31.40]	6.45 [0.254]	95.39 [64.10]
8	133 x 29	4.29 [0.169]	85.72 [57.60]	9.55 [0.376]	174.86[117.50]
6	133 x 27	5.38 [0.212]	131.40 [88.30]	—	—
4	133 x 25	6.81 [0.268]	212.81 [143.0]	—	—

Wire Size (AWG)	Shield Size (AWG)	RCWxWx1xxx-AWG-x		RCWxWx2xxx-AWG-x	
		Nom. OD max.	Max. Weight@90% (g per m/lbs per kft)	Nom. OD max.	Max. Weight@90% (g per m/lbs per kft)
26	38	1.91 [0.075]	8.82 [5.93]	2.84 [0.112]	14.88 [10.0]
24	38	2.03 [0.080]	10.45 [7.02]	3.10 [0.122]	18.01 [12.1]
22	38	2.16 [0.085]	12.28 [8.25]	3.35 [0.132]	21.58 [14.5]
20	38	2.36 [0.093]	15.63 [10.50]	3.76 [0.148]	27.98 [18.8]
18	38	2.62 [0.103]	20.09 [13.50]	4.27 [0.168]	36.76 [24.7]
16	38	2.82 [0.111]	24.11 [16.20]	4.67 [0.184]	44.35 [29.8]
14	38	3.15 [0.124]	32.29 [21.70]	5.33 [0.210]	60.57 [40.7]
12	38	3.63 [0.143]	45.54 [30.60]	6.40 [0.252]	88.25 [59.3]
10	38	4.19 [0.165]	65.33 [43.90]	7.52 [0.296]	127.83 [85.9]

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RCW (Continued)

Part Numbering System — Cable (Per NEMA WC 27500)

RCW X XX # X XX - AWG - X

Basic Product Number

Component Wire ID/Shield Coverage Code (per WC 27500)
(Note: Some ID methods of WC 27500 may not be available - standard codes offered are A, B, D and E, as defined below)

A - 85% min. shield cov. (if applic.); solid wire colors selected in order from the following: White, Blue, Orange, Green, Red, Black, Yellow, Violet, Gray, Brown

B - 85% min. shield coverage (if applic.); band-marked solid wire colors based on AWG size as follows:

AWG	Color	AWG	Color	AWG	Color
26	Black	18	White	10	Brown
24	Blue	16	Blue	8	Red
22	Green	14	Green	6	Blue
20	Red	12	Yellow	4	Yellow

D - Same as A, except 90% min. shield coverage

E - Same as B, except 90% min. shield coverage

Component Wire Code (per WC 27500) and MIL-W-22759 Slash Sheet

WC = 81 = RCW5981
WE = 82 = RCW5982
WJ = 86 = RCW5986
WK = 87 = RCW5987
WM = 89 = RCW5989
WN = 90 = RCW5990
WP = 91 = RCW5991
WR = 92 = RCW5992

Number of Component Wires

Shield Code (per WC 27500)

U - No Shield
T - Tin-coated copper, round
S - Silver-coated copper, round
N - Nickel-coated copper, round
G - Silver-coated copper, flat

Jacket Code (per WC 27500)

00 - No jacket
06 - PTFE tape wrap
24 - FP/PI/FP and PTFE tape wraps

Conductor Size (AWG)

Jacket Color Code (per MIL-STD-681)

0	- Black		5	- Green	
1	- Brown		6	- Blue	
2	- Red		7	- Violet	
3	- Orange		8	- Gray	
4	- Yellow		9	- White	

Example:
RCWAWJ2G24-22-9 = **M27500A22WJ2G24**

Military Part Number

Raychem Part Number

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

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USA: 1-800-522-6752
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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

RCW (Continued)

Part Numbering System — Primary Wire (Per MIL-W-22759)

RCW59 XX - AWG - X

Basic Product Number

MIL-W-22759 Slash Sheet as follows:

81 - Lightweight, silver-coated, high-strength or ultra high-strength copper alloy, AWG 26-20
82 - Lightweight, nickel-aoted, high-strength or ultra high-strength copper alloy, AWG 26-20
86 - Normal weight, silver-coated copper, AWG 26-4
87 - Normal weight, nickel-coated copper, AWG 26-4
89 - Normal weight, silver-coated, high-strength or ultra high-strength copper alloy, AWG 26-20
90 - Normal weight, nickel-coated, high-strength or ultra high-strength copper alloy, AWG 26-20
91 - Lightweight, silver-coated copper, AWG 26-10
92 - Lightweight, nickel-coated copper, AWG 26-10

Conductor Size (AWG)

Insulation Color Code (per MIL-STD-681)

(Note: Colors are in accordance with the UV laser markable color limits specified in the applicable MIL-W-22759 slash sheet. Standard wire color is white).

0 - Black
1 - Brown
2 - Red
3 - Orange
4 - Yellow
5 - Green
6 - Blue
7 - Violet
8 - Gray
9 - White

Example:

RCW5991-22-9 = **M27559/91-22-9**

Military Part Number
Raychem Part Number

Catalog 1308940
Revised 8-06

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RCW (Continued)

Part Numbering System — Cable (Per NEMA WC 27500)

M27500 X AWG XX # X XX

Basic Product Number

Component Wire ID/Shield Coverage Code
(Note: Some ID methods may not be available for RCW cable - standard codes offered are A, B, D and E, as defined below)

A - 85% min. shield cov. (if applic.); solid wire colors selected in order from the following: White, Blue, Orange, Green, Red, Black, Yellow, Violet, Gray, Brown

B - 85% min. shield coverage (if applic.); band-marked solid wire colors based on AWG size as follows:

AWG	Color	AWG	Color	AWG	Color
26	Black	18	White	10	Brown
24	Blue	16	Blue	8	Red
22	Green	14	Green	6	Blue
20	Red	12	Yellow	4	Yellow

D - Same as A, except 90% min. shield coverage

E - Same as B, except 90% min. shield coverage

Conductor Size (AWG)

Basic Wire Spec Code (MIL-W-22759 Slash sheet & RCW Wire)

WC = 81 = RCW5981
WE = 82 = RCW5982
WJ = 86 = RCW5986
WK = 87 = RCW5987
WM = 89 = RCW5989
WN = 90 = RCW5990
WP = 91 = RCW5991
WR = 92 = RCW5992

Number of Component Wires

Shield Material and Style Code

U - No Shield
T - Tin-coated copper, round
S - Silver-coated copper, round
N - Nickel-coated copper, round
G - Silver-coated copper, flat

Jacket Material and Style Code

00 - No jacket
06 - PTFE tape wrap, white
24 - FP/PI/FP and PTFE tape wraps, white

Example:

M27500A22WJ2G24 = **RCWAWJ2G24-22-9**

RCWAWJ2G24-22-9 — Raychem Part Number
M27500A22WJ2G24 — Military Part Number

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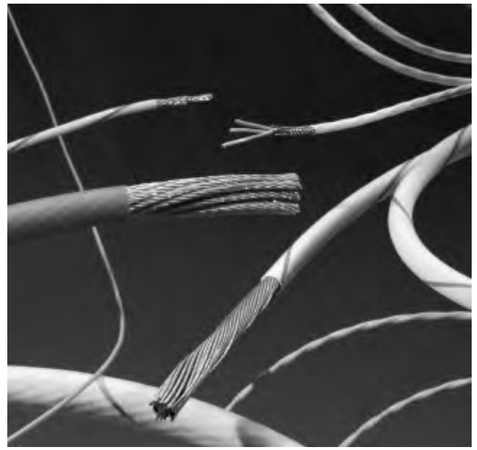
FlexLine (SPEC 80)

Product Facts

- Reduced weight
- Flexibility
- Low outgassing
- Function over a broad temperature range
- Flammability
- Arc track resistance
- Resistance to atomic oxygen
- Radiation resistance
- High quality and reliability
- Ease of fabrication (into Harnesses due to flexibility)
- Agency approvals
- -65°C up to +200°C [-85°F up to +392°F]
- Small size
- 600V rating
- Optional high strand count for increased flexibility
- Variety of insulation/jacket options
- Dual wall and single wall options
- Easy to install
- Mechanically tough
- Compliance with FAR 25 flammability requirements
- Resistance to harsh fluids & solvents per MIL-W-22759



Applications

FlexLine wire (also known as SPEC 80) is insulated with a flexible modified radiation cross-linked ETFE polymer. It has a temperature rating of -65°C to +200°C [-85°F to +392°F] continuous using silver copper conductor, and combines the easy handling of our SPEC 55 wire and cable with additional flexibility. FlexLine wire is used in a broad range of applications, from Hook-up wire to Power Cables.

FlexLine wire constructions provide maximum flexibility similar to the MIL-W-22759 products in Mechanical, Chemical and Thermal properties.

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FlexLine (SPEC 80) (Continued)

FlexLine Insulation System

Single Wall

Dual Wall

Single Wall 82 Wire
High strand count conductors
Light weight
AWG sizes 28 to 00
(6-mil nominal insulation thickness)

Dual Wall 81 Wire
Standard M22759 conductor stranding
Increased toughness
AWG sizes 28 to 000
(10-mil nominal insulation thickness)

Part Numbering System

8x X X X X X- Size- X/X- X

Jacket Color Identification Code (in accordance with MIL-STD-681)

Primary Wire Insulation Color
(in accordance with MIL-STD-681)

0 - Black	4 - Yellow	8 - Gray
1 - Brown	5 - Green	9 - White
2 - Red	6 - Blue	
3 - Orange	7 - Violet	

Conductor Size (AWG)

Conductor Type

1 - Tin-coated copper	4 - Silver-coated high strength copper alloy
2 - Silver-coated copper	
3 - Nickel-coated copper	6 - Nickel-coated high strength copper alloy

Number of Conductors
1 through 9

Class of Wire
1 - 600 V general purpose wire, lightweight
8 - 600 V airframe wire, normal weight

Construction
0 - Primary wire & unshielded, unjacketed
1 - Round-braid shielded & jacketed cable*
2 - Flat-braid shielded & jacketed cable*
3 - Round-braid shielded cable, no jacket*
4 - Jacketed cable, no shield
5 - Spiral-shielded & jacketed cable*
6-9 Special constructions

Wire Type
A - General Purpose
/ - Outer Space
AC- 90% Shield Coverage

Basic Specification Number
1 - Normal Stranding
2 - High Stranding

* Shield coating same as conductor coating except for the following:
- shield for conductor type 4 shall be tin-coated copper
- round braid shield constructions for conductor type 6 shall be nickel-coated copper
- flat braid shield constructions for conductor type 6 shall be tin-coated copper

Other shield variations are designated as Special Constructions

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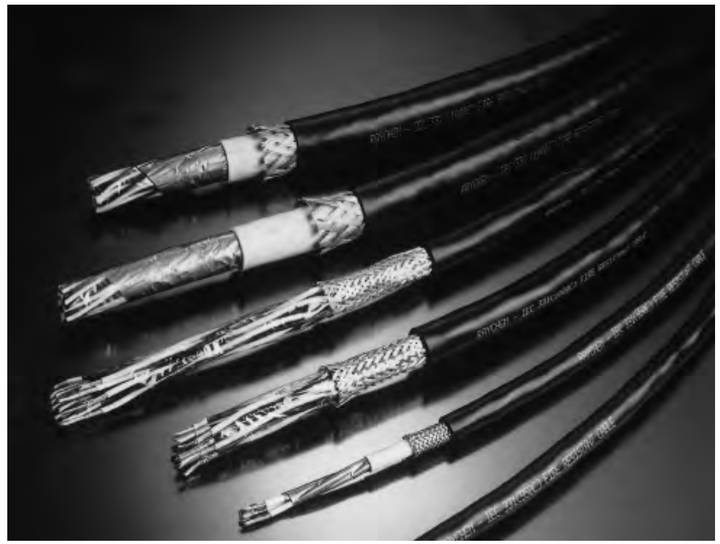
FR-1000

Halogen-Free, Fire Resistant Cable Range

Product Facts

- Highly flame retardant
- Halogen-free
- Low smoke generation
- Low toxicity index
- Low acid gas emission
- Low water uptake
- Compatible with Raychem System 100 heat-shrink components, heat-shrink tubing, molded parts and adhesives



Applications

Tyco Electronics has developed a new halogen-free, lightweight, small size, fire resistant Raychem cable to exceed the exacting fire resistant requirements of IEC 60331 (ie withstands 950°C [1742°F] for 3 hours as opposed to the 750°C [1382°F] requirement) and meet the flame-retardant requirements of IEC 60332-3 (Cat A), while maintaining significant size and weight savings over conventional materials.

FR-1000 cable consists of Raychem Type 95 primary wire with a Zerohal jacket and can be used throughout the installation, simplifying the selection for designers and electrical engineers. By a combination of our proven expertise in polymer and radiation chemistry, low fire hazard technology and precision extrusion capability, Tyco Electronics has been able to develop a range of Raychem cables featuring reduced size and weight over existing thickwall cables. This offers savings of approximately 30% and optimizes the space available. This results in lower installed costs by downsizing connectors, glanding, cable support structures, and reduced time on installation.

With increasing complexity of electronic systems, sensors, communications and safety equipment, more cables are required to fit into smaller spaces. FR-1000 small size cable can offer distinct advantages over conventional cables.

These include:

- Tough and flexible constructions aiding installation through smaller bend radii and extending service life.
- Controlled dimensions simplifying connector and transit selection.
- Resistance to widely used fluids such as diesel fuels, oils, and greases.

Operating Temperature Range

-30°C to +90°C
[-22°F to +194°F]

Catalog 1308940
Revised 8-06

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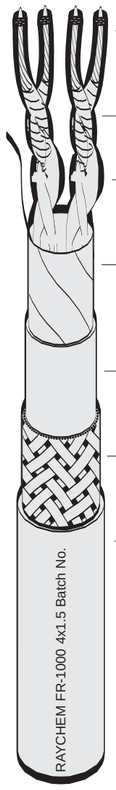
FR-1000 (Continued)

Generic Cable Construction



Example:
FR-1000 4x1.5 93497A

Conductors	Tin-plated copper to BS 6360.
Insulation	Mica based tape, halogen-free, low smoke material complying with Raychem spec WSD695.
Core Identification	Pairs – black and white and numbered. Triples – black, red and white and numbered. Multicore – white and numbered.
Shielding	Aluminized MYLAR tapewrap in contact with tinned copper drainwire.
Inner Sheath	Halogen-free, low smoke material complying with Raychem specification WCD51/1663 and WSD696.
Armor	Galvanized steel wire braid in accordance with Raychem specification WSD696 and BS6883 (BS1442).
Outer Sheath	Raychem Zerohal material complying with Raychem specification WSD696 and exceeding the requirements of BS6899, Type D. Flame retardant to IEC60332-3(Cat A) and fire resistant to IEC60331 (enhanced to 950 ± 50°C [122°F], 3 hours). Sheath printed with Raychem number and size of conductors, IEC60331 (950°C [1742°F). Sheath color black. Temperature index >260°C [500°F] (BS2782). Toxicity index <2 (NES713). Oxygen index >30% (BS2782). Smoke index <13 (BS6883).
Temperature Rating	90°C [194°F] maximum operating temperature.
Voltage Rating	600/1000V.

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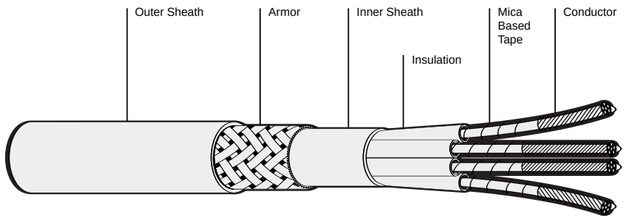
FR-1000 (Continued)

Halogen-Free, Fire Resistant Cable Range



FR-1000 Multicore Control Cables, Unshielded, Armored, 600/1000V*

Selection Table

Part No. EPD	Construction	Conductor Stranding	CSA Nominal mm²	Diameter Over Inner Sheath	Cable				Jacket Color
					Outer Diameter (min.)	Outer Diameter (max.)		Nominal Weight kg/km	
87486A	2x1.5	19/0.32	1.5	6.6 [.260]	10.2 [.402]	11.2	[.441]	178	Black
87488A	3x1.5	19/0.32	1.5	7.1 [.280]	10.8 [.425]	11.6	[.457]	203	Black
87490A	4x1.5	19/0.32	1.5	7.7 [.303]	11.2 [.441]	12.4	[.488]	236	Black
87492A	7x1.5	19/0.32	1.5	9.4 [.370]	13.0 [.512]	14.4	[.567]	328	Black
87494A	12x1.5	19/0.32	1.5	12.5 [.492]	16.0 [.630]	17.6	[.693]	486	Black
87496A	19x1.5	19/0.32	1.5	14.7 [.579]	18.2 [.717]	20.2	[.795]	677	Black
87498A	27x1.5	19/0.32	1.5	17.9 [.705]	21.3 [.839]	23.5	[.925]	906	Black
87487A	2x2.5	7/0.67	2.5	7.7 [.303]	11.2 [.441]	12.4	[.488]	224	Black
87489A	3x2.5	7/0.67	2.5	8.2 [.323]	11.7 [.461]	12.9	[.508]	257	Black
87491A	4x2.5	7/0.67	2.5	9.0 [.354]	12.6 [.496]	14.0	[.551]	312	Black
87493A	7x2.5	7/0.67	2.5	10.9 [.429]	14.7 [.579]	15.7	[.618]	429	Black
87495A	12x2.5	7/0.67	2.5	14.6 [.575]	18.1 [.713]	20.1	[.791]	661	Black
87497A	19x2.5	7/0.67	2.5	17.5 [.689]	20.9 [.823]	23.1	[.909]	936	Black
87499A	27x2.5	7/0.67	2.5	21.1 [.831]	25.3 [.996]	27.3	[1.075]	1321	Black

*Cables are armored with an overall galvanized steel wire braid armor.

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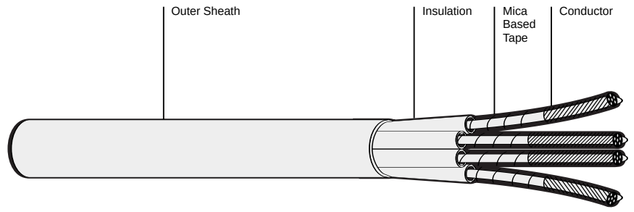
FR-1000 (Continued)



FR-1000 Multicore Control Cables, Unshielded, Unarmored, 600/1000V

Selection Table

Part No. EPD	Construction	Conductor Stranding	CSA Nominal mm²	Cable			
				Outer Diameter		Nominal Weight kg/km	Jacket Color
				(min.)	(max.)		
87472A	2x1.5	19/0.32	1.5	7.5 [.295]	7.9 [.311]	87	Black
87474A	3x1.5	19/0.32	1.5	7.8 [.307]	8.6 [.339]	108	Black
87476A	4x1.5	19/0.32	1.5	8.4 [.331]	9.2 [.362]	134	Black
87478A	7x1.5	19/0.32	1.5	10.1 [.398]	11.1 [.437]	204	Black
87480A	12x1.5	19/0.32	1.5	13.3 [.524]	14.3 [.563]	332	Black
87482A	19x1.5	19/0.32	1.5	15.2 [.598]	16.8 [.661]	490	Black
87484A	27x1.5	19/0.32	1.5	18.5 [.728]	19.9 [.783]	684	Black
87473A	2x2.5	7/0.67	2.5	8.4 [.331]	9.2 [.362]	122	Black
87475A	3x2.5	7/0.67	2.5	8.8 [.346]	9.8 [.386]	150	Black
87477A	4x2.5	7/0.67	2.5	9.7 [.382]	10.7 [.421]	192	Black
87479A	7x2.5	7/0.67	2.5	11.5 [.453]	12.7 [.500]	288	Black
87481A	12x2.5	7/0.67	2.5	15.1 [.594]	16.7 [.657]	475	Black
87483A	19x2.5	7/0.67	2.5	17.9 [.705]	19.7 [.776]	720	Black
87485A	27x2.5	7/0.67	2.5	21.3 [.839]	23.5 [.925]	995	Black

Conductors	Tin plated copper to BS6360
Insulation	Mica based tape, halogen-free, low smoke material complying with Raychem specification WSD695
Core Identification	White and numbered
Inner Sheath	Halogen-free, low smoke material complying with Raychem specification WCD51/1663 and WSD696
Armor	Galvanized steel wire braid in accordance with Raychem specification WSD696 and BS6883 (BS1442)
Outer Sheath	Raychem Zerohal material complying with Raychem specification WSD696 and exceeding the requirements of BS6899, Type D. Flame retardant to IEC60332-3(Cat A) and fire resistant to IEC60331 (enhanced to 950 +/- 50°C [122°F], 3 hours) Sheath printed with number and size of conductors, IEC331, Raychem, voltage rating and EPD number Sheath color black Oxygen index >30% (BS2782), Temperature index > 260°C (BS2782), Smoke index <13 (BS6883) Toxicity Index <2 (NES713)
Temperature Rating	90°C [194°F] maximum conductor operating temperature
Voltage Rating	600/1000V

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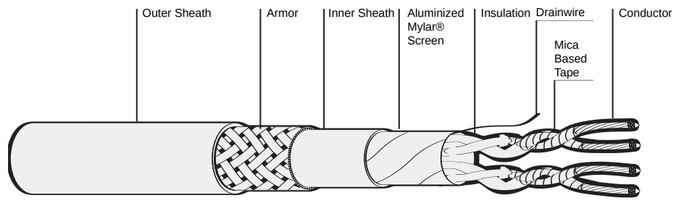
FR-1000 (Continued)

Halogen-Free, Fire Resistant Cable Range



FR-1000 Multipair Control Cables, Collectively Shielded and Armored 600/1000V*

Selection Table

Part No. EPD	Construction	Conductor Stranding	CSA Nominal mm²	Diameter (Nominal)		Cable			
				Over Shield	Over Inner Sheath	Outer Diameter (min.)	Outer Diameter (max.)	Nominal Weight kg/km	Jacket Color
93491A	3x2x0.75	19/0.23	0.75	9.7 [.382]	11.1 [.437]	14.6 [.575]	16.2 [.638]	319	Grey
93492A	7x2x0.75	19/0.23	0.75	13.1 [.516]	14.6 [.575]	18.1 [.713]	20.1 [.791]	484	Grey
93493A	12x2x0.75	19/0.23	0.75	16.4 [.646]	18.1 [.713]	21.5 [.846]	23.7 [.933]	685	Grey
93494A	20x2x0.75	19/0.23	0.75	21.2 [.835]	23.0 [.906]	26.8 [1.055]	29.6 [1.165]	1090	Grey
87500A	2x1.5	19/0.32	1.5	5.4 [.213]	6.7 [.264]	10.7 [.421]	11.3 [.445]	192	Black
87501A	2x2x1.5	19/0.32	1.5	7.2 [.283]	8.6 [.339]	12.3 [.484]	13.5 [.531]	267	Black
87502A	3x2x1.5	19/0.32	1.5	11.2 [.441]	12.7 [.500]	16.1 [.634]	17.9 [.705]	404	Black
87503A	5x2x1.5	19/0.32	1.5	13.8 [.543]	15.3 [.602]	18.8 [.740]	20.8 [.819]	541	Black
87504A	7x2x1.5	19/0.32	1.5	15.2 [.598]	16.9 [.665]	20.3 [.799]	22.5 [.886]	649	Black
87505A	10x2x1.5	19/0.32	1.5	17.5 [.705]	19.2 [.756]	22.5 [.886]	24.9 [.980]	817	Black
87506A	12x2x1.5	19/0.32	1.5	19.0 [.748]	20.7 [.815]	25.2 [.992]	26.6 [1.047]	999	Black
87507A	20x2x1.5	19/0.32	1.5	24.7 [.972]	26.5 [1.043]	30.5 [1.201]	33.7 [1.327]	1541	Black
87508A	24x2x1.5	19/0.32	1.5	26.6 [1.047]	28.6 [1.126]	33.6 [1.323]	35.6 [1.402]	1762	Black

*Cables have an overall aluminized MYLAR shield with drainwire and an overall galvanized steel wire braid armor.

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Catalog 1308940
Revised 8-06

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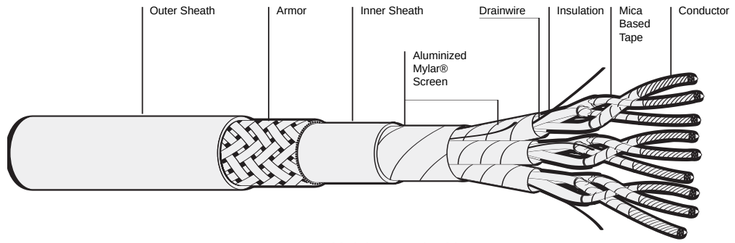
FR-1000 (Continued)



FR-1000 Multitriple control cables, Collectively Shielded and Armored, 600/1000V*

Selection Table

Part No. EPD	Construction	Conductor Stranding	CSA Nominal mm²	Diameter (Nominal)		Cable			
				Over Shield	Over Inner Sheath	Outer Diameter (min.)	Outer Diameter (max.)	Nominal Weight kg/km	Jacket Color
87509A	1x3x1.5	19/0.32	1.5	5.9 [.232]	7.2 [.283]	10.7 [.421]	11.9 [.469]	216	Black
87510A	3x3x1.5	19/0.32	1.5	12.0 [.472]	13.5 [.531]	16.9 [.665]	18.7 [.736]	480	Black
87511A	7x3x1.5	19/0.32	1.5	16.2 [.638]	17.9 [.705]	21.3 [.839]	23.5 [.925]	815	Black
87512A	12x3x1.5	19/0.32	1.5	22.2 [.874]	24.0 [.945]	28.1 [1.106]	31.1 [1.224]	1357	Black

*Cables have an overall aluminized MYLAR shield with drainwire and an overall galvanized steel wire braid armor.

Conductors	Tin plated copper to BS6360
Insulation	Mica based tape, halogen-free, low smoke material complying with Raychem specification WSD695
Core Identification	Pairs – black and white and numbered. Triples – black, red and white and numbered
Shielding	Aluminized MYLAR tapewrap in contact with tinned copper drainwire
Inner Sheath	Halogen-free, low smoke material complying with Raychem specification WCD51/1663 and WCD696
Armor	Galvanized steel wire braid in accordance with Raychem specification WSD696 and BS6883 (BS1442)
Outer Sheath	Raychem Zerohal material complying with Raychem specification WSD696 and exceeding the requirements of BS6899, Type D. Flame retardant to IEC60332-3(Cat A) and fire resistant to IEC60331 (enhanced to 950 +/- 50°C [122°F]z, 3 hours) Sheath printed with number and size of conductors, IEC331, Raychem, voltage rating and EPD number Sheath color black Oxygen index >30% (BS2782), Temperature index > 260°C [482°F] (BS2782), Smoke index <13 (BS6883) Toxicity Index <2 (NES713)
Temperature Rating	90°C maximum conductor operating temperature
Voltage Rating	600/1000V

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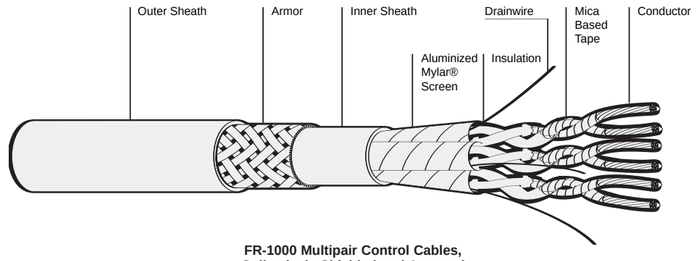
FR-1000 (Continued)

Halogen-Free, Fire Resistant Cable Range



FR-1000 Multipair Control Cables, Collectively Shielded and Armored 600/1000V*

Selection Table

Part No. EPD	Construction	Conductor Stranding	CSA Nominal mm²	Diameter (Nominal)		Cable			
				Over Shield	Over Inner Sheath	Outer Diameter (min.)	Outer Diameter (max.)	Nominal Weight kg/km	Jacket Color
93491A	3x2x0.75	19/0.23	0.75	9.7 [.382]	11.1 [.437]	14.6 [.575]	16.2 [.638]	319	Grey
93492A	7x2x0.75	19/0.23	0.75	13.1 [.516]	14.6 [.575]	18.1 [.713]	20.1 [.791]	484	Grey
93493A	12x2x0.75	19/0.23	0.75	16.4 [.646]	18.1 [.713]	21.5 [.846]	23.7 [.933]	685	Grey
93494A	20x2x0.75	19/0.23	0.75	21.2 [.835]	23.0 [.906]	26.8 [1.055]	29.6 [1.165]	1090	Grey
87500A	2x1.5	19/0.32	1.5	5.4 [.213]	6.7 [.264]	10.7 [.421]	11.3 [.445]	192	Black
87501A	2x2x1.5	19/0.32	1.5	7.2 [.283]	8.6 [.339]	12.3 [.484]	13.5 [.531]	267	Black
87502A	3x2x1.5	19/0.32	1.5	11.2 [.441]	12.7 [.500]	16.1 [.634]	17.9 [.705]	404	Black
87503A	5x2x1.5	19/0.32	1.5	13.8 [.543]	15.3 [.602]	18.8 [.740]	20.8 [.819]	541	Black
87504A	7x2x1.5	19/0.32	1.5	15.2 [.598]	16.9 [.665]	20.3 [.799]	22.5 [.886]	649	Black
87505A	10x2x1.5	19/0.32	1.5	17.5 [.689]	19.2 [.756]	22.5 [.886]	24.9 [.980]	817	Black
87506A	12x2x1.5	19/0.32	1.5	19.0 [.748]	20.7 [.815]	25.2 [.992]	26.6 [1.047]	999	Black
87507A	20x2x1.5	19/0.32	1.5	24.7 [.972]	26.5 [1.043]	30.5 [1.201]	33.7 [1.327]	1541	Black
87508A	24x2x1.5	19/0.32	1.5	26.6 [1.047]	28.6 [1.126]	33.6 [1.323]	35.6 [1.402]	1762	Black

*Cables have an overall aluminized MYLAR shield with drainwire and an overall galvanized steel wire braid armor.

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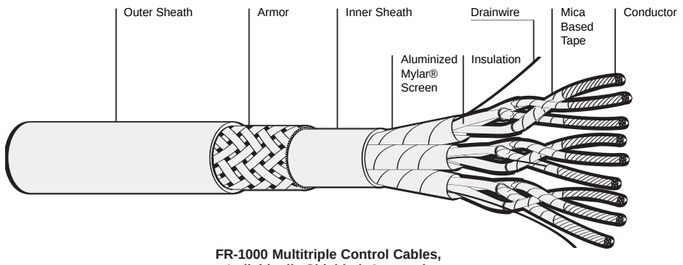
FR-1000 (Continued)



FR-1000 Multitriple Control Cables, Individually Shielded, Armored, 600/1000V*

Selection Table

Part No. EPD	Construction	Conductor Stranding	CSA Nominal mm²	Diameter (Nominal) Over Inner Sheath	Cable			
					Outer Diameter		Nominal Weight kg/km	Jacket Color
					(min.)	(max.)		
93500A	3x3x0.75	19/0.23	0.75	12.4 [.488]	15.9 [.626]	17.5 [.689]	407	Grey
93501A	7x3x0.75	19/0.23	0.75	16.8 [.661]	20.2 [.795]	22.4 [.881]	682	Grey
93502A	12x3x0.75	19/0.23	0.75	22.6 [.890]	26.4 [1.039]	29.2 [1.150]	1111	Grey
93503A	3x1.00	19/0.25	1.0	6.6 [.260]	10.6 [.417]	11.6 [.457]	198	Grey

*Cables have pairs individually shielded with aluminized MYLAR and drainwire and an overall galvanized steel wire braid armor.

Conductors	Tin plated copper to BS6360
Insulation	Mica based tape, halogen-free, low smoke material complying with Raychem specification WSD695
Core Identification	Pairs – black and white and numbered. Triples – black, red and white and numbered
Shielding	Aluminized MYLAR tapewrap in contact with tinned copper drainwire
Inner Sheath	Halogen-free, low smoke material complying with Raychem specification WCD51/1663 and WSD696
Armor	Galvanized steel wire braid in accordance with Raychem specification WSD696 and BS6883 (BS1442)
Outer Sheath	Raychem Zerohal material complying with Raychem specification WSD696 and exceeding the requirements of BS6899, Type D. Flame retardant to IEC60332-3(Cat A) and fire resistant to IEC60331 (enhanced to 950 +/- 50°C [122°F], 3 hours) Sheath printed with number and size of conductors, IEC331, Raychem, voltage rating and EPD number Sheath color black Oxygen index >30% (BS2782), Temperature index > 260°C [500°F] (BS2782), Smoke index <13 (BS6883) Toxicity Index <2 (NES713)
Temperature Rating	90°C [194°F] maximum conductor operating temperature
Voltage Rating	600/1000V

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Type 99M

Product Facts

- Low flammability
- Low smoke generation
- Low toxicity index
- Low generation of corrosive gases
- Small size, lightweight

Applications

Type 99M wire has a dual wall construction of radiation cross-linked modified polyester. This combines excellent mechanical performance and chemical resistance with a range of enhanced fire hazard properties. Type 99M wire is designed to meet the stringent low fire hazard performance now being specified by many authorities, in particular for naval, mass transit and industrial control panel wiring.

During the 1980's there were major changes in the demands of many wire and cable specifications to reduce the risks associated with all aspects of fire hazards. Specifications such as Def Stan 61-12 Part 18, have been developed over the last decade demanding improved performance of wires and cables under fire conditions.

This has led to a tightening of the requirements for flammability, smoke generation, corrosive gas generation and hazardous fume emission. Type 99M wire achieves these improvements in performance whilst retaining small size, light weight, flexibility, handleability, resistance to carbon arc tracking and resistance to chemicals and fluids.

Physical Characteristics

Handleability

Type 99M wire has been designed to be compatible with modern wiring and harnessing techniques. It is a flexible wire with virtually no springback once set. It is easily stripped with tools such as conventional die-blade strippers.

Small Size

Type 99M equipment wire has a nominal 0.2 mm insulation wall thickness which is comparable to other established thin wall wires such as SPEC 44 wire.

Light Weight

Type 99M wire is designed to have the same weights as SPEC 44 wire.

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Type 99M (Continued)

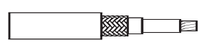
Approvals

Raychem WCD 281
Def Stan 61-12 Part 18 Issue 4 Type 1
Italian Navy STN-SR-01
Lloyds Register

Type 99M Wire and Cable - Nominal Sizes, Strandings and Weights

99M011X (600 V)
Primary Wire

99M021X (1000 V)
Primary Wire



99M1111
Shielded & Jacketed

99M1121
Shielded & Jacketed

Primary Wires/Shielded and Jacketed Cables - 99M

Size	Stranding (mm)	99M011X (600 V)		99M021X (1000 V)		99M1111		99M1121	
		OD	Weight (g/m)	OD	Weight (g/m)	OD	Weight (g/m)	OD	Weight (g/m)
26	19x0.10	0.88 [.035]	2.00	1.01 [.040]	2.2	1.80 [.071]	7.5	2.91 [.115]	13.3
24	19x0.12	0.98 [.039]	3.00	1.17 [.046]	3.4	1.90 [.075]	9.2	3.20 [.126]	16.6
22	19x0.15	1.13 [.044]	4.40	1.37 [.054]	4.9	2.05 [.081]	11.1	3.52 [.139]	20.5
20	19x0.20	1.40 [.055]	6.50	1.57 [.062]	7.3	2.30 [.091]	14.6	4.02 [.158]	27.7
18	19x0.25	1.65 [.065]	9.90	1.85 [.073]	10.9	2.55 [.100]	19.3	4.57 [.180]	37.1
16	19x0.30	1.90 [.075]	14.15	2.10 [.083]	14.5	2.95 [.116]	24.9	5.13 [.202]	48.5
14	37x0.25	2.25 [.089]	18.62	2.50 [.098]	21.8	3.13 [.123]	30.9	5.72 [.225]	60.5
12	37x0.32	2.60 [.102]	25.70	2.97 [.117]	31.3	3.48 [.137]	43.4	6.42 [.253]	86.0

Typical Properties

Test	Method	Typical value
Temperature rating	BS G230	125°C [257°F]
Voltage rating	Raychem	600 V thin wall
Tensile strength/elongation of insulation	—	30 MPa/250%
Notch propagation (0.05 mm notch)	BS G230	Pass
Shrinkage 200°C [392°F]	BS G230	<1%
Low temperature bend	BS G230	-55°C [-67°F]
Voltage withstand	BS G230	2.5 kV
Insulation resistance (20°C [68°F])	BS G230	1000 M ohms km (min)
Pliability rating	Def Stan 61-12 (18)	82 - Pliable
Fluid resistance	Def Stan 61-12 (18)	
Fuels - aircraft		Pass
Oils - (ASTM No 3)		Pass
Solvents		Pass

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Type 99M (Continued)

Environmental Properties

Mechanical Performance

The scrape abrasion and cut through resistance of Type 99M wire out performs the well-established performance of SPEC 44 wire throughout its operating temperature range.

Fluid Resistance

Type 99M wire demonstrates outstanding resistance to most acids, alkalis, hydrocarbon solvents, fuels, lubricants and water.

Electrical Arc Tracking

Type 99M wire is resistant to electrical arc tracking under both wet and dry conditions.

Voltage Ratings

Standard available voltage ratings for Type 99M wire are 600 V (0.2 mm wall thickness) and 1000 V (0.3 mm wall thickness).

Fire Hazard Characteristics

Low Toxicity Index

Type 99M wire is designed to meet the low hazardous fume emission levels required in modern specifications. For example, the change in the Toxicity Index requirement from 1.5 to 0.2 between Issue 2 and Issue 3 of Def Stan 61-12 (Part 18), is met by Type 99M wire.

Flammability

Type 99M wire has passed some of the most stringent flammability tests, such as the test in IEC 332 Part 3 (ladder test) and Underwriter's Laboratory for VW1 (individual wire)

Smoke Generation

Type 99M wire has been designed to meet stringent smoke tests such as those specified in Def Stan 61-12 (Part 18) and in many mass transit specifications.

Corrosivity

Type 99M wire has a low corrosive gas emission, demonstrated by its low acid gas value and meets the latest requirements of low fire hazard specifications.

Fire Hazard Properties

Test	Method	Typical value
Flammability	IEC 332 Pt 3	Pass
Toxicity index	Def Stan 61-12 (18)	0.1 per meter of wire
Smoke index	Def Stan 61-12 (18)	8 per meter of wire
Acid gas equivalent	TDE 76/P/76	<1.5%

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Type 99M (Continued)

Part Numbering System

99 X X X X X- Size- X/X- X

Jacket Color
(in accordance with MIL-STD-681, black preferred)

Primary Wire Insulation Color
0=Black 1=Brown 2=Red 2L=Pink 3=Orange 4=Yellow
45=Yellow/Green 5=Green 6=Blue 7=Violet 8=Grey 9=White
Additional number after base color indicates stripe

Conductor Size

Conductor Type
1 - Tin-plated copper 9 - Bare copper

Number of Conductors
1, 2, 3, 4 etc.

Class of Wire
1 - 600V equipment wire
2 - 1000V equipment wire

Constructions
0 - Primary wire & unscreened, unjacketed cables
1 - Round braid screened & jacketed*
9 - Special construction

Wire Type
M - Military wire

Basic Specification Number

* The cable jackets are Raychem Zerohal and the preferred color is black.

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Zerohal 100A

Product Facts

- Halogen free, low smoke
- Highly flame retardant
- Flexible, easy to install
- Small size, lightweight (thin wall construction)

Applications

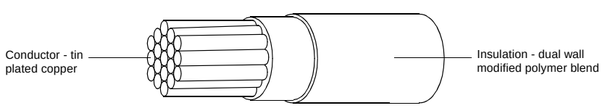
Raychem's latest generation LFH, thinwall wire has been designed for use primarily in signal, control and light power circuits in subway, regional and high speed trains. It is ideal for applications where space and weight are at a premium; fire safety is important; reliability is imperative; rugged properties to withstand service in an RMT environment are required.

The construction is a dual wall combination of Raychem formulated polymer blends developed to meet the specification requirements while maintaining the desirable features of small size, lightweight, flexibility, non-wrinkling, ease of stripping, compatibility with standard stripping equipment, lack of recoil and mechanical robustness.

Physical Characteristics

Handleability

Zerohal 100A has been designed for minimum recoil during harnessing operations, to be readily handleable by modern wiring and harnessing techniques and to be easily stripped with standard equipment and tools.



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Zerohal 100A (Continued)

Typical Properties

Test	Method	Typical Values
Physical Properties		
Insulation Tensile Strength and Ultimate Elongation	ASTM D3032	Tensile Strength 3500 psi minimum Ultimate Elongation 250% minimum
Scrape Abrasion Resistance	AAR S 501	1000 cycles minimum (90°, 0.01 inch radial edge blade, 6N load, 20°C [68°F])
Dynamic Cut Through	ASTM D3032	20 lbs. minimum (90°, 0.01 inch radial edge blade, 0.2 inch per min, 20°C [68°F])
Static Cut-through Penetration	AAR S 501	No contact with the conductor (90°, 0.01 inch radial edge blade, 10 min, 9N load, 125°C [257°F])
Thermal Properties		
Temperature Index	ASTM D3032	10,000 hours minimum at 125°C [257°F]
Accelerated ageing	ASTM D3032	No cracks, flow or dielectric breakdown. (168hr at 170°C [338°F])
Shrinkage	IEC 811-1-3	0.5% maximum at each end. (6hr at 160°C [320°F)
Insulation Blocking	MIL-W-22759E	Cores must be easily separated without damage (24hr at 125°C [257°F], 6X mandrel.)
Electrical Properties		
IR Constant	ASTM D3032	>10000 MΩkft at 20°C [68°F] >100 MΩkft at 60°C [140°F] >10 MΩkft at 90°C [194°F]
Environmental Properties		
Fluid Immersion	ASTM D3032	Fluid / NATO code / Temp (°C) / Time (hr) ASTM No.1 Oil — 100 70 IRM 902 Oil — 100 70 IRM 903 Oil — 100 70 70/30 iso-octane/toluene — 23 24 Engine lubricating oil O-236 70 24 Grease G-354 70 24 Hydraulic fluid, petroleum base H-515 50 24 Silicone damping fluid S-1724 70 24 Automotive brake fluid H-542 23 24 Fire resistant hydraulic fluid H-544 50 24 De-icing fluid S-745 23 24 Methyl Ethyl Ketone — 23 1 5% max swell. No dielectric breakdown. (30mm diameter mandrel)
Fire Hazard Properties		
Flammability - small scale	IEC 332-1	Charring confined between 50mm and 540mm from lower edge of top support. (Single vertical wire, 60 s flame)
Flammability - large scale	IEC 332-3	2.5m maximum burn length. (Five 3.5m long 37-wire bundles, vertical, 20.5 kW flame)
Smoke - small scale	ISO 5659-2	Ds1.5 of 100 max., Ds4 of 150 max., Dmax of 150 max., VOF4 of 300 max. ('NBS' smoke box with cone heater, 1.8m of wire 50 kW/m2 heat flux with and without a pilot flame)
Smoke - large scale	IEC 1034	90% minimum transmittance. (3m cube smoke box. Eight 1m long 7-wire bundles, horizontal. Fire source: 1 litre burning alcohol.)
Toxicity	IMO FTPC	Toxicity index < 1 (Test conditions as in smoke - small scale)
Halogen Content	IEC 684-2	Less than 0.2% Cl + Br + I. Less than 0.1% F (Wet chemical analysis)
Copper Mirror Corrosion	ASTM D2671	5% maximum etched area. (0.4g sample, 200°C [392°F], 16hr.)
Acid Gas Detection	IEC 754-2	pH greater than 4.3 10 µS/mm maximum (1g sample, tube furnace, T > 935°C [1715°F], gases dissolved in water)

Ordering Information

Conductor				Finished Wire Maximum Resistance at 20°C /kft/km	Diameter		Maximum Weight lbs/kft kg/km	Part No.
Wire Size AWG	Stranding No x AWG Dia (mm)	Diameter Min.	Diameter Max.		Min.	Max.		
24	19x36	0.550 [0.022]	0.63 [0.025]	25.7 [84.32]	1.09 [0.043]	1.19 [0.047]	2.41 [3.59]	100A0111-24-*
22	19x34	0.735 [0.029]	0.79 [0.031]	15.9 [52.2]	1.26 [0.050]	1.33 [0.052]	3.34 [4.98]	100A0111-22*
20	19x32	0.940 [0.037]	1.01 [0.040]	9.9 [32.4]	1.46 [0.057]	1.54 [0.061]	4.98 [7.42]	100A0111-20*
18	19x30	1.170 [0.046]	1.26 [0.050]	6.2 [20.4]	1.69 [0.067]	1.79 [0.071]	7.31 [10.89]	100A0111-18*
16	19x29	1.321 [0.052]	1.37 [0.054]	4.8 [15.8]	1.84 [0.072]	1.94 [0.076]	9.19 [13.70]	100A0111-16*
14	19x27	1.650 [0.065]	1.79 [0.070]	3.1 [10.0]	2.27 [0.089]	2.39 [0.094]	14.45 [21.53]	100A0111-14*
12	37x28	2.080 [0.082]	2.24 [0.088]	2.0 [6.63]	2.71 [0.107]	2.86 [0.113]	21.03 [31.33]	100A0111-12*
10	37x26	2.690 [0.106]	2.83 [0.111]	1.3 [4.13]	3.33 [0.131]	3.51 [0.138]	33.27 [49.58]	100A0111-10*

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Zerohal 100A (Continued)

Environmental Properties

Fluid Resistance

Zerohal 100A wire demonstrates an outstanding balance of resistance to a wide range of commonly used solvents, fluids and lubricants.

Voltage Rating

Zerohal 100A wire is a 600 volt rated wire.

Fire Hazard Characteristics

Zerohal 100A is a halogen free insulation system and does not contain phosphorus or sulphur. It meets the toxicity, smoke density, halogen content, corrosivity and flammability requirements of major recognized agencies.

Flammability

Zerohal 100A meets the flammability/burning behavior requirements of major recognized agencies.

Fire Hazard Properties

Test	Method	Typical Value
Flammability - small scale	IEC 332-1	Charring confined between 50mm and 540mm from lower edge of top support. (Single vertical wire, 60 s flame)
Flammability - large scale	IEC 332-3	2.5m maximum burn length. (Five 3.5m long 37-wire bundles, vertical, 20.5 kW flame)
Flammability	IEEE 383	Pass
Smoke - small scale	ISO 5659-2	Ds1.5 of 100 max., Ds4 of 150 max., Dmax of 150 max., VOF4 of 300 max. ('NBS' smoke box with cone heater, 1.8m of wire 50 kW/m2 heat flux with and without a pilot flame)
Smoke - small scale	ASTM E662	Smoke density - Ds4 (Max.) Flaming - 200 Non-Flaming - 75
Toxicity	IMO FTPC	Toxicity index < 1 (Test conditions as in smoke - small scale)
Halogen Content	IEC 684-2	Less than 0.2% Cl + Br + I. Less than 0.1% F (Wet chemical analysis)
Copper Mirror Corrosion	ASTM D2671	5% maximum etched area. (0.4g sample, 200°C [392°F], 16hr.)
Acid Gas Detection	IEC 754-2	pH greater than 4.3 10 µS/mm maximum (1g sample, tube furnace, T > 935°C [715°F], gases dissolved in water)

Part Numbering System

100 A X X X X- Size- X

Primary Wire Insulation Color

0 - Black	4 - Yellow	8 - Gray
1 - Brown	5 - Green	9 - White
2 - Red	6 - Blue	
3 - Orange	7 - Violet	

Conductor Size

Conductor Type
1 - Tin-plated copper

Number of Conductors
1 to 9

Class of Wire
1 - 600 V equipment wire

Construction
0 - Primary wire and unscreened, unjacketed cables
1 - Roundbraid, screened and jacketed
4 - Jacketed, no screen

Wire Type
A - AWG construction (US Specification)

Basic Specification Number

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Zerohal 100G

Product Facts

- Qualified to VG 95218-20, Type E
- Halogen free, low smoke
- Highly flame retardant
- Flexible, easy to install
- Small size, lightweight (thin wall construction)

Applications

Zerohal 100G wire has been developed to meet the requirements of German Specification VG 95218-20, Type E primary wire.

The construction is a dual wall combination of Raychem formulated polymer blends developed to meet the specification requirements while maintaining the desirable features of small size, lightweight, flexibility, non-wrinkling, ease of stripping, compatibility with standard stripping equipment, lack of recoil and mechanical robustness.

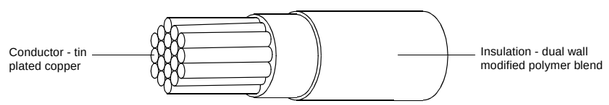
System

- System 100

Physical Characteristics

Handleability

Zerohal 100G wire has been designed for minimum recoil during harnessing operations, to be readily handleable by modern wiring and harnessing techniques and to be easily stripped with standard equipment and tools.



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Zerohal 100G (Continued)

Approvals

VG 95218-20, Type E (Electrical cables and insulated wires for low frequency - Part 20: Single core insulated wires.)

Typical Properties

Test	Method	Typical Value
Max. operating temperature	VG 95218-20, ASTM D 3032	125°C [257°F] (20,000 h)
Insulation shrinkage (160°C)	DIN VDE 0472 Pt 628, IEC 811-1-3	< 0.5%
Low temperature bend	VG 95218 - Pt 2	-55°C [-67 °F]
Pressure test at high temperature	DIN VDE 0472 Pt 609, IEC 811-3-1	125°C [257°F] < 30% indentation
Heat aging (150°C, 6 h)	DIN VDE 0472 Pt 303,	No cracking, no dielectric
(140°C, 120 h)	IEC 811-1-2	breakdown
Voltage rating	VG 95218-20	750/1300 V AC
Abrasion resistance	VG 95218 - Pt 2	Pass
Insulation blocking (125°C)	VG 95218 - Pt 2	Pass
Voltage withstand	DIN VDE 0472 pt 509	Pass
(23°C, 2.5 kV rms)		
Insulation resistance	DIN VDE 0472 pt 502, IEC 885-1	> 500 M ohms. km (20°C [68°F]) > 0.5 M ohms. km (90°C [194°F])
Chemical Resistance		
Grease (G-354)*	VG 95218 - Pt 2, 70°C 24h	< 5% diameter change, no dielectric breakdown
Hydraulic fluid (H-515, H-544)*	VG 95218 - Pt 2, 50°C 24h	< 5% diameter change, no dielectric breakdown
Brake fluid (H-542)*	VG 95218 - Pt 2, 23°C 24h	< 5% diameter change, no dielectric breakdown
De-icing fluid (S-745)*	VG 95218 - Pt 2, 23°C 24h	< 5% diameter change, no dielectric breakdown
MEK	VG 95218 - Pt 2, 23°C 1h	< 5% diameter change, no dielectric breakdown
70/30 ISO-Octane/ Toluene	VG 95218 - Pt 2, 23°C 24h	< 5% diameter change, no dielectric breakdown
Insulation		
Tensile strength	DIN VDE 0472 pt 602, IEC 811-1-1	> 20 MPa
Elongation at break	DIN VDE 0472 pt 602, IEC 811-1-1	> 200%

*NATO code. For further details please consult the German Standard VG 95218-20, Type E.

Part Numbering System

100 G X X X X- Size- X

Primary Wire Insulation Color

0	Black	3	Orange	7	Violet
1	Brown	4	Yellow	8	Gray
2	Red	5	Green	9	White
2L	Pink	6	Blue		

NB. VG 95218 T020-EXXX wire only available in colors 0, 1, 45, 6, 9

Conductor Size

Conductor Type
1 - Tin-plated copper

Number of Conductors
1

Class of Wire
1 - 750 V equipment wire

Construction
0 - Primary wire

Wire Type
G - Meeting the performance requirements of German Specification VG 95218-20, Type E

Basic Specification Number

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Zerohal 100G (Continued)

Environmental Properties

Fluid Resistance

Zerohal 100G wire demonstrates an outstanding balance of resistance to a wide range of commonly used solvents, fluids and lubricants.

Voltage Rating

Zerohal 100G wire is a 750/1300 V AC rated wire.

Fire Hazard Characteristics

Zerohal 100G is a halogen free insulation system and does not contain phosphorus or sulphur. It meets the toxicity, smoke density, halogen content, corrosivity and flammability requirements of VG 95218-20, Type E.

Flammability

Zerohal 100G meets the flammability/burning behavior requirements of VG 95218-20, Type E.

Fire Hazard Properties

Test	Method	Typical value
Toxicity	NES 713	3.5
Smoke density	IEC 1034 Pt 1 and 2	95% light transmittance
Halogen content	DIN VDE 0472 pt 815	Non-detected
Corrosivity of combustion gases	DIN VDE 0472 pt 813, IEC 754-2	5.0 pH, <4 µS/mm conductivity
Flammability	VG 95218 Pt 2	< 15 sec afterburn < 150 mm burn length

Ordering Information

Conductor Nominal Cross Sectional Area mm²	Stranding No. x nom. Dia. (mm)	Diameter Min.	Diameter Max.	Insulated Wire Maximum Resistance at 20°C ohms/km	Diameter Min.	Diameter Max.	Maximum Weight g/m	VG 95218 Part No.	Part No.
0.40	19x0.16	0.74 [.029]	0.79 [.031]	50.50	1.28 [.050]	1.39 [.055]	5.17	VG 95218 T020-E02*	100G0111-0.40-*
0.50	19x0.18	0.82 [.032]	0.90 [.035]	40.10	1.37 [.054]	1.47 [.058]	6.60	VG 95218 T020-E03*	100G0111-0.50-*
0.60	19x0.20	0.95 [.037]	1.01 [.040]	31.10	1.47 [.058]	1.57 [.062]	7.54	VG 95218 T020-E04*	100G0111-0.60-*
0.75	19x0.23	1.04 [.041]	1.15 [.045]	26.70	1.59 [.063]	1.70 [.067]	8.90	VG 95218 T020-E05*	100G0111-0.75-*
1.00	19x0.25	1.17 [.046]	1.26 [.050]	20.00	1.69 [.067]	1.80 [.071]	10.73	VG 95218 T020-E06*	100G0111-1.00-*
1.20	19x0.29	1.32 [.052]	1.42 [.056]	15.30	1.88 [.074]	1.98 [.078]	13.59	VG 95218 T020-E07*	100G0111-1.20-*
1.50	37x0.23	1.46 [.057]	1.58 [.062]	13.70	2.03 [.080]	2.13 [.084]	15.96	VG 95218 T020-E08*	100G0111-1.50-*
2.00	37x0.25	1.68 [.066]	1.82 [.072]	10.50	2.31 [.091]	2.41 [.095]	20.29	VG 95218 T020-E09*	100G0111-2.00-*
2.50	37x0.29	1.85 [.073]	2.01 [.079]	8.21	2.48 [.098]	2.63 [.104]	25.65	VG 95218 T020-E10*	100G0111-2.50-*
3.00	37x0.32	2.12 [.083]	2.24 [.088]	6.58	2.70 [.106]	2.86 [.113]	31.00	VG 95218 T020-E11*	100G0111-3.00-*
4.00	56x0.30	2.41 [.095]	2.56 [.101]	4.86	3.01 [.119]	3.16 [.124]	43.48	—	100G0111-4.00-*

The VG 95218-20, Type E specification defines that the insulation color shall be black, brown, yellow/green, blue or white only.
To ensure full compliance with the specification, order the VG 95218 part number complete with color code.
Raychem Type 100G wire, meeting the performance requirements of VG 95218-20, Type E, is available in other colors (see part numbering system). To order these colors, order the Raychem 100G part number.
*Color code in accordance with part number system.

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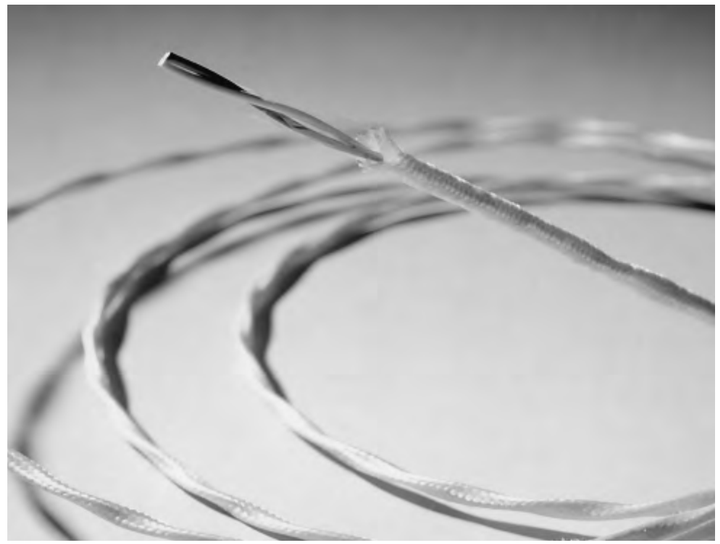
Thermocouple Extension Cable

Product Facts

- 19-strand conductor for flexibility



Applications

Tyco Electronics manufactures a broad range of Raychem Thermocouple extension cables in four thermoelement combinations. Each provides accurate transmission of electromotive force (EMF) from a Thermocouple element lead wire of the same conductor material to a thermometer, also known as a pyrometer.

All four types of Thermocouple extension cables use 19-strand conductors and are available in twisted pair, jacketed twisted pair, and shielded and jacketed twisted pair configurations. A range of cables is available from 16 AWG to 24 AWG.

Wires and cables are insulated and jacketed with radiation-crosslinked ETFE, which has a continuous operating temperature of -65°C to +200°C [-85°F to +392°F]. This material, which is fully specified in Raychem SPEC 55, has excellent physical properties and is highly resistant to a wide range of chemicals.

Operating Temperature Range

-65°C to 200°C
[-85°F to 392°F]

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Thermocouple Extension Cable (Continued)

Properties

Extension Cable Type	Thermoelement Combination	Initial Calibration Tolerances for Thermocouple Extension Wires		
		Temperature Range	Limit of Range	EMF (mv)* (min.–max.)
EX	Chromel-Constantan	0°C to 200°C [0°F to 392°F]	±1.7°C [35.1°F]	6.18–6.45
JX	Iron-Constantan	0°C to 200°C [0°F to 392°F]	±2.2°C [36.0°F]	5.15–5.39
KX	Chromel-Alumel	0°C to 200°C [0°F to 392°F]	±2.2°C [36.0°F]	4.00–4.19
TX	Copper-Constantan	0°C to 100°C [0°F to 212°F]	±1.0°C [32.0°F]	4.24–4.32

Note: The above is in accordance with ANSI-MC-96.1-1982.
*EMF is measured in millivolts (mv) at 100°C [212°F] with reference junction at 0°C [0°F].

Product Dimensions** (Nominal)

AWG Size	Twisted Pair		Twisted, Jacketed Pair		Twisted, Shielded, 38 AWG Braid Strand, Jacketed Pair	
	Outside Diameter	Weight in kg/km (lb/1000 ft)	Outside Diameter	Weight in kg/km (lb/1000 ft)	Outside Diameter	Weight in kg/km (lb/1000 ft)
24	2.29 [.090]	7.3 [4.9]	2.67 [.106]	9.9 [6.7]	3.12 [.123]	16.5 [11.1]
22	2.60 [.102]	9.9 [6.7]	2.99 [.118]	13.0 [8.8]	3.43 [.135]	21.4 [14.4]
20	2.99 [.118]	14.4 [9.7]	3.40 [.134]	18.0 [12.1]	3.83 [.151]	27.8 [18.7]
18	3.56 [.140]	20.9 [14.1]	3.96 [.156]	25.1 [16.9]	4.34 [.173]	37.5 [25.2]
16	3.96 [.156]	26.3 [17.7]	4.37 [.172]	30.9 [20.8]	4.80 [.189]	44.9 [30.2]

**Dimensions for 19-strand-conductor thermocouple. Extension Types EX, JX, KX, and TX.

Extension Cable

Color-Coding

Thermocouple extension cables are available with the wires color-coded in accordance with four standards: MIL-STD-687, ANSI-MC-96.1, British Standard Code BS 1843, and Japanese JIS-C-1602.

Special Cables

Thermocouple extension cables are also available in solid-conductor and seven-strand-conductor configurations. They come in a variety of thermoelement combinations, gauges, insulations, and multiple-pair designs, and they are available for outer space applications. Contact Tyco Electronics for details.

Extension Cable

Type EX	Chromel +	Constantan -	Jacket (if present)	Color code Wire	Jacket
ANSI-MC-96.1	Violet	Red	Violet	7/2	7
British Std.-BS 1843	Brown	Blue	Brown	1/6	1
JIS-C-1602	Violet	Red	Violet	7/2	7
Type JX	**Iron +**	**Constantan -**	**Jacket**	**Wire**	**Jacket**
MIL-STD-687	Black	Yellow	White	0/4	9
ANSI-MC-96.1	White	Red	Black	9/2	0
British Std.-BS 1843	Yellow	Blue	Black	4/6	0
JIS-C-1602	Red	White	Yellow	2/9	4
Type KX	**Chromel +**	**Alumel -**	**Jacket**	**Wire**	**Jacket**
MIL-STD-687	White	Green	White	9/5	9
ANSI-MC-96.1	Yellow	Red	Yellow	4/2	4
British Std.-BS 1843	Brown	Blue	Red	1/6	2
JIS-C-1602	Red	White	Blue	2/9	6
Type TX	**Copper +**	**Constantan -**	**Jacket**	**Wire**	**Jacket**
MIL-STD-687	Red	Yellow	White	2/4	9
ANSI-MC-96.1	Blue	Red	Blue	6/2	6
British Std.-BS 1843	White	Blue	Blue	9/6	6
JIS-C-1602	Red	White	Brown	2/9	1

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Thermocouple Extension Cable (Continued)

Part Number Selection Table

The Thermocouple cable options outlined in the table on the previous page can be ordered from the table below.

Tyco Electronics will assign a new part number on request for cables falling outside the range shown in the table.

Type	Twisted Pair	Twisted, Jacketed Pair	Shield Plating*	Twisted, Shielded, Jacketed Pair
EX	CTC-0077	CTC-0079	T	CTC-0074
			N	55A6169
JX	55A8131	CTC-0080	T	CTC-0044
KX	55A8002	CTC-0012	T	CTC-0018
			N	CTC-0015
			S	CTC-0057
TX	CTC-0078	CTC-0081	T	CTC-0073

*T = Tin-coated copper.
N = Nickel-coated copper.
S = Silver-coated copper.

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ElectroLoss Filterline

Lightweight, Ruggedized Filterline Wire and Cable

Product Facts

- Suppresses EMI above 100 MHz
- Light weight, small size
- SPEC 55 insulation
- 600 volt
- -65°C to 150°C † [-85°F to 302°F]

† -65°C to 200°C [-85°F to 392°F] also available

Applications

Today's performance needs for military and commercial electronic systems require increasingly sophisticated equipment and greater use of composite structures and enclosures. As electronics become more sensitive, the EMI protection level for electrical equipment is increasing. The Raychem ElectroLoss FilterLine wire and cable provide a high degree of EMI protection while functioning as conventional electrical wiring.

ElectroLoss FilterLine products include high-performance wire and cable, which when used as specified, suppress conducted and radiated EMI above 100 MHz.

A reliable alternative to conventional discrete filters and filter-pin connectors, ElectroLoss FilterLine cables are flexible, lightweight, and compatible with high-density connectors.

The Raychem ElectroLoss FilterLine wire and cable meets the performance requirements of MIL-C-85485, a military specification developed to provide EMI protection for military electrical interconnects.

The absorptive layer in ElectroLoss FilterLine cable is constructed of a ferrite-loaded high-temperature polymer, which provides high-frequency EMI absorptive characteristics. Achieving maximum attenuation requires concentrating the electromagnetic fields in the absorptive layer — either with a metallic shield on each wire or by an overall metallic shield protecting a bundle of individual component wires.

Radiation-crosslinked, modified conductive EFTE jackets are used over shielded filter line cables to eliminate pathways between adjacent cable shields.

Application-driven alternative ElectroLoss FilterLine constructions built to the same rigorous standards demanded of the MIL SPEC products are also available. These alternatives offer significant weight savings through the use of flat braids, improved laser mark contrast, and a broader choice of conductors.

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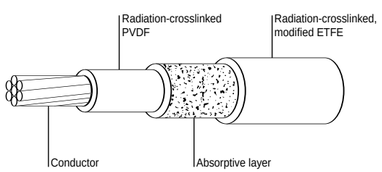

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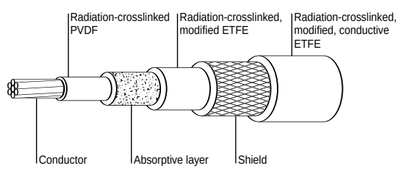

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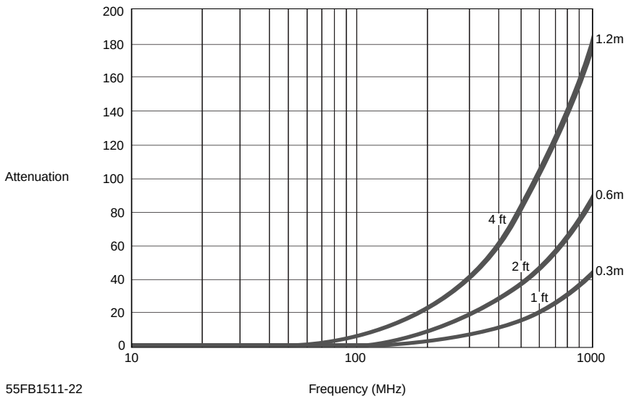
ElectroLoss Filterline (Continued)

Performance

Effective against conducted EMI ElectroLoss FilterLine wire and cable systems attenuate high-frequency EMI and allow low frequency signals to pass with minimum loss. When properly installed and used, filter line wire and cables function as low-pass electrical filters, attenuating both conducted and radiated EMI above 100MHz. The performance of ElectroLoss FilterLine product is best demonstrated by measuring the attenuation (insertion loss) of a length of cable over a broad range of frequencies. Graph 1 depicts typical insertion loss characteristics.

Graph 1 - Typical insertion loss



Temperature rating	-65°C to +150°C † [-85°F to302°F]
Voltage rating	600V r.m.s

† -65°C to 200°C [-85°F to 392°F] also available.

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Lightweight, Ruggedized Filterline Wire and Cable

Single Conductor Wire Specifications

AWG Size	Conductor Stranding (Number x AWG)	Maximum Outside Diameter mm (in)	Maximum Weight Kg/Km (lb/1000 ft)	MIL-SPEC Part Number	Raychem Part Number
24	19 x 36 silver coated high strength copper alloy	1.19 [.047]	4.46 [3.0]	M85485/10-24A	55FA0514-24-*
22	19 x 34 tin coated copper	1.37 [.054]	5.95 [4.0]	M85485/9-22A	55FA0511-22-*
20	19 x 32 tin coated copper	1.57 [.062]	8.63 [5.8]	M85485/9-20A	55FA0511-20-*
18	19 x 30 tin coated copper	1.85 [.073]	12.95 [8.7]	M85485/9-18A	55FA0511-18-*
16	19 x 29 tin coated copper	2.08 [.082]	16.67 [11.2]	M85485/9-16A	55FA0511-16-*
14	19 x 27 tin coated copper	2.51 [.099]	23.96 [16.1]	M85485/9-14A	55FA0511-14-*
12	37 x 28 tin coated copper	2.95 [.116]	35.71 [24.0]	M85485/9-12A	55FA0511-12-*
10	37 x 26 tin coated copper	3.58 [.141]	55.06 [37.0]	M85485/9-10A	55FA0511-10-*

* The color of component wire shall be light violet designated by 7L.
The designated colors for components in finished cable shall be light violet for component 1 and light violet with stripe designators for remaining component wires as follows:

Component wire	1	2	3	4	5
Color designator	7L	7L6	7L3	7L5	7L2

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Lightweight, Ruggedized Filterline Wire and Cable
(Continued)

Unshielded, Unjacketed 2-5 Conductor Cable Specifications

AWG Size	Number of Conductor	Maximum Outside Diameter	Maximum Weight Kg/Km (lb/1000 ft)	MIL-SPEC Part Number	Raychem Part Number
24	2	2.39 [.094]	9.08 [6.1]	M85485/11-24M2A	55FA0524-24-*
22	2	2.74 [.108]	12.20 [8.2]	M85485/11-22T2A	55FA0521-22-*
20	2	3.15 [.124]	17.56 [11.8]	M85485/11-20T2A	55FA0521-20-*
18	2	3.71 [.146]	26.34 [17.7]	M85485/11-18T2A	55FA0521-18-*
16	2	4.17 [.164]	33.93 [22.8]	M85485/11-16T2A	55FA0521-16-*
14	2	5.03 [.198]	48.81 [32.8]	M85485/11-14T2A	55FA0521-14-*
24	3	2.59 [.102]	13.69 [9.2]	M85485/11-24M3A	55FA0534-24-*
22	3	2.97 [.117]	18.15 [12.2]	M85485/11-22T3A	55FA0531-22-*
20	3	3.40 [.134]	26.34 [17.7]	M85485/11-20T3A	55FA0531-20-*
18	3	4.01 [.158]	39.58 [26.6]	M85485/11-18T3A	55FA0531-18-*
16	3	4.50 [.177]	51.03 [34.3]	M85485/11-16T3A	55FA0531-16-*
14	3	5.44 [.214]	73.36 [49.3]	M85485/11-14T3A	55FA0531-14-*
24	4	3.28 [.129]	18.15 [12.2]	M85485/11-24M4A	55FA0544-24-*
22	4	3.78 [.149]	24.25 [16.3]	M85485/11-22T4A	55FA0541-22-*
20	4	4.34[.171]	35.27 [23.7]	M85485/11-20T4A	55FA0541-20-*
18	4	5.11 [.201]	52.82 [35.5]	M85485/11-18T4A	55FA0541-18-*
16	4	5.74 [.226]	68.00 [45.7]	M85485/11-16T4A	55FA0541-16-*
14	4	6.91 [.272]	97.76 [65.7]	M85485/11-14T4A	55FA0541-14-*
24	5	3.58 [.141]	22.77 [15.3]	M85485/11-24M5A	55FA0554-24-*
22	5	4.11 [.162]	30.36 [20.4]	M85485/11-22T5A	55FA0551-22-*
20	5	4.72 [.186]	44.04 [29.6]	M85485/11-20T5A	55FA0551-20-*
18	5	5.56 [.219]	66.07 [44.4]	M85485/11-18T5A	55FA0551-18-*
16	5	6.25 [.246]	84.96 [57.1]	M85485/11-16T5A	55FA0551-16-*
14	5	7.54 [.297]	122.16 [82.1]	M85485/11-14T5A	55FA0551-14-*

* The color of component wire shall be light violet designated by 7L.
The designated colors for components in finished cable shall be light violet for component 1 and light violet with stripe designators for remaining component wires as follows:

Component wire	1	2	3	4	5
Color designator	7L	7L6	7L3	7L5	7L2

Catalog 1308940
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Lightweight, Ruggedized Filterline Wire and Cable
(Continued)

Shielded, Jacketed 1-5 Conductor Cable Specifications

Electroloss Filterline Wire and Cable Light Weight Ruggedized Constructions

AWG Size	Number of Conductors	Shield Size AWG Tin Coated Copper	Maximum Outside Diameter mm (in)	Maximum Weight Kg/Km (lb/1000 ft)	MIL-SPEC Part Number	Raychem Part Number
24	1	38	2.13 [.084]	10.86 [7.3]	M85485/12-24U1A	55FB1514-24-*
22	1	38	2.31 [.091]	13.09 [8.8]	M85485/12-22T1A	55FB1511-22-*
20	1	38	2.51 [.099]	16.67 [11.2]	M85485/12-20T1A	55FB1511-20-*
18	1	38	2.79 [.110]	22.17 [14.9]	M85485/12-18T1A	55FB1511-18-*
16	1	38	3.02 [.119]	26.78 [18.0]	M85485/12-16T1A	55FB1511-16-*
14	1	38	3.45 [.136]	35.86 [24.1]	M85485/12-14T1A	55FB1511-14-*
12	1	38	3.89 [.153]	49.40 [33.2]	M85485/12-12T1A	55FB1511-12-*
10	1	38	4.55 [.179]	71.57 [48.1]	M85485/12-10T1A	55FB1511-10-*
24	2	38	3.33 [.131]	19.34 [13.0]	M85485/12-24U2A	55FB1524-24-*
22	2	38	3.68 [.145]	23.81 [16.0]	M85485/12-22T2A	55FB1521-22-*
20	2	38	4.09 [.161]	30.50 [20.5]	M85485/12-20T2A	55FB1521-20-*
18	2	38	4.65 [.183]	41.37 [27.8]	M85485/12-18T2A	55FB1521-18-*
16	2	38	5.11 [.201]	50.59 [34.0]	M85485/12-16T2A	55FB1521-16-*
14	2	38	6.02 [.237]	69.49 [46.7]	M85485/12-14T2A	55FB1521-14-*
24	3	38	3.53 [.139]	25.30 [17.0]	M85485/12-24U3A	55FB1534-24-*
22	3	38	3.91 [.154]	31.10 [20.9]	M85485/12-22T3A	55FB1531-22-*
20	3	38	4.34 [.171]	41.07 [27.6]	M85485/12-20T3A	55FB1531-20-*
18	3	38	4.95 [.195]	56.54 [38.0]	M85485/12-18T3A	55FB1531-18-*
16	3	38	5.44 [.214]	69.94 [47.0]	M85485/12-16T3A	55FB1531-16-*
14	3	38	6.43 [.253]	96.87 [65.1]	M85485/12-14T3A	55FB1531-14-*
24	4	38	4.19 [.165]	31.69 [21.3]	M85485/12-24U4A	55FB1544-24-*
22	4	38	4.67 [.184]	39.58 [26.6]	M85485/12-22T4A	55FB1541-22-*
20	4	38	5.23 [.206]	52.68 [35.4]	M85485/12-20T4A	55FB1541-20-*
18	4	38	5.99 [.236]	72.91 [49.0]	M85485/12-18T4A	55FB1541-18-*
16	4	38	6.68 [.263]	91.36 [61.4]	M85485/12-16T4A	55FB1541-16-*
14	4	38	7.85 [.309]	125.59 [84.4]	M85485/12-14T4A	55FB1541-14-*
24	5	38	4.52 [.178]	37.80 [25.4]	M85485/12-24U5A	55FB1554-24-*
22	5	38	5.05 [.199]	47.32 [31.8]	M85485/12-22T5A	55FB1551-22-*
20	5	38	5.66 [.223]	63.39 [42.6]	M85485/12-20T5A	55FB1551-20-*
18	5	38	6.55 [.258]	89.43 [60.1]	M85485/12-18T5A	55FB1551-18-*
16	5	38	7.24 [.285]	111.00 [74.6]	M85485/12-16T5A	55FB1551-16-*
14	5	38	8.53 [.336]	153.26 [103.0]	M85485/12-14T5A	55FB1551-14-*

* The color of component wire shall be light violet designated by 7L.
The designated colors for components in finished cable shall be light violet for component 1 and light violet with stripe designators for remaining component wires as follows:

Component wire	1	2	3	4	5
Color designator	7L	7L6	7L3	7L5	7L2

Fluid Resistance

Fluids	Hydrocarbons
	Fuels and lubricants
	Alcohols
	Cleaning fluids
	Glycols
	Synthetic fuels and lubricants
	Ketones

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Cheminax Coaxial Cables

Small, Lightweight Coaxial Cables

Product Facts

- Light weight, small size
- Temperature range of -65°C to 200°C [-85°F to 392°F]
- Low capacitance and attenuation
- High velocity of propagation
- High flexibility

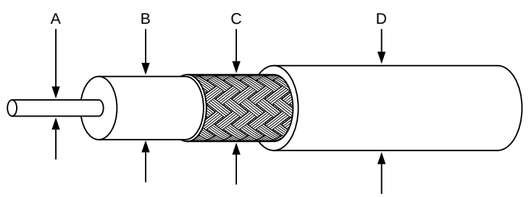
Applications

Cheminax controlled electrical cables are used in the aircraft and aerospace industries. They have a wide range of applications in missiles, avionics, radio-frequency and microwave systems, computers, security and surveillance systems, and communications.

Cheminax coaxial cables were designed to solve interconnect problems in electronic systems, such as computers, military equipment, and other areas of high-density packing, where cables are required to perform to more exacting specifications than standard radio-grade (RG) or UL recognized (UR) constructions.

Tyco Electronics' advanced materials technology has allowed the design and development of Raychem Cheminax miniature coaxial cables that offer substantial savings in size and weight while improving mechanical performance and reducing attenuation.

Cables can be designed that are either smaller and lighter than standard RG and UR cables or provide significantly lower attenuation and capacitance with no significant increase in size.



A Conductor
B Dielectric
C Shield
D Jacket

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Part Numbering System

95	27	A	1	3	1	7	-	0
XX	XX	X	X	X	X	X	-	X

Example: 9527A1317-0

Jacket Color Identification Code

0 - Black	4 - Yellow	8 - Gray
1 - Brown	5 - Green	9 - White
2 - Red	6 - Blue	9X - Translucent White
3 - Orange	7 - Violet	X - Clear

Conductor Type

1 - Tin-coated copper
2 - Silver-coated copper
3 - Nickel-coated copper
4 - Silver-coated high strength copper alloy
5 - Aluminum
6 - Nickel-coated high strength copper alloy
7 - Tin-coated copper-clad steel
8 - Silver-coated copper-clad steel
9 - Bare copper
0 - Other
A - Silver-coated CS95

Dielectric Material

1 - Rayfoam L (Polyethylene)	6 - Modified XL-ETFE (SPEC 55)
2 - Rayfoam H (Foamed FEP)	7 - Flex XL-ETFE
3 - Rayolin F (Solid)	8 - Rayfoam M (Foamed MFA)
4 - Modified FEP (Solid)	0 - Other

Outer Jacket Material

1 - General purpose PVF[2]	6 - Modified XL-ETFE (SPEC 55)
2 - Outerspace PVF[2]	7 - Flex XL-ETFE (SPEC 80)
3 - Thermorad F & S	8 - Zerohal & Thermorad Low Smoke
4 - Modified FEP	9 - None
5 - ETFE (Uncrosslinked)	0 - Other

Construction

1 - Round braid	6 - Triax - other
2 - Flat braid	7 - Other
3 - 2 round braids	8 - Composite shield
4 - 2 shields (other)	9 - Core only
5 - Triax-round braids	0 - Other

Variation

A - Standard	U - Low Loss
B - Low Noise	W - Waterblocked
C-Z - Sequential within any PNs	S - Outer Space Requirements

Conductor Size (AWG)

Always 2 digits - 0X if under 10 AWG

Impedance

Always 2 digits - last 2 digits if over 100 ohms
0X (1 digit) if under 10 ohms

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Cheminax Coaxial Cables (Continued)

Specifications/Approvals

Series	Raychem
Cheminax cables	1200

Product Dimensions (Nominal)

Typical Product Part No.	Impedance (ohms)	Capacitance pF/m (pF/ft)	Attenuation at 400 MHz dB/100m (dB/100 ft)	A Conductor Diameter	B Dielectric Diameter	C Shield Diameter	D Jacket Diameter	Weight in kg/km (lb/1000ft)
5012E1339	50	98.4 [30.0]	14.8 [4.5]	2.26 [.089]	7.24 [.285]	7.98 [.314]	10.24 [.403]	162.2 [109.0]
5012M1612	50	82.0 [25.0]	16.1 [4.9]	2.26 [.089]	6.07 [.239]	6.60 [.260]	7.06 [.278]	74.5 [50.1]
5024A1311	50	83.7 [25.5]	50.3 [15.3]	0.62 [.025]	1.70 [.067]	2.18 [.085]	2.67 [.104]	11.8 [7.9]
5026D1027	50	88.9 [27.1]	63.7 [19.4]	0.48 [.019]	1.27 [.050]	1.70 [.067]	2.21 [.087]	11.8 [7.9]
5030A1317	50	90.2 [27.5]	97.5 [29.7]	0.30 [.012]	0.79 [.031]	1.12 [.044]	1.57 [.062]	4.5 [3.0]
5030A1424	50	100.4 [30.6]	94.5 [28.8]	0.30 [.012]	0.86 [.034]	1.19 [.047]	1.60 [.063]	5.7 [3.8]
7520A1311	75	56.1 [17.1]	20.0 [6.1]	1.02 [.040]	4.57 [.180]	5.11 [.201]	6.12 [.241]	43.2 [29.0]
7524A1311	75	56.4 [17.2]	31.8 [9.7]	0.62 [.025]	2.82 [.111]	3.25 [.128]	3.86 [.152]	19.2 [12.9]
7528H1424	75	54.5 [16.6]	44.0 [13.4]	0.32 [.013]	1.37 [.054]	1.73 [.068]	2.13 [.084]	8.9 [6.0]
7530A1317	75	60.4 [18.3]	58.8 [17.9]	0.30 [.012]	1.35 [.053]	1.78 [.07]	2.29 [.09]	8.3 [5.6]
7530H1424	75	57.4 [17.5]	58.1 [17.7]	0.30 [.012]	1.30 [.051]	1.73 [.068]	2.03 [.08]	8.5 [5.7]
9522A1311	95	44.3 [13.5]	19.7 [6.0]	0.79 [.031]	5.51 [.217]	6.05 [.238]	7.32 [.288]	55.1 [37.0]
9527J1528	95	44.3 [13.5]	31.8 [9.7]	0.43 [.017]	2.84 [.112]	3.18 [.125]	3.58 [.141]	19.2 [12.9]
9530H1014	95	44.3 [13.5]	44.3 [13.5]	0.30 [.012]	1.83 [.072]	2.26 [.089]	2.62 [.103]	13.1 [8.8]

Note: All values are nominal.

Product Characteristics

General	Conductor Range	12 AWG to 30 AWG
	Operating Temperature Range*	-65°C to 200°C [-85°Fto 392°F]
Electrical	Impedance range	50 ohms to 125 ohms
	Dielectric constant	1.65–2.3
	Velocity of propagation	67%–80%

*Temperature rating varies depending on materials used in specific construction.

Small, Lightweight Coaxial Cables

Properties (per SCD)

Physical	Typical Value of Dielectric Material		
	Rayfoam L	Rayfoam H	Rayolin F
Tensile (min.)	6.8 MPa (1000 psi)	4.1 MPa (600 psi)	12.2 MPa (1800 psi)
Elongation (min.)	50%	50%	200%
Electrical			
Dielectric withstand (min.)	1000 V	1000 V	1000 V
Velocity of propagation (nom.)	78%	78%	67%
Dielectric constant	1.65	1.65	2.2

Physical	Type Value of Jacket Material					
	Thermorad	SPEC 55	FlexLine	FEP	Zerohal	SPEC 44
Tensile (min.)	13.6 MPa (2000 psi)	34 MPa (5000 psi)	20.4 MPa (3000 psi)	13.6 MPa (2000 psi)	8.2 MPa (1200 psi)	27.2 MPa (2500 psi)
Elongation (min.)	250%	50%	100%	200%	150%	150%
Temperature (max.)	125°C [257°F]	200°C [392°F]	200°C [392°F]	200°C [392°F]	125°C [257°F]	150°C [302°F]
Flammability*	Method C	Method B	Method B	Method B	Method B	Method B
Fluid category*	C	A	A	A	C	

*See Raychem specification WCD-1200 for details.

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Cheminax — High Performance Alternatives to Standard Cables

Raychem Alternatives to RG Cables

RG/U	Raychem Alternative	Comments
4	5020A3311-0	Small/light
	5018D3311-0	Improved electricals
5	5018D3311-0	Small/light
8	5012E1339-0	Dimensionally similar
11	7518A1311-0	Small/light
29	5020A1311-0	Small/light
31	5012E1339-0	Dimensionally similar
55	5020A3311-0	Small/light
	5018D3311-0	Improved electricals
58	5021D1331-0	Dimensionally similar
	5020A1311-0	Small/light
	5018A1311-0	Improved electricals
59	7523D1331-0	Dimensionally similar
	7524A1311-0	Small/light
	7520A1311-0	Improved electricals
62	9524A1311-0	Small/light
63	2524A1311-0	Small/light
87	5012A3311-0	Small/light
89	5012A3311-0	Small/light
115	5012A3311-0	Small/light
122	5020A1311-0	Improved electricals
124	7524A1311-0	Small/light
133	9524A1311-0	Small/light
140	7524A1311-0	Small/light
141	5020A1311-0	Small/light
142	5019D3318-0	Small/light
	5018D3311-0	Improved electricals
144	7518A1311-0	Small/light
149	7518A1311-0	Small/light
159	5020A1311-0	Small/light
174	5026A1311-0	Small/light
	5024A1311-0	Improved electricals
178	5030A1317-0	Small/light
	5028A1317-0	Improved electricals
179	7530A1317-0	Small/light
	7528A1317-0	Improved electricals
180	9530E1014-0	Small/light
	9527A1318-9	Improved electricals
188	5026A1311-0	Small/light
	5024A1311-0	Improved electricals
210	9524A1311-0	Small/light
213	5012E1339-0	Dimensionally similar
214	5012A3311-0	Small/light
223	5019D3318-0	Small/light
	5018D3311-0	Improved electricals
225	5012A3311-0	Small/light
235	5012A3311-0	Small/light
279	7524A1311-0	Dimensionally similar
282	5024A1311-0	Small/light
302	7524A1311-0	Small/light
303	5020A1311-0	Small/light
304	5018A1311-0	Small/light
316	5026A1311-0	Small/light
	5024A1311-0	Improved electricals
393	5012A3311-0	Small/light
400	5020A3311-0	Small/light
	5018D3311-0	Improved electricals
403	5030A5314-0	Small/light

Note: To complement the mechanical and electrical features of Cheminax miniature coax cable, Tyco Electronics offers Raychem SolderSleeve, SolderTacts, and PinPak termination devices and RF connector devices. Controlled electrical cables and components are available for data bus systems.

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UK: 44-208-420-8341

Cheminax — High Performance Alternatives to Standard Cables (Continued)

Raychem Alternatives to UR Cables

UR	Raychem Alternative	Comments
43	5020A1311-0	Small/light
57	7518A1311-0	Small/light
65	7518A1311-0	Small/light
67	5012E1339-0	Dimensionally similar
70	7524A1311-0	Small/light
72	5020A1311-0	Small/light
76	5020A1311-0	Small/light
84	7524A1311-0	Small/light
90	7522A1311-0	Small/light
95	5026A1311-0	Small/light
96	9524A1311-0	Dimensionally similar
102	5012E1339-0	Dimensionally similar
104	7522A1311-0	Small/light
105	7518A1311-0	Small/light
106	7222A1311-0	Small/light
107	5012E1339-0	Small/light
108	5020A1311-0	Small/light
109	5026A1311-0	Small/light
110	5030A1317-0	Small/light
111	7530A1317-0	Small/light
112	5012A3311-0	Small/light
113	7518A1311-0	Small/light
116	5026A1311-0	Small/light
117	7524A1311-0	Small/light
200	7524A1311-0	Dimensionally similar
201	7522A1311-0	Dimensionally similar
202	7522A1311-0	Dimensionally similar
203	7520A1311-0	Small/light
204	7518A1311-0	Dimensionally similar
205	7518A1311-0	Dimensionally similar
207	7524A1311-0	Small/light
208	7524A1311-0	Small/light
210	7524A1311-0	Small/light
301	5020A1311-0	Small/light
306	7524A1311-0	Small/light

Note: To complement the mechanical and electrical features of Cheminax miniature coax cable, Tyco Electronics offers Raychem SolderSleeve, SolderTacts, and PinPak termination devices and RF connector devices. Controlled electrical cables and components are available for data bus systems. For further information see the Electrical Interconnect Products section of this catalog.

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Cheminax Twin Axial Cable

Small, Lightweight Twin Axial Cables

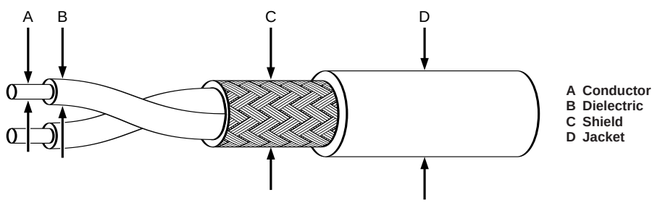
Product Facts

- Light weight, small size
- Temperature range of -65°C to 200°C [-85°F to 392°F]
- Low capacitance
- High data rates
- Excellent shop handling

Applications

These small, lightweight cables are specially designed for use in MIL-STD-1553 data bus applications. Raychem materials technology allows the design and construction of cables that meet rigorous electrical and environmental performance requirements while minimizing size and weight.

Cheminax twin axial cables provide elegant solutions to an increasing range of data bus and multiplex signal transmission applications.



A Conductor
B Dielectric
C Shield
D Jacket

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Cheminax Twin Axial Cable (Continued)

Specifications/Approvals

Series	Raychem
Cheminax cables	1200

Product Dimensions*

Typical Product Part No.	Impedance (ohms)	Capacitance pF/m(pF/ft)	A Conductor Diameter	B Dielectric Diameter	C Shield Diameter	D Jacket Diameter	Weight in kg/km (lb/1000ft)
5024A1661	50	104.7 [31.9]	.64 [.025]	0.89 [.035]	2.21 [.087]	2.62 [.103]	14.4 [9.7]
5026A1664	50	136.2 [41.5]	.48 [.019]	0.66 [.026]	1.75 [.069]	2.16 [.085]	10.0 [6.7]
7520A1662	75	74.2 [22.6]	1.02 [.040]	2.03 [.080]	4.60 [.181]	5.05 [.199]	42.9 [28.8]
7526J1660	75	88.6 [27.0]	.48 [.019]	0.99 [.039]	2.41 [.095]	2.82 [.111]	14.9 [10.0]
7820D0331	78	67.3 [20.5]	1.02 [.040]	2.11 [.083]	4.75 [.187]	5.72 [.225]	46.9 [31.5]
7824E0422	78	55.1 [16.8]	.64 [.025]	1.19 [.047]	2.82 [.111]	3.33 [.131]	19.6 [13.2]
0022E0311	100	49.2 [15.0]	.79 [.031]	1.98 [.078]	4.39 [.173]	5.16 [.203]	30.5 [20.5]
0024A0024	100	44.3 [13.5]	.64 [.025]	1.30 [.051]	3.02 [.119]	3.63 [.143]	25.1 [16.9]
0026A0024	100	44.0 [13.4]	.48 [.019]	1.14 [.045]	2.72 [.107]	3.23 [.127]	18.7 [12.6]
2524H0524	125	39.4 [12.0]	.64 [.025]	1.83 [.072]	4.09 [.161]	4.50 [.177]	25.3 [17.7]
2526E1114	125	36.1 [11.0]	.48 [.019]	1.40 [.055]	3.33 [.131]	3.73 [.147]	21.7 [14.6]
2530A0314	125	39.4 [12.0]	.30 [.012]	0.86 [.034]	2.16 [.085]	2.67 [.105]	10.6 [7.1]
10595-24	70	91.9 [28.0]	.64 [.025]	1.19 [.047]	2.82 [.111]	3.23 [.127]	17.9 [12.0]
10606-26	75	91.9 [28.0]	.53 [.021]	0.99 [.039]	2.41 [.095]	2.82 [.111]	13.4 [9.0]
10612-24	77	91.9 [28.0]	.64 [.025]	1.22 [.048]	2.90 [.114]	3.30 [.130]	23.7 [15.9]
10613-24	77	91.9 [28.0]	.64 [.025]	1.22 [.048]	3.33 [.131]	3.73 [.147]	39.0 [26.2]
10614-24	77	91.9 [28.0]	.64 [.025]	1.22 [.048]	3.73 [.147]	4.09 [.161]	40.3 [27.1]

*All dimensions are nominal.

Small, Lightweight Twin Axial Cables

Product Characteristics

General	Conductor range Operating temperature range*	20 AWG to 30 AWG -65°C to 200°C [-85°F to 392°F]
Electrical	Impedance range Capacitance range	50 ohms to 125 ohms 30 pF/ft to 10 pF/ft

*Temperature rating varies depending on materials used in specific construction.

Properties (per SCD)

Physical	Typical Value of Dielectric Material				
	Rayfoam L	Rayfoam H	Rayolin F	FEP (solid)	Radiation-Crosslinked XL ETFE
Tensile (min.)	6.8 MPa (1000 psi)	9.1 MPa (600 psi)	12.2 MPa (1800 psi)	6.8 MPa (1000 psi)	34 MPa (5000 psi)
Elongation (min.)	50%	50%	200%	150%	50%
Electrical					
Dielectric withstand (min.)	1000 V	1000 V	1000 V	1000 V	1000 V
Velocity of propagation (nom.)	78%	78%	67%	69%	61%
Permittivity (nom.)	1.65	1.65	2.2	2.1	2.7
Physical	**Typical Value of Jacket Material**					
	Thermorad	**SPEC 55**	**FlexLine**	**FEP**	**Zerohal**	**SPEC 44**
Tensile (min.)	13.6 MPa (2000 psi)	34 MPa (5000 psi)	20.4 MPa (3000 psi)	13.6 MPa (2000 psi)	8.2 MPa (1200 psi)	27.2 MPa (2500 psi)
Elongation (min.)	250%	50%	100%	200%	150%	150%
Temperature (max.)	125°C [257°F]	200°C [392°F]	200°C [392°F]	200°C [392°F]	125°C [257°F]	150°C [302°F]
Flammability**	Method C	Method B	Method B	Method B	Method B	Method B
Fluid category**	C	A	A	A	C	B

*See Raychem specification WCD-1200 for details.

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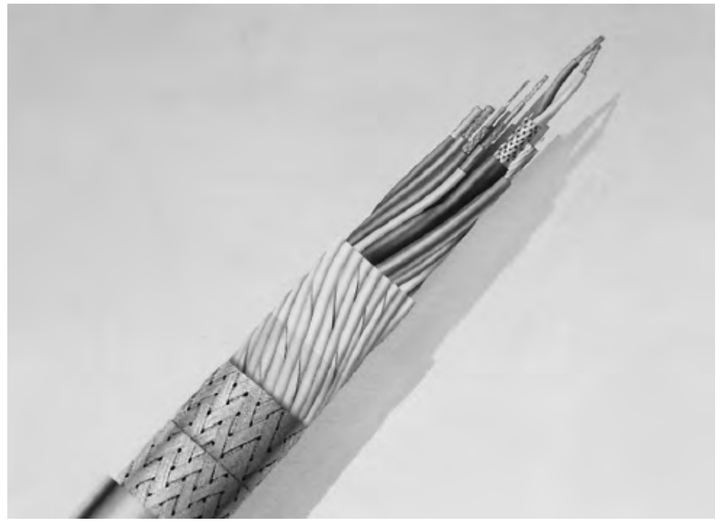
Custom-designed and Standard Multiconductor (Multicore) Cables

Product Facts

- Temperature capability: -55°C to +260°C [-67°F to +500°F]
- Small size, lightweight
- System compatibility with other Raychem products
- Complete range of components
- Specially formulated jacket materials
- Special shielding to address EMI/EMC problems
- Custom designed and purpose built
- Fast response—design, pricing, and delivery
- Prototype length facility
- Raychem Dynalink extended flex-life and increased flexibility
- Fire-resistant: circuit integrity (IEC331, enhanced 950°C [1742°F], 3 hours)
- Small-size, lightweight, low-fire-hazard for modern high-speed vessels



Applications

Tyco Electronics is the leading manufacturer of Raychem custom-designed, small-size, lightweight, high-performance multi-conductor (multicore) cables. Applications are found in the aerospace, commercial marine, naval, mass transportation, automotive, offshore, military ground vehicle, ground support, high-performance instrumentation, industrial, and commercial markets. Raychem multiconductor (multicore) cables have been approved to many standards demanding high performance criteria in service use.

Multiconductor (Multicore) Cables Purpose Built and Designed Using Raychem Components and Technology

Multiconductor cables are used in widely varying applications and environments. Careful consideration must be given to the selection of components with the right combination of physical, chemical, and electrical properties for specific applications.

Tyco Electronics' leadership in the technologies of polymer blending and subsequent radiation crosslinking has led to the development of a particularly broad range of Raychem cables. High-performance component wires and miniature coaxial cables are combined with unique cable jacket materials to meet the requirements of demanding environments.

Established as one of the leading manufacturers of special purpose Raychem cables, Tyco Electronics has continued to develop both its design and manufacturing expertise.

Development of a sophisticated CAD system has allowed increasingly rapid response to any design request, followed by manufacturing to the highest quality standards.

Planar Film-Bonded Cables

Tyco Electronics can custom-design and build a variety of Raychem component wires and cables onto high-performance carrier films. Components and carriers are matched to ensure temperature and environmental stability.

Specifications/Approvals

Agency	Industry	Military	Raychem
Underwriters' Laboratories	Lloyd's Register of Shipping	Def. Stan. 61-12 Pt 25	WCD series
BSENISO9001	Det Norske Veritas	VG 95218 Pts 27 and 28	—
MSV 34410-34413, 34435,34436	—	—	—

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Multicore Cables

Design Flexibility

Components

- SPEC 44 wire and cable
- SPEC 55 wire and cable
- Type 99 wire and cable
- 100 wire
- Coaxial cables
- ElectroLoss FilterLine cables
- Flexible power cables
- Optical fibers
- Special components

Wraps and Braids

- Fabric and film tapes
- KEVLAR or steel strength members
- Full range of electrical screens (including SuperScreens)

Jacket Materials

- FDR 25 - Fluid resistant, flexible, high temperature
- Thermorad - General purpose
- Thermorad HTF/ - Very high temperature, Fluoroelastomer fluid resistant
- Raythane C - Tough and flexible
- Raythane FR - Tough, flexible, flame-retardant
- Rayolin - Low moisture transmission
- Neoprene - Low-temperature flexibility
- Zerohal - LFH

KEVLAR is a trademark of E. I. DuPont de Nemours and Company.

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Properties and Specifications

Specifications and Approvals (Components and Jacket Materials)

Specifications														
UK Designation	**FDR 25**	**Zerohal**	**Fluoro-elastomer**	**Thermorad**	**Rayolin**	**Raythane C**	**AFR**	**Neoprene**	**44 Wire**	**55 Wire**	**100 Wire**	**99 Wire**	**Hytrel**
US Designation		**Zerohal**	**Thermorad HTF**	**Thermorad F**		**Raythane FR**		**Thermorad NTFR**	**44 Wire**	**55 Wire**	**100 Wire**		
Def Stan 61-12 Part 31 (NES 518)		X											
Def Stan 61-12 Part 25		X							X				
Def Stan 61-12 Part 18 type 1 (issue 4) (Maintenance range)									X				
Def Stan 61-12 Part 18 type 1 (issue 4)		X										X	
Def Stan 61-12 Part 25		X										X	
Def Stan 61-12 Part 26									X				
34435, 34436		X							X				
VG 95218 Part 20, 21, 22 and 23									X	X			
VG 95218 Part 24, 25 and 26	X												
VG 95218 Part 27 and 28	X	X							X		X		
VG 95218 Part 1000									X				
VG 95218 Part 1001 and 1002										X			
MIL-C-24640 (PMS 400)		X							X				
MIL-W-81044/MIL-C-27500									X				
MIL-W-22759/MIL-C-27500										X			
A014000		X										X	
O2-517		X			X				X				
Approvals													
Lloyds Register of Shipping/DNV		X		X		X			X			X	
Bureau Veritas	X	X	X	X		X	X	X	X	X			
UL				X		X (FR)	X		X	X			
CAA									X	X			
BWB	X			X					X	X			
VDE	X			X					X	X			
Det Norskeveritas													
Germanischer Lloyds		X									X		
American Bureau of Shipping		X									X		
Lloyds		X									X		
Bureau Veritas		X									X		

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Products and Specifications (Continued)

Major Cable Specifications

Country	Cable Specification	Specification Description	Approved Jacket
UK	Def Stan 61-12 Part 25	Royal Navy specification covering limited fire hazard thin-wall insulated electric cables using Def-Stan 61-12 Part 18 approved wire. Signal, control and light power circuits.	Zerohal
Germany	VG 95218 (parts 27 and 28)	Military ground systems specification for signal, control and power cables. Wire to VG 95218 Parts 20-23 and 1000.	FDR-25
USA	MIL-C-24640 (PMS 400)	Navy specification covering limited fire hazard thin-wall insulated electric cables for signal, control and light power circuits. Wire to MIL-W-81044.	Zerohal

Summary of Typical Cable Jacket Properties

UK Designation	US Designation	Property				Chemical Resistance		
		Temperature Range °C*	Abrasion Resistance	Flexibility	Flame Resistance	Acid	Alkaline	Hydrocarbon
FDR25	—	-40 to 150	Fair	Very good	Self-ext;ing	Good	Good	Very Good
Zerohal	Zerohal UK & US	-30 to 105	Good	Good	Self-ext;ing	Good	Good	Good
Fluoroelastomer	Thermorad HTF	-20 to 200	Good	Good	Nonburning	Excellent	Excellent	Excellent
Thermorad	Thermorad F	-55 to 125	Good	Good	Self-ext;ing	Good	Good	Good
Raythane C	—	-25 to 80	Excellent	Excellent	Self-ext;ing	Fair	Fair	Excellent
—	Raythane FR	-65 to 90	Excellent	Excellent	Self-ext;ing	Fair	Fair	Excellent
Neoprene	Thermorad NTFR	-55 to 110	Very Good	Excellent	Self-ext;ing	Good	Good	Good
Rayolin	—	-55 to 95	Very Good	Fair	—	Good	Good	Good
AFR	—	-40 to 105	Excellent	Good	Self-ext;ing	Good	Good	Good
—	Thermorad LS	-30 to 105	Good	Good	Self-ext;ing	Good	Good	Good
—	Thermorad O	-55 to 125	Good	Good	Self-ext;ing	Good	Good	Good
—	Thermorad 300	-65 to 200	Very Good	Fair	Self-ext;ing	Excellent	Excellent	Excellent
Polyvinylidene Fluoride	Thermorad K	-65 to 150	Very Good	Fair	Self-ext;ing	Excellent	Good	Excellent
Modified ETFE	Thermorad HT	-65 to 200	Very Good	Fair	Self-ext;ing	Excellent	Excellent	Excellent
Modified Flexible ETFE	Thermorad FL	-55 to 200	Very Good	Good	Self-ext;ing	Excellent	Excellent	Excellent

*Operating temperatures for cables are application dependent. Figures shown are for guidance only. In many cases the limits shown may be extended at both ends of the temperature range. Consult Tyco Electronics for guidance.

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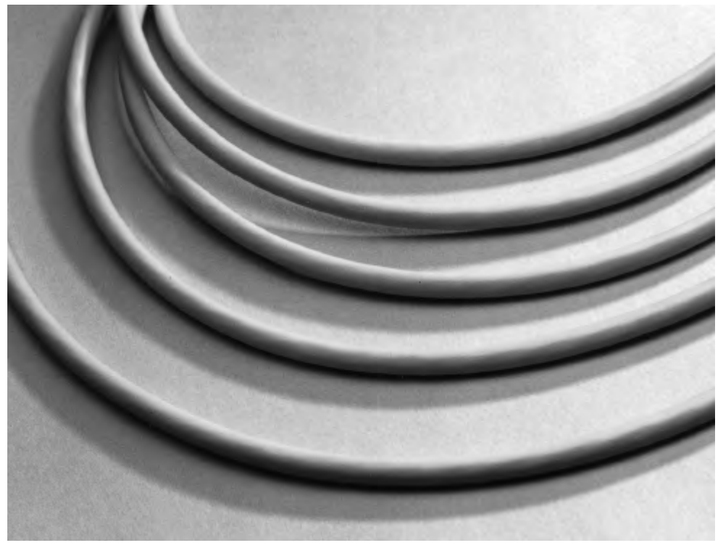
FDR25

Flexible, Diesel Resistant Wire and Cable Jacket Material

Product Facts

- Highly flame retardant
- Compatible with Raychem System 25 tubing, molded parts and adhesives
- Qualified to VG standards

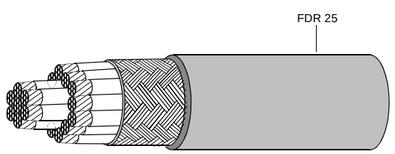


Applications

FDR 25 cable jacket was originally developed for the Leopard II main battle tank to provide an exceptional range of properties. Used in compartments exposed to hot diesel fuels and vibration, FDR 25 resists a wide range of aggressive fluids and offers excellent low temperature flexibility. These properties have also led to a widespread use of FDR 25 on other military vehicles and in many applications such as test and communications equipment. FDR 25 is fully compatible with Raychem's high performance harnessing system — System 25.

Operating Temperature Range

-40°C to 150°C
[-40°F to 302°F]



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FDR25 (Continued)

Typical Characteristics when Tested in Accordance with Raychem Specification WCD 2002 (UK) and WCD 3304 (US)

Mechanical	Tensile strength (MPa) Elongation (%) Tear strength (N/mm) Abrasion resistance (1.6 kg load) Cold bend	20 500 5 40 scrapes min. -40°C [-40°F]	
Thermal aging	Endurance IEC 216 Heat aging 120h, 175°C [347°F] Heat shock 4 h at 225°C [437°F]	2500 h 150°C [302°F] TS 8 MPa (min). Eb 150% (min) No cracks, drips or flowing, 6 mm total shrinkage in 300 mm	
Fluid resistance	24 h immersion	% Retention of properties Tensile strength	 Elongation
	Diesel fuels 70°C [158°F]	70	70
	Hydraulic fluids 50°C [122°F]	70	70
	Lubricating oils 100°C [212°F]	70	80
	Cleaning fluids 23°C [73°F]	90	95
	Deicing fluids 23°C [73°F]	90	95
Electrical	Insulation resistance 20°C [68°F] M ohm.km min.	2	
Other	45° flammability	30 s (max) afterburn 100 mm (max) burn length	
	Vertical flammability	Self extinguishing	
	Acid gas	4% HCl equivalent (max.)	

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Zerohal

Low Fire Hazard Performance Wire and Cable Jacket Material

Product Facts

- Halogen free
- Low smoke generation
- Highly flame retarded
- Low toxicity index
- Low corrosive gas emission
- Temperature rating -30°C to +105°C [-22°F to +221°F]

Applications

Cables rarely initiate fires, but they could be involved in them and can significantly increase the damage caused should they propagate the fire. Until recently the flame retarding of cables was achieved by the use of halogenated flame retardants which are effective fire suppressants, but which unfortunately produce dense smoke and corrosive acid gases when burned. These effects are highly undesirable in a fire, hindering evacuation and fire fighting, endangering life and causing corrosion damage to expensive and vital equipment.

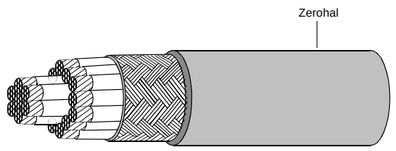
Raychem Zerohal is a halogen-free cable jacket material developed by Tyco Electronics and approved to the most exacting requirements for low fire hazard cables in many countries and, as such, is the most widely accepted material for these applications in the marine, process and mass transport industries. Combined with SPEC 44 wire or Type 99 and 100 wire, this jacket material provides small size, light weight cables (approximately 40% weight saving over conventional materials).

Zerohal combines the good mechanical and electrical features of some conventional cables with good flame retardancy, low smoke generation, low evolution of hazardous and corrosive gases, and good resistance to diesel fuel, lubricating oils and water.

Zerohal jacket material is fully compatible with the low fire hazard harnessing system - System 100.

System

- System 100



Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

Zerohal (Continued)

Product Characteristics when Tested in Accordance with Raychem Specification WCD 2015 and WC 2001 (Zerohal with Fungicide)

Mechanical	Tensile strength (MPa) Elongation (%) Tear strength (N/mm) Abrasion resistance (1.6 kg load) Cold bend	8 200 5 30 scrapes min. -30°C [-22°F]	
Thermal aging	Heat aging 120 h 130°C [266°F]	60% min retention of TS and Eb	
	Heat shock 4 h at 225°C [437°F]	No cracks, drips or flowing, 6 mm total shrinkage in 300 mm	
		Retention of properties	
		Tensile strength	Elongation
Fluid resistance	Diesel fuels 100°C [212°F] /24 h	85	75
	IRM 902 24h, 100°C [212°F]	90	75
	Lubricating oils 50°C [122°F]/24 h	80	75
	Water uptake (ASTM D570) 70°C [158°F]/28 days	2% weight uptake (max)	
Electrical	Insulation resistance 20°C [68°F] M ohms km (min)	40	
Other	45° flammability	Self extinguishing	
	Vertical flammability (Swedish Chimney)	Self extinguishing	
	Acid gas	1.2% HCl equivalent (max)	
	Limiting oxygen index	32%	
	Temperature index	275°C [527°F]	
	Toxicity index	2.5 per 100 g	
	Smoke index	18	
	Halogen content	None detected	

Low Fire Hazard Performance

Flammability

Current thinking on fire hazard defines the term ‘Fire Risk’. This description recognizes that the risk in a fire situation is influenced strongly from several factors including, ignitability, heat release, smoke evolution and toxic gas emission together with flammability.

There are several test procedures available used to assess flammability of wires and cables. Still in widespread use is Limiting Oxygen Index (LOI), but it is now generally recognized that because the test is conducted on a single specimen (of cable jacket or wire) in laboratory conditions, the results are, at best, only weakly correlated to actual fire situations. Critical Temperature Index (CTI), is a related test and assesses performance at elevated temperature but nevertheless it is still conducted on a single specimen. More recent evidence and thinking places significantly greater importance on large scale flammability tests, such as IEC 60332-3, in which the sample consists of several bundles of wires. These tests predict more accurately the likely behavior of cables in actual fire scenarios. Raychem Zerohal cable jackets give very good results in small scale laboratory based tests (e.g. LOI, CTI) and Zerohal cables perform very well in large scale tests (e.g. IEC 60332-3). Overall Zerohal jacketed cables have been shown to exhibit excellent flammability characteristics.

Corrosivity

Under fire conditions, polymers containing halogens, sulphur and phosphorous all form corrosive acid gases or liquids. These acids can then attack items such as printed circuit boards, connectors, control relays and metal structures, including steel reinforcement bars embedded in concrete. Test methods to evaluate corrosivity involve direct measurement of the amount of acid gas produced during pyrolysis, eg to British Rail Specification TDE 76/P/16 or measurement of pH and electrical conductivities of solutions.

Toxicity Index

The various gases given off by combustion of polymeric materials are toxic to differing degrees.

The Def Stan 02-713, assesses the concentration of each of the possible by-products and, by measuring the amounts of these materials, a Toxicity Index is assigned.

Zerohal jacket material has a typical Toxicity Index of 1.7, compared to a typical value of 6 for CSP and 20 for PVC jacketed cable. The Def Stan 61-12 part 31 specification requirement for a cable jacket is <5.

Smoke

The problems of classifying flammability and corrosive gas generation equally apply to measuring smoke generation. The method accepted by most authorities involves the use of the NBS smoke chamber where optical density of the chamber's atmosphere is constantly measured during pyrolysis.

The 10% visibility line indicates the density of smoke which would cause human disorientation and confusion. The rate of change of smoke density can be summarized to a single numerical value, as in NES 711, to give a smoke index for a material and thus offers simple comparison of materials performance.

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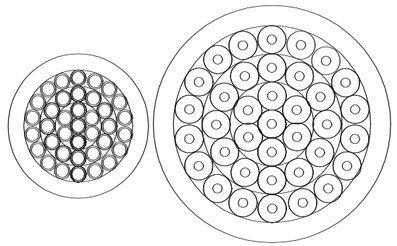
Zerohal (Continued)



	Raychem Cable to Def Stan 61-12 Pt25	Cable to DGS 212
Diameter	12.5 mm (nom.)	21.3 mm
Weight	328 g/m (nom.)	526 g/m
Conductor	0.60 mm² (nom.)	0.5 mm²

Navy Applications

37 Component Cable Comparison

Ships are becoming smaller and more sophisticated, with an ever increasing complexity of electronic systems, sensors and weapons. As technology advances shipbuilders are called upon to update and modify existing systems or fit completely new ones. The proliferation of electronic hardware requires more and more communication systems to transfer data from one place to another. To provide all the necessary interconnections, hundreds of multicore cables have to run throughout the ship. These, along with cables for power, lighting and other basic services, create a severe space problem within ducts and hangers.

For the vessel to achieve maximum speed, maneuverability and range, it is vital to keep the “top weight” to a minimum and since most of the equipment is located on the upper decks, system weight must be kept as low as possible.

The diagram shows a lightweight cable compared with a traditional Navy cable having the same cross-sectional area of copper. Both cables have the same number of conductors. A saving in size has been made on the insulation material, but without sacrificing the mechanical or electrical characteristics of the cable. A typical saving in cable tray volume could be as high as 40%. Lightweight cables can also save in excess of twenty tons on a typical frigate and three to five tons on a fast patrol boat.

Raychem lightweight, small size cables are giving reliable service in frigates, corvettes, fast patrol boats, hydrofoils and submarines in many major Navies.

Due to recent improvements in manufacturing, Raychem can now offer an even tighter tolerance of ±2.5% on cable diameter. This is well within the limits imposed by specifications such as Def Stan 61-12 part 25, and offers significant benefits to system designers, particularly where cable glanding is involved.

Weight savings within “maxima allowed” by existing specifications are also achievable.

Other Applications

The increasing awareness of many areas of industry of the need to minimize fire hazard risk is leading to a rapid growth in the use of Zerohal jacketed cables. Applications include rail and mass transit, offshore platforms and other enclosed areas where a fire would present a significant threat to people or equipment.

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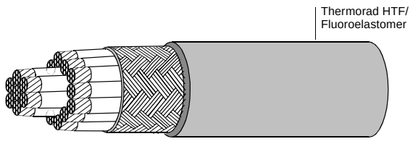
Thermorad HTF/ Fluoroelastomer

High Temperature Performance Wire and Cable Jacket Material

Product Facts

- High temperature capability -20°C to +200°C [-4°F to 392°F]
- Excellent chemical resistance
- Flame retardant
- Continuous aircraft fuel immersion



Applications

Thermorad HTF/ Fluoroelastomer is a material specially formulated for use in applications where exceptional performance is required.

It displays excellent stability during continuous high temperature exposure to adverse chemical environments.

Thermorad HTF/ Fluoroelastomer has a continuous operating temperature of up to 200°C [392°F], and finds applications in aircraft fuel tanks and on high performance engine cables. Thermorad HTF/ Fluoroelastomer cable jackets are compatible with the Raychem high temperature harnessing systems — System 200.

System

- System 200

Typical Characteristics when Tested in Accordance with Raychem Specification WCD 51/367

Mechanical	Tensile strength Elongation Abrasion resistance (1.6 kg load) Cold bend -0°C ± 3°C [37°F]	12 MPa 400% 40 scrapes min. No cracking	
Thermal aging	Heat age	168 h 250°C [482°F]	
	Heat shock 4 h at 300°C ± 3°C [572°F ± 37°F]	No cracks, drips or flowing, 6 mm total shrinkage in 300 mm	
Fluid resistance	72 h immersion	% Retention	
		Tensile strength	Elongation
	Diesel oil 100°C [212°F]	60	60
	ASTM No 2 oil 100°C [212°F]	60	60
Electrical	Insulation resistance 20°C [68°F] M ohms. km (min)	10	
Other	45° flammability	30 s (max) afterburn 100 mm (max) burn length	
	Vertical flammability	Self extinguishing	

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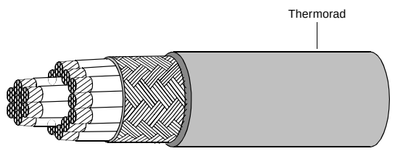
Thermorad/Thermorad F

General Purpose Wire and Cable Jacket Material

Product Facts

- Temperature rating -55°C to +125°C [-67°F to 257°F]
- Highly flame retardant
- Resistant to fuels, oils and greases
- Resistant to NBC decontaminant
- UL approved



Applications

Thermorad is a general purpose jacket material which is unaffected by most common chemicals and solvents and is suitable for use during N.B.C. decontamination. Thermorad is highly flame retardant and has an overall balance of physical and chemical properties.

Thermorad cables find widespread use in industrial, commercial and military applications. This includes railways, commercial vehicles, medical equipment, communication equipment and commercial electronics. Thermorad cable jackets are compatible with Raychem polyolefin tubings, molded parts and adhesives.

Typical Characteristics when Tested in Accordance with Raychem Specification WCD 51/1602 (UK) and WCD 3310 (US)

Mechanical	Tensile strength Elongation Abrasion resistance (1.6 kg load) Cold bend	22 MPa 550% 300 scrapes min. -55°C [-67°F]	
Thermal aging	Heat aging 120 h, 170°C [338°F]	60% min. retention of TS and Eb	
	Heat shock 4 hours at 225°C [437°F]	No cracks, drips or flowing, 6 mm total shrinkage in 300 mm	
Fluid resistance	72 hour immersion, 50°C [122°F]	% Retention of properties	
		Tensile strength	Elongation
	IRM 902	60	60
	SKYDROL	60	60
Electrical	Insulation resistance 20°C [68°F] M ohms km (min)	100	
Other	45° flammability	30 s (max.) afterburn 75 mm (max.) burn length	
	Acid gas	4% HCl equivalent (max.)	

SKYDROL is a registered trademark of Monsanto Company.

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Raythane, Neoprene, Rayolin and AFR

Specialized Wire and Cable Jacket Material

Product Facts

Raythane C

- -25°C to +80°C [-13°F to +176°F]

and Raythane FR

- -65°C to +90°C [-85°F to +194°F]
- Mechanically tough
- Can be overmolded

Rayolin

- -55°C to +95°C [-67°F to +203°F]
- Excellent long term water immersion
- Can be overmolded
- Compatible with Raychem's underwater cable splices

Neoprene (US designation Thermorad NTFR)

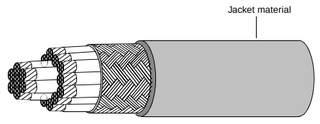
- -55°C to +90°C [-67°F to +194°F]
- Extreme flexibility
- Highly flexible at low temperatures

AFR

- -40°C to +105°C [-40°F to +221°F]
- Abrasion resistant
- Fuel resistant
- Flame retardant

Applications

In addition to the preferred cable jacket materials, Tyco Electronics offers a variety of Raychem cable jackets for specialized applications. For example, specialized materials are available for extreme low temperature flexibility or for enhanced abrasion resistance, or non-cross-linked materials for cable splicing or overmolding.



Typical Characteristics when Tested in Accordance with Raychem Specification WCD

		WCD51/1625 Raythane C	WCD3310 Raythane FR	WCD51/147 Neoprene*	WCD51/1601 Rayolin	WCD51/1619 AFR
Mechanical	Tensile strength (MPa)	45	45	12	14 12	
	Elongation (%)	400	400	400	250	150
	Abrasion resistance (1.6 kg load)	500 scrapes	500 scrapes	30 scrapes	300 scrapes	200 scrapes
	Cold bend	-25°C [-13°F]	-15°C [5°F]	-55°C [-67°F]	-55°C [-67°F]	-40°C [-40°F]
Thermal aging	Endurance (10000 h)	80°C [176°F]	90°C [194°F]	90°C [194°F]	95°C 203°F]	105°C [221°F]
Fluid resistance	24 h immersion Diesel fuels 50°C [122°F]	Excellent	Excellent	Good	—	Good
	SKYDROL 50°C [122°F]	—	—	Excellent	Excellent	Excellent
	IRM 902 100°C [212°F]	Excellent	Excellent	Good	Good	Good
Electrical	Insulation resistance 20°C [68°F] M ohms. km (min)	1	1	5	100	100
Other	45° flammability	Pass	Pass	Pass	—	Pass

* In the US use Thermorad NTFR to WCD 3314.

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Electrical Shielding

Interference — Designing for the Threat

Applications

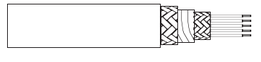
In many applications, shielding of cables is important, whether it be to minimize cross-talk within the cable, to prevent interference from external sources, or to eliminate radiation from the cable itself.

The design of cables to provide effective shielding over a broad frequency spectrum is complex, and cables must be tailored to specific electromagnetic environments. From simple aluminized MYLAR film that provides electrostatic shielding, progressively more complex shielding can be designed incorporating plated copper braids and Mu metal wraps.

Optimization

Performance of conventional braiding can be significantly improved by computer optimization. This tightly controlled process can give many times the shielding performance of a basic braided shield with minimal weight penalty or increase in optical coverage. Supershielded cables combine Mu metal wraps with optimized braids to provide even further enhanced performance, especially at low frequencies.

Available Shields

Shield Type	Construction	Typical Application
Aluminized MYLAR		Electrostatic shielding
Single Braid		Low level EMI Low sensitivity
Single Optimized Braid		Sensitive lines High EMI
Double Optimized Braid		Highly sensitive lines Severe EMI
Supershielded		EMP/Tempest
Double Supershielded		Severest of applications

MYLAR is a trademark of Dupont Teijin Films U.S.

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Electrical Shielding (Continued)

Measuring Shielding Efficiency

Surface Transfer Impedance (Zt)

To assess the effectiveness of a shield, Tyco Electronics has adopted the line injection method as described in IEC 1196-1 to measure the surface transfer impedance (Zt) of a cable shield. This relates the open circuit voltage generated on a component wire inside the cable to the current injected on the overall shield. The unit of Zt is Ohms per meter, thus the voltage coupling is length dependent and long cables exhibit more leakage than similar but shorter length ones. To determine the surface transfer impedance across a range of frequencies, a drive signal is generated by the internal tracking generator of a spectrum analyzer, and amplified. The voltage is induced on the center conductor of the sample which is amplified and returned to the signal generator for measurement. The understanding of leakage mechanisms has enabled Tyco Electronics to design Raychem cables with guaranteed minimum Zt values for the desired operating environment.

Supershielding

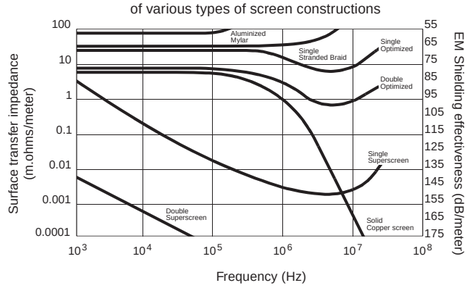
EMP Hardened Cables

The requirements for nuclear hardened cables present the engineer with a range of problems. The waveform of the EMP is such that the majority of power is dissipated in a frequency band between 1 KHz and 5 MHz, where little protection is given by conventionally shielded cables. Tyco Electronics has solved this problem with a range of supershielded cables which give shielding performance at these frequencies by incorporating materials which change the inductance of the shield and lower the transfer impedance. Raychem supershielded cables have a sandwich construction of Mu metal tapes between optimized braids. Mu metal is a ferro-magnetic material which has a high permeability over a wide range of field strengths. It is applied to the cable in a way which maintains cable flexibility and minimizes work hardening and any consequent reduction in permeability. Supershielded cables not only give protection against EMP but also other major interference modes.

Shielded Cables

Controlling the Threat

Screening performance
of various types of screen constructions



Testing

Tyco Electronics EMC test facilities have the capability for bulk current injection and radiation field testing in addition to surface transfer impedance measurements. The installation is a proven facility in characterizing new design parameters.

Design and Manufacturing Expertise

The problems of shielding cables are complex. However, with the introduction of optimized braids and supershielded cables, Tyco Electronics has the capability to solve the most difficult shielding problems. Shielding of cables without degrading cable flexibility can be provided for coaxial and multiconductor cables for all EMC and EMP conditions. To complement this range of cables, Tyco Electronics manufactures Raychem cable terminations and connector back fittings to give total interconnection system shielding performance.

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Computer-Aided Design

Custom Design Capability

Applications

Every year, Tyco Electronics designs and builds several thousand custom, high-performance, multiconductor cables that meet unique product needs.

Design staff can draw on an extensive range of high-performance cable components and jacket materials, while incorporating both color-coding and alphanumeric marking techniques for component identification. These options, combined with a full range of EMI shields, lead to a huge variety of construction possibilities.

Tyco Electronics developed computer-aided design tools to provide a fast response to design requests. The software, used by factory engineers or product specialists in the field, can generate cable design proposals with drawings and quotations in minutes. A design drawing details all the cable data and can be used as the input to harness or cable splice (joint) design. The resulting cable is tailored to customers' exact needs in an efficient design that is superior to the compromise cable selected from a product catalog.

Quality Assurance

Raychem WCD and WSD cable specifications ensure that performance and quality standards are maintained to the highest level. Tyco Electronics manufacturing sites have obtained the highest available quality system approvals, including ISO 9000 and QS9000. Raychem cables are manufactured to meet the requirements of several major specifications.

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Power Cables

Product Facts

- Choice of jacket materials
- -55°C to +125°C [-67°F to +257°F]
- Size and weight savings
- Excellent flexibility
- Resistance to solvents and chemicals

Applications

Tyco Electronics offers a range of flexible Raychem power cables that are insulated and jacketed using materials that provide improved performance over other materials, such as CSP/EPR, silicone, or PCP/Butyl. Four different types of cable are available:

Type TR is a general purpose, single-wall, 125°C [257°F] construction normally specified for use inside cabinets in protected areas.

Type ZHI is a halogen-free 105°C [221°F] cable with good oil resistance. It is particularly suitable for use in offshore, ship, and mass transit applications where low-fire-hazard performance is required. Refer to Raychem specification WCD 2015.

Type FTR is a dual-wall, 125°C [257°F], diesel-oil-resistant cable originally developed for tank engine compartment applications. It meets the German BWB VG 95218 specification. Refer to Raychem specification WCD 2002.

Type AFR is a 105°C [221°F], single-extrusion, abrasion-resistant, flame- and fuel-resistant, radiation-crosslinked polyolefin.

Type ZHPCG is a halogen-free, 115°C [239°F] cable with good oil resistance and resistance to water. It is particularly suitable to the Mass Transit, Marine and Off-Shore industries where its low fire hazard performance and flexibility are key to a successful installation. Refer to Raychem Specification WSD 1265.

Each offers particular advantages for specific applications and each is also available in multiconductor constructions and shielded and jacketed versions. Cables offer size and weight savings, good resistance to abrasion and cut-through, and the ability to operate in difficult environments.

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Power Cables (Continued)

Specifications/Approvals*

Series	Agency	Military	Raychem
TR	—	Def. Stan. 61-12 Part 31 (jacket material)	WCD 2003, WCD 51/160
ZHI	—	—	WCD 2015
FTR	—	BWB VG 95218 Types G, H, and K	WCD 2002
AFR	UL style 3496	—	WCD 2011, WCD 51/160
ZHPCG	—	—	WSD 1265

*See specifications listed for details of performance.

Conductors (Tinned Soft Copper)

Conductor Size mm²	Stranding				Max. Resistance at 20°C in Ω/km (Ω/1000 ft) Class 5/6
	IEC Class 5		IEC Class 6		
	No. x mm	Nom. Dia.	No. x mm	Nom. Dia.	
1.5	30 x 0.25	1.49 [.05]	85 x 0.15	1.53 [.06]	13.20 [4.02]
2.5	50 x 0.25	1.90 [.07]	140 x 0.15	2.40 [.09]	7.82 [2.38]
4.0	56 x 0.30	2.49 [.10]	228 x 0.15	2.90 [.11]	4.85 [1.48]
6.0	84 x 0.30	3.00 [.12]	189 x 0.20	3.60 [.14]	3.23 [0.98]
10.0	80 x 0.40	4.60 [.18]	324 x 0.20	4.55 [.18]	1.88 [0.57]
16.0	126 x 0.40	5.70 [.22]	513 x 0.20	5.50 [.22]	1.19 [0.36]
25.0	196 x 0.40	7.10 [.28]	783 x 0.20	7.30 [.29]	0.78 [0.24]
35.0	276 x 0.40	8.50 [.33]	1107 x 0.20	8.55 [.34]	0.55 [0.17]
50.0	396 x 0.40	10.30 [.41]	702 x 0.30	10.15 [.40]	0.39 [0.12]
70.0	360 x 0.50	12.40 [.49]	999 x 0.30	12.00 [.47]	0.27 [0.08]
95.0	475 x 0.50	14.50 [.57]	1332 x 0.30	14.05 [.55]	0.20 [0.06]
120.0	608 x 0.50	16.00 [.63]	1702 x 0.30	16.30 [.64]	0.15 [0.05]
150.0	777 x 0.50	18.00 [.71]	2109 x 0.30	17.40 [.68]	0.13 [0.04]
185.0	925 x 0.50	20.00 [.79]	2590 x 0.30	20.00 [.79]	0.10 [0.030]
240.0	1221 x 0.50	23.00 [.91]	—	—	0.08 [0.024]
300.0	1554 x 0.50	26.00 [1.0]	—	—	0.06 [0.018]
400.0	2035 x 0.50	30.00 [1.2]	—	—	0.05 [0.015]

Note: Types TR and FTR use IEC Class 6 conductors.
Types ZHI and AFR use IEC Class 5 conductors.

Materials Performance Summary

Material	Tensile Strength N/mm² typical	Abrasion Resistance	Cut Through	Temperature Rating °C 10000 h	Preferred Color
TR	20	Excellent	Good	125	Black
ZHI	9	Good	Very Good	105	Black
FTR	18	Good	Good	125	Black
AFR	18	Excellent	Very Good	105	Grey
ZHPCG	8	Good	Good	115	Black

Note: Where a higher operating temperature is required, Raychem SPEC 55 provides outstanding performance up to 200°C continuous operating temperature. For these or other special applications, please contact Tyco Electronics.

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UK: 44-208-420-8341

Power Cables (Continued)

Table 1. Nominal Diameters and Maximum Weights

Conductor Size (mm²)	TR 16			FTR 16		
	Part No.	Nom. OD in mm (in)	Max. weight in kg/km (lb/1000 ft)	Part No.	Nom. OD in mm (in)	Max. weight in kg/km (lb/1000 ft)
1.5	—	—	—	—	—	—
2.5	TR 16-2.5	3.9 [.15]	34.0 [22.8]	—	—	—
4.0	-4	4.5 [.17]	51.0 [34.2]	FTR 16-4	5.6 [.22]	69.0 [46.2]
6.0	-6	5.2 [.20]	73.0 [48.9]	-6	6.3 [.25]	94.0 [63.0]
10.0	-10	6.2 [.24]	117.0 [78.4]	-10	7.5 [.29]	147.0 [98.5]
16.0	-16	7.4 [.29]	182.0 [121.9]	-16	8.8 [.35]	220.0 [147.4]
25.0	-25	9.3 [.37]	274.0 [183.6]	-25	10.7 [.42]	323.0 [216.4]
35.0	-35	10.6 [.42]	383.0 [256.6]	-35	12.1 [.48]	444.0 [297.5]
50.0	-50	12.5 [.49]	542.0 [363.1]	-50	14.0 [.55]	619.0 [414.7]
70.0	-70	14.6 [.57]	765.0 [512.6]	-70	16.2 [.64]	861.0 [576.9]
95.0	-95	17.0 [.67]	1020.0 [683.4]	-95	18.8 [.74]	1148.0 [769.2]
120.0	—	—	—	-120	21.3 [.84]	1484.0 [994.3]

Table 2. Nominal Diameters and Maximum Weights

Conductor Size (mm²)	ZHI 15			AFR 35		
	Part No.	Nom. OD in mm (in)	Max. Weight in kg/km (lb/1000 ft)	Part No.	Nom. OD in mm (in)	Max. Weight in kg/km (lb/1000 ft)
1.5	ZHI 15 -1.5	4.09 [.16]	33.5 [22.4]	AFR 35-1.5	2.8 [.11]	31.0 [20.8]
2.5	-2.5	4.69 [.18]	48.8 [32.7]	-2.5	3.9 [.15]	42.0 [28.1]
4.0	-4	5.49 [.22]	72.1 [48.3]	-4	4.8 [.19]	61.0 [40.9]
6.0	-6	6.16 [.24]	99.8 [66.9]	-6	6.2 [.24]	92.0 [61.6]
10.0	-10	8.20 [.32]	159.0 [106.5]	-10	7.0 [.28]	143.0 [95.8]
16.0	-16	9.30 [.37]	223.0 [149.4]	-16	8.1 [.32]	211.0 [141.1]
25.0	-25	10.90 [.43]	331.0 [221.8]	-25	10.3 [.41]	333.0 [223.1]
35.0	-35	12.30 [.48]	448.0 [300.2]	-35	11.7 [.46]	452.0 [302.8]
50.0	-50	14.70 [.58]	631.0 [422.8]	-50	13.7 [.54]	634.0 [424.8]
70.0	-70	16.80 [.66]	852.0 [570.8]	-70	16.0 [.63]	885.0 [593.0]
95.0	-95	19.10 [.75]	1108.0 [742.4]	-95	18.5 [.73]	1165.0 [780.6]
120.0	-120	21.00 [.83]	1438.0 [963.5]	-120	20.4 [.80]	1480.0 [991.6]
150.0	-150	23.00 [.91]	1748.0 [1171.2]	-150	22.6 [.89]	1825.0 [1222.8]
185.0	-185	25.60 [1.01]	2088.0 [1399.0]	-185	24.8 [.98]	2215.0 [1484.1]
240.0	-240	28.60 [1.13]	2705.0 [1812.4]	-240	27.8 [1.1]	2875.0 [1926.3]
300.0	-300	32.00 [1.26]	3363.0 [2253.2]	-300	32.0 [1.2]	3645.0 [2442.2]
400.0	-400	36.40 [1.43]	4396.0 [2945.3]	-400	36.0 [1.4]	4730.0 [3169.1]

Table 3. Nominal Diameters and Maximum Weights

Conductor Size (mm²)	ZHPCG-15			ZHPCG-35		
	Part No.	Nom. OD in mm [in]	Max. Weight in kg/km [lb/1000 ft]	Part No.	Nom. OD in mm [in]	Max. Weight in kg/km [lb/1000 ft]
1	ZHPCG-15-1	3.77 [.14]	28.0 [18.1]	ZHPCG-35 -1	—	—
1.5	-1.5	3.79 [.15]	36.0 [24.2]	-1.5	4.55 [.18]	60.0 [40.3]
2.5	-2.5	4.27 [.17]	45.0 [30.2]	-2.5	5.07 [.20]	82.0 [55.1]
4.0	-4	4.64 [.18]	60.0 [40.3]	-4	5.66 [.22]	100.0 [67.2]
6.0	-6	5.31 [.21]	85.0 [57.1]	-6	6.15 [.24]	130.0 [87.4]
10.0	-10	6.53 [.26]	135.0 [90.7]	-10	7.33 [.29]	185.0 [124.3]
16.0	-16	8.03 [.32]	195.0 [131.0]	-16	8.83 [.35]	250.0 [167.9]
25.0	-25	9.70 [.38]	300.0 [201.6]	-25	10.50 [.41]	350.0 [235.2]
35.0	-35	11.30 [.44]	443.0 [297.7]	-35	11.70 [.46]	430.0 [288.9]
50.0	-50	13.50 [.53]	623.0 [418.6]	-50	13.48 [.53]	590.0 [396.5]
70.0	-70	15.60 [.61]	847.0 [569.1]	-70	15.33 [.60]	790.0 [530.8]
95.0	-95	18.10 [.71]	1119.0 [751.9]	-95	17.93 [.71]	1020.0 [685.4]
120.0	-120	19.80 [.78]	1445.0 [970.9]	-120	19.80 [.78]	1320.0 [887.0]
150.0	-150	22.00 [.87]	1775.0 [1192.7]	-150	21.44 [.84]	1550.0 [1041.5]
185.0	-185	24.40 [.96]	2115.0 [1421.2]	-184	23.28 [.92]	1900.0 [1276.7]
240.0	-240	27.80 [1.09]	2762.0 [1856.0]	-240	27.33 [1.08]	2500.0 [1679.9]
300.0	-300	31.20 [1.23]	3452.0 [2320.0]	-300	32.50 [1.28]	3562.0 [2393.5]
400.0	-400	35.20 [1.39]	4474.0 [3006.4]	-400	37.00 [1.46]	5645.0 [3793.3]

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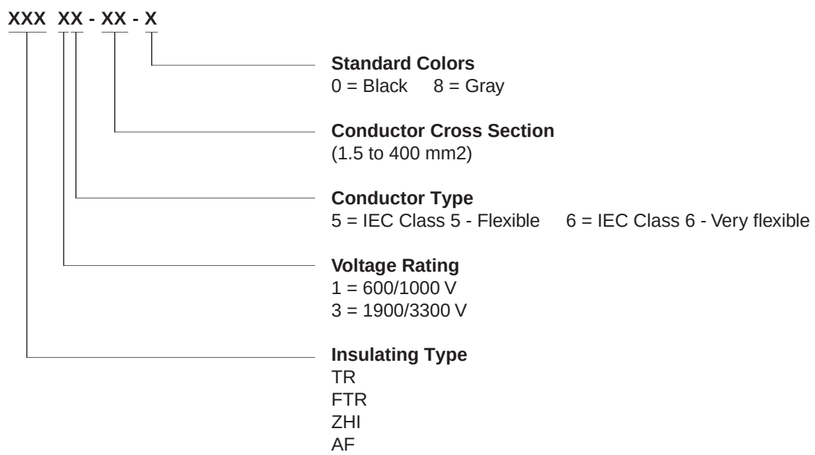
Power Cables (Continued)

Part Numbering System



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Conductor Sizes, Strandings, and Resistance Values

Applications

The conductors used with Raychem wires are concentric in construction and are specifically designed for use with thin-wall insulations. The table on the next page gives nominal values for tin-plated copper, silver-plated copper, and silver-plated high-strength copper alloy (SPHSCA) constructions. Typically, tin-plated copper is suitable for use in applications up to 150°C [302°F] and silver-plated copper in applications up to 200°C [392°F] (SPEC 55 wire only).

The current-carrying capacities assume a maximum 60°C [140°F] increase in temperature of a single wire in free air at 40°C [104°F]. For details of performance in conditions other than 40°C [104°F], contact Tyco Electronics.

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Conductor Sizes, Strandings, and Resistance Values (Continued)

Nominal Values of American Wire Gauge (AWG) and Metric Conductors

Size		Stranding No./mm	Stranding No./AWG	Outside Diameter (min.–max.)		Max Resistance in Ω/km (Ω/1000 ft)			Current-Carrying Capacity (amps)
AWG	mm²					Tin-copper	Silver-copper	SPHSCA	
30	0.06	7/0.10	7/38	0.28-0.31	[0.011-0.012]	347 [106]	324 [99]	377 [115]	3.0
28	0.09	7/0.13	7/36	0.36-0.39	[0.014-0.015]	220 [67]	205 [62]	239 [73]	4.0
26	0.15	19/0.10	19/38	0.46-0.49	[0.018-0.019]	133 [40]	123 [37]	144 [44]	5.5
24	0.25	19/0.13	19/36	0.55-0.62	[0.022-0.024]	84 [26]	78 [24]	91 [28]	7.5
22	0.40	19/0.15	19/34	0.70-0.76	[0.028-0.030]	51 [16]	49 [15]	56 [17]	10.0
20	0.60	19/0.20	19/32	0.92-0.97	[0.036-0.038]	31 [9]	30 [9]	34 [10]	13.0
18	1.00	19/0.25	19/30	1.18-1.26	[0.046-0.050]	20 [6]	20 [6]	—	17.5
16	1.20	19/0.30	19/29	1.34-1.48	[0.053-0.058]	15 [4]	15 [4]	—	20.0
14	2.00	37/0.25	37/30	1.65-1.72	[0.065-0.068]	10 [3]	10 [3]	—	28.0
12	3.00	37/0.32	37/28	2.12-2.18	[0.083-0.086]	7 [2]	7 [2]	—	37.0
10	4.50	37/0.40	37/26	2.69-2.74	[0.106-0.108]	4 [1]	4 [1]	—	53.0
8	9.00	133/0.29	133/29	4.01-4.20	[0.158-0.165]	2 [0.6]	2 [0.6]	—	78.0
6	13.5	133/0.36	133/27 [5.30]	5.03-5.48	[0.198-0.216]	1.4 [0.4]	1.4 [0.4]	—	105.0
4	21.0	133/0.45	133/25 [6.62]	6.35-6.96	[0.250-0.274]	0.9 [0.3]	0.9 [0.3]	—	142.0
2	33.0	665/0.25	665/30 [8.54]	8.13-8.64	[0.320-0.340]	0.6 [0.2]	0.6 [0.2]	—	196.0
0	51.0	1045/0.25	1045/30 [10.87]	10.00-10.80	[0.394-0.425]	0.4 [0.1]	0.4 [0.1]	—	266.0

Note: Abbreviations:
Cond. = Conductor
SPHSCA = Silver-plated high-strength copper
Tin-copper = Tin-plated copper
Silver-copper = Silver-plated copper
N/A = Not available

For product details, please refer to relevant specification control drawing.

Current Derating Factors for Wire Bundles in Free Air

No. of wires	2	3	4	7	9	12	15	18	21	24	27	30	37
Derating factor	.825	.73	.66	.54	.49	.43	.39	.36	.33	.31	.29	.28	.26

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Fiber Optic Cables

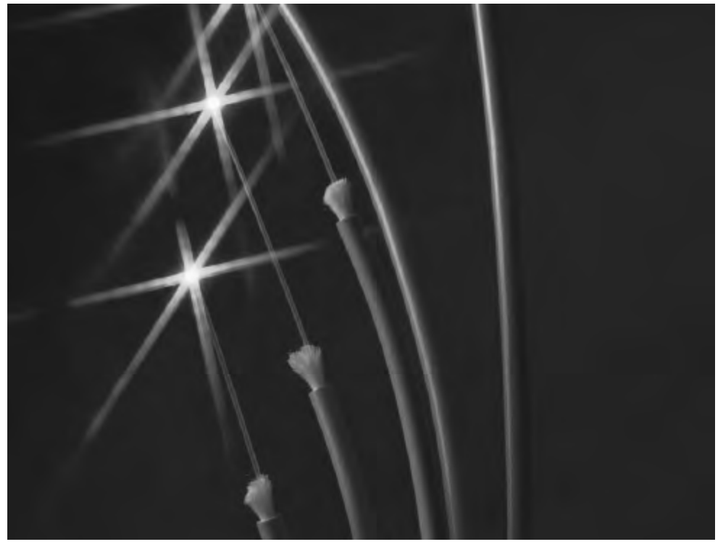
High Performance Interconnection Fiber Optic Link

Product Facts

- Low smoke
- Low corrosive gas emission
- Limited fire hazard
- Halogen free
- Small size and lightweight
- Custom design
- Range of jacket materials
- Inherent security of transmitted signals
- Low loss, high performance cables
- Water-blocking options
- Meets the requirements of Def Stan 60-1 part 2

Typical applications

- Military communications
- Military control systems
- Naval applications
- Underwater and ROV's
- Hazardous Environments



Standard Fiber Optic Cable Constructions

The use of increasingly sensitive and more sophisticated equipment in marine and military applications means a corresponding requirement for high performance interconnection links. Fiber optic links offer high performance and have many advantages over copper systems such as:

- Interference immunity (EMI & RFI)
- High bandwidth (for improved message capacity)
- Small size, lightweight
- Low loss, durability
- Security and safety

However, to ensure the reliability of a fiber system the cable design, materials and interconnection accessories employed are all extremely important.

Tyco Electronics provides a range of single and multi-core Fiber Optic Cables offering innovative solutions to interconnect problems. Tyco Electronics leadership in the field of advanced material technology, coupled with more than 15 years experience of supplying ruggedized cables for marine and military applications, ensures superior performance levels in the harshest of environments.

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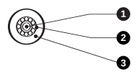
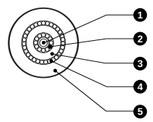
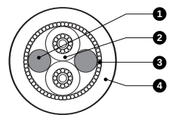
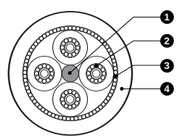
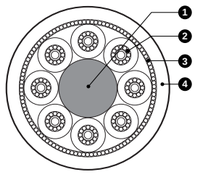
Fiber Optic Cables (Continued)

Simplex Fiber Optic Cable	Component	Fiber Size	Qty/Diameter
	1. Secondary Buffered Fiber	(62.5/125)	1
	2. Strength Member	—	1.5 mm
	3. Zerohal Sheath	—	2.7 ± 0.2 mm

Ruggedized Simplex Fiber Optic Cable	Component	Fiber Size	Qty/Diameter
	1. Secondary Buffered Fiber	(62.5/125)	1
	2. Strength Member	—	1.5 mm
	3. Zerohal Sheath	—	2.7 mm
	4. Strength Member	—	3.3 mm
	5. Zerohal Sheath	—	5.3 ± 0.2 mm

2 Channel Ruggedized Fiber Optic Cable	Component	Fiber Size	Qty/Diameter
	1. Strength Member		2
	2. Simplex Cable	(62.5/125)	2
	3. Strength Member		6.0 mm
	4. Zerohal Sheath		8.2 ± 0.3 mm

4 Channel Ruggedized Fiber Optic Cable	Component	Fiber Size	Qty/Diameter
	1. Strength Member	—	1
	2. Simplex Cable	(62.5/125)	4 / 6.7 mm
	3. Strength Member	—	7.3 mm
	4. Zerohal Sheath	—	9.5 ± 0.5 mm

8 Channel Ruggedized Fiber Optic Cable	Component	Fiber Size	Qty/Diameter
	1. Strength Member	—	1
	2. Simplex Cable	(62.5/125)	8 / 9.8 mm
	3. Strength Member	—	10.4 mm
	4. Zerohal Sheath	—	12.5 ± 0.5 mm

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Fiber Optic Cables (Continued)

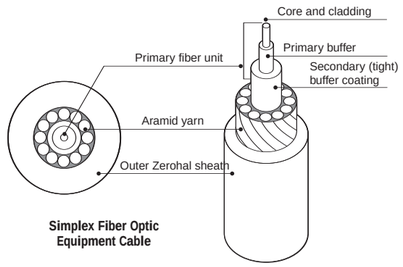
High Performance Interconnection Fiber Optic Link

Fiber Optic Equipment Cable

The diagram on the right shows a typical equipment cable, which can also be used as a sub-unit or simplex component for the larger multi-core cables, as shown in the diagrams on the previous page.

The fiber used is a high performance tight buffer type comprising an all silica fiber, with multiple coatings designed to provide mechanical and environmental protection, microbend resistance, and ease of handling in the field. Most common fiber types are readily available (see table below) and more specialized fibers are available on request.

The equipment cable has a layer of served aramid yarn providing high flexibility and tensile strength, while the outer sheath provides environmental and mechanical protection, along with low smoke emission and chemical resistance.



Simplex Fiber Optic Equipment Cable

The materials and types of designs employed have been thoroughly tested to Def Stan 60-1 (see test data on the next page) and Def Stan 61-12 Part 31 which demonstrate the suitability of the cables and fibers for use in high performance and critical marine applications.

While offering a standard range of tight buffered multi and single mode fiber optic cables, Tyco Electronics also offers the option of custom design for specific applications. These cables capitalize on the small size of the fiber thereby enabling efficient, ergonomic and reliable interconnection.

Typical 2-Channel Cable

Fiber Types and Common Features

Type	Attenuation	Bandwidth	Dispersion Slope	Numerical Aperture
—	dB/km@850/1300/1550nm	MHz-km@850/1300nm	ps/(nm2-km)	—
8/125	—/0.4/0.25	n/a	0.093	0.1
50/125	3.5/1.2/—	400/600	n/a	0.20
62.5/125	3.5/1.2/—	160/500	n/a	0.275
100/140	4.5/2.0/—	200/200	n/a	0.29

All fibers supplied with a high performance three layer tight buffer. Cables can be supplied with water-blocking and marking to suit customer requirement, and any combination of the fiber types listed above.

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Table of Requirements and Results from Def Stan 60 – 1 Part 2

Definition	Requirements								Part 2
Cable tensile strength	<0.5% cable elongation no increase in attenuation at full load and after test compared to pre-test value.						1000N applied at 100N/minute		Pass
Cable bend	No cracking or deformation of cable sheath. <0.5dB change after test.						20N load, 10 cycles of wind and unwind. 6 wraps.		Pass
Cold bend	No cracking or deformation of cable sheath. <0.5dB change after test.						20N load, 10 cycles of wind and unwind. 6 wraps, -30°C.		Pass
Cyclic bend	No cracking or deformation of cable sheath. <0.5dB change after test.						40N, 1000 cycles.		Pass
Cable impact	No cracking or deformation of cable sheath. <0.5dB change after test. 100 impacts.						12.5 mm radius, 1kg hammer, 100 mm height		Pass
Cable crush	No cracking or deformation of cable sheath. <0.5dB change after test <20% reduction from original diameter.						2000N/5 min		Pass
Cable snatch	No cracking or deformation of cable sheath. <0.5dB change after test <20% reduction from original diameter.						1kg, 10 cycles		Pass
Dynamic cut through	≥ 25N						85°C, 60N/minute, 0.45mm diameter needle blade		Pass
Tear resistance	5 N/mm						—		Pass
Shrinkage	<3mm total						16 hrs at -30°C and 16 hrs at 85°C		Pass
Scrape abrasion	500 cycles minimum						5N, 85°C, 0.45 mm diameter needle blade		Pass
Fluids	Volume	25	TS ret	60	Eb ret	60	Diesel F76	28 days @ 20°C	Pass
	swell	15	min %	60	min %	60	OX-30	28 days @ 50°C	Pass
	max %	15		60		60	OX-40 HS200X	28 days @ 50°C	Pass
		10		60		60	OMD-113	28 days @ 50°C	Pass
		50		50		50	OX-28	28 days @ 50°C	Pass
		10		80		80	Deionized water	28 days @ 50°C	Pass
		10		80		80	Deionized water + 3.5% NaCl	28 days @ 50°C	Pass
Accelerated ageing	<20% change in TS/Eb/tear between 14 and 28 days. Eb ≥ 150%						110°C for 14 and 28 days.		Pass
Arrhenius plot	40,000 hours at 85°C						End point measurement: 50% absolute elongation		Pass
Stability	175% max. elongation, 25% max. permanent elongation.						105°C, 0.2N/mm2 stress.		Pass
Pressure	Indentation not to exceed 50%.						85°C for 4 hrs.		Pass
Ozone	No cracks with normal vision.						80 – 100ppm for 120 hrs		Pass
UV light resistance	≤ 80% Eb change, ≤ 20% TS change.						8 hrs UV 55°C, 4 hrs humidity 40°C, (UV-B) 1000 hrs.		Pass
Smoke Index	20 maximum						NES 711		Pass
Toxicity index	5 maximum						NES 713		Pass
Halogen index	No detectable halogens.						Sodium fusion test (Lassaigne)		Pass
Oxygen index	29 minimum						BS 2782 Part 1 Method 141D		Pass
Temperature index	250°C minimum						Nes 715		Pass
Flammability	Not to reach within 50 mm of the lower clamp.						BS 4066 Part 1		Pass

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Precision Interconnect MIL-Aero Cables and Cable Assemblies

Introduction

Flexible, lightweight cables and assemblies are rugged and reliable in the field.

PRECISION INTERCONNECT cables and assemblies are manufactured with materials and constructions selected to survive constant flexing, harsh environments, and severe stress while continuing to deliver vital power and signals. Conductor materials and sizes, dielectrics, jacket materials, flex reliefs, and connectors work together to provide reliable connections on hand-held and wearable devices, gimbal based instruments and high performance communications interconnects.

Size, weight and flexibility

Where cables need to flex readily and repeatedly, Tyco Electronics can design cables for human or machine interfaces. Fine-wire cables reduce overall size and weight in field applications. Molded flex reliefs protect terminations.

Rugged for field use

Cable jacket materials are chosen to protect the cable from its environs. Strength members, barriers and armor can be incorporated into the design if needed. Cables and cable assemblies can be designed to be sealed against moisture or solvents.

Design options

From single coax to custom composite cables, cables are configured to suit the installation. Ribbonized conductors offer routing advantages. Micro miniature conductors reduce size and weight for hand-held and wearable applications. Combining signal and power conductors, composite cables can satisfy umbilical interconnect requirements in a single cable. Hybrid cables can include light fibers and tubes for multi-function instruments.

Turnkey solutions

Cables can be terminated to round, rectangular, D-sub or micro-D connectors. Overmolded flex/strain reliefs are incorporated to protect the terminations. Sealed components and soak caps are available for harsh environments or where moisture resistance is required.

Quality assured

PRECISION INTERCONNECT cables and assemblies are designed with the application in mind and tested per a stringent matrix of mechanical, electrical and environmental tests. Custom design validation testing may be requested and will be quoted separately. Commercial terms and conditions apply.

Typical Cable Materials for MIL-Aero Applications

Conductors —
TC or SP copper
High strength copper alloy
Cad-free copper alloy
SP copper clad steel

Insulations / Jackets —
FEP
ETFE
TPE
TPR
Silicone
Polyurethane
Expanded PTFE tape

Options —
Strength members
Barriers
Armor

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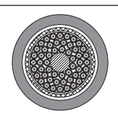
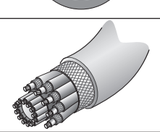
Precision Interconnect MIL-Aero Cables and Cable Assemblies

It all begins with the cable—designed, engineered and built to suit the mechanical, electrical and environmental demands of the application.

Precision Interconnect Cables

Cable	Construction	Applications	Features
Coax	Copper or copper alloy conductors in 22 to 48 AWG with ETFE or FEP dielectric, braided shields. Twinaxes and triaxes also available.	Aircraft communications.	Miniature dimensions, light weight. For high temperature and flame resistance. No halogens or chlorine.
Twisted Pairs	22 to 38 AWG. Parallel or twisted pairs. Unshielded or shielded.	Low voltage and other differential signaling applications. Also video equipment.	Low skew and fast rise time. Precision twinning available for matched time delay.
Ribbonized	38, 36 and 34 AWG 50 ohm coax in low profile planar configuration. Composite ribbons also available.	High data rate communications, instrumentation, and wearable devices.	Lightweight and very flexible. Eases routing in limited space situations.
Multi-conductor 	Multiconductor singles or coaxes in round cables.	High data rate communications, instrumentation, and wearable devices.	Flexible and durable. Materials may be selected for high temperature, crush resistance and high flex-life.
Composite 	Insulated singles, coaxes, triaxes and/or twisted pairs in a single, round cable to provide power and signals.	Umbicals to headsets, helmet mounted displays, wearable computers.	Miniature dimensions, light weight. Materials may be selected for high flex life, high temperature and flame resistance.

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METRIC
Dimensions in this section are millimeters over inches

Note: Users should independently evaluate the suitability of the product for their application. Before ordering, check with Tyco Electronics for most current data.

11 Cabling and Accessories

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KTKK Product Family Overview

Applications

KTKK cable assemblies are one-part assemblies for screened and unscreened cables. Constructed from Raychem heat-shrinkable screened molded parts and connector adapters, the assembly consists of parts already well proven in harsh military environments.

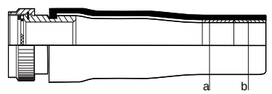
Installation is simply effected by coupling the adapter to the connector and shrinking the rear of the molded part onto the cable with a hot air gun.

The molded part has a hot-melt adhesive preinstalled to provide a bond between the cable jacket and the molded part.

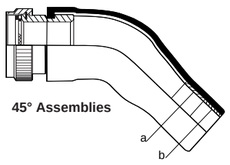
When used in conjunction with shielded (screened) cables, the assembly provides electrical continuity between the cable shield and the connector with Rayaten molded parts.

Rayaten molded parts are shielded, heat-shrinkable parts providing shielding levels better than 80 dB at 100 MHz.

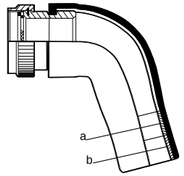
Assembly Types



Straight Assemblies



45° Assemblies



90° Assemblies

a = Preinstalled conductive adhesive for use with Rayaten screened molded parts only.

b = Preinstalled environment adhesive for use with screened and unscreened KTKK assemblies (see “Preinstalled adhesives,” page 11-9).

Materials Available

Material		Specification
-25 fluid-resistant modified elastomer	-25S fluid-resistant modified elastomer; shielded	RK-6719
-100 low-fire-hazard material	-100S low-fire-hazard; shielded	RK-6724

Precoated Adhesives

Material	Available Coatings (Unshielded)	Available Coatings (Shielded)
-25	S-1048 (/86) high-temperature hot-melt adhesive	—
-25S	—	S-1030 (/180) low-fire-hazard hot-melt adhesive
-100	S-1030 (/180) low-fire-hazard hot-melt adhesive	—
-100S	—	S-1275 conductive adhesive for use with Rayaten molded parts.

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KTKK Assemblies Screened

Pattern 105 Connectors or Connector Code 76

25S Fluid Resistant Elastomer

Connector Shell Size	Straight Assemblies		45° Assemblies		90° Assemblies	
	Raychem Part No.	Cable O.D. Range	Raychem Part No.	Cable O.D. Range	Raychem Part No.	Cable O.D. Range
08	KTKK 0520	5.0-8.0 [.197-.315]	KTKK 0560	5.0-7.0 [.197-.276]	—	—
10	KTKK 0521	6.0-13.0 [.236-.512]	KTKK 0561	6.0-9.0 [.236-.354]	KTKK 1051	6.0-13.0 [.236-.512]
12	KTKK 0522	7.2-15.0 [.283-.591]	KTKK 0562	7.2-11.0 [.283-.433]	KTKK 1052	7.2-15.0 [.283-.591]
14	KTKK 0523	7.2-15.0 [.283-.591]	KTKK 0563	7.2-11.0 [.283-.433]	KTKK 1053	7.2-15.0 [.283-.591]
16	KTKK 0524	8.5-19.0 [.335-.748]	KTKK 0564	8.5-17.0 [.335-.669]	KTKK 1054	8.5-19.0 [.335-.748]
18	KTKK 0525	8.5-20.0 [.335-.748]	KTKK 0565	8.5-17.0 [.335-.669]	KTKK 1055	8.5-19.0 [.335-.748]
20	KTKK 0526	10.0-24.0 [.394-.945]	KTKK 0566	10.0-21.0 [.394-.827]	KTKK 1056	10.0-24.0 [.394-.945]
22	KTKK 0527	10.0-24.0 [.394-.945]	KTKK 0567	10.0-21.0 [.394-.827]	KTKK 1057	10.0-24.0 [.394-.945]
24	KTKK 0528	15.8-33.0 [.622-1.299]	KTKK 0568	15.8-29.0 [.622-1.142]	KTKK 1058	15.8-33.0 [.622-1.299]

100S Low Fire Hazard Material

08	KTKK 0465	5.0-7.0 [.197-.276]	KTKK 0603	5.0-7.0 [.197-.276]	—	—
10	KTKK 0466	6.0-9.0 [.236-.354]	KTKK 0604	6.0-9.0 [.236-.354]	KTKK 1251	6.0-9.0 [.236-.354]
12	KTKK 0467	7.2-11.0 [.283-.433]	KTKK 0605	7.2-11.0 [.283-.433]	KTKK 1252	7.2-11.0 [.283-.433]
14	KTKK 0468	7.2-11.0 [.283-.433]	KTKK 0606	7.2-11.0 [.283-.433]	KTKK 1253	7.2-11.0 [.283-.433]
16	KTKK 0469	8.5-17.0 [.335-.669]	KTKK 0607	8.5-17.0 [.335-.669]	KTKK 1254	8.5-17.0 [.335-.669]
18	KTKK 0470	8.5-17.0 [.335-.669]	KTKK 0608	8.5-17.0 [.335-.669]	KTKK 1255	8.5-17.0 [.335-.669]
20	KTKK 0471	10.0-21.0 [.394-.827]	KTKK 0609	10.0-21.0 [.394-.827]	KTKK 1256	10.0-21.0 [.394-.827]
22	KTKK 0472	10.0-21.0 [.394-.827]	KTKK 0610	10.0-21.0 [.394-.827]	KTKK 1257	10.0-21.0 [.394-.827]
24	KTKK 0473	15.8-29.0 [.622-1.142]	KTKK 0611	15.8-29.0 [.622-1.142]	KTKK 1258	15.8-29.0 [.622-1.142]

Pattern 602 Connectors or Connector Code 54

25S Fluid Resistant Elastomer

Connector Shell Size	Straight Assemblies		45° Assemblies		90° Assemblies	
	Raychem Part No.	Cable O.D. Range	Raychem Part No.	Cable O.D. Range	Raychem Part No.	Cable O.D. Range
08	KTKK 0840	5.0-8.0 [.197-.315]	KTKK 0970	5.0-7.0 [.197-.276]	—	—
10	KTKK 0841	6.0-13.0 [.236-.512]	KTKK 0971	6.0-9.0 [.236-.354]	KTKK 0851	6.0-13.0 [.236-.512]
12	KTKK 0842	7.2-15.0 [.283-.591]	KTKK 0972	7.2-11.0 [.283-.433]	KTKK 0852	7.2-15.0 [.283-.591]
14	KTKK 0843	7.2-15.0 [.283-.591]	KTKK 0973	7.2-11.0 [.283-.433]	KTKK 0853	7.2-15.0 [.283-.591]
16	KTKK 0844	8.5-19.0 [.335-.748]	KTKK 0974	8.5-17.0 [.335-.669]	KTKK 0854	8.5-19.0 [.335-.748]
18	KTKK 0845	8.5-19.0 [.335-.748]	KTKK 0975	8.5-17.0 [.335-.669]	KTKK 0855	8.5-19.0 [.335-.748]
20	KTKK 0846	10.0-24.0 [.394-.945]	KTKK 0976	10.0-21.0 [.394-.827]	KTKK 0856	10.0-24.0 [.394-.945]
22	KTKK 0847	10.0-24.0 [.394-.945]	KTKK 0977	10.0-21.0 [.394-.827]	KTKK 0857	10.0-24.0 [.394-.945]
24	KTKK 0848	15.8-33.0 [.622-1.299]	KTKK 0978	15.8-29.0 [.622-1.142]	KTKK 0858	15.8-33.0 [.622-1.299]

100S Low Fire Hazard Material

08	KTKK 0612	5.0-7.0 [.197-.276]	KTKK 0780	5.0-7.0 [.197-.276]	—	—
10	KTKK 0613	6.0-9.0 [.236-.354]	KTKK 0781	6.0-9.0 [.236-.354]	KTKK 1241	6.0-9.0 [.236-.354]
12	KTKK 0614	7.2-11.0 [.283-.433]	KTKK 0782	7.2-11.0 [.283-.433]	KTKK 1242	7.2-11.0 [.283-.433]
14	KTKK 0615	7.2-11.0 [.283-.433]	KTKK 0783	7.2-11.0 [.283-.433]	KTKK 1243	7.2-11.0 [.283-.433]
16	KTKK 0616	8.5-17.0 [.335-.669]	KTKK 0784	8.5-17.0 [.335-.669]	KTKK 1244	8.5-17.0 [.335-.669]
18	KTKK 0617	8.5-17.0 [.335-.669]	KTKK 0785	8.5-17.0 [.335-.669]	KTKK 1245	8.5-17.0 [.335-.669]
20	KTKK 0618	10.0-21.0 [.394-.827]	KTKK 0786	10.0-21.0 [.394-.827]	KTKK 1246	10.0-21.0 [.394-.827]
22	KTKK 0619	10.0-21.0 [.394-.827]	KTKK 0787	10.0-21.0 [.394-.827]	KTKK 1247	10.0-21.0 [.394-.827]
24	KTKK 0620	15.8-29.0 [.622-1.142]	KTKK 0788	15.8-29.0 [.622-1.142]	KTKK 1248	15.8-29.0 [.622-1.142]

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Revised 8-06

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KTKK Assemblies Screened (Continued)

Pattern 608 Connectors or Connector Code 79

25S Fluid Resistant Elastomer

Connector Shell Size	Straight Assemblies		45° Assemblies		90° Assemblies	
	Raychem Part No.	Cable O.D. Range	Raychem Part No.	Cable O.D. Range	Raychem Part No.	Cable O.D. Range
08	KTKK 0530	5.0-8.0 [.197-.315]	KTKK 0540	5.0-7.0 [.197-.276]	—	—
10	KTKK 0531	6.0-13.0 [.236-.512]	KTKK 0541	6.0-9.0 [.236-.354]	KTKK 1261	6.0-13.0 [.236-.512]
12	KTKK 0532	7.2-15.0 [.283-.591]	KTKK 0542	7.2-11.0 [.283-.433]	KTKK 1262	7.2-15.0 [.283-.591]
14	KTKK 0533	7.2-15.0 [.283-.591]	KTKK 0543	7.2-11.0 [.283-.433]	KTKK 1263	7.2-15.0 [.283-.591]
16	KTKK 0534	8.5-19.0 [.335-.748]	KTKK 0544	8.5-17.0 [.335-.669]	KTKK 1264	8.5-19.0 [.335-.748]
18	KTKK 0535	8.5-19.0 [.335-.748]	KTKK 0545	8.5-17.0 [.335-.669]	KTKK 1265	8.5-19.0 [.335-.748]
20	KTKK 0536	10.0-24.0 [.394-.945]	KTKK 0546	10.0-21.0 [.394-.827]	KTKK 1266	10.0-24.0 [.394-.945]
22	KTKK 0537	10.0-24.0 [.394-.945]	KTKK 0547	10.0-21.0 [.394-.827]	KTKK 1267	10.0-24.0 [.394-.945]
24	KTKK 0538	15.8-33.0 [.622-1.299]	KTKK 0548	15.8-29.0 [.622-1.142]	KTKK 1268	15.8-33.0 [.622-1.299]

100S Low Fire Hazard Material

08	KTKK 0444	5.0-7.0 [.197-.276]	KTKK 0580	5.0-7.0 [.197-.276]	—	—
10	KTKK 0445	6.0-9.0 [.236-.354]	KTKK 0581	6.0-9.0 [.236-.354]	KTKK 1021	6.0-9.0 [.236-.512]
12	KTKK 0446	7.2-11.0 [.283-.433]	KTKK 0582	7.2-11.0 [.283-.433]	KTKK 1022	7.2-11.0 [.283-.591]
14	KTKK 0447	7.2-11.0 [.283-.433]	KTKK 0583	7.2-11.0 [.283-.433]	KTKK 1023	7.2-11.0 [.283-.591]
16	KTKK 0448	8.5-17.0 [.335-.669]	KTKK 0584	8.5-17.0 [.335-.669]	KTKK 1024	8.5-17.0 [.335-.748]
18	KTKK 0449	8.5-17.0 [.335-.669]	KTKK 0585	8.5-17.0 [.335-.669]	KTKK 1025	8.5-17.0 [.335-.748]
20	KTKK 0450	10.0-21.0 [.394-.827]	KTKK 0586	10.0-21.0 [.394-.827]	KTKK 1026	10.0-21.0 [.394-.827]
22	KTKK 0451	10.0-21.0 [.394-.827]	KTKK 0587	10.0-21.0 [.394-.827]	KTKK 1027	10.0-21.0 [.394-.827]
24	KTKK 0452	15.8-29.0 [.622-1.142]	KTKK 0588	15.8-29.0 [.622-1.142]	KTKK 1028	15.8-29.0 [.622-1.142]

38999 Series III and IV Connectors or Connector Code 40

25S Fluid Resistant Elastomer

Connector Shell Size	Straight Assemblies		45° Assemblies		90° Assemblies	
	Raychem Part No.	Cable O.D. Range (mm)	Raychem Part No.	Cable O.D. Range (mm)	Raychem Part No.	Cable O.D. Range (mm)
08	KTKK 1110	5.0-8.0 [.197-.315]	KTKK 1120	5.0-7.0 [.197-.276]	—	—
10	KTKK 1111	6.0-13.0 [.236-.512]	KTKK 1121	6.0-9.0 [.236-.354]	KTKK 1131	6.0-13.0 [.236-.512]
12	KTKK 1112	7.2-15.0 [.283-.591]	KTKK 1122	7.2-11.0 [.283-.433]	KTKK 1132	7.2-15.0 [.283-.591]
14	KTKK 1113	7.2-15.0 [.283-.591]	KTKK 1123	7.2-11.0 [.283-.433]	KTKK 1133	7.2-15.0 [.283-.591]
16	KTKK 1114	8.5-19.0 [.335-.748]	KTKK 1124	8.5-17.0 [.335-.669]	KTKK 1134	8.5-19.0 [.335-.748]
18	KTKK 1115	8.5-19.0 [.335-.748]	KTKK 1125	8.5-17.0 [.335-.669]	KTKK 1135	8.5-19.0 [.335-.748]
20	KTKK 1116	10.0-24.0 [.394-.945]	KTKK 1126	10.0-21.0 [.394-.827]	KTKK 1136	10.0-24.0 [.394-.945]
22	KTKK 1117	10.0-24.0 [.394-.945]	KTKK 1127	10.0-21.0 [.394-.827]	KTKK 1137	10.0-24.0 [.394-.945]
24	KTKK 1118	15.8-33.0 [.622-1.299]	KTKK 1128	15.8-29.0 [.622-1.142]	KTKK 1138	15.8-33.0 [.622-1.299]

100S Low Fire Hazard Material

08	KTKK 0670	5.0-7.0 [.197-.276]	KTKK 0660	5.0-7.0 [.197-.276]	—	—
10	KTKK 0671	6.0-9.0 [.236-.354]	KTKK 0661	6.0-9.0 [.236-.354]	KTKK 1181	6.0-9.0 [.236-.354]
12	KTKK 0672	7.2-11.0 [.283-.433]	KTKK 0662	7.2-11.0 [.283-.433]	KTKK 1182	7.2-11.0 [.283-.433]
14	KTKK 0673	7.2-11.0 [.283-.433]	KTKK 0663	7.2-11.0 [.283-.433]	KTKK 1183	7.2-11.0 [.283-.433]
16	KTKK 0674	8.5-17.0 [.335-.669]	KTKK 0664	8.5-17.0 [.335-.669]	KTKK 1184	8.5-17.0 [.335-.669]
18	KTKK 0675	8.5-17.0 [.335-.669]	KTKK 0665	8.5-17.0 [.335-.669]	KTKK 1185	8.5-17.0 [.335-.669]
20	KTKK 0676	10.0-21.0 [.394-.827]	KTKK 0666	10.0-21.0 [.394-.827]	KTKK 1186	10.0-21.0 [.394-.827]
22	KTKK 0677	10.0-21.0 [.394-.827]	KTKK 0667	10.0-21.0 [.394-.827]	KTKK 1187	10.0-21.0 [.394-.827]
24	KTKK 0678	15.8-29.0 [.622-1.142]	KTKK 0668	15.8-29.0 [.622-1.142]	KTKK 1188	15.8-29.0 [.622-1.142]

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

KTKK Assemblies Screened (Continued)

38999 Series I and II Connectors or Connector Code 41

25S Fluid Resistant Elastomer

Connector Shell Size	Straight Assemblies		45° Assemblies		90° Assemblies	
	Raychem Part No.	Cable O.D. Range	Raychem Part No.	Cable O.D. Range	Raychem Part No.	Cable O.D. Range
08	KTKK 0500	5.0-8.0 [.197-.315]	KTKK 0510	5.0-7.0 [.197-.276]	—	—
10	KTKK 0501	6.0-13.0 [.236-.512]	KTKK 0511	6.0-9.0 [.236-.354]	KTKK 0831	6.0-13.0 [.236-.512]
12	KTKK 0502	7.2-15.0 [.283-.591]	KTKK 0512	7.2-11.0 [.283-.433]	KTKK 0832	7.2-15.0 [.283-.591]
14	KTKK 0503	7.2-15.0 [.283-.591]	KTKK 0513	7.2-11.0 [.283-.433]	KTKK 0833	7.2-15.0 [.283-.591]
16	KTKK 0504	8.5-19.0 [.335-.748]	KTKK 0514	8.5-17.0 [.335-.669]	KTKK 0834	8.5-19.0 [.335-.748]
18	KTKK 0505	8.5-19.0 [.335-.748]	KTKK 0515	8.5-17.0 [.335-.669]	KTKK 0835	8.5-19.0 [.335-.748]
20	KTKK 0506	10.0-24.0 [.394-.945]	KTKK 0516	10.0-21.0 [.394-.827]	KTKK 0836	10.0-24.0 [.394-.945]
22	KTKK 0507	10.0-24.0 [.394-.945]	KTKK 0517	10.0-21.0 [.394-.827]	KTKK 0837	10.0-24.0 [.394-.945]
24	KTKK 0508	15.8-33.0 [.622-1.299]	KTKK 0518	15.8-29.0 [.622-1.142]	KTKK 0838	15.8-33.0 [.622-1.299]

100S Low Fire Hazard Material

08	KTKK 0640	5.0-7.0 [.197-.276]	KTKK 0630	5.0-7.0 [.197-.276]	—	—
10	KTKK 0641	6.0-9.0 [.236-.354]	KTKK 0631	6.0-9.0 [.236-.354]	KTKK 0721	6.0-9.0 [.236-.354]
12	KTKK 0642	7.2-11.0 [.283-.433]	KTKK 0632	7.2-11.0 [.283-.433]	KTKK 0722	7.2-11.0 [.283-.433]
14	KTKK 0643	7.2-11.0 [.283-.433]	KTKK 0633	7.2-11.0 [.283-.433]	KTKK 0723	7.2-11.0 [.283-.433]
16	KTKK 0644	8.5-17.0 [.335-.669]	KTKK 0634	8.5-17.0 [.335-.669]	KTKK 0724	8.5-17.0 [.335-.669]
18	KTKK 0645	8.5-17.0 [.335-.669]	KTKK 0635	8.5-17.0 [.335-.669]	KTKK 0725	8.5-17.0 [.335-.669]
20	KTKK 0646	10.0-21.0 [.394-.827]	KTKK 0636	10.0-21.0 [.394-.827]	KTKK 0726	10.0-21.0 [.394-.827]
22	KTKK 0647	10.0-21.0 [.394-.827]	KTKK 0637	10.0-21.0 [.394-.827]	KTKK 0727	10.0-21.0 [.394-.827]
24	KTKK 0648	15.8-29.0 [.622-1.142]	KTKK 0638	15.8-29.0 [.622-1.142]	KTKK 0728	15.8-29.0 [.622-1.142]

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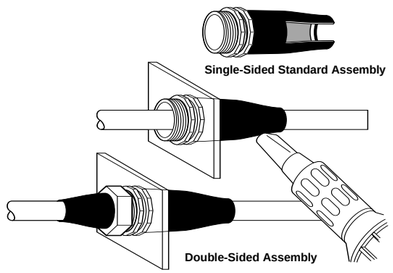
UK: 44-208-420-8341

TCFS/R

Product Facts

- Screened or unscreened cables
- One-piece part
- Each size covers a wide cable range
- Light weight
- Single- or double-sided assembly



Applications

Provides environmental sealing and screen continuity to a bulkhead as a cable passes through. The assembly consists of a specifically designed locknut and O-ring seal, onto the rear of which is preinstalled a Raychem heat-shrinkable molded part. Feedthrough installation is simply effected by tightening the locknut on the rear of the bulkhead, which compresses the O-ring and ensures that a small knife-edge provides electrical contact between the assembly and the bulkhead.

When heat is applied to the molded part in the form of hot air, a seal to the cable is formed with hot-melt adhesive. When specified for screened cables, the assembly contains a conductive adhesive, which provides electrical continuity between the screen and the bulkhead via Rayaten molded parts.

These molded parts are shielded (screened), heat-shrinkable parts providing shielding levels better than 80 dB at 100 MHz.

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TCFS/R (Continued)

Part Numbering System

TCFX* - 12 62C - 0 - 20 - 100 A H

Adhesive System
E = Epoxy (consult factory)
H = S-1030 hot melt
W = S-1048 hot melt

Molded Part Type
A = Straight unscreened
B = 90° unscreened
C = Straight screened
D = 45° screened
E = 90° screened (16–36 only)

Molded Part Material
-25 = Semirigid elastomer
-100 = Low fire hazard

Thread Length
(may be three digits if more than 95 mm required)
20 mm standard
5 mm increments, minimum 15 mm

Assembly Modification Code
0 = Standard assembly
1 = Double-sided assembly (only straight unshielded boot available on double nut)
2 = Same as 1 but with potting ports
3 = Locknut
4 = 60° metalwork
5 = Same as 0 but with potting ports

Feedthrough Material/Finish
01W = Nickel aluminium bronze, shotblast
19B = Aluminium-alloy–plated cadmium, olive drab, over electroless nickel
19C = Aluminium-alloy–plated electroless nickel
19Q = Aluminium-alloy–plated zinc cobalt
62C = Stainless-steel–plated electroless nickel

Feedthrough Size

Part Description
TCFS uses a full-length molded part
TCFR uses a shortened molded part
(only available on straight assemblies)

*See Molded Parts Materials Section 12 for -25 and -100 information.

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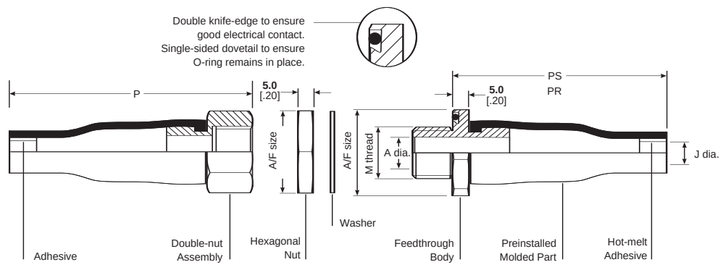
TCFS/R (Continued)



PS = screened PR = unscreened

Product Dimensions

Feed-through Size	J Diameter*					M Thread	A Dia. Max.	A/F Body	A/F Nut	P ±10% Unscreened			Hole Size
	Unshielded		Shielded										
	a Min.	b Max.	a Min. -25S	-100S	b Max.					P	PS	PR	
TCFS/R-12	11 [.43]	5.6 [.22]	7.5 [.30]	6.5 [.26]	5.0 [.20]	M12 x 1.5	7.5 [.30]	24 [.95]	17 [.67]	52	50	43	13.0 [.51]
TCFS/R-16	15 [.59]	5.9 [.23]	12.5 [.49]	8.5 [.33]	6.0 [.24]	M16 x 1.5	10.2 [.40]	29 [1.14]	22 [.87]	57	65	48	17.0 [.67]
TCFS/R-20	19 [.75]	7.1 [.28]	14.5 [.57]	10.5 [.41]	7.2 [.28]	M20 x 1.5	14.0 [.55]	34 [1.34]	27 [1.06]	61	77	52	21.0 [.83]
TCFS/R-24	23 [.90]	8.4 [.33]	18.5 [.73]	16.5 [.65]	8.5 [.33]	M24 x 1.5	19.2 [.76]	38 [1.50]	30 [1.18]	74	90	65	25.0 [.98]
TCFS/R-30	29 [1.14]	9.9 [.39]	23.5 [.93]	20.5 [.81]	10.0 [.39]	M30 x 1.5	24.2 [.95]	48 [1.89]	36 [1.48]	73	115	64	31.0 [1.22]
TCFS/R-36	35 [1.38]	15.7 [.62]	32.5 [1.28]	28.5 [1.12]	15.8 [.62]	M36 x 1.5	30.2 [1.49]	52 [2.05]	41 [1.61]	104	140	95	37.0 [1.46]
TCFR-48	45 [1.77]	16.8 [.66]	38.5 [1.52]	35.5 [1.40]	N/A	M48 x 1.5	40.2 [1.58]	67 [2.64]	55 [2.17]	144	110	135	50.0 [1.97]

*a = Supplied dimension
b = Dimension after free recovery

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S-1030, S-1048, S-1275 (Rayaten)

Product Characteristics

S-1030 Polyolefin Hot-Melt Adhesive	
Precoat designation	/180
Type	Polyolefin hot-melt adhesive
Operating temperature range	-80°C to 80°C [-112°F to 176°F]
Bonding temperature	120°C [248°F]
Minimum shelf life at or below 25°C	4 years
Specification	RK-6017, RT-1050/6
Comments	Excellent water blocking and low temperature

S-1048 HIgh-Performance Hot-Melt Adhesive	
Precoat designation	/86
Type	High-performance hot-melt adhesive
Operating temperature range	-55°C to 120°C [-67°F to 248°F]
Bonding temperature	160°C [320°F]
Minimum shelf life at or below 25°C	4 years
Specification	RK-6626, RT-1050/3
Comments	Good solvent resistance but requires higher temperature to achieve bonding

S-1275 Rayaten Conductive Adhesive* (for KTKK assemblies only)	
Type	Electrically conductive polyamide hot-melt adhesives
Operating temperature range	-40°C to 70°C [-40°F to 158°F]
Bonding temperature	160°C [320°F]
Minimum shelf life at or below 25°C	2 years
Specification	RK-6637
Comments	Conductive adhesive for use with Rayaten parts

*Not sold separately.

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SESK — Shipboard Electrical Splice Kits

Product Facts

- Waterproofing and corrosion proofing
- Standard sizes that cover most single-, two-, three-, four-, and multi-conductor cables
- Excellent electrical-insulation properties and abrasion protection
- Easy installation
- Operating temperature range of -55°C to +90°C [-67°F to +194°F]
- Approved for new ship construction

Applications

SESK kits provide fast, waterproof repair of single-, two-, three-, four-, and multi-conductor cables. Kits are suitable for both permanent and temporary repairs. The self-sealing heat-shrinkable tubing used in each kit provides a watertight seal for the inner insulation and outer jacket. The flame-retardant tubing material provides electrical and thermal properties similar to those of most Navy standard cables.

Installation

Minimum shrink temperature: 121°C [250°F]

Specifications/Approvals

Series	Military	Industry	Agency	Raychem
SESK	MIL-DTL-23053*	IEEE-383 Massive Flame Vertical Tray Test	Lloyd's Register	—
	USCG CGHQ-3774	SST-FR	DNV	—
	U.S. Navy drawing 5001027-19	RW-2011	ABS	—
Tubing used to replace cable jacket	SST-FR	SST-FR	—	Sigmaform FR
	—	—	SST-FR	RW-2011

*Formerly MIL+23053/15A

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SESK — Shipboard Electrical Splice Kits (Continued)

Part No.	Cable Range (Navy Standard)	Approx. AWG Equivalent
Single-Conductor Cable		
SESK S-4	S-4–S-10	#14–#10
SESK S-16	S-16–S-41	#8–#4
SESK S-52	S-52–S-106	#3–#1/0
SESK S-133	S-133–S-250	#2/0–250 mcm
SESK S-300	S-300–S-600	300 mcm–600 mcm
SESK S-650	S-650–S-1000	650 mcm–1000 mcm
Two-Conductor Cable		
SESK D-3	D-3	#22–#16
SESK D-4	D-4–D-10	#14–#10
SESK D-14	D-14	#9
SESK D-23	D-23–D-41	#7–#4
SESK D-50	D-50–D-168	#3–#3/0
SESK D-200	D-200–D-250	#4/0–250 mcm
SESK D-300	D-300–D-350	300 mcm–350 mcm
SESK D-400	D-400–D-450	400 mcm–450 mcm
Three-Conductor Cable		
SESK T-3	T-3	#22–#16
SESK T-4	T-4–T-10	#14–#10
SESK T-14	T-14–T-20	#9–#7
SESK T-23	T-23–T-41	#6–#4
SESK T-50	T-50–T-168	#3/0
SESK T-200	T-200–T-250	#4/0–250 mcm
SESK T-300	T-300–T-350	300 mcm–350 mcm
SESK T-400	T-400–T-450	400 mcm–450 mcm
SESK T-500	T-500–T-600	500 mcm–600 mcm
Four-Conductor Cable		
SESK F-3	F-3	#22–#16
SESK F-4	F-4–F-9	#14–#10
SESK F-23	F-23	#6
SESK F-50	F-50	#3
SESK F-75	F-75–F-100	#1–#1/0
SESK F-150	F-150–F-200	#3/0–#4/0
Multiconductor Cable		
SESK M-2	2	#18–#22
SESK M-4	4	#18–#22
SESK M-6	6	#18–#22
SESK M-8	8	#18–#22
SESK M-10	10	#18–#22
SESK M-12	12	#18–#22
SESK M-14	14	#18–#22
SESK M-16	16	#18–#22
SESK M-18	18	#18–#22
SESK M-20	20	#18–#22
SESK M-22	22	#18–#22
SESK M-24	24	#18–#22
SESK M-26	26	#18–#22
SESK M-28	28	#18–#22
SESK M-30	30	#18–#22
SESK M-32	32	#18–#22

Note: SESK kits are also available for UJIS cables. Contact Tyco Electronics for details.

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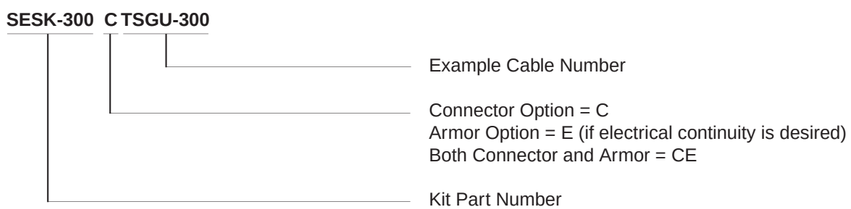
UK: 44-208-420-8341

SESK — Shipboard Electrical Splice Kits (Continued)

Part Numbering System



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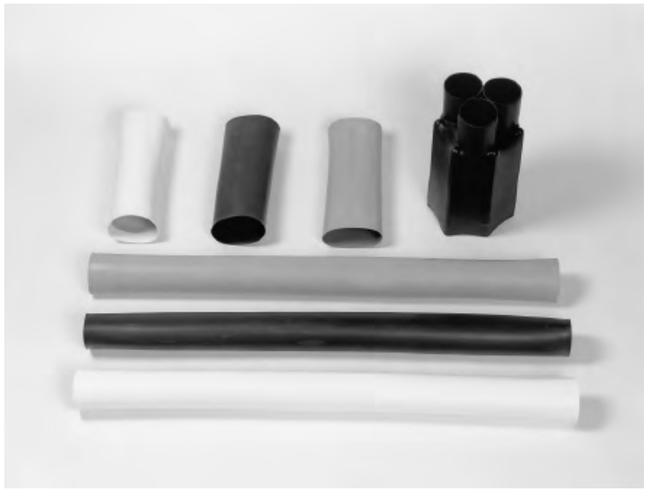
Japan: 81-44-844-8013
UK: 44-208-420-8341

Ship or Shore Breakout Kits

Product Facts

- Heat-shrinkable boot replaces potting or molding
- Flame-retardant tubing has a 3:1 shrink ratio
- Kit offers resistance to moisture, fungus, and weathering
- Operating temperature range of -55°C to +90°C [-67°F to +194°F]



Applications

Waterproof splices for power cables are available in red, white, and black for positive identification of each conductor.

Bolting power cables together and wrapping the splice with tape used to be the accepted method. Now the in-line splice—with thick-wall, self-sealing, heat-shrinkable products—is the accepted system for strain relief, environmental sealing, and phase identification for power cables. Tubing accommodates a large difference between cable diameters. Sigmaform boots can replace tapes, epoxies, and dips.

Installation

Minimum shrink temperature: 121°C [250°F]

Specifications/Approvals

Series	Military	Industry
2E171-4	NAVSEA 803-5001027-17	DNV
	MIL-C-24368	Lloyd's
	MIL-DTL-23053/15* and MIL-I-81765/1	ABS

Ordering Information

Part No.	Model
2E171-4	In-line splice cable sealing kit**

**Each kit contains:
- Cable breakout boot
- Three-phase identification tubings (red, white, and black)
- Three connector tubings
- A #100 grit emery cloth
- Installation instructions

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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Definitions

Introduction

For high-performance sealing and strain relief, the perfect mate for a Raychem molded part in a wiring application is a Raychem adapter.

Tyco Electronics offers a variety of Raychem adapters for applications in many industries, including aerospace, marine, and mass transit.

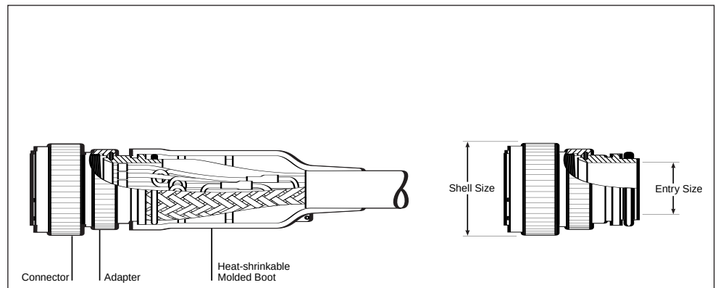
These adapters are:

- Available in many configurations to match applications
- Easy to install
- Ideal for high-reliability applications
- Kitted for customer convenience.

In this section we present Raychem spin-coupling adapters and Tinel-Lock adapters.

The Tinel-Lock adapter utilizes Raychem's Tinel ring to terminate the overall shield to the adapter. The Tinel ring is a low-profile, high-strength, shape-memory-alloy shield-termination device available in many sizes to accommodate various entry sizes and shield configurations.

Tinel-Lock adapters are ideal for lightweight aerospace applications requiring repeated high-to-low temperature cycles.



Adapter Type

Tyco Electronics offers four Raychem adapter types: solid (sometimes called "fixed"), spin-coupling, braided, and Tinel-Lock. Each is designed to offer a suitable interface between a connector and a heat-shrinkable molded part.

Raychem Adapter Code

A numerical code is used to identify connectors with similar adapter interfaces. This code is used to determine the adapter family and part number.

Adapter Part Number

The part number is the sequence of numbers and letters that describes the adapter family (or series), size, material, finish, and modifications. The part numbering system is explained on pages 11-29 and 11-30.

Adapter Family

Tyco Electronics offers several families (or series) of Raychem adapter products. Each Raychem adapter part number begins with an alphanumeric prefix denoting the Raychem product family.

Entry Size

Entry size is the diameter of the hole through which the cable enters into the adapter. For example, the 08 entry is 12.7 [0.5]. Entry sizes are specified on braided and Tinel-Lock adapters only.

Ring Designator

This is a two-letter code that is part of each Tinel-Lock adapter part number. It specifies the size of the Tinel-Lock ring suited to specific types of cable braid.

Shell Size

This is the size of a connector as specified by the connector manufacturer. It is normally a two-digit number between 08 and 24, although certain connectors are obtainable in either larger or smaller sizes and some use letter codes.

Order Number

This is a two-digit number that specifies the size of the adapter that will mate to the corresponding shell size of a connector. The order number is frequently the same as the connector shell size, but should be checked by reference to the appropriate product page(s) in this catalog.

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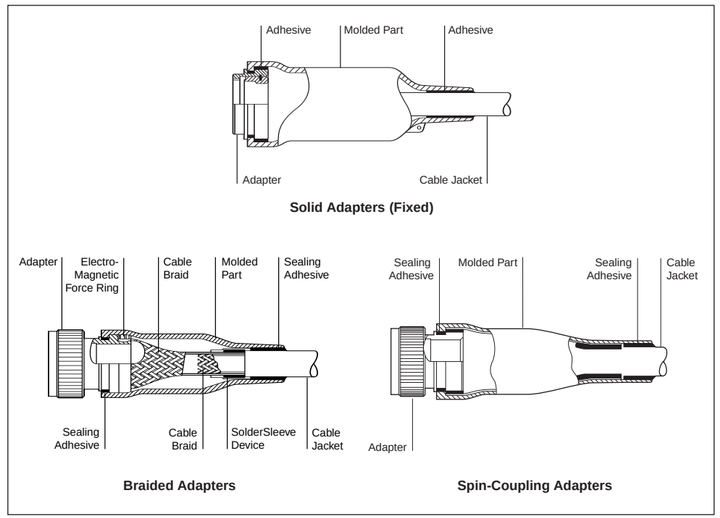
Types of Adapters



Adapter Types

Tyco Electronics offers several types of Raychem adapters for unscreened and screened termination systems. The choice is largely dependent upon the screening level required and the braid termination method.

The four principal adapter types are:

- Solid (fixed)
- Spin-Coupling
- Braided
- Tinel-Lock

Solid Adapters (Fixed)

Solid adapters are designed for use where no access is required; for example, when potting is necessary or a lower space profile is needed.

These adapters have a boot groove to accommodate a lipped heat-shrinkable boot. Repair cannot be made without removing the boot.

Spin-Coupling Adapters

Spin-coupling adapters are two-part components that have a rotatable coupling nut and a grooved body designed to accommodate lipped-type heat-shrinkable boots.

Spin-couplings with an appropriate molded part are used for environmental protection and strain relief of unscreened cable terminations. Cable repairs can be made without damaging the boot.

Braided Adapters

These are spin-coupling adapters that have a short length of tubular braided shield attached to the rear of the adapter. The braid is constructed from tinned copper wire and has a handling characteristic that enables it to be pulled down onto a wide range of cable diameters. This allows a standard entry size to be used with most cable sizes.

The shield is terminated to the cable braid using a SolderSleeve device, which provides screen continuity through to the connector. Straight, 45°, and 90° configurations are available.

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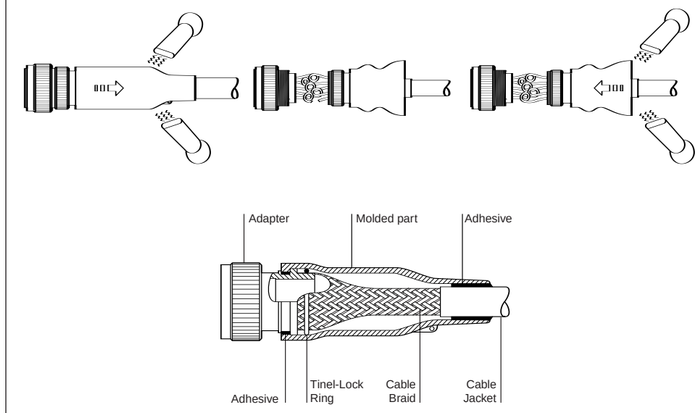
Types of Adapters (Continued)



Tinel-Lock Adapters

Tinel-Lock Adapters

This termination system consists of a modified spin-coupling adapter with a Tinel-Lock ring. The Tinel-Lock ring is made from a special shape memory metal that shrinks uniformly when heated (see Application Tooling, pages 11-89 to 11-92).

The Tinel-Lock ring is used to terminate copper cable braid directly onto the rear of the adapter. The adapter entry size and ring designator must be selected to suit the cable diameter and braid type.

The resulting 360° termination withstands severe shock, vibration, temperature cycling, and corrosion. Straight, 45°, and 90° configurations are available.

Roll-back Repair with Adapters

More than 85 percent of cable repairs are made within 75 [3.0] of the connectors—usually because of a broken pin or wire. By reheating the heat-shrinkable boot and unscrewing the adapter coupling nut, the boot can be “rolled back,” providing access to the rear of the connector for repair. This technique is applicable to spin-coupling, shielded, and Tinel-Lock adapters.

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Adapter Selection Process

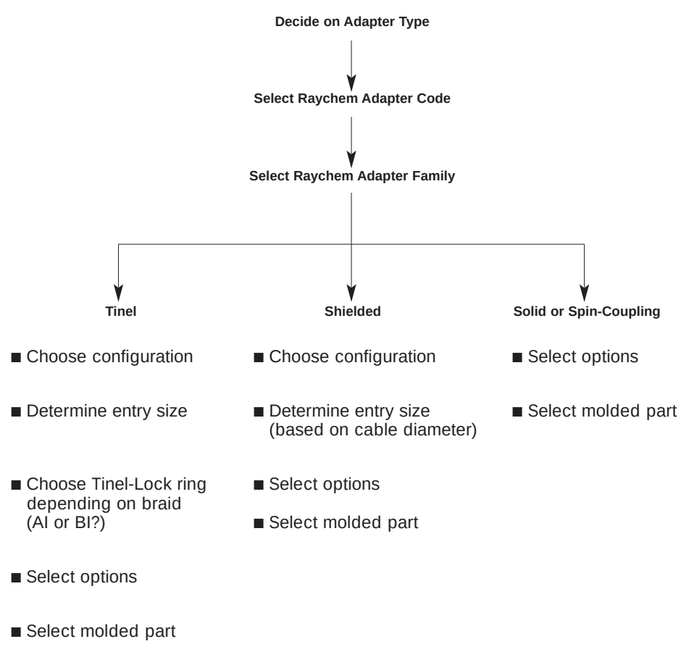
Step-by-Step Selection Process

Selecting an adapter for your application involves a five-step process:

1. From the connector number, determine:
   - Order number (shell size)
   - Material
   - Plating
2. Decide what adapter type you need for the connector.
3. Determine the Raychem connector code for that adapter type. (Use Table A, B, or C on pages 11-18 to 11-27).
4. Determine the Raychem adapter family for that connector code. (Use Table D on page 11-28).
5. Build the adapter part number. (See page 11-29).

The chart below will lead you through these steps.

Adapter Selection Flowchart



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Raychem Adapter Code

Table A. Raychem Adapter Code by Military Part Number

Selecting the Raychem Adapter Code

Tables A, B, and C that follow provide Raychem adapter codes for typical connectors.

If you know the military part number for the connector, you can obtain the Raychem adapter code from Table A that begins on this page.

If you know the manufacturer's prefix for the connector, you can obtain the Raychem adapter code from Table B that begins on page 11-22.

If you know the connector specification, you can obtain the Raychem adapter code from Table C on page 11-27.

Military Part No.	Connector Specification	Series/Class	Raychem Adapter Code
D38999/20	MIL-C-38999	Series III: Class C, F, K, W	40
D38999/24	MIL-C-38999	Series III: Class C, F, K, W	40
D38999/26	MIL-C-38999	Series III: Class C, F, K, W	40
D38999/40	MIL-C-38999	Series IV: Class C, F, W	40
D38999/42	MIL-C-38999	Series IV: Class C, F, W	40
D38999/44	MIL-C-38999	Series IV: Class C, F, W	Contact Tyco Electronics
D38999/46	MIL-C-38999	Series IV: Class F, W	40
D38999/47	MIL-C-38999	Series IV: Class C, W	40
M28840/10	MIL-C-28840	Class D, DS	30
M28840/11	MIL-C-28840	Class D, DS	30
M28840/14	MIL-C-28840	Class D, DS	30
M28840/16	MIL-C-28840	Class D, DS	30
M81511/01	MIL-C-81511	Series 2: Class A, E, F	61
M81511/03	MIL-C-81511	Series 2: Class A, E, F	61
M81511/05	MIL-C-81511	Series 2: Class A, E, F	61
M81511/06	MIL-C-81511	Series 2: Class A, E, F	61
M81511/21	MIL-C-81511	Series 1: Class A, E, F	61
M81511/23	MIL-C-81511	Series 1: Class A, E, F	61
M81511/25	MIL-C-81511	Series 1: Class A, E, F	61
M81511/26	MIL-C-81511	Series 1: Class A, E, F	61
M81511/31	MIL-C-81511	Series 2: Class C, P, T	61
M81511/32	MIL-C-81511	Series 2: Class C, P, T	61
M81511/33	MIL-C-81511	Series 2: Class C, P, T	61
M81511/34	MIL-C-81511	Series 2: Class C, P, T	61
M81511/35	MIL-C-81511	Series 1: Class C, P, T	61
M81511/36	MIL-C-81511	Series 1: Class C, P, T	61
M81511/37	MIL-C-81511	Series 1: Class C, P, T	61
M81511/38	MIL-C-81511	Series 1: Class C, P, T	61
M81511/41	MIL-C-81511	Series 3: Class A, E, F	61
M81511/45	MIL-C-81511	Series 3: Class A, E, F	61
M81511/46	MIL-C-81511	Series 3: Class A, E, F	61
M81511/49	MIL-C-81511	Series 3: Class A, E, F	61
M81511/51	MIL-C-81511	Series 4: Class A, E, F	61
M81511/53	MIL-C-81511	Series 4: Class A, E, F	61
M81511/55	MIL-C-81511	Series 4: Class A, E, F	61
M81511/56	MIL-C-81511	Series 4: Class A, E, F	61
M83723/01	MIL-C-83723	Series I: Class A, G, R	54
M83723/02	MIL-C-83723	Series I: Class A, G, R	54
M83723/03	MIL-C-83723	Series I: Class A, G, R	54
M83723/04	MIL-C-83723	Series I: Class A, G, R	54
M83723/05	MIL-C-83723	Series I: Class A, G, R	54
M83723/06	MIL-C-83723	Series I: Class A, G, R	54
M83723/07	MIL-C-83723	Series I: Class A, G, R	54
M83723/08	MIL-C-83723	Series I: Class A, G, R	54
M83723/13	MIL-C-83723	Series I: Class A, G, R	54
M83723/14	MIL-C-83723	Series I: Class A, G, R	54
M83723/17	MIL-C-83723	Series II: Class A, G, R	19
M83723/18	MIL-C-83723	Series II: Class A, G, R	19
M83723/19	MIL-C-83723	Series II: Class A, G, R	19
M83723/20	MIL-C-83723	Series II: Class A, G, R	19
M83723/23	MIL-C-83723	Series II: Class A, G, R	19
M83723/24	MIL-C-83723	Series II: Class A, G, R	19
M83723/36	MIL-C-83723	Series I: Class A, G, R	54
M83723/37	MIL-C-83723	Series I: Class A, G, R	54
M83723/38	MIL-C-83723	Series I: Class A, G, R	54
M83723/39	MIL-C-83723	Series I: Class A, G, R	54
M83723/40	MIL-C-83723	Series I: Class A, G, R	54
M83723/41	MIL-C-83723	Series I: Class A, G, R	54
M83723/42	MIL-C-83723	Series I: Class G, R	54
M83723/43	MIL-C-83723	Series I: Class G, R	54
M83723/48	MIL-C-83723	Series I: Class G, R	54

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Raychem Adapter Code (Continued)

Table A. Raychem Adapter Code by Military Part Number (Continued)

Military Part No.	Connector Specification	Series/Class	Raychem Adapter Code
M83723/49	MIL-C-83723	Series I: Class G, R	54
M83723/52	MIL-C-83723	Series II: Class K	19
M83723/53	MIL-C-83723	Series II: Class K	19
M83723/65	MIL-C-83723	Series III: Class H	54
M83723/66	MIL-C-83723	Series III: Class A, G, R	54
M83723/67	MIL-C-83723	Series III: Class A, G, R	54
M83723/68	MIL-C-83723	Series III: Class A, G, R	54
M83723/69	MIL-C-83723	Series III: Class A, G, R	54
M83723/71	MIL-C-83723	Series III: Class A, G, R	54
M83723/72	MIL-C-83723	Series III: Class A, G, R	54
M83723/73	MIL-C-83723	Series III: Class A, G, R	54
M83723/74	MIL-C-83723	Series III: Class A, G, R	54
M83723/75	MIL-C-83723	Series III: Class A, G, R	54
M83723/76	MIL-C-83723	Series III: Class A, G, R	54
M83723/77	MIL-C-83723	Series III: Class G, R	54
M83723/78	MIL-C-83723	Series III: Class G, R	54
M83723/82	MIL-C-83723	Series III: Class A, G, K, R, S	54
M83723/83	MIL-C-83723	Series III: Class A, G, K, R, S	54
M83723/84	MIL-C-83723	Series III: Class A, G, K, R, S	54
M83723/85	MIL-C-83723	Series III: Class A, G, K, R, S	54
M83723/86	MIL-C-83723	Series III: Class A, G, K, R	54
M83723/87	MIL-C-83723	Series III: Class A, G, K, R	54
M83723/91	MIL-C-83723	Series III: Class G, R, W	54
M83723/92	MIL-C-83723	Series III: Class G, R, W	54
M83723/95	MIL-C-83723	Series III: Class A, G, K, R	54
M83723/96	MIL-C-83723	Series III: Class A, G, K, R	54
M83723/97	MIL-C-83723	Series III: Class S	54
M83723/98	MIL-C-83723	Series III: Class S	54
MS17343	MIL-C-22992	Class C, J, R	32
MS17344	MIL-C-22992	Class C, J, R	32
MS17345	MIL-C-22992	Class C, J, R	32
MS17346	MIL-C-22992	Class C, R	32
MS17347	MIL-C-22992	Class C, J, R	32
MS17348	MIL-C-22992	Class C, R	32
MS24264	MIL-C-26500 (AL)	Class F, G, R Type B&T aluminum shell	51
MS24264	MIL-C-26500 (SST)	Class E Type B&T stainless steel shell	52
MS24265	MIL-C-26500 (AL)	Class F, G, R Type B&T aluminum shell	51
MS24265	MIL-C-26500 (SST)	Class E Type B&T stainless steel shell	52
MS24266	MIL-C-26500 (SST)	Class E Type B&T stainless steel shell	52
MS24266	MIL-C-26500 (AL)	Class F, G, R Type B&T aluminum shell	51
MS27466	MIL-C-38999	Series I: Class E, P, T	41
MS27467	MIL-C-38999	Series I: Class E, P, T	41
MS27468	MIL-C-38999	Series I: Class E, P, T	41
MS27469	MIL-C-38999	Series I: Class Y	Contact Tyco Electronics
MS27472	MIL-C-38999	Series II: Class T	41
MS27473	MIL-C-38999	Series II: Class E, P, T	41
MS27474	MIL-C-38999	Series II: Class T	41
MS27475	MIL-C-38999	Series II: Class Y	Contact Tyco Electronics
MS27479	MIL-C-38999	Series II: Class T	41
MS27480	MIL-C-38999	Series II: Class E, T	41
MS27481	MIL-C-38999	Series II: Class T	41
MS27482	MIL-C-38999	Series II: Class Y	Contact Tyco Electronics
MS27484	MIL-C-38999	Series II: Class E, T	41
MS27497	MIL-C-38999	Series II: Class T	41
MS27515	MIL-C-38999	Series I: Class E	Contact Tyco Electronics

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Raychem Adapter Code (Continued)

Table A. Raychem Adapter Code by Military Part Number (Continued)

Military Part No.	Connector Specification	Series/Class	Raychem Adapter Code
MS27613	MIL-C-26500 (SST)	Class K Type B&T stainless steel shell	52
MS27614	MIL-C-26500 (SST)	Class K Type B&T stainless steel shell	52
MS27615	MIL-C-26500 (SST)	Class K Type B&T stainless steel shell	52
MS27652	MIL-C-38999	Series I: Class E, T	41
MS27653	MIL-C-38999	Series I: Class E, T	41
MS27654	MIL-C-38999	Series I: Class E, T	Contact Tyco Electronics
MS27656	MIL-C-38999	Series I: Class E, T	41
MS27661	MIL-C-38999	Series I	41
MS27665	MIL-C-38999	Series I	41
MS3100	MIL-C-5015	Class A, E, F, R less endbell; solder contact	18
MS3101	MIL-C-5015	Class A, E, F, R less endbell; solder contact	18
MS3106	MIL-C-5015	Class A, E, F, R less endbell; solder contact	18
MS3107	MIL-C-5015	Class A, E, F, R less endbell; solder contact	18
MS3108	MIL-C-5015	Solder contact with endbell	15
MS3110	MIL-C-26482	Series 1: Class E, F, J, P	21
MS3111	MIL-C-26482	Series 1: Class E, F, J, P	21
MS3114	MIL-C-26482	Series 1: Class E, F, P	24[1]
MS3116	MIL-C-26482	Series 1: Class E, F, J, P	21
MS3120	MIL-C-26482	Series 1: Class E, F, J, P	21
MS3121	MIL-C-26482	Series 1: Class E, F, J, P	21
MS3124	MIL-C-26482	Series 1: Class E, F, P	24[1]
MS3126	MIL-C-26482	Series 1: Class E, F, J, P	21
MS3128	MIL-C-26482	Series 1: Class E, F, J, P	21
MS3130	MIL-C-81703	Series 1: Class E, P, J	71
MS3132	MIL-C-81703	Series 1: Class E	71
MS3134	MIL-C-81703	Series 1: Class E, P, J	71
MS3137	MIL-C-81703	Series 1: Class E, P, J	71
MS3138	MIL-C-81703	Series 1: Class E, P, J	71
MS3140	MIL-C-81703	Series 1: Class E, J	71
MS3144	MIL-C-81703	Series 1: Class E, J	71
MS3147	MIL-C-81703	Series 1: Class E, J	71
MS3148	MIL-C-81703	Series 1: Class E, J	71
MS3400	MIL-C-5015	Class D, L, U, W crimp contact	54
MS3401	MIL-C-5015	Class D, L, U, W crimp contact	54
MS3404	MIL-C-5015	Class D, L, U, W crimp contact	54
MS3406	MIL-C-5015	Class D, L, U, W crimp contact	54
MS3408	MIL-C-5015	Class D, L, U, W crimp contact	54
MS3409	MIL-C-5015	Crimp contact	54
MS3412	MIL-C-5015	Class D, L, U, W crimp contact less endbell	54
MS3424	MIL-C-81703	Series 3: Class E, L	54
MS3445	MIL-C-81703	Series 2: Class E	71
MS3446	MIL-C-81703	Series 3: Class E, L	54
MS3450	MIL-C-5015	Class D, L, U, W crimp contact	54
MS3451	MIL-C-5015	Class D, L, U, W crimp contact	54
MS3454	MIL-C-5015	Class D, L, U, W crimp contact	54
MS3456	MIL-C-5015	Class D, L, U, W crimp contact	54
MS3459	MIL-C-5015	Class L, W crimp contact	54
MS3464	MIL-C-81703	Series 3: Class E, L	54
MS3467	MIL-C-81703	Series 3: Class E, L	54
MS3468	MIL-C-81703	Series 3: Class E, L	54
MS3470	MIL-C-26482	Series 2: Class A, L	54
MS3471	MIL-C-26482	Series 2: Class A, L	54
MS3472	MIL-C-26482	Series 2: Class A, L	54
MS3474	MIL-C-26482	Series 2: Class A, L	54
MS3475	MIL-C-26482	Series 2: Class A, L	54
MS3476	MIL-C-26482	Series 2: Class A, L	54
NAS1599	MIL-C-81703	Series 3:	54
NAS1641	MIL-C-81703	Series 3:	54
NAS1642	MIL-C-81703	Series 3:	54
NAS1643	MIL-C-81703	Series 3:	54

[1]Code 24 connectors have an internal accessory thread.

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Raychem Adapter Code (Continued)

Table A. Raychem Adapter Code by Military Part Number (Continued)

Military Part No.	Connector Specification	Series/Class	Raychem Adapter Code
NAS1650	MIL-C-81703	Series 3:	54
NAS1651	MIL-C-81703	Series 3:	54
NAS1652	MIL-C-81703	Series 3:	54
NAS1653	MIL-C-81703	Series 3:	54
NAS1692	MIL-C-81703	Series 3:	54
NAS1693	MIL-C-81703	Series 3:	54
NAS1694	MIL-C-81703	Series 3:	54
NAS1699	MIL-C-81703	Series 3:	54
NAS1700	MIL-C-81703	Series 3:	54
NAS1701	MIL-C-81703	Series 3:	54
NAS1702	MIL-C-81703	Series 3:	54

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Raychem Adapter Code (Continued)

Table B. Raychem Adapter Code by Manufacturer's Prefix

Manufacturer's Prefix	Manufacturer[6]	Connector Specification	Series/Class	Raychem Adapter Code
10-214	Bendix	MIL-C-5015	MS3100 Class A, E, R	18
10-475	Bendix	40M38277	—	41
10-720	Bendix	MIL-C-5015	MS3100 Class A, E, R	18
118	Amphenol	MIL-C-26482	Series 2	54
149	Deutsch	MIL-C-81703	Series 1	71
162GB	Amphenol	MIL-C-26482	Series 1	76, 77[4]
164GB	Amphenol	BS9522 F0023	—	Contact Tyco Electronics
165	Amphenol	None	—	Contact Tyco Electronics
172	Amphenol	MIL-C-5015	—	Contact Tyco Electronics
179	Amphenol	MIL-C-5015	—	Contact Tyco Electronics
182	Amphenol	None	—	Contact Tyco Electronics
246	Amphenol	MIL-C-5015	MS3100 Class E, F, R	18
251	Cannon	MIL-C-26482	Series 1	21
2PPN	Plessey	MIL-C-26482	Series 1	21
2PPN-07	Plessey	MIL-C-26482	Series 1	24[3]
2PSN	Plessey	BS9522 F0017	Patt 105	76, 77[4]
2PSN-07	Plessey	MIL-C-26482	Series 1	24[3]
348	Amphenol	MIL-C-81511	Series 1 and 2	61
381	Deutsch	40M39569	—	54
418	Amphenol	MIL-C-38999	Series I and II	41
45/PT	Socapex	MIL-C-26482	Series 1	21
450	Deutsch	MIL-C-26482	Series 1	21
451	Socapex	PRL 54125	—	21 or 24[3]
460	Deutsch	MIL-C-26482	Series 1	21
48	Amphenol	MIL-C-26500	Alum Class F, G, R	51
486	Amphenol	MIL-C-26482	Series 2	54
518	Amphenol	MIL-C-83723	Series III	54
5MS	FKI[2]	Def. Stan. 59-35	Patt 121A	75
602	Amphenol	Def. Stan. 59-56	Patt 602	54
602GB	Amphenol	Def. Stan. 59-56	Patt 602	54
62AB-14	Amphenol	MIL-C-26482	Series 1	Contact Tyco Electronics
62GB	Amphenol	Def. Stan. 59-35	Patt 105	76, 77[4]
650	Schaltbau	VG 95329	—	61
652	Amphenol	LN 29504	—	54
652	UMD	PRL 54125	—	21 or 24[3]
674	Schaltbau	VG 95328	—	Contact Tyco Electronics
675	Schaltbau	VG 95328	—	Contact Tyco Electronics
679	Schaltbau	VG 95329	—	61
69	Amphenol	MIL-C-5015	MS3100 Class E, F, R	18
71	Bendix	MIL-C-5015	MS3100 Class A, E, R	18
711	Amphenol	BS9522 F0042	—	54
801	Amphenol	None	—	54
837	Deutsch	MIL-C-83723	Series III	54
83723	Souriau	MIL-C-83723	Series III	54
83730	Deutsch	MIL-C-83723	Series III	54
845	Souriau	NFL 54120	—	Contact Tyco Electronics
847	Souriau	NFL 54120	—	Contact Tyco Electronics
850	Souriau	MIL-C-26482	Series 1	21
851	Souriau	MIL-C-26482	Series 1	21
8520	Souriau	MIL-C-26482	Series 2	54
8525	Souriau	NAS 1599	—	54
8526	Souriau	PAN 6432-1	—	54
853	Souriau	MIL-C-83723	Series III	54
857	Souriau	LN 29728	—	54
89	Souriau	NFL 54140	—	54

[2]FKI was previously Thorn.
[3]Code 24 connectors have an internal accessory thread.
[4]Code 77 braided version.
[6]Some of the connector manufacturers names may have changed and may not exist. They are listed here to assist users who know them as listed names.

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Raychem Adapter Code (Continued)

Table B. Raychem Adapter Code by Manufacturer's Prefix (Continued)

Manufacturer's Prefix	Manufacturer[6]	Connector Specification	Series/Class	Raychem Adapter Code
891	Souriau	MIL-C-5015	Class K	Contact Tyco Electronics
892	Souriau	MIL-C-5015	Class K	Contact Tyco Electronics
8LT	Souriau	MIL-C-38999	Series I	41
8ST	Souriau	VG 96912	Series 1	47
8T	Souriau	MIL-C-38999	Series II	41
9-815	Deutsch	MIL-C-81511	Series 3 and 4	61
91-483	Bendix	MIL-C-26482	Series 2	54
944	Matrix	MIL-C-5015	MS3400 Class L, U, W	54
951	Deutsch	LN 29500	—	Contact Tyco Electronics
97	Amphenol	MIL-C-5015	MS3100 Class A	18
981	Matrix	MIL-C-5015	MS3400	54
A815	Deutsch	MIL-C-81511	Series 3	61
AA70	Deutsch	Not known	—	71
AB05	AB Elec	Def. Stan. 59-35	Patt 105	76, 77[4]
AB06	AB Elec	Def. Stan. 59-35	Patt 105	76, 77[4]
ABB	AB Elec	BS9522 F0032	—	78
ABJ	AB Elec	MIL-C-38999	Series I and II	41
ADS	Deutsch	MIL-C-81703	—	71
AFD	Deutsch	MIL-C-83723	Series I	54
AFD5	Deutsch	MIL-C-26482	Series 2	54
B815	Deutsch	MIL-C-81511	Series 4	61
BE	Pyle	MIL-C-83723	Series III	54
BG	Bendix	MIL-C-26482	Series I	21
BL	G&H Tech	MIL-C-38999	Series IV	40
BL	TRW	MIL-C-38999	Series IV	40
BT	Burndy	MIL-C-26482	Series 1	21
BT	Pyle	MIL-C-83723	Series III	54
BTK	Deutsch	MIL-C-26482	Series 1	21
BY1	Pyle	MIL-C-83723	Series III	54
C48	TRW	MIL-C-26500	Aluminum	51
CA (Bayonet)	Cannon	VG 95234	—	58
CA3101	Cannon	MIL-C-5015	MS3100 class E, F, R	18
CA3101	Cannon	MIL-C-5015	MS3100 Class A	18
CA3101KE	Cannon	MIL-C-5015	Class K	Contact Tyco Electronics
CIR	VEAM	VG 95234	—	64***, 66**, 78*
CN0930	TRW	MIL-C-83723	Series III	54
CT	Burndy	MIL-C-38999	Series II	41
CT	Plessey	MIL-C-38999	Series II	41
CV-R	Cannon	MIL-C-83723	Series II	19
CV34	Cannon	MIL-C-5015	MS3400 Class L, U, W	54
CVA	Cannon	MIL-C-83723	Series II	19
CWL	Cannon	None	—	31
CWLD	Cannon	MIL-C-22992	Class C, J, R	32
D817	Deutsch	MIL-C-81703	Series 3	54
DA	Deutsch	None	—	71
DBAD	Deutsch	MIL-C-81703	—	Contact Tyco Electronics
DBAS	Deutsch	MIL-C-81703	Series 3	54
DD	Deutsch	MIL-C-81703	Series 2	71
DFE	Deutsch	MIL-C-26482	Series 2	54
DKM	Deutsch	VG 95328	—	Contact Tyco Electronics
DL	Deutsch	MIL-C-83723	Series III	54
DM	Deutsch	MIL-C-81703	Series 1	71
DPX	Cannon		—	Contact Tyco Electronics
DS	Deutsch	None	—	71
DTS	Deutsch	MIL-C-38999	Series III	40

* AB connectors only
** VEAM standard
***VEAM panel mount
[4]Code 77 braided version.
[6]Some of the connector manufacturers names may have changed and may not exist. They are listed here to assist users who know them as listed names.

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Raychem Adapter Code (Continued)

Table B. Raychem Adapter Code by Manufacturer's Prefix (Continued)

Manufacturer's Prefix	Manufacturer[6]	Connector Specification	Series/Class	Raychem Adapter Code
EA	Pyle	None	—	54
EB	Pyle	NAS 1599	—	54
EEG	Pyle	MIL-C-83723	Series I	54
ES	Pyle	None	—	54
ESC004	Various	MIL-C-5015	Class K	Contact Tyco Electronics
ET	Pyle	NAS 1599	—	54
FC	Flight	MIL-C-5015	Rev E only	Contact Tyco Electronics
FDBA	Deutsch	LN 29504	—	54
FF	Flight	MIL-C-5015	MS3400 Class D, L, U, W	54
FH	Flight	MIL-C-83723	Series III	54
FPK	Pyle	MIL-C-26500	Class K	52
FP5K	Pyle	MIL-C-26500	Class K	Contact Tyco Electronics
FYL	Pyle	MIL-C-26500	Class K	52
G	Burndy	None	—	21
GC-E	General	MIL-C-26482	Series 1	21
GTA	Hughes	MIL-C-28840	—	30
HAN	Deutsch	MIL-C-5015	MS3100 Class E, KE	Contact Tyco Electronics
HD	SAE	MIL-C-28840	—	30
HTMAS	Cannon	MIL-C-5015	Class K	Contact Tyco Electronics
HTMF	Cannon	MIL-C-83723	Series III: Class K	54
HTMS	AB Elec	MVEE 695	—	75
JT	Amphenol	MIL-C-38999	Series II	41
JT	Bendix/FKI	MIL-C-38999	Series II	41
JT	Socapex	MIL-C-38999	Series II	41
JT-R	FKI[2]	PAN 6433-1	—	41
JT-R	Teldix	PAN 6433-1	—	41
KFS	Cannon	MIL-C-28840	—	30
KJ	Cannon	MIL-C-38999	Series II	41
KJA	Cannon	MIL-C-38999	Series III	40
KJJ	Cannon	MIL-C-38999	Series II	Contact Tyco Electronics
KJJL	Cannon	MIL-C-38999	Series I	Contact Tyco Electronics
KJL	Cannon	MIL-C-38999	Series I	41
KPSE	Cannon	MIL-C-26482	Series 1	21
KPT	Cannon	MIL-C-26482	Series 1	21
KV-R	Cannon	NAS 1599	—	54
L	Burndy	MIL-C-26482	Series 1	21
LJT	Bendix	MIL-C-38999	Series I	41
LJT	Socapex	MIL-C-38999	Series I	41
LL3	Deutsch	MIL-C-81511	—	61
LL5/6	Deutsch	BS9540 F0001	Patt 602	Contact Tyco Electronics
LMB	Litton-Veam	Def. Stan. 59-35	Patt 121A	75
LPT	Deutsch	MIL-C-26482	Series 1	21
LS	Pyle	None	—	54
LTT	FKI[2]	BS9522 F0029	Patt 616	41
M-T	Burndy	MIL-C-26482	Series 1	21
M723	Matrix	MIL-C-83723	Series II	19
MB1	Matrix	MIL-C-26482	Series 2	54
MB3	Matrix	MIL-C-83723	Series III	54
MB9	Matrix	MIL-C-38999	Series I and II	41
MD	Matrix	MIL-C-26482	Series 2	54
MDR	Deutsch	None	—	71
MF	Cannon	MIL-C-83723	Series III	54
MK12	Plessey	Def. Stan. 59-35	Patt 603	76, 77[4]
MK18	Plessey	Def. Stan. 59-35	Patt 608	79[5]
MK38	Plessey	MIL-C-38999	Series I	41

[2]FKI was previously Thorn.
[4]Code 77 braided version.
[5]Free connectors only.
[6]Some of the connector manufacturers names may have changed and may not exist. They are listed here to assist users who know them as listed names.

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Raychem Adapter Code (Continued)

Table B. Raychem Adapter Code by Manufacturer's Prefix (Continued)

Manufacturer's Prefix	Manufacturer[6]	Connector Specification	Series/Class	Raychem Adapter Code
MK25	Plessey	MIL-C-38999	Series II	41
MK7	Plessey	DEF 5325-2	Patt 104	Contact Tyco Electronics
MK8	Plessey	Def. Stan. 59-35	Patt 105	76, 77[4]
ML94	Matrix	MIL-C-38999	Series IV	40
MQ3	Matrix	MIL-C-83723	Series III	54
MT3	Matrix	MIL-C-83723	Series III	54
MT93	Matrix	MIL-C-38999	Series III	40
P5	Plessey	NFL 54 125	—	76 or 24[3], 77[4]
PAT104D	AB Elec	Def. Stan. 59-35	Patt 104	Contact Tyco Electronics
PT	Socapex	MIL-C-26482	Series 1	76, 77[4]
PT	Teldix	MIL-C-26482	Series 1	76, 77[4]
PT-CE	Bendix	None	—	22
PT-G	Teldix	VG 95328	—	Contact Tyco Electronics
PT-SE	Socapex	MIL-C-26482	Series 1	76, 77[4]
PT-SE	Teldix	MIL-C-26482	Series 1	76, 77[4]
PT07	Bendix	MIL-C-26482	Series 1	24[3]
PT07SE	FKI[2]	MIL-C-26482	Series 1	24[3]
PT33	FKI[2]	BS9522 F0017	Patt 105	76, 77[4]
PT33SE	FKI[2]	BS9522 N0001	Patt 603	76, 77[4]
PT44	FKI[2]	BS9522 F0017	Patt 105	76, 77[4]
PT44SE	FKI[2]	BS9522 N0001	Patt 603	76, 77[4]
PT55	FKI[2]	BS9522 F0017	Patt 105	76, 77[4]
PT55SE	FKI[2]	BS9522 N0001	Patt 603	76, 77[4]
PT77	FKI[2]	BS9522 F0017	Patt 105	76, 77[4]
PT77SE	FKI[2]	BS9522 N0001	Patt 603	76, 77[4]
PTG55	FKI[2]	BS9522 F0017	Patt 105	76, 77[4]
PTG55SE	FKI[2]	BS9522 N0001	Patt 603	76, 77[4]
PTS-DR	Bendix	MIL-C-26482	Series 2	54
PV7	Cannon	MIL-C-26482	Series 2	54
PVJ	Cannon	MIL-C-26482	Series 2	54
PVW	Cannon	—	—	54
PVX	Cannon	Def. Stan. 59-56	Patt 602	54
QDP	Bendix	None	—	32
QRP	AB Elec	—	—	78
QWL	Bendix	None	—	31
QWLD	Bendix	MIL-C-22992	Class C, J, R	32
RD1	Raychem	MIS-20065	—	54
RR	Deutsch	Def. Stan. 59-56	Patt 602	54
RR20	Deutsch	PAN 6432-2	—	54
RR50	Deutsch	PAN 6432-1	—	54
RR70	Deutsch	PAN 6432-2	—	54
RSM	Deutsch	None	—	71
RTK	Deutsch	None	—	71
SA	SAE	MIL-C-5015	MS3400	54
SB	Bendix	MIL-C-5015	Class E	18
SB-104	AB Elec	Def. Stan. 59-35	Patt 104	Contact Tyco Electronics
SB-M4	AB Elec	Def. Stan. 59-35	Patt 104	Contact Tyco Electronics
SB-MS	AB	BS9522 F0030	—	75
SC	Bendix	MIL-C-5015	MS3100 Class A	18
SCB	SICEM	VG 95234	—	Contact Tyco Electronics
SF	Bendix	MIL-C-5015	MS3100 Class E	18
SG	Bendix	MIL-C-5015	MS3100 Class E	18
SJT	Various	PAN 6433-2	—	47
SJT07	Various	PAN 6433-2	—	Contact Tyco Electronics
SLPT	Deutsch	MIL-C-26482	Series 1	76, 77[4]

[2]FKI was previously Thorn.
[3]Code 24 connectors have an internal accessory thread.
[4]Code 77 braided version.
[6]Some of the connector manufacturers names may have changed and may not exist. They are listed here to assist users who know them as listed names.

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Table B. Raychem Adapter Code by Manufacturer's Prefix (Continued)

Manufacturer's Prefix	Manufacturer[6]	Connector Specification	Series/Class	Raychem Adapter Code
SM	Bendix	MIL-C-5015	MS3100 Class A, E, R	18
SPT	Bendix	MIL-C-26482	Series 1	76, 77[4]
SPT	Socapex	MIL-C-26482	Series 1	76, 77[4]
SPT07	Various	MIL-C-26482	Series 1	24[3]
STK	Deutsch	None	—	71
STT	FKI[2]	BS9522 F0012	Patt 615	47
STT07	FKI[2]	BS9522 F0012	Patt 615	Contact Tyco Electronics
T3[1]	Pyle	MIL-C-38999	Series III	40
TRIM TRIO	Burndy	None	—	Contact Tyco Electronics
TT	FKI[2]	BS9522 N0003	Patt 614	41
TV	FKI[2]/Bendix	MIL-C-38999	Series III	40
TV-O-R	Bendix	MIL-C-38999	Series III and IV	40
TVP	FKI[2]/Bendix	MIL-C-38999	Series III	40
TVPS	FKI[2]/Bendix	MIL-C-38999	Series III	Contact Tyco Electronics
TVS	FKI[2]/Bendix	MIL-C-38999	Series III	Contact Tyco Electronics
Tri-Start	Bendix	MIL-C-38999	Series III and IV	40
VPT	VEAM	MIL-C-26482	Series 1	21
VTT	FKI[2]	MIL-C-38999	Series III	40
ZZY/ZZW	Pyle	MIL-C-26500	Class R, G (AL)	51
ZZY/ZZW	Pyle	MIL-C-26500	Class E (SST)	52

[1]May be a number or letter depending upon connector style.
[2]FKI was previously Thorn.
[3]Code 24 connectors have an internal accessory thread.
[4]Code 77 braided version.
[5]Free connectors only.
[6]Some of the connector manufacturers names may have changed and may not exist. They are listed here to assist users who know them as listed names.

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Raychem Adapter Code (Continued)

Table C. Raychem Adapter Code by Connector Specification

Connector Specification	Series/Class	Raychem Adapter Code
40M38277	—	41
40M39569	—	54
BS9520	G0001	41
BS9520	G0002	41
BS9520	G0003	40
BS9522 F0012	Patt 615	47
BS9522 F0014	Patt 104	Contact Tyco Electronics
BS9522 F0017	Patt 105	76
BS9522 F0020	Patt 608	79[2]
BS9522 F0023	—	Contact Tyco Electronics
BS9522 F0029	Patt 616	41
BS9522 F0030	Patt 121A	75
BS9522 F0032	Patt 121B	78
BS9522 F0042	—	54
BS9522 N0001	Patt 603	76
BS9522 N0003	Patt 614	41
BS9540 F0001	Patt 602	54
LN 29500	—	21
LN 29504	—	54
LN 29728	—	54
LN 29729	—	47
MIL-C-22992	Class C, J, R	32
MIL-C-26482	Series 1	21, 24[1]
MIL-C-26482	Series 2	54
MIL-C-26500	Aluminum, Class F, G, R	51
MIL-C-26500	Stainless steel, Class E, K	52
MIL-C-28840	Class D	30
MIL-C-38999	Series I and II	41
MIL-C-38999	Series III and IV	40
MIL-C-5015	MS3400	54
MIL-C-5015	MS3100	18, 15 (with endbell)
MIL-C-5015	5MS	75
MIL-C-81511	Series 1, 2, 3, and 4	61
MIL-C-81703	Series 1, 2	71
MIL-C-81703	Series 3	54
MIL-C-83723	Series II	19
MIL-C-83723	Series I and III	54
MIL-C-85049/59	—	32
MIL-C-85049/60	—	54
MIL-C-85049/62	—	41
MIL-C-85049/69	—	40
MIS-20065	—	54
MVEE	5MS	75
NAS 1599	—	54
NFL 54120	—	Contact Tyco Electronics
NFL 54140	—	54
PAN 6432-1	—	54
PAN 6432-2	—	54
PAN 6433-1	—	41
PAN 6433-2	—	47
PRL 54125	—	21, 24[1]
VG 95234	—	64***, 66**, 78*
VG 95328	—	Contact Tyco Electronics
VG 95329	—	61
VG 96912	Series 2	41
VG 96912	Series 1	47

[1]Code 24 connectors have an internal accessory thread.
[2]Free connectors only.

* AB connectors only
** VEAM standard
***VEAM panel mount

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Raychem Adapter Family

Selecting the Raychem Adapter Family

Using Table D below and the Raychem adapter code you selected in Table A, B, or C, select the Raychem adapter family for the adapter type you chose (spin-coupling or Tinel-Lock).

With the alphanumeric prefix for that family you can then build the part number for your Raychem adapter.

Table D. Identification of Adapter Family Prefix by Raychem Adapter Code

Raychem	Boot Adapter		Shielded Adapter			Tinel-Lock Adapter	Band-Strap
Connector Code	Solid (Fixed)	Spin-Coupling	Straight	45°	90°	Straight, 45°, and 90°	Adapter
15	210M5	202M5	219M0	219M1	219M2	TXR 15	—
18	218M5	218M6	218M7	218M8	218M9	TXR 18	BND 18
19	201M7	201M4	—	—	—	—	—
21	203M6	203M9	206M0	206M1	206M2zx	TXR 21	BND 21
24	208M5	208M6	216M0	216M1	206M5	—	—
30	211M8	211M9	211M5	211M6	211M7	TXR 30	—
32	—	204M3	207M3	212M4	212M5	TXR 32	BND 32
40	209M3	209M4	208M7	208M8	208M9	TXR 40	BND 40
41	202M1	202M2	204M0	204M1	204M2	TXR 41	BND 41
47	202M8	202M7	210M0	210M1	210M2	TXR 47	BND 47
51	207M4	205M5	207M0	207M1	207M2	TXR 51	—
52	208M3	209M6	208M0	208M1	208M2	TXR 52	—
54	201M9	201M1	203M0	203M1	203M2	TXR 54	BND 54
61	202M3	202M4	205M0	205M1	205M2	TXR 61	—
71	203M5	202M9	217M0	217M1	217M2	TXR 71	—
75	228M5	228M7	227M0	227M1	227M2	TXR 75	—
76	225M6	225M5	—	—	—	TXR 76	—
77	228M6	228M8	228M0	228M1	228M2	—	—
78	225M4	225M3	225M0	225M1	225M2	TXR 78	—
79	—	229M3	229M1	229M2	229M0	TXR 79	—
80	215M4	213M5	213M6	213M7	213M8	TXR 80	—
81	214M3	214M4	214M5	214M6	214M7	TXR 81	—

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Raychem Part Number

Having Selected the Right Adapter Type and Raychem Adapter Family, You Can Now Construct a Part Number for the Adapter.

1. Start with the alphanumeric prefix you selected in Table D. This will be the basis of your part number.
2. Add to the prefix the codes and designators required for your adapter type and application. These may include several or all of the following:

- Order number
- Manufacturer's prefix
- Material
- Finish
- Entry size
- Ring designator
- Option codes

Using the right codes and designators helps ensure that the adapter you select will meet the application requirements.

To determine which codes and designators you will need, use the Part numbering system shown below. To select the right codes and designators, turn to the pages that follow.

Part Numbering System

201M1 16 - 19 B

Spin-Coupling or Solid Adapter

- Adapter family
- Order number
- Manufacturer's prefix (connector code 18 only)
- Material
- Finish
- Options*

*For full range of options, consult Tyco Electronics.

203M0 16 - 19 B 10

Shielded Adapter

- Adapter family
- Order number
- Manufacturer's prefix (connector code 18 only)
- Material
- Finish
- Entry size
- Options*

- ■ Standard braid length (6") requires no modification code.
- ■ Nonstandard braid length is stated in inches (12 = 12" length)

*For full range of options, consult Tyco Electronics.

TXR54 A B 00 - 16 10 AI

Tinel-Lock Adapter

- Adapter family
- Material (A - aluminium alloy; S = stainless steel)
- Finish
- Angle (00 = straight; 45 = 45˚; 90 = 90˚)
- Manufacturer's prefix (connector code 18 only)
- Order number
- Entry size
- Ring designator
- Options*

*For full range of options, consult Tyco Electronics.

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Band Strap Adapters
Part Numbering System

Raychem Part Number (Continued)

BND 54 A B 00 - 12 06 A

Product Designator
BND — Adapter and Band
BNX — Adapter only

Adapter Code

Material[2]
A — Aluminum alloy per QQ-A-225
B — Nickel aluminum bronze per ASTM B150
S — Stainless steel per QQ-S-763

Finish (See S-CH00-0157-002)

Configuration
00 = Straight 45 = 45° 90 = 90°
4W = 45° 9W = 90°

For BND 18, dash may be replaced by a letter

Order Number

Entry Size[3]

Band Termination Device Code[1]
A — BND-1225S (Standard Supply for Americas and Asia)
CRES-Lock Banding Strap
B — (Standard Supply European Countries)

Notes:

1. See Drawings BND-1225S or BND-XX25S for information on bands. Adapter dimensions for "A" designation may be different than those listed in this catalog. Contact Tyco Electronics for Specification Control Drawing (SCD) for these adapters.
2. Alternative equivalent material specifications to those shown may be supplied at Tyco Electronics' discretion.
3. For standard entry sizes see relevant specification control drawing. For entry sizes larger than standard (Type II Adapters), see sheets 3 and 4.

Band Strap Adapter Modification Option Field (Omit if not required)

BND54AB00-1206A D F H J L N P S

D — Drain holes modification

F — Internal abrasion resistant coating

H — Helical conduit thread

J — Chain attachment assembly

L — Lock wire holes manufacturer's option
Include mod if required
Standard on codes 40 and 54

Optional O-Ring material
Omit for standard silicone (ZZ-R-765, grade 70: S59)
C — Neoprene per AMS3209
U — Fluorosilicone per MIL-R-25988, class 1
N — Nitrile (Buna N) per AMS3215
V — Fluorocarbon per MIL-R-83248, class 1

P — Pre-coiled bandstrap option
(See drawings BND-1225P or BND-XX25P)

S — Self-locking spin nut

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Material and Finish

Selecting the Material and Finish

To ensure optimum compatibility, select the adapter material and finish to match those of the connector.

Most circular connectors are manufactured from aluminum with a cadmium finish.

Raychem Material Codes

Material* Description	Material Code Solid, Spin-Coupling, and Shielded Adapters	Tinel-Lock Adapters	Typical Applications
Aluminum alloy	19	A	Standard material for normal applications
Stainless steel	62	S	Corrosion-resistant and high-temperature (firewall) applications
Nickel aluminum bronze	01	B	Exposed marine environments

*Other materials available upon request.

Raychem Finish Codes

Finish* Description	Color	Finish Code	Typical Applications
Cadmium, per QQ-P-416, Type II, Class 3	Olive drab	A	Corrosion-resistant conductive finish
Cadmium, per QQ-P-416, Type II, Class 3 over electroless nickel (500-hour salt-spray–resistant finish)	Olive drab	B	Corrosion resistance for exposed environments
Electroless nickel, per MIL-C-26074, Class 4, Grade B	—	C	High conductivity for optimum screening performance
Anodized, hard, per MIL-A-8625, Type III, Class 2	Black	G	Nonconductive finish for aluminum adapters
Passivated, per QQ-P-35 or MIL-S-5002	—	J	Nonconductive, corrosion-resistant finish for stainless steel adapters
Unplated, shotblast	—	W	Nonreflective finish for nickel aluminum bronze adapters

*Other finishes available upon request.

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Entry Size

Determining the Wire Bundle Size

The entry size of an adapter is based on the size of the wire bundle. If you don't know the size of the wire bundle, measure a prototype or calculate the size.

Calculation of the wire bundle size is based on three values:

- Cable outside diameter (COD)
- Cable jacket thickness
- Jacketed cable diameter

Instructions for calculating these values follow.

COD Calculation

To calculate the cable outside diameter, first determine whether the wires in the bundle are of the same size or of different sizes.

COD Calculation for Wires of the Same Size

For bundles with wires that are all of the same size, follow these steps:

1. Determine the number of wires in the wire bundle.
2. Find the multiplication factor for that number in Table E shown on the next page.
3. Find the wire diameter in the Wire and Cable section (Section 10) of this catalog.
4. Multiply the wire diameter (from Step 3) by the multiplication factor (from Step 2) as shown below.

Formula: D = Fd

Where:
D = Bundle diameter

F = Multiplication factor

d = Wire diameter

Example: A bundle of wires containing 27 x 44A0111-22

F = 6.00 (the multiplication factor for 27 wires from Table E)

d = 1.19 mm (.049 in)*

D = 6 x 1.19 mm (6 x .049 in)

D = 7.14 mm (.294 in)

*Diameter of 44A0111-22 wire obtained from the Wire and Cable Section 10 of this catalog.

COD Calculation for Wires of Different Sizes

To determine the wire bundle diameter when using wires of different sizes, follow these steps:

1. Determine the number of wires in the wire bundle.
2. Find the diameter of the wires in the Wire and Cable section of this catalog.
3. Calculate the cable outside diameter by using this formula:

$$D = 1.2\sqrt{N1d1^2 + N2d\ 22 + N3d3^2}$$

Where:
D = Bundle diameter

N = Number of wires

d = Diameter of wires

Example: A bundle of wires containing

3 x 44A0111-221* (1.192-mm dia.)

5 x 44A0111-201* (1.42-mm dia.)

1 x 44A0111-181* (1.65-mm dia.)

$$D = 1.2\sqrt{3 \times 1.192^2 + 5 \times 1.42^2 + 1 \times 1.65^2}$$
$$D = 1.2\sqrt{3 \times 1.4 + 5 \times 2.02 + 1 \times 2.7}$$
$$D = 1.2\sqrt{4.2 + 10.1 + 2.7}$$
$$D = 1.2\sqrt{17}$$
$$D = 1.2 \times 4.12$$
$$D = 4.95\ mm$$

*For wire information see the Wire and Cable Section 10 of this catalog.

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Entry Size (Continued)

Table E. Multiplication Factors for Wire Bundles with Equal Size Wires

This table provides multiplication factors for wire bundles of 1 to 61 wires.

To determine the approximate diameter of a wire bundle when the wires are all the same size, find the factor for the number of wires in the bundle and multiply the wire diameter by that factor.

Number of Wires	Multiplication Factor	Number of Wires	Multiplication Factor
1	1.00	32	6.70
2	1.60	33	6.70
3	2.00	34	7.00
4	2.41	35	7.00
5	2.70	36	7.00
6	3.00	37	7.00
7	3.00	38	7.31
8	3.60	39	7.31
9	4.00	40	7.31
10	4.00	41	7.61
11	4.00	42	7.61
12	4.00	43	7.61
13	4.41	44	7.61
14	4.41	45	8.00
15	4.70	46	8.00
16	4.70	47	8.00
17	5.00	48	8.00
18	5.00	49	8.41
19	5.00	50	8.41
20	5.31	51	8.41
21	5.31	52	8.41
22	5.61	53	8.70
23	5.61	54	8.70
24	5.61	55	8.70
25	6.00	56	8.70
26	6.00	57	9.00
27	6.00	58	9.00
28	6.41	59	9.00
29	6.41	60	9.00
30	6.41	61	9.00
31	6.70	—	—

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Entry Size (Continued)

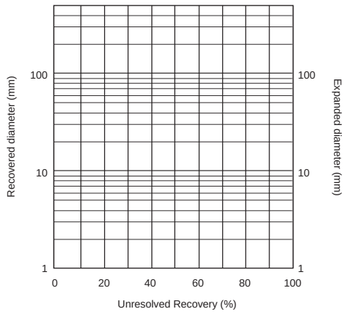

Figure 1.

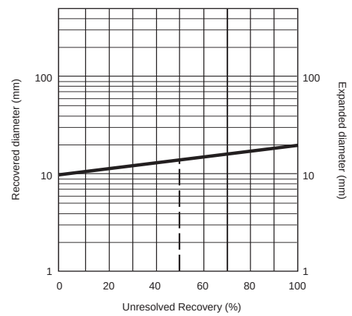

Figure 2.

Cable Jacket Thickness Calculation

To determine the wall thickness of a jacket over a wire bundle:

1. Use the chart in Figure 1 to determine the unresolved recovery of the tubing jacket
2. Use the chart in Figure 3 to determine the wall thickness reduction factor.
3. Calculate the jacket wall thickness by multiplying the fully shrunk wall thickness (as detailed in the Tubing section — Section 12 — of this catalog) by the wall thickness reduction factor.

Step 1. Determine the Unresolved Recovery of the Tubing Jacket.

1. Locate the recovered and expanded diameters of the chosen tubing size on the chart in Figure 1.
2. Lay a straight edge between the two values and pencil in a straight line connecting them.
3. Find the wire bundle diameter on the Expanded Diameter scale of the chart in Figure 1.
4. From the wire bundle diameter value, draw a straight horizontal line across the chart.
5. From the intersection of the line from step 3 and the line from step 2, read down vertically to the “Unresolved Recovery” for this combination.

Example (see Figure 2):

Recovered tubing diameter = 10 mm

Expanded tubing diameter = 20 mm

Wire bundle diameter =13 mm

Unresolved recovery = 50%

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Entry Size (Continued)

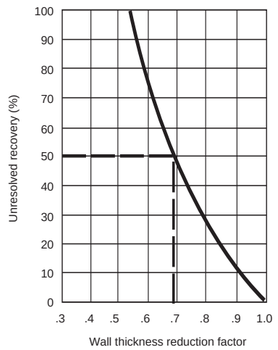

Figure 3.

Step 2. Find the Wall Thickness Reduction Factor.

1. On the Unresolved Recovery scale of the chart in Figure 3 above, find the unresolved recovery value determined in Step 1.
2. From the unresolved recovery value, draw a straight line across the chart to the curved line.
3. At the point where that line intersects the chart's curved line, read vertically down to the wall thickness reduction factor.

Example shown:

Unresolved recovery = 50%

Reduction factor = 0.68

Step 3. Calculate the Jacket Wall Thickness.

Multiply the fully shrunk wall thickness of the tubing by the reduction factor.

Example:

Fully shrunk wall thickness of tubing	= 1.45 mm
Wall thickness reduction factor (from Figure 3)	= 0.68
Jacket wall thickness	= 1.4 x 0.68
	= 0.99 mm

Note:
If the cable is to be shielded (screened), an addition must be made to the wire bundle diameter for the braid. In the example, 0.8 mm would be added to the wire bundle diameter for a single layer of RAY 101 (36 AWG) braid to make a total wire bundle diameter of 13.8 mm.

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Entry Size (Continued)

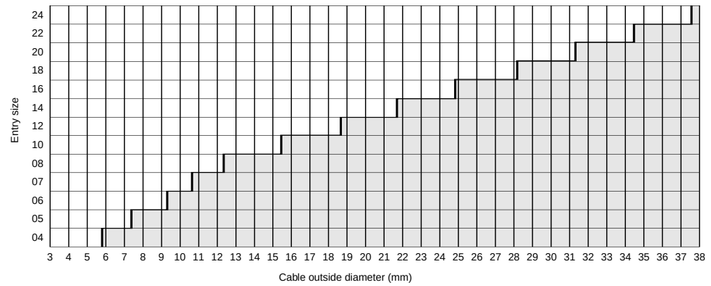

Figure 4. Entry Size by Cable Outside Diameter (in millimeters)

Determining the Entry Size

Once you have the wire bundle size, you can use the chart in Figure 4 to select the entry size. This chart shows the minimum entry sizes for cables from 3 to 38 mm [.118 to 1.496 in] in diameter. In other words, the white spaces on the chart represent all of the cable outside diameters each entry size will fit.

Follow these steps:

1. Find the cable diameter on the chart.
2. Note the lowest entry size that will fit the cable diameter

Braided Adapters

The extreme flexibility of the braid on these adapters accommodates a large range of cable diameters. It is therefore recommended that the standard entry size for any given adapter part number be specified as indicated on the relevant data sheet. Nonstandard entry sizes are available on special order.

Use the selection chart in Figure 4 to ensure that the standard entry size will pass over the jacketed cable diameter.

Tinel-Lock Adapters

With Tinel-Lock adapters, the cable braid must be opened up to fit onto the outside diameter of the adapter entry. For optimum performance, select the smallest entry size that will pass over the jacketed cable diameter. Repair of the connector will be easier using the boot and shield rollback if a slightly larger than minimum entry size is used.

The selection chart in Figure 4 shows the minimum entry sizes for cable diameters in the range of 3 mm to 38 mm. This will ensure that the jacketed cable passes through the adapter for easy assembly.

It should be checked to be sure the braid will open sufficiently to fit the entry size selected and to ensure that the braid and boot can be rolled back.

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Entry Size (Continued)

Ray 101 Tinned-Copper Braid

Tyco Electronics manufactures a range of Raychem tubular braided shields (sometimes called “screens”) that are used for shielding hand-built harnesses.

These braids are specially designed to have:

- Good surface transfer impedance
- Large opening ratio
- Good handling characteristics
- Compatibility with Tinel-Lock adapters

Sizes are available to cover wire bundle diameters from 2.5 to 38 [.10 to 1.50]. The table below shows the wire bundle diameter range for each braid size and also shows which adapter entry sizes are compatible with each of these braids and bundle diameters.

The entry sizes do not allow for the additional thickness of the braid and the heat-shrunk cable jacket.

Ray 101 Data

Part No.	Number of Carriers	Number of Ends/ Carrier	Individual Strand Size (mm/AWG)	Wire Bundle Diameter Range			Tinel Adapter Entry Size (Single-Layer Braid)
				Min.	Max.	Wall Thickness (Nom.)	
RAY 101-3.0	16	10	0.1 [38]	2.5 [.10]	5.0 [.20]	N/A	N/A
RAY 101-4.0	24	7	0.13 [36]	3.5 [.14]	7.5 [.30]	0.4 [.02]	04*
RAY 101-6.0	24	9	0.13 [36]	4.0 [.16]	9.5 [.37]	0.4 [.02]	04, 05, 06*, 07
RAY 101-7.5	24	14	0.13 [36]	6.0 [.24]	14.0 [.55]	0.4 [.02]	05, 06, 07, 10*
RAY 101-10.0	36	12	0.13 [36]	8.0 [.31]	22.0 [.87]	0.4 [.02]	07, 08, 10 12*
RAY 101-12.5	36	15	0.13 [36]	10.0 [.39]	24.0 [.94]	0.4 [.02]	08, 10, 12,14, 16*
RAY 101-20.0	48	16	0.13 [36]	16.0 [.63]	38.0 [1.50]	0.4 [.02]	12, 14, 16, 18, 20, 22

*Combination is not preferred; use only if absolutely necessary.

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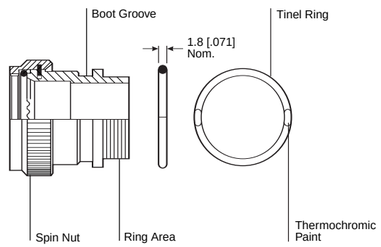
Tinel-Lock Ring

Tinel-Lock Ring and Braid

The Tinel-Lock ring designator must be specified according to the type of cable braid used, and is added to the part number after the adapter entry size. There are two types of ring, AI and BI, for each entry size.

Tinel rings are marked with thermochromic paint, which changes color when the correct installation temperature is reached. BI-type rings are identified with a red spot.

Braid type, material, and construction are variable. If in doubt, contact Tyco Electronics for advice.



Braid Type	Ring Designator
Single layer 36 AWG	AI
Single layer 34 AWG	AI
Single layer 32 AWG	BI
Single layer 30 AWG	BI
Double layer 36 AWG	BI
Double layer 34 AWG	BI

A or B = Size of Braid I = Insulating Layer

Table F. Wire Gauge (AWG) to Diameter Cross-Reference

Use this table to establish wire gauge if not known.

Wire Gauge (AWG)	Diameter
40	0.079 [0.0031]
39	0.089 [0.0035]
38	0.102 [0.0040]
37	0.114 [0.0045]
36	0.127 [0.0050]
35	0.142 [0.0056]
34	0.160 [0.0063]
33	0.180 [0.0071]
32	0.203 [0.0080]
31	0.226 [0.0089]
30	0.254 [0.0100]
29	0.287 [0.0113]
28	0.320 [0.0126]

Note: It may be necessary to use an 'A' rather than a 'B' ring on entry sizes 04-07 when terminating a multicore cable with double layer machined braid. Braid applied by machine provides less size flexibility than pull-on braid at the smaller entry sizes. If disturbance during assembly causes loss of braid lay, grip of the tinel ring may be affected. Evaluation is recommended. Contact Tyco Electronics for more information.

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Dimensions are shown for reference purposes only. Specifications subject to change.

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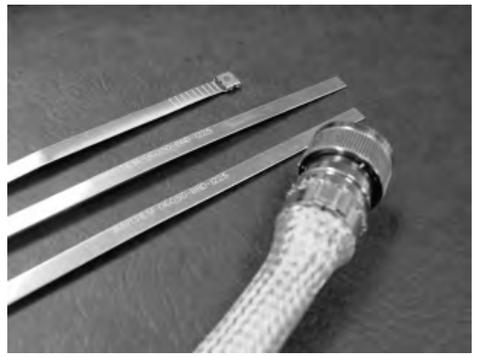
C. America: 57-1-254-4444

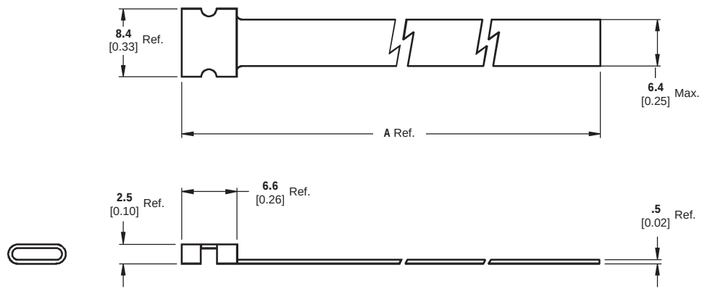
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

CRES-Lock Bands



The CRES-Lock (Americas and Asia)/BND (Europe) band strap designator must be specified when using a band adapter. There are two forms of band that are available — precoiled and straight. Straight is a standard configuration and does not require any notation. If precoiled bands are required, an option P must be used. Refer to CH00-0250-016 drawing for more detailed information. CRES-Lock band strap comes in 12 inch length and BND band strap comes in 14 inch length. These fit all entry sizes for both the CRES-Lock and BND adapter.

Use the band strap designation A in Americas and Asia and B for Europe.



Clamping Band — Straight

Notes:
1. The band is constructed from 300 Series passivated stainless steel and is designed to be installed with either a hand or electric banding tool. Contact Tyco Electronics for further information.
2. The band will be permanently marked with code identification number and full part number (e.g. 06090-BND-1225S).

Part Number	Entry SIzes	A Ref. ±1.5 [±0.06]
BND-1225S	03 to 24	**305.0** 12.00
BND-1425S	03 to 34	**362.0** 14.25

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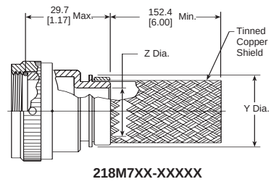
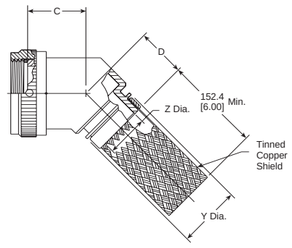
Code 18 MIL-C-5015 (MS3100)

Braided Adapters



218M7XX-XXXXX



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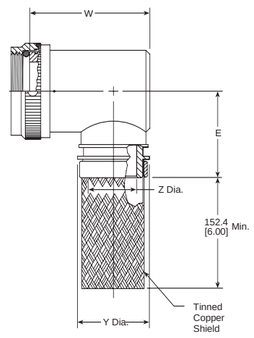

218M9XX-XXXXX

Manufacturer Code	Connector Manufacturer MS3100/3101/3106
A	Amphenol-Class A
B	Bendix-Class A/E/R
C	Cannon-Class A/E/R
D*	Unknown-Class A/E/R
R	Amphenol-Class R
—	Manufacturer code not required

*Additional pieces supplied when manufacturer is unknown.
All thread sizes for order number apply.

Catalog 1308940
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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

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UK: 44-208-420-8341

Code 18 MIL-C-5015 (MS3100) (Continued)

Braided Adapters
(continued)

Table of Dimensions

Order No.	Shell Size	Manufacturer Code	Max. Entry Size, Type 1**	Thread	Dimensions		
					C Max.	D Max.	E Max.
08	8S	B	04	.375-32 UNEF	20.3 [0.80]	23.4 [0.92]	31.2 [1.23]
08	8S	C	04	.438-28 UNEF	20.3 [0.80]	23.4 [0.92]	31.2 [1.23]
08	8S	A, R	04	.438-27 UNS	20.3 [0.80]	23.4 [0.92]	31.2 [1.23]
08	8S	D	04	See * above.	20.3 [0.80]	23.4 [0.92]	31.2 [1.23]
10	10S	—	06	.500-28 UNEF	21.1 [0.83]	24.1 [0.95]	31.2 [1.23]
11	10SL	C	07	.562-24 UNEF	21.1 [0.83]	24.1 [0.83]	31.2 [1.23]
11	10SL	A, B, R	07	.625-24 UNEF	21.1 [0.83]	24.1 [0.95]	31.2 [1.23]
11	10SL	D	07	See * above.	21.1 [0.83]	24.1 [0.95]	31.2 [1.23]
12	12 & 12S	B, C	08	.625-24 UNEF	21.1 [0.83]	24.1 [0.95]	31.2 [1.23]
12	12 & 12S	A, R	08	.688-24 UNEF	21.8 [0.86]	24.9 [0.98]	33.0 [1.30]
12	12 & 12S	D	08	See * above.	21.8 [0.86]	24.9 [0.98]	33.0 [1.30]
14	14 & 14S	—	10	.750-20 UNEF	21.8 [0.86]	24.9 [0.98]	33.0 [1.30]
16	16 & 16S	—	12	.875-20 UNEF	22.6 [0.89]	25.9 [1.02]	36.1 [1.42]
18	18	—	12	1.000-20 UNEF	23.4 [0.92]	26.7 [1.05]	37.6 [1.48]
20	20	A, B, C	16	1.125-18 UNEF	24.1 [0.95]	27.4 [1.08]	39.4 [1.55]
20	20	R	16	1.125-24 UNS	24.1 [0.95]	27.4 [1.08]	39.4 [1.55]
20	20	D	16	See * above.	24.1 [0.95]	27.4 [1.08]	39.4 [1.55]
22	22	—	18	1.250-18 UNEF	24.9 [0.98]	28.2 [1.11]	40.9 [1.61]
24	24	—	20	1.375-18 UNEF	24.9 [0.98]	28.2 [1.11]	42.4 [1.67]
28	28	—	24	1.625-18 UNEF	27.4 [1.08]	29.7 [1.17]	47.2 [1.86]
32	32	B, C	24	1.875-16 UN	28.2 [1.11]	31.2 [1.23]	48.8 [1.92]
32	32	A, R	24	1.906-18 UN	28.2 [1.11]	31.2 [1.23]	48.8 [1.92]
32	32	D	24	See * above.	28.2 [1.11]	31.2 [1.23]	48.8 [1.92]
36	36	B	24	2.062-16 UNS	31.2 [1.23]	32.3 [1.27]	52.1 [2.05]
36	36	R	24	2.062-20 UNS	31.2 [1.23]	32.3 [1.27]	52.1 [2.05]
36	36	C	24	2.125-16 UN	31.2 [1.23]	32.3 [1.27]	52.1 [2.05]
36	36	A	24	2.125-18 UNS	31.2 [1.23]	32.3 [1.27]	52.1 [2.05]
36	36	D	24	See * above.	31.2 [1.23]	32.3 [1.27]	52.1 [2.05]
40	40	B	24	2.312-16 UNS	32.3 [1.27]	33.0 [1.30]	55.1 [2.17]
40	40	A, C, R	24	2.375-16 UN	32.3 [1.27]	33.0 [1.30]	55.1 [2.17]
40	40	D	24	See * above.	32.3 [1.27]	33.0 [1.30]	55.1 [2.17]
44	44	–	24	2.625-16 UN	34.0 [1.34]	34.5 [1.36]	61.5 [2.42]
48	48	C	24	2.812-18 UNS	34.0 [1.34]	34.5 [1.36]	61.5 [2.42]
48	48	A, R	24	2.875-16 UN	34.0 [1.34]	34.5 [1.36]	61.5 [2.42]
48	48	D	24	See * above.	34.0 [1.34]	34.5 [1.36]	61.5 [2.42]

**For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied. Contact Tyco Electronics for information.

Entry Size Dimensions

Entry Size	Dimensions		
	Z Dia. +0.25–0.5	Y Dia. ±0.38	W Max.
04	6.35 [0.250]	11.58 [0.456]	31.2 [1.23]
05	7.92 [0.312]	13.08 [0.515]	32.8 [1.29]
06	9.53 [0.375]	14.76 [0.581]	34.3 [1.35]
07	11.13 [0.438]	16.33 [0.643]	36.1 [1.42]
08	12.70 [0.500]	17.91 [0.705]	37.6 [1.48]
10	15.88 [0.625]	21.11 [0.831]	40.6 [1.60]
12	19.05 [0.750]	24.21 [0.953]	43.9 [1.73]
14	22.23 [0.875]	27.46 [1.081]	47.0 [1.85]
16	25.40 [1.000]	30.61 [1.205]	50.8 [2.00]
18	28.58 [1.125]	35.08 [1.381]	54.1 [2.13]
20	31.75 [1.250]	38.25 [1.506]	57.2 [2.25]
22	34.93 [1.375]	41.43 [1.631]	—
24	38.10 [1.500]	44.60 [1.756]	—

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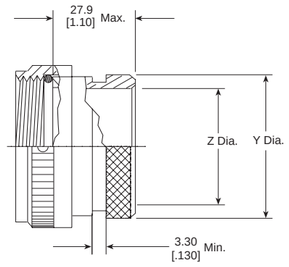
Code 18 MIL-C-5015 (MS3100) (Continued)

Solid Adapters

Manufacturer Code	Connector Manufacturer MS3100/3101/3106
A	Amphenol-Class A
B	Bendix-Class A/E/R
C	Cannon-Class A/E/R
D*	Unknown-Class A/E/R
R	Amphenol-Class R
—	Manufacturer code not required

*Additional pieces supplied when manufacturer is unknown.
All thread sizes for order number apply.



218M6XX-XXX

Table of Dimensions

Order No.	Shell Size	Manufacturer Code	Thread	Dimensions	
				Y ±0.5	Z Min.
08	8S	B	.375–32 UNEF	13.2 [0.52]	6.22 [0.24]
08	8S	C	.438–28 UNEF	13.2 [0.52]	7.80 [0.31]
08	8S	A, R	.438–27 UNS	13.2 [0.52]	7.80 [0.31]
08	8S	D	See * above.	13.2 [0.52]	7.80 [0.31]
10	10S	—	.500–28 UNEF	15.0 [0.59]	9.40 [0.37]
11	10SL	C	.562–24 UNEF	15.0 [0.59]	11.00 [0.43]
11	10SL	A, B, R	.625–24 UNEF	19.3 [0.76]	12.57 [0.49]
11	10SL	D	See * above.	19.3 [0.76]	11.00 [0.43]
12	12 & 12S	B, C	.625–24 UNEF	19.3 [0.76]	12.57 [0.49]
12	12 & 12S	A, R	.688–24 UNEF	19.3 [0.76]	14.15 [0.56]
12	12 & 12S	D	See * above.	19.3 [0.76]	12.57 [0.49]
14	14 & 14S	—	.750–20 UNEF	20.9 [0.82]	15.75 [0.62]
16	16 & 16S	—	.875–20 UNEF	24.1 [0.95]	18.92 [0.74]
18	18	—	1.000 - 20 UNEF	26.1 [1.03]	20.50 [0.81]
20	20	A, B, C	1.125–18 UNEF	34.0 [1.34]	25.27 [0.99]
20	20	R	1.125–24 UNS	34.0 [1.34]	25.27 [0.99]
20	20	D	See * above.	34.0 [1.34]	25.27 [0.99]
22	22	—	1.250–18 UNEF	36.3 [1.43]	28.45 [1.12]
24	24	—	1.375–18 UNEF	40.5 [1.59]	31.62 [1.24]
28	28	—	1.625–18 UNEF	43.0 [1.69]	34.80 [1.37]
32	32	B, C	1.875–16 UN	48.4 [1.91]	41.15 [1.62]
32	32	A, R	1.906–18 UN	48.4 [1.91]	41.15 [1.62]
32	32	D	See * above.	48.4 [1.91]	41.15 [1.62]
36	36	B	2.062–16 UNS	54.7 [2.15]	47.50 [1.87]
36	36	R	2.062–20 UNS	54.7 [2.15]	47.50 [1.87]
36	36	C	2.125–16 UN	54.7 [2.15]	47.50 [1.87]
36	36	A	2.125–18 UNS	54.7 [2.15]	47.50 [1.87]
36	36	D	See * above.	54.7 [2.15]	47.50 [1.87]
40	40	B	2.312–16 UNS	60.6 [2.39]	53.85 [2.12]
40	40	A, C, R	2.375–16 UN	60.6 [2.39]	53.85 [2.12]
40	40	D	See * above.	60.6 [2.39]	53.85 [2.12]
44	44	–	2.625–16 UN	67.1 [2.64]	60.20 [2.37]
48	48	C	2.812–18 UNS	73.5 [2.89]	66.55 [2.62]
48	48	A, R	2.875–16 UN	73.5 [2.89]	66.55 [2.62]
48	48	D	See * above.	73.5 [2.89]	66.55 [2.62]

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Code 18 MIL-C-5015 (MS3100) (Continued)

Solid Adapters
(continued)

Molded Part Selection Guide (Solid)

Y Diameter	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
13.2 [0.52]	202W232	—	4.3 [0.19]	—	—	—
13.2 [0.52]	202K121	222K121	5.6 [0.22]	202D211	222D211	6.4 [0.25]
15.0 [0.59]	202K132	222K132	5.9 [0.23]	202D221	222D221	7.4 [0.29]
19.2 [0.76]	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
20.9 [0.82]	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
24.1 [0.95]	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
26.1 [1.03]	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
34.0 [1.34]	202K163	222K163	9.9 [0.33]	202D253	222D253	10.4 [0.41]
36.2 [1.43]	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]
40.5 [1.59]	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]
43.0 [1.69]	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]
48.4 [1.91]	202K185	222K185	16.8 [0.66]	202D274	222D274	14.3 [0.56]
54.7 [2.15]	202K185	222K185	16.8 [0.66]	202D274	222D274	14.3 [0.56]
60.6 [2.39]	—	—	—	202D285	222D285	17.5 [0.68]
67.1 [2.64]	—	—	—	202D296	222D296	19.6 [0.76]
73.5 [2.89]	—	—	—	202D299	222D299	22.9 [0.89]

Uniboot Parts

Y Diameter	Part No.	Cable OD (Min.)
13.2 [0.52]	202C611	4.8 [0.19]
15.0 [0.59]	202C621	8.1 [0.32]
19.3 [0.76]	202C621	8.1 [0.32]
20.9 [0.82]	202C632	12.7 [0.50]
24.1 [0.95]	202C632	12.7 [0.50]
26.1 [1.03]	202C642	17.5 [0.69]
34.0 [1.34]	202C653	22.4 [0.88]
36.3 [1.43]	202C653	22.4 [0.88]
40.5 [1.59]	202C653	22.4 [0.88]
43.0 [1.69]	202C663	22.9 [0.90]
48.4 [1.91]	202C663	22.9 [0.90]
54.7 [2.15]	202C663	22.9 [0.90]
60.6 [2.39]	202C663	22.9 [0.90]
67.1 [2.64]	202C663	22.9 [0.90]
73.5 [2.89]	202C663	22.9 [0.90]

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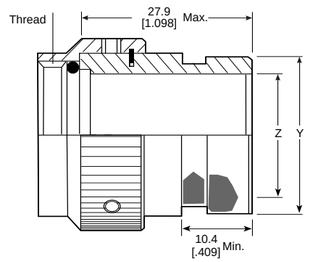
Code 18 MIL-C-5015 (MS3100) (Continued)

Spin-Coupling Adapters

Manufacturer Code	Connector Manufacturer MS3100/3101/3106
A	Amphenol-Class A
B	Bendix-Class A/E/R
C	Cannon-Class A/E/R
D*	Unknown-Class A/E/R
R	Amphenol-Class R
—	Manufacturer code not required

*Additional pieces supplied when manufacturer is unknown.
All thread sizes for order number apply.



218M6XX-XXX

Table of Dimensions

Order No.	Shell Size	Manufacturer Code	Thread	Dimensions	
				Y ±0.5	Z Min.
08	8S	B	.375–32 UNEF	13.2 [0.52]	6.22 [0.24]
08	8S	C	.438–28 UNEF	13.2 [0.52]	7.80 [0.31]
08	8S	A, R	.438–27 UNS	13.2 [0.52]	7.80 [0.31]
08	8S	D	See * above.	13.2 [0.52]	7.80 [0.31]
10	10S	—	.500–28 UNEF	15.0 [0.59]	9.40 [0.37]
11	10SL	C	.562–24 UNEF	15.0 [0.59]	11.00 [0.43]
11	10SL	A, B, R	.625–24 UNEF	19.3 [0.76]	12.57 [0.49]
11	10SL	D	See * above.	19.3 [0.76]	11.00 [0.43]
12	12 & 12S	B, C	.625–24 UNEF	19.3 [0.76]	12.57 [0.49]
12	12 & 12S	A, R	.688–24 UNEF	19.3 [0.76]	14.15 [0.56]
12	12 & 12S	D	See * above.	19.3 [0.76]	12.57 [0.49]
14	14 & 14S	—	.750–20 UNEF	20.9 [0.82]	15.75 [0.62]
16	16 & 16S	—	.875–20 UNEF	24.1 [0.95]	18.92 [0.74]
18	18	—	1.000 - 20 UNEF	26.1 [1.03]	20.50 [0.81]
20	20	A, B, C	1.125–18 UNEF	34.0 [1.34]	25.27 [0.99]
20	20	R	1.125–24 UNS	34.0 [1.34]	25.27 [0.99]
20	20	D	See * above.	34.0 [1.34]	25.27 [0.99]
22	22	—	1.250–18 UNEF	36.3 [1.43]	28.45 [1.12]
24	24	—	1.375–18 UNEF	40.5 [1.59]	31.62 [1.24]
28	28	—	1.625–18 UNEF	43.0 [1.69]	34.80 [1.37]
32	32	B, C	1.875–16 UN	48.4 [1.91]	41.15 [1.62]
32	32	A, R	1.906–18 UN	48.4 [1.91]	41.15 [1.62]
32	32	D	See * above.	48.4 [1.91]	41.15 [1.62]
36	36	B	2.062–16 UNS	54.7 [2.15]	47.50 [1.87]
36	36	R	2.062–20 UNS	54.7 [2.15]	47.50 [1.87]
36	36	C	2.125–16 UN	54.7 [2.15]	47.50 [1.87]
36	36	A	2.125–18 UNS	54.7 [2.15]	47.50 [1.87]
36	36	D	See * above.	54.7 [2.15]	47.50 [1.87]
40	40	B	2.312–16 UNS	60.6 [2.39]	53.85 [2.12]
40	40	A, C, R	2.375–16 UN	60.6 [2.39]	53.85 [2.12]
40	40	D	See * above	60.6 [2.39]	53.85 [2.12]
44	44	–	2.625–16 UN	67.1 [2.64]	60.20 [2.37]
48	48	C	2.812–18 UNS	73.5 [2.89]	66.55 [2.62]
48	48	A, R	2.875–16 UN	73.5 [2.89]	66.55 [2.62]
48	48	D	See * above	73.5 [2.89]	66.55 [2.62]

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Code 18 MIL-C-5015 (MS3100) (Continued)

Molded Part Selection Guide (Spin-Coupling)

Y Diameter	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
13.2 [0.52]		202W232	4.3 [0.19]			
13.2 [0.52]	202K121	222K121	5.6 [0.22]	202D211	222D211	6.4 [0.25]
15.0 [0.59]	202K132	222K132	5.9 [0.23]	202D221	222D221	7.4 [0.29]
19.2 [0.76]	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
20.9 [0.82]	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
24.1 [0.95]	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
26.1 [1.03]	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
34.0 [1.34]	202K163	222K163	9.9 [0.33]	202D253	222D253	10.4 [0.41]
36.2 [1.43]	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]
40.5 [1.59]	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]
43.0 [1.69]	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]
48.4 [1.91]	202K185	222K185	16.8 [0.66]	202D274	222D274	14.3 [0.56]
54.7 [2.15]	202K185	222K185	16.8 [0.66]	202D274	222D274	14.3 [0.56]

Uniboot Parts

Y Diameter	Part No.	Cable OD (Min.)
13.2 [0.52]	202C611	4.8 [0.19]
15.0 [0.59]	202C621	8.1 [0.32]
19.3 [0.76]	202C621	8.1 [0.32]
20.9 [0.82]	202C632	12.7 [0.50]
24.1 [0.95]	202C632	12.7 [0.50]
26.1 [1.03]	202C642	17.5 [0.69]
34.0 [1.34]	202C653	22.4 [0.88]
36.3 [1.43]	202C653	22.4 [0.88]
40.5 [1.59]	202C653	22.4 [0.88]
43.0 [1.69]	202C663	22.9 [0.90]
48.4 [1.91]	202C663	22.9 [0.90]
54.7 [2.15]	202C663	22.9 [0.90]

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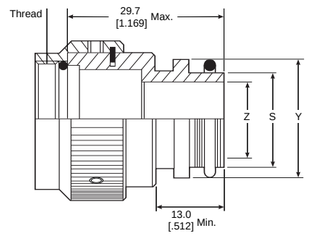
Code 18 MIL-C-5015 (MS3100) (Continued)

Tinel-Lock Adapters



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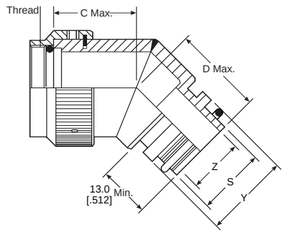

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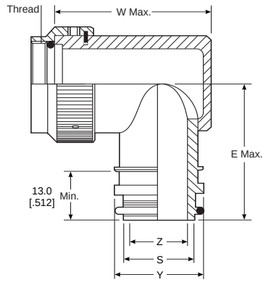

TXR18XX90-XXXXXX

Manufacturer Code	Connector Manufacturer MS3100/3101/3106
A	Amphenol-Class A
B	Bendix-Class A/E/R
C	Cannon-Class A/E/R
D*	Unknown-Class A/E/R
R	Amphenol-Class R
—	Manufacturer code not required

*Additional pieces supplied when manufacturer is unknown.
All thread sizes for order number apply.

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Code 18 MIL-C-5015 (MS3100) (Continued)

Tinel-Lock Adapters
(continued)

Table of Dimensions

Order No.	Shell Size	Manufacturer Code	Max. Entry Size, Type 1**	Thread	Dimensions		
					C Max.	D Max.	E Max.
08	8S	B	04	.375-32 UNEF	20.3 [0.80]	23.4 [0.92]	31.2 [1.23]
08	8S	C	04	.438-28 UNEF	20.3 [0.80]	23.4 [0.92]	31.2 [1.23]
08	8S	A, R	04	.438-27 UNS	20.3 [0.80]	23.4 [0.92]	31.2 [1.23]
08	8S	D	04	*	20.3 [0.80]	23.4 [0.92]	31.2 [1.23]
10	10S	—	06	.500-28 UNEF	21.1 [0.83]	24.1 [0.95]	31.2 [1.23]
11	10SL	C	07	.562-24 UNEF	21.1 [0.83]	24.1 [0.83]	31.2 [1.23]
11	10SL	A, B, R	07	.625-24 UNEF	21.1 [0.83]	24.1 [0.95]	31.2 [1.23]
11	10SL	D	07	*	21.1 [0.83]	24.1 [0.95]	31.2 [1.23]
12	12 & 12S	B, C	08	.625-24 UNEF	21.1 [0.83]	24.1 [0.95]	31.2 [1.23]
12	12 & 12S	A, R	08	.688-24 UNEF	21.8 [0.86]	24.9 [0.98]	33.0 [1.30]
12	12 & 12S	D	08	*	21.8 [0.86]	24.9 [0.98]	33.0 [1.30]
14	14 & 14S	—	10	.750-20 UNEF	21.8 [0.86]	24.9 [0.98]	33.0 [1.30]
16	16 & 16S	—	12	.875-20 UNEF	22.6 [0.89]	25.9 [1.02]	36.1 [1.42]
18	18	—	12	1.000-20 UNEF	23.4 [0.92]	26.7 [1.05]	37.6 [1.48]
20	20	A, B, C	16	1.125-18 UNEF	24.1 [0.95]	27.4 [1.08]	39.4 [1.55]
20	20	R	16	1.125-24 UNS	24.1 [0.95]	27.4 [1.08]	39.4 [1.55]
20	20	D	16	*	24.1 [0.95]	27.4 [1.08]	39.4 [1.55]
22	22	—	18	1.250-18 UNEF	24.9 [0.98]	28.2 [1.11]	40.9 [1.61]
24	24	—	20	1.375-18 UNEF	24.9 [0.98]	28.2 [1.11]	42.4 [1.67]
28	28	—	24	1.625-18 UNEF	27.4 [1.08]	29.7 [1.17]	47.2 [1.86]
32	32	B, C	24	1.875-16 UN	28.2 [1.11]	31.2 [1.23]	48.8 [1.92]
32	32	A, R	24	1.906-18 UN	28.2 [1.11]	31.2 [1.23]	48.8 [1.92]
32	32	D	24	*	28.2 [1.11]	31.2 [1.23]	48.8 [1.92]
36	36	B	24	2.062-16 UNS	31.2 [1.23]	32.3 [1.27]	52.1 [2.05]
36	36	R	24	2.062-20 UNS	31.2 [1.23]	32.3 [1.27]	52.1 [2.05]
36	36	C	24	2.125-16 UN	31.2 [1.23]	32.3 [1.27]	52.1 [2.05]
36	36	A	24	2.125-18 UNS	31.2 [1.23]	32.3 [1.27]	52.1 [2.05]
36	36	D	24	*	31.2 [1.23]	32.3 [1.27]	52.1 [2.05]
40	40	B	24	2.312-16 UNS	32.3 [1.27]	33.0 [1.30]	55.1 [2.17]
40	40	A, C, R	24	2.375-16 UN	32.3 [1.27]	33.0 [1.30]	55.1 [2.17]
40	40	D	24	*	32.3 [1.27]	33.0 [1.30]	55.1 [2.17]
44	44	—	24	2.625-16 UN	34.0 [1.34]	34.5 [1.36]	61.5 [2.42]
48	48	C	24	2.812-18 UNS	34.0 [1.34]	34.5 [1.36]	61.5 [2.42]
48	48	A, R	24	2.875-16 UN	34.0 [1.34]	34.5 [1.36]	61.5 [2.42]
48	48	D	24	*	34.0 [1.34]	34.5 [1.36]	61.5 [2.42]

* Additional pieces, etc. (from page 11-48)
**For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied. Contact Tyco Electronics for information.

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Code 18 MIL-C-5015 (MS3100) (Continued)

Tinel-Lock Adapters
(continued)

Entry Size Dimensions

Entry Size	Dimensions			
	Z Dia. +0.25–0.5	S Diameter (min.–max.)	Y Dia. ±0.38	W Max.
04	6.35 [0.25]	9.39–9.56 [0.37–0.38]	13.97 [0.55]	31.50 [1.24]
05	7.92 [0.31]	10.97–11.13 [0.43–0.44]	15.54 [0.61]	34.30 [1.35]
06	9.52 [0.37]	12.57–12.73 [0.49–0.50]	17.14 [0.67]	35.80 [1.41]
07	11.09 [0.44]	14.12–14.31 [0.55–0.56]	18.71 [0.74]	37.30 [1.47]
08	12.70 [0.50]	15.72–15.91 [0.62–0.63]	20.32 [0.80]	39.10 [1.54]
10	15.87 [0.62]	18.84–19.11 [0.74–0.75]	23.49 [0.92]	41.40 [1.63]
12	19.05 [0.75]	22.02–22.28 [0.87–0.88]	26.67 [1.05]	45.50 [1.79]
14	22.23 [0.88]	25.17–25.46 [0.99–1.00]	29.84 [1.17]	48.80 [1.92]
16	25.40 [1.00]	28.34–28.63 [1.12–1.13]	33.02 [1.30]	51.80 [2.04]
18	28.57 [1.12]	31.52–31.81 [1.24–1.25]	36.19 [1.42]	54.90 [2.16]
20	31.75 [1.25]	34.69–34.98 [1.37–1.38]	39.37 [1.55]	58.20 [2.29]
22	34.93 [1.38]	37.79–38.15 [1.49–1.50]	42.55 [1.68]	66.80 [2.63]
24	38.10 [1.50]	40.97–41.33 [1.61–1.63]	45.72 [1.80]	70.10 [2.76]

Molded Part Selection Guide (Tinel)

Tinel-Lock Entry Size	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
04	202K232	—	3.30 [0.13]	—	—	—
04	202W232	—	4.30 [0.19]	—	—	—
04	202K121	222K121	5.60 [0.22]	202D211	222D211	6.40 [0.25]
05, 06	202K132	222K132	5.90 [0.23]	202D221	222D221	7.40 [0.29]
07, 08	202K142	222K142	7.10 [0.28]	202D232	222D232	8.40 [0.33]
10, 12	202K153	222K152	8.40 [0.33]	202D242	222D242	9.70 [0.38]
14, 16	202K163	222K163	9.90 [0.39]	202D253	222D253	10.50 [0.41]
18, 20, 22	202K174	222K174	15.70 [0.62]	202D263	222D263	12.20 [0.48]
24	202K185	222K185	16.80 [0.66]	—	—	—

Uniboot Parts

Tinel-Lock Entry Size	Part No.	Cable OD (min.)
04	202C611	4.8 [0.19]
05, 06, 07	202C621	8.1 [0.32]
08, 10, 12	202C632	12.7 [0.50]
12, 14, 16	202C642	17.5 [0.69]
16, 18, 20, 22	202C653	22.4 [0.88]

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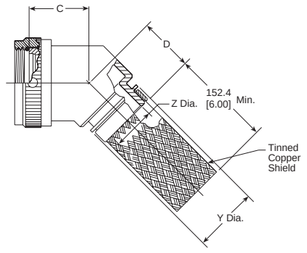
Code 21 MIL-C-26482 Series 1

Braided Adapters



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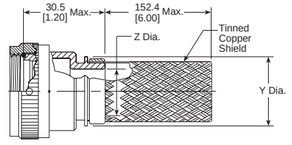

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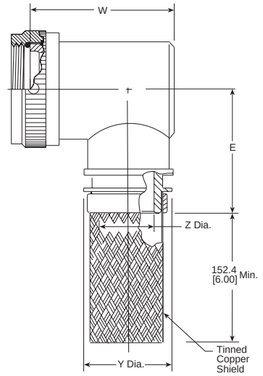

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Table of Dimensions

Order No.	Shell Size	Max. Entry Size, Type 1*	Thread	Dimensions		
				C Max.	D Max.	E Max.
08	8	04	.438-28 UNEF	21.6 [0.85]	23.1 [0.91]	29.0 [1.14]
10	10	06	.562-24 UNEF	22.4 [0.88]	23.9 [0.94]	30.5 [1.20]
12	12	08	.688-24 UNEF	23.1 [0.91]	24.6 [0.97]	32.3 [1.27]
14	14	10	.812-20 UNEF	23.4 [0.92]	24.9 [0.98]	33.5 [1.32]
16	16	12	.938-20 UNEF	24.1 [0.95]	25.7 [1.01]	34.8 [1.37]
18	18	12	1.062-18 UNEF	24.4 [0.96]	25.9 [1.02]	36.3 [1.43]
20	20	14	1.188-18 UNEF	25.1 [0.99]	26.7 [1.05]	38.1 [1.50]
22	22	16	1.312-18 UNEF	25.7 [1.01]	27.4 [1.08]	39.6 [1.56]
24	24	18	1.438-18 UNEF	26.2 [1.03]	27.7 [1.09]	40.9 [1.61]

*For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied. Contact Tyco Electronics for information.

Entry Size Dimensions

Entry Size	Dimensions		
	Z +0.25–0.5	Y Dia.	W Max.
04	6.35 [0.25]	13.97 [0.55]	31.0 [1.22]
05	7.92 [0.31]	15.54 [0.61]	32.8 [1.29]
06	9.52 [0.37]	17.14 [0.67]	34.3 [1.35]
07	11.09 [0.44]	18.71 [0.74]	35.8 [1.41]
08	12.70 [0.50]	20.32 [0.80]	37.3 [1.47]
10	15.87 [0.62]	23.49 [0.92]	40.6 [1.60]
12	19.05 [0.75]	26.67 [1.05]	43.7 [1.72]
14	22.23 [0.88]	29.84 [1.17]	47.0 [1.85]
16	25.40 [1.00]	33.02 [1.30]	50.0 [1.97]
18	28.57 [1.12]	36.19 [1.42]	53.3 [2.10]

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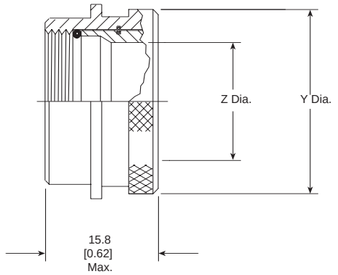
Code 21 MIL-C-26482 Series 1 (Continued)

Solid Adapters



203M6XX-XXX

Table of Dimensions

Order Number	Shell Size	Thread	Dimensions	
			Y +0.000-0.030 (+0.00) (-0.76) Dia.	Z Min.
08	8	.438-28 UNEF	17.88 [0.704]	6.63 [0.26]
10	10	.562-24 UNEF	21.06 [0.829]	9.27 [0.36]
12	12	.688-24 UNEF	24.23 [0.954]	12.98 [0.51]
14	14	.812-20 UNEF	27.41 [1.079]	15.37 [0.61]
16	16	.938-20 UNEF	31.85 [1.254]	18.54 [0.73]
18	18	1.062-18 UNEF	33.03 [1.316]	20.90 [0.82]
20	20	1.188-18 UNEF	36.63 [1.442]	24.10 [0.95]
22	22	1.312-18 UNEF	39.78 [1.566]	27.28 [1.07]
24	24	1.438-18 UNEF	42.98 [1.692]	29.67 [1.17]

Molded Part Selection Guide (Solid)

Order No.	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
08	202K132	222K132	5.9 [0.23]	202D221	222D221	7.4 [0.29]
10	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
12, 14	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
16, 18	202K163	222K163	9.9 [0.39]	202D253	222D253	10.5 [0.41]
20, 22, 24	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]

Uniboot Parts

Order No.	Part No.	Cable OD (Min.)
08	202C621	8.1 [0.32]
10	202C632	12.7 [0.50]
12, 14	202C642	17.5 [0.69]
16, 18, 20, 22, 24	202C653	22.4 [0.88]

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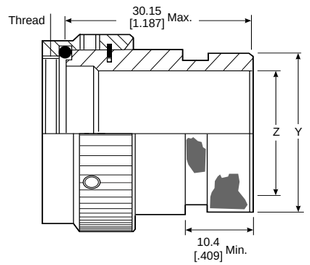
Japan: 81-44-844-8013
UK: 44-208-420-8341

Code 21 MIL-C-26482 Series 1 (Continued)

Spin-Coupling Adapters



203M9XX-XXX

Table of Dimensions

Order No.	Shell Size	Thread	Dimensions	
			Y +0.00–0.76 Dia.	Z Min.
08	8	.438-28 UNEF	13.54 [0.53]	6.63 [0.26]
10	10	.562-24 UNEF	15.37 [0.61]	9.27 [0.36]
12	12	.688-24 UNEF	19.66 [0.77]	12.98 [0.51]
14	14	.812-20 UNEF	21.29 [0.84]	15.37 [0.61]
16	16	.938-20 UNEF	24.46 [0.96]	18.54 [0.73]
18	18	1.062-18 UNEF	26.47 [1.04]	20.90 [0.82]
20	20	1.188-18 UNEF	30.91 [1.22]	24.10 [0.95]
22	22	1.312-18 UNEF	34.42 [1.36]	27.28 [1.07]
24	24	1.438-18 UNEF	36.65 [1.44]	29.67 [1.17]

Molded Part Selection Guide (Spin-Coupling)

Order No.	Standard K Parts			Low-profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
08	202W232	—	4.3 [0.19]	—	—	—
08	202K121	222K121	5.6 [0.22]	202D211	222D211	6.4 [0.25]
10	202K132	222K132	5.9 [0.23]	202D221	222D221	7.4 [0.29]
12, 14	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
16, 18	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
20, 22	202K163	222K163	9.9 [0.39]	202D253	222D253	10.5 [0.41]
24	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]

Uniboot Parts

Order No.	Part No.	Cable OD (Min.)
08	202C611	4.8 [0.19]
10, 12	202C621	8.1 [0.32]
14, 16	202C632	12.7 [0.50]
18, 20	202C642	17.5 [0.69]
22, 24	202C653	22.4 [0.88]

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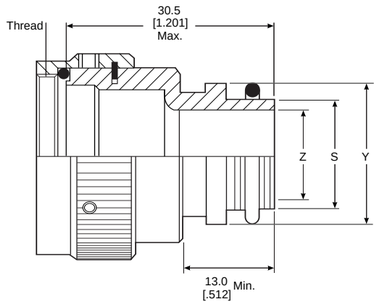
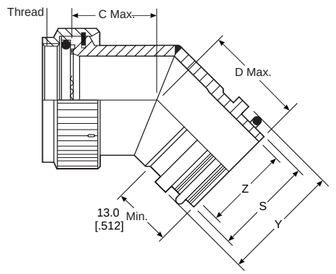
Code 21 MIL-C-26482 Series 1 (Continued)

Tinel-Lock Adapters



TXR21XX00-XXXX XX



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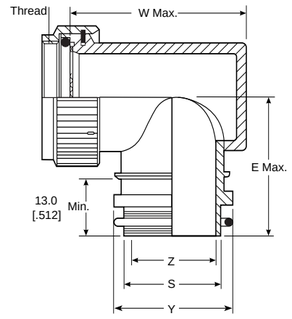

TXR21XX90-XXXXXX

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Code 21 MIL-C-26482 Series 1 (Continued)

Tinel-Lock Adapters
(continued)

Table of Dimensions

Order No.	Shell Size	Max. Entry Size, Type 1*	Thread	Dimensions		
				C Max.	D Max.	E Max.
08	8	04	.438-28 UNEF	21.6 [0.85]	23.1 [0.91]	29.0 [1.14]
10	10	06	.562-24 UNEF	22.4 [0.88]	23.9 [0.94]	30.5 [1.20]
12	12	08	.688-24 UNEF	23.1 [0.91]	24.6 [0.97]	32.3 [1.27]
14	14	10	.812-20 UNEF	23.4 [0.92]	24.9 [0.98]	33.5 [1.32]
16	16	12	.938-20 UNEF	24.1 [0.95]	25.7 [1.01]	34.8 [1.37]
18	18	12	1.062-18 UNEF	24.4 [0.96]	25.9 [1.02]	36.3 [1.43]
20	20	14	1.188-18 UNEF	25.1 [0.99]	26.7 [1.05]	38.1 [1.50]
22	22	16	1.312-18 UNEF	25.7 [1.01]	27.4 [1.08]	39.6 [1.56]
24	24	18	1.438-18 UNEF	26.2 [1.03]	27.7 [1.09]	40.9 [1.61]

*For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied. Contact Tyco Electronics for information.

Entry Size Dimensions

Entry Size	Dimensions			
	Z +0.25–0.5	S Diameter(Min.–Max.)	Y Dia.	W Max.
04	6.35 [0.25]	9.39–9.56 [0.37–0.38]	13.97 [0.55]	31.0 [1.22]
05	7.92 [0.31]	10.97–11.13 [0.43–0.44]	15.54 [0.61]	32.8 [1.29]
06	9.52 [0.37]	12.57–12.73 [0.49–0.50]	17.14 [0.67]	34.3 [1.35]
07	11.09 [0.44]	14.12–14.31 [0.55–0.56]	18.71 [0.74]	35.8 [1.41]
08	12.7 [0.50]	15.72–15.91 [0.62–0.63]	20.32 [0.80]	37.3 [1.47]
10	15.87 [0.62]	18.84–19.11 [0.74–0.75]	23.49 [0.92]	40.6 [1.60]
12	19.05 [0.75]	22.02–22.28 [0.87–0.88]	26.67 [1.05]	43.7 [1.72]
14	22.23 [0.88]	25.17–25.46 [0.99–1.00]	29.84 [1.17]	47.0 [1.85]
16	25.4 [1.00]	28.34–28.63 [1.12–1.13]	33.02 [1.30]	50.0 [1.97]
18	28.57 [1.12]	31.52–31.81 [1.24–1.25]	36.19 [1.42]	53.3 [2.10]

Molded Part Selection Guide (Tinel)

Tinel-Lock Entry Size	Standard K Parts			Low-profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
04	202K232	—	3.3 [0.1]	—	—	—
04	202W232	—	4.3 [0.2]	—	—	—
04	202K121	222K121	5.6 [0.2]	202D211	222D211	6.4 [0.3]
05, 06	202K132	222K132	5.9 [0.2]	202D221	222D221	7.4 [0.3]
07, 08	202K142	222K142	7.1 [0.3]	202D232	222D232	8.4 [0.3]
10, 12	202K153	222K152	8.4 [0.3]	202D242	222D242	9.7 [0.4]
14, 16	202K163	222K163	9.9 [0.4]	202D253	222D253	10.5 [0.4]
18, 20, 22	202K174	222K174	15.7 [0.6]	202D263	222D263	12.2 [0.5]
24	202K185	222K185	16.8 [0.7]	—	—	—

Uniboot Parts

Tinel-Lock Entry Size	Part No.	Cable OD (Min.)
04	202C611	4.8 [0.19]
05, 06, 07	202C621	8.1 [0.32]
08, 10, 12	202C632	12.7 [0.50]
12, 14, 16	202C642	17.5 [0.69]
16, 18, 20, 22	202C653	22.4 [0.88]
24	202C663	22.9 [0.90]

Catalog 1308940
Revised 8-06

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Code 21 MIL-C-26482 Series 1 (Continued)

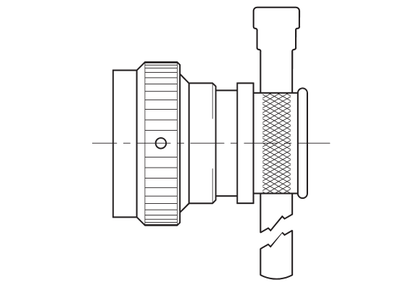
CRES-Lock Adapters (USA)
BND Adapters (Europe)

Code 21 Band Strap Adapter

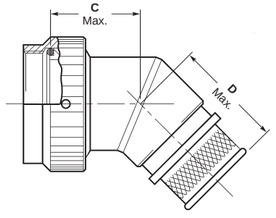
Notes:

1. This product is designed to terminate a braided cable shield by means of a band strap and a heat shrinkable lipped boot to a connector.
2. See CH00-0250-016 for ordering information, modifications and additional dimensions.
3. See drawing BND-XX25S for band strap dimensions and information.
4. Adapter to be permanently marked with code identification number and full part number (e.g. 06090-BND21AB00-1812). Band strap shall bear no part marking.
5. All entry sizes are shown in Table II. Maximum entry sizes are as shown in Table I. For larger entry sizes than the maximum, a Type II adapter may be supplied. See CH00-0250-016 for further details.
6. Adapter mates to: MIL-C-26482 Series I, MS3110, MS3116, MS3120 and MS3126 Class E and F Connectors.
7. Anti-rotational set screw, 3 threaded holes 120° ± 5° apart, single mating set screw supplied: AN565DC4H2. Not required for Type II adapters.

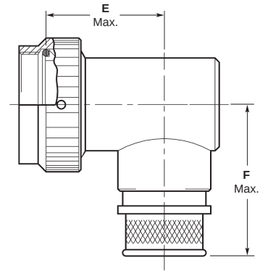
For additional codes available, contact Tyco Electronics.



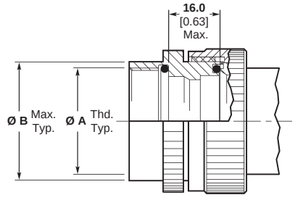
Straight Adapter
Code 00



45° Adapter
Code 45



90° Adapter
Code 90



Type II Modification
(See Note 5)

Catalog 1308940
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CRES-Lock Adapters (USA) BND Adapters (Europe) (continued)

Code 21 Band Strap Adapter (Continued)

Code 21 MIL-C-26482 Series 1 (Continued)

Table I

Order Number	Shell Size[2]	Entry Size Max. Type I[1]	Ø A Unified Thread UNEF Class 2B	Ø B Max.	C Max.	D Max.	F Max.
08	08	04	0.4375–28	**18.3** 0.72	**21.6** 0.85	**27.2** 1.07	**33.0** 1.30
10	10	06	0.5625–24	**21.6** 0.85	**22.4** 0.88	**27.9** 1.10	**34.5** 1.36
12	12	08	0.6875–24	**24.9** 0.98	**23.1** 0.91	**28.7** 1.13	**36.3** 1.43
14	14	10	0.8125–20	**28.2** 1.11	**23.4** 0.92	**29.0** 1.14	**37.6** 1.48
16	16	12	0.9375–20	**31.2** 1.23	**24.1** 0.95	**29.7** 1.17	**38.9** 1.53
18	18	13	1.0625–18	**34.5** 1.36	**24.4** 0.96	**30.0** 1.18	**40.4** 1.59
20	20	15	1.1875–18	**37.6** 1.48	**25.1** 0.99	**30.7** 1.21	**42.2** 1.66
22	22	16	1.3125–18	**40.6** 1.60	**25.7** 1.01	**31.5** 1.24	**43.7** 1.72
24	24	18	1.4375–18	**43.2** 1.70	**26.2** 1.03	**31.8** 1.25	**45.0** 1.77

1. All entry sizes are shown in Table II. Maximum entry sizes are as shown in Table I. For larger entry sizes than the maximum, a Type II adapter may be supplied. See CH00-0250-016 for further details.
2. Adapter mates to: MIL-C-26482 Series I, MS3110, MS3116, MS3120 and MS3126 Class E and F Connectors.

Table II

Entry Size	Ø Z +0.25/-0.50 [+0.010/-0.020]	Ø S ±0.51 [±0.020]	Ø Y ±0.38 [±0.015]	E Max.
03	**4.75** 0.188	**7.92** 0.312	**11.10** 0.438	**19.0** 0.75
04	**6.35** 0.250	**9.52** 0.375	**12.70** 0.500	**19.8** 0.78
05	**7.92** 0.312	**11.12** 0.438	**14.30** 0.563	**20.1** 0.79
06	**9.52** 0.375	**12.70** 0.500	**15.88** 0.625	**21.1** 0.83
07	**11.12** 0.438	**14.30** 0.562	**17.50** 0.689	**21.6** 0.85
08	**12.70** 0.500	**15.88** 0.625	**19.05** 0.750	**22.6** 0.89
09	**14.30** 0.562	**17.50** 0.688	**20.65** 0.813	**23.6** 0.93
10	**15.88** 0.625	**19.05** 0.750	**22.23** 0.875	**24.4** 0.96
11	**17.50** 0.688	**20.65** 0.812	**23.80** 0.938	**24.9** 0.98
12	**19.05** 0.750	**22.23** 0.875	**25.40** 1.000	**25.9** 1.02
13	**20.65** 0.812	**23.83** 0.938	**27.00** 1.063	**26.7** 1.05
14	**22.23** 0.875	**25.40** 1.000	**30.16** 1.189	**27.4** 1.08

Table II (Continued)

Entry Size	Ø Z +0.25/-0.50 [+0.010/-0.020]	Ø S ±0.51 [±0.020]	Ø Y ±0.38 [±0.015]	E Max.
15	**23.83** .0938	**27.00** 1.062	**31.75** 1.250	**28.2** 1.11
16	**25.40** 1.000	**28.58** 1.125	**33.34** 1.313	**29.0** 1.14
18	**28.58** 1.125	**31.75** 1.250	**36.51** 1.438	**30.5** 1.20
20	**31.75** 1.250	**34.90** 1.375	**39.69** 1.563	N/A
22	**34.90** 1.375	**38.10** 1.500	**42.86** 1.688	N/A
24	**38.10** 1.500	**41.28** 1.625	**46.83** 1.844	N/A
26	**41.28** 1.625	**44.45** 1.750	**49.61** 1.953	N/A
28	**44.45** 1.750	**47.63** 1.875	**52.78** 2.078	N/A
30	**47.65** 1.875	**50.80** 2.000	**56.36** 2.219	N/A
32	**50.80** 2.000	**54.00** 2.125	**59.53** 2.344	N/A
34	**54.00** 2.125	**57.15** 2.250	**62.71** 2.469	N/A

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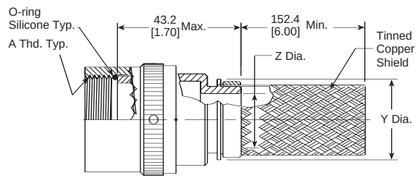
Code 32 MIL-C-22992

Braided Adapters



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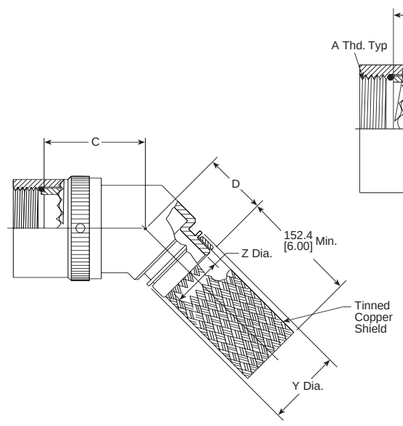

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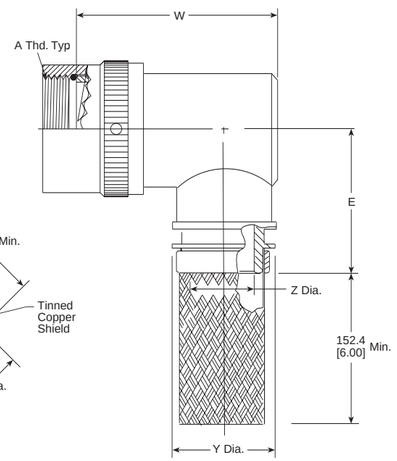

212M5XX-XXXXX

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UK: 44-208-420-8341

Code 32 MIL-C-22992 (Continued)

Braided Adapters
(continued)

Table of Dimensions

Order No.	Shell Size	Max. Entry Size, Type 1*	A Left Hand Thd. Class 2B	Dimensions		
				C Max.	D Max.	E Max
12	12	08	.750-20 UNEF	29.0 [1.14]	25.4 [1.00]	33.5 [1.32]
14	14	10	.875-20 UNEF	29.7 [1.17]	25.9 [1.02]	35.3 [1.39]
16	16	12	1.000-20 UNEF	30.0 [1.18]	26.2 [1.03]	37.1 [1.46]
18	18	14	1.125-18 UNEF	30.7 [1.21]	26.9 [1.06]	38.6 [1.52]
20	20	16	1.250-18 UNEF	31.2 [1.23]	27.7 [1.09]	40.1 [1.58]
22	22	18	1.375-18 UNEF	32.0 [1.26]	28.2 [1.11]	41.7 [1.64]
24	24	22	1.625-18 UNEF	33.5 [1.32]	30.0 [1.18]	46.5 [1.83]
28	28	24	1.875-16 UN	34.8 [1.37]	31.2 [1.23]	49.8 [1.96]
32	32	28	2.062-16 UNS	36.3 [1.43]	32.5 [1.28]	52.8 [2.08]
36	36	28	2.312-16 UNS	37.6 [1.48]	33.8 [1.33]	56.1 [2.21]
40	40	28	2.625-16 UN	38.9 [1.53]	35.3 [1.39]	58.9 [2.32]

*For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied. Contact Tyco Electronics for information.

Entry Size Dimensions

Entry Size	Dimensions		
	Z ± 0.20 (± 0.51)	Y Dia. Min.	W Max.
03	4.75 [.187]	9.98 [.393]	39.6 [1.56]
04	6.35 [.250]	11.58 [.456]	39.6 [1.56]
05	7.92 [.312]	13.08 [.515]	42.9 [1.69]
06	9.53 [.375]	14.76 [.581]	42.9 [1.69]
07	11.13 [.438]	16.33 [.643]	46.0 [1.81]
08	12.70 [.500]	17.91 [.705]	—
09	14.27 [.562]	17.91 [.705]	49.3 [1.94]
10	15.88 [.625]	21.11 [.831]	49.3 [1.94]
11	17.48 [.688]	22.68 [.893]	52.3 [2.06]
12	19.05 [.750]	24.21 [.953]	52.3 [2.06]
13	20.62 [.812]	24.21 [.953]	55.6 [2.19]
14	22.23 [.875]	27.46 [1.081]	55.6 [2.19]
15	23.83 [.938]	29.03 [1.143]	59.9 [2.36]
16	25.40 [1.000]	30.61 [1.205]	59.9 [2.36]
18	28.58 [1.125]	35.08 [1.381]	69.6 [2.74]
20	31.75 [1.250]	38.25 [1.506]	72.6 [2.86]
22	34.93 [1.375]	41.43 [1.631]	75.9 [2.99]
24	38.10 [1.500]	44.60 [1.756]	79.0 [3.11]
28	44.45 [1.750]	50.90 [2.004]	85.3 [3.36]

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

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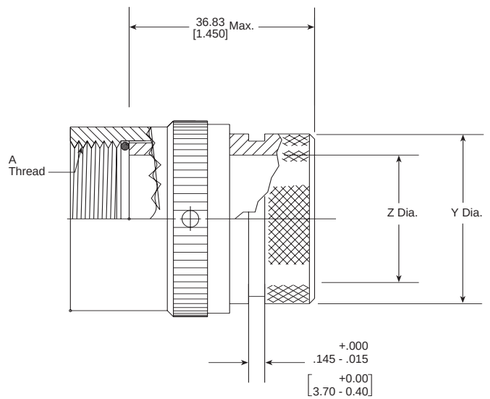
Code 32 MIL-C-22992 (Continued)

Spin-Coupling Adapters



204M3XX-XXX

Table of Dimensions

Base Part Number	Shell Size	A L.H. Thread Class 2B	Dimensions Y ± .020 (±0.51)	Dimensions Z Min.
12	12	.750-20 UNEF	20.24 [.797]	12.47 [.491]
14	14	.875-20 UNEF	23.44 [.923]	14.35 [.565]
16	16	1.000-20 UNEF	26.42 [1.040]	17.53 [.690]
18	18	1.125-18 UNEF	31.17 [1.227]	18.19 [.716]
20	20	1.250-18 UNEF	34.49 [1.358]	21.72 [.855]
22	22	1.375-18 UNEF	37.21 [1.465]	25.02 [.985]
24	24	1.625-18 UNEF	42.82 [1.686]	30.48 [1.200]
28	28	1.875-16 UN	50.06 [1.971]	36.58 [1.440]
32	32	2.062-16 UNS	55.35 [2.179]	40.77 [1.605]
36	36	2.312-16 UNEF	61.01 [2.402]	52.96 [2.085]
40	40	2.625-16 UNS	67.46 [2.656]	57.15 [2.250]
44	44	2.875-16 UNS	70.66 [2.782]	62.46 [2.549]

*For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied.
Contact Tyco Electronics for information.

Molded Part Size Selection Guide (Spin-Coupling)

Order No.	Standard K Parts Straight Part No.	Standard K Parts 90° Part No.	Standard K Parts Cable OD (Min.)	Low-profile D Parts Straight Part No.	Low-profile D Parts 90° Part No.	Low-profile D Parts Cable OD (Min.)
12	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
14, 16	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
18, 20	202K163	222K163	9.9 [0.39]	202D253	222D253	10.5 [0.41]
22, 24	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]
26, 32, 36	202K185	222K185	16.8 [0.66]	—	—	—

Uniboot Parts

Order No.	Part No.	Cable OD (Min.)
12	202C632	12.7 [0.50]
14, 16	202C642	17.5 [0.69]
18, 20, 22, 24	202C653	22.4 [0.88]

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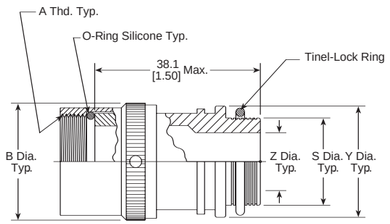
UK: 44-208-420-8341

Code 32 MIL-C-22992 (Continued)

Tinel-Lock Adapters



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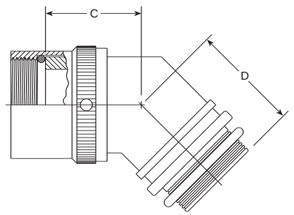

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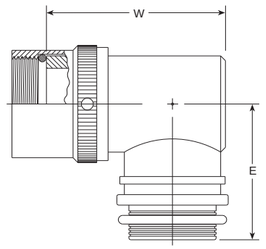

TXR32XX90-XXXXXX

Order No.	Shell Size	Max. Entry Size Type I	Dimensions							
			A Left Hand Thd Class 2B	C Max.	D Max.	E Max.	Z +.010 -.020	S Dia.	Y ± .015 (± 0.38)	W Max.
12	12	08	.750-20 UNEF	29.0 [1.14]	25.4 [1.00]	33.5 [1.32]	19.05 [.750]	22.28 [.877] 22.02 [.867]	26.67 [1.050]	52.3 [2.06]
14	14	10	.875-20 UNEF	29.7 [1.17]	25.9 [1.02]	35.3 [1.39]	22.23 [.875]	25.46 [1.002] 25.17 [.991]	29.84 [1.175]	55.6 [2.19]
16	16	12	1.000-20 UNEF	30.0 [1.18]	26.2 [1.03]	37.1 [1.46]	25.40 [1.000]	28.63 [1.127] 28.34 [1.116]	33.02 [1.300]	59.01 [2.36]
18	18	14	1.125-18 UNEF	30.7 [1.21]	26.9 [1.06]	38.6 [1.52]	28.57 [1.125]	31.81 [1.252] 31.52 [1.241]	36.19 [1.425]	69.6 [2.74]
20	20	16	1.250-18 UNEF	31.2 [1.23]	27.7 [1.09]	40.1 [1.58]	31.75 [1.250]	34.98 [1.377] 34.69 [1.366]	39..37 [1.550]	72.6 [2.86]
22	22	18	1.375-18 UNEF	32.0 [1.26]	28.2 [1.11]	41.7 [1.64]	34.93 [1.375]	38.15 [1.502] 37.79 [1.488]	42.55 [1.675]	75.9 [2.99]
24	24	22	1.625-18 UNEF	33.5 [1.32]	30.0 [1.18]	46.5 [1.83]	38.10 [1.500]	41.33 [1.627] 40.97 [1.613]	45.72 [1.800]	79.0 [3.11]
28	28	24	1.875-16 UN	34.8 [1.37]	31.2 [1.23]	49.8 [1.96]	—	—	—	—
32	32	24	2.062-16 UNS	36.3 [1.43]	32.5 [1.28]	52.8 [2.08]	—	—	—	—
36	36	24	2.312-16 UNS	37.6 [1.48]	33.8 [1.33]	56.1 [2.21]	—	—	—	—
40	40	24	2.625-16 UN	38.9 [1.53]	35.3 [1.39]	58.9 [2.32]	—	—	—	—

**For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied. Contact Tyco Electronics for information.

Catalog 1308940
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UK: 44-208-420-8341

Code 32 MIL-C-22992 (Continued)

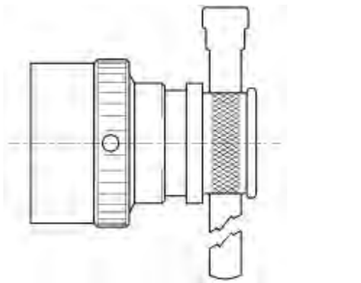
CRES-Lock Adapters (USA)
BND Adapters (Europe)

Code 32 Band Strap Adapter

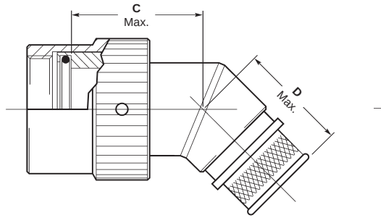
Notes:

1. This product is designed to terminate a braided cable shield by means of a band strap and a heat shrinkable lipped boot to a connector.
2. See CH00-0250-016 for ordering information, modifications and additional dimensions.
3. See drawing BND-XX25S for band strap dimensions and information.
4. Adapter to be permanently marked with code identification number and full part number (e.g. 06090-BND32AB00-1812). Band strap shall bear no part marking.
5. All entry sizes are shown in Table II. Maximum entry sizes are as shown in Table I. For larger entry sizes than the maximum, a Type II adapter may be supplied. See CH00-0250-016 for further details.
6. Adapter mates to: MIL-C-22992, Class C and R, MS17343, 44, 45 and 47 Connectors.
7. Anti-rotational set screw, 3 threaded holes 120° ± 5° apart, single mating set screw supplied: AN565DC4H2. Not required for Type II adapters.

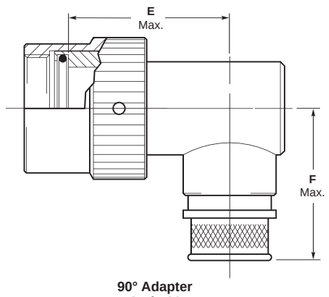
For additional codes available, contact Tyco Electronics.



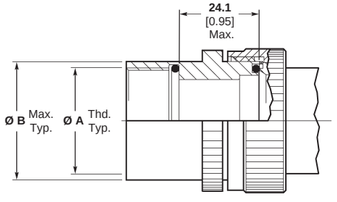
Straight Adapter
Code 00



45° Adapter
Code 45



90° Adapter
Code 90



Type II Modification
(See Note 5)

Catalog 1308940
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Japan: 81-44-844-8013
UK: 44-208-420-8341

Code 32 MIL-C-22992 (Continued)

CRES-Lock Adapters (USA) BND Adapters (Europe) (continued)

Code 32 Band Strap Adapter (Continued)

Table I

Order Number	Shell Size[2]	Entry Size Max. Type I[1]	Ø A Unified Thread Class 2B	Ø B Max.	C Max.	D Max.	F Max.
12	12	08	0.7500–20 UNEF	**27.2** 1.07	**29.0** 1.14	**28.4** 1.12	**36.6** 1.44
14	14	10	0.8750–20 UNEF	**30.2** 1.19	**29.7** 1.17	**28.9** 1.14	**38.4** 1.51
16	16	12	1.0000–20 UNEF	**33.5** 1.32	**30.0** 1.18	**29.2** 1.15	**40.1** 1.58
18	18	14	1.1250–18 UNEF	**36.6** 1.44	**30.7** 1.21	**30.0** 1.18	**41.7** 1.64
20	20	16	1.2500–18 UNEF	**39.9** 1.57	**31.2** 1.23	**30.7** 1.21	**43.2** 1.70
22	22	18	1.3750–18 UNEF	**42.9** 1.69	**32.0** 1.26	**31.2** 1.23	**44.7** 1.76
24	24	22	1.6250–18 UNEF	**52.6** 2.07	**33.5** 1.32	**33.0** 1.30	**49.5** 1.95
28	28	26	1.8750–16 UN	**58.9** 2.32	**34.8** 1.37	**34.3** 1.35	**52.8** 2.08
32	32	30	2.0625–16 UNS	**65.3** 2.57	**36.3** 1.43	**35.6** 1.40	**55.9** 2.20
36	36	34	2.3125–16 UNS	**71.6** 2.82	**37.6** 1.48	**36.8** 1.45	**59.2** 2.33
40	40	34	2.6250–16 UN	**78.0** 3.07	**38.9** 1.53	**38.4** 1.51	**62.0** 2.44

1. All entry sizes are shown in Table II. Maximum entry sizes are as shown in Table I. For larger entry sizes than the maximum, a Type II adapter may be supplied. See CH00-0250-016 for further details.
2. Adapter mates to: MIL-C-22992, Class C and R, MS17343, 44, 45 and 47 Connectors.

Table II

Entry Size	Ø Z +0.25/-0.50 [+0.010/-0.020]	Ø S ±0.51 [±0.020]	Ø Y ±0.38 [±0.015]	E Max.
03	**4.75** 0.188	**7.92** 0.312	**11.10** 0.438	**28.3** 1.12
04	**6.35** 0.250	**9.52** 0.375	**12.70** 0.500	**29.3** 1.15
05	**7.92** 0.312	**11.12** 0.438	**14.30** 0.563	**30.0** 1.18
06	**9.52** 0.375	**12.70** 0.500	**15.88** 0.625	**30.8** 1.21
07	**11.12** 0.438	**14.30** 0.562	**17.50** 0.689	**31.5** 1.24
08	**12.70** 0.500	**15.88** 0.625	**19.05** 0.750	**32.3** 1.27
09	**14.30** 0.562	**17.50** 0.688	**20.65** 0.813	**33.3** 1.31
10	**15.88** 0.625	**19.05** 0.750	**22.23** 0.875	**34.0** 1.34
11	**17.50** 0.688	**20.65** 0.812	**23.80** 0.938	**35.0** 1.38
12	**19.05** 0.750	**22.23** 0.875	**25.40** 1.000	**35.8** 1.41
13	**20.65** 0.812	**23.83** 0.938	**27.00** 1.063	**36.0** 1.42
14	**22.23** 0.875	**25.40** 1.000	**30.16** 1.189	**37.5** 1.48

Table II (Continued)

Entry Size	Ø Z +0.25/-0.50 [+0.010/-0.020]	Ø S ±0.51 [±0.020]	Ø Y ±0.38 [±0.015]	E Max.
15	**23.83** .0938	**27.00** 1.062	**31.75** 1.250	**37.8** 1.49
16	**25.40** 1.000	**28.58** 1.125	**33.34** 1.313	**38.3** 1.51
18	**28.58** 1.125	**31.75** 1.250	**36.51** 1.438	**39.8** 1.57
20	**31.75** 1.250	**34.90** 1.375	**39.69** 1.563	**41.3** 1.63
22	**34.90** 1.375	**38.10** 1.500	**42.86** 1.688	**43.0** 1.69
24	**38.10** 1.500	**41.28** 1.625	**46.83** 1.844	**44.5** 1.75
26	**41.28** 1.625	**44.45** 1.750	**49.61** 1.953	**46.3** 1.82
28	**44.45** 1.750	**47.63** 1.875	**52.78** 2.078	**48.3** 1.90
30	**47.65** 1.875	**50.80** 2.000	**56.36** 2.219	**50.0** 1.97
32	**50.80** 2.000	**54.00** 2.125	**59.53** 2.344	**51.5** 2.03
34	**54.00** 2.125	**57.15** 2.250	**62.71** 2.469	**53.3** 2.10

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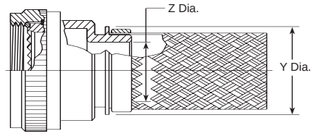
Code 40 MIL-C-38999 Series III and IV

Braided Adapters



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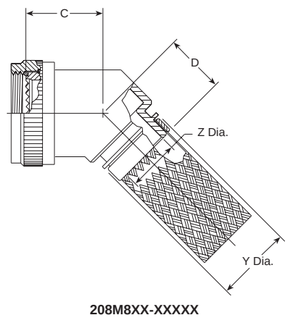

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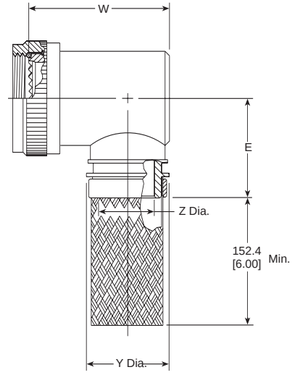

208M9XX-XXXXX

Table of Dimensions

Order No.	Shell Size Commercial	Military	Max. Entry* Size Type 1	Thread	Dimensions		
					C Max.	D Max.	E Max.
08	9	A	04	M12 x 1.0	20.8 [0.82]	22.6 [0.89]	29.2 [1.15]
10	11	B	07	M15 x 1.0	21.3 [0.84]	23.4 [0.92]	30.7 [1.21]
12	13	C	09	M18 x 1.0	22.1 [0.87]	24.1 [0.95]	32.5 [1.28]
14	15	D	10	M2 x 1.0	22.6 [0.89]	24.1 [0.95]	34.0 [1.34]
16	17	E	12	M25 x 1.0	23.4 [0.92]	24.9 [0.98]	35.6 [1.40]
18	19	F	14	M28 x 1.0	24.1 [0.95]	25.7 [1.01]	37.1 [1.46]
20	21	G	16	M31 x 1.0	24.6 [0.97]	26.4 [1.04]	38.9 [1.53]
22	23	H	18	M34 x 1.0	25.4 [1.00]	27.2 [1.07]	40.4 [1.59]
24	25	J	20	M37 x 1.0	25.9 [1.02]	27.2 [1.07]	42.4 [1.67]

*For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied. Contact Tyco Electronics for information.

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Code 40 MIL-C-38999 Series III and IV (Continued)

Braided Adapters
(continued)

Entry Size Dimensions

Entry Size	Dimensions		
	Z +0.25–0.5	Y Dia.	W Max.
04	6.35 [0.25]	13.97 [0.55]	31.2 [1.23]
05	7.92 [0.31]	15.54 [0.61]	32.8 [1.29]
06	9.52 [0.37]	17.14 [0.67]	34.3 [1.35]
07	11.09 [0.44]	18.71 [0.74]	36.1 [1.42]
08	12.7 [0.50]	20.32 [0.80]	37.6 [1.48]
10	15.87 [0.62]	23.49 [0.92]	40.6 [1.60]
12	19.05 [0.75]	26.67 [1.05]	43.9 [1.73]
14	22.23 [0.88]	29.84 [1.17]	47.0 [1.85]
16	25.4 [1.00]	33.02 [1.30]	50.8 [2.00]
18	28.57 [1.12]	36.19 [1.42]	54.1 [2.13]
20	31.75 [1.25]	39.37 [1.55]	57.21 [2.25]

Molded Part Selection Guide (Braided)

Tinel-Lock Entry Size	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
04	202K232	—	3.3 [0.1]	—	—	—
04	202W232	—	4.3 [0.2]	—	—	—
04	202K121	222K121	5.6 [0.2]	202D211	222D211	6.4 [0.3]
05, 06	202K132	222K132	5.9 [0.2]	202D221	222D221	7.4 [0.3]
07, 08	202K142	222K142	7.1 [0.3]	202D232	222D232	8.4 [0.3]
10, 12	202K153	222K152	8.4 [0.3]	202D242	222D242	9.7 [0.4]
14, 16	202K163	222K163	9.9 [0.4]	202D253	222D253	10.5 [0.4]
18, 20, 22	202K174	222K174	15.7 [0.6]	202D263	222D263	12.2 [0.5]
24	202K185	222K185	16.8 [0.7]	—	—	—

Uniboot Parts

Tinel-Lock Entry Size	Part No.	Cable OD (Min.)
04	202C611	4.8 [0.19]
05, 06, 07	202C621	8.1 [0.32]
08, 10, 12	202C632	12.7 [0.50]
12, 14, 16	202C642	17.5 [0.69]
16, 18, 20, 22	202C653	22.4 [0.88]
24	202C663	22.9 [0.90]

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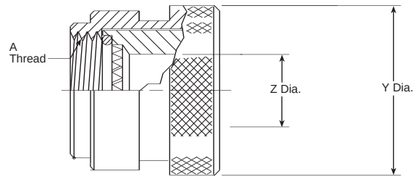
Japan: 81-44-844-8013
UK: 44-208-420-8341

Code 40 MIL-C-38999 Series III and IV (Continued)

Solid Adapters



209M3XX-XXX

Table of Dimensions

Order No.	Shell Size Commercial	Military	A Thread	Dimensions	
				Y +.000- .030 (+0.00) (–0.76)	Z Dia. Min.
08	9	A	M12 x 1.0	18.26 [.719]	6.35 [.250]
10	11	B	M15 x 1.0	21.44 [.844]	9.52 [.375]
12	13	C	M18 x 1.0	24.61 [.969]	12.70 [.500]
14	15	D	M22 x 1.0	30.91 [1.217]	15.88 [.625]
16	17	E	M25 x 1.0	34.40 [1.354]	19.05 [.750]
18	19	F	M28 x 1.0	37.50 [1.476]	20.62 [.812]
20	21	G	M31 x 1.0	38.89 [1.531]	23.80 [.937]
22	23	H	M34 x 1.0	42.06 [1.656]	26.97 [1.062]
24	25	J	M37 x 1.0	45.24 [1.781]	30.18 [1.188]

Molded Part Selection Guide (Solid)

Order No.	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
08	202K132	222K132	5.9 [0.23]	202D221	222D221	7.4 [0.29]
10	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
12, 14	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
16, 18	202K163	222K163	9.9 [0.39]	202D253	222D253	10.5 [0.41]
20, 22, 24	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]

Uniboot Parts

Order No.	Part No.	Cable OD (Min.)
08	202C621	8.1 [0.32]
10	202C632	12.7 [0.50]
12, 14	202C642	17.5 [0.69]
16, 18, 20, 22	202C653	22.4 [0.88]

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

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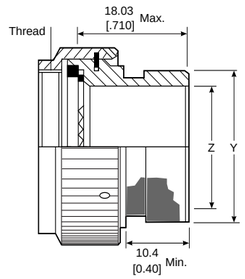
Japan: 81-44-844-8013
UK: 44-208-420-8341

Code 40 MIL-C-38999 Series III and IV (Continued)

Spin-Coupling Adapters



209M4XX-XXX

Table of Dimensions

Order No.	Shell Size Commercial	Military	Thread	Dimensions	
				Y Dia. Max.	Z Dia. Max.
08	9	A	M12 x 1.0	13.54 [0.53]	6.35 [0.25]
10	11	B	M15 x 1.0	15.37 [0.61]	9.52 [0.37]
12	13	C	M18 x 1.0	19.66 [0.77]	12.7 [0.50]
14	15	D	M22 x 1.0	21.29 [0.84]	15.75 [0.62]
16	17	E	M25 x 1.0	24.46 [0.96]	18.92 [0.74]
18	19	F	M28 x 1.0	26.47 [1.04]	20.62 [0.81]
20	21	G	M31 x 1.0	30.91 [1.22]	23.8 [0.94]
22	23	H	M34 x 1.0	34.42 [1.36]	26.97 [1.06]
24	25	J	M37 x 1.0	36.65 [1.44]	29.85 [1.18]

Molded Part Selection Guide (Spin-Coupling)

Order No.	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
03, 08	202W232	—	4.3 [0.19]	—	—	—
03, 08	202K121	222K121	5.6 [0.22]	202D211	222D211	6.4 [0.25]
10, 11	202K132	222K132	5.9 [0.23]	202D221	222D221	7.4 [0.29]
12, 14	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
16, 18	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
20, 22	202K163	222K163	9.9 [0.39]	202D253	222D253	10.5 [0.41]
24, 28	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]
32, 36	202K185	222K185	16.8 [0.66]	—	—	—

Uniboot Parts

Order No.	Part No.	Cable OD (Min.)
03, 08	202C611	4.8 [0.19]
10, 11, 12	202C621	8.1 [0.32]
14, 16	202C632	12.7 [0.50]
18, 20	202C642	17.5 [0.69]
22, 24	202C653	22.4 [0.88]

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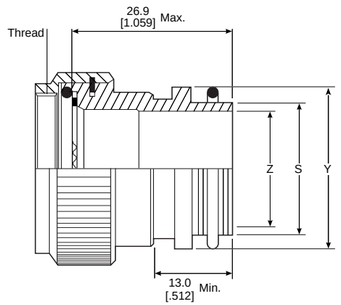
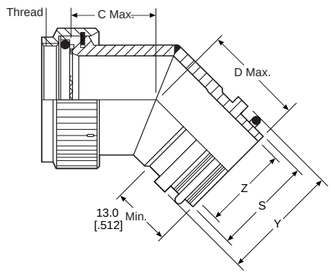
Code 40 MIL-C-38999 Series III and IV (Continued)

Tinel-Lock Adapters



TXR40XX00-XXXXXX



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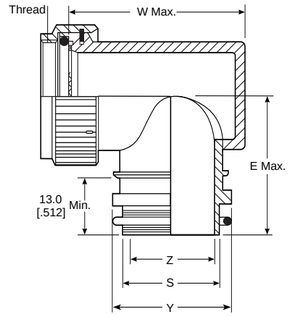

TXR40XX90-XXXXXX

Table of Dimensions

Order No.	Shell Size Commercial	Military	Max. Entry* Size Type 1	Thread	Dimensions		
					C Max.	D Max.	E Max.
08	9	A	04	M12 x 1.0	20.8 [0.82]	22.6 [0.89]	27.9 [1.10]
10	11	B	07	M15 x 1.0	21.3 [0.84]	23.4 [0.92]	30.5 [1.20]
12	13	C	08	M18 x 1.0	22.1 [0.87]	24.1 [0.95]	32.0 [1.26]
14	15	D	10	M2 x 1.0	22.6 [0.89]	24.1 [0.95]	34.0 [1.34]
16	17	E	12	M25 x 1.0	23.4 [0.92]	24.9 [0.98]	35.6 [1.40]
18	19	F	14	M28 x 1.0	24.1 [0.95]	25.7 [1.01]	36.8 [1.45]
20	21	G	16	M31 x 1.0	24.6 [0.97]	26.4 [1.04]	38.4 [1.51]
22	23	H	18	M34 x 1.0	25.4 [1.00]	27.2 [1.07]	39.9 [1.57]
24	25	J	20	M37 x 1.0	25.9 [1.02]	27.2 [1.07]	42.4 [1.67]

*For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied. Contact Tyco Electronics for information.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Code 40 MIL-C-38999 Series III and IV (Continued)

Tinel-Lock Adapters
(continued)

Entry Size Dimensions

Entry Size	Dimensions			
	Z +0.25–0.5	S Diameter (Min.–Max.)	Y Dia.	W Max.
04	6.35 [0.25]	9.39–9.56 [0.37–0.38]	13.97 [0.55]	31.2 [1.23]
05	7.92 [0.31]	10.97–11.13 [0.43–0.44]	15.54 [0.61]	32.8 [1.29]
06	9.52 [0.37]	12.57–12.73 [0.49–0.50]	17.14 [0.67]	34.3 [1.35]
07	11.09 [0.44]	14.12–14.31 [0.55–0.56]	18.71 [0.74]	36.1 [1.42]
08	12.7 [0.50]	15.72–15.91 [0.62–0.63]	20.32 [0.80]	37.6 [1.48]
10	15.87 [0.62]	18.84–19.11 [0.74–0.75]	23.49 [0.92]	40.6 [1.60]
12	19.05 [0.75]	22.02–22.28 [0.87–0.88]	26.67 [1.05]	43.9 [1.73]
14	22.23 [0.88]	25.17–25.46 [0.99–1.00]	29.84 [1.17]	47.0 [1.85]
16	25.4 [1.00]	28.34–28.63 [1.12–1.13]	33.02 [1.30]	50.8 [2.00]
18	28.57 [1.12]	31.52–31.81 [1.24–1.25]	36.19 [1.42]	54.1 [2.13]
20	31.75 [1.25]	34.69–34.98 [1.37–1.38]	39.37 [1.55]	57.21 [2.25]

Molded Part Selection Guide (Tinel)

Tinel-Lock Entry Size	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
04	202K232	—	3.3 [0.1]	—	—	—
04	202W232	—	4.3 [0.2]	—	—	—
04	202K121	222K121	5.6 [0.2]	202D211	222D211	6.4 [0.3]
05, 06	202K132	222K132	5.9 [0.2]	202D221	222D221	7.4 [0.3]
07, 08	202K142	222K142	7.1 [0.3]	202D232	222D232	8.4 [0.3]
10, 12	202K153	222K152	8.4 [0.3]	202D242	222D242	9.7 [0.4]
14, 16	202K163	222K163	9.9 [0.4]	202D253	222D253	10.5 [0.4]
18, 20, 22	202K174	222K174	15.7 [0.6]	202D263	222D263	12.2 [0.5]
24	202K185	222K185	16.8 [0.7]	—	—	—

Uniboot Parts

Tinel-Lock Entry Size	Part No.	Cable OD (Min.)
04	202C611	4.8 [0.19]
05, 06, 07	202C621	8.1 [0.32]
08, 10, 12	202C632	12.7 [0.50]
12, 14, 16	202C642	17.5 [0.69]
16, 18, 20, 22	202C653	22.4 [0.88]
24	202C663	22.9 [0.90]

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

Code 40 MIL-C-38999 Series III and IV (Continued)

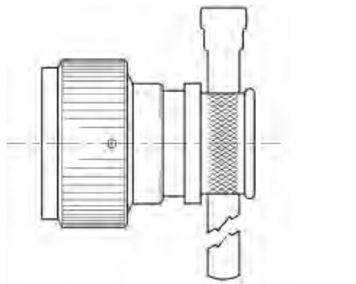
CRES-Lock Adapters (USA)
BND Adapters (Europe)

Code 40 Band Strap Adapter

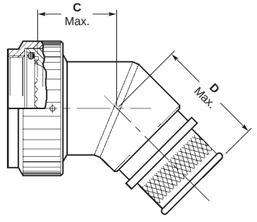
Notes:

1. This product is designed to terminate a braided cable shield by means of a band strap and a heat shrinkable lipped boot to a connector.
2. See CH00-0250-016 for ordering information, modifications and additional dimensions.
3. See drawing BND-XX25S for band strap dimensions and information.
4. Adapter to be permanently marked with code identification number and full part number (e.g. 06090-BND40AB00-1814). Band strap shall bear no part marking.
5. All entry sizes are shown in Table II. Maximum entry sizes are as shown in Table I. For larger entry sizes than the maximum, a Type II adapter may be supplied. See CH00-0250-016 for further details.
6. Adapter mates to: MIL-C-38999 Series III and IV, Class C, F, K and W, D38999/20, /24, /26, /40, /46 and /47 Connectors. When so mated it shall provide a water-tight seal meeting the requirements of MIL-C-85049, paragraph 3.5.7.
7. Coupling nut shall have 3 lock wire holes 120° apart.

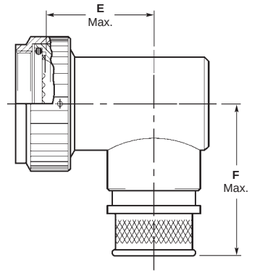
For additional codes available, contact Tyco Electronics.



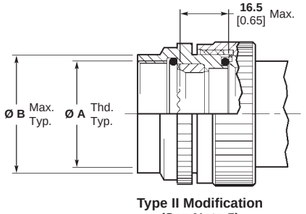
Straight Adapter
Code 00



45° Adapter
Code 45



90° Adapter
Code 90



Type II Modification
(See Note 5)

Catalog 1308940
Revised 8-06

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Code 40 MIL-C-38999 Series III and IV (Continued)

CRES-Lock Adapters (USA)
BND Adapters (Europe)
(continued)

Code 40 Band Strap Adapter (Continued)

Table I

Order Number	Shell Size[2] Com.	Shell Size[2] MIL	Entry Size Max. Type I[1]	Ø A Metric Thread Class 2B	Ø B Max.	Ø B Max.[3]	C Max.	D Max.	F Max.
8	9	A	04	M12 x 1.0	**19.1** 0.75	**24.6** 0.97	**20.8** 0.82	**26.7** 1.05	**32.0** 1.26
10	11	B	07	M15 x 1.0	**21.6** 0.85	**27.0** 1.06	**21.3** 0.84	**27.4** 1.08	**34.5** 1.36
12	13	C	09	M18 x 1.0	**25.4** 1.00	**31.0** 1.22	**22.1** 0.87	**28.2** 1.11	**36.1** 1.42
14	15	D	10	M22 x 1.0	**29.2** 1.15	**35.8** 1.41	**22.6** 0.89	**28.2** 1.11	**38.1** 1.50
16	17	E	12	M25 x 1.0	**31.8** 1.25	**37.3** 1.47	**23.4** 0.92	**29.0** 1.14	**39.6** 1.56
18	19	F	14	M28 x 1.0	**35.6** 1.40	**40.6** 1.60	**24.1** 0.95	**29.7** 1.17	**40.9** 1.61
20	21	G	16	M31 x 1.0	**38.1** 1.50	**44.5** 1.75	**24.6** 0.97	**30.5** 1.20	**42.4** 1.67
22	23	H	18	M34 x 1.0	**41.9** 1.65	**47.0** 1.85	**25.4** 1.00	**31.3** 1.23	**43.9** 1.73
24	25	J	20	M37 x 1.0	**44.5** 1.75	**51.6** 2.03	**25.9** 1.02	**31.3** 1.23	**46.5** 1.83

1. All entry sizes are shown in Table II. Maximum entry sizes are as shown in Table I. For larger entry sizes than the maximum, a Type II adapter may be supplied. See CH00-0250-016 for further details.
2. Adapter mates to: MIL-C-38999 Series III and IV, Class C, F, K and W, D38999/20, /24, /26, /40, /46 and /47 Connectors. When so mated it shall provide a water-tight seal meeting the requirements of MIL-C-85049, paragraph 3.5.7.
3. These dimensions apply if a self-locking coupling nut is used, modification code "S".

Table II

Entry Size	Ø Z +0.25/-0.50 [+0.010/-0.020]	Ø S ±0.51 [±0.020]	Ø Y ±0.38 [±0.015]	E Max.
03	**4.75** 0.188	**7.92** 0.312	**11.10** 0.438	**15.8** 0.62
04	**6.35** 0.250	**9.52** 0.375	**12.70** 0.500	**16.3** 0.64
05	**7.92** 0.312	**11.12** 0.438	**14.30** 0.563	**16.8** 0.66
06	**9.52** 0.375	**12.70** 0.500	**15.88** 0.625	**17.8** 0.70
07	**11.12** 0.438	**14.30** 0.562	**17.50** 0.689	**18.3** 0.72
08	**12.70** 0.500	**15.88** 0.625	**19.05** 0.750	**19.8** 0.78
09	**14.30** 0.562	**17.50** 0.688	**20.65** 0.813	**21.3** 0.84
10	**15.88** 0.625	**19.05** 0.750	**22.23** 0.875	**22.4** 0.88
11	**17.50** 0.688	**20.65** 0.812	**23.80** 0.938	**22.9** 0.90
12	**19.05** 0.750	**22.23** 0.875	**25.40** 1.000	**23.4** 0.92
13	**20.65** 0.812	**23.83** 0.938	**27.00** 1.063	**24.4** 0.96
14	**22.23** 0.875	**25.40** 1.000	**30.16** 1.189	**25.4** 1.00

Table II (Continued)

Entry Size	Ø Z +0.25/-0.50 [+0.010/-0.020]	Ø S ±0.51 [±0.020]	Ø Y ±0.38 [±0.015]	E Max.
15	**23.83** .0938	**27.00** 1.062	**31.75** 1.250	**25.4** 1.00
16	**25.40** 1.000	**28.58** 1.125	**33.34** 1.313	**26.4** 1.04
18	**28.58** 1.125	**31.75** 1.250	**36.51** 1.438	**27.7** 1.09
20	**31.75** 1.250	**34.90** 1.375	**39.69** 1.563	**29.2** 1.15
22	**34.90** 1.375	**38.10** 1.500	**42.86** 1.688	N/A
24	**38.10** 1.500	**41.28** 1.625	**46.83** 1.844	N/A
26	**41.28** 1.625	**44.45** 1.750	**49.61** 1.953	N/A
28	**44.45** 1.750	**47.63** 1.875	**52.78** 2.078	N/A
30	**47.65** 1.875	**50.80** 2.000	**56.36** 2.219	N/A
32	**50.80** 2.000	**54.00** 2.125	**59.53** 2.344	N/A
34	**54.00** 2.125	**57.15** 2.250	**62.71** 2.469	N/A

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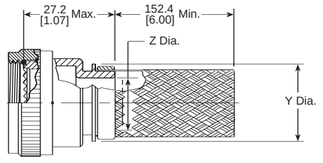
Code 41 MIL-C-38999 Series I and II

Braided Adapters



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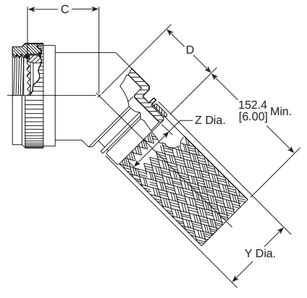

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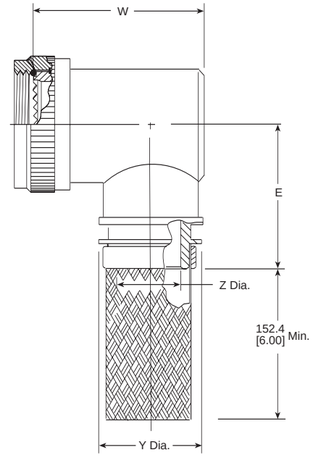

204M2XX-XXXXX

Table of Dimensions

Order No.	Shell Size		Max. Entry* Size Type 1	A Unified Thread Class 2B	Dimensions		
	Series I	Series II			C Max.	D Max.	E Max.
08	9	8	04	.438-28 UNEF	19.8 [0.78]	23.1 [0.91]	29.2 [1.15]
10	11	10	06	.562-24 UNEF	20.3 [0.80]	23.6 [0.93]	30.7 [1.21]
12	13	12	08	.688-24 UNEF	21.1 [0.83]	24.4 [0.96]	32.5 [1.28]
14	15	14	10	.812-20 UNEF	21.6 [0.85]	24.9 [0.98]	34.0 [1.34]
16	17	16	12	.938-20 UNEF	22.4 [0.88]	25.4 [1.00]	35.6 [1.40]
18	19	18	13	1.062-18 UNEF	22.9 [0.90]	26.2 [1.03]	37.1 [1.46]
20	21	20	15	1.188-18 UNEF	23.6 [0.93]	26.9 [1.06]	38.9 [1.53]
22	23	22	16	1.312-18 UNEF	24.4 [0.96]	27.4 [1.08]	40.4 [1.59]
24	25	24	18	1.438-18 UNEF	24.9 [0.98]	28.2 [1.11]	41.9 [1.65]

*For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied.
Contact Tyco Electronics for information.

Catalog 1308940
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UK: 44-208-420-8341

Code 41 MIL-C-38999 Series I and II (Continued)

Braided Adapters
(continued)

Entry Size Dimensions

Entry Size	Dimensions		
	Z ±0.020 (±0.51)	Y Dia. Min.	W Max.
03	4.75 [.187]	9.98 [.393]	27.2 [1.07]
04	6.35 [.250]	11.58 [.456]	27.2 [1.07]
05	7.92 [.312]	13.08 [.515]	28.7 [1.13]
06	9.53 [.375]	14.76 [.581]	30.2 [1.19]
07	11.13 [.438]	16.33 [.643]	31.8 [1.25]
08	12.70 [.500]	17.91 [.705]	33.5 [1.32]
09	14.27 [.562]	17.91 [.705]	36.6 [1.44]
10	15.88 [.625]	21.11 [.831]	36.6 [1.44]
11	17.48 [.688]	22.68 [.893]	39.9 [1.57]
12	19.05 [.750]	24.21 [.953]	39.9 [1.57]
13	20.62 [.812]	24.21 [.953]	42.9 [1.69]
14	22.23 [.875]	27.46 [1.081]	42.9 [1.69]
15	23.83 [.938]	29.03 [1.143]	46.2 [1.82]
16	25.40 [1.000]	30.61 [1.205]	46.2 [1.82]
18	28.58 [1.125]	35.08 [1.381]	49.3 [1.94]
20	31.75 [1.250]	38.25 [1.506]	—
22	34.93 [1.375]	41.43 [1.631]	—
24	38.10 [1.500]	44.60 [1.756]	—
28	44.45 [1.750]	50.90 [2.004]	—

Molded Part Selection Guide (Braided)

Tinel-Lock Entry Size	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
04	202K232	—	3.3 [0.1]	—	—	—
04	202W232	—	4.3 [0.2]	—	—	—
04	202K121	222K121	5.6 [0.2]	202D211	222D211	6.4 [0.3]
05, 06	202K132	222K132	5.9 [0.2]	202D221	222D221	7.4 [0.3]
07, 08	202K142	222K142	7.1 [0.3]	202D232	222D232	8.4 [0.3]
10, 12	202K153	222K152	8.4 [0.3]	202D242	222D242	9.7 [0.4]
14, 16	202K163	222K163	9.9 [0.4]	202D253	222D253	10.5 [0.4]
18, 20, 22	202K174	222K174	15.7 [0.6]	202D263	222D263	12.2 [0.5]
24	202K185	222K185	16.8 [0.7]	—	—	—

Uniboot Parts

Order No.	Part No.	Cable OD (Min.)
04	202C611	4.8 [0.19]
05, 06, 07	202C621	8.1 [0.32]
08, 10, 12	202C632	12.7 [0.50]
12, 14, 16	202C642	17.5 [0.69]
16, 18, 20, 22	202C653	22.4 [0.88]
24	202C663	22.9 [0.90]

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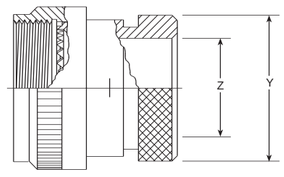
Code 41 MIL-C-38999 Series I and II (Continued)

Solid Adapters



202M1XX-XXX

Table of Dimensions

Order No.	Shell Size Series I	Series II	Thread	Dimensions	
				Y +0.00-0.30 (+0.00) (-0.76) dia.	Z min.
08	9	8	.438-28 UNEF	18.26 [.719]	6.71 [.264]
10	11	10	.562-24 UNEF	21.44 [.844]	9.96 [.392]
12	13	12	.688-24 UNEF	24.61 [.969]	12.85 [.506]
14	15	14	.812-20 UNEF	27.79 [1.094]	16.03 [.631]
16	17	16	.938-20 UNEF	32.54 [1.281]	19.20 [.756]
18	19	18	1.062-18 UNEF	35.71 [1.406]	21.44 [.844]
20	21	20	1.188-18 UNEF	38.89 [1.531]	24.64 [.970]
22	23	22	1.312-18 UNEF	42.06 [1.656]	27.79 [1.094]
24	25	24	1.438-18 UNEF	45.24 [1.781]	30.71 [1.209]

Molded Part Selection Guide (Solid)

Order No.	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
08	202K132	222K132	5.9 [0.23]	202D221	222D221	7.4 [0.29]
10	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
12, 14	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
16, 18	202K163	222K163	9.9 [0.39]	202D253	222D253	10.5 [0.41]
20, 22, 24	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]

Uniboot Parts

Order No.	Part No.	Cable OD (Min.)
08	202C621	8.1 [0.32]
10	202C632	12.7 [0.50]
12, 14	202C642	17.5 [0.69]
16, 18, 20, 22	202C653	22.4 [0.88]

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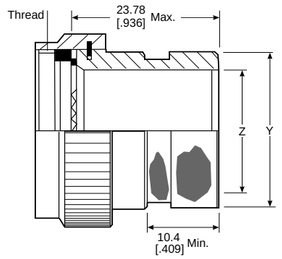
Code 41 MIL-C-38999 Series I and II (Continued)

Spin-Coupling Adapters



202M2XX-XXX

Table of Dimensions

Order No.	Shell Size Series I	Series II	Thread	Dimensions	
				Y +0.00-0.76 Dia.	Z Min.
08	9	8	.438-28 UNEF	13.54 [0.53]	6.35 [0.25]
10	11	10	.562-24 UNEF	15.37 [0.61]	9.53 [0.38]
12	13	12	.688-24 UNEF	19.66 [0.77]	12.70 [0.50]
14	15	14	.812-20 UNEF	21.29 [0.84]	15.88 [0.63]
16	17	16	.938-20 UNEF	24.46 [0.96]	19.05 [0.75]
18	19	18	1.062-18 UNEF	26.47 [1.04]	20.62 [0.81]
20	21	20	1.188-18 UNEF	30.91 [1.22]	23.80 [0.94]
22	23	22	1.312-18 UNEF	34.42 [1.36]	26.97 [1.06]
24	25	24	1.438-18 UNEF	36.65 [1.44]	30.18 [1.19]

Molded Part Selection Guide (Spin-Coupling)

Order No.	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
08	202W232	—	4.3 [0.19]	—	—	—
08	202K121	222K121	5.6 [0.22]	202D211	222D211	6.4 [0.25]
10	202K132	222K132	5.9 [0.23]	202D221	222D221	7.4 [0.29]
12, 14	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
16, 18	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
20, 22	202K163	222K163	9.9 [0.39]	202D253	222D253	10.5 [0.41]
24, 28	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]

Uniboot Parts

Order No.	Part No.	Cable OD (Min.)
08	202C611	4.8 [0.19]
10, 12	202C621	8.1 [0.32]
14, 16	202C632	12.7 [0.50]
18, 20	202C642	17.5 [0.69]
22, 24	202C653	22.4 [0.88]

Catalog 1308940
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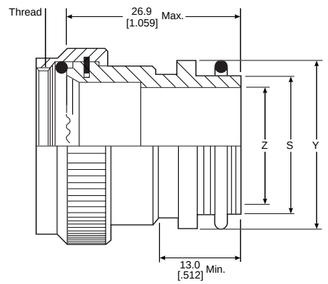
Code 41 MIL-C-38999 Series I and II (Continued)

Tinel-Lock Adapters



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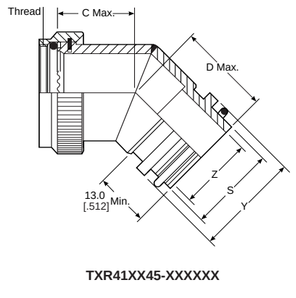

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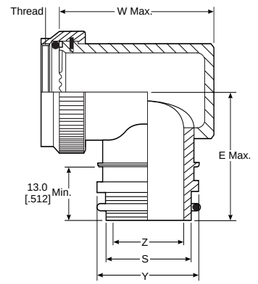

TXR41XX90-XXXXXX

Table of Dimensions

Order No.	Shell Size Series I	Series II	Max. Entry* Size Type 1	A Unified Thread Class 2B	Dimensions		
					C Max.	D Max.	E Max.
08	9	8	—	.438-28 UNEF	17.5 [0.69]	23.1 [0.91]	29.2 [1.15]
10	11	10	—	.562-24 UNEF	18.3 [0.72]	23.6 [0.93]	30.7 [1.21]
12	13	12	08	.688-24 UNEF	18.8 [0.74]	24.4 [0.96]	32.5 [1.28]
14	15	14	10	.812-20 UNEF	19.3 [0.76]	24.9 [0.98]	34.0 [1.34]
16	17	16	12	.938-20 UNEF	20.1 [0.79]	25.4 [1.00]	35.6 [1.40]
18	19	18	13	1.062-18 UNEF	20.6 [0.81]	26.2 [1.03]	37.1 [1.46]
20	21	20	15	1.188-18 UNEF	21.3 [0.84]	26.9 [1.06]	38.9 [1.53]
22	23	22	16	1.312-18 UNEF	22.1 [0.87]	27.4 [1.08]	40.4 [1.59]
24	25	24	18	1.438-18 UNEF	22.6 [0.89]	28.2 [1.11]	41.9 [1.65]

*For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied. Contact Tyco Electronics for information.

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Code 41 MIL-C-38999 Series I and II (Continued)

Tinel-Lock Adapters
(continued)

Entry Size Dimensions

Entry Size	Dimensions			
	Z +0.25–0.5	S Diameter (Min.–Max.)	Y ±0.38	W Max.
04	6.35 [0.25]	9.39–9.56 [0.37–0.38]	13.97 [0.55]	27.2 [1.07]
05	7.92 [0.31]	10.97–11.13 [0.43–0.44]	15.54 [0.61]	28.7 [1.13]
06	9.52 [0.37]	12.57–12.73 [0.49–0.50]	17.14 [0.67]	30.2 [1.19]
07	11.09 [0.44]	14.12–14.31 [0.55–0.56]	18.71 [0.74]	31.8 [1.25]
08	12.70 [0.50]	15.72–15.91 [0.62–0.63]	20.32 [0.80]	33.5 [1.32]
10	15.87 [0.62]	18.84–19.11 [0.74–0.75]	23.49 [0.92]	36.6 [1.44]
12	19.05 [0.75]	22.02–22.28 [0.87–0.88]	26.67 [1.05]	39.9 [1.57]
14	22.23 [0.88]	25.17–25.46 [0.99–1.00]	29.84 [1.17]	42.9 [1.69]
16	25.4 [1.00]	28.34–28.63 [1.12–1.13]	33.02 [1.30]	46.2 [1.82]
18	28.57 [1.12]	31.52–31.81 [1.24–1.25]	36.19 [1.42]	49.3 [1.94]

Molded Part Selection Guide (Tinel)

Order No.	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
04	202K232	—	3.3 [0.1]	—	—	—
04	202W232	—	4.3 [0.2]	—	—	—
04	202K121	222K121	5.6 [0.2]	202D211	222D211	6.4 [0.3]
05, 06	202K132	222K132	5.9 [0.2]	202D221	222D221	7.4 [0.3]
07, 08	202K142	222K142	7.1 [0.3]	202D232	222D232	8.4 [0.3]
10, 12	202K153	222K152	8.4 [0.3]	202D242	222D242	9.7 [0.4]
14, 16	202K163	222K163	9.9 [0.4]	202D253	222D253	10.5 [0.4]
18, 20, 22	202K174	222K174	15.7 [0.6]	202D263	222D263	12.2 [0.5]
24	202K185	222K185	16.8 [0.7]	—	—	—

Uniboot Parts

Order No.	Part No.	Cable OD (Min.)
04	202C611	4.8 [0.19]
05, 06, 07	202C621	8.1 [0.32]
08, 10, 12	202C632	12.7 [0.50]
12, 14, 16	202C642	17.5 [0.69]
16, 18, 20, 22	202C653	22.4 [0.88]
24	202C663	22.9 [0.90]

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Code 41 MIL-C-38999 Series I and II (Continued)

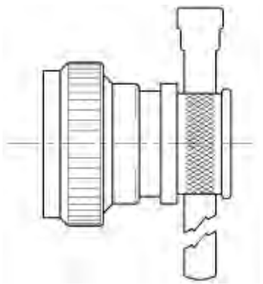
CRES-Lock Adapters (USA)
BND Adapters (Europe)

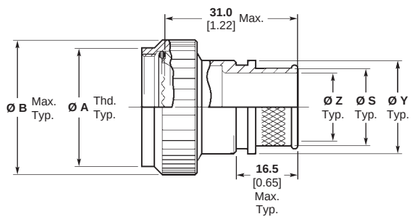
Code 41 Band Strap Adapter

Notes:

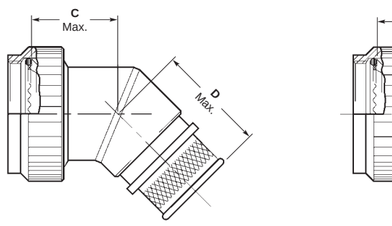
1. This product is designed to terminate a braided cable shield by means of a band strap and a heat shrinkable lipped boot to a connector.
2. See CH00-0250-016 for ordering information, modifications and additional dimensions.
3. See drawing BND-XX25S for band strap dimensions and information.
4. Adapter to be permanently marked with code identification number and full part number (e.g. 06090-BND41AB00-1812). Band strap shall bear no part marking.
5. All entry sizes are shown in Table II. Maximum entry sizes are as shown in Table I. For larger entry sizes than the maximum, a Type II adapter may be supplied. See CH00-0250-016 for further details.
6. Adapter mates to: MIL-C-38999 Series I and II, Class E and T, MS27466, MS27467, MS27468, MS27472, MS27473, MS27474, MS27479, MS27480, MS27481, MS27484, MS27497, MS27652, MS27653 and MS27656 Connectors.

For additional codes available, contact Tyco Electronics.

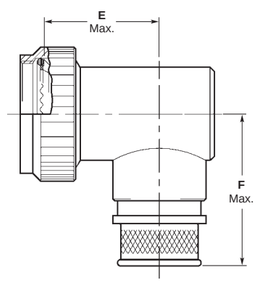




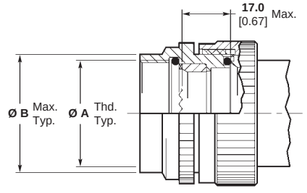
Straight Adapter
Code 00



45° Adapter
Code 45



90° Adapter
Code 90



Type II Modification
(See Note 5)

Catalog 1308940
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Code 41 MIL-C-38999 Series I and II (Continued)

CRES-Lock Adapters (USA)
BND Adapters (Europe)
(continued)

Code 41 Band Strap Adapter (Continued)

Table I

Order Number	Shell Size[2] Series I	Shell Size[2] Series II	Entry Size Max. Type I[1]	Ø A Unified Thread UNEF Class 2B	Ø B Max.	Ø B Max.[3]	C Max.	D Max.	F Max.
08	9	08	04	0.4375–28	**19.1** 0.75	**24.6** 0.97	**17.5** 0.69	**27.2** 1.07	**33.3** 1.31
10	11	10	06	0.5625–24	**20.8** 0.85	**27.0** 1.06	**18.3** 0.72	**27.7** 1.09	**34.8** 1.37
12	13	12	08	0.6875–24	**25.4** 1.00	**31.0** 1.22	**18.8** 0.74	**28.4** 1.12	**36.6** 1.44
14	15	14	10	0.8125–20	**27.2** 1.10	**35.8** 1.41	**19.3** 0.76	**29.0** 1.14	**38.1** 1.50
16	17	16	12	0.9375–20	**31.8** 1.25	**37.3** 1.47	**20.1** 0.79	**29.5** 1.16	**39.6** 1.56
18	19	18	13	1.0625–18	**35.6** 1.40	**40.6** 1.60	**20.6** 0.81	**30.2** 1.19	**41.1** 1.62
20	21	20	15	1.1875–18	**38.1** 1.50	**44.5** 1.75	**21.3** 0.84	**31.0** 1.22	**42.9** 1.69
22	23	22	16	1.3125–18	**41.9** 1.65	**46.8** 1.84	**22.1** 0.87	**31.5** 1.24	**44.5** 1.75
24	25	24	18	1.4375–18	**44.5** 1.75	**51.6** 2.03	**22.6** 0.89	**32.3** 1.27	**46.0** 1.81

1. All entry sizes are shown in Table II. Maximum entry sizes are as shown in Table I. For larger entry sizes than the maximum, a Type II adapter may be supplied. See CH00-0250-016 for further details.
2. Adapter mates to: MIL-C-38999 Series I and II, Class E and T, MS27466, MS27467, MS27468, MS27472, MS27473, MS27474, MS27479, MS27480, MS27481, MS27484, MS27497, MS27652, MS27653 and MS27656 Connectors.
3. These dimensions apply if a self-locking coupling nut is used, modification code “S”.

Table II

Entry Size	Ø Z +0.25/-0.50 [+0.010/-0.020]	Ø S ±0.51 [±0.020]	Ø Y ±0.38 [±0.015]	E Max.
03	**4.75** 0.188	**7.92** 0.312	**11.10** 0.438	**15.3** 0.60
04	**6.35** 0.250	**9.52** 0.375	**12.70** 0.500	**16.3** 0.64
05	**7.92** 0.312	**11.12** 0.438	**14.30** 0.563	**16.8** 0.66
06	**9.52** 0.375	**12.70** 0.500	**15.88** 0.625	**17.8** 0.70
07	**11.12** 0.438	**14.30** 0.562	**17.50** 0.689	**18.8** 0.74
08	**12.70** 0.500	**15.88** 0.625	**19.05** 0.750	**19.3** 0.76
09	**14.30** 0.562	**17.50** 0.688	**20.65** 0.813	**20.3** 0.80
10	**15.88** 0.625	**19.05** 0.750	**22.23** 0.875	**21.3** 0.84
11	**17.50** 0.688	**20.65** 0.812	**23.80** 0.938	**21.8** 0.86
12	**19.05** 0.750	**22.23** 0.875	**25.40** 1.000	**22.9** 0.90
13	**20.65** 0.812	**23.83** 0.938	**27.00** 1.063	**23.8** 0.94
14	**22.23** 0.875	**25.40** 1.000	**30.16** 1.189	**24.4** 0.96

Table II (Continued)

Entry Size	Ø Z +0.25/-0.50 [+0.010/-0.020]	Ø S ±0.51 [±0.020]	Ø Y ±0.38 [±0.015]	E Max.
15	**23.83** .0938	**27.00** 1.062	**31.75** 1.250	**25.4** 1.00
16	**25.40** 1.000	**28.58** 1.125	**33.34** 1.313	**25.9** 1.02
18	**28.58** 1.125	**31.75** 1.250	**36.51** 1.438	**27.4** 1.08
20	**31.75** 1.250	**34.90** 1.375	**39.69** 1.563	N/A
22	**34.90** 1.375	**38.10** 1.500	**42.86** 1.688	N/A
24	**38.10** 1.500	**41.28** 1.625	**46.83** 1.844	N/A
26	**41.28** 1.625	**44.45** 1.750	**49.61** 1.953	N/A
28	**44.45** 1.750	**47.63** 1.875	**52.78** 2.078	N/A
30	**47.65** 1.875	**50.80** 2.000	**56.36** 2.219	N/A
32	**50.80** 2.000	**54.00** 2.125	**59.53** 2.344	N/A
34	**54.00** 2.125	**57.15** 2.250	**62.71** 2.469	N/A

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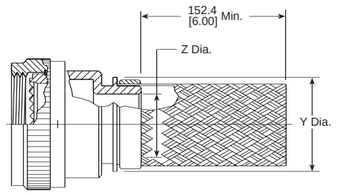
Code 54 MIL-C-5015 (MS3400), MIL-C-26482 Series 2, MIL-C-83723 Series I and III, MIL-C-81703 Series III

Braided Adapters



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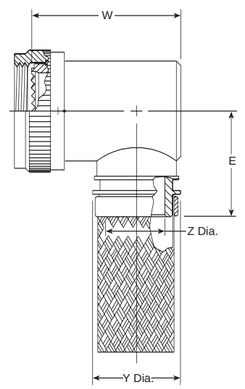
203M0XX-XXXXX



203M2XX-XXXXX

Table of Dimensions

Order No.	Shell Size		Max. Entry Size Type 1*	Thread	Dimensions		
	MIL-C-81703	MIL-C-5015			C Max.	D Max.	E Max.
03	3	—	04	.562-24 UNEF	19.10 [0.75]	23.10 [0.91]	28.70 [1.13]
08	—	8 & 8S	04	.500-20 UNF	19.10 [0.75]	23.10 [0.91]	27.90 [1.10]
10	—	10, 10S & 10 SL	06	.625-24 UNEF	19.60 [0.77]	23.60 [0.93]	29.50 [1.16]
12	7	12 & 12S	08	.750-20 UNEF	20.30 [0.80]	24.10 [0.95]	31.00 [1.22]
14	12	14 & 14S	08	.875-20 UNEF	20.80 [0.82]	24.60 [0.97]	32.50 [1.28]
16	19	16 & 16S	10	1.000-20 UNEF	21.30 [0.84]	25.40 [1.00]	34.30 [1.35]
18	27	18	12	1.062-18 UNEF	21.80 [0.86]	25.70 [1.01]	35.60 [1.40]
20	37	20	14	1.188-18 UNEF	22.40 [0.88]	26.40 [1.04]	37.10 [1.46]
22	—	22	16	1.312-18 UNEF	23.10 [0.91]	26.90 [1.06]	38.90 [1.53]
24	—	24	18	1.438-18 UNEF	23.60 [0.93]	27.70 [1.09]	40.40 [1.59]
28	—	28	22	1.750-18 UNS	24.90 [0.98]	29.20 [1.15]	45.20 [1.78]
32	—	32	24	2.000-18 UNS	26.20 [1.03]	30.50 [1.20]	48.30 [1.90]
36	—	36	24	2.250-16 UN	27.40 [1.08]	31.80 [1.25]	51.60 [2.03]
40	—	40	24	2.500-16 UN	29.00 [1.14]	33.30 [1.31]	54.60 [2.15]
44	—	44	24	2.750-16 UN	30.20 [1.19]	34.50 [1.36]	57.90 [2.28]
48	—	48	24	3.000-16 UN	31.50 [1.24]	35.10 [1.38]	61.00 [2.40]
61	61	—	18	1.500-18 UNEF	23.90 [0.94]	27.90 [1.10]	41.10 [1.62]

*For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied. Contact Tyco Electronics for information.

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Code 54 MIL-C-5015 (MS3400), MIL-C-26482 Series 2, MIL-C-83723 Series I and III, MIL-C-81703 Series III (Continued)

Braided Adapters
(continued)

Entry Size Dimensions

Entry Size	Dimensions			
	Z +0.25–0.5	S Diameter (Min.–Max.)	Y ±0.38	W Max.
04	6.35 [0.25]	9.39–9.56 [0.37–0.38]	13.97 [0.55]	28.4 [1.12]
05	7.92 [0.31]	10.97–11.13 [0.43–0.44]	15.54 [0.61]	30.2 [1.19]
06	9.52 [0.37]	12.57–12.73 [0.49–0.50]	17.14 [0.67]	31.8 [1.25]
07	11.09 [0.44]	14.12–14.31 [0.55–0.56]	18.71 [0.74]	33.3 [1.31]
08	12.7 [0.50]	15.72–15.91 [0.62–0.63]	20.32 [0.80]	35.1 [1.38]
10	15.87 [0.62]	18.84–19.11 [0.74–0.75]	23.49 [0.92]	38.1 [1.50]
12	19.05 [0.75]	22.02–22.28 [0.87–0.88]	26.67 [1.05]	41.1 [1.62]
14	22.23 [0.88]	25.17–25.46 [0.99–1.00]	29.84 [1.17]	44.5 [1.75]
16	25.4 [1.00]	28.34–28.63 [1.12–1.13]	33.02 [1.30]	47.8 [1.88]
18	28.57 [1.12]	31.52–31.81 [1.24–1.25]	36.19 [1.42]	50.8 [2.00]
20	31.75 [1.25]	34.69-34.98 [1.37-1.38]	39.37 [1.55]	53.8 [2.12]
22	34.93 [1.38]	37.79-38.15 [1.49-1.50]	42.55 [1.68]	57.2 [2.25]
24	38.1 [1.50]	40.97-41.33 [1.61-1.63]	45.72 [1.80]	60.5 [2.38]

Molded Part Selection Guide (Braided)

Tinel-Lock Entry Size	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
04	202K232	—	3.3 [0.1]	—	—	—
04	202W232	—	4.3 [0.2]	—	—	—
04	202K121	222K121	5.6 [0.2]	202D211	222D211	6.4 [0.3]
05, 06	202K132	222K132	5.9 [0.2]	202D221	222D221	7.4 [0.3]
07, 08	202K142	222K142	7.1 [0.3]	202D232	222D232	8.4 [0.3]
10, 12	202K153	222K152	8.4 [0.3]	202D242	222D242	9.7 [0.4]
14, 16	202K163	222K163	9.9 [0.4]	202D253	222D253	10.5 [0.4]
18, 20, 22	202K174	222K174	15.7 [0.6]	202D263	222D263	12.2 [0.5]
24	202K185	222K185	16.8 [0.7]	—	—	—

Uniboot Parts

Tinel-Lock Entry Size	Part No.	Cable OD (Min.)
04	202C611	4.8 [0.19]
05, 06, 07	202C621	8.1 [0.32]
08, 10, 12	202C632	12.7 [0.50]
12, 14, 16	202C642	17.5 [0.69]
16, 18, 20, 22	202C653	22.4 [0.88]
24	202C663	22.9 [0.90]

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Code 54 MIL-C-5015 (MS3400), MIL-C-26482 Series 2, MIL-C-83723 Series I and III, MIL-C-81703 Series III (Continued)

Solid Adapters

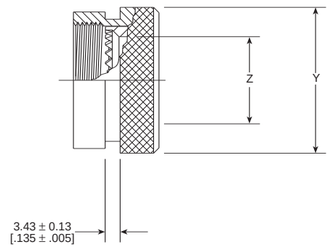

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Table of Dimensions

Order No.	Shell Size		Thread	Dimensions	
	MIL-C-81703	MIL-C-5015		Y +0.00-0.51 Dia.	Z Dia. Min.
03	3	—	.562-24 UNEF	13.54 [0.53]	6.35 [0.25]
08	—	8 & 8S	.500-20 UNF	13.54 [0.53]	6.35 [0.25]
10	—	10, 10S & 10SL	.625-24 UNEF	15.37 [0.61]	9.02 [0.36]
12	7	12 & 12S	.750-20 UNEF	19.66 [0.77]	12.47 [0.49]
14	12	14 & 14S	.875-20 UNEF	21.29 [0.84]	14.35 [0.56]
16	19	16 & 16S	1.000-20 UNEF	24.46 [0.96]	17.53 [0.69]
18	27	18	1.062-18 UNEF	26.47 [1.04]	19.53 [0.77]
20	37	20	1.188-18 UNEF	30.91 [1.22]	22.71 [0.89]
22	—	22	1.312-18 UNEF	34.42 [1.36]	25.88 [1.02]
24	—	24	1.438-18 UNEF	36.65 [1.44]	28.80 [1.13]
28	—	28	1.750-18 UNS	43.41 [1.71]	34.77 [1.37]
32	—	32	2.000-18 UNS	48.74 [1.92]	41.02 [1.61]
36	—	36	2.250-16 UN	55.09 [2.17]	46.48 [1.83]
40	—	40	2.500-16 UN	61.01 [2.40]	51.94 [2.04]
44	—	44	2.750-16 UN	67.49 [2.66]	58.42 [2.30]
48	—	48	3.000-16 UN	73.84 [2.91]	64.77 [2.55]
61	61	—	1.500-18 UNEF	36.65 [1.44]	29.82 [1.17]

Molded Part Selection Guide (Solid)

Order No.	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
03	202K132	222K132	5.9 [0.23]	202D221	222D221	7.4 [0.29]
10	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
12, 14	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
16, 18, 19, 27	202K163	222K163	9.9 [0.39]	202D253	222D253	10.5 [0.41]
20, 22, 24, 28, 37	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]
28, 32	202K185	222K185	16.8 [0.66]	—	—	—

Uniboot Parts

Order No.	Part No.	Cable OD (Min.)
08	202C621	8.1 [0.32]
7, 10, 12	202C632	12.7 [0.50]
12, 14	202C642	17.5 [0.69]
24, 27, 37, 61	202C653	22.4 [0.88]

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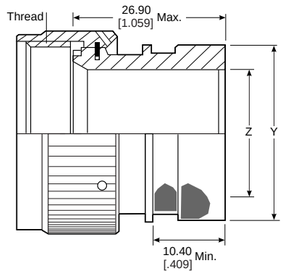
Code 54 MIL-C-5015 (MS3400), MIL-C-26482 Series 2, MIL-C-83723 Series I and III, MIL-C-81703 Series III (Continued)

Spin-Coupling Adapters



201M1XX-XXX

Table of Dimensions

Order No.	Shell Size		Thread	Dimensions	
	MIL-C-81703	MIL-C-5015		Y +0.00-0.51 Dia.	Z Dia. Min.
03	3	—	.562-24 UNEF	13.54 [0.53]	6.35 [0.25]
08	—	8 & 8S	.500-20 UNF	13.54 [0.53]	6.35 [0.25]
10	—	10, 10S & 10SL	.625-24 UNEF	15.37 [0.61]	9.02 [0.36]
12	7	12 & 12S	.750-20 UNEF	19.66 [0.77]	12.47 [0.49]
14	12	14 & 14S	.875-20 UNEF	21.29 [0.84]	14.35 [0.56]
16	19	16 & 16S	1.000-20 UNEF	24.46 [0.96]	17.53 [0.69]
18	27	18	1.062-18 UNEF	26.47 [1.04]	19.53 [0.77]
20	37	20	1.188-18 UNEF	30.91 [1.22]	22.71 [0.89]
22	—	22	1.312-18 UNEF	34.42 [1.36]	25.88 [1.02]
24	—	24	1.438-18 UNEF	36.65 [1.44]	28.80 [1.13]
28	—	28	1.750-18 UNS	43.41 [1.71]	34.77 [1.37]
32	—	32	2.000-18 UNS	48.74 [1.92]	41.02 [1.61]
36	—	36	2.250-16 UN	55.09 [2.17]	46.48 [1.83]
40	—	40	2.500-16 UN	61.01 [2.40]	51.94 [2.04]
44	—	44	2.750-16 UN	67.49 [2.66]	58.42 [2.30]
48	—	48	3.000-16 UN	73.84 [2.91]	64.77 [2.55]
61	61	—	1.500-18 UNEF	36.65 [1.44]	29.82 [1.17]

Molded Part Selection Guide (Spin-coupling)

Order No.	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
03, 08	202W232	—	4.3 [0.19]	—	—	—
03, 08	202K121	222K121	5.6 [0.22]	202D211	222D211	6.4 [0.25]
10, 11	202K132	222K132	5.9 [0.23]	202D221	222D221	7.4 [0.29]
12, 14	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
16, 18	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
20, 22	202K163	222K163	9.9 [0.39]	202D253	222D253	10.5 [0.41]
24, 28, 61	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]
32, 36	202K185	222K185	16.8 [0.66]	—	—	—

Uniboot Parts

Order No.	Part No.	Cable OD (Min.)
08	202C621	8.1 [0.32]
7, 10, 12	202C632	12.7 [0.50]
12, 14	202C642	17.5 [0.69]
24, 27, 37, 61	202C653	22.4 [0.88]

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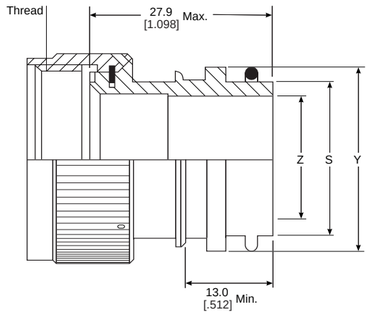

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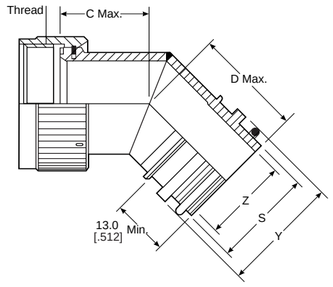

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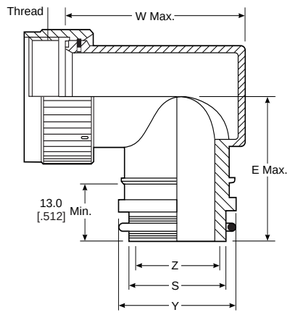

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Code 54 MIL-C-5015 (MS3400), MIL-C-26482 Series 2, MIL-C-83723 Series I and III, MIL-C-81703 Series III (Continued)

Tinel-Lock Adapters
(continued)

Table of Dimensions

Order No.	Shell Size		Max. Entry Size Type 1*	Thread	Dimensions		
	MIL-C-81703	MIL-C-5015			C Max.	D Max.	E Max.
03	3	—	04	.562-24 UNEF	19.10 [0.75]	23.10 [0.91]	28.70 [1.13]
08	—	8 & 8S	04	.500-20 UNF	19.10 [0.75]	23.10 [0.91]	27.90 [1.10]
10	—	10, 10S & 10 SL	06	.625-24 UNEF	19.60 [0.77]	23.60 [0.93]	29.50 [1.16]
12	7	12 & 12S	08	.750-20 UNEF	20.30 [0.80]	24.10 [0.95]	31.00 [1.22]
14	12	14 & 14S	08	.875-20 UNEF	20.80 [0.82]	24.60 [0.97]	32.50 [1.28]
16	19	16 & 16S	10	1.000-20 UNEF	21.30 [0.84]	25.40 [1.00]	34.30 [1.35]
18	27	18	12	1.062-18 UNEF	21.80 [0.86]	25.70 [1.01]	35.60 [1.40]
20	37	20	14	1.188-18 UNEF	22.40 [0.88]	26.40 [1.04]	37.10 [1.46]
22	—	22	16	1.312-18 UNEF	23.10 [0.91]	26.90 [1.06]	38.90 [1.53]
24	—	24	18	1.438-18 UNEF	23.60 [0.93]	27.70 [1.09]	40.40 [1.59]
28	—	28	22	1.750-18 UNS	24.90 [0.98]	29.20 [1.15]	45.20 [1.78]
32	—	32	24	2.000-18 UNS	26.20 [1.03]	30.50 [1.20]	48.30 [1.90]
36	—	36	24	2.250-16 UN	27.40 [1.08]	31.80 [1.25]	51.60 [2.03]
40	—	40	24	2.500-16 UN	29.00 [1.14]	33.30 [1.31]	54.60 [2.15]
44	—	44	24	2.750-16 UN	30.20 [1.19]	34.50 [1.36]	57.90 [2.28]
48	—	48	24	3.000-16 UN	31.50 [1.24]	35.10 [1.38]	61.00 [2.40]
61	61	—	18	1.500-18 UNEF	23.90 [0.94]	27.90 [1.10]	41.10 [1.62]

*For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied. Contact Tyco Electronics for information.

Entry Size Dimensions

Entry Size	Dimensions			
	Z +0.25–0.5	S Diameter (Min.–Max.)	Y ±0.38	W Max.
04	6.35 [0.25]	9.39—9.56 [0.37—0.38]	13.97 [0.55]	28.4 [1.12]
05	7.92 [0.31]	10.97—11.13 [0.43—0.44]	15.54 [0.61]	30.2 [1.19]
06	9.52 [0.37]	12.57—12.73 [0.49—0.50]	17.14 [0.67]	31.8 [1.25]
07	11.09 [0.44]	14.12—14.31 [0.55—0.56]	18.71 [0.74]	33.3 [1.31]
08	12.70 [0.50]	15.72—15.91 [0.62—0.63]	20.32 [0.80]	35.1 [1.38]
10	15.87 [0.62]	18.84—19.11 [0.74—0.75]	23.49 [0.92]	38.1 [1.50]
12	19.05 [0.75]	22.02—22.28 [0.87—0.88]	26.67 [1.05]	41.1 [1.62]
14	22.23 [0.88]	25.17—25.46 [0.99—1.00]	29.84 [1.17]	44.5 [1.75]
16	25.40 [1.00]	28.34—28.63 [1.12—1.13]	33.02 [1.30]	47.8 [1.88]
18	28.57 [1.12]	31.52—31.81 [1.24—1.25]	36.19 [1.42]	50.8 [2.00]
20	31.75 [1.25]	34.69-34.98 [1.37-1.38]	39.37 [1.55]	53.8 [2.12]
22	34.93 [1.38]	37.79-38.15 [1.49-1.50]	42.55 [1.68]	57.2 [2.25]
24	38.10 [1.50]	40.97-41.33 [1.61-1.63]	45.72 [1.80]	60.5 [2.38]

Molded Part Selection Guide (Tinel)

Tinel-Lock Entry Size	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
04	202K232	—	3.3 [0.1]	—	—	—
04	202W232	—	4.3 [0.2]	—	—	—
04	202K121	222K121	5.6 [0.2]	202D211	222D211	6.4 [0.3]
05, 06	202K132	222K132	5.9 [0.2]	202D221	222D221	7.4 [0.3]
07, 08	202K142	222K142	7.1 [0.3]	202D232	222D232	8.4 [0.3]
10, 12	202K153	222K152	8.4 [0.3]	202D242	222D242	9.7 [0.4]
14, 16	202K163	222K163	9.9 [0.4]	202D253	222D253	10.5 [0.4]
18, 20, 22	202K174	222K174	15.7 [0.6]	202D263	222D263	12.2 [0.5]
24	202K185	222K185	16.8 [0.7]	—	—	—

Uniboot Parts

Tinel-Lock Entry Size	Part No.	Cable OD (Min.)
04	202C611	4.8 [0.19]
05, 06, 07	202C621	8.1 [0.32]
08, 10, 12	202C632	12.7 [0.50]
12, 14, 16	202C642	17.5 [0.69]
16, 18, 20, 22	202C653	22.4 [0.88]
24	202C663	22.9 [0.90]

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Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Code 54 MIL-C-5015 (MS3400), MIL-C-26482 Series 2, MIL-C-83723 Series I and III, MIL-C-81703 Series III (Continued)

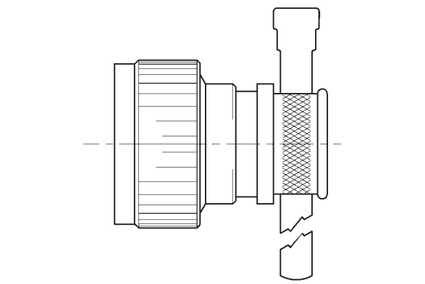
CRES-Lock Adapters (USA)
BND Adapters (Europe)

Code 54 Band Strap Adapter

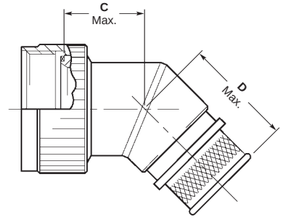
Notes:

1. This product is designed to terminate a braided cable shield by means of a band strap and a heat shrinkable lipped boot to a connector.
2. See CH00-0250-016 for ordering information, modifications and additional dimensions.
3. See drawing BND-XX25S for band strap dimensions and information.
4. Adapter to be permanently marked with code identification number and full part number (e.g. 06090-BND54AB00-1812). Band strap shall bear no part marking.
5. All entry sizes are shown in Table II. Maximum entry sizes are as shown in Table I. For larger entry sizes than the maximum, a Type II adapter may be supplied. See CH00-0250-016 for further details.

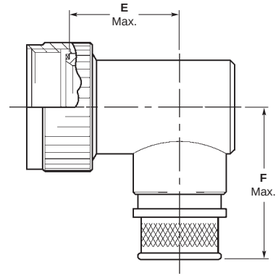
For additional codes available, contact Tyco Electronics.



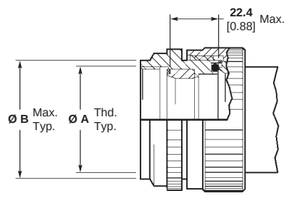
Straight Adapter
Code 00



45° Adapter
Code 45



90° Adapter
Code 90



Type II Modification
(See Note 5)

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Japan: 81-44-844-8013
UK: 44-208-420-8341

CRES-Lock Adapters (USA)
BND Adapters (Europe)
(continued)

Code 54 Band Strap Adapter (Continued)

Code 54 MIL-C-5015 (MS3400), MIL-C-26482 Series 2, MIL-C-83723 Series I and III, MIL-C-81703 Series III (Continued)

Table I

Order Number	Shell Size Series[2]	Shell Size Series[3]	Entry Size Max. Type I[1]	Ø A Unified Thread Class 2B	Ø B Max.	Ø B Max.[4]	C Max.	D Max.	F Max.
08	—	08	04	0.5000–20 UNF	**15.7** 0.67	**22.6** 0.89	**19.0** 0.75	**26.2** 1.03	**31.0** 1.22
10	—	10	06	0.6250–24 UNEF	**18.5** 0.73	**25.7** 1.01	**19.6** 0.77	**26.7** 1.05	**32.5** 1.28
12	7	12	08	0.7500–20 UNEF	**21.8** 0.86	**29.0** 1.14	**20.3** 0.80	**27.2** 1.07	**34.3** 1.35
14	12	14	09	0.8750–20 UNEF	**24.9** 0.98	**32.0** 1.26	**20.9** 0.82	**27.7** 1.09	**35.6** 1.40
16	19	16	11	0.9375–20 UNEF	**28.2** 1.11	**35.3** 1.39	**21.3** 0.84	**28.4** 1.12	**37.1** 1.46
18	27	18	12	1.0000–20 UNEF	**31.0** 1.22	**38.4** 1.51	**21.8** 0.86	**28.7** 1.13	**38.9** 1.53
20	37	20	14	1.1875–18 UNEF	**34.3** 1.35	**41.7** 1.64	**22.4** 0.88	**29.5** 1.16	**40.4** 1.59
22	—	22	16	1.3125–18 UNEF	**37.3** 1.47	**44.7** 1.76	**23.1** 0.91	**30.0** 1.18	**41.9** 1.65
24	—	24	18	1.4375–18 UNEF	**40.5** 1.59	**48.0** 1.89	**23.6** 0.93	**30.7** 1.21	**43.4** 1.71
28	—	28	22	1.7500–18 UNS	**50.0** 1.97	**54.4** 2.14	**24.9** 0.98	**31.8** 1.25	**48.3** 1.90
32	—	32	26	2.0000–18 UNS	**56.4** 2.22	**61.0** 2.40	**26.2** 1.03	**33.3** 1.31	**51.6** 2.03
36	—	36	28	2.2500–16 UN	**62.7** 2.47	**67.1** 2.64	**27.4** 1.08	**34.3** 1.35	**54.6** 2.15
40	—	40	32	2.5000–16 UN	**69.1** 2.72	**73.4** 2.89	**28.4** 1.12	**35.6** 1.40	**57.7** 2.27
44	—	44	34	2.75000–16 UN	**75.4** 2.97	**79.8** 3.14	**29.7** 1.17	**36.8** 1.45	**61.0** 2.40
48	—	48	34	3.0000–16 UN	**81.8** 3.22	**86.1** 3.39	**31.0** 1.22	**38.1** 1.50	**64.0** 2.52
61	61	—	18	1.5000–18 UNEF	**41.9** 1.65	**47.8** 1.88	**23.9** 0.94	**30.7** 1.21	**44.2** 1.74

1. All entry sizes are shown in Table II. Maximum entry sizes are as shown in Table I. For larger entry sizes than the maximum, a Type II adapter may be supplied. See CH00-0250-016 for further details.
2. Adapter mates to: MIL-C-81703 Series III, MS3424, MS3446, MS3464, MS3467, MS3468, Class E and L Connectors.
3. Adapter mates to MIL-C-5015G, MS3400 Series, Class D, E, K, L, U and W: MS3400, MS3401, MS3404, MS3406, MS3450, MS3451, MS3454, MS3456, MS3470, MS3471, MS3472, MS3474, MS3475, MS3476, MIL-C-83723 Series II, Class A and L. MIL-C-83723, /14, /36, /37, /38, /39, /40, /41, /42, /43, /48, /49, /65, /66, /67, /68, /69, /70, /71, /72, /73, /74, /75, /76, /77, /78, /82, /83, /84, /85, /86, /87, /91, /92, /95, /97, and /98 Connectors, MS3155 controlled interfaces.
4. These dimensions apply if a self-locking coupling nut is used, modification code "S".

Table II

Entry Size	Ø Z +0.25/-0.50 [+0.010/-0.020]	Ø S ±0.51 [±0.020]	Ø Y ±0.38 [±0.015]	E Max.
03	**4.75** 0.188	**7.92** 0.312	**11.10** 0.438	**16.3** 0.64
04	**6.35** 0.250	**9.52** 0.375	**12.70** 0.500	**16.3** 0.64
05	**7.92** 0.312	**11.12** 0.438	**14.30** 0.563	**17.3** 0.68
06	**9.52** 0.375	**12.70** 0.500	**15.88** 0.625	**17.8** 0.70
07	**11.12** 0.438	**14.30** 0.562	**17.50** 0.689	**18.8** 0.74
08	**12.70** 0.500	**15.88** 0.625	**19.05** 0.750	**19.8** 0.78
09	**14.30** 0.562	**17.50** 0.688	**20.65** 0.813	**20.3** 0.80
10	**15.88** 0.625	**19.05** 0.750	**22.23** 0.875	**20.8** 0.82
11	**17.50** 0.688	**20.65** 0.812	**23.80** 0.938	**21.8** 0.86
12	**19.05** 0.750	**22.23** 0.875	**25.40** 1.000	**22.9** 0.90
13	**20.65** 0.812	**23.83** 0.938	**27.00** 1.063	**23.9** 0.94
14	**22.23** 0.875	**25.40** 1.000	**30.16** 1.189	**24.4** 0.96

Table II (Continued)

Entry Size	Ø Z +0.25/-0.50 [+0.010/-0.020]	Ø S ±0.51 [±0.020]	Ø Y ±0.38 [±0.015]	E Max.
15	**23.83** 0.938	**27.00** 1.062	**31.75** 1.250	**24.9** 0.98
16	**25.40** 1.000	**28.58** 1.125	**33.34** 1.313	**25.9** 1.02
18	**28.58** 1.125	**31.75** 1.250	**36.51** 1.438	**28.3** 1.11
20	**31.75** 1.250	**34.90** 1.375	**39.69** 1.563	**29.8** 1.17
22	**34.90** 1.375	**38.10** 1.500	**42.86** 1.688	**31.3** 1.23
24	**38.10** 1.500	**41.28** 1.625	**46.83** 1.844	**33.8** 1.33
26	**41.28** 1.625	**44.45** 1.750	**49.61** 1.953	**35.1** 1.38
28	**44.45** 1.750	**47.63** 1.875	**52.78** 2.078	**36.3** 1.43
30	**47.65** 1.875	**50.80** 2.000	**56.36** 2.219	**37.8** 1.49
32	**50.80** 2.000	**54.00** 2.125	**59.53** 2.344	**39.6** 1.56
34	**54.00** 2.125	**57.15** 2.250	**62.71** 2.469	**41.1** 1.62

Catalog 1308940
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Code 76 BS 9522 F0017 (Pattern 105)

Spin-Coupling Adapters

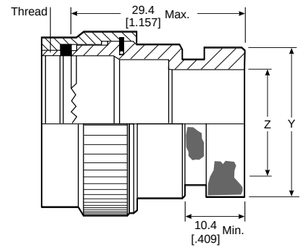

Table of Dimensions

Order No.	Shell Size	Thread	Dimensions	
			Y Max.	Z Min.
08	8	.438-28 UNEF	13.54 [0.53]	6.9 [0.27]
10	10	.562-24 UNEF	15.37 [0.61]	9.9 [0.39]
12	12	.688-24 UNEF	19.66 [0.77]	13.4 [0.53]
14	14	.812-20 UNEF	21.29 [0.84]	15.9 [0.63]
16	16	.938-20 UNEF	24.47 [0.96]	18.9 [0.74]
18	18	1.062-18 UNEF	26.47 [1.04]	21.4 [0.84]
20	20	1.188-18 UNEF	30.92 [1.22]	23.9 [0.94]
22	22	1.312-18 UNEF	34.42 [1.36]	27.4 [1.08]
24	24	1.438-18 UNEF	36.40 [1.44]	29.9 [1.18]

Molded Part Selection Guide (Spin-Coupling)

Order No.	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
03, 08	202W232	—	4.3 [0.19]	—	—	—
03, 08	202K121	222K121	5.6 [0.22]	202D211	222D211	6.4 [0.25]
10, 11	202K132	222K132	5.9 [0.23]	202D221	222D221	7.4 [0.29]
12, 14	202K142	222K142	7.1 [0.28]	202D232	222D232	8.4 [0.33]
16, 18	202K153	222K152	8.4 [0.33]	202D242	222D242	9.7 [0.38]
20, 22	202K163	222K163	9.9 [0.39]	202D253	222D253	10.5 [0.41]
24, 28,	202K174	222K174	15.7 [0.62]	202D263	222D263	12.2 [0.48]
32, 36	202K185	222K185	16.8 [0.66]	202D274	222D274	14.3 [0.56]

Uniboot Parts

Order No.	Part No.	Cable OD (Min.)
03, 08	202C611	4.8 [0.19]
10, 11, 12	202C621	8.1 [0.32]
14, 16	202C632	12.7 [0.50]
18, 20	202C642	17.5 [0.69]
22, 24	202C653	22.4 [0.88]

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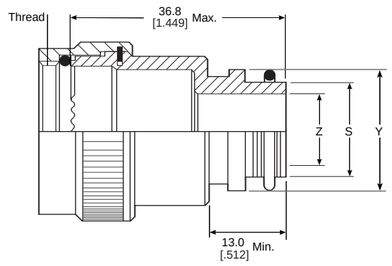
Code 76 BS 9522 F0017 (Pattern 105) (Continued)

Tinel-Lock Adapters



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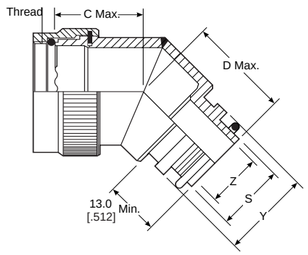

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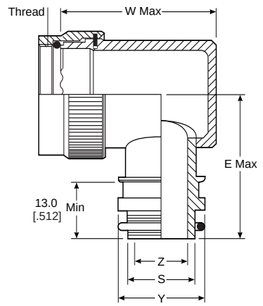

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Table of Dimensions

Order No.	Shell Size	Max. Entry Size Type 1*	Thread	Dimensions		
				C Max.	D Max.	E Max.
08	8	04	.438-28 UNEF	18.0 [.74]	21.3 [.87]	26.7 [1.05]
10	10	07	.562-24 UNEF	18.8 [.76]	22.1 [.90]	28.2 [1.11]
12	12	08	.688-24 UNEF	19.3 [.79]	22.9 [.92]	30.2 [1.19]
14	14	10	.812-20 UNEF	20.1 [.82]	23.4 [.95]	31.8 [1.25]
16	16	12	.938-20 UNEF	20.8 [.84]	24.1 [.97]	33.5 [1.32]
18	18	12	1.062-18 UNEF	21.3 [.87]	24.6 [1.00]	35.1 [1.38]
20	20	16	1.188-18 UNEF	22.1 [.89]	25.4 [1.02]	36.6 [1.44]
22	22	18	1.312-18 UNEF	22.6 [.92]	25.9 [1.05]	38.1 [1.50]
24	24	20	1.438-18 UNEF	23.4 [.97]	26.7 [1.07]	39.4 [1.55]

*For larger than maximum type 1 entry sizes, a two-piece adapter will be supplied. Contact Tyco Electronics for information.

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Code 76 BS 9522 F0017 (Pattern 105) (Continued)

Tinel-Lock Adapters
(continued)

Entry Size Dimensions

Entry Size	Dimensions			
	Z +0.25–0.5	S Diameter (Min.–Max.)	Y ±0.38	W Max.
04	6.35 [0.25]	9.39—9.56 [0.37—0.38]	13.97 [1.22]	31.0 [0.55]
05	7.92 [0.31]	10.97—11.13 [0.43—0.44]	15.54 [1.29]	32.8 [0.61]
06	9.52 [0.37]	12.57—12.73 [0.49—0.50]	17.14 [1.35]	34.3 [0.67]
07	11.09 [0.44]	14.12—14.31 [0.55—0.56]	18.71 [1.41]	35.8 [0.74]
08	12.7 [0.50]	15.72—15.91 [0.62—0.63]	20.32 [1.47]	37.3 [0.80]
10	15.87 [0.62]	18.84—19.11 [0.74—0.75]	23.49 [1.60]	40.6 [0.92]
12	19.05 [0.75]	22.02—22.28 [0.87—0.88]	26.67 [1.72]	43.7 [1.05]
14	22.23 [0.88]	25.17—25.46 [0.99—1.00]	29.84 [1.85]	47.0 [1.17]
16	25.4 [1.00]	28.34—28.63 [1.12—1.13]	33.02 [1.97]	50.0 [1.30]
18	28.57 [1.12]	31.52—31.81 [1.24—1.25]	36.19 [2.10]	53.3 [1.42]
20	31.75 [1.25]	34.69—34.98 [1.37—1.38]	39.37 [1.55]	53.8 [2.19]

Molded Part Selection Guide (Tinel)

Tinel-Lock Entry Size	Standard K Parts			Low-Profile D Parts		
	Straight Part No.	90° Part No.	Cable OD (Min.)	Straight Part No.	90° Part No.	Cable OD (Min.)
04	202K232	—	3.3 [0.1]	—	—	—
04	202W232	—	4.3 [0.2]	—	—	—
04	202K121	222K121	5.6 [0.2]	202D211	222D211	6.4 [0.3]
05, 06	202K132	222K132	5.9 [0.2]	202D221	222D221	7.4 [0.3]
07, 08	202K142	222K142	7.1 [0.3]	202D232	222D232	8.4 [0.3]
10, 12	202K153	222K152	8.4 [0.3]	202D242	222D242	9.7 [0.4]
14, 16	202K163	222K163	9.9 [0.4]	202D253	222D253	10.5 [0.4]
18, 20, 22	202K174	222K174	15.7 [0.6]	202D263	222D263	12.2 [0.5]
24	202K185	222K185	16.8 [0.7]	—	—	—

Uniboot Parts

Tinel-Lock Entry Size	Part No.	Cable OD (Min.)
04	202C611	4.8 [0.19]
05, 06, 07	202C621	8.1 [0.32]
08, 10, 12	202C632	12.7 [0.50]
12, 14, 16	202C642	17.5 [0.69]
16, 18, 20, 22	202C653	22.4 [0.88]
24	202C663	22.9 [0.90]

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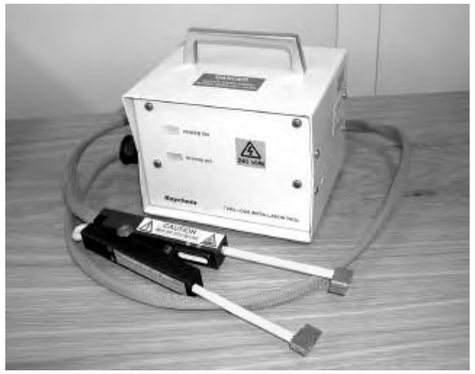
AD-5000 and RH-396X Tinel-Lock Installation Tool
Tinel-Lock Screened Termination Products



Applications

The AD-5000-TINEL-ASSY is a manually operated resistance heating tool designed specifically to install Raychem Tinel-Lock ring screened terminations in small batches. Recommended maximum continuous batch is 15, 6 second installations. The standard tool accommodates Tinel Rings from size TR04 to TR24 inclusive.

Various electrode (jaws) types can be used to install other Tinel-Lock ring sizes and types. The operator uses the hand-held tool to install the Tinel-Lock ring in its correct position on screened terminations. The Tinel-Lock ring has two patches of thermochromic paint on the Tinel-Lock ring.

The operator positions the Tinel-Lock ring on the terminations, with at least one of the patches of thermochromic paint visible. The Tinel-Lock ring is then clamped in the jaws to start the installation. Installation is complete when the thermochromic paint turns black.

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AD-5000 and RH-396X Tinel-Lock Installation Tool
Tinel-Lock Screened Termination Products (Continued)

Technical Specification

Electrical Supply	220V-240V-50Hz
Machine Cycle Times for Tinel-Lock rings used on typical range of harnesses:	5 to 15 Seconds depending on ring size and braid type on the termination.
Mains Fuse	240 V 2 Amp (Type T anti - surge)
Total System Noise	Silent Operation
Dimensions	340 x 320 x 170 mm [13.4 x 13 x 6.7 in]
Weight	4.2 Kg

Product Range

	Tinel-Lock Rings
STANDARD ELECTRODES FITTED :	Sizes TRO4 to TR24
Conduit Electrodes Fitted	Conduit systems / TR rings on double braid
Square Profile Electrodes Fitted	TC02-TC03 RINGS

Ordering Information

	Description	Part No.
Tinel installation tool (220V-240V)	AD-5000-TINEL-ASSY	411993-000
Also available in the US and Asia Pacific: Resistance heating tool: 915088-01. Use with American Beauty Transformer - #105-A12 (110V) or #105-A12-220V (220V) and foot switch #10519		
Tinel installation tool (120 VAC)	RH-3960-1-TINEL-KIT-120V	173643-000
Tinel installation tool (220 VAC)	RH-3965-1-TINEL-KIT-220V	859855-000

Recommended Spares — AD-5000

Hand Tool Assembly	AD-5000-TINEL-HAND-TOOL	795257-000
Standard Electrodes (TR04 to TR24 RINGS)	AD-5000-TINEL-STD-ELECT	180245-000
Conduit Electrodes (Conduit systems or TR rings on double braid)	AD-5000-TINEL-COND-ELECT	747235-000
Square Profile Electrodes (TC02-TC03 RINGS)	AD-5000-TINEL-SQ-EXT-ELEC	065583-000

Recommended Spares — RH-396X

Hand Tool Assembly	915088-01-TINI-RING-HEATR	170224-000
Foot Switch	IR-500-P-FOOT-SWITCH	993702-000
120 VAC Transformer	TRNSFMR-120V-105-A12-250W	570939-000
220 VAC Transformer	TRNSFMR-220V-105-A12-250W	574557-000

N.B. Electrodes are two per P.C.N.

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AD-5010-Tinel Bench-230V Tinel-Lock Installation Tool
Tinel-Lock Screened Termination Products

Applications

The AD-5010-TINEL-BENCH-230V is a manually operated resistance heating tool designed specifically to install Raychem Tinel-Lock ring screened terminations in large batches, in continuous operation. The tool accommodates Tinel Rings from size TR04 to TR24 inclusive. Various electrode (jaws) types can be used to install other Tinel-Lock ring sizes and types.

The operator uses the tool to install the Tinel-Lock ring in its correct position on screened terminations. The Tinel-Lock ring has two patches of thermochromic paint to ensure consistent installation.

The operator positions the Tinel-Lock ring on the termination, with at least one of the patches of thermochromic paint visible, and operates the push-button (or footswitch if fitted).

The Tinel-Lock ring is then located in spring-loaded jaws (it is not necessary to clamp the ring manually). The push button or footswitch (if fitted) is then operated to start the cycle, the cable is held in position for the duration of the installation. This is complete when the thermochromic paint turns black. This normally takes between 3 to 12 seconds, depending on ring size, braid type etc. An ammeter on the front panel shows installation current used. A needle file is provided for periodic cleaning of the electrodes.

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AD-5010-Tinel Bench-230V Tinel-Lock Installation Tool
Tinel-Lock Screened Termination Products (Continued)

Technical Specification

Electrical Supply	230 V 50 Hz
Machine Cycle Times for Tinel-Lock rings used on typical range of harnesses:	3 to 12 Seconds depending on ring size and braid type on the termination.
Mains Fuses (2)	240 V 2 Amp (Type T anti - surge)
Total System Noise	Silent Operation
Dimensions	245 x 305 x 290 mm [10 x 12 x 11 in]
Weight	24 Kg

Product Range

	Tinel-Lock Rings
STANDARD ELECTRODES FITTED :	Sizes TRO4 to TR24, conduit systems and TR rings on double braid
Square Profile Electrodes Fitted	TC02-TC03 RINGS

Accessories

	Description	Part No.
Footswitch Kit	AD-5010-BENCH-FOOTSW-KIT	072845-000

Recommended Spares

	Description	Part No.
Standard Electrodes (TR04-TR24 RINGS)	AD-5010-BENCH-STD-ELECT	222899-000
Square Profile Electrodes (TC02-TC03 RINGS)	AD-5010-BENCH-SQ-ELECT	727799-000
Mechanism Assembly (Including electrode set)	AD-5010-BENCH-MECH	924079-000

N.B Electrodes are two per P.C.N.

Ordering Information

	Description	Part No.
Tinel installation tool	AD-5000-TINEL-ASSY	411993-000

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BSTS/BSTS-FR	General purpose, heat-shrinkable tubing	12-49, 12-50
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METRIC
Dimensions in this section are millimeters over inches

Note: Users should independently evaluate the suitability of the product for their application. Before ordering, check with Tyco Electronics for most current data.

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Heat-Shrink Tubing, Molded Parts and Adhesives

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Overview

Tyco Electronics Raychem brand of tubing was developed when our scientists pioneered the application of radiation crosslinking and the development of heat-shrinkable polymer products. Today Tyco Electronics is recognized worldwide for its expertise in these areas.

The Raychem brand of tubings are made of polyolefins, fluoropolymers, and elastomers enhanced by radiation crosslinking and heat-shrinkability. When heated during installation, our tubings shrink to conform to virtually any shape. They provide dependable insulation, mechanical protection, and strain relief, as well as aesthetic appeal.

Single wall tubings are available in thin-wall, medium-wall, and thick-wall versions. With dual wall tubings, an inner wall — either an encapsulant or an adhesive — melts and flows during installation heating, to protect against environmental damage. Encapsulants protect connections and components from splashes and corrosion. Adhesives go a step further, sealing to plastic, metal, rubber, or other substrates.

You can choose from tubings that are highly flexible or semirigid, designed for operation in high- or low-temperature environments, and halogen-free and flame-retardant to meet a range of industry standards.

Available in many sizes, constructions, lengths, and colors to meet both commercial and military specifications, our tubings can also be customized for special applications.

Installation is fast and easy with handheld heating tools or bench-mounted heaters. A range of automatic and semi-automatic installation equipment is available for high-volume applications.

Tubing Categories

	Type	Product Name		
Single Wall	Very Flexible	LSTT Versafit	Versafit V2 Versafit V4	
	Flexible	CGPT DCPT RNF-100	RNF-3000 RP-4800	
	Semirigid	CRN	RT-3	
Dual Wall	Semi-flexible	ATUM	DWP-125	HTAT
	Flexible	TAT-125		
	Semirigid	ES1000 ES2000	FL2500 SCL	SCT
Heavy Duty		BSTS HF	HRHF/HRNF/HRSR SST	
Special Purpose	Elastomers	DR-25 NT-MIL NTFR	SFR SRFR RW-200	RW-200-E
	Fluoropolymers	RNF-150 RT-375	RT555 RW-175	TFE and TFE-R
	MicroFit	MFT-RW-175		
	Caps	ES Caps PD Caps		
	Conduit	HCTE		
	Kits	RayBlock 85	RayBlock 105	
	Low toxicity	XFFR	ZH-100	ZHTM
	Fiber and fabric	HFT5000		
	Braid	RF-PET	RF-PFR	RF-PETM

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Tubing Selection Guide

		PRODUCT	Polyolefin	Fluoropolymer	Elastomer	Operating Temperature °C / [°F]		Min. Shrink Temperature (°C)	Min. Full Recovery Temperature (°C)	Shrink Ratio
Single Wall	Very flexible	LSTT	.			–40 to 125	[–40 to 257]	65	110	2:1
		Versafit	.			–55 to 135	[–67 to 275]	70	90	2:1
		Versafit V2	.			–30 to 125	[–22 to 257]	70	90	2:1
		Versafit V4	.			–30 to 125	[–22 to 257]	70	90	2:1
	Flexible	CGPT	.			–40 to 135	[–40 to 275]	80	120	2:1
		DCPT	.			–55 to 135	[–67 to 275]	95	120	2:1
		RNF-100	.			–55 to 135	[–67 to 275]	95	121	2:1
		RNF-3000	.			–55 to 135	[–67 to 275]	80	120	3:1
		RP-4800	.			–55 to 135	[–67 to 275]	95	121	4:1
	Semirigid	CRN	.			–55 to 135	[–67 to 275]	110	135	2:1
		RT-3	.			–55 to 135	[–67 to 275]	110	135	2.5:1
Dual wall [adhesive-and encapsulant-lined]	Semiflexible	ATUM	.			–55 to 110	[–67 to 230]	80	110	3:1 4:1
		DWP-125	.			–40 to 110	[–40 to 230]	80	125	3:1
		HTAT	.			–55 to 125	[–67 to 257]	80	110	4:1
	Flexible	TAT-125	.			–55 to 110	[–67 to 230]	95	121	2:1
	Semirigid	ES1000	.			–40 to 130	[–40 to 266]	110	135	4:1
		ES2000	.			–40 to 130	[–40 to 266]	110	135	4:1
		FL2500	.			–40 to 135	[–40 to 275]	110	135	4:1
		SCL	.			–55 to 110	[–67 to 230]	125	135	3:1
		SCT	.			–40 to 150	[–40 to 302]	110	135	4:1
Heavy Duty		BSTS	.			–55 to 90	[–67 to 194]	90	121	3:1
		HF	.			–55 to 90	[–67 to 194]	80	121	3:1
		HRHF/HRNF/HRSR	.			–55 to 90	[–67 to 194]	80	121	5.6:1
		SST	.			–55 to 90	[–67 to 194]	90	121	3:1
Special	Elastomers	DR-25			.	–75 to 150	[–103 to 302]	150	175	2:1
Purpose		NT-MIL			.	–70 to 121	[–94 to 250]	90	135	2:1
		NTFR			.	–70 to 121	[–94 to 250]	90	135	2:1
		SFR			.	–75 to 180	[–103 to 356]	135	175	1.75:1
		SRFR			.	–75 to 200	[–103 to 392]	135	175	1.5:1
		RW-200			.	–40 to 200	[–40 to 392]	100	175	2:1
		RW-200-E			.	–55 to 200	[–67 to 392]	100	175	2:1
	Fluoropolymers	RNF-150		.		–55 to 150	[–67 to 302]	110	150	2:1
		RT-375		.		–55 to 150	[–67 to 302]	125	150	2:1
		RT555		.		–65 to 200	[–85 to 392]	150	220	2:1
		RW-175		.		–55 to 175	[–67 to 347]	155	175	2:1
		TFE and TFE-R		.		–67 to 250	[–89 to 482]	330	340	1.8:1/ 3.2:1
	MicroFit	MFT-RW-175		.		–55 to 175	[–67 to 347]	155	175	2.5:1
	Caps	ES Caps	.			–40 to 105	[–40 to 221]	100	135	4:1
		PD Caps	.			–55 to 110	[–67 to 230]	125	135	3:1
	Conduit	HCTE		.		–55 to 200	[–67 to 392]	N/A	N/A	N/A
	Kits	RayBlock 85	.			–40 to 85	[–40 to 185]	80	110	4:1
		RayBlock 105	.			–40 to 105	[–40 to 221]	80	110	4:1
	Low Toxicity	XFFR	.			–55 to 105	[–67 to 221]	70	121	3:1
		ZH-100	.			–30 to 105	[–22 to 221]	80	120	2:1
		ZHTM	.			–30 to 105	[–22 to 221]	80	121	2:1
	Fiber & Fabric	HFT5000				–40 to 125	[–40 to 257]	80	110	2:1
	Braids	RF-PET				–50 to 150	[–58 to 302]	N/A	N/A	N/A
		RF-PFR				–50 to 150	[–58 to 302]	N/A	N/A	N/A
		RF-PETM				–50 to 150	[–58 to 302]	N/A	N/A	N/A

* For specific MIL-Spec information for each product, refer to individual product pages or the Tubing Cross-Reference Guide on page 12-8.
** Sizes 9/3 through 70/21 only.
† Clear is not flame-retardant.

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UK: 44-208-420-8341

Tubing Selection Guide (Continued)

Size Range (Inside Diameter as Supplied)	Colored	Clear	Flame-Retardant	UL 224	CSA	VW-1 (UL/CSA)	MIL Spec*	USP Class VI	ABS	DESCRIPTION
1.6 mm to 38 mm	.	.								Non-flame-retardant polyolefin
3/64" to 4"	.		.	.	.	.	.			Highly flame-retardant, multi-spec polyolefin
1 mm to 30 mm	.		.	.	.	.				Highly flame-retardant polyolefin
3/64" to 1"	.		.	.	.	.				Very-thin-wall, highly flame-retardant polyolefin
1 mm to 10 mm	.		.	.	.	.				
1.6 mm to 38 mm	.	.	.	.	.					General purpose, flame-retardant polyolefin†
3 mm to 38 mm	.		.	.	.					Green and yellow striped polyolefin
3/64" to 5"	.	.	.	.	.		.			High-performance flexible polyolefin†
1.5 mm to 39 mm	.	.	.	.	.		.			3:1 shrink ratio general-purpose polyolefin†
3/4" to 4.5"	.		.	.			.			4:1 shrink ratio polyolefin
3/64" to 3/4"	.	.	.	.	.		.			Flame-retardant polyolefin†
.240" to .485"	.		.	.	.					Semirigid polyolefin for terminal insulation
3 mm to 40 mm	.	.	.	.			.			3:1 and 4:1 shrink ratio adhesive-lined polyolefin†
4 mm to 52 mm	.		.	.						
1/8" to 1"	.		.	.	.					3:1 shrink ratio adhesive-lined polyolefin
4 mm to 48 mm	.		.							High-temperature adhesive-lined polyolefin
1/8" to 1 1/2"	.	.	.	.			.			2:1 adhesive-lined polyolefin†
.225" to .700"		.		.						Clear high-shrink-ratio adhesive-lined polyolefin
.225" to .700"	.		.	.						Flame-retardant adhesive-lined polyolefin
.300" to .700"	.		.							Fully flame-retardant, adhesive-lined polyolefin
1/8" to 1"	.			.			.			3:1 shrink ratio encapsulant-lined polyolefin
.300" to .700"	.		.							High-temperature adhesive-lined polyolefin
.3" to 4.5"	.		.						.	Rugged, general purpose, thick-wall polyolefin
.4" to 2.7"	.		.						.	Highly flexible, thick-wall polyolefin
.6" to 4"	.		.						.	High-shrink-ratio repair sleeve
.3" to 4.5"	.		.				.		.	Self-sealing, dual wall polyolefin
1/8" to 3"	.		.				.			Diesel-resistant elastomer
1/8" to 4"	.		.				.			Flexible rugged modified elastomer
1/8" to 3"	.		.				.			Very flexible rugged neoprene
1/4" to 2"	.		.				.			Very flexible silicone
2.9 mm to 51 mm	.		.	.		.				Very flexible silicone rubber
1/8" to 2"	.		.				.			High-temperature flexible elastomer
1/8" to 2"	.		.				.			High-temperature flexible elastomer
3/64" to 1"	.		.	.		.	.			High-performance flexible fluoropolymer
3/64" to 1 1/2"	.	.	.	.	.	.	.			Clear high-performance flexible fluoropolymer
1/8" to 2"	.		.	.		.				Fluid- and chemical-resistant fluoropolymer
3/64" to 1 1/2"	.	.	.	.	.	.	.			High-performance fluoropolymer
0.8 mm to 11.9 mm/		.	.				.			High-temperature Teflon fluoropolymer resin
2 mm to 32 mm										
.014" to .045"	.	.	.							High performance fluoropolymer microtubing
.225" to .427"	.	.	.	.						High-ratio, adhesive-lined caps
1/8" to 1/2"	.			.						Semirigid encapsulant-lined polyolefin caps
.187" to 2"	.		.							Modified ETFE, helically convoluted tubing
12 mm to 32 mm	.		.							Heat-shrinkable water blocking system
12 mm to 32 mm	.		.							Heat-shrinkable water blocking system
.4" to 3"	.		.						.	Halogen-free, flame-retardant polyolefin
1/8" to 2"	.		.							Thin-wall, low-fire-hazard polyolefin
3 mm to 40 mm	.		.							Low toxicity, flexible polyolefin
12 mm to 80 mm	.									Heat-shrinkable, fabric tubing
1/8" to 2"	.									Expandable, braided polyester sleeving
1/8" to 2"	.		.	.	.	.				Expandable, braided polyester sleeving
3 mm to 50 mm	.									Expandable, braided polyester sleeving

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Specification Cross-Reference Guide

Product Type	UL File	CSA File	AMS-DTL-23053* Sheet	AMS-DTL-23053* Class	MIL-PRF-46846 Type	MIL-PRF-46846 Class	Raychem Specification
ATUM	E85381**		/4	3			RW-2063 & RK-6024
BSTS							RW-2017
BSTS-FR			/15	1 & 2			RW-2017
CGPT	E35586	LR31929					RW-2059
CRN Type 1 (colors)	E35586	LR31929†	/6	1			RT-360, Type 1
CRN Type 2 (clear)			/6	2			RT-360, Type 2
DCPT	E35586	LR31929					RW-2056
DR-25			/16				RT-1116
DWP-125	E35586	LR31929					DWP-125 SCD
ES1000	E85381						RT-1113
ES2000	E85381						RT-1112
ES Caps	E85381						RW-3006
FL2500							FL2500 SCD
HCTE							RT-1162
HF			/15	1			RW-2023
HFT5000	E199379						RW-2060
HRSR							RW-2013
HRNF							RW-2013
HRHF							RW-2013
HTAT							RW-2052
LSTT							RW-2051
MFT-RW-175							RW-175 MicroFit SCD
NT-MIL			/1	1 & 2			RW-3030
NTFR							RT-511
PD Caps	E85381						PD Caps SCD
RayBlock 85							RW-2101
RayBlock 105							RW-2102
RF-PETM							
RF-PET							RW-2069
RF-PFR							
RNF-100 Type 1 (colors)	E35586	LR31929	/5	1			RT-350, Type 1
RNF-100 Type 2 (clear)			/5	2			RT-350, Type 2
RNF-150	E35586 VW-1		/18	2			RT-370
RNF-3000	E35586	LR31929					RW-2053
RP-4800	E35586		/5	1††			RT-1122
RT-3	E35586	LR31929†					RT-360†††
RT-375	E35586 VW-1	LR31929 VW-1	/18	2			RT-375
RT555	E85381						RT-555
RW-175	E35586 VW-1	LR31929 VW-1	/8				RW-3029
RW-200			/13				RT-1146
RW-200-E							RK-6014/1
SCL	E85381		/4	1			RT-1301
SCT							SCT SCD
SFR			/10		II	1	RT-1140
SRFR	E85381 VW-1						RT-1142/RW-2057
SST							RW-2011
SST-FR			/15	1 & 2			RW-2011
TAT-125 Type 1 (colors)	E85381		/4	2			TAT-125 SCD
TAT-125 Type 2 (clear)							TAT-125 SCD
TFE/TFE-R							RW-2054, RW-2055
Versafit	E35586 VW-1	LR31929 VW-1	/5	1 & 3			RW-3009
Versafit V2	E35586 VW-1	LR31929 VW-1					RW-3023
Versafit V4	E85381 VW-1	LR31929 VW-1					RW-3023
XFFR							RW 2016
ZH-100							RW-2031
ZHTM							RW-2058

* Formerly MIL-I-23053 and MIL-DTL-23053 ** Black only, except sizes 3/1 and 4/1.
† Black only †† Overexpanded ††† With exception to dimensions and longitudinal change.

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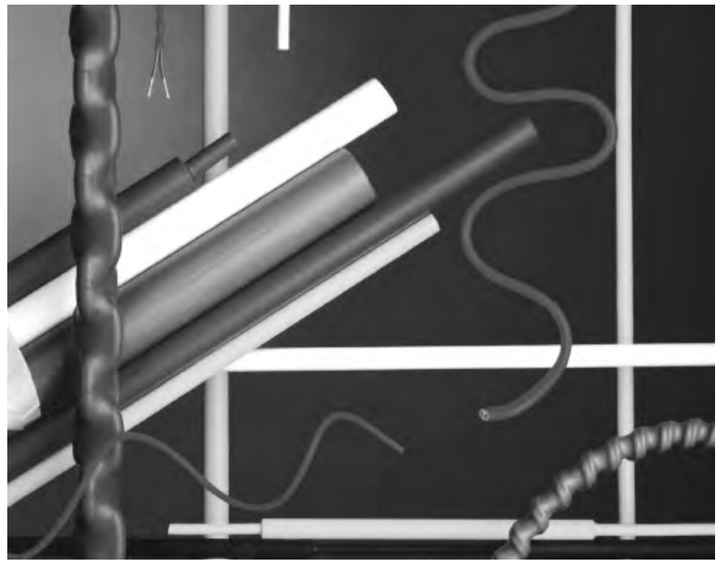
CGPT

General Purpose, Flame-Retardant* Polyolefin Tubing

Product Facts

- 2:1 and 3:1 shrink ratio
- Very good chemical and solvent resistance
- Flexible
- Excellent physical and electrical performance



Applications

CGPT is a tough, flexible, general purpose polyolefin tubing with good resistance to common fluids and solvents and a high dielectric strength. Its unique blend of chemical, electrical, and physical properties makes it suitable for a wide range of applications, including electrical insulation, strain relief, cable bundling, color-coding and identification of wires, cables, pipes, and electrical and electronic components, and mechanical protection.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 120°C [248°F]

Operating Temperature Range

-40°C to 135°C
[-40°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Raychem
CGPT	E35586 600 V, 125°C	LR31929 600 V, 125°C	RW-2059

* Clear product (-X) is not flame-retardant.

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CGPT (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
2:1			
1.2/06	1.2 [0.046]	0.6 [0.023]	0.45 ± 0.12 [0.018 ± 0.005]
1.6/0.8	1.6 [0.062]	0.8 [0.031]	0.45 ± 0.12 [0.018 ± 0.005]
2.4/1.2	2.4 [0.093]	1.2 [0.046]	0.50 ± 0.12 [0.019 ± 0.005]
3.2/1.6	3.2 [0.125]	1.6 [0.062]	0.50 ± 0.12 [0.019 ± 0.005]***
4.8/2.4	4.8 [0.187]	2.4 [0.093]	0.50 ± 0.12 [0.019 ± 0.005]***
6.4/3.2	6.4 [0.250]	3.2 [0.125]	0.65 ± 0.15 [0.026 ± 0.006]***
9.5/4.8	9.5 [0.375]	4.8 [0.187]	0.65 ± 0.15 [0.026 ± 0.006]***
12.7/6.4	12.7 [0.500]	6.4 [0.250]	0.65 ± 0.15 [0.026 ± 0.006]***
19/9.5	19.0 [0.748]	9.5 [0.375]	0.75 ± 0.15 [0.029 ± 0.006]***
25.4/12.7	25.4 [1.000]	12.7 [0.500]	0.90 ± 0.20 [0.035 ± 0.008]***
32/16	32.0 [1.250]	16.0 [0.630]	0.95 ± 0.20 [0.037 ± 0.008]***
38/19	38.0 [1.496]	19.0 [0.748]	1.00 ± 0.20 [0.039 ± 0.008]***
51/26	51.0 [2.000]	26.0 [1.000]	1.15 ± 0.25 [0.045 ± 0.010]
76/38	76.0 [2.992]	38.0 [1.496]	1.25 ± 0.25 [0.049 ± 0.010]
102/51	102.0 [4.016]	51.0 [2.008]	1.40 ± 0.30 [0.055 ± 0.012]
3:1			
1.5/0.5	1.5 [0.059]	0.5 [0.020]	0.45 ± 0.12 [0.018 ± 0.005)***
3/1	3.0 [0.118]	1.0 [0.040]	0.55 ± 0.12 [0.022 ± 0.005)***
6/2	6.0 [0.236]	2.0 [0.079]	0.65 ± 0.12 [0.026 ± 0.005)***
9/3	9.0 [0.354]	3.0 [0.118]	0.75 ± 0.15 [0.030 ± 0.006)***
12/4	12.0 [0.472]	4.0 [0.157]	0.75 ± 0.15 [0.030 ± 0.006)***
18/6	18.0 [0.709]	6.0 [0.236]	0.85 ± 0.15 [0.033 ± 0.006)***
24/8	24.0 [0.945]	8.0 [0.315]	1.00 ± 0.20 [0.039 ± 0.008]***
39/13	39.0 [1.540]	13.0 [0.512]	1.15 ± 0.25 [0.045 ± 0.010]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0), White (-9), red (-2), blue (-6), yellow (-4), green (-5), clear (-X), yellow/green (-45) as indicated by an ***
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging****	On spools.	
Ordering description	Specify product name, size and color (for example, CGPT 4.8/2.4-0).	

**** Available in the convenient RaySpool packaging/dispensing system for sizes:
2:1 - 2.4/1.2 up to 25.4/12.7
3:1 - 3/1 up to 24/8

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CRN

Semirigid, Flame-Retardant, Polyolefin Tubing

Product Facts

- 2:1 shrink ratio
- High abrasion resistance
- Transfer of flex stress away from typically weak points such as solder and crimp joints, helping ensure a reliable connection
- Flame-retardance (colors only)
- Outstanding physical and electrical performance
- Excellent chemical and solvent-resistance properties

Applications

Ideally suited for wire strain-relief applications such as soldered or crimped connections, wire splices, and terminations. Provides mechanical protection for delicate components. Can be used for component packaging and for rugged marking of cables.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-55°C to 135°C [-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Military	Raychem
CRN Type 1 (colors)	E35586 600 V, 125°C	LR31929 (black only) 600 V, 125°C	AMS-DTL-23053/6*, Class I	RT-360, Type 1 RK-6003
CRN Type 2 (clear)	—	—	AMS-DTL-23053/6*, Class 2	RT-360, Type 2

* Formerly MIL-I-23053/6 and MIL-DTL-23053/6.

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CRN (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
3/64	1.2 [0.046]	0.6 [0.023]	0.51 ± 0.08 [0.020 ± 0.003]
1/16	1.6 [0.063]	0.8 [0.031]	0.51 ± 0.08 [0.020 ± 0.003]
3/32	2.4 [0.093]	1.2 [0.046]	0.51 ± 0.08 [0.020 ± 0.003]
1/8	3.2 [0.125]	1.6 [0.062]	0.51 ± 0.08 [0.020 ± 0.003]
3/16	4.8 [0.187]	2.4 [0.093]	0.64 ± 0.08 [0.025 ± 0.003]
1/4	6.4 [0.250]	3.2 [0.125]	0.64 ± 0.08 [0.025 ± 0.003]
3/8	9.5 [0.375]	4.8 [0.187]	0.76 ± 0.08 [0.030 ± 0.003]
1/2	12.7 [0.500]	6.4 [0.250]	0.76 ± 0.08 [0.030 ± 0.003]
3/4	19.1 [0.750]	9.5 [0.375]	0.89 ± 0.12 [0.035 ± 0.005]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	Clear (-X, not flame-retardant)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	In 1.2-meter [4-foot] lengths.	
Ordering description***	Specify product name, size and color (for example, CRN 1/4-0).	

*** Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

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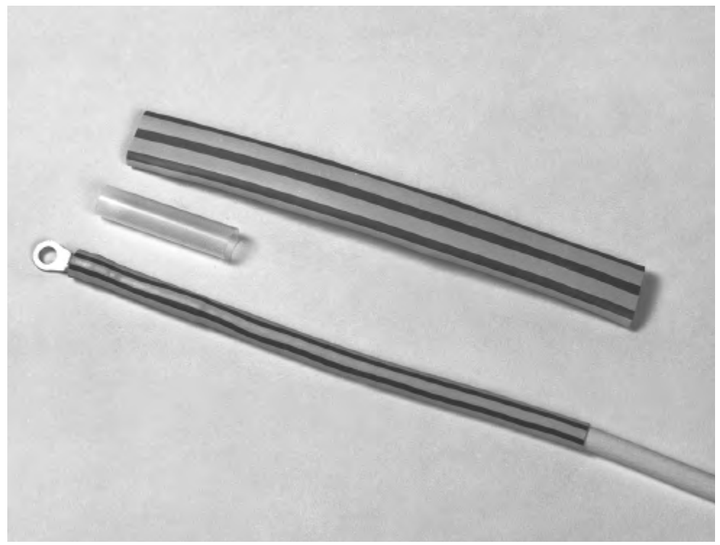
DCPT

Flexible, Flame-Retardant, Dual-Color, Polyolefin Tubing

Product Facts

- 2:1 and 3:1 shrink ratio
- Dual colors (yellow/green) for instant identification
- Co-extrusion of tubing colors, giving color permanence superior to that of conventional ink marking
- Flame-retardance
- Flexibility: able to conform to irregular shapes
- Excellent physical, chemical, and electrical properties that meet industry standards for highly reliable, general purpose tubing



Applications

Used to identify “ground” on wires and in cables, and to jacket and insulate light-duty harnesses.

Easily marked by conventional techniques for additional identification of wires and cables.

Installation

Minimum shrink temperature: 95°C [203°F]

Minimum full recovery temperature: 120°C [248°F]

Operating Temperature Range

-55°C to 135°C [-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Military	Agency	Raychem
DCPT	E35586 600 V, 125°C	LR31929 600 V, 125°C	Def Stan 59-97 Issue 3 Type 2B VG 95343 Pt 5 Type A	AFS 2270 DIN 29807 VDE 0341 Pt 9005 Type A	RW-2056

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DCPT (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness* After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
2:1			
3/1.5	3 [0.118]	1.5 [0.059]	0.51 ± 0.10 [0.020 ± 0.004]
6/3	6 [0.236]	3.0 [0.118]	0.58 ± 0.10 [0.023 ± 0.004]
8/4	8 [0.315]	4.0 [0.158]	0.64 ± 0.10 [0.025 ± 0.004]
10/5	10 [0.394]	5.0 [0.197]	0.64 ± 0.10 [0.025 ± 0.004]
12/6	12 [0.472]	6.0 [0.236]	0.64 ± 0.10 [0.025 ± 0.004]
19/9	19 [0.748]	9.0 [0.354]	0.76 ± 0.12 [0.030 ± 0.005]
26/13	26 [1.024]	13.0 [0.512]	0.89 ± 0.12 [0.035 ± 0.005]
38/19	38 [1.500]	19.0 [0.748]	1.00 ± 0.12 [0.039 ± 0.005]
51/19	51 [2.000]	19.0 [0.748]	1.02 ± 0.15 [0.040 ± 0.006]
3:1 (Europe only)			
3/1	3.0 [0.118]	1.0 [0.039]	0.55 ± 0.10 [0.022 ± 0.004]
6/2	6.0 [0.236]	2.0 [0.079]	0.65 ± 0.10 [0.026 ± 0.004]
9/3	9.0 [0.354]	3.0 [0.118]	0.75 ± 0.15 [0.030 ± 0.006]
12/4	12.0 [0.472]	4.0 [0.157]	0.75 ± 0.15 [0.030 ± 0.006]
18/6	18.0 [0.709]	6.0 [0.236]	0.85 ± 0.15 [0.033 ± 0.006]
24/8	24.0 [0.945]	8.0 [0.315]	1.00 ± 0.20 [0.039 ± 0.008]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Yellow/green stripe (-45)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools.	
Ordering description**	Specify product name, size and color (for example, DCPT 8/4-45).	

** Europe only. For supply to Def Stan and BS add -DS or -BS to ordering description.

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

LSTT

Low-Shrink-Temperature, Non-Flame-Retardant, Heat-Shrinkable, Polyolefin tubing

Product Facts

- 2:1 shrink ratio
- Rapid recovery at low temperatures
- Can be used with temperature-sensitive materials
- Flexible
- Not flame-retardant
- Excellent physical and electrical performance

Applications

LSTT is a highly flexible, low-shrink-temperature, heat-shrinkable tubing. Its low shrink temperature offers exceptionally fast recovery for maximum efficiency in high-volume commercial applications and makes it suitable for use on or near delicate, temperature-sensitive materials, such as PVC jacketed wire and cable. Although not flame-retardant, LSTT meets the automotive flame propagation standard MVSS 302.

Typical applications include electrical termination insulation, color-coding, covering of heat-sensitive devices, cosmetic coverings, and mechanical protection.

Installation

Minimum shrink temperature: 65°C [149°F]

Minimum full recovery temperature: 110°C [230°F]

Operating Temperature Range

-40°C to 125°C [-40°F to 257°F]

Specifications/Approvals

Series	Industry	Raychem
LSTT	MVSS302	RW-2051

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

LSTT (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness* After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
1.6	1.6 [0.063]	0.8 [0.031]	0.50 ± 0.12 [0.018 ± 0.005]
2.4	2.4 [0.093]	1.2 [0.046]	0.55 ± 0.12 [0.022 ± 0.005]
3.2	3.2 [0.125]	1.6 [0.062]	0.55 ± 0.12 [0.022 ± 0.005]
4.8	4.8 [0.187]	2.4 [0.093]	0.55 ± 0.12 [0.022 ± 0.005]
6.4	6.4 [0.250]	3.2 [0.125]	0.65 ± 0.15 [0.026 ± 0.006]
9.5	9.5 [0.375]	4.8 [0.187]	0.65 ± 0.15 [0.026 ± 0.006]
12.7	12.7 [0.500]	6.4 [0.250]	0.65 ± 0.15 [0.026 ± 0.006]
19.0	19.0 [0.748]	9.5 [0.375]	0.80 ± 0.15 [0.032 ± 0.006]
25.4	25.4 [1.000]	12.7 [0.500]	0.95 ± 0.18 [0.037 ± 0.007]
32.0	32.0 [1.260]	16.0 [0.630]	1.05 ± 0.20 [0.041 ± 0.008]
38.0	38.0 [1.496]	19.0 [0.748]	1.05 ± 0.20 [0.041 ± 0.008]
52.0**	52.0 [2.047]	26.0 [1.024]	1.14 ± 0.18 [0.045 ± 0.007]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.
** Available in black only.

Ordering Information

Color	Standard	Black (-0), white (-9), red (-2), blue (-6), yellow (-4)
	Nonstandard	Green (-5), grey (-8), clear (-X)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On plastic spools***	
Ordering description	Specify product name, size and color (for example, LSTT 6.4-0).	

*** Available in the convenient RaySpool packaging/dispensing system, for sizes 2.4 up to 25.4

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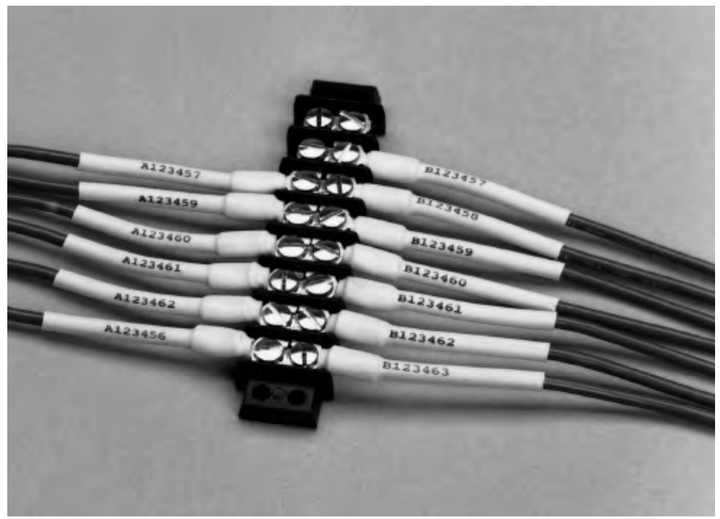
RNF-100

Flexible, Flame-Retardant, General Purpose, Polyolefin Tubing

Product Facts

- 2:1 shrink ratio
- Superior abrasion and solvent resistance when compared with that of many flexible, general purpose polyolefin tubings
- Excellent physical, chemical, and electrical properties that meet or exceed industrial and military standards for highly reliable, general purpose tubing
- Flexible; conforms to irregular shapes
- Flame-retardant (colors only)
- Wide range of sizes and colors



Applications

Designed to provide superior mechanical (abrasion, cut-through, and strain relief), thermal, and fluid-resistance performance in demanding environments. Widely used to provide insulation and strain relief of wire terminations and connections. Used for jacketing wire bundles and light-duty harnesses where superior abrasion resistance is a plus. Also used to identify and color-code electrical connections and wire bundles.

Installation

Minimum shrink temperature: 95°C [203°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

-55°C to 135°C
[-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Military	Industry	Raychem
RNF-100 Type 1 (colors)	E35586 600 V, 125°C	LR31929 600 V, 125°C	AMS-DTL-23053/5*, Class 1 Def. Stan. 59-97 Type 2B	VDE 0341 Pt 9005 Type A and B	RT-350, Type 1 RK-6001
RNF-100 Type 2 (clear)	—	—	AMS-DTL-23053/5*, Class 2 VG 95343 Pt 5 Type B	—	RT-350, Type 2 RK-6001

* Formerly MIL-I-23053/5 and MIL-DTL-23053/5.

Catalog 1308940
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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

RNF-100 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
3/64	1.2 [0.046]	0.6 [0.023]	0.40 ± 0.08 [0.016 ± 0.003]
1/16	1.6 [0.063]	0.8 [0.031]	0.43 ± 0.08 [0.017 ± 0.003]
3/32	2.4 [0.093]	1.2 [0.046]	0.51 ± 0.08 [0.020 ± 0.003]
1/8	3.2 [0.125]	1.6 [0.062]	0.51 ± 0.08 [0.020 ± 0.003]
3/16	4.8 [0.187]	2.4 [0.093]	0.51 ± 0.08 [0.020 ± 0.003]
1/4	6.4 [0.250]	3.2 [0.125]	0.64 ± 0.08 [0.025 ± 0.003]
3/8	9.5 [0.375]	4.8 [0.187]	0.64 ± 0.08 [0.025 ± 0.003]
1/2	12.7 [0.500]	6.4 [0.250]	0.64 ± 0.08 [0.025 ± 0.003]
3/4	19.1 [0.750]	9.5 [0.375]	0.76 ± 0.08 [0.030 ± 0.003]
1	25.4 [1.000]	12.7 [0.500]	0.89 ± 0.12 [0.035 ± 0.005]
1 1/4	31.8 [1.250]	15.9 [0.625]	1.02 ± 0.15 [0.040 ± 0.006]
1 1/2	38.1 [1.500]	19.1 [0.750]	1.02 ± 0.15 [0.040 ± 0.006]
2	50.8 [2.000]	25.4 [1.000]	1.14 ± 0.16 [0.045 ± 0.007]
3	76.2 [3.000]	38.1 [1.500]	1.27 ± 0.20 [0.050 ± 0.008]
4	101.6 [4.000]	50.8 [2.000]	1.40 ± 0.23 [0.055 ± 0.009]
5	127.0 [5.000]	63.5 [2.500]	1.52 ± 0.23 [0.060 ± 0.009]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0, BK), white (-9, WH), red (-2, RD), blue (-6, BU), yellow (-4, YO), green (-5, GN), clear (-X, CL)
	Nonstandard	Brown (-1, BN), orange (-3, OR), violet (-7, VT), gray (-8, GY)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request	
Standard packaging	On spools or in 1.2-meter [4-foot] lengths.	
Ordering description***	Specify product name, size and color (for example, RNF-100 1/4-0 [Europe] or RNF-100 1/4-BK [Americas]).	

*** Sizes 3/64" through 1" are available in an easy-to-use Mini-Spool packaging/dispensing system in the U.S.

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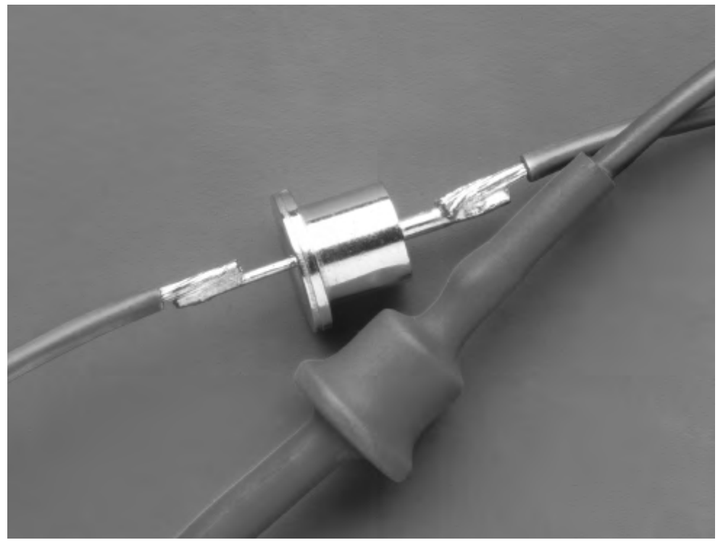
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

RNF-3000

Flexible, High-Shrink-Ratio, Flame-Retardant, General Purpose, Polyolefin Tubing

Product Facts

- 3:1 shrink ratio easily accommodates awkward, irregular shapes
- Few sizes cover a wide range of diameters, allowing reduced inventory
- Excellent physical, chemical, and electrical properties meet industry standards for highly reliable, general purpose tubing
- Flame-retardant (colors only)



Applications

Used for insulation and strain relief of wire terminations and electrical connections. Also ideal for light-duty harnessing, jacketing, and identification of wires, cables, and electrical and electronic components.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 120°C [248°F]

Operating Temperature Range

-55°C to 135°C [-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Military	Industry	Raychem
RNF-3000	E35586 600 V, 125°C	LR31929 600 V, 125°C	Def. Stan. 59-97 Type 2B VG 95343 Pt 5 Type A (color) VG 95343 Pt 5 Type B (clear)	VDE 0341 Pt 9005 Type A and B	RW-2053

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

RNF-3000 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
1.5/0.5	1.5 [0.060]	0.5 [0.019]	0.45 ± 0.10 [0.018 ± 0.003]
3/1	3 [0.118]	1 [0.039]	0.55 ± 0.10 [0.022 ± 0.003]
4.5/1.5	4.5 [0.177]	1.5 [0.059]	0.55 ± 0.10 [0.022 ± 0.003]
6/2	6 [0.236]	2 [0.079]	0.65 ± 0.10 [0.026 ± 0.003]
9/3	9 [0.354]	3 [0.118]	0.75 ± 0.12 [0.030 ± 0.004]
12/4	12 [0.472]	4 [0.157]	0.75 ± 0.12 [0.030 ± 0.004]
18/6	18 [0.709]	6 [0.236]	0.85 ± 0.12 [0.033 ± 0.004]
24/8	24 [0.944]	8 [0.315]	1.00 ± 0.18 [0.039 ± 0.007]
39/13	39 [1.534]	13 [0.512]	1.15 ± 0.20 [0.045 ± 0.008]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard**	Black (-0), white (-9), red (-2), blue (-6), yellow (-4), green (-5), clear (-X)
	Nonstandard	Brown (-1), orange (-3), violet (-7), gray (-8)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging***	On spools or in 1.2-meter [4-foot] lengths.	
Ordering description****	Specify product name, size and color (for example, RNF-3000 6/2-0).	

** Black is the only standard color in the Americas. All other colors are nonstandard.
*** Only spools are standard in the Americas. 1.2 meter [4-foot] lengths are nonstandard.
**** Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

RP-4800

High-Shrink-Ratio, Flame-Retardant, Polyolefin Tubing

Product Facts

- 4:1 shrink ratio
- Conforms well to highly variable substrate dimensions
- Has excellent physical, chemical, and electrical properties that meet or exceed industrial and military standards
- Shows no significant degradation when exposed to common solvents and chemicals, including aviation fuel and hydraulic fluid

Applications

Ideal for repairing harnesses or cables; will pass over a large-diameter connector or transition, and then shrink down onto a smaller-diameter jacket. Can insulate or protect a substrate of varying dimensions. Also provides the abrasion and fluid resistance required in harnessing applications.

Installation

Minimum shrink temperature: 95°C [203°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

-55°C to 135°C [-67°F to 275°F]

Specifications/Approvals

Series	UL	Military	Industry	Raychem
RP-4800	E35586 600V, 125°C (black only)	AMS-DTL-23053/5*, Class 1 Overexpanded VG 95343 Pt 5 Type A	VDE 0341 Pt 9005 Type A	RT-1122

* Formerly MIL-I-23053/5 and MIL-DTL-23053/5.

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

RP-4800 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
No. 1	25.4 [1.000]	7.0 [0.275]	1.14 ± 0.18 [0.045 ± 0.007]
No. 2	50.8 [2.000]	14.0 [0.550]	1.14 ± 0.18 [0.045 ± 0.007]
No. 3	76.2 [3.000]	20.6 [0.810]	1.14 ± 0.18 [0.045 ± 0.007]
No. 4	101.6 [4.000]	26.7 [1.050]	1.14 ± 0.18 [0.045 ± 0.007]
No. 5	25.4 [1.000]	11.7 [0.462]	1.14 ± 0.18 [0.045 ± 0.007]
No. 6	60.3 [2.375]	17.3 [0.680]	1.14 ± 0.18 [0.045 ± 0.007]
No. 7	76.2 [3.000]	21.3 [0.840]	1.14 ± 0.18 [0.045 ± 0.007]
No. 8	95.3 [3.750]	23.6 [0.930]	1.14 ± 0.18 [0.045 ± 0.007]
No. 9	114.3 [4.500]	36.8 [1.450]	1.14 ± 0.18 [0.045 ± 0.007]
No. 10	38.1 [1.500]	9.5 [0.375]	1.14 ± 0.18 [0.045 ± 0.007]
No. 11	19.1 [0.750]	4.6 [0.180]	1.14 ± 0.18 [0.045 ± 0.007]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9), red (-2), blue (-6), yellow (-4), green (-5), brown (-1), orange (-3), violet (-7), gray (-8)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools or in 1.2-meter [4-foot] lengths.	
Ordering description***	Specify product name, size and color (for example, RP-4800 NO.1-0).	

*** Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

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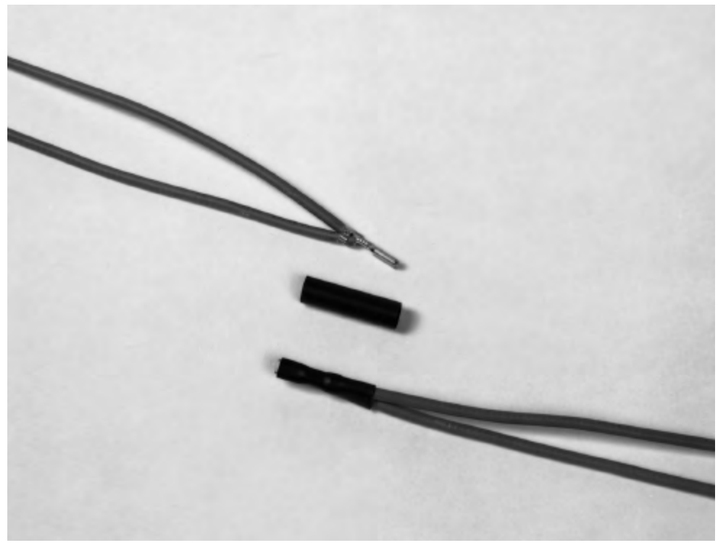
Japan: 81-44-844-8013
UK: 44-208-420-8341

RT-3

Semirigid, Flame-Retardant, Polyolefin Tubing

Product Facts

- 2.5:1 shrink ratio
- Tightly controlled expanded diameters
- High abrasion resistance
- Semirigidity that transfers flex stress away from typically weak points such as solder and crimp joints, helping to ensure a reliable connection
- Excellent chemical and solvent resistance
- Outstanding physical and electrical performance



Applications

Suitable for wire strain-relief applications — soldered or crimped connections, wire splices, terminations. Well suited for use with semiautomated production equipment requiring tubing with a tightly controlled expanded diameter. Acts as a tough covering for delicate components; provides mechanical protection.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-55°C to 135°C [-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Raychem
RT-3	E35586 600 V, 125°C	LR31929 (black only) 600 V, 125°C	RT-360*

* Except dimensions and longitudinal change.

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

RT-3 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
No. 1	6.1 ± 0.4 [0.240 ± 0.015]	2.4 [0.095]	0.79 ± 0.08 [0.031 ± 0.003]
No. 2	8.1 ± 0.4 [0.320 ± 0.015]	3.2 [0.125]	0.79 ± 0.08 [0.031 ± 0.003]
No. 3	9.5 ± 0.5 [0.375 ± 0.020]	3.8 [0.150]	0.79 ± 0.08 [0.031 ± 0.003]
No. 4	12.3 ± 0.5 [0.485 ± 0.020]	5.1 [0.200]	0.79 ± 0.08 [0.031 ± 0.003]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Black only
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.
Standard packaging	In 1-inch cut pieces or in 1.2-meter [4-foot] lengths.
Ordering description	Specify product name, size and color (for example, RT-3 No. 1-0).

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Highly Flame-Retardant, Very Flexible, Low-Shrink-Temperature, Polyolefin Tubing

Product Facts

- 2:1 shrink ratio
- Low shrink temperature reduces installation time and the risk of damage to temperature-sensitive components
- Very flexible; doesn't easily wrinkle when bent
- Highly flame-retardant
- Hot stamps extremely well
- Higher temperature rating, better thermal stability, and higher resistance to physical abuse than noncrosslinked materials
- Free of polybrominated biphenyls (PBBs) and polybrominated biphenyl oxides and ethers (PBBOs and PBBEs), which are classified as environmentally hazardous substances

Applications

Cost-effective choice for many commercial and military applications; electrically insulates and protects in-line components, disconnect terminals, and splices. Bundles wires for very flexible light-duty harnesses. Strain-relieves electrical wire connections for commercial applications. Identifies or color-codes wires, cables, terminals, and components.

Installation

Minimum shrink temperature: 70°C [158°F]

Minimum full recovery temperature: 90°C [194°F]

Operating Temperature Range

-55°C to 135°C [-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Military	Raychem
Versafit	E35586 VW-1 600 V, 125°C	LR31929 VW-1 600 V, 125°C	AMS-DTL-23053/5* Classes 1 & 3	RW-3009

* Formerly MIL-I-23053/5 and MIL-DTL-23053/5.

Catalog 1308940
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Versafit (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Expanded as Supplied	Maximum Recovered After Heating	
3/64	1.63 ± 0.2 [0.064 ± 0.008]	0.6 [0.023]	0.40 ± 0.08 [0.016 ± 0.003]
1/16	1.85 ± 0.2 [0.073 ± 0.008]	0.8 [0.031]	0.43 ± 0.08 [0.017 ± 0.003]
3/32	2.79 ± 0.2 [0.110 ± 0.008]	1.2 [0.046]	0.51 ± 0.08 [0.020 ± 0.003]
1/8	3.43 ± 0.2 [0.135 ± 0.008]	1.6 [0.062]	0.51 ± 0.08 [0.020 ± 0.003]
3/16	5.21 ± 0.3 [0.205 ± 0.010]	2.4 [0.093]	0.51 ± 0.08 [0.020 ± 0.003]
1/4	7.11 ± 0.3 [0.280 ± 0.010]	3.2 [0.125]	0.64 ± 0.08 [0.025 ± 0.003]
3/8	10.16 ± 0.4 [0.400 ± 0.015]	4.8 [0.187]	0.64 ± 0.08 [0.025 ± 0.003]
1/2	13.72 ± 0.4 [0.540 ± 0.015]	6.4 [0.250]	0.64 ± 0.08 [0.025 ± 0.003]
5/8***	16.90 ± 0.4 [0.665 ± 0.015]	8.0 [0.315]	0.76 ± 0.08 [0.030 ± 0.003]
3/4	20.45 ± 0.4 [0.805 ± 0.015]	9.5 [0.375]	0.76 ± 0.08 [0.030 ± 0.003]
1	25.53 ± 0.4 [1.055 ± 0.015]	12.7 [0.500]	0.89 ± 0.12 [0.035 ± 0.005]
1 1/4***	33.40 ± 0.7 [1.315 ± 0.025]	15.9 [0.625]	1.02 ± 0.15 [0.040 ± 0.006]
1 1/2	39.88 ± 0.8 [1.570 ± 0.030]	19.1 [0.750]	1.02 ± 0.15 [0.040 ± 0.006]
2	52.83 ± 1.0 [2.080 ± 0.040]	25.4 [1.000]	1.14 ± 0.16 [0.045 ± 0.007]
3	78.49 ± 1.0 [3.090 ± 0.040]	38.1 [1.500]	1.27 ± 0.20 [0.050 ± 0.008]
4	104.14 ± 1.3 [4.100 ± 0.050]	50.8 [2.000]	1.40 ± 0.23 [0.055 ± 0.009]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.
*** Nonstandard size; available by special order only.

Ordering Information

Color	Standard	Black (-0), white (-9), red (-2), blue (-6), yellow (-4), green (-5)
	Nonstandard	Brown (-1), orange (-3), violet (-7), gray (-8)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging****	On spools.	
Ordering description*****	Specify product name, size and color (for example, Versafit 1/4-0).	

**** Sizes 3/64" through 1" are available in an easy-to-use Mini-Spool packaging/dispensing system in the U.S. Available in the convenient RaySpool packaging/dispensing system, for sizes 1/16" up to 1", in Europe only.
***** Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

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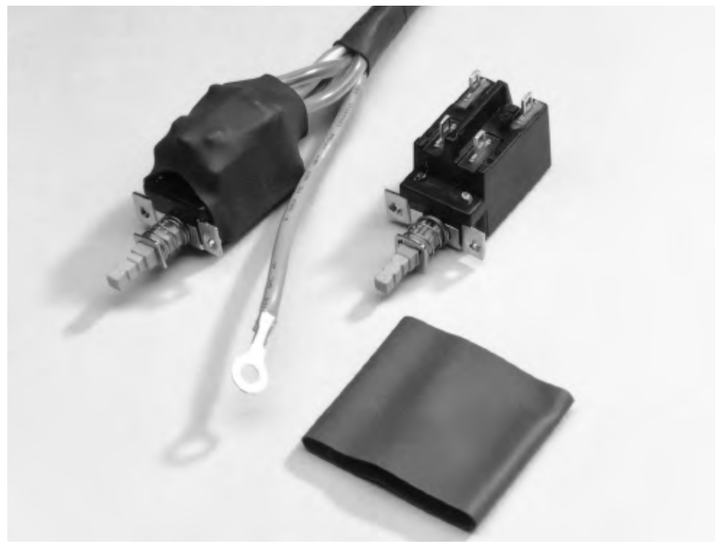
Versafit V2

Highly Flame-Retardant, Very Flexible, Low-Shrink-Temperature, Polyolefin Tubing



Product Facts

- 2:1 shrink ratio
- Low shrink temperature reduces installation time and the risk of damage to temperature-sensitive components
- Very flexible; doesn't easily wrinkle when bent
- Highly flame-retardant
- Hot stamps extremely well
- Higher temperature rating, better thermal stability, and higher resistance to physical abuse than noncrosslinked materials
- Free of polybrominated biphenyls (PBBs) and polybrominated biphenyl oxides and ethers (PBBOs and PBBEs), which are classified as environmentally hazardous substances

Applications

Cost-effective choice for many commercial applications; electrically insulates and protects in-line components, disconnect terminals, and splices. Bundles wires for very flexible light-duty harnesses. Strain-relieves electrical wire connections. Identifies or color-codes wires, cables, terminals, and components.

Installation

Minimum shrink temperature: 70°C [158°F]

Minimum full recovery temperature: 90°C [194°F]

Operating Temperature Range

-30°C to 125°C [-22°F to 257°F]

Specifications/Approvals

Series	UL	CSA	Raychem
Versafit V2	E35586 VW-1 600 V, 125°C	LR31929 VW-1 600 V, 125°C	RW-3023

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UK: 44-208-420-8341

Versafit V2 (Continued)

Product Dimensions

Size	Inside Diameter		Wall Thickness	
	Expanded as Supplied	Maximum Recovered After Heating	Expanded as Supplied (Nominal)	Recovered* After Heating (Minimum)
1.0	1.5 ± 0.2 [0.059 ± 0.008]	0.50 [0.020]	0.20 [0.008]	0.33 [0.013]
1.5	2.1 ± 0.2 [0.075 ± 0.008]	0.75 [0.030]	0.20 [0.008]	0.35 [0.014]
2.0	2.6 ± 0.2 [0.102 ± 0.008]	1.00 [0.039]	0.25 [0.010]	0.43 [0.017]
2.5	3.1 ± 0.2 [0.122 ± 0.008]	1.25 [0.049]	0.25 [0.010]	0.43 [0.017]
3.0	3.6 ± 0.2 [0.142 ± 0.008]	1.50 [0.059]	0.25 [0.010]	0.43 [0.017]
3.5	4.1 ± 0.3 [0.161 ± 0.012]	1.75 [0.069]	0.25 [0.010]	0.43 [0.017]
4.0	4.6 ± 0.3 [0.181 ± 0.012]	2.00 [0.079]	0.25 [0.010]	0.43 [0.017]
5.0	5.6 ± 0.3 [0.221 ± 0.012]	2.50 [0.098]	0.30 [0.012]	0.56 [0.022]
6.0	6.6 ± 0.3 [0.260 ± 0.012]	3.00 [0.118]	0.30 [0.012]	0.56 [0.022]
7.0	7.6 ± 0.3 [0.299 ± 0.012]	3.50 [0.138]	0.30 [0.012]	0.56 [0.022]
8.0	8.6 ± 0.3 [0.339 ± 0.012]	4.00 [0158]	0.30 [0.012]	0.56 [0.022]
9.0	9.6 ± 0.3 [0.378 ± 0.012]	4.50 [0.177]	0.30 [0.012]	0.56 [0.022]
10.0	10.4 ± 0.3 [0.409 ± 0.012]	5.00 [0.197]	0.30 [0.012]	0.56 [0.022]
11.0	11.4 ± 0.3 [0.449 ± 0.012]	5.50 [0.217]	0.30 [0.012]	0.56 [0.022]
12.0	12.7 ± 0.3 [0.500 ± 0.012]	6.00 [0.236]	0.30 [0.012]	0.56 [0.022]
13.0	13.5 ± 0.3 [0.532 ± 0.012]	6.50 [0.256]	0.35 [0.014]	0.66 [0.026]
14.0	14.4 ± 0.4 [0.567 ± 0.016]	7.00 [0.276]	0.35 [0.014]	0.68 [0.027]
15.0	15.7 ± 0.4 [0.618 ± 0.016]	7.50 [0.295]	0.35 [0.014]	0.68 [0.027]
16.0	16.9 ± 0.4 [0.665 ± 0.016]	8.00 [0.315]	0.35 [0.014]	0.68 [0.027]
18.0	19.0 ± 0.4 [0.748 ± 0.016]	9.00 [0.354]	0.40 [0.016]	0.76 [0.030]
20.0	21.4 ± 0.4 [0.843 ± 0.016]	10.00 [0.394]	0.40 [0.016]	0.76 [0.030]
22.0	23.2 ± 0.4 [0.913 ± 0.016]	11.00 [0.433]	0.45 [0.018]	0.89 [0.035]
25.0	26.8 ± 0.4 [1.055 ± 0.016]	12.50 [0.492]	0.45 [0.018]	0.89 [0.035]
27.0	28.2 ± 0.5 [1.110 ± 0.020]	12.50 [0.492]	0.45 [0.018]	0.89 [0.035]
28.0	30.0 ± 0.5 [1.181 ± 0.020]	14.00 [0.551]	0.45 [0.018]	0.89 [0.035]
30.0	32.1 ± 0.5 [1.264 ± 0.020]	15.00 [0.591]	0.45 [0.018]	0.89 [0.035]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9), red (-2), blue (-6), yellow (-4), green (-5), orange (-3), violet (-7), brown (-1), gray (-8)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools.	
Ordering description	Specify product name, size and color (for example, Versafit V2-3.0-0).	

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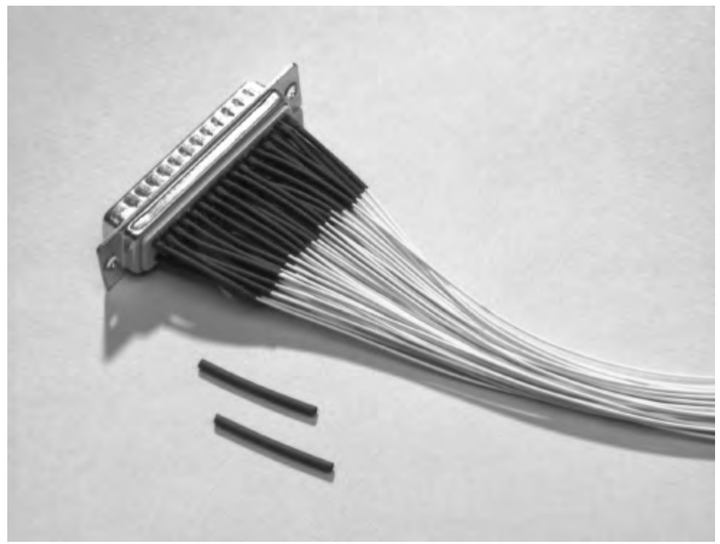
Japan: 81-44-844-8013
UK: 44-208-420-8341

Versafit V4

Very-Thin-Wall, Very Flexible, Highly Flame-Retardant, Polyolefin Tubing

Product Facts

- 2:1 shrink ratio
- Very thin wall provides space savings and rapid shrinking
- Low shrink temperature further reduces installation time and risk of damage to temperature-sensitive components
- Very flexible; doesn't easily wrinkle when bent
- Free of polybrominated biphenyls (PBBs) and polybrominated biphenyl oxides and ethers (PBBOs and PBBEs), which are classified as environmentally hazardous substances



Applications

Typically used where space saving is important. Offers the ability to pack components more closely than is possible with standard tubings. Cost-effective choice for many commercial applications; electrically insulates and protects in-line components, disconnect terminals, and splices. Used for strain relief on high-density connectors.

Installation

Minimum shrink temperature: 70°C [158°F]

Minimum full recovery temperature: 90°C [194°F]

Operating Temperature Range

-30°C to 125°C [-22°F to 257°F]

Specifications/Approvals

Series	UL	CSA	Raychem
Versafit V4	E85381 VW-1 300 V, 125°C	LR31929 VW-1 150 V, 125°C	RW-3023

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UK: 44-208-420-8341

Versafit V4 (Continued)

Product Dimensions

Metric Size	Inside Diameter		Wall Thickness	
	Expanded as Supplied	Maximum Recovered After Heating	Expanded as Supplied (Nominal)	Recovered* After Heating (Minimum)
0.6/0.3	0.95 ± 0.25 [0.037 ± 0.010]	0.30 [0.012]	0.10 [0.004]	0.25 [0.010]
0.8/0.4	1.20 ± 0.25 [0.047 ± 0.010]	0.40 [0.016]	0.10 [0.004]	0.25 [0.010]
1.0/0.5	1.40 ± 0.25 [0.055 ± 0.010]	0.50 [0.020]	0.10 [0.004]	0.25 [0.010]
1.5/0.75	1.90 ± 0.25 [0.075 ± 0.010]	0.75 [0.030]	0.10 [0.004]	0.25 [0.010]
2.0/1.0	2.30 ± 0.25 [0.091 ± 0.010]	1.00 [0.039]	0.10 [0.004]	0.25 [0.010]
2.5/1.25	2.80 ± 0.25 [0.110 ± 0.010]	1.25 [0.049]	0.15 [0.006]	0.25 [0.010]
3.0/1.5	3.30 ± 0.25 [0.130 ± 0.010]	1.50 [0.059]	0.15 [0.006]	0.25 [0.010]
3.5/1.75	3.80 ± 0.25 [0.150 ± 0.010]	1.75 [0.069]	0.15 [0.006]	0.25 [0.010]
4.0/2.0	4.40 ± 0.25 [0.173 ± 0.010]	2.00 [0.079]	0.15 [0.006]	0.25 [0.010]
5.0/2.5	5.50 ± 0.25 [0.217 ± 0.010]	2.50 [0.098]	0.15 [0.006]	0.25 [0.010]
6.0/3.0	6.50 ± 0.40 [0.256 ± 0.016]	3.00 [0.118]	0.15 [0.006]	0.28 [0.011]
7.0/3.5	7.50 ± 0.40 [0.295 ± 0.016]	3.50 [0.138]	0.15 [0.006]	0.28 [0.011]
8.0/4.0	8.50 ± 0.40 [0.335 ± 0.016]	4.00 [0.158]	0.15 [0.006]	0.28 [0.011]
9.0/4.5	9.50 ± 0.40 [0.374 ± 0.016]	4.50 [0.177]	0.15 [0.006]	0.28 [0.011]
10.0/5.0	10.50 ± 0.50 [0.413 ± 0.020]	5.00 [0.197]	0.15 [0.006]	0.28 [0.011]

Inch Size	Inside Diameter		Recovered Wall Thickness* After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
3/64	1.2 [0.046]	0.6 [0.023]	0.30 ± 0.05 [0.012 ± 0.002]
1/16	1.6 [0.062]	0.8 [0.031]	0.30 ± 0.05 [0.012 ± 0.002]
3/32	2.4 [0.093]	1.2 [0.046]	0.30 ± 0.05 [0.012 ± 0.002]
1/8	3.2 [0.125]	1.6 [0.062]	0.33 ± 0.05 [0.013 ± 0.002]
3/16	4.8 [0.187]	2.4 [0.093]	0.33 ± 0.05 [0.013 ± 0.002]
1/4	6.4 [0.250]	3.2 [0.125]	0.36 ± 0.08 [0.014 ± 0.003]
3/8	9.5 [0.375]	4.8 [0.187]	0.36 ± 0.08 [0.014 ± 0.003]
1/2	12.7 [0.500]	6.4 [0.250]	0.36 ± 0.08 [0.014 ± 0.003]
3/4	19.1 [0.750]	9.5 [0.375]	0.43 ± 0.08 [0.017 ± 0.003]
1	25.4 [1.000]	12.7 [0.500]	0.51 ± 0.08 [0.020 ± 0.003]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	Other colors available upon request.
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools.	
Marking	Marked with UL/CSA/-F- legends (metric sizes) or unmarked (inch sizes).	
Ordering description	Specify product name, size (mm or in.) and color (for example, Versafit V4-1.0-0).	

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UK: 44-208-420-8341

ATUM

High-Shrink-Ratio, Adhesive-Lined Polyolefin Tubing

Product Facts

- 3:1 and 4:1 shrink ratios allow for connector-to-cable sealing
- Tubing environmentally seals and protects components and interconnections
- Medium wall provides increased mechanical protection
- ATUM adhesive bonds to a wide variety of plastics, rubbers, and metals, including polyethylene, aluminum, steel, and copper

Applications

Environmentally seals and protects a wide variety of electrical applications, including back end connector sealing, breakouts, and connector-to-cable transitions. High expansion ratio makes it possible to repair most damaged cable jackets without removing connectors.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 110°C [230°F]

Operating Temperature Range

–55°C to 110°C [–67°F to 230°F]

Specifications/Approvals

Series	UL**	Military	Raychem
ATUM	E85381 600V, 110°C	AMS-DTL-23053/4*, Class 3	RW-2063 — Black RK-6024 — Colors and clear

* Formerly MIL-I-23053/4 and MIL-DTL-23053/4. Sizes 3/1, 6/2, 12/4, 24/8, and 40/13 only.
** Black only, except sizes 3/1 and 4/1.

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UK: 44-208-420-8341

ATUM (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Total Wall After Heating	Adhesive Wall After Heating (Nominal)
3:1				
3/1	3.0 [0.118]	1.0 [0.039]	1.00 ± 0.28 [0.039 ± 0.010]	0.50 [0.020]
4.5/1.5	4.5 [0.177]	1.5 [0.059]	1.10 ± 0.25 [0.043 ± 0.011]	0.50 [0.020]
6/2	6.0 [0.236]	2.0 [0.079]	1.00 ± 0.28 [0.039 ± 0.010]	0.50 [0.020]
9/3	9.0 [0.354]	3.0 [0.118]	1.40 ± 0.28 [0.055 ± 0.010]	0.61 [0.024]
12/4	12.0 [0.472]	4.0 [0.157]	1.78 ± 0.38 [0.070 ± 0.015]	0.76 [0.030]
19/6	19.0 [0.748]	6.0 [0.236]	2.25 ± 0.55 [0.088 ± 0.022]	0.76 [0.030]
24/8	24.0 [0.940]	8.0 [0.315]	2.54 ± 0.55 [0.100 ± 0.022]	1.02 [0.040]
40/13	40.0 [1.570]	13.0 [0.512]	2.54 ± 0.55 [0.100 ± 0.022]	1.02 [0.040]
4:1				
4/1	4.0 [0.158]	1.0 [0.039]	1.00 ± 0.28 [0.039 ± 0.010]	0.50 [0.020]
8/2	8.0 [0.315]	2.0 [0.079]	1.00 ± 0.28 [0.039 ± 0.010]	0.50 [0.020]
12/3	12.0 [0.472]	3.0 [0.118]	1.40 ± 0.28 [0.055 ± 0.010]	0.61 [0.024]
16/4	16.0 [0.630]	4.0 [0.158]	1.78 ± 0.38 [0.070 ± 0.015]	0.76 [0.030]
24/6	24.0 [0.945]	6.0 [0.236]	2.25 ± 0.55 [0.088 ± 0.022]	0.76 [0.030]
32/8	32.0 [1.260]	8.0 [0.315]	2.54 ± 0.55 [0.100 ± 0.022]	1.02 [0.040]
52/13	52.0 [2.050]	13.0 [0.512]	2.54 ± 0.55 [0.100 ± 0.022]	1.02 [0.040]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	Clear in 3:1 sizes only (non-flame-retardant jacket); other colors available on request.
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	In 1.2-meter [4-foot] lengths.	
Ordering description***	Specify product name, size and color (for example, ATUM 8/2-0).	

*** Europe Only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

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UK: 44-208-420-8341

DWP-125

Flexible, High-Shrink-Ratio, Adhesive-Lined, Polyolefin Tubing

Product Facts

- **3:1 shrink ratio allows for insulation and sealing of irregular shapes**
- **Medium wall provides increased mechanical protection while maintaining flexibility when installed**
- **Adhesive bonds to a wide variety of plastics, rubber, and metals, including polyethylene, neoprene, and steel**

Applications

Environmentally seals and protects a wide variety of electrical applications, including wire splices, breakouts, and connector-to-cable transitions. Ideal for applications where UL recognized/CSA certified adhesive-lined tubing is required.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 125°C [257°F]

Operating Temperature Range

–40°C to 110°C [–40°F to 230°F]

Specifications/Approvals

Series	UL	CSA	Military	Raychem
DWP-125	E35586 600 V, 125°C	LR31929 600 V, 125°C	AMS-DTL-23053/4*, Class 3 (colors only)	DWP-125 SCD

* Formerly MIL-I-23053/4 and MIL-DTL-23053/4. Meets the material properties except for Sealing Efficiency.

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DWP-125 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Total Wall After Heating	Nominal Adhesive Wall After Heating
1/8	3.2 [0.125]	1.0 [0.040]	1.07 [0.042]	0.18 [0.007]
3/16	4.8 [0.187]	1.5 [0.060]	1.32 [0.052]	0.43 [0.017]
1/4	6.4 [0.250]	2.0 [0.080]	1.45 [0.057]	0.56 [0.022]
3/8	9.5 [0.375]	3.0 [0.120]	1.65 [0.065]	0.68 [0.027]
1/2	12.7 [0.500]	4.0 [0.157]	1.70 [0.067]	0.68 [0.027]
3/4	19.1 [0.750]	6.0 [0.230]	2.03 [0.080]	0.76 [0.030]
1	25.4 [1.000]	8.0 [0.320]	2.50 [0.100]	0.76 [0.030]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9), red (-2), blue (-6), yellow (-4), green (-5), clear (-X, non-flame-retardant jacket). Other colors available upon request.
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	In 1.2-meter [4-foot] lengths.	
Ordering description	Specify product name, size and color (for example, DWP-125 1/4-0).	

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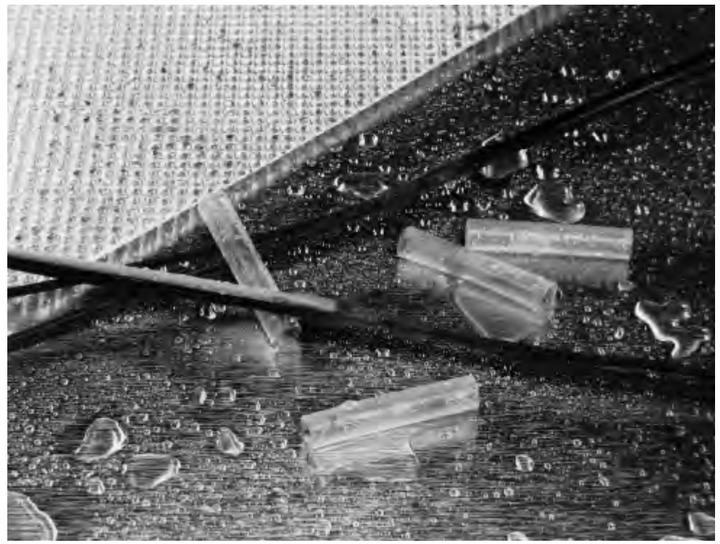
ES1000

Clear, High-Shrink-Ratio, Adhesive-Lined, Semirigid Polyolefin Tubing



Product Facts

- **4:1 shrink ratio allows a few sizes to cover a wide range of splice and component diameters**
- **Mechanically tough tubing provides strain relief and abrasion protection of wire splices, terminals and other components**
- **Thick adhesive liner forms an effective barrier against fluids and moisture and performs well at an extended temperature range**

Applications

Specially designed for environmental sealing and electrical insulation of wire splices, terminations, and components where see-through inspection is required.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

–40°C to 130°C [–40°F to 266°F]

Specifications/Approvals

Series	UL	Raychem
ES1000	E85381 600 V, 125°C	RT-1113

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

ES1000 (Continued)

Product Dimensions

Part Number	Inside Diameter (Including Core)		Recovered Wall Thickness*		
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Minimum Total Wall After Heating	Minimum Jacket Wall After Heating	Minimum Adhesive Wall After Heating
ES1000-No.1	5.72 [0.225]	1.27 [0.050]	1.20 [0.047]	0.64 [0.025]	0.56 [0.022]
ES1000-No.2	7.44 [0.293]	1.65 [0.065]	1.52 [0.060]	0.76 [0.030]	0.76 [0.030]
ES1000-No.3	10.85 [0.427]	2.41 [0.095]	1.91 [0.075]	0.89 [0.035]	1.02 [0.040]
ES1000-No.4	17.78 [0.700]	4.45 [0.175]	2.41 [0.095]	1.04 [0.041]	1.37 [0.054]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Clear (-X)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	Cut pieces.
Marking	Tubing will be printed with its numbered size (such as ES-1, ES-2, ES-3, or ES-4).
Ordering description	Specify product name, numbered size, color, and cut length (for example, ES1000-NO.2-X-50MM).

Catalog 1308940
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UK: 44-208-420-8341

ES2000

Flame-Retardant, High-Shrink-Ratio, Adhesive-Lined Semirigid Polyolefin Tubing

Product Facts

- 4:1 shrink ratio allows a few sizes to cover a wide range of splice and component diameters
- Flame-retardant and mechanically tough, the tubing provides strain relief and abrasion protection of wire splices, terminals, and other components
- Thick adhesive liner forms an effective barrier against fluids and moisture and performs well at an extended temperature range
- UL recognized

Applications

Specially designed for environmental sealing and electrical insulation of wire splices, terminations, and components.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

–40°C to 130°C [–40°F to 266°F]

Specifications/Approvals

Series	UL	Raychem
ES2000	E85381 600 V, 125°C	RT-1112

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

ES2000 (Continued)

Product Dimensions

Part Number	Inside Diameter (Including Core)		Recovered Wall Thickness*		
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Minimum Total Wall After Heating	Minimum Jacket Wall After Heating	Minimum Adhesive Wall After Heating
ES2000-No.1	5.72 [0.225]	1.27 [0.050]	1.20 [0.047]	0.64 [0.025]	0.56 [0.022]
ES2000-No.2	7.44 [0.293]	1.65 [0.065]	1.52 [0.060]	0.76 [0.030]	0.76 [0.030]
ES2000-No.3	10.85 [0.427]	2.41 [0.095]	1.91 [0.075]	0.89 [0.035]	1.02 [0.040]
ES2000-No.4	17.78 [0.700]	4.45 [0.175]	2.41 [0.095]	1.04 [0.041]	1.37 [0.054]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	Cut pieces.
Marking	Tubing will be printed with its numbered size (such as ES-1, ES-2, ES-3, or ES-4).
Ordering description	Specify product name, numbered size, color, and cut length (for example, ES2000-NO.2-0-50MM).

Catalog 1308940
Revised 8-06

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FL2500

Fully Flame-Retardant, Adhesive-Lined, Polyolefin Heat-Shrinkable Tubing

Product Facts

- **4:1 shrink ratio allows a few sizes to cover a wide range of wire terminations and components**
- **Flame-retardant tubing jacket and adhesive provide full flame-retardancy**
- **Fully flame-retardant and mechanically tough, the tubing provides strain relief and abrasion protection of wire splices, terminals and other components**
- **Thick high-performance adhesive lining offers permanent sealing of splices, fusible links, terminals and in-line components**

Applications

Tough flame-retardant polyolefin tubing lined with a flame-retardant adhesive provides the optimum solution for applications where full flame-retardancy is preferred or specified.

Rated to 135°C [275°F] for 3000 hours, it is suitable for use on harnesses which will be exposed to harsh environments. As the tubing shrinks, the adhesive lining melts and flows to fill all voids and create a complete seal against moisture, oils, chemicals and other fluids.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

–40°C to 135°C [–40°F to 275°F]

Specifications/Approvals

Series	Raychem
FL2500	FL2500 SCD

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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Japan: 81-44-844-8013
UK: 44-208-420-8341

FL2500 (Continued)

Product Dimensions

Part Number	Inside Diameter (Including Core)		Recovered Wall Thickness*	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Total Wall After Heating	Minimum Adhesive Wall After Heating
FL2500-No. 1	7.62 [0.300]	1.65 [0.065]	1.52 ± 0.3 [0.060 ± 0.012]	0.711 [0.028]
FL2500-No. 2	9.02 [0.355]	2.29 [0.090]	1.52 ± 0.3 [0.060 ± 0.012]	0.711 [0.028]
FL2500-No. 3	11.56 [0.455]	2.54 [0.100]	2.29 ± 0.3 [0.090 ± 0.012]	1.321 [0.052]
FL2500-No. 4	17.79 [0.700]	4.45 [0.175]	2.54 ± 0.3 [0.100 ± 0.012]	1.346 [0.053]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Black (-0) with a white adhesive liner
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	Cut pieces.
Marking	Tubing will be marked with its numbered size (such as FL-1, FL-2, FL-3, FL-4).
Ordering description	Specify product name, size, color, and cut length (for example, FL2500-NO.2-0-50MM).

Catalog 1308940
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UK: 44-208-420-8341

HTAT

Semiflexible, Dual Wall, Moisture-Resistant, Heat-Shrinkable Tubing

Product Facts

- 4:1 shrink ratio
- Environmental sealing
- High-strength bonding
- Ideal connector sealing covering large diameter differences

Applications

Designed to provide environmental sealing for a range of substrates, at elevated temperatures. Manufactured by Tyco Electronics from radiation-crosslinked polyolefins, the inner wall melts when heated and is forced into interstices by the shrinking of the outer wall so that, when cooled, the substrate is encapsulated by a tough, protective moisture barrier. An operating range of –55˚C to 125˚C [–67˚F to 257˚F] and a high shrink ratio as standard, mean that the tubing offers superior environmental protection to a wide range of irregular shapes with varying dimensions. The jacket is flame-retardant to reduce flame propagation.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 110°C [230°F]

Operating Temperature Range

–55°C to 125°C [–67°F to 257°F]

Specifications/Approvals

Series	Raychem
HTAT	RW-2052

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

HTAT (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Total Wall After Heating	Nominal Adhesive Wall After Heating
4/1	4.0 [0.158]	1.0 [0.039]	1.00 [0.039]	0.40 [0.016]
8/2	8.0 [0.315]	2.0 [0.079]	1.00 [0.039]	0.50 [0.020]
12/3	12.0 [0.472]	3.0 [0.118]	1.40 [0.055]	0.60 [0.024]
16/4	16.0 [0.630]	4.0 [0.158]	1.75 [0.069]	0.75 [0.030]
24/6	24.0 [0.945]	6.0 [0.236]	2.25 [0.088]	0.80 [0.032]
32/8	32.0 [1.260]	8.0 [0.315]	2.50 [0.098]	1.00 [0.039]
48/13	48.0 [1.890]	13.0 [0.512]	2.55 [0.100]	1.00 [0.039]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.
Standard packaging	In 1.2 meter [4-ft] lengths.
Ordering description	Specify product name, size and color (for example, HTAT 8/2-0).

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Revised 8-06

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UK: 44-208-420-8341

SCL

Semirigid, Encapsulant-Lined, Polyolefin Tubing

Product Facts

- **3:1 shrink ratio**
- **Splash-resistant, moisture-resistant covering; not intended for use where immersion in fluids is required**
- **Rugged protection against abrasion, vibration, and flexing**
- **Excellent strain relief and insulation of weak points**

Applications

Encapsulates components, splices, and terminations where moisture resistance and mechanical protection are required. Encapsulant melts and flows to fill surface irregularities of the substrate. While still hot, the tubing can be blocked to form a wire breakout.

Installation

Minimum shrink temperature: 125°C [257°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

–55°C to 110°C [–67°F to 230°F]

Specifications/Approvals

Series	UL	Military	Raychem
SCL	E85381 600 V, 125°C	AMS-DTL-23053/4*, Class 1	RT-1301

* Formerly MIL-I-23053/4 and MIL-DTL-23053/4.

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Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

SCL (Continued)

Product Dimensions

Size	Additional Standard Color	Inside Diameter		Recovered Wall Thickness**	
		Minimum Expanded as Supplied	Maximum Recovered After Heating	Total Wall After Heating	Meltable Wall After Heating (Nominal)
1/8	Brown	3.2 [0.125]	0.6 [0.023]	0.96 ± 0.15 [0.038 ± 0.006]	0.51 [0.020]
3/16	Gray	4.8 [0.187]	1.5 [0.060]	1.09 ± 0.15 [0.043 ± 0.006]	0.64 [0.025]
1/4	White	6.4 [0.250]	2.0 [0.080]	1.19 ± 0.15 [0.047 ± 0.006]	0.69 [0.027]
3/8	Red	9.5 [0.375]	3.4 [0.135]	1.27 ± 0.18 [0.050 ± 0.007]	0.76 [0.030]
1/2	Blue	12.7 [0.500]	5.0 [0.195]	1.39 ± 0.18 [0.055 ± 0.007]	0.89 [0.035]
3/4	Yellow	19.1 [0.750]	8.0 [0.313]	1.65 ± 0.18 [0.065 ± 0.007]	1.02 [0.040]
1	N/A	25.4 [1.000]	10.2 [0.400]	1.90 ± 0.18 [0.075 ± 0.007]	1.02 [0.040]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0) for all sizes, plus one additional color per size per Product Dimensions table.
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	In 1.2-meter [4-foot] lengths.	
Ordering description***	Specify product name, size and color (for example, SCL 1/4-0).	

*** Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

Flame-Retardant, Adhesive-Lined, Semirigid Polyolefin Tubing (Extended Temperature Range)

Product Facts

- 4:1 shrink ratio allows a few sizes to cover a wide range of splice and component diameters
- Flame-retardant and mechanically tough, the tubing provides strain relief and abrasion protection of wire splices, terminals, and other components
- Thick adhesive liner forms an effective barrier against fluids and moisture and performs well at an extended temperature range

Applications
Specially designed to insulate and seal automotive wire splices and components in an under-the-hood automotive environment. Specially formulated to function at an extended temperature range.

Installation
Minimum shrink temperature: 110°C [230°F]
Minimum full recovery temperature: 135°C [266°F]

Operating Temperature Range
–40°C to 150°C [–40°F to 302°F]

Specifications/Approvals

Series	Raychem
SCT	SCT SCD

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

SCT (Continued)

Product Dimensions

Part Number	Inside Diameter		Recovered Wall Thickness*	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Total Wall After Heating	Meltable Wall After Heating (Nominal)
SCT No. 1	7.6 [0.300]	1.7 [0.065]	1.52 ± 0.30 [0.060 ± 0 .012]	0.76 [0.030]
SCT No. 2	9.0 [0.355]	2.3 [0.090]	1.52 ± 0.30 [0.060 ± 0 .012]	0.76 [0.030]
SCT No. 3	11.6 [0.455]	2.5 [0.100]	2.29 ± 0.30 [0.090 ± 0.012]	1.40 [0.055]
SCT No. 4	17.8 [0.700]	4.4 [0.175]	2.54 ± 0.30 [0.100 ± 0.012]	1.52 [0.060]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Black
Size selection	Always order the largest size that will shrink snugly over the component being covered. Special order sizes are available upon request.
Standard packaging	Cut pieces.
Marking	Tubing will be printed with its numbered size (such as SCT-1, SCT-2, SCT-3, SCT-4).
Ordering description	Specify product name, numbered size, color and cut length (for example, SCT-NO.3-0-75MM).

Catalog 1308940
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Adhesive-Lined, Flexible, Polyolefin Tubing

Product Facts

- **2:1 shrink ratio**
- **Thin adhesive lining that bonds to outer tubing and surface below, forming a positive environmental seal**
- **Flexibility of both tubing and adhesive**
- **Moisture seal that is resistant to bending of the substrate**
- **Good mechanical strength and cut-through resistance**
- **Adhesive that bonds to a wide variety of plastics, rubbers, and metals, including polyethylene, neoprene, lead, and steel**

Applications

Seals and protects simple in-line splices, bimetallic joints, and components from fluids, moisture, and corrosion. Repairs damaged wire insulation, especially where flexibility is required. Provides one-step electrical insulation and moisture sealing.

Installation

Minimum shrink temperature: 95°C [203°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

–55°C to 110°C [–67°F to 230°F]

Specifications/Approvals

Series	UL	Military	Raychem
TAT-125 Type 1 (colors)	E85381 600 V, 125°C	AMS-DTL-23053/4*, Class 2	RW-3032
TAT-125 Type 2 (clear)	—	—	RW-3032

* Formerly MIL-I-23053/4 and MIL-DTL-23053/4. Sizes 1/4" through 1 1/2" only.

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

TAT-125 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Total Wall After Heating (Nominal)	Adhesive Wall After Heating (Nominal)
1/8	3.2 [0.125]	1.6 [0.062]	0.69 [0.027]	0.23 [0.009]
3/16	4.8 [0.187]	2.4 [0.093]	0.71 [0.028]	0.25 [0.010]
1/4	6.4 [0.250]	3.2 [0.125]	0.74 [0.029]	0.13 [0.005]
3/8	9.5 [0.375]	4.8 [0.187]	0.74 [0.029]	0.13 [0.005]
1/2	12.7 [0.500]	6.4 [0.250]	0.76 [0.030]	0.15 [0.006]
3/4	19.1 [0.750]	9.5 [0.375]	0.89 [0.035]	0.15 [0.006]
1	25.4 [1.000]	12.7 [0.500]	1.07 [0.042]	0.20 [0.008]
1 1/2	38.1 [1.500]	19.1 [0.750]	1.19 [0.047]	0.28 [0.011]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9), red (-2), blue (-6), yellow (-4), green (-5), brown (-1), orange (-3), violet (-7), gray (-8), clear (-X , not flame-retardant)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	In 1.2-meter [4-foot] lengths.	
Ordering description	Specify product name, size and color (for example, TAT-125 1/4-0).	

Catalog 1308940
Revised 8-06

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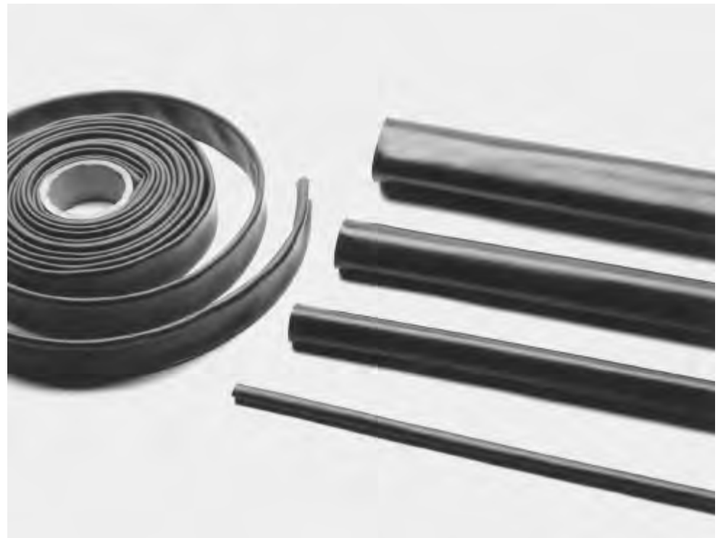
USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

General Purpose, Heat-Shrinkable Tubing

Product Facts

- Excellent thick-wall insulation and abrasion protection
- No adhesive — can be removed easily
- Expansion ratios as high as 3:1
- Availability in flame-retardant material with FR callout (see “Ordering Information” and “Part Numbering System” on the next page)
- BSTS has the following agency approvals:
  - ABS (American Bureau of Shipping)
  - DNV (Det Norske Veritas)
  - Lloyd’s (Lloyd’s Register of Shipping)



Applications

BSTS heat-shrinkable tubing is made of a rugged polymer that resists moisture, fungus, and weathering. It also has excellent electrical properties. This tubing is useful in applications where insulation, abrasion resistance, and strain relief are important. When used with SFTS tape sealant, it can provide a watertight system in nonpressurized applications.

Installation

Minimum shrink temperature: 90°C [194°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

–55°C to 90°C [–67°F to 194°F]

Specifications/Approvals

Series	Military	Industry	Raychem
BSTS	—	—	RW-2017
BSTS-FR	AMS-DTL-23053/15*, Class 1 and Class 2**	ASTM D 685, nonburning ASTM D 2863, oxygen index IPCEA S-19-81, cable insulation and jackets	RW-2017

* Formerly MIL-I-23053/15 and MIL-DTL-23053/15.
** Except for coatings requirement. Refer to SST-FR when coating is required.

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

BSTS/BSTS-FR (Continued)

Product Dimensions

Size	Inside Diameter		Wall Thickness (Nominal)	
	Minimum Expanded as Supplied	Maximum recovered After Heating	Expanded as Supplied	Recovered After Heating****
BSTS-03	7.62 [0.300]	2.54 [0.100]	0.63 [0.025]	1.52 [0.060]
BSTS-04	10.16 [0.400]	3.81 [0.150]	0.63 [0.025]	1.52 [0.060]
BSTS-07M***	19.05 [0.750]	5.59 [0.220]	0.51 [0.020]	1.52 [0.060]
BSTS-07	19.05 [0.750]	5.59 [0.220]	0.76 [0.030]	2.41 [0.095]
BSTS-11M	27.94 [1.100]	9.52 [0.375]	0.76 [0.030]	2.67 [0.110]
BSTS-11	27.94 [1.100]	9.52 [0.375]	1.02 [0.040]	3.05 [0.120]
BSTS-13M	33.02 [1.300]	9.52 [0.375]	0.63 [0.025]	2.67 [0.110]
BSTS-13	33.02 [1.300]	9.52 [0.375]	0.89 [0.035]	3.05 [0.120]
BSTS-15M	38.10 [1.500]	12.70 [0.500]	0.89 [0.035]	3.05 [0.120]
BSTS-15	38.10 [1.500]	12.70 [0.500]	1.27 [0.050]	3.56 [0.140]
BSTS-17M	43.18 [1.700]	12.70 [0.500]	1.02 [0.040]	3.05 [0.120]
BSTS-17	43.18 [1.700]	12.70 [0.500]	1.14 [0.045]	3.56 [0.140]
BSTS-20M	50.80 [2.000]	19.05 [0.750]	1.27 [0.050]	3.05 [0.120]
BSTS-20	50.80 [2.000]	19.05 [0.750]	1.27 [0.050]	3.94 [0.160]
BSTS-27	65.58 [2.700]	22.86 [0.900]	1.27 [0.050]	3.94 [0.160]
BSTS-30	76.20 [3.000]	31.75 [1.250]	1.27 [0.050]	3.94 [0.160]
BSTS-35	88.90 [3.500]	31.75 [1.250]	1.27 [0.050]	3.94 [0.160]
BSTS-40	101.60 [4.000]	44.45 [1.750]	1.27 [0.050]	3.94 [0.160]
BSTS-45	114.30 [4.500]	44.45 [1.750]	1.27 [0.050]	3.94 [0.160]

*** M = Medium wall tubing.
**** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	Red (-2), white (-9), clear (-X not flame-retardant)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	1.2-meter [4-foot] or 7.5-meter [25-foot] lengths.	
Ordering description	See below.	

Part Numbering System

BSTS - _ _ x _ _ / _ / _

- **"NM"** - no mark
- **Color**
  - Black / leave blank (standard)
  - White / WHT
  - Red / RED
  - Clear / CL
- **"FR"** - flame-retardant
- **Length** in feet (4 and 25 feet standard)
- **"M"** medium wall
- **Size**
- **Family**

Example: BSTS-11MX4/NM

Catalog 1308940
Revised 8-06

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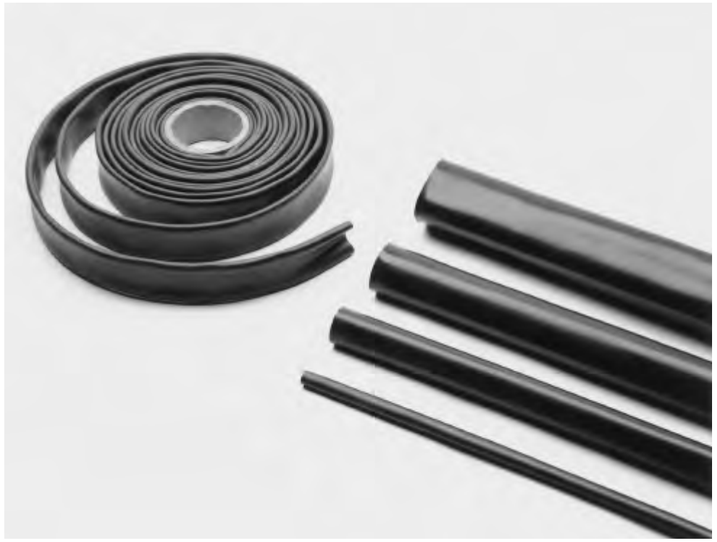
HF

High-Flex, Heavy-Wall, Heat-Shrinkable Tubing



Product Facts

- Offers high flexibility
- Provides excellent insulation and abrasion-protection, per U.S. Mine Safety and Health Administration (MSHA) regulations
- Flame-retardant
- HF has the following agency approvals:
  - ABS (American Bureau of Shipping)
  - DNV (Det Norske Veritas)
  - Lloyd's (Lloyd's Register of Shipping)

Applications

Developed for cable jacketing applications where cable flexibility is important, high-flex (HF) tubing is ideal for jacketing cables where sharp bends or turns are required. Also ideal for situations where the cable is subject to motion. Such situations are common for industrial machinery, transportation equipment, robotics, welding, and many other cabling applications. To complete the cable jacket seal, the ends may be sealed for further water and corrosion protection by using available tape sealant or adhesive.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

–55°C to 90°C [–67°F to 194°F]

Specifications/Approvals

Series	Military	Raychem
HF	AMS-DTL-23053/15* Class 1**	RW-2023

* Formerly MIL-I-23053/15 and MIL-DTL-23053/15.
** Except for coatings requirement.

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

HF (Continued)

Product Dimensions

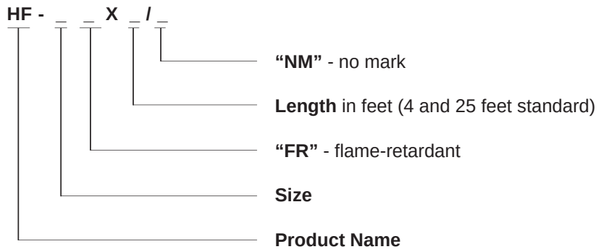
Size	Standard Nominal Length (m/ft)	Inside Diameter		Wall Thickness**
		Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Recovered After Heating
HF04	1.2, 7.5 [4, 25]	10.16 [0.40]	3.81 [0.150]	1.52 [0.060]
HF07	1.2, 7.5 [4, 25]	19.05 [0.75]	5.59 [0.220]	1.52 [0.060]
HF11	1.2, 7.5 [4, 25]	27.94 [1.10]	9.52 [0.375]	2.67 [0.105]
HF13	1.2, 7.5 [4, 25]	33.02 [1.30]	9.52 [0.375]	2.67 [0.105]
HF15	1.2, 7.5 [4, 25]	38.10 [1.50]	12.70 [0.500]	3.05 [0.120]
HF17	1.2, 7.5 [4, 25]	43.14 [1.70]	12.70 [0.500]	3.05 [0.120]
HF20	1.2, 7.5 [4, 25]	50.80 [2.00]	19.05 [0.750]	3.56 [0.140]
HF27	1.2, 7.5 [4, 25]	68.58 [2.70]	22.86 [0.900]	3.94 [0.155]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	1.2-meter [4-foot] or 7.5-meter [25-foot] lengths. Nonstandard lengths are available upon request.
Ordering description	See below.

Part Numbering System



Example: HF-17FRX25/NM

Catalog 1308940
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UK: 44-208-420-8341

High-Ratio, Heat-Shrinkable Tubing

Product Facts

- Offers toughness and durability
- Provides excellent insulation and abrasion protection
- Is available in flame-retardant material.
- Shrinks to fit (5.6:1)
- FR callouts meet the flame-retardant material requirements of AMS-DTL-23053/15*
- HRHF and HRSR have the following agency approvals:
  - ABS (American Bureau of Shipping)
  - DNV (Det Norske Veritas)
  - LIoyd's (LIoyd's Register of Shipping)

Applications

High-ratio (HR) heat-shrinkable tubing, with expansion ratios as high as 5.6 to 1, is designed to accommodate large size differences between cables and cable connectors and backshells, thus simplifying repair of damaged cable. High-ratio tubing is available in semirigid flame-retardant (SR), standard (NF), or high-flex flame-retardant (HF) material and with or without factory-applied sealants and adhesives. The water-proofing sealant provides environmental sealing and is watertight in wet and corrosive locations per USCG CGHQ-3774. The thermoplastic adhesive coating offers excellent strain relief and environ-mental sealing.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

–55°C to 90°C
[–67°F to 194°F]

Specifications/Approvals

Series	Military	Agency	Raychem
HRSR	AMS-DTL-23053/15*	ABS, DNV, Lloyd's	RW-2013
HRHF	AMS-DTL-23053/15*	ABS, DNV, Lloyd's	RW-2013
HRNF	—	—	—

* Formerly MIL-I-23053/15 and MIL-DTL-23053/15.

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

HRHF/HRNF/HRSR (Continued)

Product Dimensions

Size†	Inside Diameter		Recovered Wall Thickness††
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal After Heating
HR**060	15.24 [0.60]	3.81 [0.150]	1.52 [0.060]
HR**125	31.75 [1.25]	5.59 [0.220]	1.52 [0.060]
HR**175	44.45 [1.75]	8.00 [0.315]	2.41 [0.095]
HR**200	50.80 [2.00]	9.52 [0.375]	2.67 [0.105]
HR**250	63.50 [2.50]	12.70 [0.500]	3.05 [0.120]
HR**300	76.20 [3.00]	19.05 [0.750]	3.05 [0.120]
HR**400	101.60 [4.00]	22.86 [0.900]	3.56 [0.140]

† For ** substitute HF, NF or SR for material required. Add FR to end of number for flame-retardant material.
†† Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black
	Nonstandard	Clear (CL) available with HRHF only (not flame-retardant)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Other sizes are available upon request.	
Standard packaging	10-inch-maximum* lengths.	
Ordering description	See below.	

* Cutting tolerance is ± .125".

Part Numbering System — Military Approved Part Numbers

HRHF - _ _ - _ _ / _ _

"NM" - no mark

Coating
Adhesive (/97)
Sealant (/226)

Length in inches (10 inches standard)

"FR" - flame-retardant for SR and HF

Size

Product Name
HRHF - high flex
HRNF - non-flame-retardant
HRSR - semirigid

Example: HRHF-125FR-10/226-NM

Catalog 1308940
Revised 8-06

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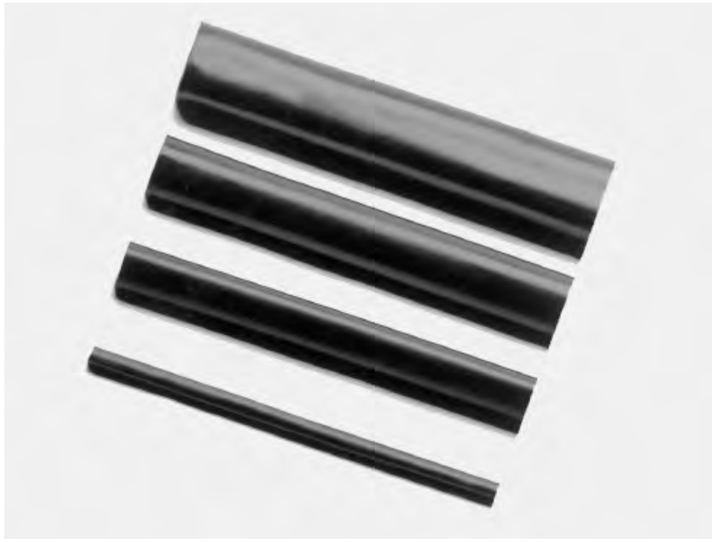
SST/SST-FR

Self-Sealing, Heat-Shrinkable Tubing



Product Facts

- Thick adhesive liner forms an effective barrier against fluids and moisture
- Thick-wall insulation, strain relief and abrasion protection
- No need for greases, tape, or epoxy
- Expansion ratios as high as 3:1
- Available in flame-retardant material
- SST has the following agency approvals:
  - ABS (American Bureau of Shipping)
  - DNV (Det Norske Veritas)
  - Lloyd's (Lloyd's Register of Shipping)

Applications

SST provides a simple, positive splice-sealing method that offers protection under adverse environmental conditions. Tubing supplied with standard sealant provides water sealing and environmental protection in wet or underground applications. The thermoplastic adhesive not only seals, but also provides mechanical strain relief. The polymer tubing has excellent insulating, abrasion-resistance, and strain-relief properties.

Installation

Minimum shrink temperature: 90°C [195°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

–55°C to 90°C [–67°F to 194°F]

Specifications/Approvals

Series	Military	Industry	Raychem
SST	—	—	RW- 2011
SST-FR	AMS-DTL-23053/15*, Classes 1 and 2	ASTM D 685, nonburning ASTM D 2863, oxygen index	RW -2011
		IPCEA S-19-81, cable insulation and jackets	
		IEEE-383 Section 2.5 massive flame vertical tray	
		ABS, DNV, Lloyd's Register	

* Formerly MIL-I-23053/I5 and MIL-DTL-23053/15.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

SST/SST-FR (Continued)

Product Dimensions (inches)

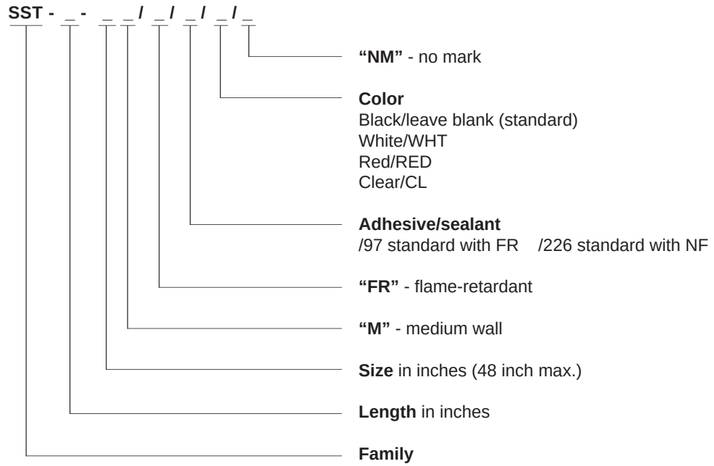
Size†	Standard Nominal Length	Inside Diameter		Wall Thickness		Recommended Cable Range for 600-Volt Cable
		Minimum Expanded as Supplied	Maximum Recovered After Heating	Expanded	Nominal Wall After Heating††	
SST*-03	6, 30	0.300	0.100	0.025	0.060	18 through 14 AWG
SST*-04	6, 30	0.400	0.150	0.025	0.060	14 through 10 AWG
SST*-07M	6, 9, 12, 48	0.750	0.220	0.020	0.060	8 through 1 AWG
SST*-07	6, 9, 12, 48	0.750	0.220	0.030	0.095	8 through 1 AWG
SST*-11M	6, 9, 12, 48	1.100	0.375	0.030	0.105	2 through 4/0 AWG
SST*-11	6, 9, 12, 48	1.100	0.375	0.040	0.120	2 through 4/0 AWG
SST*-13M	6, 9, 12, 48	1.300	0.375	0.025	0.105	2 through 4/0 AWG
SST*-13	6, 9, 12, 48	1.300	0.375	0.035	0.120	2 through 4/0 AWG
SST*-15M	6, 9, 12, 48	1.500	0.500	0.035	0.120	2/0 AWG through 500 MCM
SST*-15	6, 9, 12, 48	1.500	0.500	0.050	0.140	2/0 AWG through 500 MCM
SST*-17M	6, 9, 12, 48	1.700	0.500	0.030	0.120	2/0 AWG through 500 MCM
SST*-17	6, 9, 12, 48	1.700	0.500	0.045	0.140	2/0 AWG through 500 MCM
SST*-20M	6, 9, 12, 48	2.000	0.750	0.040	0.120	350 MCM through 1000 MCM
SST*-20	6, 9, 12, 48	2.000	0.750	0.050	0.155	350 MCM through 1000 MCM
SST*-27	12, 18, 24, 48	2.700	0.900	0.050	0.155	500 MCM through 1250 MCM
SST*-30	12, 18, 24, 48	3.000	1.250	0.050	0.155	900 MCM through 1500 MCM
SST*-40	12, 18, 24, 48	4.000	1.750	0.050	0.155	1500 MCM through 2500 MCM
SST*-45	12, 18, 24, 48	4.500	1.750	0.050	0.155	1500 MCM through 2500 MCM

† In place of asterisk* substitute length of tubing to be ordered. For example, SST*-11, as the third column indicates, comes in 6-, 9-,12- and 48-inch lengths, so a 9-inch cut piece of SST tubing would be SST 9-11.
The suffix M = medium-wall tubing.
†† Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.
Standard packaging	See Product Dimensions table.
Ordering description	Specify product name, cut length, size and color (for example, SST 48-07/FR/RS).

Part Numbering System



Example: SST-48-07M/FR/97/NM

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

DR-25

Heat-Shrinkable, Flexible, Chemical and Abrasion Resistant Tubing

Product Facts

- Flame-retardant
- System 25 tubing
- Shrink ratio 2:1

Applications

Specially formulated for optimum high temperature fluid resistance, and long term heat resistance. Resistant to aviation and diesel fuels, hydraulic fluids and lubricating oils.

Particularly suitable as a jacketing material for military ground vehicle cables and harnesses. It is also ideally suited for the demands of motorsport cable harnesses. When used in conjunction with System 25 heat-shrinkable molded shapes and S1125 high performance adhesive, these products provide a complete cable harness system.

Installation

Minimum shrink temperature: 150°C [302°F]

Minimum full recovery temperature: 175°C [347°F]

Operating Temperature Range

–75°C to 150°C [–103°F to 302°F] (per VG 95343 Part 5 Type D)

Specifications/Approvals

Series	Military	Raychem
DR-25	AMS-DTL-23053/16*	RT-1116
	VG 95343 Part 5 Type D	RK-6008/1
	VDE 0341/Pt 9005	
	Def Stan 59-97 Issue 3 Type 6B	
	BS 4G-198 Part 3 10A	

* Formerly MIL-I-23053/16 and MIL-DTL-23053/16.

Catalog 1308940
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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

DR-25 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
1/8	3.2 [0.125]	1.6 [0.062]	0.76 ± 0.15 [0.030 ± 0.006]
3/16	4.8 [0.187]	2.4 [0.093]	0.84 ± 0.15 [0.033 ± 0.006]
1/4	6.4 [0.250]	3.2 [0.125]	0.89 ± 0.15 [0.035 ± 0.006]
3/8	9.5 [0.375]	4.8 [0.187]	1.02 ± 0.20 [0.040 ± 0.008]
1/2	12.7 [0.500]	6.4 [0.250]	1.22 ± 0.20 [0.048 ± 0.008]
3/4	19.0 [0.748]	9.5 [0.375]	1.45 ± 0.28 [0.057 ± 0.011]
1	25.4 [1.000]	12.7 [0.500]	1.78 ± 0.28 [0.070 ± 0.011]
1 1/2	38.0 [1.500]	19.0 [0.748]	2.41 ± 0.41 [0.095 ± 0.016]
2	51.0 [2.000]	25.4 [1.000]	2.79 ± 0.41 [0.110 ± 0.016]
3	76.0 [3.000]	38.0 [1.500]	3.18 ± 0.50 [0.125 ± 0.020]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.
Standard packaging	On spools.
Ordering description***	Specify product name, size and color (for example, DR-25 1/8-0)

*** Europe only. For supply to Def Stan and BS add -DS or -BS to ordering description.

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

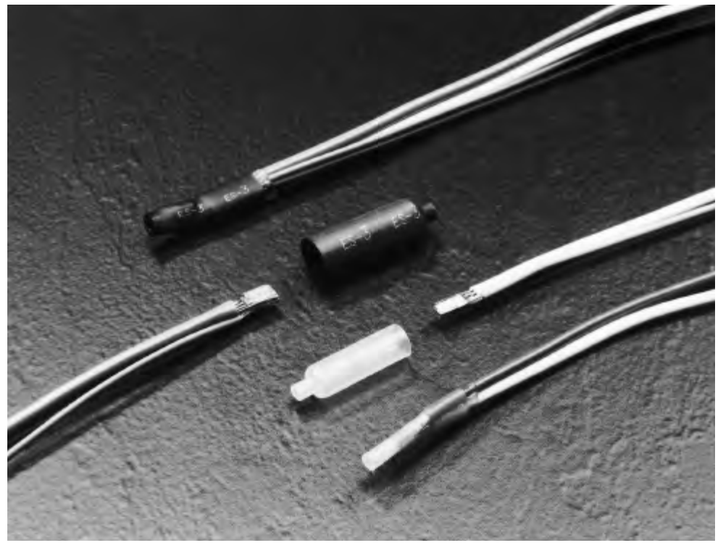
Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

ES Caps

High-Shrink-Ratio, Adhesive-Lined, Semirigid Polyolefin Caps



Product Facts

- 4:1 shrink ratio allows a few sizes to cover a wide range of splice and component diameters
- Mechanically tough jacket provides strain relief and abrasion protection
- Thick adhesive liner forms an effective barrier against fluids and moisture and performs well at an extended temperature range

Applications

Specially designed to provide mechanical and environmental protection of stub splices in electrical harnesses. Clear caps allow see-through inspection; black caps are flame-retardant.

Installation

Minimum shrink temperature: 100°C [212°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

–40°C to 105°C [–40°F to 221°F]

Specifications/Approvals

Series	UL	Raychem
ES Caps	E85381 600 V, 125°C	RW-3006

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UK: 44-208-420-8341

ES Caps (Continued)

Product Dimensions

Part Number	Inside Diameter (Including Core)			Recovered Wall Thickness**		
	Standard Length* as Supplied (Millimeters)	Minimum Expanded as supplied	Maximum Recovered After Heating	Minimum Total Wall After Heating	Minimum Jacket Wall After Heating	Minimum Adhesive Wall After Heating
ES Cap-No.1	30, 35	5.72 [0.225]	1.27 [0.050]	1.20 [0.047]	0.64 [0.025]	0.56 [0.022]
ES Cap-No.2	30, 35	7.44 [0.293]	1.65 [0.065]	1.52 [0.060]	0.76 [0.030]	0.76 [0.030]
ES Cap-No.3	40, 50	10.85 [0.427]	2.41 [0.095]	1.91 [0.075]	0.89 [0.035]	1.02 [0.040]

* Other cap lengths available upon request.
** Wall thickness will be less if cap recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0), clear (-X)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Other cap lengths available on request.	
Standard packaging	In pieces.	
Marking	Caps will be marked with their numbered size (such as ES-1, ES-2, or ES-3).	
Ordering description	Specify product name, size, color, and length (for example, ES CAP-NO.2-X-35MM).	

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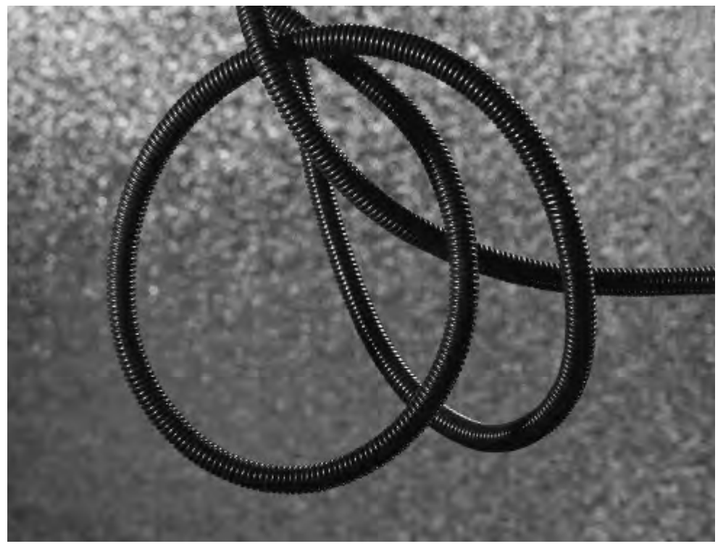
HCTE

Helical Convolex Tubing with a High Crush Resistance



Product Facts

- Highly flame-retardant
- Highly flexible and fluid resistant
- Not heat-shrinkable
- High crush resistance
- System 300 conduit tubing

Applications

Used as a conduit to provide mechanical protection for electrical wiring systems in applications requiring flexibility, high-temperature performance and good resistance to a variety of fluids. Widely used in the military and commercial aerospace industries. Can be used in conjunction with other Raychem components to form an integrated harnessing system.

Installation

It is recommended that no more than 70% of the internal area (“fill factor”) of the HCTE conduit be occupied by wires in any application.

Operating Temperature Range

–55°C to 200°C [–67°F to 392°F]

Specifications/Approvals

Series	Military	Raychem
HCTE	VG 96936 Part 6	RT-1162

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UK: 44-208-420-8341

HCTE (Continued)

Product Dimensions

Size	Inside Diameter Minimum	Outside Diameter Maximum	Maximum Wall Thickness
0187	4.60 [0.181]	8.10 [0.320]	0.46 [0.018]
0281	6.90 [0.273]	10.50 [0.414]	0.46 [0.018]
0312	7.70 [0.306]	11.80 [0.450]	0.46 [0.018]
0375	9.20 [0.364]	12.90 [0.510]	0.46 [0.018]
0437	10.80 [0.427]	14.50 [0.571]	0.46 [0.018]
0500	12.30 [0.485]	16.50 [0.650]	0.58 [0.023]
0625	15.40 [0.608]	19.50 [0.770]	0.58 [0.023]
0750	17.90 [0.730]	23.60 [0.930]	0.58 [0.023]
0875	21.80 [0.860]	27.20 [1.073]	0.58 [0.023]
1000	24.70 [0.975]	31.10 [1.226]	0.58 [0.023]
1250	30.70 [1.210]	35.30 [1.539]	0.58 [0.023]
1500	36.50 [1.437]	46.50 [1.832]	0.58 [0.023]
1625	39.60 [1.562]	50.17 [1.975]	0.58 [0.023]
1750	42.67 [1.688]	52.88 [2.082]	0.58 [0.023]
2000	49.20 [1.937]	59.23 [2.332]	0.58 [0.023]

Ordering Information

Color	Standard Black (-0)
Size selection	Always order a conduit size that will ensure that a “fill factor” of 70% is not exceeded.
Standard packaging	On spools.
Ordering description	Specify product name, size and color (for example, HCTE-0187-0).

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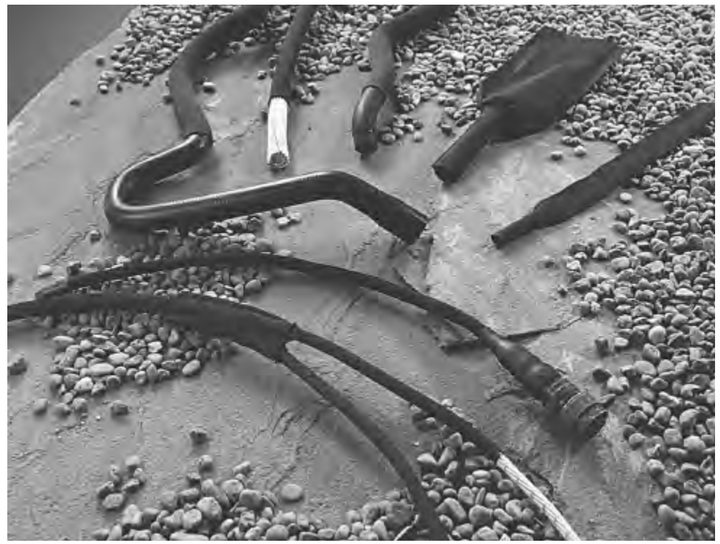
HFT5000

Heat-Shrinkable Fabric Tubing

Product Facts

- Highly flexible woven fabric tubing
- Polyethylene/polyester construction for excellent abrasion resistance
- Halogen free
- Heat-shrinkable to grip substrates tightly without additional fixing
- 2:1 shrink ratio for easy installation onto different substrate diameters and sizes
- Highly flexible woven fabric construction for easy, compliant installation onto awkward substrates such as bent hoses
- Outstanding abrasion resistance over a wide temperature range
- Easily cut with standard industrial cutting equipment
- Resistant to harsh environments
- Multifilament construction that ensures soft, safe handling
- Low shrink temperature for safe installation onto heat sensitive substrates



Applications

Designed primarily to provide mechanical abrasion protection for components such as rubber hoses, plastic pipes, and harness wiring bundles. Also suitable for other applications, such as noise and rattle suppression.

The woven construction makes HFT5000 extremely flexible and resistant to trapping water, heat and humidity. Provides outstanding abrasion, chafing and cutting protection, even at high temperatures.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 110°C [230°F]

Maximum storage temperature: 60°C [140°F]

Operating Temperature Range

3000 hours:
–40°C to 125°C
[–40°F to 257°F]

1000 hours:
–40°C to 150°C
[–40°F to 302°F]

Specifications/Approvals

Series	UL	Raychem
HFT5000	E199379 Rated 135˚C	RW-2060

Catalog 1308940
Revised 8-06

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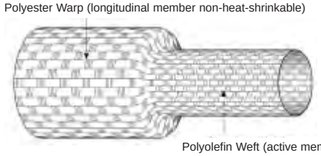
HFT5000 (Continued)

Product Dimensions

Polyester Warp (longitudinal member non-heat-shrinkable)



Polyolefin Weft (active member heat-shrinkable)

Size	Inside Diameter	
	Minimum Expanded as Supplied	Maximum Recovered After Heating
Standard		
12/6	12 [0.47]	6 [0.24]
20/10	20 [0.79]	10 [0.39]
30/15	30 [1.18]	15 [0.59]
40/20	40 [1.57]	20 [0.79]
50/25	50 [1.97]	25 [0.98]
60/30	60 [2.36]	30 [1.18]
70/35	70 [2.76]	35 [1.38]
Nonstandard High Volume		
25/12	25 [0.98]	12 [0.47]
34/17	34 [1.34]	17 [0.67]
80/40	80 [3.15]	40 [1.57]

Ordering Information

Color	Standard	Black (-0)
Standard packaging	On spools.	
Ordering description	Specify product name, size and color (for example, HFT5000-12/6-0)	

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MicroFit

Small-Diameter, High-Shrink-Ratio Tubing

Product Facts

- Small diameter
- High shrink ratio
- Thin wall
- Fluoropolymer material

Applications

The MicroFit family of small-diameter, high-shrink-ratio tubing is ideal for electrical insulation, mechanical protection, and strain relief in smaller, more compact commercial electronics products. Offered in a variety of materials. The RW-175 version of MicroFit tubing is suitable for use in space applications.

Installation

Minimum full recovery temperature:

175°C [347°F] (RW-175)

Operating Temperature Range

RW-175: –55°C to 175°C [–67°F to 347°F]

Specifications/Approvals

Series	Material	Master File Number	Raychem
RW-175 MicroFit	—	—	RW-175 MicroFit SCD

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Japan: 81-44-844-8013
UK: 44-208-420-8341

MicroFit (Continued)

Product Dimensions

Size	Inside Diameter		Wall Thickness	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	As Supplied (Nominal)	Recovered*** (Maximum)
MFT-*-No. 1-**	0.356 [0.014]	0.178 [0.007]	0.076 [0.003]	0.127 [0.005]
MFT-*-No. 2-**	0.610 [0.024]	0.305 [0.012]	0.064 [0.0025]	0.152 [0.006]
MFT-*-No. 33-**	1.143 [0.045]	0.432 [0.017]	0.064 [0.0025]	0.178 [0.007]
MFT-*-No. 65-**	0.635 [0.025]	0.254 [0.010]	0.127 [0.005]	0.330 [0.013]

* Replace single asterisk with material type: MT1000, MT2000, or RW-175.
** Replace double asterisk with color-code number.
*** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

		MT1000	MT2000	RW-175
Color	Standard	Translucent (-X)	Black (-0), clear (-X)	Translucent (-X)
	Nonstandard	Black (-0)	White (-9), red (-2), yellow (-4), blue (-6), orange (-3)	Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.			
Standard packaging	On plastic spools****			
Ordering description	Specify product name, material, size and color (for example, MFT-MT2000-NO.1-0).			

**** MFT-MT1000 and MFT-MT2000 are double bagged.

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NT-MIL

Flexible, Rugged, Modified Elastomeric Tubing

Product Facts

- Remains flexible at temperatures as low as –70°C [–94°F] without cracking
- Withstands heat shock at 200°C [392°F] without dripping, flowing or cracking
- Offers outstanding resistance to abrasion and physical abuse while providing flexibility and strain relief needed in rugged harnessing applications
- Resistant to most fluids and solvents, including aviation and ground vehicle fuels, lubricating oil, and hydraulic fluids
- Meets the stringent requirements of SAE-AMS-DTL-23053/1, Classes 1 and 2

Applications

Widely used for insulation, strain relief and abrasion protection on cable harnesses and wire bundles in the military and aerospace industries where a reliable rugged tubing is needed. Especially suitable for applications requiring exposure to common fluids and solvents.

Installation

Minimum shrink temperature: 90°C [194°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

–70°C to 121°C [–94°F to 250°F]

Specifications/Approvals

Series	Military	Raychem
NT-MIL	AMS-DTL-23053/1*, Classes 1 & 2	RW-3030

* Formerly MIL-I-23053/1 and MIL-DTL-23053/1

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NT-MIL (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness* After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
1/8	3.2 [0.125]	1.6 [0.061]	0.69 ± 0.20 [0.027 ± 0.008]
3/16	4.8 [0.187]	2.5 [0.100]	0.84 ± 0.25 [0.033 ± 0.010]
1/4	6.4 [0.250]	3.6 [0.143]	0.89 ± 0.25 [0.035 ± 0.010]
3/8	9.5 [0.375]	5.4 [0.211]	1.01 ± 0.25 [0.040 ± 0.010]
1/2	12.7 [0.500]	7.3 [0.286]	1.21 ± 0.38 [0.048 ± 0.015]
5/8	15.9 [0.625]	9.1 [0.357]	1.32 ± 0.38 [0.052 ± 0.015]
3/4	19.1 [0.750]	10.9 [0.428]	1.44 ± 0.38 [0.057 ± 0.015]
7/8	22.2 [0.875]	12.7 [0.500]	1.65 ± 0.38 [0.065 ± 0.015]
1	25.4 [1.000]	14.5 [0.570]	1.77 ± 0.51 [0.070 ± 0.020]
1 1/4	31.8 [1.250]	18.1 [0.714]	2.20 ± 0.51 [0.087 ± 0.020]
1 1/2	38.1 [1.500]	21.8 [0.857]	2.41 ± 0.51 [0.095 ± 0.020]
1 3/4	44.5 [1.750]	25.4 [1.000]	2.71 ± 0.51 [0.107 ± 0.020]
2	50.8 [2.000]	29.0 [1.140]	2.79 ± 0.51 [0.110 ± 0.020]
3	76.2 [3.000]	43.4 [1.710]	3.17 ± 0.51 [0.125 ± 0.020]
4	101.6 [4.000]	57.9 [2.280]	3.55 ± 0.51 [0.140 ± 0.020]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.
Standard packaging	On spools.
Ordering description	Specify product name, size and color (for example, NT-MIL 1/4-0).

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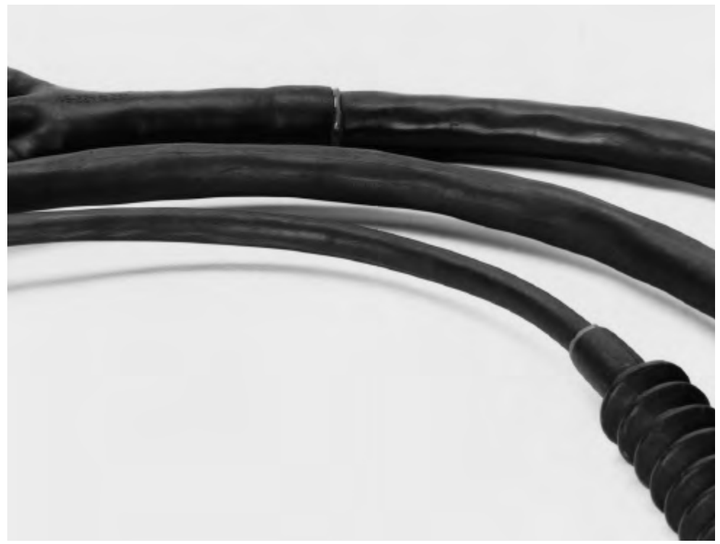
NTFR



Very Flexible, Rugged Neoprene Elastomer Tubing

Product Facts

- Remains flexible at low temperatures without cracking
- Offers outstanding resistance to abrasion and physical abuse while providing the flexibility and strain relief needed for rugged applications
- Resistant to most fluids and solvents, including aviation and ground-vehicle fuels, lubricating oil, and hydraulic fluids (see Raychem Specification RT-511)
- Performance exceeds the stringent requirements of SAE-AMS-DTL-23053/1, Class 2
- System 20

Applications

Widely used for insulation, strain relief, and abrasion protection on cable harnesses and wire bundles in the military and aerospace industries. Especially suitable for applications requiring exposure to fluids and solvents at elevated temperatures.

Installation

Minimum shrink temperature: 90°C [194°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

–70°C to 121°C
[–94°F to 250°F]

Specifications/Approvals

Series	Military	Agency	Raychem
NTFR	SC-X-15112	AMS 3623	RT-511

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Japan: 81-44-844-8013
UK: 44-208-420-8341

NTFR (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
1/8	3.2 [0.125]	1.6 [0.061]	0.69 ± 0.20 [0.027 ± 0.008]
3/16	4.8 [0.187]	2.5 [0.100]	0.84 ± 0.25 [0.033 ± 0.010]
1/4	6.4 [0.250]	3.6 [0.143]	0.89 ± 0.25 [0.035 ± 0.010]
3/8	9.5 [0.375]	5.4 [0.211]	1.01 ± 0.25 [0.040 ± 0.010]
1/2	12.7 [0.500]	7.3 [0.286]	1.21 ± 0.38 [0.048 ± 0.015]
5/8	15.9 [0.625]	9.1 [0.357]	1.32 ± 0.38 [0.052 ± 0.015]
3/4	19.1 [0.750]	10.9 [0.428]	1.44 ± 0.38 [0.057 ± 0.015]
7/8	22.2 [0.875]	12.7 [0.500]	1.65 ± 0.38 [0.065 ± 0.015]
1	25.4 [1.000]	14.5 [0.570]	1.77 ± 0.51 [0.070 ± 0.020]
1 1/4	31.8 [1.250]	18.1 [0.714]	2.20 ± 0.51 [0.087 ± 0.020]
1 1/2	38.1 [1.500]	21.8 [0.857]	2.41 ± 0.51 [0.095 ± 0.020]
1 3/4	44.5 [1.750]	25.4 [1.000]	2.71 ± 0.51 [0.107 ± 0.020]
2	50.8 [2.000]	29.0 [1.140]	2.79 ± 0.51 [0.110 ± 0.020]
3	76.2 [3.000]	43.4 [1.710]	3.17 ± 0.51 [0.125 ± 0.020]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.
Standard packaging	On spools.
Ordering description	Specify product name, size and color (for example, NTFR 1/4-0).

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

PD Caps

Semirigid, Encapsulant-Lined, Polyolefin Caps

Product Facts

- 3:1 shrink ratio
- Permanent or temporary way to terminate wires
- Rapid, simple installation
- Rugged protection against abrasion, vibration, and flexing
- PD caps provide a splash-resistant, moisture-resistant covering (but not intended for use where immersion in fluids is required)

Applications

PD Caps offer an improved, inexpensive way to encapsulate crimped electrical connections, including those on motor coils. Their encapsulant lining melts and flows to fill surface irregularities of the substrate. These vibration-proof caps are used to insulate and terminate dead-end electrical cables, fixtures, connectors, and other electrical components.

Installation

Minimum shrink temperature: 125°C [257°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

–55°C to 110°C [–67°F to 230°F]

Specifications/Approvals

Series	UL	Raychem
PD Caps	E85381 600 V, 125°C	PD Caps SCD

Catalog 1308940
Revised 8-06

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PD Caps (Continued)

Product Dimensions

Size	Length		Inside Diameter		Recovered Wall Thickness** Total Wall After Heating
	Nominal Overall as Supplied	Minimum Open Barrel as Supplied*	Minimum Expanded as Supplied	Maximum Recovered After Heating	
1/8	22.0 [0.87]	12.7 [0.50]	3.2 [0.125]	0.58 [0.023]	1.22 ± 0.15 [0.048 ± 0.006]
3/16	25.4 [1.00]	15.2 [0.60]	4.8 [0.187]	1.52 [0.060]	1.57 ± 0.20 [0.062 ± 0.008]
1/4	28.4 [1.12]	15.2 [0.60]	6.4 [0.250]	2.03 [0.080]	1.98 ± 0.25 [0.078 ± 0.010]
3/8	31.8 [1.25]	18.3 [0.72]	9.5 [0.375]	2.29 [0.090]	2.08 ± 0.25 [0.082 ± 0.010]
1/2	38.1 [1.50]	21.6 [0.85]	12.7 [0.500]	2.29 [0.090]	2.54 ± 0.25 [0.100 ± 0.010]

* See glossary for definition of “barrel.”
** Wall thickness will be less if recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.
Standard packaging	In pieces.
Ordering description	Specify product name, size and color (for example, PD Caps 1/4-0).

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

RayBlock 85

Heat-Shrinkable Water-Blocking System

Product Facts

- Environmentally seals wire bundles of up to 20 wires
- Withstands temperature excursions to 105°C [221°F]
- Provides excellent strain relief and reduces noise
- Offers a low-profile installed product only marginally larger than the cable bundle itself

Applications

Designed to provide consistent sealing for cable bundles and the back of connectors. The wires are placed within the channels of a specially formulated hot-melt adhesive profile, then covered by dual-wall, heat-shrinkable tubing with a flame-retardant, radiation-crosslinked outer wall and hot-melt-adhesive inner wall. When the tubing is heated, the hot-melt adhesive melts and the tubing shrinks, forcing the molten adhesive to fill all the voids within the wire bundle and tubing. The result is a solid plug of adhesive molded around each wire in the bundle, creating a moisture-resistant seal.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 110°C [230°F]

Operating Temperature Range

–40°C to 85°C [–40°F to 185°F]

Specifications/Approvals

Series	Raychem
RayBlock 85	RayBlock 85 SCD RW-2101

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

RayBlock 85 (Continued)

Product Dimensions

Part Number	No. of Channels	Profile			Tubing Inside Diameter		
		Outside Height	Length	Width	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Length
RayBlock 85 Kit 0102-A0	2	8.5 [0.335]	2.75 [0.108]	8.50 [0.335]	12.0 [0.472]	3.0 [0.118]	40 [1.57]
RayBlock 85 Kit 0203-A0	3	8.5 [0.335]	2.75 [0.108]	12.25 [0.482]	24.0 [0.945]	6.0 [0.236]	47 [1.85]
RayBlock 85 Kit 0504-A0	4	8.5 [0.335]	2.75 [0.108]	16.00 [0.630]	16.0 [0.630]	4.0 [0.158]	40 [1.57]
RayBlock 85 Kit 0405-A0	5	8.5 [0.335]	2.75 [0.108]	19.75 [0.778]	24.0 [0.945]	6.0 [0.236]	45 [1.77]
RayBlock 85 Kit 0107-A0	7	8.5 [0.335]	2.75 [0.108]	27.25 [1.070]	24.0 [0.945]	6.0 [0.236]	65 [2.56]
RayBlock 85 Kit 0510-A0	10	8.5 [0.335]	2.75 [0.108]	38.50 [1.520]	32.0 [1.260]	8.0 [0.315]	55 [2.17]

Ordering Information

Color	Standard	Black (-0)
Size selection	For wire with an outside diameter smaller than 2.8 [0.110] , use a maximum of two wires per channel. For wire with an outside diameter of 2.8–3.5 [0.110 to 0.138], use a maximum of one wire per channel. Special order sizes are available upon request.	
Standard packaging	One kit (contains 1000 pcs. of profile and 1000 pcs. of tubing).	

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

RayBlock 105

Heat-Shrinkable Water-Blocking System

Product Facts

- Environmentally seals wire bundles of up to 20 wires
- Withstands temperature excursions to 120°C [248°F]
- Provides excellent strain relief and reduces noise
- Offers a low-profile installed product only marginally larger than the cable bundle itself

Applications

Designed to provide consistent sealing for cable bundles and the back of connectors. The wires in the bundle are placed within the channels of a specially formulated hot-melt adhesive profile, and then covered by dual wall, heat-shrinkable tubing with a flame-retardant radiation-crosslinked outer wall and hot-melt-adhesive inner wall. When the tubing is heated, the hot-melt adhesive melts and the tubing shrinks, forcing the molten adhesive to fill all the voids within the wire bundle and tubing. The result is a solid plug of adhesive molded around each wire in the bundle, creating a moisture-resistant seal.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 110°C [230°F]

Operating Temperature Range

–40°C to 105°C [–40°F to 221°F]

Specifications/Approvals

Series	Raychem
RayBlock 105	RayBlock 105 SCD RW-2102

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

RayBlock 105 (Continued)

Product Dimensions

Part Number	No. of Channels	Profile			Tubing Inside Diameter		
		Outside Height	Length	Width	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Length
RayBlock 105 Kit 0102-A0	2	8.5 [0.335]	2.75 [0.108]	8.50 [0.335]	12.0 [0.472]	3.0 [0.118]	40 [1.57]
RayBlock 105 Kit 0103-A0	3	8.5 [0.335]	2.75 [0.108]	12.25 [0.482]	16.0 [0.630]	4.0 [0.158]	40 [1.57]
RayBlock 105 Kit 0504-A0	4	8.5 [0.335]	2.75 [0.108]	16.00 [0.630]	16.0 [0.630]	4.0 [0.158]	45 [1.77]
RayBlock 105 Kit 0105-A0	5	8.5 [0.335]	2.75 [0.108]	19.75 [0.778]	24.0 [0.945]	6.0 [0.236]	45 [1.77]
RayBlock 105 Kit 0107-A0	7	8.5 [0.335]	2.75 [0.108]	27.20 [1.070]	24.0 [0.945]	6.0 [0.236]	65 [2.56]
RayBlock 105 Kit 0110-A0	10	8.5 [0.335]	2.75 [0.108]	38.50 [1.520]	32.0 [1.260]	8.0 [0.315]	65 [2.56]

Ordering Information

Color	Standard Black (-0)
Size selection	For wire with an outside diameter smaller than 2.8 [0.110], use a maximum of two wires per channel. For wire with an outside diameter of 2.8–3.5 [0.110–0.138], use a maximum of one wire per channel. Special order sizes are available upon request.
Standard packaging	One kit (contains 1000 pcs. of profile and 1000 pcs. of tubing).

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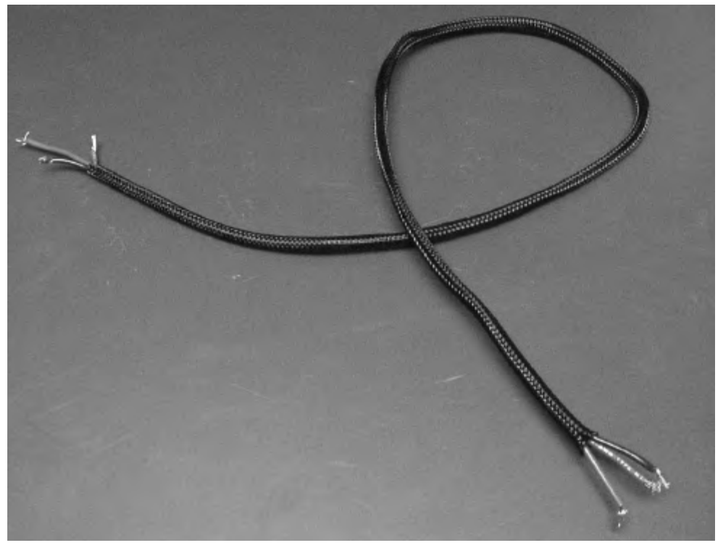
Rayflex Tubing

PET and PFR Expandable, Braided, Polyester Sleeving



Product Facts

- Excellent abrasion and cut-through resistance
- Lightweight
- Flexible (even at low temperatures)
- Fungus-proof
- Not affected by most chemicals and solvents, non-hygroscopic
- PFR meets UL VW-1, FAR25, and is Self-Extinguishing
- Fiber diameter is 0.254 [0.010]

Applications

Rayflex tubing is suited for the mechanical protection of wire harnesses, hoses, and all other applications where exceptional flexibility combined with superior abrasion/cut resistance is required. It also serves as an economical means for wire bundling that will not trap heat or moisture; expanding easily to fit over irregular shapes, then contracting to conform and grip. To prevent fraying, these products should be cut to length using a hot knife.

Installation

This product is cold applied.

Operating Temperature Range

–50°C to 150°C [–58°F to 302°F]

(220°C [428°F] for short periods)

Specifications/Approvals

Series	UL	CSA	Raychem
Rayflex PET	—	—	RW-2069
Rayflex PFR	E197586 Rated 125˚C	LR31929 Rated 125˚C	—

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

Rayflex Tubing (Continued)

Product Dimensions

Size	Nominal Size	Size Range
RAYFLEX PET expandable polyester braid		
1/8	3 [0.125]	2.4-6.4 [0.094-0.250]
1/4	6 [0.250]	3.2-9.5 [0.125-0.375]
3/8	10 [0.375]	4.7-16 [0.188-0.630]
1/2	13 [0.500]	6.4-19 [0.250-0.750]
3/4	19 [0.750]	13-32 [0.500-1.250]
1-1/4	32 [1.250]	19-45 [0.750-1.750]
1-3/4	45 [1.750]	32-70 [1.250-2.750]
2	51 [2.000]	38-76 [1.500-3.000]
RAYFLEX PFR flame-retardant, expandable polyester braid		
1/8	3 [0.125]	2.4-6.4 [0.094-0.250]
1/4	6 [0.250]	3.2-9.5 [0.125-0.375]
3/8	10 [0.375]	4.7-16 [0.188-0.630]
1/2	13 [0.500]	6.4-19 [0.250-0.750]
3/4	19 [0.750]	13-32 [0.500-1.250]
1-1/4	32 [1.250]	19-45 [0.750-1.750]
1-3/4	45 [1.750]	32-70 [1.250-2.750]
2	51 [2.000]	38-76 [1.500-3.000]

Ordering Information

Color	Standard	RF-PET: Black (-0) RF-PFR: Black with white X-Cross tracers (-09)
Standard packaging	On spools.	
Ordering description	Specify product name, size and color (for example, RF-PET 1/8-0).	

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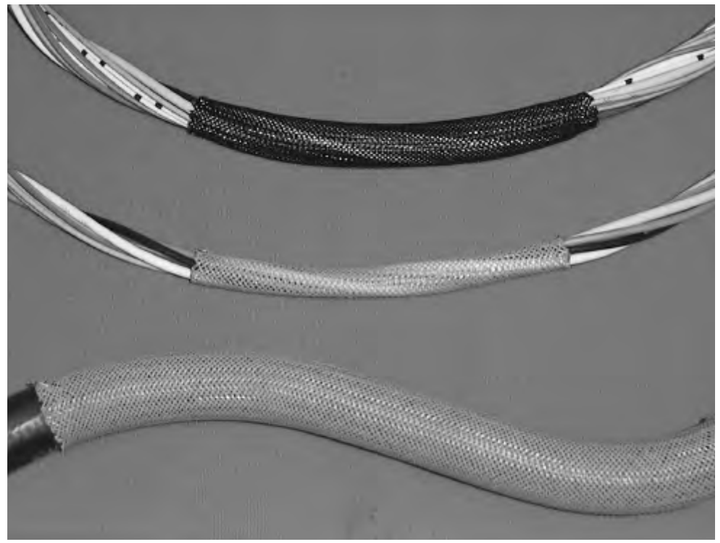
UK: 44-208-420-8341

Rayflex PETM Tubing

Expandable, Braided, Polyester Sleeving



Product Facts

- Excellent abrasion and cut-through resistance
- Lightweight construction with 0.22 [.009] fiber
- Flexible (even at low temperatures)
- Fungus-resistant
- Resistant to most chemicals and solvents, non-hygroscopic
- Wide range of metric sizes

Applications

Rayflex tubing is suited for the mechanical protection of wire harnesses, hoses, and all other applications where exceptional flexibility combined with superior abrasion/cut resistance is required. It also serves as an economical means for wire bundling that will not trap heat or moisture; expanding easily to fit over irregular shapes, then contracting to conform and grip. To prevent fraying, these products should be cut to length using a hot knife.

Installation

This product is cold applied.

Operating Temperature Range

–50°C to 150°C [–58°F to 302°F]

(220°C [428°F] for short periods)

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

Rayflex PETM Tubing (Continued)

Product Dimensions

Nominal Size	Size Range	
	Minimum	Maximum
3 [0.119]	1 [0.039]	5 [0.197]
4 [0.158]	2 [0.079]	7 [0.276]
5 [0.197]	3 [0.118]	9 [0.354]
6 [0.236]	4 [0.158]	12 [0.472]
8 [0.315]	5 [0.197]	12 [0.472]
10 [0.394]	7 [0.276]	15 [0.591]
12 [0.472]	8 [0.315]	17 [0.669]
15 [0.591]	10 [0.394]	20 [0.787]
20 [0.787]	14 [0.551]	26 [1.024]
25 [0.984]	18 [0.709]	34 [1.339]
30 [1.181]	20 [0.787]	40 [1.575]
40 [1.575]	30 [1.181]	50 [1.969]
50 [1.969]	40 [1.575]	60 [2.362]

Ordering Information

Color	Standard	Black (-0), Grey (-8)
Standard packaging	On spools.	
Ordering description	Specify product name, size and color (for example, RF-PETM-03-0).	

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RNF-150

High-Performance, Flame-Resistant, Flexible, Fluoropolymer Tubing

Product Facts

- 2:1 shrink ratio
- Approximately 40 percent thinner walls than most general purpose polyolefin tubings
- High flame-resistance
- Excellent physical and electrical properties after exposure to many chemicals and solvents at 50°C [122°F] (but not recommended for use in direct contact with ketones)
- Recommended maximum temperature for use as a primary insulator: 135°C [275°F]

Applications

Can be used for jacketing and bundling of wires to form light-duty harnesses, especially where a low profile, abrasion resistance, and flexibility are needed. Can also be used to provide insulation and strain relief of electrical connections and wire terminations, identification of wires, and packaging of components.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 150°C [302°F]

Operating Temperature Range

–55°C to 150°C [–67°F to 302°F]

Specifications/Approvals

Series	UL	Military	Raychem
RNF-150	E35586 VW-1 600 V, 150°C	AMS-DTL-23053/18*, Class 2	RT-370

* Formerly MIL-I-23053/18 and MIL-DTL-23053/18.

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

RNF-150 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
3/64	1.2 [0.046]	0.6 [0.023]	0.25 ± 0.05 [0.010 ± 0.002]
1/16	1.6 [0.063]	0.8 [0.031]	0.25 ± 0.05 [0.010 ± 0.002]
3/32	2.4 [0.093]	1.2 [0.046]	0.25 ± 0.05 [0.010 ± 0.002]
1/8	3.2 [0.125]	1.6 [0.062]	0.25 ± 0.05 [0.010 ± 0.002]
3/16	4.8 [0.187]	2.4 [0.093]	0.25 ± 0.05 [0.010 ± 0.002]
1/4	6.4 [0.250]	3.2 [0.125]	0.30 ± 0.08 [0.012 ± 0.003]
3/8	9.5 [0.375]	4.8 [0.187]	0.30 ± 0.08 [0.012 ± 0.003]
1/2	12.7 [0.500]	6.4 [0.250]	0.30 ± 0.08 [0.012 ± 0.003]
3/4	19.1 [0.750]	9.5 [0.375]	0.43 ± 0.08 [0.017 ± 0.003]
1	25.4 [1.000]	12.7 [0.500]	0.48 ± 0.08 [0.019 ± 0.003]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools.	
Ordering description***	Specify product name, size and color (for example, RNF-150 1/4-0).	

*** Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

Catalog 1308940
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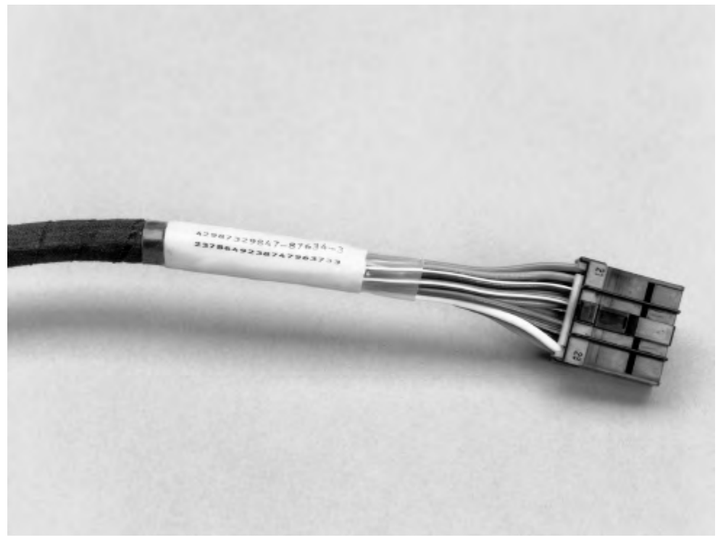
RT-375

12

Clear, Flame-Resistant, Flexible, Fluoropolymer Tubing



Product Facts

- 2:1 shrink ratio
- Exceptional clarity and clarity stability
- Toughness, chemical resistance, and high-temperature performance
- High flame-resistance
- Approximately 40 percent thinner walls than most general purpose polyolefin tubings
- Recommended maximum temperature for use as a primary insulator: 135°C [275°F]

Applications

Protects wire and cable markers subject to extreme abuse, while permitting full inspectability of each item covered. Provides bundling and jacketing of wires and cables, protecting them from mechanical and chemical abuse. Protects electronic components while permitting their identification and inspection.

Installation

Minimum shrink temperature: 125°C [257°F]

Minimum full recovery temperature: 150°C [302°F]

Operating Temperature Range

–55°C to 150°C [–67°F to 302°F]

Specifications/Approvals

Series	UL	CSA	Military	Raychem
RT-375	E35586 VW-1 600 V, 150°C	LR31929 VW-1 600 V, 150°C	AMS-DTL-23053/18*, Class 2	RT-375

* Formerly MIL-I-23053/18 and MIL-DTL-23053/18.

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

RT-375 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
3/64	1.2 [0.046)	0.6 [0.023]	0.25 ± 0.05 [0.010 ± 0.002]
1/16	1.6 [0.063]	0.8 [0.031]	0.25 ± 0.05 [0.010 ± 0.002]
3/32	2.4 [0.093]	1.2 [0.046]	0.25 ± 0.05 [0.010 ± 0.002]
1/8	3.2 [0.125]	1.6 [0.062]	0.25 ± 0.05 [0.010 ± 0.002]
3/16	4.8 [0.187]	2.4 [0.093]	0.25 ± 0.05 [0.010 ± 0.002]
1/4	6.4 [0.250]	3.2 [0.125]	0.30 ± 0.08 [0.012 ± 0.003]
3/8	9.5 [0.375]	4.8 [0.187]	0.30 ± 0.08 [0.012 ± 0.003]
1/2	12.7 [0.500]	6.4 [0.250]	0.30 ± 0.08 [0.012 ± 0.003]
3/4	19.1 [0.750]	9.5 [0.375]	0.43 ± 0.08 [0.017 ± 0.003]
1	25.4 [1.000]	12.7 [0.500]	0.48 ± 0.08 [0.019 ± 0.003]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Clear (-X)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.
Standard packaging	On spools.
Ordering description***	Specify product name, size and color (for example, RT-375 1/4-X).

*** Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

Catalog 1308940
Revised 8-06

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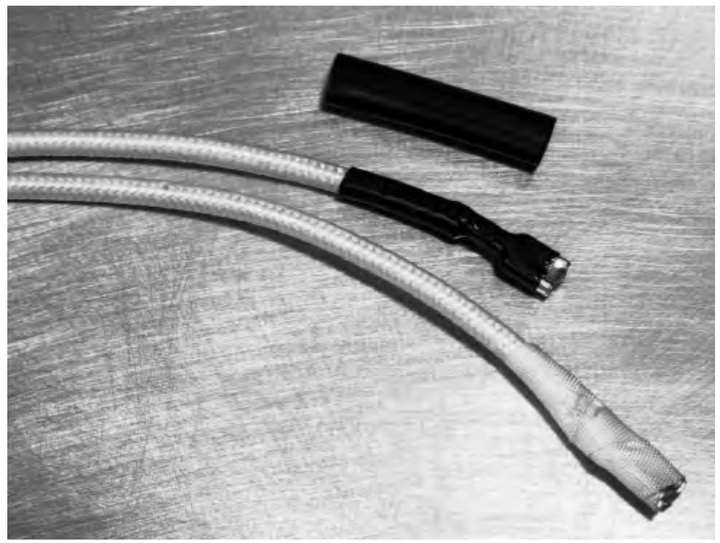
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

RT555

Fluid-Resistant, Chemical-Resistant, Crosslinked Fluoropolymer Tubing with Extended Temperature Range



Product Facts

- Resistance to high temperatures, solvents, corrosive chemicals, and radiation
- Extreme resistance to hydrocarbons
- Low outgassing (successfully tested for NASA outgassing requirements)
- Highly flame-retardant
- 40 percent lighter weight than tubing made with fluoroelastomer
- System 300 tubing

Applications

Suitable for commercial applications requiring heat resistance (electrical and hydraulic systems near aircraft or automotive engines or in fuel tanks), applications in chemically exposed environments (industrial process equipment in the pulp and paper, steel, and chemical industries), and equipment for handling caustic or dangerous chemicals or inks. Use for insulation and strain relief on appliances (electric ranges, microwave ovens, gas grills, and industrial paint-drying equipment) and for protection of delicate electronic instruments in down-hole applications.

Installation

Minimum shrink temperature: 150°C [302°F]

Minimum full recovery temperature: 220°C [428°F]

Operating Temperature Range

–65°C to 200°C [–85°F to 392°F]

Specifications/Approvals

Series	UL	Raychem
RT555	Listed for 185°C for 100,000-hr continuous use (File E85381) Listed for 200°C for 40,000-hr cumulative intermittent exposure	RT-555

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UK: 44-208-420-8341

RT555 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness* After Heating		
	Minimum Expanded as Supplied	Maximum Recovered after Heating	Minimum	Maximum	Nominal
1/8	3.18 [0.125]	1.57 [0.062]	0.25 [0.010]	0.41 [0.016]	0.30 [0.012]
3/16	4.75 [0.187]	2.36 [0.093]	0.28 [0.011]	0.46 [0.018]	0.36 [0.014]
1/4	6.35 [0.250]	3.18 [0.125]	0.33 [0.013]	0.51 [0.020]	0.41 [0.016]
3/8	9.53 [0.375]	4.75 [0.187]	0.41 [0.016]	0.58 [0.023]	0.48 [0.019]
1/2	12.70 [0.500]	6.35 [0.250]	0.41 [0.016]	0.58 [0.023]	0.48 [0.019]
5/8	15.88 [0.625]	7.95 [0.313]	0.48 [0.019]	0.66 [0.026]	0.56 [0.022]
3/4	19.05 [0.750]	9.53 [0.375]	0.61 [0.024]	0.79 [0.031]	0.69 [0.027]
1	25.40 [1.000]	12.70 [0.500]	0.71 [0.028]	0.89 [0.035]	0.79 [0.031]
1 1/4	31.75 [1.250]	15.88 [0.625]	0.76 [0.030]	0.94 [0.037]	0.84 [0.033]
1 1/2	38.10 [1.500]	19.05 [0.750]	0.86 [0.034]	1.04 [0.041]	0.94 [0.037]
2	50.80 [2.000]	25.40 [1.000]	0.94 [0.037]	1.12 [0.044]	1.02 [0.040]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.
Standard packaging	On spools.
Ordering description	Specify product name, size and color (for example, RT555 1/8-0).

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RW-175

High-Temperature, Chemical-Resistant, Polyvinylidene Fluoride Tubing

Product Facts

- 2:1 shrink ratio
- Tough, semirigid, very-thin-wall insulation
- High flame-resistance, meeting the requirements of AMS-DTL-23053*, Test C, with UL and CSA VW-1 rating
- High-temperature performance that meets or exceeds military and industrial standards
- Protection from most industrial solvents, fuels, and chemicals
- Recommended maximum temperature for use as a primary insulator: 135°C [275°F]

Applications

Especially suitable for applications requiring high-temperature performance, outstanding abrasion resistance and cut-through resistance, or superior chemical and solvent properties. Provides electrical insulation and strain relief of multipin connectors and solder joints. Ideal for applications that require dense packing of components or visual inspection of covered components.

Installation

Minimum shrink temperature: 155°C [311°F]

Minimum full recovery temperature: 175°C [347°F]

Operating Temperature Range

–55°C to 175°C [–67°F to 347°F]

Specifications/Approvals

Series	UL	CSA	Military	Industry	Raychem
RW-175	E35586 VW-1 600 V, 150°C	LR31929 VW-1 600 V, 150°C	AMS-DTL-23053/8* Def. Stan. 59-97 Type 3 VG 95343 Pt 5 Type F BS 3G 198 Pt4	VDE 0341 Pt 9005	RW-3029/1 RW-3029/2

* Formerly MIL-I-23053 and MIL-DTL-23053/8.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

RW-175 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
3/64	1.2 [0.046]	0.6 [0.023]	0.25 ± 0.05 [0.010 ± 0.002]
1/16	1.6 [0.063]	0.8 [0.031]	0.25 ± 0.05 [0.010 ± 0.002]
3/32	2.4 [0.093]	1.2 [0.046]	0.25 ± 0.05 [0.010 ± 0.002]
1/8	3.2 [0.125]	1.6 [0.062]	0.25 ± 0.05 [0.010 ± 0.002]
3/16	4.8 [0.187]	2.4 [0.093]	0.25 ± 0.05 [0.010 ± 0.002]
1/4	6.4 [0.250]	3.2 [0.125]	0.33 ± 0.05 [0.013 ± 0.002]
3/8	9.5 [0.375]	4.8 [0.187]	0.33 ± 0.05 [0.013 ± 0.002]
1/2	12.7 [0.500]	6.4 [0.250]	0.33 ± 0.05 [0.013 ± 0.002]
3/4	19.1 [0.750]	9.5 [0.375]	0.43 ± 0.08 [0.017 ± 0.003]
1	25.4 [1.000]	12.7 [0.500]	0.48 ± 0.08 [0.019 ± 0.003]
1 1/2	38.1 [1.500]	19.1 [0.750]	0.51 ± 0.08 [0.020 ± 0.003]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Clear (-X)
	Nonstandard	Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	In 1.2-meter [4-foot] lengths.	
Ordering description***	Specify product name, size and color (for example, RW-175 3/64-X).	

*** Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

Catalog 1308940
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UK: 44-208-420-8341

RW-200/RW-200-E

Heat-Shrinkable, Chemical-Resistant, High-Temperature Tubing

Product Facts

- High resistance to impact and abrasion
- Resistance to a wide variety of fuels, lubricants, acids, and solvents at elevated temperatures
- Flexibility at low temperatures without cracking

Applications

Raychem premium heat-shrinkable tubing is fabricated from modified fluoroelastomers — a crosslinked material designed for a wide range of applications. It is available in two configurations. RW-200 is the standard wall thickness version, RW-200-E has a thicker wall. Offering fluid resistance, RW-200 and RW-200-E tubing can be used in applications up to 200°C [392°F].

Installation

Minimum shrink temperature: 100°C [212°F]

Minimum full recovery temperature: 175°C [347°F]

Operating Temperature Range

–55°C to 200°C [–67°F to 392°F]

Specifications/Approvals

Series	Military	Raychem
RW-200	AMS-DTL 23053/13*	RW-3037
RW-200-E	Def. Stan. 59-97 Issue 3 Type 4A VG 95343 Part 5 Type E VDE 0341/Pt9005 BS 4G-198 Part 3 12A MIL-PRF-46846 Type III, Class I	RW-3037

* Formerly MIL-I-23053/13 and MIL-DTL-23053/13.

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

RW-200/RW-200-E (Continued)

Product Dimensions

Type RW-200

Size	As Supplied	As Recovered			
	Inside Diameter Minimum	Inside Diameter Maximum	Wall Thickness		
			Minimum	Maximum	Nominal
1/8	**3.18** .125	**1.57** .062	**0.65** .026	**0.90** .035	**0.78** .031
3/16	**4.75** .187	**2.39** .094	**0.70** .028	**1.07** .042	**0.89** .035
1/4	**6.35** .250	**3.18** .125	**0.70** .028	**1.07** .042	**0.89** .035
3/8	**9.53** .375	**4.75** .187	**0.70** .028	**1.07** .042	**0.89** .035
1/2	**12.70** .500	**6.35** .250	**0.70** .028	**1.07** .042	**0.89** .035
5/8	**15.90** .625	**7.92** .312	**0.86** .034	**1.27** .050	**1.07** .042
3/4	**19.10** .750	**9.53** .375	**0.86** .034	**1.27** .050	**1.07** .042
7/8	**22.20** .875	**11.10** .437	**0.97** .038	**1.52** .060	**1.25** .049
1	**25.40** 1.000	**12.70** .500	**0.97** .038	**1.52** .060	**1.25** .049
1-1/4	**31.80** 1.250	**15.90** .625	**1.00** .040	**1.78** .070	**1.40** .055
1-1/2	**38.10** 1.500	**19.10** .750	**1.00** .040	**1.78** .070	**1.40** .055
2	**50.80** 2.000	**25.40** 1.000	**1.22** .048	**2.08** .082	**1.65** .065

Type RW-200-E

Size	As Supplied	As Recovered			
	Inside Diameter Minimum	Inside Diameter Maximum	Wall Thickness		
			Minimum	Maximum	Nominal
1/8	**3.18** .125	**1.57** .062	**0.65** .026	**0.90** .035	**0.78** .031
3/16	**4.75** .187	**2.39** .094	**0.65** .026	**1.00** .040	**0.83** .033
1/4	**6.35** .250	**3.18** .125	**0.70** .028	**1.00** .040	**0.85** .034
3/8	**9.53** .375	**4.75** .187	**0.80** .031	**1.15** .045	**0.97** .038
1/2	**12.70** .500	**6.35** .250	**0.90** .035	**1.35** .053	**1.13** .044
5/8	**15.90** .625	**7.92** .312	**0.95** .037	**1.50** .059	**1.25** .049
3/4	**19.10** .750	**9.53** .375	**1.10** .043	**1.70** .067	**1.40** .055
7/8	**22.20** .875	**11.10** .437	**1.15** .045	**1.90** .075	**1.52** .060
1	**25.40** 1.000	**12.70** .500	**1.35** .053	**2.00** .080	**1.68** .067
1-1/4	**31.80** 1.250	**15.90** .625	**1.35** .053	**2.30** .090	**1.83** .072
1-1/2	**38.10** 1.500	**19.10** .750	**1.90** .075	**2.40** .095	**2.15** .085
2	**50.80** 2.000	**25.40** 1.000	**2.30** .091	**3.30** .130	**2.80** .111

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.
Standard packaging	On spools.
Ordering description****	Specify product name, size and color (for example, RW-200-1/4-0).

**** Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

Catalog 1308940
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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

SFR

Very Flexible, Flame-Retardant, Silicone Elastomer Tubing

Product Facts

- Outstanding low-temperature flexibility
- Resistance to hydraulic fluids, fuel, and lubricating oil
- Very good ablative characteristics: when exposed to flame, surface turns to insulative char or “ablates”

Applications

Provides cable jacketing, harness protection, and strain relief for electronic components, semi-conductor leads, and wire splices. Ideal for applications that require flexibility over a wide range of operating temperatures.

Installation

Minimum shrink temperature: 135°C [285°F]

Minimum full recovery temperature: 175°C [347°F]

Operating Temperature Range

–75°C to 180°C [–103°F to 356°F]

Specifications/Approvals

Series	Military	Raychem
SFR	AMS-DTL-23053/10* MIL-PRF-46846, Type II, Class 1	RT-1140

* Formerly MIL-I-23053/10 and MIL-DTL-23053/10.

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UK: 44-208-420-8341

SFR (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
1/4	6.4 [0.250]	3.6 [0.143]	0.88 ± 0.25 [0.035 ± 0.010]
3/8	9.5 [0.375]	5.4 [0.214]	1.02 ± 0.25 [0.040 ± 0.010]
1/2	12.7 [0.500]	7.3 [0.286]	1.21 ± 0.38 [0.048 ± 0.015]
5/8	15.9 [0.625]	9.1 [0.357]	1.32 ± 0.38 [0.052 ± 0.015]
3/4	19.1 [0.750]	10.9 [0.428]	1.44 ± 0.38 [0.057 ± 0.015]
7/8	22.2 [0.875]	12.7 [0.500]	1.65 ± 0.38 [0.065 ± 0.015]
1	25.4 [1.000]	14.5 [0.570]	1.77 ± 0.51 [0.070 ± 0.020]
1 1/4	31.8 [1.250]	18.1 [0.714]	2.21 ± 0.51 [0.087 ± 0.020]
1 1/2	38.1 [1.500]	21.8 [0.857]	2.41 ± 0.51 [0.095 ± 0.020]
1 3/4	44.5 [1.750]	25.4 [1.000]	2.71 ± 0.51 [0.107 ± 0.020]
2	50.8 [2.000]	29.0 [1.140]	2.79 ± 0.51 [0.110 ± 0.020]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.
Standard packaging	On spools.
Ordering description***	Specify product name, size and color (for example, SFR 1/4-0).

*** Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

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SRFR

Highly Flexible, Silicone Rubber Tubing

Product Facts

- Highly flame-retardant
- Extremely flexible at high and low temperatures
- Shrink ratio 1.5:1 minimum except sizes 4/2.9 and 29/20

Applications

Highly flexible and resistant to high and low temperatures. Unlike other silicone materials, SRFR displays outstanding physical strength. It resists extreme heat shocks, and exhibits good thermal insulation. SRFR is non-burning and has outstanding ablative properties as well as excellent physical and electrical properties. SRFR is used in medical equipment where its key properties are outstanding flexibility and ability to withstand exposure to sterilization conditions. Other applications include thyristor power cable insulation, heating element and bus bar insulation, fiber optic bundle sheathing, and rocketry support cable protection.

Installation

Minimum shrink temperature: 135°C [275°F]

Minimum full recovery temperature: 175°C [347°F]

Operating Temperature Range

–75°C to 200°C
[–103°F to 392°F]

Specifications/Approvals

Series	UL	Raychem
SRFR	E85381 VW-1 600V, 200°C	RT-1142 RW- 2057

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Japan: 81-44-844-8013
UK: 44-208-420-8341

SRFR (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness** After Heating (Nominal)
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
2.9/1.7	2.9 [0.114]	1.7 [0.067]	1.0 ± 0.50 [0.039 ± 0.020]
4/2.9	4.0 [0.158]	2.9 [0.114]	1.0 ± 0.50 [0.039 ± 0.020]
7.8/4.6	7.8 [0.307]	4.6 [0.181]	1.0 ± 0.50 [0.039 ± 0.020]
10/6.5	10.0 [0.394]	6.5 [0.256]	1.5 ± 0.50 [0.059 ± 0.020]
15/9.6	15.0 [0.591]	9.6 [0.378]	1.5 ± 0.50 [0.059 ± 0.020]
21/13	21.0 [0.827]	13.0 [0.512]	2.0 ± 0.75 [0.079 ± 0.030]
29/20	29.0 [1.142]	20.0 [0.787]	2.0 ± 0.75 [0.079 ± 0.030]
41/27	41.0 [1.614]	27.0 [1.063]	3.0 ± 1.00 [0.118 ± 0.039]
51/33	51.0 [2.008]	33.0 [1.299]	3.0 ± 1.00 [0.118 ± 0.039]

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Gray (-8)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.	
Standard packaging	On spools.	
Ordering description	Specify product name, size and color (for example, SRFR 2.9/1.7-8).	

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UK: 44-208-420-8341

TFE and TFE-R

High-Temperature, Chemically Inert, Modified Tubing made with Teflon Fluoropolymer

Product Facts

- Shrink ratio: 1.8:1 (TFE)
  3.2:1 (TFE-R)
- High flame-resistance
- Excellent chemical resistance

Applications

Designed to provide insulation and mechanical protection in severe chemical and thermal environments. Used to cover hydraulic hose and couplings to prevent contamination and corrosion. The high mechanical strength and extremely low coefficient of friction make it ideal for reducing damage to bearing shafts and similar applications.

Installation

Minimum shrink temperature: 330°C [625°F]

Minimum full recovery temperature: 340°C [644°F]

Operating Temperature Range

–67°C to 250°C [–88.6°F to 482°F]

Specifications/Approvals

Series	Military	Raychem
TFE, TFE-R	AMS-DTL-23053/12*, Classes 1 and 3 Def. Stan. 59-97 Type 5A (TFE) Def. Stan. 59-97 Type 5B (TFE-R)	RW-2055 (TFE) RW-2054 (TFE-R)

* Formerly MIL-I-23053/12 and MIL-DTL-23053/12.

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Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

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USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

TFE and TFE-R (Continued)

Product Dimensions (millimeters)

Size		Inside Diameter				Recovered Wall Thickness** After Heating (Nominal)	
		Minimum Expanded as Supplied		Maximum Recovered After Heating			
TFE	TFE-R	TFE	TFE-R	TFE	TFE-R	TFE	TFE-R
30	5/64	0.8	2.0	0.38	0.6	0.23	0.23
28	1/8	0.9	3.2	0.46	1.0	0.23	0.25
26	1/4	1.1	6.4	0.56	1.6	0.25	0.30
24	3/8	1.2	9.5	0.68	2.4	0.25	0.30
22	1/2	1.4	12.7	0.81	3.7	0.30	0.38
20	5/8	1.5	15.9	0.99	4.5	0.30	0.38
18	3/4	1.9	19.0	1.24	5.7	0.30	0.38
16	1	2.3	25.4	1.55	7.1	0.30	0.38
14	1 1/4	3.0	32.0	1.83	8.8	0.30	0.38
12		3.8		2.26		0.30	
10		4.8		2.84		0.30	
8		6.1		3.58	—	0.38	—
6	—	7.6	—	4.52	—	0.38	—
4	—	9.4	—	5.69	—	0.38	—
2	—	10.9	—	7.06	—	0.38	—
0	—	11.9	—	8.81	—	0.38	—

** Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Clear (-X)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.
Standard packaging	In 1.2-meter [4-foot] lengths.
Ordering description***	Specify product name, size and color (for example,TFE 22-X).

*** Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

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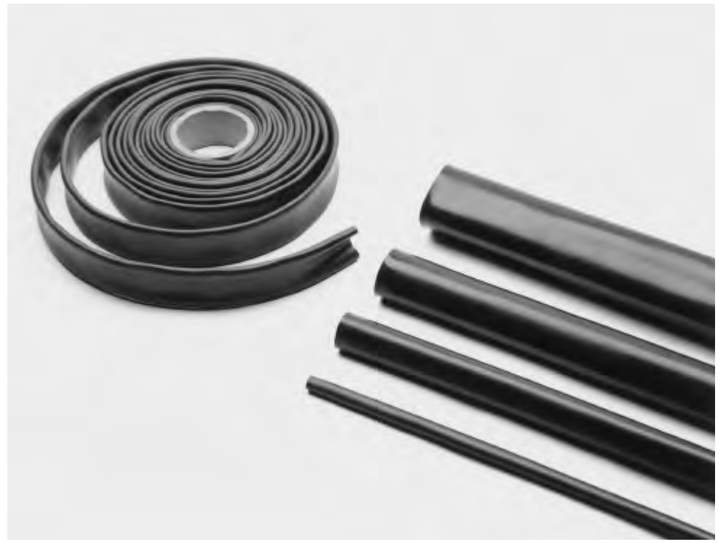
XFFR

Halogen-Free, Flame-Retardant, Heat-Shrinkable Tubing



Product Facts

- Emits minimal amounts of toxic or acid gases during combustion
- Meets performance requirements of MIL-C-24640 and MIL-C-24643 cable jackets
- Resists moisture, fungus, and weathering
- Available in expansion ratios as high as 3:1
- XFFR has the following approvals:
  - ABS (American Bureau of Shipping)
  - DNV (Det Norske Veritas)
  - Lloyd's (Lloyd's Register of Shipping)

Applications

XFFR halogen-free tubing can be used for rejacketing and repairing halogen-free cables in any enclosed area where a flame-retardant, halogen-free environment is required. These environments include tunnels, buildings, mass transit vehicles, and ships. When installed with SFTS-FR1 tape, the tubing can also be used in applications requiring water sealing and protection from abrasion and corrosion.

Installation

Minimum shrink temperature: 70°C [158°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

–55°C to 105°C [–67°F to 221°F]

Specifications/Approvals

Series	Military	Industry	Raychem
XFFR	MIL-C-24643	NES 713 NES 711	RW-2016

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UK: 44-208-420-8341

XFFR (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness* After Heating (Nominal)
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
XFFR-03	7.62 [0.300]	2.54 [0.100]	1.52 [0.060]
XFFR-04	10.16 [0.400]	3.81 [0.150]	1.52 [0.060]
XFFR-07	19.05 [0.750]	5.59 [0.220]	2.03 [0.080]
XFFR-11	27.94 [1.100]	9.52 [0.375]	2.67 [0.105]
XFFR-15	38.10 [1.500]	12.70 [0.500]	3.05 [0.120]
XFFR-20	50.80 [2.000]	19.05 [0.750]	3.05 [0.120]
XFFR-30	76.20 [3.000]	31.75 [1.250]	3.94 [0.155]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.	
Standard packaging	1.2-meter [4-foot] or 7.5-meter [25-foot] lengths.	

Part Numbering System

XFFR - 03 X 4 / NM

- **"NM"** - no mark
- **Length** in feet (4 feet standard)
- **Size**
- **Family**

No adhesive.

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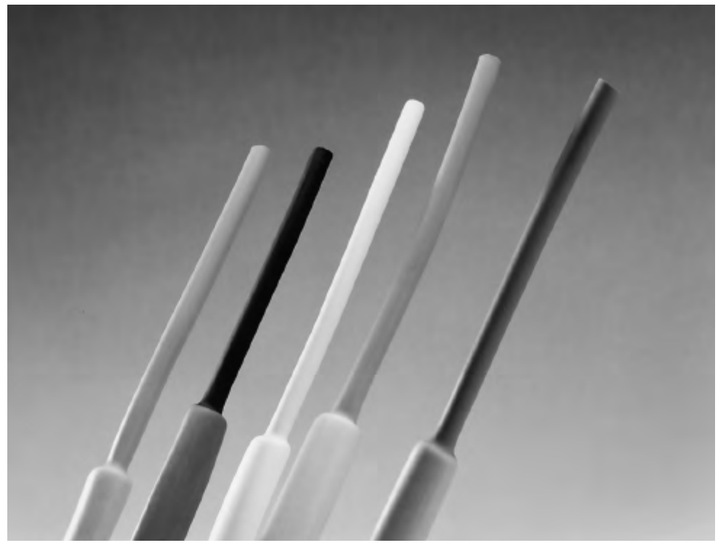
ZH-100

Flexible, Thin-Wall, Low-Fire-Hazard Tubing

Product Facts

- 2:1 shrink ratio
- Low smoke emissions
- Flexible, flame-retardant
- No added halogens
- Low evolution of acid gases



Applications

ZH-100 is a flexible, thin-wall, heat-shrinkable tubing designed for low-fire-hazard applications. ZH-100 contains no added halogens, and exhibits excellent fire safety characteristics combined with low evolution of acid gases, while retaining good mechanical and fluid resistance properties.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 120°C [248°F]

Operating Temperature Range

–30°C to 105°C [–22°F to 221°F]

Specifications/Approvals

Series	Military	Agency	Raychem
ZH-100	Def. Stan. 59-97 Issue 3 Type 8	BR 1326A BS 3G-198 Part 3 Type 15	RW-2031

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

ZH-100 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness* After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
1/8	3.2 [0.125]	1.6 [0.062]	0.50 ± 0.10 [0.019 ± 0.004]
3/16	4.8 [0.187]	2.4 [0.093]	0.50 ± .0.10 [0.019 ± 0.004]
1/4	6.4 [0.250]	3.2 [0.125]	0.65 ± 0.15 [0.026 ± 0.006]
3/8	9.5 [0.375]	4.8 [0.187]	0.65 ± 0.15 [0.026 ± 0.006]
1/2	12.7 [0.500]	6.4 [0.250]	0.65 ± 0.15 [0.026 ± 0.006]
3/4	19.0 [0.750]	9.5 [0.375]	0.75 ± 0.15 [0.030 ± 0.006]
1	25.4 [1.000]	12.7 [0.500]	0.90 ± 0.15 [0.035 ± 0.006]
1 1/2	38.0 [1.500]	19.0 [0.750]	1.00 ± 0.20 [0.039 ± 0.008]
2	51.0 [2.000]	25.4 [1.000]	1.15 ± 0.25 [0.045 ± 0.010]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9), red (-2), blue (-6), yellow (-4), green (-5)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools.	
Ordering description**	Specify product name, size and color (for example, ZH-100 1/8-0).	

** Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

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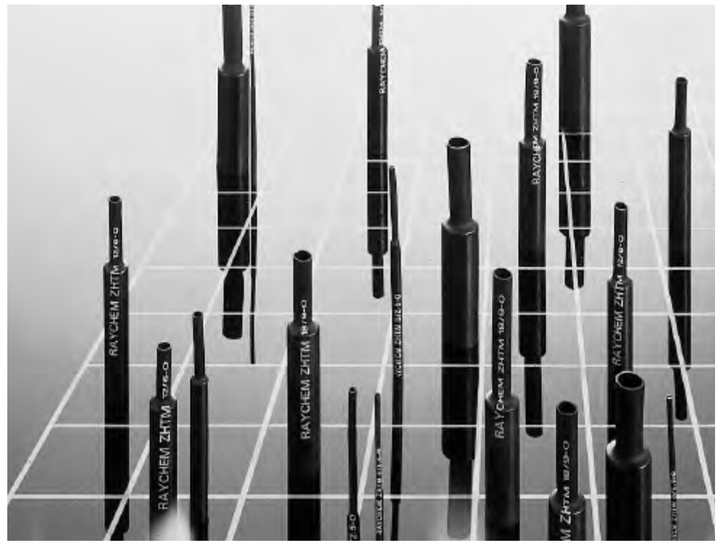
ZHTM

Heat-Shrinkable, Flexible Tubing with Low Toxicity for Fire Safety Applications

Product Facts

- 2:1 shrink ratio
- Low smoke emission
- System 100 tubing

Applications

A flexible, thick-wall, heat-shrinkable tubing to be used in conjunction with -100 molded parts and Zerohal cable to form Raychem System 100. This material exhibits excellent fire safety characteristics combined with low smoke emission and low evolution of acid gases while retaining good mechanical and fluid-resistance properties. Used for insulation and protection of cables, harnesses, and electrical and electronic components in enclosed spaces, such as in marine applications, mass transit systems, and offshore installations, to reduce toxicity risks, or where equipment would be irreparably damaged by corrosive products of combustion.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

–30°C to 105°C
[–22°F to 221°F]

Specifications/Approvals

Series	Military	Agency	Industry	Raychem
ZHTM	Def. Stan. 59-97 Issue 3 Type 8	BS 4G-198 Part 3 Type 15 VG 95343 Part 5 Type L VDE 0341/Pt 9005	BR 1326A	RW-2058

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Revised 8-06

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UK: 44-208-420-8341

ZHTM (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness* After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
3/1.5	3.0 [0.118]	1.5 [0.059]	0.70 ± 0.10 [0.028 ± 0.004]
5/2.5	5.0 [0.197]	2.5 [0.098]	0.75 ± 0.12 [0.030 ± 0.005]
8/4	8.0 [0.315]	4.0 [0.157]	0.80 ± 0.15 [0.031 ± 0.006]
12/6	12.0 [0.472]	6.0 [0.236]	0.90 ± 0.15 [0.035 ± 0.006]
18/9	18.0 [0.709]	9.0 [0.354]	1.00 ± 0.18 [0.039 ± 0.007]
24/12	24.0 [0.945]	12.0 [0.472]	1.10 ± 0.20 [0.043 ± 0.008]
40/20	40.0 [1.575]	20.0 [0.789]	1.30 ± 0.23 [0.051 ± 0.009]
50/30	50.0 [1.969]	30.0 [1.181]	1.50 ± 0.28 [0.059 ± 0.011]

* Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools.	
Ordering description**	Specify product name, size and color (for example, ZHTM 8/4-0).	

**Europe only. For supply to Def Stan and BS add -DS or -BS to ordering description.

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Bulbous Molded Parts

Raychem bulbous-shaped molded parts provide rugged mechanical and environmental protection, meet numerous specifications, and have been used successfully in military wire and cable harnesses for more than 30 years.

Most connector strain relief boots come in two versions:

- With an adapter lip molded into the “H” end, which locks into the groove on the backshell adapter (part number is identified with a “D” or “K”).
- Without the adapter lip (the boot may be installed directly on the rear of connector threads 12 mm [.472] long or longer). This part number is identified with an “A.”

Many other optional features are available, such as molding ports and drain holes. For other modifications and custom shapes, please contact Tyco Electronics.

Modifications

Certain variations of the standard shapes, such as shorter leg lengths or specific over expansions, are possible. Modifications must be requested prior to your order, for feasibility.

Molding Port Modifications (-00)

Some specifications call for potting the molded shape with sealant to provide additional protection from moisture. Most of the bulbous boots and transitions can be ordered with molding ports for this purpose.

Drain Hole Modification (-88)

Some specifications require drain holes in the molded part to provide an exit for condensation. Drain holes must be requested when you place your order.

Specials

Complete design, tooling, and production of custom molded shapes and special adaptations are also possible. Estimates are made upon request.

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General Information (Continued)

Breakout Boots

Heavy-duty breakouts provide mechanical strain relief and environmental sealing for power cables where the cable jacket is cut back and conductors broken out.

These boots are used widely in ship building and meet the requirements of the following:

- Lloyd's Register of Shipping
- Det Norske Veritas (DNV)
- American Bureau of Shipping (ABS)
- DOD-STD-2003
- MIL-I-81765/1A

Cable End Caps

Heat-shrinkable end caps provide a reliable method of sealing power cables, pipes, conduit, and other cylindrical objects against corrosion and moisture penetration.

Slim-Line Molded Parts

With their low profile, these flexible molded parts conform to cables better and create less bulk at transition points and connectors than bulbous molded parts.

Raychem molded parts are available in a variety of slim-line shapes, including straight and right-angle boots as well as transitions. A small family of parts can provide a wide variety of expansions (under expansion, over expansion, cut-off). Modifications are easily provided.

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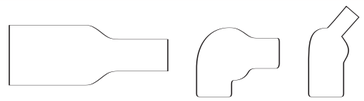
Boots

Application	Family Description	Typical Shapes
Lipped boots for use with a circular adapter	202D121 to 196 222D121 to 196 202K121 to 185 222K121 to 185 242W042 to 063	
Nonlipped boots for use directly on a circular connector	202A111 to 196 222A111 to 196	
Low-profile lipped boots for use with a circular adapter	202D211 to 299 222D211 to 299 202F211 to 274 222F211 to 285 202G211 to 253	
Lipped boots for use with a circular adapter	202D921 to 963 222D921 to 963	
Lipped boots with compressible design for use with a circular adapter	202C611 to 663 202G611 to 653	
Adapter boots for use with D-subminiature connectors	214A011 to 052 234A011 to 071 214A311 to 352 234A111 to 152 234A611 to 671	

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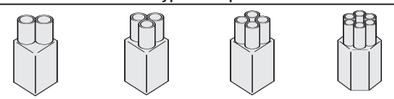
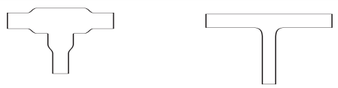
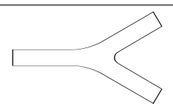
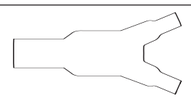
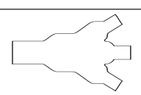
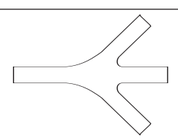
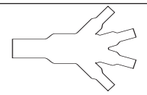
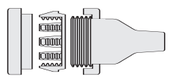
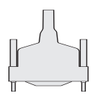
Transitions

Application	Family Description	Typical Shapes
Breakout Boots	SSB, T, F, 6S, 85	
"T" Transitions	301A011 to 048 301A511 to 514 322A112 to 158	
45° Transitions	342A012 to 058	
30° Transitions	362A014 to 114	
"Y" Transitions	381A301 to 304 382A012 to 046	 
3:1 Transitions	462A011 to 060 462A421 to 424	 
4:1 Transitions	562A011 to 067	

Shape Selection: Other Products

Application	Family Description	Typical Shapes
Feedthroughs	207W213 to 256 and CES	
D-Subminiatures	214P009 to 037	
End Caps	101A011 to 094 and SSC	

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Part Numbering System

2 0 2D 1 21 - 3 - 01 / 42 - 0

Color (0 = Black). Other colors factory quote

Optional Adhesive* Coating (precoated in factory)

Modification (available on request)
- Over expansion
- Cutoff
- Molding ports (injection and vent)

Material**

Size of Part in Family: From 11 (= smallest) to 99 (= largest)

Family Number

Type of Part:
A = Nonlipped boots/transitions
C = Lipped boot
D = Lipped boot
F = Lipped boot
K = Lipped boot
S = Rayaten
G = Lipped boot
W, P = Other shapes

Angle of Part:

All openings	One opening
Circular	**Noncircular**
0 = Straight	**0 = Straight**
2 = 90°	3 = 90°
4 = 45°	5 = 45°
6 = 30°	7 = 30°

Number of openings in the part

* See pages 12-206 to 12-211 for details on adhesives.
** See page 12-124 for details on materials.

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USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Boots: Circular Connectors — Lipped

Lipped Boots for Use With an Adapter

As supplied

After recovery

202D121 through 196 | 202D211 through 299 | 202D921 through 963 | 202K121 through 185

As supplied

After recovery

222B012 through 063 | 222B112 and 123 | 222D121 through 196 | 222D211 through 299

As supplied

After recovery

222D921 through 963
222K121 | 202K121 through 185 | 242 A312 and 322

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Boots: Circular Connectors — Nonlipped

Nonlipped Boots for Direct Attachment on Connectors

As supplied

After recovery

202A011 through 096 | 202A111 through 196 | 202A212 through 264 | 202A312 through 364 | 202A512

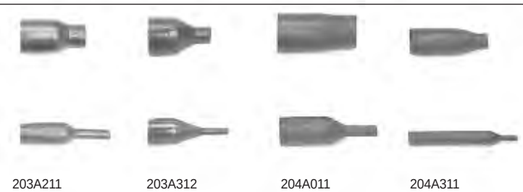
As supplied

After recovery

202A915 | 202A921 | 202B422 and 433 | 203A021

As supplied

After recovery



203A211 | 203A312 | 204A011 | 204A311

As supplied

After recovery

204A411 | 204A511 | 204A612 | 208A011 through 098 | 222A011 through 096

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Visual Selection Guide (Continued)

Boots: Circular Connectors — Nonlipped (Continued)

Nonlipped Boots for Direct Attachment on Connectors

As supplied

After recovery

222A111 through 196 | 222A213 through 255 | 222A313 through 355 | 223A213 through 233 | 224A012

As supplied

After recovery

226A045 & 075 | 228A011 through 097 | 242A142 | 243A012 & 022 | 246A166

As supplied

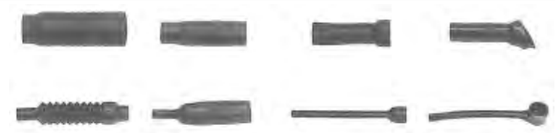
After recovery

202B521 through 598

Boots: Circular Connectors–Slim-Line

As supplied

After recovery



202C611 through 633
202G621 through 653 | 202E334 through 346 | 202F211 through 274
202G211 through 253 | 222F211 through 285

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Visual Selection Guide (Continued)

Boots: Rectangular Connectors

As supplied					
After recovery					
	211A012	214A011 through 052	214A124 and 133	214A311 through 352	214A452
As supplied					
After recovery					
	214A511 thru 552	214A613	214A814	214A923	214B623
As supplied					
After recovery					
	214B713	234A011 through 071	234A111 through 152	234A313 through 333	234A413 through 434
As supplied					
After recovery					
	234A611 through 671	234A711 through 752	234A911 through 971	234B011 through 052	

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Visual Selection Guide (Continued)

Transitions: Bulbous

As supplied					
After recovery					
	301A011 through 048	302A012 through 037	302A214	322A012 through 037	322A112 through 158

As supplied				
After recovery				
	322A315	322A412 through 434	322A514	322B813

As supplied				
After recovery				
	323A211	323A222	341A015	342A012 through 058

As supplied					
After recovery					
	342A112 through 138	342A215	342A313 and 323	343A014 through 027	362A014 through 114

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Transitions: Bulbous
(Continued)

As supplied					
After recovery					
	363A018 and 020	381A015	381A115	382A012 through 046	402A013

As supplied					
After recovery					
	403A123 through 155	413A013 and 024	422A011	422A114	422A414

As supplied					
After recovery					
	422A616	422A716	422A813	423A014	423A117

As supplied					
After recovery					
	453A017	453A215 and 225	462A011 through 060	462A214	

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Visual Selection Guide (Continued)

Transitions: Bulbous (Continued)

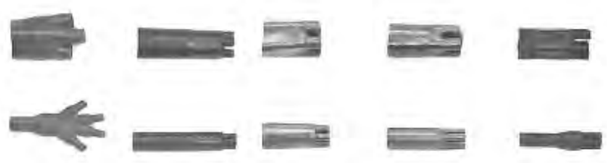
As supplied

After recovery

502A516 | 502A812 through 845 | 522A013 | 561A017

As supplied

After recovery



562A011 through 067 | 602A012 | 602A022 | 602A114 | 602A212

As supplied

After recovery

622A014 | 703A155 | 704A011 and 012 | 902A014

Transitions: Slim-Line

As supplied

After recovery

301A511 through 514 | 381A301 through 304 | 462A421 through 424

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Visual Selection Guide (Continued)

Covers

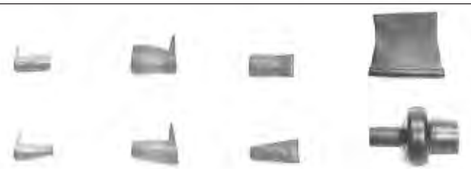
As supplied

After recovery

102A911 102A951 102A961 102A962 102A981

As supplied

After recovery



102A992 102A993 102A994 202A817

As supplied

After recovery

220A012 through 023 234A211 234B111 and 122 254A015 301A212 301A222, 302A312

As supplied

After recovery

302A734 401A112 and 402A212

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Visual Selection Guide (Continued)

Covers (Continued)

As supplied

After recovery

401A212 and 403A312 | 401A414 | 402A222 | 403A016 | 501A012 and 502A212

As supplied

After recovery

501A112 | 601A012

Sleeves

As supplied

After recovery

200A413 and 200A426 | 200D944 thru 988

As supplied

After recovery

201A711 through 792 | 202B211 through 302 (Not heat-shrinkable) | 202B811 through 832

As supplied

After recovery

207W213 through 264 with A-type nut | 207W213-x-01 through 264-x-01 with B-type nut

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Visual Selection Guide (Continued)

Caps

As supplied

After recovery

101A011 thru 094

102A811 through 865

Miscellaneous

204A711 and 002A011
Riser and Plug
(Not heat-shrinkable)

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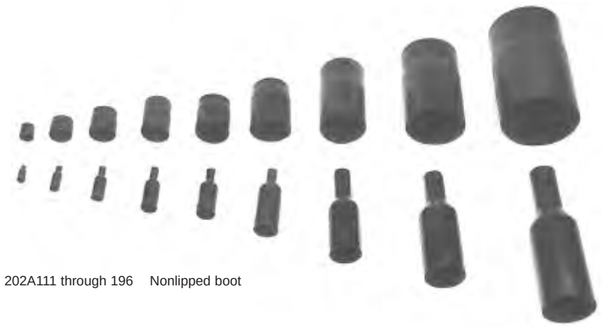
Selected Molded Shapes Families

As supplied

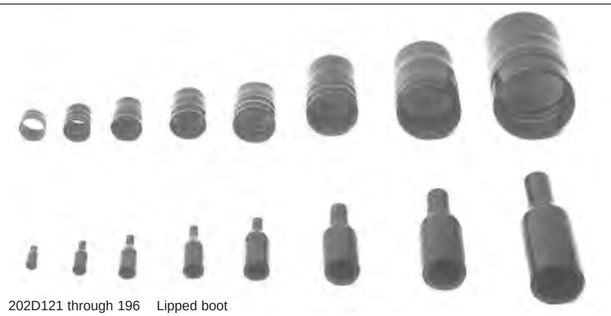
After recovery



202A111 through 196 Nonlipped boot

As supplied

After recovery



202D121 through 196 Lipped boot

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Selected Molded Shapes Families (Continued)

As supplied

After recovery

202A212 through 264 Nonlipped boot

202D211 through 299 Lipped boot

As supplied

After recovery

202D921 through 963 Lipped boot

202K121 through 185 Lipped boot

As supplied

After recovery

207W213 through 264 Feedthrough

214A011 through 052 Rectangular boot

As supplied

After recovery

222A111 through 196 90° boot nonlipped

222A213 through 255 90° boot nonlipped

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Visual Selection Guide (Continued)

Selected Molded Shapes Families (Continued)

As supplied

After recovery

222A313 through 355 90° boot nonlipped

222D121 through 196 90° boot lipped

As supplied

After recovery

222D211 through 299 90° boot lipped

222D921 though 963 90° boot lipped

As supplied

After recovery

222K121 through 185 90° boot lipped

301A011 through 048 T transition

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Table 1. Boots

Boot Type	Material Dash Number	Part Number	Dimensions		Fits Adapter Order Number			
			Cable Diameter Range	Length	Solid	Spin Coupling	Entry Size Shielded	Tinel-Lock
Uni-boot	50, 51 71	202C611	4.83-9.65 [.19-.38]	120.65 [4.75]	—	—	04	04
		202C621	8.13-16.26 [.32-.64]	133.35 [5.25]	12	12—14	06-08	04-07
		202C632	12.70-25.40 [.50-1.00]	146.05 [5.75]	14-16	16-18	10-14	10-16
		202C642	17.53-35.05 [.69-1.38]	158.75 [6.25]	18-20	20	12-18	12-18
		202C653	22.35-44.20 [.88-1.74]	171.45 [6.75]	22-32	22-32	18-20	16-20
		202C663	22.86-55.63 [.90-2.19]	236.22 [9.30]	24, 28, 31	32, 36	—	—
	55	202G621	8.13-16.26 [.32-.64]	133.86 [5.27]	12-14	12-14	06-08	04-07
		202G632	12.70-25.40 [.50-1.00]	151.13 [5.95]	16	16-18	10-14	08-12
		202G642	17.53-35.05 [.69-1.38]	157.23 [6.19]	18-20	20	12-18	12-18
		202G653	22.35-44.20 [.88-1.74]	170.18 [6.70]	22-32	22-32	18-20	16-22
		—	—	—	16-24, 61	22-28, 61	—	—
Low-profile, Straight	50, 51 71	202F211	6.60-15.75 [.26-.62]	105.16 [4.14]	10	08-10	04-07	04-07
		202F221	7.62-19.30 [.30-.76]	123.95 [4.88]	12-14	12-14	07-10	05-08
		202F232	8.89-22.86 [.35-.90]	146.30 [5.76]	16	16-18	10-14	08-12
		202F242	10.16-27.18 [.40-1.07]	172.21 [6.78]	18-20	20	12-18	12-16
		202F253	10.92-29.97 [.43-1.18]	185.16 [7.29]	22	22	18-20	16-18
		202F263	12.70-36.83 [.50-1.45]	213.61 [8.41]	24-28	24-28	20	18-20
		202F274	14.99-42.93 [.59-1.69]	203.20 [8.00]	24	32	—	—
	55	202G221	7.62-19.30 [.30-.76]	121.16 [4.77]	12-14	12-14	07-10	05-08
		202G232	8.89-22.86 [.35-.90]	138.68 [5.46]	16	16-18	10-14	10-12
		202G242	10.16-27.18 [.40-1.07]	159.51 [6.28]	18-20	20	14-18	12-16
		202G253	10.92-29.97 [.43-1.18]	177.80 [7.00]	22-28	22-24	16-20	16-18
		—	—	—	16-20	20-24	—	—
Low-profile, 90°	50, 51 71	222F211	6.60-15.75 [.26-.62]	105.16 [4.14]	10	08-10	04-07	04-07
		222F221	7.62-20.83 [.30-.82]	123.95 [4.88]	12-14	12-14	07-10	05-10
		222F232	8.89-22.86 [.35-.90]	146.30 [5.76]	16	16-18	10-14	08-12
		222F242	10.16-27.18 [.40-1.07]	172.21 [6.78]	18-20	20	12-18	12-16
		222F253	10.92-29.97 [.43-1.18]	185.16 [7.29]	22	22	18, 20	16-18
		222F263	12.70-36.83 [.50-1.45]	213.61 [8.41]	24-28	24-28	20	18, 20
		222F274	14.99-42.43 [.59-1.69]	224.54 [8.84]	24	32	—	—
		222F285	17.53-61.21 [.69-2.41]	227.33 [8.95]	24-32	32-40	—	—

(continued on next page)

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Table 1. Boots (Continued)

Boot Type	Material Dash Number	Part Number	Dimensions		Fits Adapter Order Number			
			Cable Diameter Range	Length	Solid	Spin Coupling	Entry Size Shielded	Tinel-Lock
Low-profile, Straight	3,4,25	202D211	6.60-15.75 [.26-.62]	105.92 [4.17]	08	08-10	06-07	04-07
		202D221	7.62-19.30 [.30-.76]	121.16 [4.77]	08-10	08-10	08	06-07
		202D232	8.89-22.86 [.35-.90]	138.68 [5.46]	10-12	10-12	10-12	08-10
		202D242	10.16-27.18 [.40-1.07]	159.51 [6.28]	12-14	12-14	12-14	10-12
		202D253	10.92-29.97 [.43-1.18]	177.80 [7.00]	16-18	16-18	16-18	14-16
		202D263	12.70-36.83 [.50-1.45]	203.20 [8.00]	20-22	20-22	18-20	18-20
		202D274	14.99-42.93 [.59-1.69]	203.20 [8.00]	24	28	22-24	22-24
		202D285	18.29-55.88 [.72-2.20]	203.20 [8.00]	28	32-34	28	—
		202D296	20.07-59.69 [.79-2.35]	203.20 [8.00]	—	40	—	—
		202D299	23.37-72.39 [.92-2.85]	203.20 [8.00]	—	44	—	—
Low-profile, 90°	3,4,25	222D211	6.60-15.75 [.26-.62]	105.16 [4.14]	08	08-10	06-07	04-07
		222D221	7.62-19.30 [.30-.76]	123.95 [4.88]	08-10	08-10	08	06-08
		222D232	8.89-22.86 [.35-.90]	146.30 [5.76]	10-12	10-12	10-12	08-10
		222D242	10.16-27.18 [.40-1.07]	172.21 [6.78]	12-14	12-14	12-14	10-12
		222D253	10.92-29.97 [.43-1.18]	185.16 [7.29]	16-18	16-18	16-18	14-16
		222D263	12.70-36.83 [.50-1.45]	213.61 [8.41]	20-22	20-22	18-20	18-20
		222D274	14.99-42.93 [.59-1.69]	224.54 [8.84]	24	28	22-24	22-24
		222D285	18.29-55.88 [.72-2.20]	227.33 [8.95]	28	32-34	28	
		222D296	20.07-59.69 [.79-2.35]	233.43 [9.19]	—	40	—	—
		222D299	23.37-72.39 [.92-2.85]	203.20 [8.00]	—	44	—	—
Bulbous, Straight	3,4,25	202D121	6.10-19.05 [.24-.75]	38.10 [1.50]	—	08	04-05	04-07
		202D132	7.11-23.37 [.28-.92]	54.86 [2.16]	08	10	06-07	06-08
		202D142	7.62-25.15 [.30-.99]	66.80 [2.63]	10	12-14	09-10	07-10
		202D153	8.89-30.48 [.35-1.20]	80.10 [3.15]	12-14	16-18	11-14	10-12
		202D163	10.41-34.29 [.41-1.35]	103.63 [4.08]	16-18	20-22	15-16	14-16
		202D174	10.41-34.29 [.41-1.35]	103.63 [4.08]	16-18	20-22	15-16	14-16
		202D185	20.83-53.34 [.82-2.10]	165.10 [6.50]	—	—	24	24
		202D196	25.91-69.85 [1.02-2.75]	177.80 [7.00]	—	—	—	—
		202K121	6.10-19.05 [.24-.75]	38.10 [1.50]	—	08	04-05	04-07
		202K132	7.11-23.37 [.28-.92]	54.86 [2.16]	08	10	06-07	06-08
		202K142	7.62-25.15 [.30-.99]	66.80 [2.63]	10	12-14	09-10	07-10
		202K153	8.89-30.48 [.35-1.20]	80.10 [3.15]	12-14	16-18	11-14	10-12
		202K163	10.41-34.29 [.41-1.35]	103.63 [4.08]	16-18	20-22	15-16	14-16
		202K174	10.41-34.29 [.41-1.35]	103.63 [4.08]	16-18	20-22	15-16	14-16
		202K185	20.83-53.34 [.82-2.10]	165.10 [6.50]	—	—	24	24
Bulbous, 90°	3,4,25	222D121	6.10-19.05 [.24-.75]	21.34 [0.84]		08	04-05	04-07
		222D132	7.11-23.37 [.28-.92]	33.78 [1.33]	08	10	06-07	05-08
		222D142	7.62-25.15 [.30-.99]	36.58 [1.44]	10	12-14	09-10	08-10
		222D153	8.89-30.48 [.35-1.20]	43.69 [1.72]	12-14	16-18	11-14	10-14
		222D163	10.41-34.29 [.41-1.35]	53.59 [2.11]	16-18	20-22	15-16	14-18
		222D174	16.26-44.96 [.64-1.77]	77.98 [3.07]	20-24	24	18-22	18-22
		222D185	20.83-53.34 [.82-2.10]	97.54 [3.84]	—	—	24	24
		222D196	25.91-69.85 [1.02-2.75]	117.86 [4.64]	—	—	—	—
		222K121	6.10-19.05 [.24-.75]	21.34 [0.84]		08	04-05	04-07
		222K132	7.11-23.37 [.28-.92]	33.78 [1.33]	08	10	06-07	05-08
		222K142	7.62-25.15 [.30-.99]	36.58 [1.44]	10	12-14	09-10	08-10
		222K153	8.89-30.48 [.35-1.20]	43.69 [1.72]	12-14	16-18	11-14	10-14
		222K163	10.41-34.29 [.41-1.35]	53.59 [2.11]	16-18	20-22	15-16	14-18
		222K174	16.26-44.96 [.64-1.77]	77.98 [3.07]	20-24	24	18-22	18-22
		222K185	20.83-53.34 [.82-2.10]	97.54 [3.84]	—	—	24	24

Note: 202KXXX and 222KXXX parts Europe only.

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UK: 44-208-420-8341

Boot Adapter Selection Tables (Continued)

Table 2. Shims

Part Number	Cable Diameter Range	Shim Boot or Tubing
202C611	3.81-4.83 [.15-.19]	Tubing
202C621	6.35-8.13 [.25-.32]	Tubing
202C632	9.65-12.70 [.38-.50]	Tubing
202C632	3.30-9.65 [.13-.38]	202E334
202C632	14.48-17.53 [.57-.69]	Tubing
202C642	9.91-14.48 [.39-.57]	202E346
202C642	3.30-9.65 [.13-.38]	202E344
202C642	19.30-22.35 [.76-.88]	Tubing
202C653	9.91-19.30 [.39-.76]	202E346
202C653	3.30-9.65 [.13-.38]	202E344
202C658	17.53-22.86 [.69-.90]	Tubing
202C663	17.53-22.86 [.69-.90]	Tubing
202D211/202F211	5.08-6.60 [.20-.26]	Tubing
222D211/222F211	5.08-6.60 [.20-.26]	Tubing
202D221/202F221	5.84-7.62 [.23-.30]	Tubing
222D221/222F221	5.84-7.62 [.23-.30]	Tubing
202D221/202F221	5.92 [.233]	Tubing
222D221/222F221	5.92 [.233]	Tubing
202D232/202F232	6.86-8.89 [.27-.35]	Tubing
222D232/222F232	6.86-8.89 [.27-.35]	Tubing
202D2421202F242	7.87-10.16 [.31-.40]	Tubing
222D242/222F242	3.30-7.87 [.13-.31]	202E334
202D253/202F253	8.38-10.92 [.33-.43]	Tubing
222D253/222F253	3.30-8.38 [.13-.33]	202E334
202D263/202F263	9.65-12.70 [.38-.50]	Tubing
222D263/222F263	3.30-9.65 [.13-.38]	202E334
202D274/202F274	11.43-14.99 [.45-.59]	Tubing
222D274/222F274	9.91-11.43 [.39-.45]	202E346
222D274/222F274	3.30-9.65 [.13-.38]	202E344
222D274/222F274	13.46-17.53 [.53-.69]	Tubing
222D285/222F285	9.91-13.46 [.39-.53]	202E346
222D285/222F285	3.30-9.65 [.13-.38]	202E344
222D1XDU222D1XX	—	Use tubing as a shim if necessary

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Material Selection Table

Applications

Tyco Electronics offers Raychem products in a variety of materials to enable designers and material specifiers to obtain optimum performance.

Material*	Characteristics
-3 Molded Part Material	A general purpose, heat-shrinkable semi rigid and flame retarded polyolefin molding compound with good resistance to fluids and heat. -3 molded parts are ideal for use in applications where toughness combined with resistance to occasional exposure to fluids or heat is required. -3 molded parts are recommended for use in System 10.
-3S Molded Part Material	A general purpose, heat-shrinkable flame retarded, polyolefin compound used to make shielded molded parts.-3S molded parts form part of the Rayaten shielding system and are ideal for use in applications where toughness combined with resistance to occasional exposure to fluids or heat is required. -3S molded parts are recommended for use in System 10.
-4 Molded Part Material	A general purpose, heat-shrinkable flexible and flame retarded polyolefin molding compound with good resistance to fluids and heat. -4 molded parts are ideal for use in applications where toughness combined with resistance to occasional exposure to fluids or heat is required. -4 molded parts are recommended for use in System 10.
-6 Molded Part Material	Designed for use in applications where extreme flexibility is required. The parts provide excellent strain relief and sealing over a broad temperature range and remain flexible at very low temperatures. The standard color is black.
-8 Molded Part Material	For use in outer space, where use of low outgassing components is required. The parts provide excellent strain relief at connector cable terminations. Please contact Raychem for available shapes. The standard color is black.
-12 Molded Part Material	A high temperature, heat-shrinkable, flexible, flame retarded, fluoroelastomeric molding compound with excellent resistance to long term fluid immersion and heat exposure. A wide range of shapes are available in this material. -12 molded parts are recommended for use in System 200.
-25 Molded Part Material	A heat-shrinkable, semi rigid, fluid and temperature resistant, elastomeric molding compound, designed to offer excellent performance in harsh environments. Ideal for use in military vehicles where high temperatures and long term exposure to hot fluids is expected. A wide range of shapes are available in this material. -25 molded parts are recommended for use in System 25.
-25S Molded Part Material	A heat-shrinkable, semi rigid, fluid and temperature resistant, elastomeric compound, used to make shielded molded parts. -25S molded parts form part of the Rayaten shielding system and are ideal for use in military vehicles where high temperatures and long term exposure to hot fluids is expected. -25S molded parts are recommended for use in System 25.
-50 Molded Part Material	A heat-shrinkable, highly flexible, fluid and temperature resistant, VPB molding compound, ideal for use in general purpose and high temperature military applications where exposure to petroleum based solvents is expected. Uniboots and a wide range of low profile shapes are available in this material. -50 molded parts are recommended for use in System 30.
-51 Molded Part Material	A heat-shrinkable, rugged, flexible, fluid and temperature resistant, EPB molding compound, ideal for use in general purpose applications where exposure to petroleum based solvents is expected. Uniboots and a wide range of low profile shapes are available in this material. -51 molded parts are recommended for use in System 20.
-55 Molded Part Material	A heat-shrinkable, flexible, flame retarded, fluid and high temperature resistant, modified fluoropolymer molding compound. A wide range of shapes is available. -55 molded parts are recommended for use in System 300.
-71 Molded Part Material	A heat-shrinkable, flexible, fluid and temperature resistant, polyolefin molding compound, ideal for use in general purpose applications where a good balance of fluid and heat resistance properties is required. Uniboots and a wide range of low profile shapes are available. -71 molded parts are suitable for use in System 10.
-100 Molded Part Material	A heat-shrinkable, semi flexible, low fire hazard molding compound designed to offer excellent fire safety characteristics combined with low smoke and low acid gas emission -100 also exhibits good mechanical and fluid resistance properties. A wide range of shapes are available in this material. -100 molded parts are recommended for use in System 100.
-100S Molded Part Material	A heat-shrinkable, semi flexible, low fire hazard compound used to make shielded molded parts. 100S molded parts form part of the Rayaten shielding system and are designed to offer excellent fire safety characteristics combined with low smoke and low acid gas emission. -100S also exhibits good mechanical and fluid resistance properties. -100S molded parts are recommended for use in System 100.
-125 Molded Part Material	A heat-shrinkable, flame retarded, fluid and high temperature resistant, modified fluoropolymer molding compound. A range of shapes are available. -125 molded parts are recommended for use in System 300.
-130 Molded Part Material	Non flame-retarded molded material. Low shrink temperature.
-146 Molded Part Material	Flame retarded, ultra-high ratio heat-shrinkable material.
-152 Molded Part Material	Flame retarded, high ratio heat-shrinkable material.

* Check with specific part page for applicable materials.

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UK: 44-208-420-8341

-3

Semi-Rigid Modified Polyolefin

Product Facts

- Heat-shrinkable
- Semi-Rigid
- Flame Retardant
- Good resistance to fluids and heat

Applications

Raychem molded parts in -3 material are designed for use in general harnessing applications where toughness is required and systems are occasionally exposed to fluids or heat. The adhesive-lined parts provide excellent sealing and strain relief at connector-cable terminations and transitions. A wide range of shapes are available in this material. The standard color is black.

Installation

Raychem -3 molded parts will shrink on the application of heat above 125°C [257°F].

Recommended installation temperature: 150°C [302°F]

Operating Temperature Range

–55°C to 135°C [–67°F to 275°F]

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UK: 44-208-420-8341

-3 (Continued)

Specifications/Approvals

UL	Military	Raychem
224, File E85381	SAE-AS81765/1, Type I Def. Stan. 59-97 Issue 3 Type DA (Europe) BS-G-198-5-DA (Europe)	RT-301

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	10.5 MPa (min.)	ISO 37; ASTM D 412
	Ultimate elongation	250% (min.)	ISO 37; ASTM D 412
	2% secant modulus	80–160 MPa	ASTM D 882
	Specific gravity	1.4 (max.)	ISO 1183; ASTM D 792
Thermal	Heat aging for 168 h at 175°C [347°F]	Ultimate elongation 150% (min.)	ISO 188, ISO 37
	Heat shock for 4 h at 225°C [437°F]	No dripping, cracking, or flowing	ASTM D 2671
	Low-temperature flex at –55°C [–67°F]	No cracking during mandrel bend	RK-6703, CL 2.7: RT-301 Sec. 4.3.4
	Flammability	Self-extinguishing	RK-6703, CL 2.8: ASTM D 635
Electrical	Electric strength	8 MV/m (min.)	IEC 243
Water absorption	—	0.5% (max.)	ISO 62
Fluid resistance	Aviation fuel F40	Tensile strength 8.5 MPa (min.) Ultimate elongation 200% (min.)	ISO 1817 and ISO 37 after immersion for 24 h at 23°C [73°F]
	Lubricating oil O-149	Tensile strength 8.5 MPa (min.) Ultimate elongation 200% (min.)	ISO 1817 and ISO 37 after immersion for 24 h at 23°C [73°F]
	Phosphate ester hydraulic fluid (DTD 900/4881A)	Tensile strength 8.5 MPa (min.) Ultimate elongation 200% (min.)	ISO 1817 and ISO 37 after immersion for 24 h at 23°C [73°F]

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-4

Flexible Polyolefin

Product Facts

- Heat-shrinkable
- Flexible
- Flame Retardant
- Good resistance to fluids and heat

Applications

Raychem molded parts in -4 material are designed for use in general harnessing applications where toughness is required and systems are occasionally exposed to fluids or heat. The adhesive-lined parts provide excellent sealing and strain relief at connector-cable terminations and transitions.

A wide range of shapes are available in this material. The standard color is black.

Installation

Raychem -4 molded parts will shrink on the application of heat above 100°C [212°F].

Recommended installation temperature: 150°C [302°F]

Operating Temperature Range

–55°C to 135°C [–67°F to 275°F]

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Japan: 81-44-844-8013
UK: 44-208-420-8341

-4 (Continued)

Specifications/Approvals

UL	Military	Raychem
224, File E85381	SAE-AS81765/1, Type II	RT-1304

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	1800 psi (min.)	ASTM D 412
	Ultimate elongation	400% (min.)	ASTM D 412
	Specific gravity	1.3 (max.)	ASTM D 792
Thermal	Heat aging for 168 h at 175°C [347°F]	Ultimate elongation 300% (min.)	RT 1304 Sec. 4.3.3
	Heat shock for 4 h at 225°C [437°F]	No dripping, flowing, or cracking	RT 1304 Sec. 4.3.5
	Low-temperature flex at –55°C [–67°F]	No cracking	RT 1304 Sec. 4.3.4
	Flammability (burn time)	Average flame time: 120 s (max.)	ASTM D 635
Electrical	Dielectric strength	350 V/mil (min.)	ASTM D 149
Water absorption	—	0.3% (max.)	ASTM D 570
Fluid resistance	JP-4 fuel, aviation gasoline, water, hydraulic fluid	Tensile strength 8.5 MPa psi (min.) Ultimate elongation 200% (min.)	RT-1304 Sec. 4.3.3

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Japan: 81-44-844-8013
UK: 44-208-420-8341

-12

Modified Fluoroelastomer

12

Heat-Shrink Tubing, Molded Parts and Adhesives

Product Facts

- Heat-shrinkable, flexible, fluid-resistant modified fluoro-elastomer
- Excellent resistance to long-term fuel immersion

Applications

Raychem -12 molded parts with fluoroelastomers are designed to be used in conjunction with tubing made from fluoroelastomers or multi-conductor cable jackets and a suitable adhesive in Raychem System 200. This system provides excellent resistance to elevated temperatures and continuous fuel immersion. Available in a wide range of configurations, -12 molded parts will operate from –55°C [–67°F] to 200°C [392°F]. The standard color is black.

Installation

Raychem -12 molded parts will shrink on the application of heat above 175°C [347°F].

Recommended installation temperature: 220°C [428°F]

Operating Temperature Range

–55°C to 200°C [–67°F to 392°F]

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Japan: 81-44-844-8013
UK: 44-208-420-8341

-12 (Continued)

Specifications/Approvals

Military	Raychem
SAE-AS81765/4	RT-1312
Def. Stan. 59-97 Issue 3 Type DD (Europe)	—
BS-G-198-5-DD-P (Europe)	—

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	12.4 MPa (min.)	ISO 37
	Ultimate elongation	300% (min.)	ISO 37
	2% secant modulus	70 MPa (max.)	ASTM D 882
	Specific gravity	1.95 (max.)	ISO 1183
Thermal	Heat aging for 168 h at 250°C [482°F]	Ultimate elongation 250% (min.)	ISO 188, ISO 37
	Heat shock for 4 h at 300°C [572°F]	No dripping, cracking, or flowing	ASTM D 2671
	Low temperature flex at –55°C [–67°F]	No cracking	ASTM D 2671
	Flammability (burn time)	30 s (max.)	ASTM D 635
Electrical	Electric strength	8 MV/m (min).	IEC 243
Water absorption	—	0.5% (max.)	ISO 62
Fluid resistance	Aviation fuel F40	Tensile strength 11 MPa (min.) Ultimate elongation 200% (min.)	ISO 1817 after immersion for 24 h at 23°C [73°F]
	Lubricating oil O-149	Tensile strength 11 MPa (min.) Ultimate elongation 200% (min.)	ISO 1817 after immersion for 24 h at 93°C [200°F]
	Hydraulic fluid H515	Tensile strength 11 MPa (min.) Ultimate elongation 200% (min.)	ISO 1817 after immersion for 24 h at 93°C [200°F]

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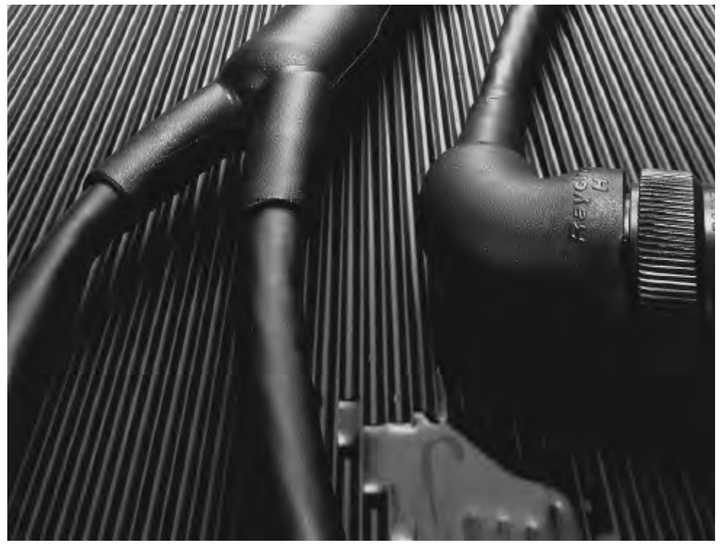
UK: 44-208-420-8341

-25

Fluid-Resistant Modified Elastomer

Product Facts

- Heat-shrinkable, semi-rigid, chemical- and abrasion-resistant molded shapes
- Excellent resistance to high-temperature fluids
- Resistance to long-term exposure at elevated temperatures



Applications

Raychem heat-shrinkable molded parts in -25 material are designed to be used in conjunction with other System 25 components such as DR-25 tubing and S1125 adhesive, providing a complete cable harness system capability.

-25 parts have been specifically formulated and designed to provide optimum high-temperature fluid resistance and long-term heat resistance. This unique balance of properties makes -25 parts particularly suitable for sealing and strain relief at connector-cable terminations and cable-to-cable transitions on military vehicle cables and harnesses. Available in a wide range of configurations, -25 parts will operate from –75°C to 150°C [–103°F to 302°F] for long periods. The standard color is black.

Installation

Raychem -25 molded parts will shrink on the application of heat above 135°C [275°F].

Recommended installation temperature: 175°C [347°F]

Operating Temperature Range

–75°C to 150°C [–103°F to 302°F]

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UK: 44-208-420-8341

-25 (Continued)

Specifications/Approvals

Military	Raychem
VG 95343 Parts 6, 7, 8 and 9 (Europe)	RT-1325
Def Stan 59-97, Issue 3, Type DE (Europe)	—
BSG-198-5-DE-P	—

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	15 MPa (min.)	ASTM D 412
	Ultimate elongation	350% (min.)	ASTM D 412
	Specific gravity	1.5 (max.)	ASTM D 792
Thermal	Heat aging for 168 h at 150°C [302°F	Ultimate elongation 300% (min.)	ASTM D 412
	Heat shock for 4 h at 225°C [437°F]	No dripping, cracking, or flowing	ASTM D 2671
	Low-temperature flex for 4 h at –70°C [–94°F]	No cracking during mandrel bend	ASTM D 2671
	Flammability (burn time)	120 s (max.)	ASTM D 635
Electrical	Electric strength	8 MV/m	ASTM D 149
Fluid resistance	Aviation fuel JP-4 (MIL-T-5624)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Hydraulic fluid (MIL-H-6083)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Diesel fuel (VV-F-800 No 2)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 50°C [122°F]
	Automotive gasoline (MIL-G-3056)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]

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-25S

Fluid-Resistant Screened Elastomer

Product Facts

- Fuel and heat resistance
- RFI, EMI protection

Applications

Rayaten screened molded parts in -25S material are designed for use with FDR-25 or DR-25 jacketed screened multiconductor cable and S1125 adhesive to provide a complete high-performance harness system offering high levels of RFI and EMI protection. This -25 material provides optimum high-temperature fluid-resistance and long-term heat-aging properties. The material is particularly suitable for providing encapsulation, mechanical protection, and strain relief on terminations and cable transitions in harsh environments.The standard color is black. Products made from this material are normally used in an assembly (see Section 11, pages 11-2 to 11-13).

Operating Temperature Range

–55°C to 150°C
[–67°F to 302°F]

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-25S (Continued)

Specifications/Approvals

Military	Raychem
VG 95343 Pt. 20, Pt. 22	RK-6719

Product Characteristics

		Specification Requirements*	Screening effectiveness in dB at 3 KHz to 30 MHz (min.)	Screening effectiveness in dB at >30 MHz to 100 MHz (min.)
Initial values		Tensile strength: 12 MPa (min.)	—	—
		Ultimate elongation: 400% (min.)	—	—
		Metal adhesion: 15 N/cm (min.)	—	—
		Shielding effectiveness	75	70
Thermal	Heat shock (1/2 h at 200°C [392°F])	Tensile strength: 12 MPa (min.)	—	—
		Ultimate elongation: 400% (min.)	—	—
		Shielding effectiveness	75	70
	Heat aging (168 h at 160°C [320°F])	Tensile strength: 12 MPa (min.)	—	—
		Ultimate elongation: 400% (min.)	—	—
		Shielding effectiveness	75	70
	3 thermal cycles of –75°C to 150°C [–103°F to 302°F]	Shielding effectiveness	75	70
Immersion in the following fluids for 24 h:				
Chemical	Lubricating oil (O-156, at 100°C [212°F])	Tensile strength: 10 MPa (min.)	—	—
		Ultimate elongation: 300% (min.)	—	—
		Shielding effectiveness	75	70
	Hydraulic fluid H515, at 50°C [122°F]	Tensile strength: 10 MPa (min.)	—	—
		Ultimate elongation: 300% (min.)	—	—
		Shielding effectiveness	75	70
	Aviation fuel JP4 F40, at 23°C [73°F]	Tensile strength: 10 MPa (min.)	—	—
		Ultimate elongation: 300% (min.)	—	—
		Shielding effectiveness	75	70
	Diesel fuel F54, at 23°C [73°F]	Tensile strength: 10 MPa (min.)	—	—
		Ultimate elongation: 300% (min.)	—	—
		Shielding effectiveness	75	70
	1, 1, 1, trichloroethane (1 h, at 23°C [73°F])	Tensile strength: 10 MPa (min.)	—	—
		Ultimate elongation: 300% (min.)	—	—
		Shielding effectiveness	75	70

* Values quoted are for the polymer/metal composite in all cases when terminated using epoxy adhesives.

Catalog 1308940
Revised 8-06

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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

-50

Fluid-Resistant Modified Elastomer

Product Facts

- Excellent heat and fluid resistance
- Low profile
- Rugged
- Lightweight

Applications

A high-performance blend of fluoroelastomers and other polymers, Raychem -50 offers excellent fluid and temperature resistance. It is suitable for use in most areas of military vehicle harnessing. This material is available in the Uniboot range and should be chosen in applications that use System 30 components. The standard color is black.

Installation

Raychem -50 molded parts will shrink on the application of heat above 125°C [257°F].

Recommended installation temperature is 175°C [347°F]

Operating Temperature Range

–55°C to 150°C [–67°F to 302°F]

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Revised 8-06

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-50 (Continued)

Specifications/Approvals

Military	Raychem
SC-X-15111 (U.S.)	RT-1313

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	15 MPa (min.)	ASTM D 412
	Ultimate elongation	350% (min.)	ASTM D 412
	Specific gravity	1.5 (max.)	ASTM D 792
Thermal	Heat aging for 168 h at 150°C [302°F]	Ultimate elongation 300% (min.)	ASTM D 412
	Heat shock for 4 h at 225°C [437°F]	No dripping, cracking, or flowing	ASTM D 2671
	Low-temperature flex for 4 h at –70°C [–94°F]	No cracking during mandrel bend	ASTM D 2671
	Flammability (burn time)	120 s (max.)	ASTM D 635
Electrical	Electric strength	8 MV/m	ASTM D 149
Fluid resistance	Aviation fuel JP-4 (MIL-T-5624)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Hydraulic fluid (MIL-H-6083)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Diesel fuel (VV-F-800 No 2)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 50°C [122°F]
	Automotive gasoline (MIL-G-3056)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]

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-51

12

Chemical-Resistant Fluoroelastomer

Product Facts

- Excellent fuel resistance
- Low profile
- Rugged
- Lightweight

Applications

A high-performance elastomeric blend of polymers, Raychem -51 offers excellent fluid resistance.

It is suitable for use in most areas of military vehicle harnessing. This material is available in the Uniboot range and other slimline boots and transitions. The standard color is black.

Installation

Raychem -51 molded parts will shrink on the application of heat above 125°C [257°F].

Recommended installation temperature is 150°C [302°F]

Operating Temperature Range

–55°C to 135°C [–67°F to 275°F]

Catalog 1308940
Revised 8-06

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-51 (Continued)

Specifications/Approvals

Military	Raychem
SC-X-15112 (U.S.)	RT-1321

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	1500 psi (min.)	ASTM D 412
	Ultimate elongation	300% (min.)	ASTM D 412
	Specific gravity	1.6 (max.)	ASTM D 792
Thermal	Heat aging for 168 h at 121°C [250°F]	Tensile strength 1200 psi. (min.) Elongation 250% (min.)	RT-1321 Sec. 4.3.3 RT-1321 Sec. 4.3.3
	Heat shock for 4 h at 200°C [392°F]	No dripping, flowing, or cracking	RT-1321 Sec. 4.3.5
	Low-temperature flex for 4 h at –55°C [–67°F]	No cracking	RT-1321 Sec. 4.3.4
	Flammability (burn time)	120 seconds, 1 inch (max.)	ASTM D 635
Electrical	Dielectric strength	200 V/mil (min.)	ASTM D 149
Fluid resistance	Lubricating oil, diesel oil, water for 24 h at 25°C [77°F]	Tensile strength 1000 psi (min.) Elongation 225% (min.) Weight increase 10% (max.)	RT-1321 Sec. 4.3.3 and 4.3.7
	Gasoline for 24 h at 25°C [77°F]	Tensile strength 800 psi (min.) Elongation 225% (min.) Weight increase 25% (max.)	RT-1321 Sec. 4.3.3 and 4.3.7
	Isopropyl alcohol, cleaning fluid for 24 h at 25°C 77°F]	Tensile strength 1400 psi (min.) Elongation 225% (min.) Weight increase 10% (max.)	RT-1321 Sec. 4.3.3 and 4.3.7
	Hydraulic fluid for 24 h at 71°C [160°F]	Tensile strength 1000 psi (min.) Elongation 225% (min.) Weight increase 25% (max.)	RT-1321 Sec. 4.3.3 and 4.3.7

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-55

Flexible Fluoropolymer

Product Facts

- Flame retardant
- Abrasion and cut through resistance
- Flexible
- High temperature resistance
- High fluid resistance
- Environmentally sealed

Applications

A heat-shrinkable, flexible, flame retardant, fluid and high temperature resistant, modified fluoropolymer molding compound. -55 molded parts are ideal for use in applications where chemical resistance and abrasion resistance is required. A wide range of shapes are available. -55 molded parts are recommended for use in System 300.

Use the System 300 family of parts in military and industrial applications where excellent high temperature performance and good physical and chemical properties are a requirement.

System 300 jacketing is based on a modified fluoropolymer and features a one part epoxy adhesive in tape form.

Installation

This specification covers the requirements for one type of flexible, electrical insulating molded component whose expanded dimensions will reduce to a predetermined size upon the application of heat in excess of 220°C [428°F].

Operating Temperature Range

–65°C to 200°C
[–85°f to 392°F]

Specifications/Approvals	RT-1330

Product Characteristics

Physical	Tensile Strength	psi (MPa)	3500 minimum (24.1)	Section 4.3.3
	Ultimate Elongation	percent	200 minimum	ASTM D 2671
	Specific Gravity	—	2.0 maximum	ASTM D 792
	Low Temperature Flexibility 4 hours at –65 ± 2°C [–85 ± 4°F]	—	No cracking	Section 4.3.4
	Heat Shock 4 hours at 300°C [572°F]	—	No dripping, flowing or cracking	Section 4.3.5
	Heat Resistance 336 hours at 250°C [482°F]	—	—	Section 4.3.6
	Followed by tests for: Tensile Strength Elongation	 psi (MPa) percent	 2000 minimum (13.8) 150 minimum	 Section 4.3.3 ASTM D 2671

Catalog 1308940
Revised 8-06

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Product Characteristics
(Continued)

-55 (Continued)

Electrical			
Dielectric Strength	volts/mil	200 minimum	ASTM D 149
Volume Resistivity	ohm-cm	1011 minimum	ASTM D 257
Chemical			
Corrosive Effect 16 hours at 200 ± 3°C [392 ± 5°F]	—	Noncorrosive	Section 4.3.7 ASTM D 2671 Procedure A
Flammability Average Time of Burning Average Extent of Burning	 seconds inches (mm)	 15 maximum 0.5 maximum (12.5)	ASTM D 635
Fungus Resistance	—	Rating of 1 or less	ASTM G 21
Water Absorption 24 hours at 23 ± 3°C [73 ± 5°F)]	percent	0.5 maximum	ASTM D 570
Fluid Resistance 24 hours at 23 ± 3°C [73 ± 5°F] in: Gasoline, Aviation Grade 100 (ASTM D 910) 1,1,1 Trichloroethane (MIL-T-81533) Coolanol 25 Followed by tests for: Tensile Strength Ultimate Elongation 24 hours at 50 ± 3°C [122 ± 5°F] in: JP-5 (MIL-T-5624) Deicing Fluid (MIL-A-8243) Cleaning Compound (MIL-C-43616) 5% Salt Solution (O-S-1926) Fuel Oil, Diesel (VV-F-800, DF-2) Followed by tests for: Tensile Strength Ultimate Elongation 24 hours at 75 ± 3°C [167 ± 5°F] in: Hydraulic Fluid (MIL-H-5606) Skydrol 500 Lubricating Oil (MIL-L-2104) Lubricating Oil (MIL-L-7808) Followed by tests for: Tensile Strength Ultimate Elongation	— psi (MPa) percent psi (MPa) percent — psi (MPa) percent	— 3000 minimum (20.7) 150 minimum 3000 minimum (20.7) 150 minimum — 3000 minimum (20.7) 150 minimum	Section 4.3.8 Section 4.3.3 ASTM D 2671 Section 4.3.3 ASTM D 2671 Section 4.3.8 Section 4,3.3 ASTM D 2671
Fluid Resistance 5 hours at 23 ± 3°C [73± 5°F] Tensile Strength Ultimate Elongation	— psi (MPa) Percent	— 3500 minimum (24.1) 150 minimum	Section 4.3.8 Section 4.3.3 ASTM D 2671
Nuclear			Section 4.3.9
Radiation Resistance Followed by tests for: Tensile Strength Ultimate Elongation	 psi (MPa) percent	 3500 minimum (24.1) 150 minimum	 —

SKYDROL is a registered trademark of Monsanto Company.

Catalog 1308940
Revised 8-06

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-71

Semirigid Modified Polyolefin

Product Facts

- **Flexible**
- **Flame-retardant**

Applications

Raychem -71 is a flexible, flame-retardant polyolefin suitable for use in general harnessing applications. The material is very flexible and offers a good balance of fluid and heat resistance. If Uniboot molded parts are required, -71 should be chosen as a replacement for -3. The standard color is black.

Installation

Raychem -71 molded parts will shrink on the application of heat above 100°C [212°F].

Recommended installation temperature is 150°C [302°F]

Operating Temperature Range

–55°C to 135°C [–67°F to 275°F]

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-71 (Continued)

Specifications/Approvals

Military	Raychem
SAE-AS81765/1, Type I	RT-1316

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	10 MPa (min.)	ASTM D 412
	Ultimate elongation	250% (min.)	ASTM D 412
	Specific gravity	1.40 (max.)	ASTM D 792
Thermal	Heat aging for 168 hr at 175°C [347°F]	Ultimate elongation 200% (min.)	ASTM D 412
	Heat shock for 4 h at 250°C [482°F]	No dripping, cracking, or flowing	ASTM D 2671
	Low-temperature flex for 4 h at –55°C [–67°F]	No cracking during mandrel bend	ASTM D 2671
	Flammability (burn time)	90 s (max.)	ASTM D 635
Electrical	Electric strength	8 MV/m	ASTM D 149
Water absorption	—	0.5% (max.)	ASTM D 570
Fluid resistance	Aviation fuel JP-4 (MIL-T-5624)	Tensile strength 5 MPa (min.) Ultimate elongation 200% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Lubricating oil O-149 (MIL-L-7808)	Tensile strength 5 MPa (min.) Ultimate elongation 200% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Hydraulic fluid (MIL-H-5606)	Tensile strength 5 MPa (min.) Ultimate elongation 200% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Skydrol 500	Tensile strength 5 MPa (min.) Ultimate elongation 200% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]

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Low-Fire-Hazard Material

Product Facts

- Heat-shrinkable, semiflexible molded shapes for low fire hazard applications
- Low-smoke index as defined by BS G 198 Part 5
- Low-toxicity index as defined by NES 713
- High-temperature index as defined by ISO 4589-3

Applications

Raychem heat-shrinkable molded parts in -100 material form part of Raychem's System 100. The molded parts are designed for use in conjunction with Raychem Zerohal cable and tubing for applications where hazard reduction in the event of fire is crucial. The material exhibits excellent fire safety characteristics combined with low-smoke and low-acid-gas emission while retaining good mechanical and fluid-resistant properties. -100 parts with adhesive lining provide location, sealing, and strain relief of cable-connector terminations and cable–cable transitions on harnesses used where there is a need to lower the risk (such as in marine applications, mass transit systems, and offshore installations), or where equipment would be irreparably damaged by the corrosive products of combustion. Available in a wide range of configurations, -100 parts will operate continuously from –30°C to 105°C [–22°F to 221°F]. The standard color is black.

Installation

Raychem -100 molded parts will shrink on the application of heat above 120°C [248°F].

Recommended installation temperature: 150°C [302°F]

Operating Temperature Range

–30°C to 105°C [–22°F to 221°F]

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-100 (Continued)

Specifications/Approvals

Military/NAVSEA	Raychem
5617649 (U.S.)	RT-1323
	RK-6717
Def. Stan 59-97, Issue 3, Type DF (Europe)	—
BSG 198 Part 5 Type DF (Europe)	—
BR1326 listed Class C	—

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	8 MPa (min.)	ISO 37
	Ultimate elongation	200% (min.)	ISO 37
	2% secant modulus	130 MPa (max.)	ASTM D 882
	Specific gravity	1.5 (max.)	ISO 1183
Thermal	Heat aging for 168 h at 150°C [302°F]	Ultimate elongation 100% (min.)	ISO 188, ISO 37
	Heat shock for 4 h at 225°C [437°F]	No dripping, cracking, or flowing	ASTM D 2671
	Low-temperature flex at –30°C [–22°F]	No cracking during mandrel bend	ASTM D 2671
Fire safety properties	Limiting oxygen index	29 min.	ISO 4589-2
	Temperature index	250°C [482°F] (min.)	ISO 4589-3
	Flammability (burn time)	100 s (max.)	ASTM D 635
	Smoke index	20 (max.)	BSG 198 Part 5
	Toxicity index	5 (max.) per 100 g	NES 713
Electrical	Electric strength	15 MV/m (min.)	IEC 243
Water absorption	—	0.75% (max.) at 23°C [73°F] 3.5% (max.) at 70°C [158°F]	ISO 62
Fluid resistance	ISO 1817 Gasoline fuel	Tensile strength 5 MPa (min.) Ultimate elongation 150% (min.)	ISO 1817 and ISO 37 after immersion for 24 h at 23°C [73°F]
	Lubricating oil O-149	Tensile strength 5 MPa (min.) Ultimate elongation 150% (min.)	ISO 1817 and ISO 37 after immersion for 24 h at 50°C [122°F]
	Hydraulic fluid H515	Tensile strength 5 MPa (min.) Ultimate elongation 150% (min.)	ISO 1817 and ISO 37 after immersion for 24 h at 23°C [73°F]

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-100S

Low-Fire-Hazard Screened Material

Product Facts

- Screened Zerohal material
- Low smoke index as defined by NES 711
- Low toxicity index as defined by NES 713
- High temperature index as defined by NES 715

Applications

-100S is the Zerohal material option in Raychem Rayaten shield (screen) termination system. This material combines the fire safety properties of -100 with the excellent EMI and RFI screening of Rayaten screened molded parts where there is a need to lower the risk.

-100S is suitable for high-performance screen terminations in areas where Raychem Zerohal materials are required.

The standard color is black. Products made from these materials are normally used in an assembly (see Section 11, pages 11-2 to 11-13).

Operating Temperature Range

–30°C to 105°C
[–22°F to 221°F]

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-100S (Continued)

Specifications/Approvals

Military	Raychem
VG 95343 Pt. 20, Pt. 22	RK-6724

Product Characteristics

		Specification Requirements*	Screening Effectiveness in dB at	
			3 KHz to 30 MHz (min.)	>30 MHz to 100 MHz (min.)
Initial values		Tensile strength: 7 MPa (min.) Metal adhesion: 15 N/cm (min.) Shielding effectiveness	75	70
Thermal	Heat shock (1/2 h at 200°C [392°F])	Metal adhesion: 15 N/cm (min.) Shielding effectiveness	75	70
	Heat aging (168 h at 150°C [302°F])	Metal adhesion: 15 N/cm (min.) Shielding effectiveness	75	70
Fluids	Immersion in the following fluids for 24 h:			
	Phosphate ester hydraulic fluid DTD900/4881 at 23°C [73°F]	Tensile strength: 5 MPa (min.) Shielding effectiveness	75	70
	Water at 23°C [73°F]	Tensile strength: 5 MPa (min.) Shielding effectiveness	75	70
	Lubricating oil O-149 at 50°C [122°F]	Tensile strength: 5 MPa (min.) Shielding effectiveness	75	70
	Transformer oil S-756 at 50°C [122°F]	Tensile strength: 5 MPa (min.) Shielding effectiveness	75	70

* Values quoted are for the polymer/metal composite in all cases when terminated using epoxy adhesives. (Refer to pages 12-206 to 12-211.)

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-125

Flexible Fluoropolymer

Product Facts

- **Flame retardant**
- **Abrasion and cut through resistance**
- **High temperature resistance**
- **High fluid resistance**
- **Environmentally sealed**

Applications

A heat-shrinkable, flame retardant, fluid and high temperature resistant, modified fluoropolymer molding compound. A range of shapes is available. -125 molded parts are recommended for use in System 300.

Use the System 300 family of parts in military and industrial applications where excellent high temperature performance and good physical and chemical properties are a requirement.

System 300 jacketing is based on a modified fluoropolymer and features a one part epoxy adhesive in tape form.

Installation

This specification covers the requirements for one type of electrically insulating molded component whose dimensions will reduce to a predetermined size upon the application of heat in excess of 160°C ± 3°C [320°F ± 5°F].

Operating Temperature Range

–55°C to 175°C
[–67°F to 347°F]

Specifications/Approvals

RT-1334

Product Characteristics

Physical	Elastic Memory	Percent	275 minimum expansion 90 minimum retraction	Section 4.3.2
	Tensile Strength	psi (MPa)	4000 minimum (27.5)	Section 4.3.3
	Ultimate Elongation	Percent	300 minimum	ASTM D 412
	Secant Modulus	psi (MPa)	100,000 maximum (689)	Section 4.3.4 ASTM D 882
	Specific Gravity	—	1.85 maximum	ASTM D 792
	Low Temperature Flexibility 4 hours at –57 ± 3°C [–70 ± 5°F]	—	No cracking	Section 4.3.5
	Heat Shock 4 hours at 300 ± 5°C [572 ± 9°F]	—	No dripping, flowing or cracking	Section 4.3.6
	Heat Resistance 168 hours at 250 ± 5°C [482 ± 9°F] Followed by tests for: Tensile Strength Ultimate Elongation 2000 hours at 150 ± 3°C [302 ± 5°F] Followed by tests for: Tensile Strength Ultimate Elongation	— psi (MPa) Percent — psi (MPa) Percent	— 3500 minimum (24.1) 250 minimum — 3500 minimum (24.1) 250 minimum	Section 4.3.7.1 Section 4.3.3 Section 4.3.3 Section 4.3.7.2 Section 4.3.3 Section 4.3.3

Catalog 1308940
Revised 8-06

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USA: 1-800-522-6752
Canada: 1-905-470-4425
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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Product Characteristics
(Continued)

-125 (Continued)

Electrical			
Dielectric Strength	Volts/mil (kV/mm)	300 minimum (11.9)	ASTM D 149
Volume Resistivity	ohm-cm	1013 minimum	ASTM D 257
Chemical			
Corrosive Effect 16 hours at 175 ± 3°C [347 ± 5°F]	—	Noncorrosive	Section 4.3.8 ASTM D 2671 Procedure A
Flammability Initial Average Time of Burning Average Extent of Burning After Fluid Immersion 24 hours at 23 ± 3°C [73 ± 5°F] Gasoline, Automotive, Combat MIL-G-3056 Fuel Oil, Diesel VV-F-800 DF-2 Turbine Fuel, Aviation, JP-4 MIL-T-5624 Average Time of Burning Average Extent of Burning	 Seconds Inches (mm) Seconds Inches (mm)	 15 maximum 1 maximum (25) 30 maximum 1 maximum (25)	 ASTM D 635 Section 4.3.10 ASTM D 635
Fungus Resistance	—	Rating of 1 or less	ASTM G 21
Water Absorption 24 hours at 23 ± 3°C [73 ± 5°F]	Percent	0.5 maximum	ASTM D 570
Fluid Resistance 24 hours at 23 ± 3°C [73 ± 5°F] Gasoline, Automotive, Combat MIL-G-3056 24 hours at 50 ± 3°C [122 ± 5°F] Fuel Oil Diesel VV-F-800 DF-2 Turbine Fuel, Aviation, JP-4 MIL-T-5624 Electrolyte 10873919 5% Salt Solution O-S-1926 Anti-Icing & Defrosting Fluid MIL-A-8243 Lube Oil, Aircraft, Synthetic MIL-L-23699 Lube Oil MIL-L-2104 Lube Oil, Aircraft, Synthetic MIL-L-7808 24 hours at 100 ± 3°C [212 ± 5°F] Hydraulic Fluid, Synthetic MIL-H-46170 4 hours at 50 ± 3°C [122 ± 5°F] Cleaning Compound PC-437 5 hours at 23 ± 3°C [73 ± 5°F] Decontaminating Agent, DS-2 MIL-D-50030 Decontaminating Agent STB MIL-D-12468 Followed by tests for: Tensile Strength Ultimate Elongation Weight Increase	—

End Caps, 101A011 to 094

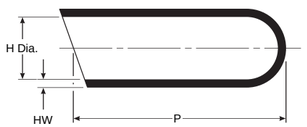
Raychem end caps provide optimum waterproofing and environmental protection for underwater, underground, or outdoor applications. The end caps are highly resistant to moisture, fungus, and weathering.

Applications

Use for protecting cables and pipes or capping unused outlets in transitions. Provides an environmental seal when used with adhesive.

As Supplied (a)

After Unrestricted Recovery (b)



Product Dimensions

Part Number	H		P	HW
	Min. a	Max. b	Min. b	±20% b
101A011	5.10 [.20]	2.00 [.08]	22.90 [.90]	1.02 [.04]
101A021	7.40 [.29]	3.30 [.13]	25.40 [1.00]	1.27 [.05]
101A031	10.20 [.40]	4.80 [.18]	30.50 [1.20]	1.52 [.06]
101A041	15.20 [.60]	6.40 [.25]	40.60 [1.60]	1.78 [.07]
101A052	20.60 [.81]	9.40 [.37]	61.00 [2.40]	2.03 [.08]
101A062	25.40 [1.00]	11.40 [.45]	68.80 [2.70]	2.29 [.09]
101A073	39.40 [1.56]	18.00 [.71]	91.40 [3.60]	2.54 [.10]
101A083	50.80 [2.00]	22.90 [.90]	101.60 [4.00]	2.79 [.11]
101A094	83.80 [3.30]	38.10 [1.50]	114.30 [4.50]	3.05 [.12]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

End Caps, 101A011 to 094 (Continued)

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/180	S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

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Heat-Shrinkable End Caps

Product Facts

- Self-sealing for waterproofing (sealant-coated parts only)
- Electrical insulation to 1000 V
- Abrasion-resistance
- Mechanical protection
- Easy installation, requiring no special skills
- Operating temperature range of –40°C to 85°C [–40°F to 185°F]
- Minimum shrink temperature of 121°C [250°F]

Applications

These SSC heat-shrinkable end caps are made from a thermally stabilized, modified polyolefin, which makes them highly resistant to moisture, fungus, and weathering. The end caps also have excellent electrical properties. End caps coated with sealant are available for underwater or underground applications with a pressure differential up to 20 psi between the inside of the cable and the outside environment. End caps may be used over lead, steel, aluminum, copper, polyethylene, polyolefin, EPR, and PVC jacketing materials.

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SSC (Continued)

Specifications/Approvals

Type	Raychem	Military/Commercial
SSC-X and SSC-XTV	SSC specification control drawing	PPS-3011/6
—	RT-1050-1	—
—	RW-2019	—
—	RW-2024	—

Adhesive is 1239 = PPS-3012/70

Product Dimensions

Part Number	Inner Diameter* As Supplied (min.)	Recovered Inside Dia. (max.)	Length Recovered ± 10 %	Wall Thickness Recovered ± 20 %
SSC-1	10.00 [.390]	4.00 [.160]	33.50 [1.320]	2.00 [.080]
SSC-2	20.00 [.790]	7.50 [.300]	55.30 [2.180]	2.30 [.090]
SSC-3	35.00 [1.380]	15.00 [.590]	89.90 [3.540]	3.00 [.120]
SSC-4	55.00 [2.170]	25.00 [.980]	143.20 [5.640]	3.30 [.130]
SSC-5	75.00 [2.950]	32.00 [1.250]	150.10 [5.910]	3.30 [.130]
SSC-5M1	75.00 [2.950]	32.00 [1.250]	79.25 [3.120]	3.30 [.130]
SSC-6	100.00 [3.940]	45.00 [1.770]	162.50 [6.400]	4.00 [.160]
SSC-7	120.00 [4.720]	70.00 [2.760]	145.00 [5.710]	3.80 [.150]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

* Adhesive is optional. As-supplied dimensions appearing in table are for uncoated parts. When adhesive is added, entry diameters will be reduced by 1.5 [.06] maximum.

Ordering Information

Military	
SSC-XTV	Sealing end cap with adhesive
SSC-X	Sealing end cap with adhesive
SSC-XU	End cap, uncoated

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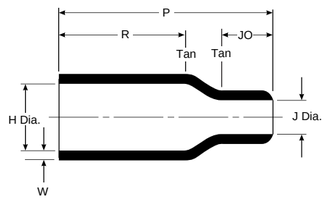
202A111 to 196

Straight Boot

As Supplied (a)

After Unrestricted Recovery (b)



Applications

Use for mechanical protection and connector/cable strain relief. This family of boots has no lip, so that a boot can be installed directly onto the connector accessory thread.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H			J			P	R	JO	W
	Min.		Max.	Min.		Max.				
	-3, -4, -25 a	-12, -100 a	b	-3, -4, -25 a	-12, -100 a	b	±10% b	±10% b	Ref. b	±20% b
202A111	16.5 [.65]	16.5 [.65]	7.9 [.31]	16.5 [.65]	11.9 [.47]	3.8 [.15]	25.4 [1.00]	14.2 [.56]	5.8 [.23]	1.27 [.05]
202A121	24.6 [.97]	22.6 [.89]	9.9 [.39]	24.6 [.97]	17.8 [.70]	5.3 [.21]	38.1 [1.50]	21.8 [.86]	9.1 [.36]	1.52 [.06]
202A132	28.4 [1.12]	26.2 [1.03]	14.2 [.56]	28.4 [1.12]	20.3 [.80]	6.6 [.26]	51.3 [2.02]	27.9 [1.10]	13.0 [.51]	1.78 [.07]
202A142	31.0 [1.22]	31.0 [1.22]	17.8 [.70]	31.0 [1.22]	25.4 [1.00]	7.4 [.29]	66.8 [2.63]	35.6 [1.40]	17.8 [.70]	1.78 [.07]
202A153	36.1 [1.42]	36.1 [1.42]	21.9 [.86]	36.1 [1.42]	26.2 [1.03]	8.6 [.34]	73.7 [2.90]	41.4 [1.63]	16.0 [.63]	1.78 [.07]
202A163	42.7 [1.68]	42.7 [1.68]	27.4 [1.08]	42.7 [1.68]	27.2 [1.07]	9.4 [.37]	99.1 [3.90]	62.7 [2.47]	18.0 [.71]	2.03 [.08]
202A174	51.8 [2.04]	48.3 [1.90]	35.3 [1.39]	51.8 [2.04]	48.3 [1.90]	16.0 [.63]	130.0 [5.13]	64.8 [2.55]	41.9 [1.65]	3.30 [.13]
202A185	66.0 [2.60]	66.0 [2.60]	43.7 [1.72]	66.0 [2.60]	54.1 [2.13]	19.6 [.77]	161.3 [6.35]	90.2 [3.55]	47.8 [1.88]	3.81 [.15]
202A196	86.4 [3.40]	86.4 [3.40]	57.2 [2.25]	86.4 [3.40]	71.4 [2.81]	26.9 [1.06]	212.6 [8.37]	113.0 [4.45]	62.2 [2.45]	4.06 [.16]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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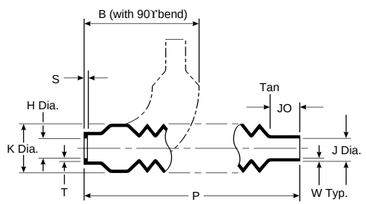
202C611 to 663

Uniboot

As Supplied (a)

After Unrestricted Recovery (b)



Applications

Use to provide abrasion protection for connectors. The flexibility of design allows a variety of cable outlet angles. When installed on a spin-coupling adapter, cold reentry to the connector is possible by compressing the molded part. When used with adhesive it provides environmental sealing.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-50	Fluoroelastomer polymer blend	N/A	S-1125
-51	Elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H Min. a -50, -51	H Min. a -71	H Max. b	J Min. a -50, -51	J Min. a -71	J Max. b	K Max. b	P ±10% b	JO ±10% b	S ±.03[0.76] b	T ±.03[0.76] b	W Min. b	B Nom. b
202C611	14.2 [.56]	17.5 [.69]	6.9 [.27]	11.2 [.44]	14.2 [.56]	4.8 [.19]	21.1 [.83]	120.7 [4.75]	17.5 [.69]	1.52 [.06]	1.27 [.05]	0.33 [.013]	62.5 [2.46]
202C621	22.4 [.88]	26.4 [1.04]	11.7 [.46]	17.8 [.70]	26.4 [1.04]	8.1 [.32]	26.7 [1.05]	133.4 [5.25]	19.0 [.78]	1.52 [.06]	1.27 [.05]	0.46 [.018]	67.8 [2.67]
202C632	34.0 [1.34]	38.1 [1.50]	17.5 [.69]	26.9 [1.06]	38.1 [1.50]	12.7 [.50]	32.8 [1.29]	146.1 [5.75]	22.4 [.88]	1.78 [.07]	1.27 [.05]	0.51 [.020]	73.4 [2.89]
202C642	44.2 [1.74]	47.8 [1.88]	22.4 [.88]	36.6 [1.44]	47.8 [1.88]	17.5 [.69]	37.8 [1.49]	158.8 [6.25]	25.4 [1.00]	1.78 [.07]	1.27 [.05]	0.61 [.024]	78.2 [3.08]
202C653	21.2 [53.8]	54.9 [2.16]	27.9 [1.10]	45.7 [1.80]	54.9 [2.16]	22.4 [.88]	42.9 [1.69]	171.5 [6.75]	28.4 [1.12]	1.78 [.07]	2.03 [.08]	0.61 [.024]	82.8 [3.26]
202C663	22.5 [57.2]	77.2 [3.04]	40.6 [1.60]	57.2 [2.25]	54.6 [2.15]	22.9 [.90]	62.2 [2.45]	236.2 [9.30]	35.1 [1.38]	2.03 [.08]	2.03 [.08]	0.66 [.026]	138.4 [5.45]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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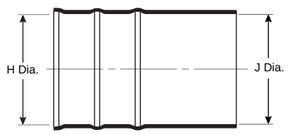
UK: 44-208-420-8341

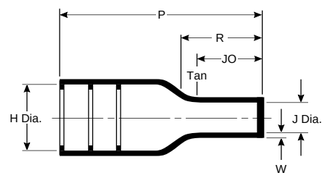
202D121 to 196

Straight, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors. Boot is compatible with all Raychem grooved adapters of appropriate shell size.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J			P	JO	W	RR
	Min. a	Max. b	Min. -3, -4, -25 a	Min. -12, -100 a	Max. b	±10% b	±10% b	±20% b	±10% b
202D121	23.3 [.92]	10.5 [.41]	23.3 [.92]	12.4 [.49]	5.6 [.22]	38.1 [1.50]	10.2 [.40]	1.78 [.07]	—
202D132	28.4 [1.12]	14.3 [.56]	28.4 [1.12]	14.7 [.58]	6.6 [.26]	54.9 [2.16]	16.5 [.65]	1.78 [.07]	21.6 [.85]
202D142	31.0 [1.22]	17.8 [.70]	31.0 [1.22]	16.0 [.63]	7.2 [.28]	66.8 [2.63]	17.8 [.70]	2.03 [.08]	24.5 [.96]
202D153	36.0 [1.42]	22.4 [.88]	36.0 [1.42]	18.5 [.73]	8.4 [.33]	80.0 [3.15]	20.8 [.82]	2.03 [.08]	29.7 [1.17]
202D163	42.7 [1.68]	28.2 [1.11]	42.7 [1.68]	22.0 [.87]	9.9 [.39]	103.6 [4.08]	24.6 [.97]	2.29 [.09]	36.7 [1.44]
202D174	51.8 [2.04]	35.1 [1.38]	51.8 [2.04]	35.3 [1.39]	15.8 [.62]	130.3 [5.13]	39.6 [1.56]	3.30 [.13]	53.8 [2.12]
202D185	66.0 [2.60]	44.5 [1.75]	66.0 [2.60]	45.7 [1.80]	20.4 [.80]	165.1 [6.50]	48.3 [1.90]	4.06 [.16]	65.6 [2.59]
202D196	81.7 [3.22]	57.6 [2.27]	81.7 [3.22]	57.1 [2.25]	25.4 [1.00]	177.8 [7.00]	47.8 [1.88]	4.06 [.16]	67.1 [2.64]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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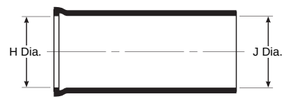
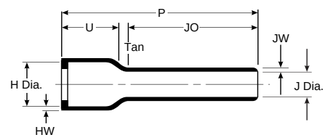
202D211 to 299

Straight, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use with circular connectors and the appropriate Raychem backshell adapter to provide connector/cable strain relief. Boot is used on open-wire-bundle airborne harnesses, or applications where the long tail replaces cable jacketing removed during termination.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J			P ±10% b	JO ±10% b	U ±10% b	HW ±20% b	JW ±20% b
	Min. a	Max. b	Min. -3, -4, -25 a	Min. -12, -100 a	Max. b					
202D211	22.4 [.88]	11.4 [.45]	22.4 [.88]	14.0 [.55]	6.4 [.25]	105.9 [4.17]	86.4 [3.40]	14.2 [.56]	1.52 [.06]	1.14 [.045]
202D221	25.7 [1.01]	15.0 [.59]	25.7 [1.01]	16.0 [.63]	7.4 [.29]	121.2 [4.77]	98.6 [3.88]	15.0 [.59]	1.52 [.06]	1.14 [.045]
202D232	29.5 [1.16]	18.8 [.74]	29.5 [1.16]	18.3 [.72]	8.4 [.33]	138.7 [5.46]	112.8 [4.44]	15.5 [.61]	1.78 [.07]	1.14 [.045]
202D242	34.0 [1.34]	22.9 [.90]	34.0 [1.34]	21.3 [.84]	9.7 [.38]	159.5 [6.28]	130.8 [5.15]	15.7 [.62]	1.78 [.07]	1.14 [.045]
202D253	37.3 [1.47]	29.5 [1.16]	37.3 [1.47]	23.1 [.91]	10.4 [.41]	177.8 [7.00]	142.2 [5.60]	18.0 [.71]	2.0 [.08]	1.14 [.045]
202D263	43.7 [1.72]	34.0 [1.34]	43.7 [1.72]	27.2 [1.07]	12.2 [.48]	203.2 [8.00]	163.1 [6.42]	19.8 [.78]	2.0 [.08]	1.14 [.045]
202D274	50.0 [1.97]	41.2 [1.62]	50.0 [1.97]	31.5 [1.24]	14.2 [.56]	203.2 [8.00]	157.7 [6.21]	20.8 [.82]	2.3 [.09]	1.40 [.055]
202D285	62.7 [2.47]	47.0 [1.85]	62.7 [2.47]	39.1 [1.54]	17.5 [.69]	203.2 [8.00]	153.2 [6.03]	23.4 [.92]	2.5 [.10]	1.40 [.055]
202D296	69.3 [2.73]	59.7 [2.35]	69.3 [2.73]	43.2 [1.70]	19.6 [.77]	203.2 [8.00]	143.3 [5.64]	23.6 [.93]	2.5 [.10]	1.40 [.055]
202D299	81.8 [3.22]	67.1 [2.64]	81.8 [3.22]	51.1 [2.01]	22.9 [.90]	203.2 [8.00]	138.4 [5.45]	31.2 [1.23]	2.5 [.10]	1.40 [.055]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

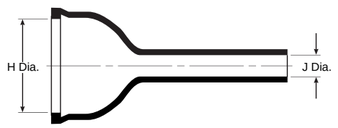
USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

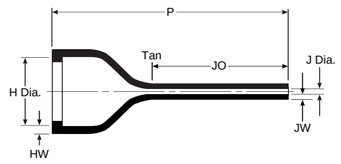
202D921 to 963

Straight, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use with circular connectors and the appropriate Raychem backshell adapter to provide connector/cable strain relief. Boot is used in applications where only a small number of the available contacts are utilized, thus resulting in a high ratio between the adapter and cable diameters.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J			P	JO	HW	JW
	Min. a	Max. b	Min. -3, -4, -25 a	Min. -12, -100 a	Max. b	±10% b	±10% b	±20% b	±20% b
202D921	19.3 [.76]	13.0 [.51]	6.3 [.25]	4.5 [.18]	2.1 [.08]	60.2 [2.37]	37.6 [1.48]	1.52 [.06]	1.14 [.045]
202D932	26.1 [1.03]	19.1 [.75]	7.6 [.30]	5.5 [.22]	2.6 [.10]	74.2 [2.92]	45.0 [1.77]	1.78 [.07]	1.14 [.045]
202D953	34.2 [1.35]	26.0 [1.02]	9.6 [.38]	6.6 [.26]	3.1 [.12]	84.3 [3.32]	51.1 [2.01]	1.78 [.07]	1.14 [.045]
202D963	43.6 [1.72]	34.1 [1.34]	11.4 [.45]	7.8 [.31]	3.6 [.14]	99.6 [3.92]	57.7 [2.27]	1.78 [.07]	1.14 [.045]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
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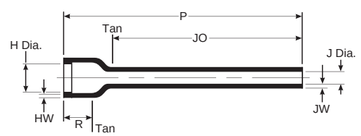
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

202F211 to 274

Straight, Lipped Boot

As Supplied (a)

After Unrestricted Recovery (b)



Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors. Boot is compatible with all Raychem grooved adapters of the appropriate shell size.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-50	Flexible fluoroelastomer polymer blend	N/A	S-1125
-51	Flexible elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J		P	JO	HW	JW
	Min. a	Max. b	Min. a	Max. b	±10% b	±10% b	±20% b	±20% b
202F211	23.9 [.94]	9.9 [.39]	17.3 [.68]	6.6 [.26]	105.9 [4.17]	86.4 [3.40]	1.5 [.06]	1.5 [.06]
202F221	27.2 [1.07]	13.2 [.52]	20.8 [.82]	7.6 [.30]	121.2 [4.77]	98.6 [3.88]	1.5 [.06]	1.5 [.06]
202F232	31.0 [1.22]	18.5 [.73]	24.4 [.96]	8.9 [.35]	138.7 [5.46]	112.8 [4.44]	1.8 [.07]	1.5 [.06]
202F242	35.6 [1.40]	22.1 [.87]	28.7 [1.13]	10.2 [.40]	159.5 [6.28]	130.8 [5.15]	1.8 [.07]	1.5 [.06]
202F253	38.9 [1.53]	28.2 [1.11]	31.5 [1.24]	10.9 [.43]	177.8 [7.00]	142.2 [5.60]	1.8 [.07]	1.5 [.06]
202F263	45.2 [1.78]	32.3 [1.27]	38.4 [1.51]	12.7 [.50]	203.2 [8.00]	163.1 [6.42]	1.8 [.07]	1.5 [.06]
202F274	51.6 [2.03]	41.1 [1.62]	45.5 [1.79]	15.0 [.59]	203.2 [8.00]	157.7 [6.21]	1.8 [.07]	1.8 [.07]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
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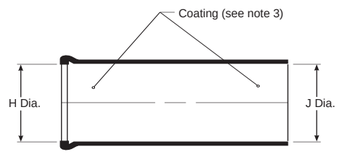
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

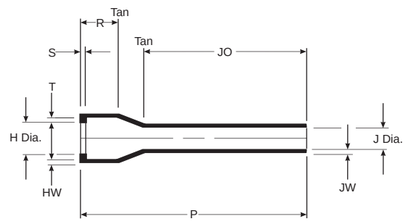
202G211 to 253

Straight, Low Profile Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors. This range of parts is compatible with all Raychem grooved adapters of appropriate shell or entry size. When used with adhesive it provides environmental sealing.

Materials Available

Material	Material Description	Adhesive Part Number
-55	Fluoroploymer	S-1255-04

Product Dimensions

Part Number	H		J		P	R	S	T	JO	HW	JW
	Min. a	Max. b	Min. a	Max. b	±10% b	±10% b	Ref. b	Ref. b	±10% b	Ref. b	Ref. b
202G211	23.9 [.94]	9.9 [.39]	23.9 [.94]	7.4 [.29]	105.9 [4.17]	11.7 [.46]	1.0 [.04]	1.3 [.05]	86.4 [3.40]	1.0 [.04]	0.7 [.03]
202G221	27.2 [1.07]	13.2 [.52]	27.2 [1.07]	8.4 [.33]	121.2 [4.77]	12.2 [.48]	1.0 [.04]	1.3 [.05]	87.4 [3.44]	1.0 [.04]	0.7 [.03]
202G232	31.0 [1.22]	18.5 [.73]	31.0 [1.22]	9.4 [.37]	138.7 [5.46]	12.2 [.48]	1.0 [.04]	1.3 [.05]	104.4 [4.11]	1.0 [.04]	0.7 [.03]
202G242	31.7 [1.25]	22.1 [.87]	31.7 [1.25]	10.7 [.42]	159.5 [6.28]	12.2 [.48]	1.0 [.04]	1.5 [.06]	124.5 [4.90]	1.0 [.04]	0.7 [.03]
202G253	38.9 [1.53]	28.2 [1.11]	38.9 [1.53]	11.9 [.47]	177.8 [7.00]	10.6 [.42]	1.3 [.05]	1.8 [.07]	143.5 [5.65]	1.3 [.05]	1.0 [.04]

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

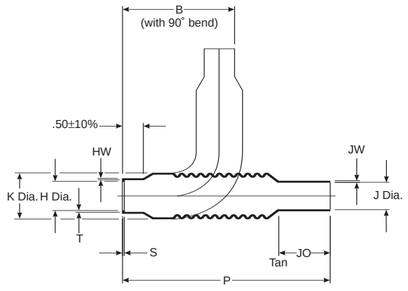
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

202G611 to 653

Uniboot

As Supplied (a)

After Unrestricted Recovery (b)



Applications

Use to provide abrasion protection for connectors. The flexibility of design allows a variety of cable outlet angles. When installed on a spin-coupling adapter, cold re-entry to the connector is possible by unscrewing the adapter and compressing the molded part. When used with adhesive it provides environmental sealing.

Materials Available

Material	Material Description	Adhesive Part Number
-55	Fluoroploymer	S-1255-04

Product Dimensions

Part Number	H		J		K	P	JO	HW	JW	S	T	B
	Min. a	Max. b	Min. a	Max. b	Max. b	±10% b	±10% b	Ref. b	Ref. b	Ref. b	Ref. b	Nom. b
202G611	14.2 [.56]	6.9 [.27]	11.2 [.44]	4.8 [.19]	21.1 [.83]	120.7 [4.75]	17.5 [.69]	1.0 [.04]	0.7 [.03]	1.0 [.04]	1.3 [.05]	62.5 [2.46]
202G621	26.6 [1.05]	11.7 [.46]	26.6 [1.05]	8.1 [.32]	26.6 [1.05]	133.8 [5.27]	19.9 [.78]	1.0 [.04]	0.7 [.03]	1.0 [.04]	1.3 [.05]	67.8 [2.67]
202G632	33.0 [1.30]	17.5 [.69]	33.0 [1.30]	12.7 [.50]	32.7 [1.29]	151.1 [5.95]	22.4 [.88]	1.0 [.04]	0.7 [.03]	1.0 [.04]	1.3 [.05]	73.4 [2.89]
202G642	35.5 [1.40]	22.3 [.88]	35.5 [1.40]	17.5 [.69]	37.8 [1.49]	157.2 [6.19]	25.4 [1.00]	1.3 [.05]	1.0 [.04]	1.3 [.05]	1.3 [.05]	78.2 [3.08]
202G653	42.6 [1.68]	27.9 [1.10]	42.6 [1.68]	22.4 [.88]	42.9 [1.69]	170.2 [6.70]	28.4 [1.12]	1.3 [.05]	1.0 [.04]	1.3 [.05]	1.5 [.06]	82.8 [3.26]

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

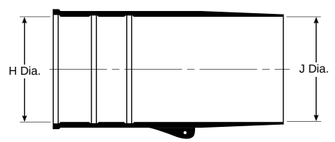
USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

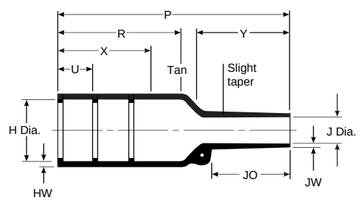
202K121 to 185

Straight, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



202K121 - 153 = 2 lips
202K163 - 185 = 3 lips

Mod 01 = 1 lip removed
Mod 02 = 2 lips removed
(only available in sizes 163, 174, 185).
For eyelet clip, order CS-1858 option.

Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors.

Boot is compatible with all Raychem grooved adapters of the appropriate shell size.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H			J					P	R	U	JO	HW	JW	X	Y
	Min. -3,-4,-12,-25 a		Max. b	Min. -3, -4, -25 a		-12 a	-100 a	Max. b	±10% b	±10% b	±10% b	±10% b	±20% b	Min. b	±20% b	±20% b
202K121	24.0 [.95]	10.4 [.41]		24.0 [.95]	13.0 [.51]	14.0 [.55]	5.6 [.22]	38.0 [1.50]	21.0 [.83]	12.0 [.47]	8.5 [.33]	1.6 [.06]	.41 [.016]	24.0 [.94]	13.0 [.51]	
202K132	30.0 [1.18]	14.2 [.56]		30.0 [1.18]	14.0 [.55]	15.0 [.59]	5.9 [.23]	55.0 [2.17]	32.0 [1.26]	12.0 [.47]	11.5 [.45]	1.8 [.07]	.81 [.032]	24.0 [.94]	18.0 [.71]	
202K142	31.0 [1.22]	18.0 [.71]		31.0 [1.22]	16.0 [.63]	18.0 [.71]	7.1 [.28]	67.0 [2.64]	35.0 [1.38]	20.0 [.79]	17.0 [.67]	1.8 [.07]	.81 [.032]	32.0 [1.26]	25.0 [.98]	
202K153	36.0 [1.42]	22.4 [.88]		36.0 [1.42]	19.0 [.75]	21.0 [.83]	8.4 [.33]	80.0 [3.15]	42.0 [1.65]	20.0 [.79]	19.5 [.76]	2.0 [.08]	.81 [.032]	32.0 [1.26]	30.0 [1.18]	
202K163	43.0[1.69]	28.2 [1.11]		43.0 [1.69]	22.0 [.87]	25.0 [.98]	9.9 [.39]	99.0 [3.90]	61.0 [2.40]	20.0 [.79]	21.0 [.82]	2.2 [.08]	.81 [.032]	52.0 [2.05]	30.0 [1.18]	
202K174	60.0 [2.36]	35.1 [1.38]		60.0 [2.36]	35.0 [1.38]	39.0 [1.54]	15.7 [.62]	130.0 [5.12]	72.0 [2.83]	20.0 [.79]	39.0 [1.53]	3.3 [.13]	1.02 [.040]	52.0 [2.05]	50.0 [1.97]	
202K185	66.0 [2.60]	44.5 [1.75]		66.0 [2.60]	38.0 [1.50]	42.0 [1.65]	16.8 [.66]	170.0 [6.69]	90.0 [3.54]	20.0 [.79]	51.5 [2.02]	3.8 [.15]	1.63 [.064]	52.0 [2.05]	70.0 [2.76]	

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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Dimensions are shown for reference purposes only. Specifications subject to change.

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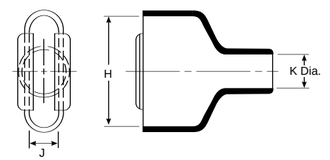
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

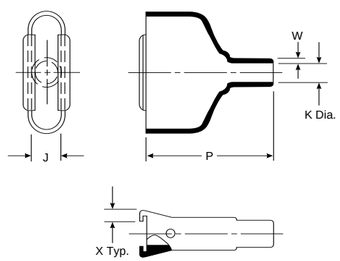
214A011 to 052

D-Subminiature, Straight Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on D-subminiature connector terminations.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J		K		P	W	X	This Boot Fits	
	±5% a	±5% b	±5% a	±5% b	Min. a	Max. b	±10% b	±20% b	±20% b	Cannon/ Cinch	Amphenol Series 17
214A011	20.3 [.80]	20.3 [.80]	10.7 [.42]	10.7 [.42]	7.9 [.31]	4.1 [.16]	33.3 [1.31]	1.0 [.04]	3.0 [.12]	DE-9	XX09X
214A021	28.2 [1.11]	28.2 [1.11]	10.7 [.42]	10.7 [.42]	10.2 [.40]	5.3 [.21]	38.9 [1.53]	1.0 [.04]	3.0 [.12]	DA-15	XX15X
214A032	42.2 [1.66]	42.2 [1.66]	10.7 [.42]	10.7 [.42]	14.0 [.55]	8.1 [.32]	45.0 [1.77]	1.0 [.04]	3.0 [.12]	DB-25	XX25X
214A042	58.7 [2.31]	58.7 [2.31]	10.7 [.42]	10.7 [.42]	17.3 [.68]	8.6 [.34]	53.3 [2.10]	1.0 [.04]	3.0 [.12]	DC-37	XX37X
214A052	57.9 [2.28]	57.9 [2.28]	13.7 [.54]	13.7 [.54]	19.1 [.75]	10.7 [.42]	61.0 [2.40]	1.0 [.04]	3.0 [.12]	DD-50	XX50X

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
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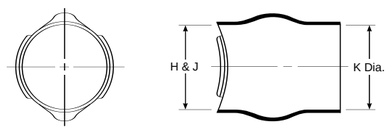
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

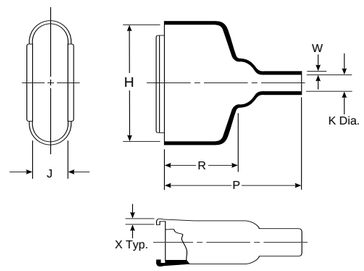
214A311 to 352

D-Subminiature, Straight Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on D-subminiature connector terminations.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-25	Fluid-resistant elastomer	/42 or /86	S-1017 or S-1048 or S-1125

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J		K		P	R	W	X	This Boot Fits	
	±5% a	±5% b	±5% a	±5% b	Min. a	Max. b	±10% b	±10% b	±20% b	±20% b	Cannon/ Cinch	Amphenol Series 17
214A311	16.0 [.63]	20.3 [.80]	16.0 [.63]	10.7 [.42]	16.0 [.63]	4.1 [.16]	33.3 [1.31]	19.1 [.75]	1.02 [.04]	3.05 [.12]	DE-9	XX09X
214A321	19.1 [.75]	28.2 [1.11]	19.1 [.75]	10.7 [.42]	19.1 [.75]	5.3 [.21]	38.9 [1.53]	22.1 [.87]	1.02 [.04]	3.05 [.12]	DA-15	XX15X
214A332	29.2 [1.15]	42.2 [1.66]	29.2 [1.15]	10.7 [.42]	29.2 [1.15]	8.1 [.32]	45.0 [1.77]	25.4 [1.00]	1.02 [.04]	3.05 [.12]	DB-25	XX25X
214A342	34.3 [1.35]	58.7 [2.31]	34.3 [1.35]	10.7 [.42]	34.3 [1.35]	8.6 [.34]	53.3 [2.10]	28.4 [1.12]	1.02 [.04]	3.05 [.12]	DC-37	XX37X
214A352	37.6 [1.48]	57.9 [2.28]	37.6 [1.48]	13.7 [.54]	37.6 [1.48]	10.7 [.42]	61.0 [2.40]	31.8 [1.25]	1.02 [.04]	3.05 [.12]	DD-50	XX50X

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

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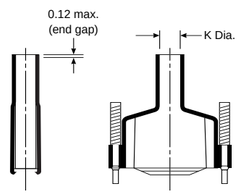
Japan: 81-44-844-8013
UK: 44-208-420-8341

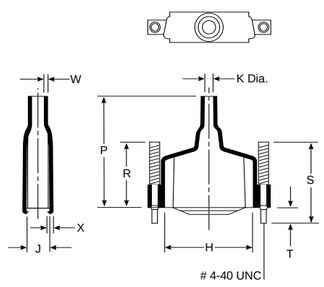
214P009 to 037

D-Subminiature, Straight Boot with Jack Screws

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on D-subminiature connector terminations.

Materials Available

Material*	Material Description
-111-0	Semirigid polyolefin (black)

* Contact Tyco Electronics for information on material properties.

Product Dimensions

Part Number	H ±5% b	J ±10% b	K Min. a	K Max. b	P ±10% b	R Ref. b	S Nom. b	T Nom. b	X ±20% b	W ±20% b	Fits Connector Size
214P009-XXX	17.3 [.68]	12.0 [.47]	9.0 [.35]	3.8 [.15]	43.0 [1.69]	22.0 [.87]	29.0 [1.14]	6.4 [.25]	1.80 [.07]	1.5 [.06]	9 pin
214P015-XXX	25.2 [.99]	12.0 [.47]	10.5 [.41]	3.8 [.15]	44.0 [1.73]	23.0 [.90]	29.0 [1.14]	6.4 [.25]	2.03 [.08]	1.5 [.06]	15 pin
214P025-XXX	38.4 [1.51]	12.0 [.47]	12.0 [.47]	5.1 [.20]	49.0 [1.87]	25.0 [.98]	29.0 [1.14]	6.4 [.25]	2.16 [.085]	1.5 [.06]	25 pin
214P037-XXX	54.2 [2.13]	12.0 [.47]	12.0 [.47]	5.8 [.22]	55.0 [2.16]	25.0 [.98]	29.0 [1.14]	6.4 [.25]	2.26 [.089]	1.5 [.06]	37 pin

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

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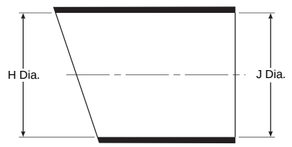
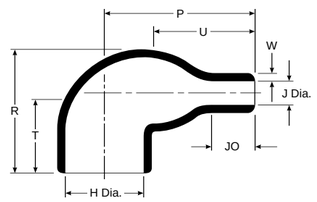
222A111 to 196

Right-Angled Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use for mechanical protection and connector-cable strain relief. This family of boots has no lip, so a boot can be installed directly onto the connector accessory thread.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or/180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J				P	R	T	U	JO	W
	Min. a	Max. b	Min. -3, -4, -25 a	Min. -100 a	Min. -12 a	Max. b	±10% b	±10% b	±10% b	±10% b	±10% b	±20% b
222A111	17.8 [.70]	7.9 [.31]	17.8 [.70]	10.9 [.43]	9.9 [.39]	3.8 [.15]	17.3 [.68]	20.1 [.79]	—	11.4 [.45]	4.3 [.17]	1.02 [.04]
222A121	24.9 [.98]	10.2 [.40]	24.9 [.98]	16.0 [.63]	18.0 [.71]	5.3 [.21]	21.3 [.84]	22.6 [.89]	—	14.7 [.58]	5.8 [.23]	1.27 [.05]
222A132	30.0 [1.18]	14.2 [.56]	30.0 [1.18]	21.1 [.83]	20.6 [.81]	6.4 [.25]	26.9 [1.06]	26.7 [1.05]	19.1 [.75]	17.8 [.70]	7.1 [.28]	1.52 [.06]
222A142	32.5 [1.28]	17.3 [.68]	32.5 [1.28]	22.9 [.90]	22.9 [.90]	6.9 [.27]	36.6 [1.44]	30.5 [1.20]	19.1 [.75]	24.9 [.98]	10.2 [.40]	1.78 [.07]
222A152	36.1 [1.42]	21.8 [.86]	36.1 [1.42]	27.4 [1.08]	26.4 [1.04]	8.4 [.33]	43.7 [1.72]	35.1 [1.38]	19.1 [.75]	30.0 [1.18]	12.7 [.50]	1.78 [.07]
222A163	43.9 [1.73]	27.4 [1.08]	43.9 [1.73]	28.4 [1.12]	27.4 [1.08]	9.4 [.37]	53.6 [2.11]	43.9 [1.73]	19.1 [.75]	34.0 [1.34]	17.3 [.68]	2.03 [.08]
222A174	53.1 [2.09]	33.8 [1.33]	53.1 [2.09]	48.3 [1.90]	46.7 [1.84]	15.0 [.59]	75.7 [2.98]	52.8 [2.08]	25.4 [1.00]	53.3 [2.10]	32.0 [1.26]	3.30 [.13]
222A185	67.6 [2.66]	44.2 [1.74]	67.6 [2.66]	58.4 [2.30]	54.4 [2.14]	20.3 [.80]	97.5 [3.84]	66.0 [2.60]	25.4 [1.00]	71.1 [2.80]	40.6 [1.60]	3.81 [.15]
222A196	87.6 [3.45]	55.4 [2.18]	87.6 [3.45]	68.8 [2.71]	63.0 [2.48]	23.4 [.92]	128.0 [5.04]	79.2 [3.12]	25.4 [1.00]	87.6 [3.45]	56.4 [2.22]	4.57 [.18]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

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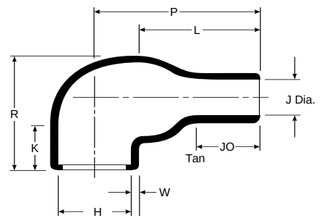
222D121 to 196

Right-Angled, Lipped Boot

As Supplied (a)

After Unrestricted Recovery (b)



Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors. Boot is compatible with all Raychem grooved adapters of the appropriate shell size.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J				P	R	JO	W	K	L
	Min. a	Max. a	Min. -3, -4, -25 b	Min. -100 b	Min. -12 b	Max. b	±10% b	Ref. b	±10%	±20%	±10% b	±10% b
222D121	23.4 [.92]	10.4 [.41]	23.4 [.92]	14.0 [.55]	12.4 [.49]	5.6 [.22]	21.3 [.84]	22.6 [.89]	5.8 [.23]	1.27 [.05]	15.2 [.60]	14.7 [.58]
222D132	28.4 [1.12]	14.2 [.56]	28.4 [1.12]	15.0 [.59]	14.7 [.58]	6.6 [.26]	33.8 [1.33]	27.2 [1.07]	15.5 [.65]	1.52 [.06]	19.1 [.75]	24.9 [.98]
222D142	31.0 [1.22]	17.8 [.70]	31.0 [1.22]	18.0 [.71]	16.0 [.63]	7.1 [.28]	36.6 [1.44]	31.0 [1.22]	12.7 [.50]	1.78 [.07]	19.1 [.75]	24.9 [.98]
222D152	36.0 [1.42]	22.4 [.88]	36.0 [1.42]	21.0 [.83]	18.5 [.73]	8.4 [.33]	43.7 [1.72]	35.1 [1.38]	14.5 [.57]	1.78 [.07]	19.1 [.75]	30.0 [1.18]
222D163	42.7 [1.68]	28.2 [1.11]	42.7 [1.68]	25.0 [.98]	22.1 [.87]	9.9 [.39]	53.6 [2.11]	43.9 [1.73]	17.5 [.69]	2.03 [.08]	19.3 [.76]	33.0 [1.30]
222D174	51.8 [2.04]	35.1 [1.38]	51.8 [2.04]	39.0 [1.54]	35.3 [1.39]	15.7 [.62]	78.0 [3.07]	52.8 [2.08]	33.5 [1.32]	3.30 [.13]	25.4 [1.00]	53.8 [2.12]
222D185	66.0 [2.60]	44.5 [1.75]	66.0 [2.60]	42.0 [1.65]	45.7 [1.80]	20.3 [.80]	97.5 [3.84]	66.0 [2.60]	40.1 [1.58]	3.81 [.15]	25.4 [1.00]	71.1 [2.80]
222D196	81.8 [3.22]	60.5 [2.38]	81.8 [3.22]	57.2 [2.25]	57.2 [2.25]	25.4 [1.00]	117.9 [4.64]	83.8 [3.30]	38.1 [1.50]	4.06 [.16]	25.4 [1.00]	80.0 [3.15]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

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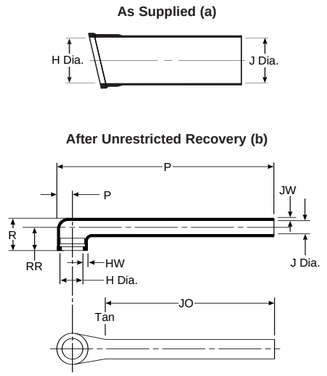
222D211 to 299

Right-Angled, Lipped Boot



Applications

Provides strain relief and mechanical protection between cable and connector. Boot is usually used on open-wire-bundle airborne harnesses, or applications where the long tail replaces cable jacketing removed during termination.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J			P	R	JO	PP	RR	HW	JW
	Min. a	Max. b	Min. -3, -4, -25 a	Min. -12, -100 b	Max. b	±10% b	Ref b	±10% b	±10% b	10% b	±20%	±20%
222D211	22.4 [.88]	11.4 [.45]	22.4 [.88]	14.0 [.55]	6.4 [.25]	105.2 [4.14]	18.5 [.73]	87.6 [3.45]	6.9 [.27]	12.4 [.49]	1.52 [.06]	1.14 [.045]
222D221	25.7 [1.01]	15.0 [.59]	25.7 [1.01]	16.0 [.63]	7.4 [.29]	124.0 [4.88]	19.8 [.78]	99.1 [3.90]	8.4 [.33]	15.0 [.59]	1.52 [.06]	1.14 [.045]
222D232	29.5 [1.16]	18.8 [.74]	29.5 [1.16]	18.3 [.72]	8.4 [.33]	146.3 [5.76]	20.8 [.82]	114.3 [4.50]	10.4 [.41]	15.5 [.61]	1.78 [.07]	1.14 [.045]
222D242	34.0 [1.34]	22.9 [.90]	34.0 [1.34]	21.3 [.84]	9.7 [.38]	172.2 [6.78]	21.8 [.86]	132.6 [5.22]	12.2 [.48]	15.7 [.62]	1.78 [.07]	1.14 [.045]
222D253	37.3 [1.47]	29.5 [1.16]	37.3 [1.47]	23.1 [.91]	10.4 [.41]	185.2 [7.29]	24.4 [.96]	143.8 [5.66]	15.5 [.61]	17.8 [.70]	2.03 [.08]	1.14 [.045]
222D263	43.7 [1.72]	34.0 [1.34]	43.7 [1.72]	27.2 [1.07]	12.2 [.48]	231.6 [8.41]	27.4 [1.08]	169.2 [6.66]	18.3 [.72]	19.8 [.78]	2.03 [.08]	1.14 [.045]
222D274	50.0 [1.97]	41.1 [1.62]	50.0 [1.97]	31.5 [1.24]	14.2 [.56]	224.5 [8.84]	29.5 [1.16]	173.2 [6.82]	21.1 [.83]	20.8 [.82]	2.29 [.09]	1.40 [.055]
222D285	62.7 [2.47]	47.0 [1.85]	62.7 [2.47]	39.1 [1.54]	17.5 [.69]	227.3 [8.95]	33.3 [1.31]	168.1 [6.62]	24.1 [.95]	23.4 [.92]	2.54 [.10]	1.40 [.055]
222D296	69.3 [2.73]	59.7 [2.35]	69.3 [2.73]	43.2 [1.70]	19.6 [.77]	233.4 [9.19]	35.1 [1.38]	157.2 [6.19]	30.0 [1.18]	23.6 [.93]	2.54 [.10]	1.40 [.055]
222D299	81.8 [3.22]	67.1 [2.64]	81.8 [3.22]	51.1 [2.01]	22.9 [.90]	237.0 [9.33]	44.5 [1.75]	151.1 [5.95]	33.3 [1.31]	31.2 [1.23]	2.54 [.10]	1.40 [.055]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

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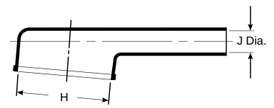
Japan: 81-44-844-8013
UK: 44-208-420-8341

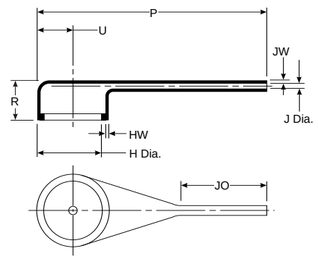
222D921 to 963

Right-Angled, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection between cable and connector. It is used in applications where only a small number of the available contacts are utilized, resulting in a high ratio between the adapter and cable diameters.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J			P	R	U	JO	HW	JW
	Min. a	Max. b	Min. -3, -4, -25 a	Min. -12, -100 a	Max. b	±10% b	Ref. b	±10% b	±10% b	±20% b	±20% b
222D921	19.3 [.76]	13.0 [.51]	6.3 [.25]	4.5 [.18]	2.1 [.08]	44.5 [1.75]	16.3 [.64]	5.6 [.22]	21.8 [.86]	1.52 [.06]	1.14 [.045]
222D932	26.1 [1.03]	19.1 [.75]	7.6 [.30]	5.6 [.22]	2.6 [.10]	67.3 [2.65]	18.0 [.71]	8.4 [.33]	29.2 [1.15]	1.78 [.07]	1.14 [.045]
222D953	34.2 [1.35]	26.0 [1.02]	9.6 [.38]	6.6 [.26]	3.0 [.12]	81.3 [3.20]	18.8 [.74]	11.4 [.45]	36.3 [1.39]	1.78 [.07]	1.14 [.045]
222D963	43.6 [1.72]	34.1 [1.34]	11.4 [.45]	7.8 [.31]	3.6 [.14]	115.6 [4.55]	21.3 [.84]	15.5 [.61]	47.0 [1.85]	1.78 [.07]	1.14 [.045]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 mm [.06"] max.

Catalog 1308940
Revised 8-06

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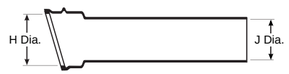
USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

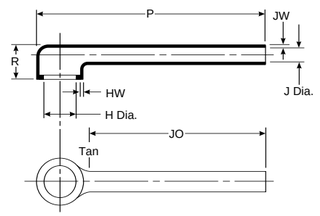
222F211 to 285

Right-Angled, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors. Boot is compatible with all Raychem grooved adapters of the appropriate shell size.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-50	Fluoroelastomer polymer blend	N/A	S-1125
-51	Elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J		P	R	JO	HW	JW
	Min. a	Max. b	Min. a	Max. b	±10% b	±10% b	±10% b	+.06 to -.03 b	±.03 b
222F211	23.9 [.94]	9.9 [.39]	17.3 [.68]	6.6 [.26]	105.2 [4.14]	18.5 [.73]	87.6 [3.45]	1.52 [.06]	1.52 [.06]
222F221	27.2 [1.07]	13.2 [.52]	20.8 [.82]	7.6 [.30]	124.0 [4.88]	19.8 [.78]	99.1 [3.90]	1.52 [.06]	1.52 [.06]
222F232	31.0 [1.22]	18.5 [.73]	24.4 [.96]	8.9 [.35]	146.3 [5.76]	20.8 [.82]	114.3 [4.50]	1.78 [.07]	1.52 [.06]
222F242	35.6 [1.40]	22.1 [.87]	28.7 [1.13]	10.2 [.40]	172.2 [6.78]	21.8 [.86]	132.6 [5.22]	1.78 [.07]	1.52 [.06]
222F253	38.9 [1.53]	28.2 [1.11]	31.5 [1.24]	10.9 [.43]	185.2 [7.29]	24.4 [.96]	143.8 [5.66]	1.78 [.07]	1.52 [.06]
222F263	45.2 [1.78]	32.3 [1.27]	38.4 [1.51]	12.7 [.50]	213.6 [8.41]	27.4 [1.08]	169.2 [6.66]	1.78 [.07]	1.52 [.06]
222F274	51.6 [2.03]	41.1 [1.62]	44.5 [1.75]	15.0 [.59]	224.5 [8.84]	29.5 [1.16]	173.2 [6.82]	1.78 [.07]	1.78 [.07]
222F285	62.7 [2.47]	42.9 [1.69]	47.2 [1.86]	17.5 [.69]	227.3 [8.95]	33.3 [1.31]	168.1 [6.62]	2.03 [.08]	1.78 [.07]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
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USA: 1-800-522-6752
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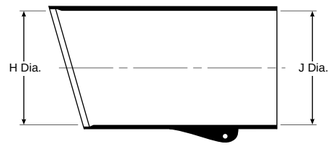
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

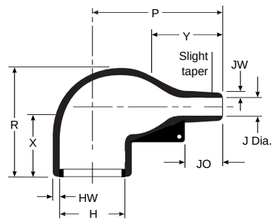
222K121 to 185

Right-Angled, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



For eyelet clip, order CS-1858 option.

Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors. Boot is compatible with all Raychem grooved adapters of the appropriate shell size.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H Min. -3, -4, -25 a	H Min. -100 a	H Max. b	J Min. -3, -4, -25 a	J Min. -100 a	J Max. b	P ±10% b	R ±10% b	JO ±10% b	HW ±20% b	JW ±20% b	X ±20% b	Y ±20% b
222K121	24.0 [.95]	24.0 [.95]	10.4 [.41]	24.0 [.95]	14.0 [.55]	5.6 [.22]	25.0 [.98]	25.0 [.98]	8.5 [.33]	1.3 [.05]	.41 [.016]	18.0 [.71]	16.0 [.63]
222K132	30.0 [1.18]	30.0 [1.18]	14.2 [.56]	30.0 [1.18]	15.0 [.59]	5.9 [.23]	32.0 [1.26]	27.0 [1.06]	8.5 [.33]	1.5 [.06]	.61 [.024]	18.0 [.71]	20.0 [.79]
222K142	31.0 [1.22]	31.0 [1.22]	18.0 [.71]	31.0 [1.22]	18.0 [.71]	7.1 [.28]	39.0 [1.54]	31.0 [1.22]	15.0 [.59]	1.8 [.07]	.81 [.032]	18.0 [.71]	20.0 [.79]
222K152	36.0 [1.42]	36.0 [1.42]	22.4 [.88]	36.0 [1.42]	21.0 [.83]	8.4 [.33]	46.0 [1.81]	38.0 [1.50]	18.0 [.63]	1.8 [.07]	.81 [.032]	25.0 [.98]	25.0 [.98]
222K163	43.0 [1.69]	43.0 [1.69]	28.2 [1.11]	43.0 [1.69]	25.0 [.98]	9.9 [.39]	55.0 [2.17]	45.0 [1.77]	17.5 [.69]	2.0 [.08]	.81 [.032]	25.0 [.98]	30.0 [1.18]
222K174	60.0 [2.36]	52.0 [2.05]	35.1 [1.38]	60.0 [2.36]	39.0 [1.54]	15.7 [.62]	80.0 [3.15]	54.0 [2.13]	32.0 [1.26]	3.3 [.13]	1.02 [.040]	25.0 [.98]	45.0 [1.77]
222K185	66.0 [2.60]	66.0 [2.60]	44.5 [1.75]	66.0 [2.60]	42.0 [1.65]	16.8 [.66]	108.0 [4.25]	68.0 [2.68]	48.0 [1.89]	3.8 [.15]	1.63 [.064]	35.0 [1.38]	70.0 [2.76]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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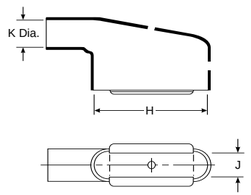
UK: 44-208-420-8341

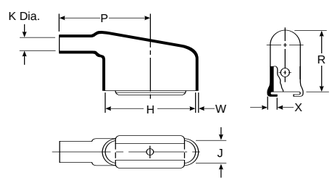
234A011 to 071

D-Subminiature, Right-Angled Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on D-subminiature connector terminations.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J		K		P	R	W	X	This Boot Fits Cannon/ Cinch
	±5% a	±5% b	±5% a	±5% b	Min. a	Max. b	±10% b	±10% b	±20% b	±20% b	
234A011	20.3 [.80]	20.3 [.80]	10.7 [.42]	10.7 [.42]	7.9 [.31]	4.1 [.16]	25.9 [1.02]	21.6 [.85]	1.02 [.04]	3.05 [.12]	DE-9
234A021	28.2 [1.11]	28.2 [1.11]	10.7 [.42]	10.7 [.42]	10.2 [.40]	5.3 [.21]	30.7 [1.21]	24.6 [.97]	1.02 [.04]	3.05 [.12]	DA-15
234A032	42.2 [1.66]	42.2 [1.66]	10.7 [.42]	10.7 [.42]	14.0 [.55]	7.4 [.29]	42.9 [1.69]	27.9 [1.10]	1.02 [.04]	3.05 [.12]	DB-25
234A042	58.7 [2.31]	58.7 [2.31]	10.7 [.42]	10.7 [.42]	17.3 [.68]	8.6 [.34]	53.3 [2.10]	30.5 [1.20]	1.02 [.04]	3.05 [.12]	DC-37
234A052	57.9 [2.28]	57.9 [2.28]	13.7 [.54]	13.7 [.54]	19.1 [.75]	10.7 [.42]	55.9 [2.20]	32.3 [1.27]	1.02 [.04]	3.05 [.12]	DD-50
234A061	20.3 [.80]	20.3 [.80]	10.7 [.42]	10.7 [.42]	7.9 [.31]	3.8 [.15]	25.9 [1.02]	18.5 [.73]	1.02 [.04]	3.05 [.12]	DE-9
234A071	28.2 [1.11]	28.2 [1.11]	10.7 [.42]	10.7 [.42]	10.2 [.40]	5.1 [.20]	30.7 [1.21]	19.8 [.78]	1.02 [.04]	3.05 [.12]	DA-15

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

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USA: 1-800-522-6752
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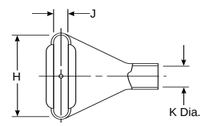
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

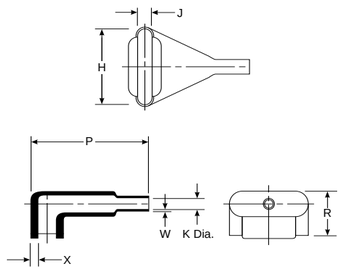
234A111 to 152

D-Subminiature, Side-Entry Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on D-subminiature connector terminations.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H ±5% a	H ±5% b	J ±5% a	J ±5% b	K Min. a	K Max. b	P ±10% b	R ±10% b	W ±20% b	X ±20% b	This Boot Fits Cannon/Cinch
234A111	20.3 [.80]	20.3 [.80]	10.7 [.42]	10.7 [.42]	7.9 [.31]	4.1 [.16]	27.9 [1.10]	18.5 [.73]	1.02 [.04]	3.05 [.12]	DE-9
234A121	28.2 [1.11]	28.2 [1.11]	10.7 [.42]	10.7 [.42]	10.2 [.40]	5.3 [.21]	35.1 [1.38]	18.8 [.74]	1.02 [.04]	3.05 [.12]	DA-15
234A132	42.2 [1.66]	42.2 [1.66]	10.7 [.42]	10.7 [.42]	14.0 [.55]	6.4 [.25]	47.5 [1.87]	20.1 [.79]	1.02 [.04]	3.05 [.12]	DB-25
234A142	58.7 [2.31]	58.7 [2.31]	10.7 [.42]	10.7 [.42]	17.3 [.68]	7.9 [.31]	59.7 [2.35]	20.1 [.79]	1.02 [.04]	3.05 [.12]	DC-37
234A152	57.9 [2.28]	57.9 [2.28]	13.7 [.54]	13.7 [.54]	19.1 [.75]	9.1 [.36]	63.2 [2.49]	26.4 [1.04]	1.02 [.04]	3.05 [.12]	DD-50

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
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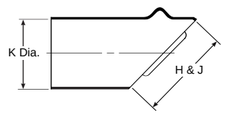
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

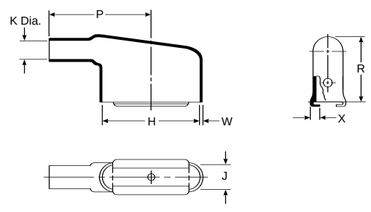
234A611 to 671

D-Subminiature, 90° End-Entry Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on D-subminiature connector terminations.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-25	Fluid-resistant elastomer	/42 or /86	S-1017 or S-1048 or S-1125

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J		K		P	R	W	X	This
	±5% a	±5% b	±5% a	±5% b	Min. a	Max. b	±10% b	±10% b	±20% b	±20% b	Boot Fits Cannon/Cinch
234A611	16.0 [.63]	20.3 [.80]	16.0 [.63]	10.7[.42]	16.0 [.63]	4.1 [.16]	25.9 [1.02]	21.6 [.85]	1.02 [.04]	3.05 [.12]	DE-9
234A621	19.1 [.75]	28.2 [1.11]	19.1 [.75]	10.7 [.42]	19.1 [.75]	5.3 [.21]	30.7 [1.21]	24.6 [.97]	1.02 [.04]	3.05 [.12]	DA-15
234A632	29.2 [1.15]	42.2 [1.66]	29.2 [1.15]	10.7 [.42]	29.2 [1.15]	7.4 [.29]	42.9 [1.69]	27.9 [1.10]	1.02 [.04]	3.05 [.12]	DB-25
234A642	34.3 [1.35]	58.7 [2.31]	34.3 [1.35]	10.7 [.42]	34.3 [1.35]	8.6 [.34]	53.3 [2.10]	30.5 [1.20]	1.02 [.04]	3.05 [.12]	DC-37
234A652	37.6 [1.48]	57.9 [2.28]	37.6 [1.48]	13.7 [.54]	37.6 [1.48]	10.7 [.42]	55.9 [2.20]	32.3 [1.27]	1.02 [.04]	3.05 [.12]	DD-50
234A661	16.0 [.63]	20.3 [.80]	16.0 [.63]	10.7 [.42]	16.0 [.63]	3.8 [.15]	25.9 [1.02]	18.5 [.73]	1.02 [.04]	3.05 [.12]	DE-9
234A671	19.1 [.75]	28.2 [1.11]	19.1 [.75]	10.7 [.42]	19.1 [.75]	5.1 [.20]	30.7 [1.21]	19.8 [.78]	1.02 [.04]	3.05 [.12]	DA-15

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

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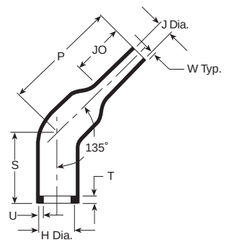
Japan: 81-44-844-8013
UK: 44-208-420-8341

242W042 to 63

45° Angled Boot

As Supplied (a)

After Unrestricted Recovery (b)



Applications

Designed for use in the aggressive environments found adjacent to engines in automotive, aerospace and military applications, heat-shrinkable molded parts provide rugged protection, strain relief and a full 360°environmental seal. The introduction of the 45° option means there is now a choice of three routes to the connector for closer positioning and greater design freedom.

Compatibility Chart

Material	Material Description	Precoating No.	Adhesive Part Number
-3	Polyolefin, semirigid	/42, /86	S-1017 or S-1048
-4	Polyolefin, flexible	/42, /86	S-1017 or S-1048
-25	Elastomer, fluid-resistant	/42, /86, /225	S-1017, S-1125 or S-1048
-130	Polyolefin, commercial flexible	/42, /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-100	Polyolefin, Zerohal	/180	S-1030

Product Dimensions

Part Number	H		J			P	S	T	U	JO	W
	Min. a	Max. b	Min. a -12, -100	Min. a -3, -25	Max. b -12, -100, -3, -25	± 10% b	± 10% b	± 10% b	± 10% b	± 10% b	± 20% b
242W042	31.0 [1.22]	17.9 [.70]	18.0 [.71]	31.0 [1.22]	7.0 [.28]	55.0 [2.17]	35.0 [1.38]	3.5 [.14]	2.0 [.08]	25.0 [.98]	1.8 [.07]
242W053	36.0 [1.42]	22.1 [.87]	21.0 [.83]	36.0 [1.42]	8.4 [.33]	60.0 [2.36]	40.0 [1.58]	3.5 [.14]	2.0 [.08]	30.0 [1.18]	2.0 [.08]
242W063	43.0 [1.69]	27.9 [1.10]	25.0 [.99]	43.0 [1.69]	9.9 [.39]	65.0 [2.56]	45.0 [1.77]	3.5 [.14]	2.0 [.08]	35.0 [1.38]	2.2 [.09]

As supplied dimensions are for uncoated parts, when coating is added, entry diameters will reduce by 1.5 [.06] max.

Ordering Information

242W0XX-X/XX-0

- Adhesive slash number (if required see Compatibility chart)
- Material dash number (see Compatibility chart)
- Base part number

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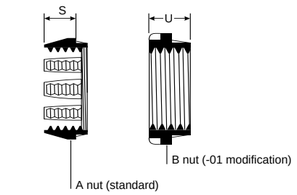
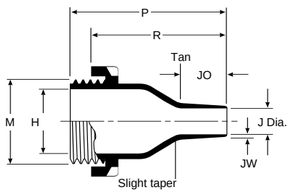
Japan: 81-44-844-8013
UK: 44-208-420-8341

207W213 to 256

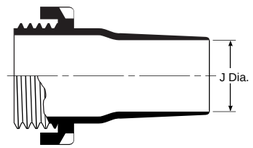
Two-Part Feedthrough

After Unrestricted Recovery (b)





As Supplied (a)



Applications

Use for strain relief and abrasion protection when cables pass through equipment boxes or panels.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H Ref. b	J Min. -3, -4, -12, -25 a	J Min. -100 a	J Max. b	JO Max. b	M Thread b	P ±10% b	R ±10% b	S ±10% b	U ±10% b	JW ±20% b	Hole Dia. ±.51 [.02]
207W213	11.9 [.47]	9.9 [.39]	8.5 [.33]	4.1 [.16]	15.2 [.60]	20.1 [.79]	62.0 [2.44]	49.0 [1.93]	13.0 [.51]	9.9 [.39]	1.3 [.05]	23.9 [.94]
207W223	20.1 [.79]	18.0 [.71]	16.5 [.65]	7.1 [.28]	19.3 [.76]	30.0 [1.18]	71.9 [2.83]	58.9 [2.32]	16.0 [.63]	9.9 [.39]	1.8 [.07]	34.0 [1.34]
207W234	30.1 [1.22]	27.9 [1.10]	26.5 [1.04]	11.9 [.47]	26.9 [1.06]	41.9 [1.65]	87.1 [3.43]	73.9 [2.91]	18.0 [.71]	9.9 [.39]	2.03 [.08]	47.0 [1.85]
207W245	45.0 [1.77]	41.9 [1.65]	40.5 [1.59]	18.0 [.71]	32.0 [1.26]	55.9 [2.20]	102.1 [4.02]	88.9 [3.50]	18.0 [.71]	9.9 [.39]	3.05 [.12]	60.5 [2.38]
207W256	68.1 [2.68]	64.0 [2.52]	64.5 [2.54]	30.0 [1.18]	39.1 [1.54]	80.0 [3.15]	121.9 [4.80]	109.0 [4.29]	18.0 [.71]	9.9 [.39]	3.05 [.12]	85.1 [3.35]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
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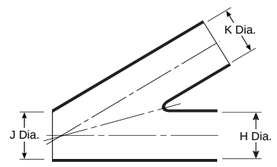
Japan: 81-44-844-8013
UK: 44-208-420-8341

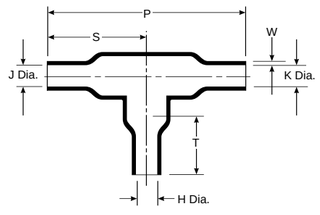
301A011 to 048

T Transition

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86, /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H, J & K		P	S	T	W
	Min. a	Max. b	±10% b	±10% b	±10% b	±30% b
301A011	6.6 [.26]	3.6 [.14]	29.7 [1.17]	15.1 [.59]	—	1.02 [.04]
301A022	13.2 [.52]	6.9 [.27]	58.7 [2.31]	29.5 [1.16]	17.5 [.69]	1.52 [.06]
301A028	20.0 [0.79]	10.2 [.40]	90 [3.54]	45 [1.77]	30 [1.18]	2.0 [.08]
301A034	26.9 [1.06]	13.5 [.53]	120.1 [4.73]	60.2 [2.37]	35.6 [1.40]	2.29 [.09]
301A048	55.6 [2.19]	30.2 [1.19]	246.4 [9.70]	123.2 [4.85]	70.9 [2.79]	3.05 [.12]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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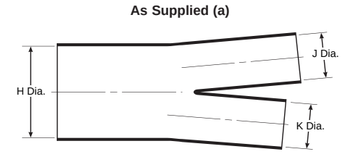
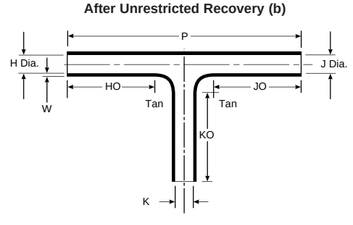
Japan: 81-44-844-8013
UK: 44-208-420-8341

301A511 to 514

Slimline T Transition





Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-50	Fluoroelastomer polymer blend	N/A	S-1125
-51	Elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-125	Fluoropolymer	N/A	S-1255-04

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J & K		HO, JO, & KO ±10% b	W Nom. b	P Nom. b
	Min. a	Max. b	Min. a	Max. b			
301A511	19.8 [.78]	6.6 [.26]	13.2 [.52]	6.6 [.26]	25.4 [1.00]	1.02 [.04]	80.8 [3.18]
301A512	34.3 [1.35]	11.4 [.45]	22.9 [.90]	11.4 [.45]	41.1 [1.62]	1.27 [.05]	120.4 [4.74]
301A513	60.2 [2.37]	20.1 [.79]	40.1 [1.58]	20.1 [.79]	63.5 [2.50]	1.52 [.06]	175.8 [6.92]
301A514*	83.3 [3.28]	33.3 [1.31]	54.9 [2.16]	33.3 [1.31]	88.9 [3.50]	1.78 [.07]	242.3 [9.54]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.
* 301A514 is not available in -125 Fluoropolymer material.

Catalog 1308940
Revised 8-06

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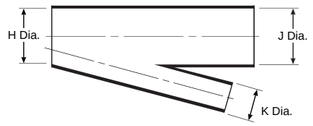
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

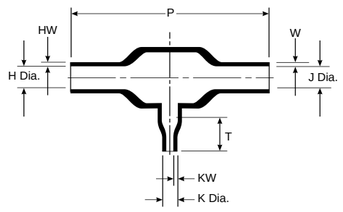
322A112 to 158

T Transition

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Modified elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H & J		K		P	T	HW & W	KW
	Min. a	Max. b	Min. a	Max. b	±10% b	±10% b	±20% b	±20% b
322A112	13.2 [.52]	5.8 [.23]	6.6 [.26]	3.0 [.12]	52.3 [2.06]	—	1.52 [.06]	1.02 [.04]
322A123	26.9 [1.06]	12.4 [.49]	6.6 [.26]	3.0 [.12]	83.3 [3.28]	10.7 [.42]	2.54 [.10]	1.02 [.04]
322A134	26.9 [1.06]	12.7 [.50]	13.2 [.52]	5.8 [.23]	107.7 [4.24]	20.3 [.80]	2.54 [.10]	1.52 [.06]
322A148	55.6 [2.19]	25.4 [1.00]	13.2 [.52]	5.8 [.23]	180.6 [7.11]	25.4 [1.00]	4.57 [.18]	1.52 [.06]
322A158	55.6 [2.19]	25.4 [1.00]	26.9 [1.06]	12.4 [.49]	222.3 [8.75]	38.1 [1.50]	4.57 [.18]	2.54 [.10]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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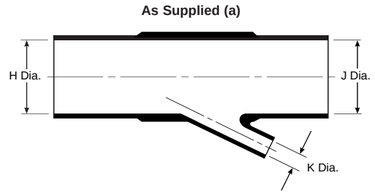
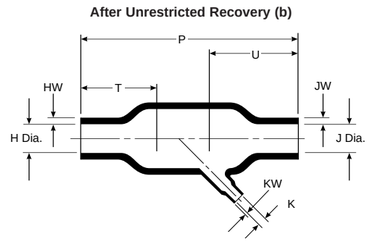
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

342A012 to 058

45° Side-Breakout Transition





Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H & J		K		P ± 10% b	T ± 10% b	U ± 10% b	HW & JW ± 20% b	KW ± 20% b
	Min. a	Max. b	Min. a	Max. b					
342A012	13.2 [.52]	6.9 [.27]	6.6 [.26]	3.6 [.14]	49.3 [1.94]	19.6 [.77]	19.6 [.77]	1.52 [.06]	1.02 [.04]
342A024	26.9 [1.06]	12.7 [.50]	6.6 [.26]	3.6 [.14]	92.5 [3.64]	31.8 [1.25]	39.6 [1.56]	2.54 [.10]	1.02 [.04]
342A034	26.9 [1.06]	13.7 [.54]	13.2 [.52]	6.1 [.24]	144.8 [5.70]	50.8 [2.00]	50.8 [2.00]	2.54 [.10]	1.52 [.06]
342A048	55.6 [2.19]	26.9 [1.06]	13.2 [.52]	6.9 [.27]	184.9 [7.28]	63.5 [2.50]	63.5 [2.50]	4.57 [.18]	1.52 [.06]
342A058	55.6 [2.19]	26.9 [1.06]	26.9 [1.06]	13.7 [.54]	203.5 [8.01]	66.0 [2.60]	66.0 [2.60]	4.57 [.18]	2.54 [.10]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

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Dimensions are shown for reference purposes only. Specifications subject to change.

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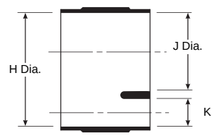
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

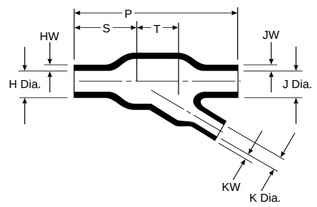
362A014 to 114

30° Side-Breakout Transition

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H & J		K		P	S	T	HW & JW	KW
	Min. a	Max. b	Min. a	Max. b	± 10% b	± 10% b	± 10% b	± 20% b	± 20% b
362A014	30.5 [1.20]	15.7 [.62]	20.3 [.80]	10.7 [.42]	82.6 [3.25]	31.8 [1.25]	21.1 [.63]	2.54 [.10]	1.78 [.07]
362A024	35.6 [1.40]	18.3 [.72]	15.2 [.60]	8.6 [.34]	63.5 [2.50]	19.1 [.75]	22.4 [.88]	2.54 [.10]	1.52 [.06]
362A114	35.6 [1.40]	18.8 [.74]	10.2 [.40]	5.3 [.21]	61.0 [2.40]	19.1 [.75]	21.3 [.84]	2.79 [.11]	1.52 [.06]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

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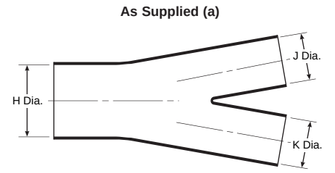
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

381A301 to 304

Slimline Y Transition



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-50	Fluoroelastomer polymer blend	N/A	S-1125
-51	Elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-125	Fluoropolymer	—	S-1255-04

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J & K		W Nom. b	P Nom. b	R & S Nom. b
	Min. a	Max. b	Min. a	Max. b			
381A301	19.8 [.78]	6.6 [.26]	13.2 [.52]	6.6 [.26]	1.0 [.04]	40.6 [1.60]	40.6 [1.60]
381A302	34.3 [1.35]	11.4 [.45]	22.9 [.90]	11.4 [.45]	1.3 [.05]	63.0 [2.48]	63.0 [2.48]
381A303	60.2 [2.37]	20.1 [.79]	40.1 [1.58]	20.1[.79]	1.5 [.06]	94.7 [3.73]	94.7 [3.73]
381A304*	83.3 [3.28]	33.3 [1.31]	54.9 [2.16]	33.3 [1.31]	1.8 [.07]	133.9 [5.27]	133.9 [5.27]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.
* 381A304 is not available in -125 Fluoropolymer material.

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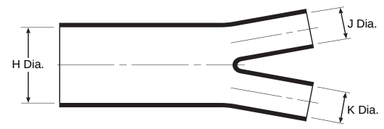
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

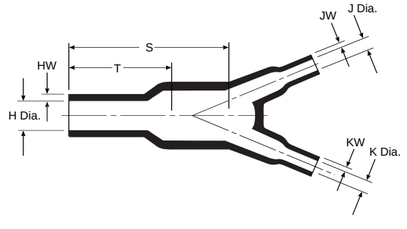
382A012 to 046

Y Transition

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J & K		S	T	HW	JW & KW
	Min. a	Max. b	Min. a	Max. b	± 10% b	± 10% b	± 20% b	± 20% b
382A012	13.2 [.52]	6.1 [.24]	6.6 [.26]	3.3 [.13]	23.9 [.94]	15.5 [.61]	1.52 [.06]	1.02 [.04]
382A023	26.9 [1.06]	12.4 [.49]	13.2 [.52]	6.1 [.24]	53.3 [2.10]	33.0 [1.30]	2.54 [.10]	1.52 [.06]
382A034	38.6 [1.52]	18.0 [.71]	26.9 [1.06]	12.4 [.49]	78.7 [3.10]	55.9 [2.20]	3.05 [.12]	2.54 [.10]
382A046	55.6 [2.19]	25.9 [1.02]	26.9 [1.06]	12.7 [.50]	111.8 [4.40]	71.1 [2.80]	4.57 [.18]	2.54 [.10]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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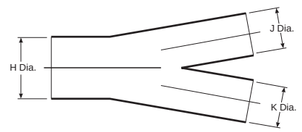
Japan: 81-44-844-8013
UK: 44-208-420-8341

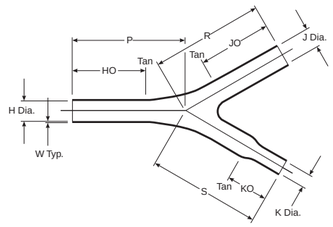
382C312, 322 and 332

Slimline Y Transition

As Supplied (a)

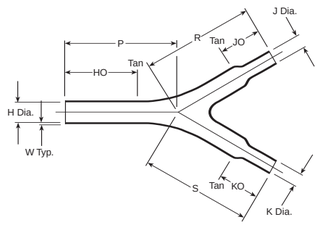


After Unrestricted Recovery (b)



382C312

After Unrestricted Recovery (b)



382C322, 382C332

12 Heat-Shrink Tubing, Molded Parts and Adhesives

Applications

Provides strain relief and mechanical protection at two into one Y junctions in cable harness assemblies. When used with adhesive it provides environmental sealing. These parts are based on the 382A3 range. They have the branched outlet(s) reduced in size to accommodate smaller cable diameters without the need for packing or shimming.

Materials Available

Material	Material Description	Precoating No.	Adhesive Part Number
-50	Fluoroelastomer polymer blend	N/A	S-1125
-51	Elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-125	Fluoropolymer	N/A	S-1255-04

Product Dimensions

Part Number	H		J		K		P, R & S	KO	HO & JO	W
	Min. a	Max. b	Min. a	Max. b	Min. a	Max. b	Nom. b	± 15% b	± 15% b	Nom b
382C312	30.5 [1.20]	11.4 [.45]	22.9 [.90]	11.4 [.45]	15.2 [.60]	7.6 [.30]	63.0 [2.48]	21.6 [.85]	41.1 [1.62]	1.0 [.04]

Part Number	H		J & K		P, R & S	HO	JO & KO	W
	Min. a	Max. b	Min. a	Max. b	Nom. b	± 15% b	± 15% b	Nom. b
382C322	22.9 [.90]	11.4 [.45]	10.2 [.40]	5.1 [.20]	63.0 [2.48]	41.1 [1.62]	21.6 [.85]	1.0 [.04]

Part Number	H		J & K		P, R & S	HO	JO & KO	W
	Min. a	Max. b	Min. a	Max. b	Nom. b	± 15% b	± 15% b	Nom. b
382C332	25.4 [1.00]	11.4 [.45]	15.2 [.60]	7.5 [.30]	63.0 [2.48]	41.1 [1.62]	21.6 [.85]	1.0 [.04]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

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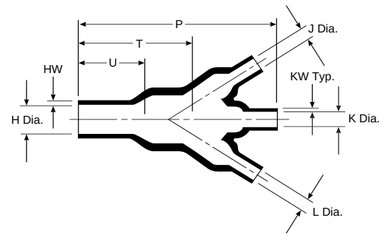
Japan: 81-44-844-8013
UK: 44-208-420-8341

462A011 to 060

Transition, One to Three Cables

As Supplied (a)

After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H Min. a	H Max. b	J, K&L Min. a	J, K&L Max. b	P ± 10% b
462A011	13.2 [.52]	6.6 [.26]	6.6 [.26]	3.6 [.14]	46.2 [1.82]
462A023	26.9 [1.06]	13.2 [.52]	13.2 [.52]	6.9 [.27]	93.2 [3.67]
462A034	38.6 [1.52]	18.8 [.74]	19.3 [.76]	9.7 [.38]	135.1 [5.32]
462A046	55.6 [2.19]	25.4 [1.00]	26.9 [1.06]	12.4 [.49]	192.0 [7.56]
462A060	91.4 [3.60]	54.6 [2.15]	45.7 [1.80]	27.4 [1.08]	390.4 [15.37]

Part Number	T ± 10% b	U ± 10% b	HW ± 20% b	KW ± 10% b
462A011	30.5 [1.20]	15.7 [.62]	1.52 [.06]	1.02 [.04]
462A023	57.2 [2.25]	33.0 [1.30]	2.54 [.10]	1.52 [.06]
462A034	88.9 [3.50]	45.7 [1.80]	3.05 [.12]	1.78 [.07]
462A046	121.9 [4.80]	71.1 [2.80]	4.57 [.18]	3.05 [.12]
462A060	254.0 [10.00]	127.0 [5.00]	7.11 [.28]	4.57 [.18]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

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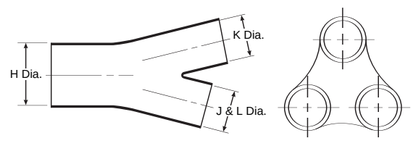
Japan: 81-44-844-8013
UK: 44-208-420-8341

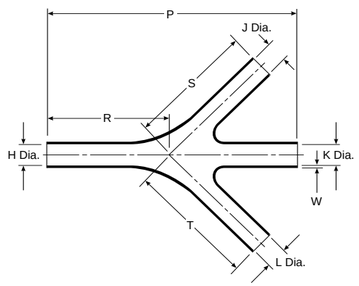
462A421 to 424

Slimline Transition, One to Three Cables

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-50	Fluoroelastomer polymer blend	N/A	S-1125
-51	Elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048

Product Dimensions

Part Number	H Min. a	H Max. b	J, K & L Min. a	J, K & L Max. b	W Nom. b	P Nom. b	R, S & T Nom. b
462A421	19.8 [.78]	6.6 [.26]	13.2 [.52]	6.6 [.26]	1.0 [.04]	85.9 [3.38]	42.9 [1.69]
462A422	34.3 [1.35]	11.4 [.45]	20.6 [.81]	11.4 [.45]	1.3 [.05]	135.6 [5.34]	67.8 [2.67]
462A423	60.2 [2.37]	20.1 [.79]	36.1 [1.42]	20.1 [.79]	1.5 [.06]	207.3 [8.16]	103.6 [4.08]
462A424*	99.8 [3.93]	33.3 [1.31]	54.9 [2.16]	33.3 [1.31]	1.8 [.07]	207.2 [8.16]	103.6 [4.08]

* -01 modification only

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-125	Fluoropolymer	—	S-1255-04

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H Min. a	H Max. b	J, K & L Min. a	J, K & L Max. b	W Nom. b	P Nom. b	R, S & T Nom. b
462A421	19.8 [.78]	6.6 [.26]	13.2 [.52]	6.6 [.26]	1.0 [.04]	85.9 [3.38]	42.9 [1.69]
462A422	34.3 [1.35]	11.4 [.45]	20.6 [.81]	11.4 [.45]	1.3 [.05]	135.6 [5.34]	67.8 [2.67]
462A423	60.2 [2.37]	20.1 [.79]	36.1 [1.42]	20.1 [.79]	1.5 [.06]	207.3 [8.16]	103.6 [4.08]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

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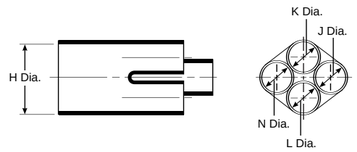
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

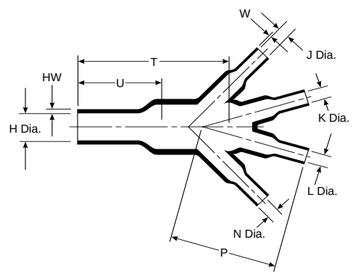
562A011 to 067

Transition, One to Four Cables

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part Number**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1048 or S-1030

* For more information, please see the appropriate material page in this section.
** For more information, please see pages 12-206 to 12-211.

Product Dimensions

Part Number	H		J, K, L & N		P	T	U	HW	W
	Min. a	Max. b	Min. a	Max. b	± 10% b	± 10% b	± 10% b	± 20% b	± 20% b
562A011	13.2 [.52]	6.9 [.27]	6.6 [.26]	3.4 [.14]	24.1 [.95]	43.9 [1.73]	18.0 [.71]	1.52 [.06]	1.02 [.04]
562A022	19.3 [.76]	9.7 [.38]	9.4 [.37]	5.3 [.21]	35.6 [1.40]	43.2 [1.70]	23.1 [.91]	1.78 [.07]	1.02 [.04]
562A032	19.3 [.76]	9.7 [.38]	13.2 [.52]	6.9 [.27]	49.3 [1.94]	50.5 [1.99]	25.4 [1.00]	1.78 [.07]	1.52 [.06]
562A043	26.9 [1.06]	13.0 [.51]	13.2 [.52]	6.9 [.27]	49.3 [1.94]	65.8 [2.59]	33.5 [1.32]	2.54 [.10]	1.52 [.06]
562A054	38.6 [1.52]	18.5 [.73]	19.3 [.76]	9.7 [.38]	71.9 [2.83]	95.3 [3.75]	46.5 [1.83]	3.05 [.12]	1.78 [.07]
562A067	55.6 [2.19]	26.7 [1.05]	26.9 [1.06]	13.0 [.51]	101.6 [4.00]	135.1 [5.32]	65.5 [2.58]	4.57 [.18]	2.54 [.10]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Catalog 1308940
Revised 8-06

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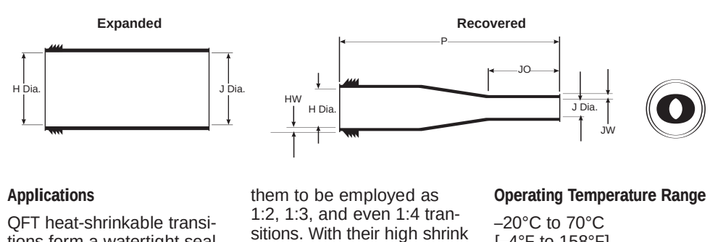
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

QFT

Configurable Heat-Shrink Transition

Product Facts

- Configurable heat-shrink transition
- Low cost commercial polyolefin
- 80°C [176°F] shrink temperature
- High shrink ratio
- Specially engineered easy-to-use crimp tool



Applications

QFT heat-shrinkable transitions form a watertight seal protecting cable splices from corrosion and mechanical abuse while providing excellent electrical insulating properties. QFT products use special crimps that allow them to be employed as 1:2, 1:3, and even 1:4 transitions. With their high shrink ratio and crimps the configurable QFT product line can accommodate almost all of your transition needs with only 3 product sizes.

Operating Temperature Range

–20°C to 70°C
[–4°F to 158°F]

Specifications/Approvals

Raychem	RW 2008	Molded Part
	RT1050/1	Adhesive

Temperature Ratings

Operating temperature range	–20°C to 70°C [–4°F to 158°F] (125°C [257°F] without sealant)
Minimum recovery temperature	55°C [131°F]
Maximum storage temperature	40°C [104°F]

Dimensions Table

	H		J		P	JO	HW	JW
	Min.	Max.	Min.	Max.	± 10%	± 10%	± 20%	± 20%
QFT1	31.0 [1.22]	9.0 [.35]	31.0 [1.22]	4.4 [.17]	60.0 [2.36]	12.0 [.47]	1.5 [.06]	1.0 [.039]
QFT2	43.0 [1.69]	14.0 [.55]	43.0 [1.69]	7.0 [.28]	75.0 [2.95]	18.0 [.71]	1.8 [.07]	1.0 [.039]
QFT3	57.0 [2.24]	24.0 [.95]	57.0 [2.24]	12.0 [.47]	90.0 [3.53]	25.0 [.98]	1.8 [.07]	1.0 [.039]

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

QFT (Continued)

Typical QFT Performance

	Property	Performance	Test method
Physical	Tensile strength	10 MPa (1500psi) minimum	ISO 37
	Ultimate elongation	250% minimum	ISO 37
	Longitudinal change	0 to 20% maximum	ISO 1183
	Specific gravity	1.4 maximum	ISO 1183
	Heat aging	Minimum 200% ultimate elongation	ISO 188
	168 hours at 120°C [248°F]	Tensile Strength 10 MPa min.	ISO 37
	Heat shock 4 hours at 105°C	No cracking, dripping or flowing	ASTM D 2671
Electrical	Dielectric strength	8MV/m minimum	IEC 243-1
Chemical	Fluid resistance 1	(24 ± 2h immersion at 23°C ± 2°C)	ISO 1817
	Engine Oil	(SAE 20W/50)	—
	Hydraulic Fluid Tensile Strength	10 MPa minimum	ISO 37
	Ultimate Elongation	200% minimum	—
	Fluid resistance 2	(30 ± 3m immersion at 23°C ± 2°C)	ISO 1817
	Automotive gasoline	(BS 4040)	—
	Diesel fuel	(BS 2869)	—
	Cleaning fluid	(TL 6850-07)	—
	Antifreeze	(Ethylene Glycol/Water 50/50 v/v)	—
	Engine cleaning fluid Tensile strength	(Gunk) 10 MPa minimum	ISO 37
	Ultimate elongation	200% minimum	—

Part Numbering System

QFT3 - 130/42 - 0*

- Color
- Adhesive
- Material
- Size
- Product name

* Available in bulk pack, part number QFT3-130/42-0-B500 (US and UK).

Ordering Information

Color	Standard	Black (-0)
	Code	0
Packaging	Standard	10 pieces per bag, 30 clips
	Bulk pack	500 pieces per box and 500 clips per bag (clips ordered separately) — contact Tyco Electronics for details
Crimp tool	QFT-Crimp-Tool-Manual (069172-000)	—

Catalog 1308940
Revised 8-06

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Heavy Duty Breakout Boots

Product Facts

- Watertight
- Easy installation, requiring no special skills
- Compatibility with polyethylene, PVC, lead, steel, aluminum, standard Navy cable jackets, and copper wire and cable
- Four configurations and twelve sizes
- Minimum shrink temperature of 121°C [250°F]
- Type approval by:
  - ABS (American Bureau of Shipping)
  - DNV (Det Norske Veritas)
  - Lloyd's (Lloyd's Register of Shipping)

Applications

These flame-retardant heat-shrinkable transitions are especially designed for shipboard applications and meet or exceed all of the U.S. Navy specifications described in MIL-I-81765/1A (as of 5/02). The transitions are made of a rugged, thermally stabilized, modified polyolefin and factory-coated with a thermoplastic adhesive sealant. As a result, they offer excellent water sealing, mechanical abrasion-protection, corrosion-resistance, weatherproofing, and electrical insulation. The transitions replace tapes, epoxies, and grease in applications involving cable breakouts, transitions, and terminations.

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SSB, D, T, F to 8S (Continued)

Specifications/Approvals

Commercial	Military
RW-2024	MIL-STD-2003
	MIL-I-81765/1A

Product Dimensions

Description	Number of Legs	ID Base		ID Legs		Leg	Length Body
		Min. Exp.	Max. Rec.	Min. Exp.	Max. Rec.		
SSB-1202 FR	2	40.64 [1.60]	11.43 [0.45]	13.97 [0.55]	3.81 [0.15]	36.83 [1.45]	62.23 [2.45]
SSB-2002 FR	2	50.8 [2.00]	35.56 [1.40]	19.05 [0.75]	8.89 [0.35]	69.85 [2.75]	88.90 [3.50]
D3-9 FR	2	20.32 [0.80]	9.39 [0.37]	8.38 [0.33]	2.79 [0.11]	17.78 [0.7]	50.8 [2]
D14-30 FR	2	30.48 [1.2]	15.24 [0.6]	12.7 [0.5]	4.32 [0.17]	25.4 [1]	63.5 [2.5]
D50-100 FR	2	48.26 [1.9]	22.86 [0.9]	19.05 [0.75]	7.62 [0.3]	30.48 [1.2]	76.2 [3]
D200-400 FR	2	76.2 [3]	38.1 [1.5]	36.83 [1.45]	12.7 [0.5]	38.1 [1.5]	88.9 [3.5]
T3-9 FR	3	22.86 [0.9]	9.14 [0.36]	8.38 [0.33]	2.29 [0.09]	19.05 [0.75]	50.80 [2.0]
T14-23 FR	3	30.48 [1.2]	17.78 [0.70]	12.70 [0.5]	4.57 [0.18]	25.4 [1]	60.96 [2.40]
T14-50 FR	3	38.1 [1.5]	12.7 [0.5]	16.51 [0.65]	4.06 [0.16]	30.48 [1.2]	76.2 [2.3]
T42-100 FR	3	43.18 [1.7]	22.86 [0.9]	20.32 [0.8]	4.83 [0.19]	30.48 [1.25]	57.15 [2.25]
T150-300 FR	3	60.96 [2.4]	35.56 [1.4]	30.48 [1.25]	12.70 [0.5]	40.6 [1.6]	88.90 [3.50]
T400 FR	3	81.28 [3.2]	50.8 [2]	35.56 [1.4]	17.78 [0.7]	40.6 [1.6]	88.9 [3.5]
T500-600 FR	3	124.46 [4.90]	58.93 [2.32]	50.8 [2]	22.86 [0.9]	50.8 [2]	187.96 [7.40]
F3-9 FR	4	22.86 [0.9]	10.92 [0.43]	7.11 [0.28]	2.79 [0.11]	19.05 [0.75]	50.8 [2]
F-23 FR	4	31.75 [1.25]	20.32 [0.8]	12.7 [0.5]	5.08 [0.2]	27.94 [1.1]	63.50 [2.50]
F42-60 FR	4	44.45 [1.75]	25.4 [1]	20.32 [0.8]	8.13 [0.32]	30.48 [1.25]	63.50 [2.50]
F75-100 FR	4	59.69 [2.35]	25.4 [1]	25.4 [1]	8.89 [0.35]	43.18 [1.7]	165.1 [6.5]
F133-200 FR	4	67.31 [2.65]	35.56 [1.4]	30.48 [1.2]	10.92 [0.43]	38.1 [1.5]	91.44 [3.6]
F150-400 FR	4	133.35 [5.25]	76.2 [3]	34.29 [1.35]	13.97 [0.55]	76.2 [3]	152.4 [6]
6S100-200 FR	6	60.96 [2.4]	36.83 [1.45]	20.32 [0.8]	8.89 [0.35]	69.85 [2.75]	86.36 [3.4]
8S23-75 FR	8	35.56 [1.4]	21.59 [0.85]	10.16 [0.4]	3.3 [0.13]	30.48 [1.25]	50.8 [2]
8S14-50 FR	8	57.15 [2.25]	21.59 [0.85]	14.22 [0.56]	3.3 [0.13]	30.48 [1.25]	50.8 [2]
8S42-100 FR	8	63.50 [2.50]	21.59 [0.85]	22.1 [0.87]	3.3 [0.13]	30.48 [1.25]	50.8 [2]

Catalog 1308940
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202W302 to 342

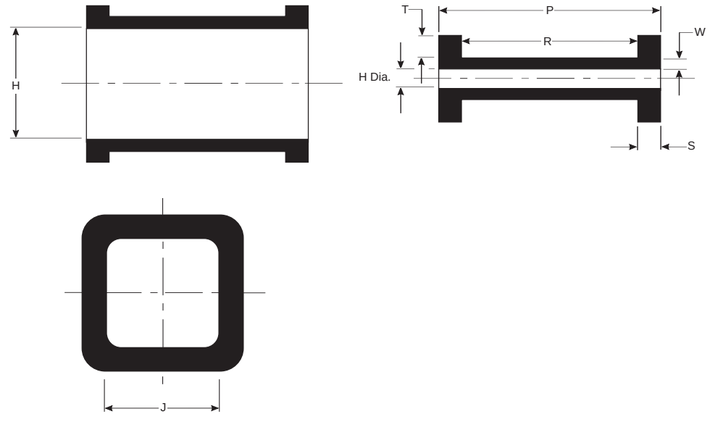
Heat-Shrink Bobbins

Product Facts

- Fast installation
- Temperature range of –40°C to 105°C [–40°F to 221°F]
- Fits range of diameters
- Low cost, high volume installation
- Shrinks onto hose/pipe/wire harnesses
- Good mechanical, thermal and chemical properties
- Good abrasion resistance
- Excellent location, cushioning and protection of cable or hoses from P clips and wire ties
- Stays in place when heated
- Suits most hoses/pipes/wire harnesses
- No expensive tooling required
- Engine area solution

As Supplied (a)

After Unrestricted Recovery (b)



Square expanded = -130 material

Circular expanded = -12 and -25 material
-3, -4

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202W302 to 342 (Continued)

Materials Available

Material	Material Description	Precoating No.	Adhesive Part Number
-3	Polyolefin, semi-rigid	/42, /86	S-1017, S-1048
-4	Polyolefin, flexible	/42, /86	S-1017, S-1048
-12	Fluoroelastomer	N/A	S-1255-04
-25	Fluid resistant elastomer	/86 or /225	S-1017 or S-1048 or S-1125
-130	Flexible polyolefin	/42, /86	S-1017

Product Dimensions

Part Number	H		J	P	R	S	T	W	Recommended Hose Sizes	
	Min. a	Max. b	Min. a	± 10% b	± 10% b	± 10% b	± 10% b	± 20% b	Min.	Max.
202W302	29.0 [1.142]	9.5 [.374]	29.0 [1.142]	35.0 [1.378]	25.0 [.984]	5.0 [.197]	3.0 [.118]	1.5 [.059]	11.0 [.433]	25.0 [.984]
202W312	39.0 [1.535]	12.7 [.500]	39.0 [1.535]	35.0 [1.378]	25.0 [.984]	5.0 [.197]	3.0 [.118]	2.0 [.079]	14.0 [.551]	34.0 [1.339]
202W321	10.0 [.394]	3.0 [.118]	10.0 [.394]	29.0 [1.142]	23.0 [.906]	3.0 [.118]	3.0 [.118]	1.5 [.059]	4.0 [.157]	8.0 [.315]
202W331	19.0 [.748]	6.4 [.252]	19.0 [.748]	29.0 [1.142]	24.0 [.945]	2.5 [.098]	2.0 [.079]	1.5 [.059]	8.0 [.315]	17.0 [.669]
202W342	54.0 [2.126]	18.0 [.709]	54.0 [2.126]	35.0 [1.378]	25.0 [.984]	5.0 [.197]	3.0 [.118]	2.0 [.079]	20.0 [.787]	48.0 [1.889]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

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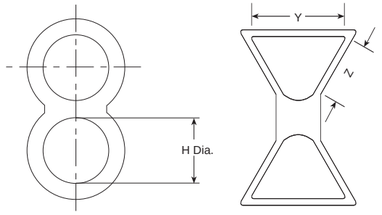
Heat-Shrink Positioning Ring

Product Facts

- Easy to install
- Close fit to hose/pipe
- Fits range of diameters due to high expansion
- Low cost, high volume installation
- Shrinks onto hose/pipe
- Minimum distance between substrates
- Good mechanical, thermal and chemical properties
- Push on fit to hose/pipe
- Stays in place when installed
- No expensive tooling required
- Positions where needed
- Keeps hoses/pipes together, optimizing space
- Under body solution
- Engine area solution
- Twinning two hoses/pipes rationalizes part descriptions
- Hose/pipe can be orientated correctly for ease of fitting to vehicle

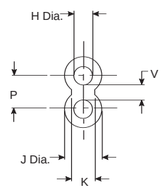
As Supplied (a)

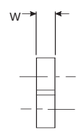


-3, -4, -25, -100

-130

After Unrestricted Recovery (b)





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400W242 (Continued)

Materials Available

Material	Material Description	Precoating No.	Adhesive Part Number
-3	Polyolefin, semi-rigid	/42, /86	S-1017 or S-1048
-4	Polyolefin, flexible	/42, /86	S-1017 or S-1048
-25	Elastomer, fluid resistant	/86, /225	S-1017 or S-1048
-100	Polyolefin, Zerohal	-100-CS1972 (S1030 tape supplied in bag)	S-1030
-130	Flexible polyolefin	/42, /86	S-1017

As supplied dimensions are for uncoated parts, when coating is added, entry diameters will reduce by 1.5 [.06] max.

Part Numbering System

400W242 -/**-0**

- **Adhesive Slash Number** (if required see compatibility chart)
- **Material Dash Number** (see compatibility chart)
- **Base Part Number**

Product Dimensions

Part Number	H Min. a	H Max. b	J Max. b	K ± 1.2 b	P ± 1.7 b	V ± 0.45 b	W ± 1 b	Y* ± 2 a	Z* ± 2 a
400W242	28 [1.102]	10.2 [.402]	19.3 [.760]	12 [.472]	17 [.669]	7.0 [.276]	10 [.394]	29 [1.142]	25 [.984]

* Applicable for -130 only.

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Heat-Shrinkable Cable Entry Seals

Product Facts

- Comes in many sizes and configurations
- Seals multicable openings
- SAE-AS81765/1 Type 1

Applications

Raychem Heat-Shrinkable Cable-Entry Seals (CESs) provide a watertight, fume-tight seal where cables enter connection boxes, bulkheads, or other enclosures.

CESs are available in two basic types: standard and threaded. The standard CES for thin-wall enclosures consists of a three-part assembly — a rigid plastic nylon nut, an O-ring, and a heat-shrinkable molded area. The CES for threaded-hole applications is a one-part assembly that combines a tapered national pipe thread (NPT) in rigid plastic nylon with a heat-shrinkable molded area.

All CESs are available with the molded area configured with one opening for a single wire or cable entry or with two, three, or four legs of equal size to seal multiple wires or cables at the entry to enclosures and/or bulkheads. To meet sealing requirements, all CESs have factory-applied adhesive that provides the seal to wire and cable jackets. When armored cable is being sealed it may be necessary to use additional sealants, such as G.E. RTV 112 or Dow Corning RTV 732, to form the water seal.

Standard Cable Entry Seal Installation Instructions

Cable Entry Seal No.	Torque	
	in-pounds	Nm
1	15-20	1.7-2.3
2	15-20	1.7-2.3
3	20-25	2.3-2.8
4	40-45	4.5-5.1
5	45-50	5.1-5.7

Step 1

Place rigid, externally threaded nut through hole so flanged end is on the inside of the can or cabinet.

Step 2

Place O-ring over threaded end and position against outside of can or cabinet.

Step 3

Screw shrinkable, internally threaded component onto the rigid nut and tighten, using appropriate spanner wrenches, until O-ring is slightly flattened — or use the torque values shown in the table to the left.

Step 4

Insert cable through expanded opening and make necessary connections (see note following Step 4 in the next section).

Step 5

Shrink expanded nose by applying 121°C–135°C [250°F–275°F] of heat from a heat gun with circular reflector, or a gas torch, or other heat source.* When part has shrunk to the cable, and when the sealant is seen to flow, discontinue heat. Additional heating will not make the component shrink tighter.

* Follow the safety precautions of the manufacturer of the heater.

Threaded Cable Entry Seal Installation Instructions

Note: Surfaces to be sealed should be clean and free of burrs, pits, or deep scratches.

Step 1

Apply a thread sealant to the threaded end and then screw threaded cable entry seal into pretapped hole or pipe fitting.

Step 2

Tighten by applying wrench to hexagonal nut.

Step 3

Insert cable through expanded opening and make necessary connection (see Note).

Step 4

Shrink expanded nose by applying 121°C–135°C [250°F–275°F] of heat from a heat gun with circular reflector, gas torch, or other heat source.* When part has shrunk to the cable, and when the sealant is seen to flow, discontinue heat. Additional heating will not make the component shrink tighter.

Note

If armored cable is used, the factory-applied sealant will not fill the interstices of the armor. The armor must be cut back so that the part is allowed to shrink and seal to the cable sheath as well as come down over the armor. To keep the armor from unraveling, some armor must be approximately 1/4 inch to 3/8 inch [.01 to .02 mm] inside the cable entry seal leg.

* Follow the safety precautions of the manufacturer of the heater.

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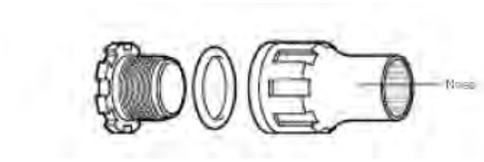
CES (Continued)

Standard CES



Temperature

Temperature rating	–55°C to 90°C [–67°F to 194°F]
Minimum shrink temperature	121°C [250°F]

Specifications

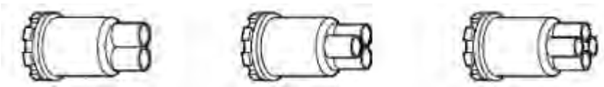
Type	Raychem	
Molded heat-shrink nose	RT-301	Flame retardant polyolefin
Adhesive	RW-2019	Hot melt adhesive

Product Dimensions

Part Number	No. of Legs	Overall Nom. Recommended Length	Min. Expanded I.D. Nose	Max. Recovered I.D. Nose	Max. I.D. of Part	Drill Size	Max. O.D. of Nut
CES-1	1	69.85 [2.75]	12.70 [0.50]	4.32 [0.17]	19.05 [0.75]	25.40 [1.00]	35.81 [1.410]
CES-2	1	69.85 [2.75]	19.05 [0.75]	6.35 [0.25]	19.05 [0.75]	25.40 [1.00]	35.81 [1.410]
CES-3	1	95.25 [3.75]	28.45 [1.12]	12.70 [0.50]	27.94 [1.10]	35.05 [1.38]	48.31 [1.902]
CES-4	1	114.30 [4.50]	40.64 [1.60]	19.05 [0.75]	39.62 [1.56]	50.80 [2.00]	69.09 [2.720]
CES-4S*	1	114.30 [4.50]	50.80 [2.00]	19.05 [0.75]	53.34 [2.10]	59.94 [2.36]	85.09 [3.350]
CES-5	1	177.80 [7.00]	69.85 [2.75]	36.32 [1.43]	73.66 [2.90]	88.90 [3.50]	103.38 [4.070]

* Part configuration may be different than depicted in figure. Contact Tyco Electronics for specification.

Breakout CES



Product Dimensions

Part Number	No. of Legs	Overall Nom. Recommended Length	Min. Expanded I.D. (Each Leg)	Max. Recovered I.D. (Each Leg)	Max. I.D. of Part	Drill Size	Max. O.D. of Nut
CES-2-D1A	2	69.85 [2.75]	15.24 [0.60]	2.79 [0.11]	19.05 [0.75]	25.40 [1.00]	35.81 [1.41]
CES-2-T1	3	69.85 [2.75]	10.16 [0.40]	2.79 [0.11]	19.05 [0.75]	25.40 [1.00]	35.81 [1.41]
CES-2-T1B	3	88.90 [3.50]	15.24 [0.60]	4.32 [0.17]	19.05 [0.75]	25.40 [1.00]	35.81 [1.41]
CES-2-F1A	4	69.85 [2.75]	10.16 [0.40]	2.79 [0.11]	19.05 [0.75]	25.40 [1.00]	35.81 [1.41]
CES-2-F1	4	88.90 [3.50]	15.24 [0.60]	4.32 [0.17]	19.05 [0.75]	25.40 [1.00]	35.81 [1.41]
CES-3-D1	2	88.90 [3.50]	15.24 [0.60]	4.32 [0.17]	27.94 [1.10]	35.05 [1.38]	48.26 [1.90]
CES-3-T1	3	88.90 [3.50]	15.24 [0.60]	4.32 [0.17]	27.94 [1.10]	35.05 [1.38]	48.26 [1.90]
CES-3-F1	4	88.90 [3.50]	15.24 [0.60]	4.32 [0.17]	27.94 [1.10]	35.05 [1.38]	48.26 [1.90]
CES-4-D3	2	101.60 [4.00]	22.86 [0.90]	7.62 [0.30]	40.64 [1.60]	50.80 [2.00]	69.09 [2.72]
CES-4-T1	3	101.60 [4.00]	22.86 [0.90]	7.62 [0.30]	40.64 [1.60]	50.80 [2.00]	69.09 [2.72]
CES-4-F1	4	101.60 [4.00]	22.86 [0.90]	7.62 [0.30]	40.64 [1.60]	50.80 [2.00]	69.09 [2.72]
CES-5-T4	3	127.00 [5.00]	31.75 [1.25]	12.70 [0.50]	73.66 [2.90]	63.50 [2.50]	103.38 [4.07]
CES-5-F4	4	127.00 [5.00]	31.75 [1.25]	12.70 [0.50]	73.66 [2.90]	63.50 [2.50]	103.38 [4.07]

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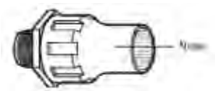
UK: 44-208-420-8341

CES (Continued)

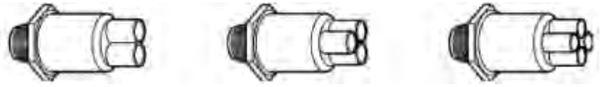
Threaded CES



Part Number	Overall Nom. Recommended Length	Min. Expanded I.D. Nose	Max. Recovered I.D. Nose	National Adapter I.D.	Pipe Thread Size
CES-2-A50	83.82 [3.30]	19.05 [0.75]	6.35 [0.25]	12.70 [0.50]	1/2–14
CES-2-A75	83.82 [3.30]	19.05 [0.75]	6.35 [0.25]	19.05 [0.75]	3/4–14
CES-2-A100	83.82 [3.30]	19.05 [0.75]	6.35 [0.25]	19.05 [0.75]	1–11 1/2
CES-3-A100	111.00 [4.37]	28.45 [1.12]	12.70 [0.50]	25.40 [1.00]	1–11 1/2
CES-3-A150	117.35 [4.62]	28.45 [1.12]	12.70 [0.50]	27.94 [1.10]	1 1/2–11 1/2
CES-4-A150*	127.00 [5.00]	50.80 [2.00]	19.05 [0.75]	35.56 [1.40]	1 1/2–11 1/2
CES-5-A250*	152.40 [6.00]	69.85 [2.75]	25.40 [1.00]	60.96 [2.40]	2 1/2–10

* Not illustrated — refer to Specification Control Drawing for details.

Threaded Breakout CES



Product Dimensions

Part Number	No. of Legs	Overall Nom. Recommended Length	Min. Expanded I.D. (Each Leg)	Max. Recovered I.D. (Each Leg)	Max. I.D. of Part	Pipe Thread Size (NPT)
CES-2A-T1	3	95.25 [3.75]	10.16 [0.4]	2.79 [0.11]	12.70 [0.50]	1/2–14
CES-2A-F1	4	95.25 [3.75]	10.16 [0.4]	2.79 [0.11]	12.70 [0.50]	1/2–14
CES-2A-D1	2	95.25 [3.75]	15.24 [0.6]	2.79 [0.11]	19.05 [0.75]	3/4–14
CES-2A-T2	3	95.25 [3.75]	10.16 [0.4]	2.79 [0.11]	19.05 [0.75]	3/4–14
CES-2A-F2	4	95.25 [3.75]	10.16 [0.4]	2.79 [0.11]	19.05 [0.75]	3/4–14
CES-3A-D1	2	95.25 [3.75]	15.24 [0.6]	4.32 [0.17]	25.40 [1.00]	1–11 1/2
CES-2A-T3	3	95.25 [3.75]	15.24 [0.6]	4.32 [0.17]	25.40 [1.00]	1–11 1/2
CES-3A-F1	4	95.25 [3.75]	15.24 [0.6]	4.32 [0.17]	25.40 [1.00]	1–11 1/2
CES-3A-D2	2	95.25 [3.75]	15.24 [0.6]	4.32 [0.17]	27.94 [1.10]	1 1/2–11 1/2
CES-3A-T2	3	95.25 [3.75]	15.24 [0.6]	4.32 [0.17]	27.94 [1.10]	1 1/2–11 1/2
CES-3A-F2	4	95.25 [3.75]	15.24 [0.6]	4.32 [0.17]	27.94 [1.10]	1 1/2–11 1/2
CES-4A-D3	2	95.25 [3.75]	22.86 [0.9]	7.62 [0.30]	37.34 [1.47]	1 1/2–11 1/2
CES-4A-T3	3	95.25 [3.75]	22.86 [0.9]	7.62 [0.30]	37.34 [1.47]	1 1/2–11 1/2
CES-4A-F3	4	95.25 [3.75]	22.86 [0.9]	7.62 [0.30]	37.34 [1.47]	1 1/2–11 1/2

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

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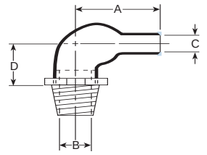
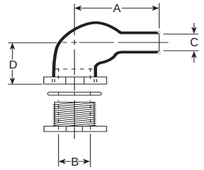
CES (Continued)

Right-Angle Threaded CES



Part Number	C		B	Length		NPT Size
	Min. Exp. ID	Max. Rec. ID	ID Min	A	D	
CES-2R-A50	12.70 [0.50]	7.11 [0.28]	12.70 [0.50]	35.56 [1.4]	25.40 [1.00]	1/2-14
CES-2R-A75	18.03 [0.71]	8.38 [0.33]	19.05 [0.75]	43.18 [1.7]	27.94 [1.10]	3/4-14
CES-3R-A100	27.94 [1.10]	9.65 [0.38]	25.40 [1.00]	53.34 [2.1]	33.78 [1.33]	1-11 1/2
CES-3R-A150	40.64 [1.60]	15.75 [0.62]	27.94 [1.10]	78.74 [3.1]	39.62 [1.56]	1 1/2-11 1/2

Right-Angle Breakout CES



Part Number	C		B	Length		Drill Size
	Min. Exp. ID	Max. Rec. ID	ID Min	D	A	
CES-1R	12.70 [0.50]	7.11 [0.28]	12.70 [0.50]	35.56 [1.4]	42.67 [1.68]	25.40 [1.00]
CES-2R	18.03 [0.71]	8.38 [0.33]	19.05 [0.75]	43.18 [1.7]	44.96 [1.77]	25.40 [1.00]
CES-3R	27.94 [1.10]	9.65 [0.38]	27.94 [1.10]	53.34 [2.1]	58.42 [2.30]	34.80 [1.37]
CES-4R	40.64 [1.60]	15.75 [0.62]	40.64 [1.60]	78.74 [3.1]	71.12 [2.80]	50.80 [2.00]

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Roll-On Sealing Sleeve

Product Facts

- A Raychem heatless sealing solution
- Re-useable sealing solution
- Roll-on to seal, roll-off to re-enter
- Enhanced sealing with gel strips
- Protection of connectors and splices against corrosion
- Available in many conveniently packaged kits

Applications

RayOLOn re-useable roll-on sealing sleeves are a family of products designed to protect connectors, electrical cable splices, and other cylindrical substrates from harsh environmental elements like salt spray and water moisture. RayOLOn sleeves are a part of Raychem's "heatless" sealing products that require no heat guns or torches. This is useful in the areas where the use of motorized heat sources or open flames are prohibited or undesirable.

RayOLOn sealing sleeves provide the sealing of the substrates by simply rolling the sleeve over the area to be protected. If the substrate requires servicing, the sleeve can be rolled off to provide access to the component under the sleeve. After the service is completed, the sleeve can be rolled on the part again to provide the protection. This operation may be done many times throughout the life of the sleeve providing time and material cost savings.

Operating Temperature Range

–40°C to 70°C
[–40°F to 158°F]

Specifications and Approvals

Raychem	RW 3031

Temperature Ratings

Continuous operating temperature range	–40°C to 70°C [–40°F to 158°F]
Short term temperature exposure	–63°C to 90°C [–81°F to 194°F]
Minimum installation	–25°C [–13°F]

Sleeve Dimensions

Base Part Number	Available Kits	Dimensions (Reference)		Recommended Use Range	Connection Length
		Diameter	Lengths		
LNCL-11-125	GK	13.0 [0.51]	125 [4.92]	6–17 [0.22–0.68]	75 [3.00]
LNCL-11-205	GK	13.0 [0.51]	205 [8.07]	6–17 [0.22–0.68]	150 [6.00]
LNCL-12-140	GK, CK-N	14.2 [0.56]	140 [5.51]	12–23 [0.48–0.90]	100 [4.00]
LNCL-12-240	GK, CK-N	14.2 [0.56]	240 [9.45]	12–23 [0.48–0.90]	175 [7.00]
LNCL-13-155	GK, TK-8	19.0 [0.75]	155 [6.10]	18–30 [0.69–1.20]	100 [4.00]
LNCL-13-305	GK	19.0 [0.75]	305 [12.00]	18–30 [0.69–1.20]	225 [9.00]
LNCL-14-185	GK, TK-7	25.9 [1.02]	185 [7.28]	25–38 [0.96–1.50]	125 [5.00]
LNCL-14-355	GK	25.9 [1.02]	355 [14.00]	25–38 [0.96–1.50]	250 [10.0]
LNCL-15-185	GK, TK-1, TK-5, TK-6	36.8 [1.45]	185 [7.28]	36–46 [1.40–2.00]	125 [5.00]
LNCL-15-260	GK, SS	36.8 [1.45]	260 [10.2]	36–46 [1.40–2.00]	190 [7.50]
LNCL-15-450	GK, SS	36.8 [1.45]	450 [17.72]	36–46 [1.40–2.00]	300 [12.0]

Refer to Raychem specification control drawing LNCL-XX-125 thru LNCL-XX-450 for more details.
* Tyco Electronics Gel and Sealant product information available at www.tycoelectronics.com

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RayOLOn Kits (Continued)

Typical RayOLOn Roll-On Sealing Sleeve Properties

	Property	Performance	Test Method
Physical/ Chemical	Tensile strength	8.3 MPa (1200 psi) minimum	ASTM D 2671
	Ultimate elongation	100 % minimum	ASTM D 412
	Density	1.1 g/cm3 maximum	ASTM D 792
	Water absorption 24 hours at 23°C [73°F]	0.5 % maximum	ASTM D 570
	Flammability	40 mm/min maximum	ASTM D 635
Electrical	Dielectric strength	90 kV/cm (225 V/mil) minimum	ASTM D 149
	Volume resistivity	1x1012 Ω-cm	ASTM D 257

Refer to Raychem specification RW3031 for more requirements and performance information.

Notes:

1. The sleeve is not intended to be heated during the installation process.
2. DO NOT CUT LNCL roll-on sealing sleeve.
3. In case of a conflict between this data sheet and RW3031, RW3031 takes precedence.
4. Not recommended for extended exposure to hydrocarbon based fuel or fluids.

Part Numbering System

LNCL - XX - XXX - XX - XX

- Configuration Designator (blank if not required)
- Kit Designator
- Length of Sleeve
- Diameter Size Designator
- Product Family Name

Kits

GK—General kit:	Roll-on sleeve, gel strip, cable tie, core tube, installation instruction
CK—Connector sealing kit:	Roll-on sleeve, cable tie, connector flange cover, gel strip, installation instruction
TK—Panel boot sealing kit:	Roll-on sleeve, ferrule, gel strip, cable tie, installation Instruction
SS—Ship-or-shore kit:	Roll-on sleeve, connection shield, installation instruction

Note: Not all sizes and lengths are available for all kit combinations. Please refer to the table on the previous page.

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shrinkHOoP

12

Cable Clamp Heat-Shrink Grommet

Product Facts

- Less assembly time
- Superior strain-relief
- Fewer errors — less rework
- Rework made easier
- No build-up taping or feeding wire through grommet
- Typical installation in just 10-20 seconds
- Re-expandable I.D. allows wire addition to a cable bundle

Applications

shrinkHOoP grommet (URHR) is an ultra high ratio heat-shrinkable-strain-relief grommet that can be placed over the cable assembly after the connector pinning operation is completed. The ultra-high expansion ratio material conveniently fills the space between the clamp type connector accessory and the cable. (When clamped into position, shrinkHOoP grommet provides strain relief that is more consistent and convenient than many conventional practices — for example, taping, grommet, or tape/grommet combination). The high ratio conformity of shrinkHOoP grommets will match most typical cable configurations from single conductor to the high density multiple conductor arrangements.

With shrinkHOoP grommet, repairs and rework are a snap — simply heat the grommet until soft, slide a NON-METALLIC probe through the center of the wire bundle (enlarging the grommet I.D.). Once cooled, the grommet will remain open allowing wires to be added, removed or reworked. The system can then be checked, the grommet reheated (shrinking it down again), positioned, and clamped in place.

Operating Temperature Range

–55°C to 135°C
[–67°F to 275°F]

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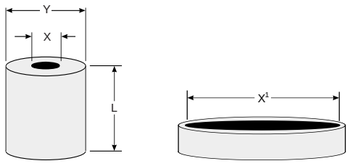
shrinkHOoP (Continued)

Specifications/Approvals

RW

Product Dimensions



Part Number	I.D. Expanded (X1) min.	I.D. Recovered (X) max.	O.D. (Y) Ref.	Length (L) Ref.	Wt. (gm) Ref.	Notes
URHR-1	25 [1.0]	2.1 [0.08]	6.0 [0.25]	13 [0.5]	0.75	a) Recovered length will allow for 1.91 [0.075] either side of the collar, minimum in most cases.
URHR-2	31 [1.23]	2.6 [0.10]	10 [.375]	13 [0.5]	1	
URHR-3	37 [1.44]	3.6 [0.14]	13 [0.5]	13 [0.5]	1.5	
URHR-4	47 [1.85]	4.7 [0.18]	14 [.562]	19 [0.75]	3.5	
URHR-5	51 [2.0]	5.1 [0.20]	21 [.812]	19 [0.75]	5	

Typical shrinkHOoP Grommet Performance

Property		Performance	Test Method
Physical	Tensile strength	1500 psi (10.3 Mpa)	ASTM D-412
	Ultimate elongation	250% minimum	ASTM D-412
	Specific gravity	1.4 maximum	ASTM D-792
	Water absorption	0.5 % maximum	ASTM D-570 A
	Flammability	Pass	ASTM D-635
	Corrosion resistance	Pass	ASTM D-2671 A
	Low temperature flex 4 hours at –55 ± 1°C [–67 ± 2°F]	Pass	ASTM D-2671 C
	Heat resistance	200% ultimate elongation, minimum	ASTM D-2671
	168 hrs at 175 ± 1°C [347 ± 2°F]	1200 psi (8.3 Mpa) tensile strength, minimum	
	Heat shock 4 hrs at 225 ± 2°C [437 ± 5°F]	No cracking, dripping or flowing	ASTM D 2671
Elastic Memory	—	275% minimum expansion to 4 inch (10 cm) of a fully recovered test specimen, and 93% recovery of expanded specimen after oven conditioning for 1 minute at 150 ± 2°C [302 ± 4°F]	—
Electrical	Dielectric strength	200 v/mil (7880 v/mm) minimum	ASTM D-876
	Volume resistivity	10 14 ohm-cm minimum	ASTM D-257
Chemical Fluid Resistance	—	200% ultimate Elongation, minimum 1200 psi (8.3 Mpa) tensile strength, minimum	ASTM F-146
	Flammability*	Avg. flame time = 30 sec. max Avg. burn length = 3 in. max. Avg. flame time from drippings = 3 sec. max	FAR part 25, Appendix F, part 1 (a), section 3

* Applies to sizes 2, 3, and 4 only.

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shrinkHOoP (Continued)

Connector Series	Connector Size				
	8 (9)	10, 12 (11, 13)	14, 16 (15, 17)	18, 20 (19, 21)	22, 24, 28*
MIL-C-5015					
MS3451, 52, 56, 59	1	2	3	4	5
MS3450	2	3	4	5	*
MIL-C-26500**					
MS24266	1	2	3	4	5
MS24264, 265	2	3	4	5	*
MIL-C-26482					
MS3120, 21, 22, 26	1	2	3	4	5
MS3470, 71, 74, 75, 76	1	2	3	4	5
MS3124, MS3472	2	3	4	5	*
MIL-C-83723 Series I					
M83723/01 & 02, 05 & 06	1	2	3	4	5
07 & 08, 13 & 14, 23 & 24	1	2	3	4	5
M83723/03 & 04	2	3	4	5	*
MIL-C-83723 Series II					
M83723/17 & 18, 23 & 24	1	2	3	4	5
M83723/12 & 20, 21 & 22	2	3	4	5	*
MIL-C-83723 Series III					
M83723/71 & 72 thru 97 & 98	1	2	3	4	5
M83723/66, 67, 68 & 69	2	3	4	5	*
MIL-C-38999 Series I					
MS27469	1	2	3	4	5
MS27466, 68, 96, 27505, 27656	2	3	4	5	*
MIL-C-38999 Series II					
MS27472, 97, 98, 27508, 27513	1	2	3	4	5
MS27473, 84, 27474	2	3	4	5	*
MIL-C-38999 Series III					
38999/26	1	2	3	4	5
38999/20, 24	3	4	5	5	*
Boeing					
BACC45, F, M, N, P, R, S, T	—	2	3	4	5
BACC 63X	—	3	4	5	*
Boeing					
DC39, 31, 34, 35, 50-57	1	2	3	4	5
DC32, 33, 36, 37, 60, 61, 62, 63	2	3	4	5	*

* Consult Tyco Electronics for availability of larger sizes.
** **Note:** Cable support clamp I.D. may effect the size of shrinkHOoP grommet selected.

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Ordering Information

Tyco Electronics Corporation has acquired XL Technologies. Use the information in the following table to convert the XL part number into the new Tyco Electronics Raychem product description.

Description XL Part Number	Convert to Description
080EK025	SSC-2/239
080EK025-woA	SSC-2/U
137EK050	SSC-3/239
137EK050-woA	SSC-3/U
1-8117-2A	CES-2A-D1
1-8117-3A	CES-2A-T1
1-8117-4A	CES-2A-F1
200EK075	SSC-4/239
200EK075-woA	SSC-4/U
20432242	CES-4/HR-3
2-8115-2A	CES-2-D1A
2-8115-2AOE	CES-2-D1A
2-8115-2B	CES-2-D1
2-8115-3A	CES-2-T1
2-8115-3B	CES-2-T1B
2-8115-4A	CES-2-F1A
2-8115-4B	CES-2-F1
2-8117-2A	CES-2A-D1
2-8117-2AOE	CES-2A-D1
2-8117-3A	CES-2A-T2
2-8117-4A	CES-2A-F2
2-8118-3A	CES-2-T1
2S-8115-2A	CES-2-D1A
2S-8115-3A	CES-2-T1
2S-8115-4A	CES-2-F1A
380EK150	SSC-6/239
380EK150woA	SSC-6/U
3-8115-2B	CES-3-D1
3-8115-3B	CES-3-T1
3-8115-4B	CES-3-F1
3-8118-4B	CES-3-F1
3A-8117-2B	CES-3A-D1
3A-8117-3B	CES-2A-T3
3A-8117-4B	CES-3A-F1
4-8115-2C	CES-4-D3
4-8115-3C	CES-4-T1
4-8115-4C	CES-4-F1
4-8117-2B	CES-3A-D2
4-8117-3B	CES-3A-T2
4-8117-4B	CES-3A-F2
4A-8117-2C	CES-4A-D3
4A-8117-3C	CES-4A-T3
4A-8117-4C	CES-4A-F3
52451-2X12A	91385-2/12
5-8115-3D	CES-5-T4
8114-1	CES-1
1/2/14	CES-1-2
8114-1-49R	CES-1R
8114-2	CES-2
8114-2-50R	CES-2R
8114-2S	CES-2
8114-3	CES-3
8114-3-51R	CES-3R
8114-3L	CES-3L
8114-3S	CES-3S
8114-4	CES-4
8114-4-54R	CES-4R
8114-4N	CES-4
8114-4S	CES-4S
8114-4S/C	CES-4S
8114-5	CES-5

Description XL Part Number	Convert to Description
8116-1	CES-2-A50
8116-1-49R	CES-2R-A50
8116-1A	CES-2-A50
8116-2	CES-2-A75
8116-2-50R	CES-2R-A75
8116-3	CES2-A100
8116-3-51R	CES-3R-A100
8116-3A	CES-3-A100
8116-4	CES-3-A150
8116-4-52R	CES-3R-A150
8116-4A	CES-4-A150
8116-5	CES-5-A250
8118-2	CES-2
91342-1	D3-9 FR
91342-12	D3-30 FR
91342-2	D14-30 FR
91342-23	D14-100 FR
91342-3X2.5	D50-200 FR
91342-3	D50-100 FR
91342-34	D50-400 FR
91342-4	D200-400 FR
91343-1	T3-9 FR
91343-2	T14-23 FR
91343-2A	T14-50 FR
91343-3	T42-100 FR
91343-4	T150-300 FR
91343-5	T-400 FR
91343-5678	T3-100 FR
91343-6	T500-600 FR
91343-910	T150-400 FR
91344-1	F3-9 FR
91344-1213	F3-23 FR
91344-1415	F42-100 FR
91344-1617	F75-200 FR
91344-2	F-23 FR
91344-3	F42-60 FR
91344-4	F75-100 FR
91344-5	F133-200 FR
91344-6	F150-400 FR
91346-3	6S100-200 FR
91346-30	202A111-3-0
91346-31	202A111-3/42-0
91346-32	202A111-3/86-0
91347-30	202A121-3-0
91347-31	202A121-3/42-0
91347-32	202A121-3/86-0
91348-1	8S23-75 FR
91348-2	8S14-50 FR
91348-3	8S42-100 FR
91348-30	202A132-3-0
91348-31	202A132-3/42-0
91348-32	202A132-3/86-0
91349-30	202A142-3-0
91349-31	202A142-3/42-0
91349-32	202A142-3/86-0
91350-30	202A153-3-0
91350-31	202A153-3/42-0
91350-32	202A153-3/86-0
91351-30	202A163-3-0
91351-31	202A163-3/42-0
91351-32	202A163-3/86-0

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Ordering Information (Continued)

Description XL Part Number	Convert to Description
91352-30	202A174-3-0
91352-31	202A174-3/42-0
91352-32	202A174-3/86-0
91353-30	202A185-3-0
91353-31	202A185-3/42-0
91353-32	202A185-3/86-0
91354-30	202A196-3-0
91354-31	202A196-3/42-0
91354-32	202A196-3/86-0
913L87-30	202D921-3/-0
913L87-31	202D921-3/42-0
913L87-32	202D921-3/86-0
91387-30	202A921-3/-0
91387-31	202A921-3/42-0
913L47-30	202D121-3/-0
913L47-31	202D121-3/42-0
913L47-32	202D121-3/86-0
913L48-30	202D132-3/-0
913L48-31	202D132-3/42-0
913L48-32	202132-3/-86-0
913L49-30	202D142-3/-0
913L49-31	202D142-3/42-0
913L49-32	202D142-3/86-0
913L50-30	202D153-3-0
913L50-31	202D153-3/42-0
913L50-32	202D153-3/86-0
913L51-30	202D163-3-0
913L51-31	202D163-3/42-0
913L51-32	202D163-3/86-0
913L52-30	202D174-3-0
913L52-31	202D174-3/42-0
913L52-32	202D174-3/86-0
913L53-30	202D185-3-0
913L53-31	202D185-3/42-0
913L53-32	202D185-3/86-0
913L54-30	202D196-3-0
913L54-31	202D196-3/42-0
913L54-32	202D196-3/86-0
913L66-30	202D211-3-0
913L66-31	202D211-3/42-0
913L66-32	202D211-3/86-0
913L67-30	202D221-3-0
913L67-31	202D221-3/42-0
913L67-32	202D221-3/86-0
913L68-30	202D232-3-0
913L68-31	202D232-3/42-0
913L68-32	202D232-3/86-0
913L69-30	202D242-3-0
913L69-31	202D242-3/42-0
913L69-32	202D242-3/86-0
913L70-30	202D253-3-0
913L70-31	202D253-3/42-0
913L70-32	202D253-3/86-0

Description XL Part Number	Convert to Description
913L87-30	202D921-3-0
913L87-31	202D921-3/42-0
913L87-32	202D921-3/86-0
913R48-30	222A132-3-0
913R48-31	222A132-3/42-0
913R48-32	222A132-3/86-0
913R49-30	222A142-3-0
913R49-31	222A142-3/42-0
913R49-32	222A142-3/86-0
913R50-30	222A152-3-0
913R50-31	222A152-3/42-0
913R50-32	222A152-3/86-0
913R51-30	222A163-3-0
913R51-31	222A163-3/42-0
913R51-32	222A163-3/86-0
913R52-30	222A174-3-0
913R52-31	222A174-3/42-0
913R52-32	222A174-3/86-0
913RL48-30	222D132-3-0
913RL48-31	222D132-3/42-0
913RL48-32	222D132-3/86-0
913RL49-30	222D142-3-0
913RL49-31	222D142-3/42-0
913RL49-32	222D142-3/86-0
913RL50-30	222D152-3-0
913RL50-31	222D152-3/42-0
913RL50-32	222D152-3/86-0
913RL51-30	222D163-3-0
913RL51-31	222D163-3/42-0
913RL51-32	222D163-3/86-0
913RL52-30	222D174-3-0
913RL52-31	222D174-3/42-0
913RL52-32	222D174-3/86-0
913Y95-30	381A301-71/-0
913Y95-31	381A301-71/42-0
913Y95-32	381A301-71/86-0
913Y96-30	381A302-71/-0
913Y96-31	381A302-71/42-0
913Y96-32	381A302-71/86-0
HHW-1.3/6A	SST-6-13FR/97-0
HHW-13/6A	SST-6-13FR/97-0
HHW-15/12	SST-12-15FR/97-0
HHW-15/6	SST-6-15FR/97-0
HHW-15/9	SST-9-15FR/97-0
HHW-20/9	SST-9-20FR/97-0
HRSR-1	URHR-1
HRSR-2	URHR-2
HRSR-3	URHR-3
HRSR-4	URHR-4
HRSR-5	URHR-5
XHTA	RHW
XHTU	RHW
XMTA	RPRD

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Introduction

Tyco Electronics manufacturers Raychem adhesives and sealants to accommodate a wide range of applications, materials, and environmental conditions.

Raychem adhesives include both thermosets and thermoplastics.

Thermosets are curable two-part epoxies or crosslinked elastomers.

Thermoplastics are hot-melt adhesives that flow when heated and set when cooled. They reflow when reheated to simplify component repair.

Tyco Electronics also manufactures Raychem products that include a thermoplastic adhesive or a mastic-type sealant for water holdout applications. The sealants adhere to non-oily substrates and can be removed where reentry is necessary.

Adhesive/Sealant Product Characteristics Table

Product Type	Precoat Designation	Type	Operating Temperature Range	Product Designation	Available Form/ Packaging
Thermosets					
S-1006	—	Epoxy/ polyamide two-part paste	–55°C to 135°C [–67°F to 275°F]	S-1006 Kit 8	50-ml dual syringe
				S-1006 Kit A	Ten 3-gram packs
S-1009	—	Epoxy/ polymercaptan two-part paste	–55°C to 135°C [–67°F to 275°F]	S-1009 Kit A	Ten 3-gram packs
				S-1009 Kit 8	50-ml dual syringe
S-1255-04	—	One-part epoxy tape adhesive	–55°C to 200°C [–67°F to 392°F]	S-1255-04	Tape [3/4 in. x .020 x 100 ft.]
S-1125	—	Epoxy/polyamide two-part paste	–55°C to 150°C [–67°F to 302°F]	S-1125 Kit 1	Five 10-gram packs
				S-1125 Kit 2	Two 10-gram packs
				S-1125 Kit 3	One 100-gram pack
				S-1125 Kit 4	Five 10-gram packs
				S-1125 Kit 5	One 10-gram pack
				S-1125 Kit 8	50-ml dual syringe
	/225	Precoated latent-curing epoxy/polyamide	–75°C to 150°C [–103°F to 302°F]	Precoat only on -25 molded parts	—
Thermoplastics					
S-1017	/42	Hot-melt/ polyamide	–20°C to 60°C*** [–4°F to 140°F]	S-1017	Tape [1 in. x .010 in. x 50 ft.]
S-1030	/180	Hot-melt/ polyolefin	–80°C to 80°C [–112°F to 176°F]	S-1030	Tape [3/4 in. x .010 in. x 33 ft.]
S-1048	/86	Hot-melt, high performance	–55°C to 120°C [–67°F to 248°F]	S-1048	Tape [1 in. x .026 in. x 100 ft.]
S-1124	/164	Hot-melt/ elastomeric polymer	–55°C to 105°C [–67°F to 221°F]	S-1124	Tape [3/4 in. x .018 in.x 100 ft.]
S-1297	/97	Hot-melt/ polyamide adhesive	–20°C to 90°C] [–4°F to 194°F]	S-1297	Tape [1 in. x .010 in. x 10 ft.]
Sealants					
S-1278	—	Hot-melt grey butyl sealant	–40°C to 90°C [–40°F to 194°F]	S-1278-01	Tape [1 in. x .062 in. x 25 ft.]
				S-1278-02	Tape [33/4 in. x .125 in. x 10 ft.]
S-1305	—	Hot-melt grey butyl sealant	–40°C to 90°C [–40°F to 194°F]	S-1305-01	Tape [1 in. x.062 in. x25 ft.]

* Shelf life from date of manufacture.
** For specific adhesion properties, see product specification sheets.
*** Passes cold bend at –40°C [–40°F] per RT-4204.
**** Only S-1006 Kit A conforms to MIL-A-46864.

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Selection Guide

To determine the adhesive or sealant most compatible with a Raychem part, you must know the part's product type.

Use the Adhesive/Sealant Selection Table on page 12-208 to determine a Raychem part's product type and the adhesive/sealant compatible with that type.

Use the Adhesive/Sealant Product Characteristics Table below to be sure the adhesive or sealant has the product characteristics your application requires.

To use the Selection Table, follow these four steps:

1. Under "Substrate Category," find the product material and product name/part number for the Raychem part.
2. Across the top of the table, find the part's product type and dash number.
3. At the intersection of the substrate category (product material/name/part number) and the product type (by designated dash number) you will find the part number for the most compatible adhesive for the Raychem part.
4. See the Adhesive/Sealant Product Characteristics Table to verify the characteristics of the adhesive/sealant you selected.

Adhesive/Sealant Product Characteristics Table (Continued)

Pot Life at 23°C [73.4°F]	Curing Conditions	Shelf life* at or below 25°C [77°F]	Specifications**	Review
1 h	96 h at 20°C [68°F] min. or 1 hr at 120°C [248°F]	2 years 1 year Kit 8	RT-1006 RK-6612 A-A-56031	General purpose harnessing adhesive. Not used on fluoroelastomers, silicone or Kynar; 20-minute pot life
20 min.	24 h at 20°C [68°F] min. or 1 hr at 95°C [203°F]	2 years 1 year Kit 8	RT-1009	General purpose harnessing adhesive Not used on fluoroelastomers or silicone; 20-minute pot life
	45 min at 120°C [248°F] 2 h at 155°C [311°F] min. or 15 min at 240°C [464°F]	1 year	RT-1014	One-part epoxy tape used with fluoroelastomer harness systems. Heat cure required (2 hours at 155°C [311°F])
90 min.	24 h at 20°C min. or 1 hr at 85°C [185°F]	18 months	RT-1011 RK-6619 VG-95343	Good fluid-resistant epoxy used with System 25
	Cure during installation of molded parts	36 months	VG-95343 RK-6630	Precoated epoxy system for System 25
—	120°C [248°F]	Unlimited	RT-1050/1	General purpose harnessing adhesive Standard precoated adhesive for -3 and -4 molded parts
—	120°C [248°F]	Unlimited	RT-1050/6 RK-6017	Good low-temperature flexibility Available as a preinstalled tape for molded parts
—	160°C [320°F]	Unlimited	RT-1050/3 RK-6626	Requires high temperature to achieve bonding. Highest service temperature for hot melt
—	135°C [275°F]	Unlimited	RT-1050/13	Requires reflowing in an oven at 150°C [302°F] for 90 minutes. Designed to bond to -51 molded parts.
—	120°C [248°F]	Unlimited	RW-2019	General purpose harnessing adhesive Standard precoated adhesive in Sigmaform molded parts, CES and CSGA cable entry seals, and SST-FR heat-shrinkable tubing
—	110°C [230°F]	Unlimited	RW-2020	General purpose sealant and cable breakout area filler
—	110°C [230°F]	Unlimited	RW-2020	Halogen-free, flame-retardant sealant and cable breakout area filler

* Shelf life from date of manufacture.
** For specific adhesion properties, see product specification sheets.
*** Passes cold bend at –40°C [–40°F] per RT-4204.
**** Only S-1006 Kit A conforms to MIL-A-46864.

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Revised 8-06

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Adhesive/Sealant Selection Table

Substrate Category	Product Name Examples	Molded Part Material Dash Number												
		-3	-4	-6	-8	-12	-25	-50	-51	-55	-71	-100	-125	-130
Polyolefin	RNF-100	S-1006	S-1006	—	—	—	—	—	—	—	S-1006	—	—	S-1006
	Versafit	S-1009	S-1009	—	—	—	—	—	—	—	S-1009	—	—	S-1009
	CRN	S-1017	S-1017	—	—	—	—	—	—	—	S-1017	—	—	S-1017
	BSTS	S-1030	S-1030	—	—	—	—	—	—	—	S-1030	—	—	—
	SST	S-1048	S-1048	—	—	—	—	—	—	—	S-1048	—	—	—
	HR	S-1297	S-1297	—	—	—	—	—	—	—	S-1297	—	—	—
Fluoro-polymer	Kynar	S-1009	S-1009	—	S-1009	—	S-1125	—	—	—	S-1009	—	S-1009	—
		S-1048	S-1048	—	—	—	—	—	—	—	S-1048	—	S-1048	—
		S-1125	S-1125	—	—	—	—	—	—	—	S-1125	—	S-1125	—
	RT555	—	—	—	—	S-1255	—	—	—	S-1255	—	—	S-1255	—
	HCTE	—	—	—	—	S-1255	S-1125	—	—	S-1255	—	—	—	—
	CONVOLEX	—	—	—	—	S-1125	—	—	—	S-1125	—	—	—	—
Vinyl	PVC	S-1006	S-1006	—	—	—	—	—	—	—	S-1006	—	—	—
		S-1009	S-1009	—	—	—	—	—	—	—	S-1009	—	—	—
		S-1017	S-1017	—	—	—	—	—	—	—	S-1017	—	—	—
Elastomer	DR-25	—	—	—	—	—	S-1125	S-1125	S-1125	—	—	—	—	—
	NT	S-1006	S-1006	—	—	—	—	—	S-1124	—	S-1006	—	—	—
		S-1009	S-1009	—	—	—	—	—	—	—	S-1009	—	—	—
		S-1017	S-1017	—	—	—	—	—	—	—	S-1017	—	—	—
	NT-FR	—	—	—	—	—	S-1125	—	S-1124	—	—	—	—	—
	SFR	—	—	*	—	—	—	—	—	—	—	—	—	—
	SRFR	—	—	*	—	—	—	—	—	—	—	—	—	—
	RW-200	—	—	—	—	S-1255	—	—	—	S-1255	—	—	S-1255	—
	VPB	—	—	—	—	—	—	S-1125	—	—	—	—	—	—
		—	—	—	—	—	—	S-1255	—	—	—	—	—	—
Zerohal	XFFR	—	—	—	—	—	—	—	—	—	—	S-1030	—	—
	ZHTM	—	—	—	—	—	—	—	—	—	—	S-1030	—	—

* GE RTV 108 used with SFR SRFR and -6 (silicone) molded parts.

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Installation Guide

Substrate Preparation Procedures

Preparation of the substrate depends on the part to be bonded. Following are two preparation procedures. The first applies to plated metals and adapters; the second applies to polymer molded parts, cable jackets, and tubing materials.

Plated Metals and Adapters

Thoroughly degrease the surface with a clean cloth or paper wipe dampened with a solvent. The cloth or paper should not be saturated with the solvent.

Allow the part to stand for a minute or two to allow complete evaporation of the solvent.

Molded Parts, Cable Jackets, and Tubing Materials

Carefully and evenly abrade the surface with #320 emery cloth. Wipe contaminants and abraded particles away with a clean cloth or paper wipe dampened with a solvent. The cloth or paper should not be saturated with the solvent. Allow the part to stand for a minute or two to allow complete evaporation of the solvent.

Note:

- Avoid contamination of the prepared surface. If using primer, apply it according to the manufacturer's instructions and allow it to dry.
- Epoxy adhesives may cause skin and eye irritation. Be sure to observe the handling instructions.
- When using hot-melt adhesives on substrates with high heat-sink capacity (such as connector backshells), preheat the substrate until it is hot to touch, then apply the adhesive tape and shrink the molded part in place.

Caution:

The use of cleaning solvent is described in the preparation of various components for adhesive bonding. Please observe the solvent manufacturer's safety recommendations. Several Raychem epoxy adhesives and solvent base primers are also described in some cases. For specific handling precautions, please consult the appropriate Raychem material safety data sheet for the adhesive being used.

Installation Procedures

The three sets of installation instructions that follow are based on the type and/or form of adhesive or sealant to be used.

Select the set of instructions that applies to your application.

Tape Adhesives and Sealants Connector Boot

1. Degrease the area of the adapter to which the boot will be bonded, using appropriate solvent on a paper tissue or clean cloth. Do not abrade the adapter.
2. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth dampened with a solvent.
3. Lightly abrade and wipe 25.4 [1.0] back inside each end of the boot.
4. When using primer, apply a thin, uniform coating to the bonding surface and let it air dry (15–20 minutes).
5. Double-wrap the adhesive tape around the cleaned area of the adapter, placing slight tension on the tape as you wrap. Tack the ends in place with a soldering iron or hot tool.
6. Double-wrap adhesive tape around the cable jacket where the end of the boot is to be located.
7. Position the boot on the adapter and the cable. Apply heat, starting at the connector end.
8. Recover the connector end of the boot onto the adapter and continue heating until the area is fully recovered and the adhesive tape is properly melted.
9. Complete the recovery of the boot, continuing toward the cable end. Heat the cable end of the boot where the adhesive is placed, until the part is fully recovered and the tape has properly melted or flowed. The tape should appear wet, form a bead or fillet between the cable and boot, and show no definition between the layers of tape.
10. Where oven curing is required to complete adhesive bonding, heat the assembled harness in a preheated oven according to the following schedule:

    S-1255-02:
    2 hours at 155°C [311°F]

    S-1124:
    90 minutes at 150°C [302°F]

Transition

1. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth dampened with a solvent.
2. Abrade and wipe the inside of each transition opening.
3. When using primer, apply a thin, uniform coating to the bonding surface and let it air dry (15–20 minutes).

Catalog 1308940
Revised 8-06

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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Installation Guide (Continued)

4. Double-wrap the tape around the abraded areas of the cable, placing slight tension on the tape as you wrap. Tack the ends in place with a soldering iron or hot tool.
5. Center the molded part over the transition area. When properly positioned, the part should not fit tightly in the “branched” area of the breakout. A tight fit may cause the part to crease or wrinkle as it recovers. The tape should extend slightly beyond the end of the transition.
6. Apply heat to the center of the transition. Recover one leg of the transition, moving heat from the center of the transition to the adhesive opening of the leg. Repeat the procedure on each leg of the transition.
7. Continue heating each end of the transition until the part is fully recovered and the adhesive tape has properly melted or flowed. The tape should now appear wet, form a bead or fillet between the cable and transition, and show no definition between the layers of tape.
8. Where oven curing is required to complete adhesive bonding, heat the assembled harness in a preheated oven according to the following schedule:

   S-1255-02:
   2 hours at 155°C [311°F]

   S-1124:
   90 minutes at 150°C [302°F]

Thermosets

Connector Boot

1. Thoroughly mix the two parts according to the instructions provided with the kit.
2. Degrease the area of the adapter to which the boot will be bonded, using appropriate solvent on a paper tissue or clean cloth. Do not abrade the adapter.
3. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth.
4. Lightly abrade back 25.4 mm [1.0] inside each end of the boot.
5. Using a spatula, apply the mixed adhesive to the adapter and shrink the boot to the end of the adapter.
6. Apply adhesive to the cable jacket and complete the shrinking process.
7. With a clean cloth, remove excess adhesive from all areas immediately.
8. Follow the curing conditions outlined in this guide.

Transition

1. Thoroughly mix the two parts according to the instructions provided with the kit.
2. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth.
3. Abrade and wipe inside each opening of the transition.
4. Using a spatula, apply the mixed adhesive to the cable jacket.
5. Apply heat to the center of the transition. Recover one leg of the transition, moving heat from the center of the transition to the adhesive opening of the leg. Repeat the procedure on each leg.
6. Remove excess adhesive from all areas immediately with a clean cloth.
7. Follow the curing conditions specified for “thermosets” in the “Adhesive/Sealant Product Characteristics Table” on pages 12-206 and 12-207.

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Installation Guide (Continued)

Molded Parts Pre-coated with Thermoplastic Adhesive

Connector Boot

1. Degrease the area of the adapter to which the boot will be bonded, using appropriate solvent on a paper tissue or clean cloth. Do not abrade the adapter or inside surface of the boot.
2. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth dampened with solvent.
3. Position the boot on the adapter and cable. Apply heat starting at the connector end.
4. Recover the connector end of the boot onto the adapter and continue heating until the area is fully recovered and the adhesive is properly melted.
5. Complete the recovery of the boot, continuing toward the cable end of the boot until the part is fully recovered and the adhesive is properly melted. The adhesive should form a bead or fillet between the cable and boot when fully melted.
6. With a clean cloth, remove excess adhesive from all areas immediately.
7. Follow the curing conditions outlined in this guide.

Transition

1. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth dampened with solvent.
2. Center the molded part over the transition area.
3. Apply heat to the center of the transition. Recover one leg of the transition, moving heat from the center of the transition to the adhesive opening of the leg. Repeat the procedure on each leg of the transition.
4. Continue heating each end until the part is fully recovered and the adhesive has properly melted. The adhesive should form a bead or fillet between the cable and transition when fully melted.
5. Follow the curing conditions specified for “thermosets” in the “Adhesive/Sealant Product Characteristics Table” on pages 12-206 and 12-207.

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AA-400 Super Heater Compressed-Air Heating Tool

Product Facts

- Automatic power cut-off switch to protect heating element if air flow is interrupted
- Pressure regulator and gauge for adjusting air flow and temperature
- Indicator light that goes on when power is applied to heating element
- Very focused heat
- Wide variety of reflectors available
- Excellent tool for small items and confined areas

Applications

Used for installing heat-shrinkable tubing in multiple applications. Excellent for installing SolderSleeve devices (wire-to-pin applications) and SolderTacts contacts.

Specifications

Utility Requirements	
Electrical	120-V model: 120 Vac, 4 A, 50–60 Hz 240-V model: 240 Vac, 2 A, 50–60 Hz
Air (oil free)	60 psig minimum, 5 cfm

Ordering Information

Model	Voltage	Description	Part Number
AA-400 Super Heater with stand, needlepoint tip, Mini SolderSleeve reflector, and input air filter	120 Vac	AA-400-32-Mk3 (110V)	582602-000
	240 Vac (CE version)	AA-400-200-CE-SUPERHTR	281917-000

Accessories and Replacement Parts*	Part Number	Description	NSN Stock Number
SolderSleeve reflector	979646-000	AA-400-94-SLD-SLV-TIP-KIT	4940-00-609-4993
Needlepoint tip	979647-000	AA-400-96	4940-00-148-9847
Boot and tubing tip	979691-000	AA-400-101	4940-00-148-9848
Mini SolderSleeve reflector	979663-000	AA-400-102	4940-01-043-7634
Low-flow tip	979672-000	AA-400-103	3439-01-173-8810
Heating Element replacement kit, 120 V	013750-000	AA-400-128	—
Heating Element replacement kit, 240 V (CE)	444179-000	AA-400-228-EL-KT-240V-CE	—
Stand	979649-000	AA-400-09	—
Input air filter	979673-000	AA-400-P-Y-92-Filter	—
Air hose replacement kit	156553-000	AA-400-136	—
Gun and air hose replacement kit	238231-000	AA-400-229-Gun-Hse-Kit	—

*Controller is not sold separately.

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CV-1981 and CV-1983 Heavy-Duty Hot-Air Heating Tools

Product Facts

- Robust, double-insulated, heavy-duty unit
- Highest-wattage unit (1600–2260 watts)
- Integral stand that allows use as bench tool
- Safe, quiet operation
- Precisely variable temperature
- Variety of reflectors available
- Easy fixturing for dual opposing heating

Applications

Used for installing dual wall or single wall tubing up to three inches in diameter and for installing SolderSleeve devices. Closed loop version (PID) also available.

Technical Specification

Electrical Supply	
CV-1981-MK2	120 V and 230 V
CV-1983	120 V and 230 V
CV-1981 PID	120 V and 230 V
Power Consumption	
CV-1981-MK2	1600 W
CV-1983	2260 W/3060 W
CV-1981 PID	1600 W
Total System Noise	
CV-1981-MK2	65dB
CV-1983	65dB
CV-1981 PID	>70dB
Length	
CV-1981-MK2	340 [13]
CV-1983	320 [13]
CV-1981 PID	350 [13]
Weight	
CV-1981-MK2	1.3 Kg [2.90 lb]
CV-1983	1.5 Kg [3.30 lb]
CV-1981 PID	1.4 Kg [3.10 lb]
Air Flow	
CV-1981-MK2	Max 230 l/min
CV-1983	Max 500 l/min
CV-1981 PID	230 l/min

Product Range
All dual wall, single wall and molded part products.
Various devices products.
For other Raychem products, contact Tyco Electronics.

Catalog 1308940
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UK: 44-208-420-8341

CV-1981 and CV-1983 Heavy-Duty Hot-Air Heating Tools (Continued)

Ordering Information

Equipment	Description	Part Number	Voltage	Hz
CV-1981-MK2	CV-1981-120V1600W-CANMK2	A42716-000	120V	50/60 Hz
	CV-1981-120V1600W-UKMK2	E95798-000	120V	50/60 Hz
	CV-1981-230V1600WMK2	813914-000	230V	50/60 Hz
	CV-1981-230V1600W-SEVMK2	F25836-000	230V	50/60 Hz
	CV-1981-230V1600-UKMK2	340970-000	230V	50/60 Hz
CV-1983	CV-1983-110V-2260W-UK	441753-000	120V	50/60 Hz
	CV-1983-220V-2260W	773898-000	230V	50/60 Hz
	CV-1983-220V-2260W-UK	985426-000	230V	50/60 Hz
	CV-1983-220V-3060W	538361-000	230V	50/60 Hz
	CV-1983-220V-3060W-UK	231866-000	230V	50/60 Hz
CV-1981-PID	CV-1981-120V-1600W-CANPIDF	839218-000	120V	50/60 Hz
	CV-1981-120V-1600W-UKPID	928826-000	120V	50/60 Hz
	CV-1981-230V-1600WPID	958770-000	230V	50/60 Hz
	CV-1981-230V-1600W-SEVPIDF	434366-000	230V	50/60 Hz
	CV-1981-230V-1600W-UKPIDF	385828-000	230V	50/60 Hz
CV-1983 Barrel Adapter	AD-1962	989172-000	—	—

Accessories

	Application	Part Number
PR-12 reflector	Tubing: 6.3–25.4 mm [0.25–1 in]	991973-000
PR-13 reflector	Tubing: Up to 6 mm [0.25 in]	991963-000
PR-13C reflector	Large SolderSleeve products	991974-000
PR-21 reflector	Tubing: Up to 25.4 mm [1 in]	991984-000
PR-24 reflector	Tubing/molded parts: 25.4–34.93 mm [1–1.38 in]	991964-000
PR-24A reflector	Tubing/molded parts: 34.93–60.33 mm [1.38–2.38 in]	991989-000
PR-25 reflector	SolderSleeve products: Up to 7 mm [0.28 in]	991965-000
PR-25D reflector	SolderSleeve products: 6.3–12.7 mm [0.25–0.50 in]	989523-000
PR-26 reflector	Small SolderSleeve products	991967-000
PR-33 reflector	SolderSleeve products: 19.05–25.4 mm [0.75–1 in]	997768-000
AD-1962 adapter for larger-barrel CV-1983	—	989172-000
PR-34 reflector	SolderSleeve products: 12.0–20.0 mm [0.47–0.79 in]	989111-000
PR-51	Special narrow reflector for molded part transitions (21.5 x 3.5 mm nozzle) [.85 x .14 in]	113069-000

Note: A42716 supersedes and replaces 538005
340970 supersedes and replaces 923002

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HL1802E and HL2005E Steinel General Purpose Hot-Air Heating Tool

Products Facts

- Light weight
- Easy, quiet operation
- Precise variable temperature
- 1500 watts
- Reflectors and stand (optional)
- Wide variety of applications
- CE approved (230 V only)

Applications

Used for installing heat-shrinkable tubings and molded parts, SolderSleeve devices, and SolderTacts contacts.

Specifications

Steinel (120 V) power requirement	120 V, 60 Hz, 12.5 A
Steinel (230 V) power requirement	230 V, 50 Hz, 8.7 A
Rated heater element power	110V - 1500 W/230V-2000W
Weight	850 g [1.9 lb]
Cord length	Approx. 3 m [approx. 8 ft]
Typical temperature output*	49°C to 593°C [120°F to 1100°F]

* The Steinel heating tool is equipped with a variable temperature control. The correct temperature setting of the tool will vary, depending on application characteristics. The recommended procedure is to experiment with scrap materials and start with the lowest temperature range.

STEINEL is a trademark of Steinel GmbH.

Catalog 1308940
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HL1802E and HL2005E Steinel General Purpose Hot-Air Heating Tool (Continued)

Ordering Information

Model/Description	Part Number
HL1802E-Kit-120 V**	289759-000
HL2005E-230V-Euro	910424-000
HL2005E-230V-UK	629014-000
HL2005E-Kit-230-Euro**	849224-000

Accessories and Replacement Parts	Description	Part Number
SolderSleeve reflector	HL1802E-074616	832011-000
HL1802E-ADAPT for use with PR reflectors***	HL1802E-ADAPT-PR	444817-000
Tubing reflector	HL1802E-070519	022611-000
Bench stand	HL1802E-BENCH-STD	717083-000
9-mm-diameter reduction nozzle	HL1802E-070618	930321-000

** Complete with SolderSleeve reflector.
*** Selection of PR reflectors can be found on page 12-214.

Accessories

SolderSleeve reflector (Part Number 832011-000) for SolderSleeve terminators, SolderTacts contacts, and small-diameter tubing. Comes standard with Steinel heating tool.

Optional tubing reflector (Part Number 022611-000) for larger tubing and molded parts. Must be ordered separately.

Clip-on bench stand (Part Number 717083-000) for heating tool. Must be ordered separately.

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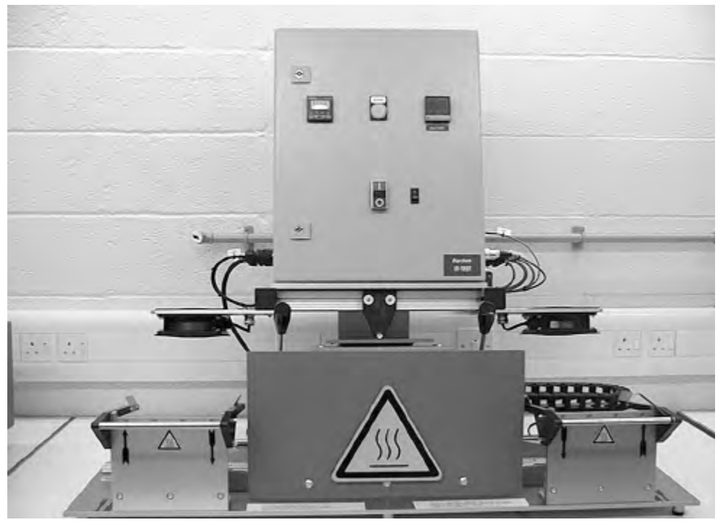
IR-1891 Shuttle Machine — Twin Workstation Heater for Multiple Installation of Short Length Tubing Products

Product Facts

- Automatic cycle start once heater is manually positioned over product, which gives improved process control (recommended for adhesive lined heat-shrinkable tubing e.g. sealing applications)
- Automatic heating head retraction at end of cycle prevents damage to components
- Multiple product fixture assemblies give increased process rates
- Cooling fan above each fixture assembly maintains holding fixture at an acceptable temperature



Applications

The IR-1891 is suitable for the installation of a range of Raychem heat-shrinkable tubing products onto a variety of small components, e.g. ring terminals, FASTON terminals and small connectors etc. The machine is provided with two work stations and a moveable heating head.

Each workstation is provided with supports for tooling fixtures (which must be specified and ordered separately). These support the workpieces and locate the tubing products. The operator loads the workpieces into the fixtures at one of the workstations, ensures that the tubing product is correctly positioned and then slides the heat head into position before initiating the heating cycle. The operator then continues with loading/unloading the other work station whilst the heating cycle is taking place.

The IR-1891-220V-Shuttle-Retn is provided with closed loop temperature control and in addition the heat head is 'locked' into position by use of an electromagnet during the heating cycle.

Once the other workstation has been loaded and the first installation is complete, the heat head is moved into position over the product and the next heating cycle initiated. Heating times vary typically from 3 to 30 seconds depending on the size and type of tubing product. Process rates up to 1200 pieces/hour can be achieved depending on the heating time and the time taken by the operator to load unload the workpieces. The installation temperature/power can be varied according to product type/size and required cycle times.

The heating elements, which are continuously energized, are of the infrared medium wave length type and consist of a coiled resistance wire contained in quartz glass tubes. The closed loop temperature control uses similar elements but having integral thermocouple sensors.

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IR-1891 Shuttle Machine — Twin Workstation Heater for Multiple Installation of Short Length Tubing Products (Continued)

Technical Specification

Electrical Supply	230 V Single Phase
Power Consumption	1600 W
Operating Temperature	650°C max
Process Rate	1200 / hour maximum depending on application and operator
Heating Times	3 to 20 seconds depending on application
System Noise	< 70 dB
Dimensions – 508636-000	L1100 x H650 x D500 mm [L43 x H25 x D20 in]
Dimensions – 613148-000 / 167309-000 / 289588-000	L1100 x H900 x D500 mm [L43 x H35 x D20 in]
Base Plate Dimensions 289588-000 / 167309-000	L1040 x D450 mm [L41 x D18 in]
Base Plate Dimensions 613148-000	L1040 x D397 mm [L41 x D16 in]

Product Range

Wide range of Raychem tubing products in particular LSTT, RNF-3000, RNF-100, HTAT, ATUM.
Maximum diameter 20 mm [0.8 in] and maximum length 60 mm [2.0 in]

Ordering Information

Description	Part Number
*IR-1891-220VShttle-Retn	289588-000
*IR-1891-220V-Retn-Syl	613148-000

* **Note:** The descriptions given here DO NOT include the supply of the necessary tooling fixtures.These are designed for each individual application.

Accessories

	Description	Part Number
Grippers:		
IR-1891-SI-GRP-165-RD-1mm	Red Gripper with 1mm hole	629602-000
IR-1891-SI-GRP-165-CL-2mm	Clear Gripper with 2mm hole	112676-000
IR-1891-SI-GRP-165-BK-3mm	Black Gripper with 3mm hole	F83221-000
IR-1891-SI-GRP-165-WT-6mm	White Gripper with 6mm hole	554196-000
Fixtures:		
IR-1891-Quick-Rel-ESS-6/1	ESS Cap (6/1) Fixture	096735-000
IR-1891-Quick-Rel-ESS-8/2	ESS Cap (8/2) Fixture	148597-000
IR-1891-Tool-Fixt-Bas-ESS	Base Unit for Fixtures	760221-000

Note: A wider range of tooling fixtures and grippers designed for previous applications are available. Please contact Tyco Electronics for details.

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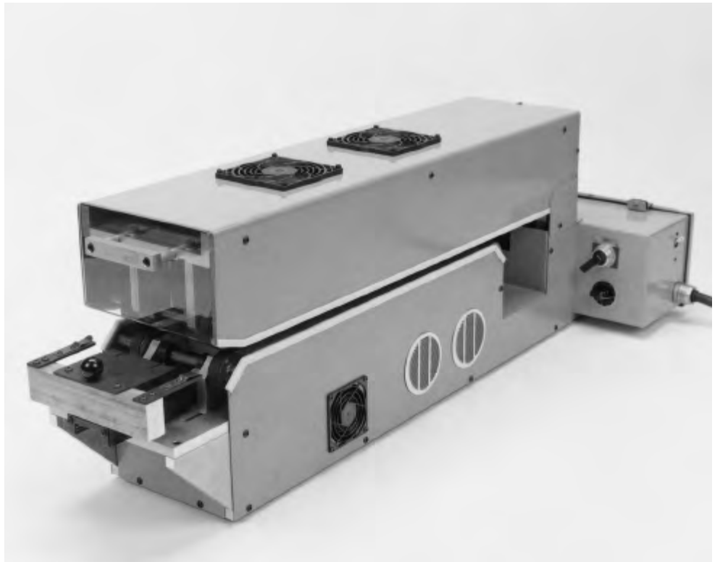
Model 16B Belt Heater

Product Facts

- Controlled heating for installation of Raychem heat-shrinkable tubing at rates required for mass production
- Controlled repeatable heating: time and temperature settings can be fixed to maintain repeatable installation parameters
- Part positioning that is clearly defined and easy to maintain
- Operation that requires only minimal skill
- Efficient and economical operation, which greatly reduces labor costs. In most cases the throughput rate is limited only by the rate at which an operator can load parts into the heater.



Applications

Designed for processing a broad range of heat-shrinkable tubing products up to 19 [75] in diameter and 101 [4.0] long. Suitable for either single-wall or adhesive-lined tubing. Heating-element temperature is adjustable up to 600°C [1112°F] and the belt speed is adjustable to 2.28 [7.5] per minute. Operator simply positions the heat-shrink tubing over the assembly and feeds it into the process chamber. Heating and cooling take place automatically with the cables or wires securely fixed.

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Model 16B Belt Heater (Continued)

Specifications and Dimensions

Electrical	Part Number 827429-000	Part Number 047143-000	Part Number 584313-000
Power requirements	120 Vac, 1 Ø, 50/60 Hz, 20 A	220 Vac, 1 Ø, 50/60 Hz, 15 A, 3-wire	230 Vac, 1 Ø, 50/60 Hz, 15 A, 4-wire
Heating elements	875 W (upper and lower)	875 W (upper and lower)	875 W (upper and lower)

Mechanical	
Conveyor belt system	Two sets of pinch belts right and left, four belts total
Machine dimensions	48 cm [19 in] W x 110 cm [43 in] L x 33 cm [13 in] H
Shipping dimensions	61 cm [24 in] W x 111 cm [44 in] L x 56 cm [42 in] H
Machine weight without crate	55 Kg [120 lb]
Shipping weight with crate	91 Kg [200 lb]

Tubing Sizes	
Inside diameter before recovery	Up to 19 mm [0.75 in]
Length	Up to 101mm [4.0 in]

Optional Attachment	
Ring terminal kit	Part Number 060053-000

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Model 19 Conveyor Heater for Processing Raychem Heat-Shrinkable Tubing and Termination Devices

Product Facts

- Closed-loop speed and temperature control
- CE approved for worldwide use
- Adaptable for different applications
- Continuous controlled process

Applications

The Model 19 conveyor heater is the latest generation of reliable and versatile process heaters for a wide variety of heat-shrinkable products.

Two sets of timing belts grip the individual assemblies and carry them through a closed-loop infrared heating zone, then through a cooling zone, and deposit the completed assemblies in a collection bin.

The processor was designed to meet the requirements of the European Safety Directives and is CE approved, allowing for worldwide use.

The processor is designed to operate on the following line voltages: 210 to 240 Vac, 20 A, 1 Ø, 50/60 Hz.

Options for this processor include:

- Powered or unpowered extension tables to support long or heavy harnesses.
- Kit for processing ring terminals and end terminations.
- Floor stand with wheels.
- Wider heating elements for tubing up to 178 [7.0] long.
- Narrow heating elements for SolderSleeve devices up to 10 [0.4] diameter and 45 [1.8] long or short length tubing less than 50 mm [2.0].

Product Features
Controlled Heating Zone

The Model 19 has two etched- foil heating elements mounted under a quartz face. Consistent heating chamber temperatures are obtained with a closed-loop temperature controller. There is a lockout on the controller to prevent unauthorized changes.

Speed Control

Consistent speed is obtained with a closed-loop speed controller. The speed is adjusted using a 3-digit thumbwheel on the front control panel. There is a lockout on the thumbwheel to prevent unauthorized changes.

Minimal Skill Requirements

There are clearly marked guides for aligning the assembly as well as the tubing or device being processed. The operator only has to center the assembly; the grippers carry it through the heating and cooling zone and deposit it into the unloading bin.

Economical Production

The throughput rate is determined by the rate at which an operator can load the processor.

Versatility

The tool description CLTEQ-M19-Belt-htr part number 714529-000 will handle tubing up to 25 [1.0] diameter and 102 [4.0] long. Tubing up to 178 [7.0] long can be handled with the use of tool description CLTEQ-M19-Belt-Htr-6in part number 075131-000. The tool description CLTEQ-M19-Beltheater-SS part number D43037-000 will handle SolderSleeve devices up to 10 [0.4] diameter and 45 [1.8] long, or short length tubing (less than 50 [2.0], where applications require a narrow heat width.

Self-Diagnostic Circuitry

There are several “self-diagnostic” circuits that alert the operator if any major component fails or if an unsafe processing condition occurs. A light will turn on and a lockout gate will lift in the entry zone, preventing the operator from loading assemblies until the situation has been corrected.

Other Features Include:

- Emergency stop.
- Automatic cool-down circuit to extend the life of components.
- Lockout on temperature and speed controllers to prevent unauthorized changes.

Catalog 1308940
Revised 8-06

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

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USA: 1-800-522-6752
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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Model 19 Conveyor Heater for Processing Raychem Heat-Shrinkable Tubing and Termination Devices (Continued)

Specifications and Dimensions

Electrical	
Power requirements	210–240 Vac, 20 A, 1 Ø, 50/60 Hz
Heating elements	Std = 3160 W/Wide = 3320 W/Narrow = 1760 W

Mechanical	
Conveyor belt system	Double-sided timing belts, pitch - 9.5 [0.375]
Belt speed	Up to 152 cm/min [5.0/min]
Processor dimensions	53 cm [21 in] W, 135 cm [53 in] L, 45 cm [18 in] H
Shipping dimensions	66 cm [26 in] W, 147 cm [58 in] L, 58 cm [23 in] H
Shipping weight with crate	86 Kg [190 lb]

Tubing sizes	
Tubing diameter (max)	25 mm [1.0 in]
Tubing length (max)	102 mm [4.0 in] 178 mm [7.0 in] wide heating element tool 50 mm [2.0 in] narrow heating element tool
Work-piece length (min)	240 mm [9.5 in]

Version	Part Number
Model 19 Standard	714529-000
Model 19 Wide	075131-000
Model 19 Narrow	D43037-000

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Model 81CE Discrete Heater

Product Facts

- Closed-loop temperature control for a precise and repeatable thermal process
- Oven dwell time precisely set by a 3-digit thumb wheel digital timer
- Heat output can be controlled to accommodate a wide variety of applications
- Operation requires only minimal skill
- Contains numerous safety features
- Meets the requirements of CE, OSHA and the NEC

Applications

The Model 81CE is a discrete heater that can process large, complex assemblies or other suitable substrates using a wide variety of heat-shrinkable tubing products up to 25 mm [1.0] in diameter and 127 mm [5.0] in length. It is suitable for use with both single wall and adhesive-lined tubing. Two jaws grip the assembly or substrate, carry it into an infrared heating chamber for a user-selectable predetermined period of time, then return the completed assembly back to the start position for removal.

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Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Model 81CE Discrete Heater (Continued)

Specifications and Dimensions

Electrical	Part Number 071965-000	Part Number 704393-000
Power requirements	120 VAC, 1Ø, 50/60 Hz, 15 A	220 VAC, 1Ø, 50/60 Hz, 15 A
Heating elements	Two 400 watt infrared stamped foil with infrared heating elements, one top and bottom.	Two 400 watt infrared stamped foil with infrared heating elements, one top and bottom.
Timing system	Eagle digital timer, 1 to 999 seconds	Eagle digital timer, 1 to 999 seconds
Pneumatic		
Requirements for jaw traverse	30-40 psi clean shop air	30-40 psi clean shop air
Dimensions		
Control box dimensions:		
Length	432 mm [17 in]	432 mm [17 in]
Width	216 mm [9 in]	216 mm [9 in]
Height	165 mm [7 in]	165 mm [7 in]
Control box weight	7.7 Kg [17 lb.]	7.7 kg [17 lb.]
Heating chamber dimensions:		
Length	380 mm [15 in]	380 mm [15 in]
Width	240 mm [10 in]	240 mm [10 in]
Height	343 mm [14 in]	343 mm [14 in]
Heating chamber weight	18 Kg [40 lb.]	18 kg [40 lb.]
Shipping Dimensions		
Length	610 mm [24 in]	610 mm [24 in]
Width	610 mm [24 in]	610 mm [24 in]
Height	530 mm [21 in]	530 mm [21 in]
Shipping weight	41 Kg [90 lb.]	41 kg [90 lb.]
Tubing Sizes		
Inside diameter before heat	Up to 25.4 mm [1 in]	Up to 25.4 mm [1 in]
Length	Up to 127 mm [5 in]	Up to 127 mm [5 in]

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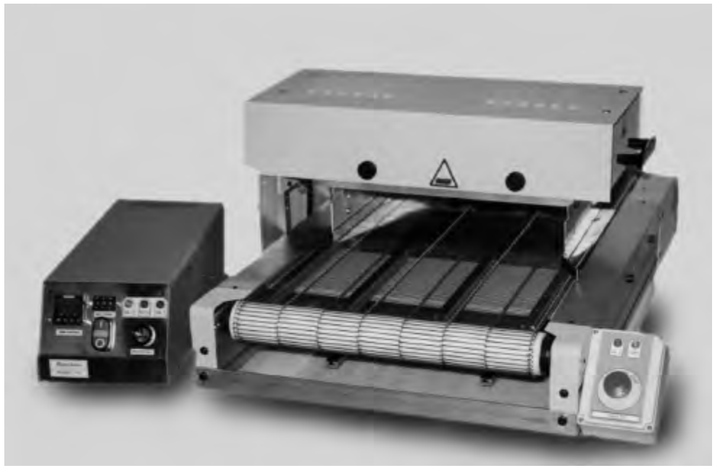
Model 105 Tunnel Oven

Product Facts

- Closed-loop temperature control for a precise and repeatable thermal process
- Conveyor speed precisely set by a 3-digit potentiometer
- Operation requires only minimal skill
- Contains numerous safety features
- Custom length conveyors for longer entry and/or exit sections available
- Optional accessories to customize the tunnel oven



Applications

Table conveyor heater that provides a controlled process system suitable for installing a wide variety of heat-shrinkable tubing products up to 76 mm [3.0] diameter and unlimited in length. Ideally suited for efficient processing of fiber and fabric HFT and both single wall and dual wall tubing. Designed as an integrated modular unit. Assemblies are placed on the entry section of a mesh belt, transported through a heating chamber, across a bank of cooling fans then discharged from the rear of the conveyor.

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Model 105 Tunnel Oven (Continued)

Specifications and Dimensions

Electrical	Part Number 955018-000
Power requirements	208/240 VAC, 1Ø, 50/60 Hz, 15 A
Heating elements	Two 1500 watt infrared stamped foil with black quartz face, one top and bottom
Operating temperature	Ambient to 650°C [1202°F]
Drive System	DC motor with SCR drive controller and 3 digit speed potentiometer
Conveyor Speed	0.06 M/min. to 1.5 M/min. [0.20 to 5.0 ft/min]
Conveyor Belt	Wire mesh 70% open
Heater Oven Gap	2 Position; 53.6 mm [2.11 in] Lower Position, 98 mm [3.86 in] Upper Position
Effective heating width	356 mm [14 in]

Dimensions	
Control box dimensions	
Length	515 mm [20 in]
Width	210 mm [8 in]
Height	178 mm [7 in]
Control box weight	7.7 Kg [17 lb]
Heating conveyor dimensions	
Length	990 mm [39 in]
Width	685 mm [27 in]
Height	417 mm [17 in]
Heating conveyor weight	68 Kg [150 lb]

Shipping Dimensions	
Length	1346 mm [53 in]
Width	1168 mm [46 in]
Height	635 mm [25 in]
Shipping weight	146 Kg [320 lb]

Tubing sizes	
Inside diameter before heat	Up to 76.2 mm [3 in]
Length	
Perpendicular to belt travel	356 mm [14 in]
Parallel to belt travel	Unlimited

Optional Accessories

- Powered outboard conveyor for processing large assemblies that require only a portion of the assembly to be heated (1 side only).
- Powered entry and exit conveyors for processing long and rigid assemblies requiring entry and exit support of the product.
- Ability to add additional heater chambers to extended custom length wire mesh conveyors.
- Custom floor stands.

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ThermoGun HG Hot-Air Heating Tool

Product Facts

- Stand-mounted or handheld, rugged unit for heavy-duty use
- Built-in stand and turbo-fan-driven blower
- Adjustable side vents
- Adjustable temperature
- 1680 to 2160 watts
- Large reflector size
- High heat output for fast installation

Applications

Used for installing molded parts onto adapters or harnesses and installing a broad range of heat-shrinkable products, including boots and tubing up to three inches in diameter.

Specifications

Model	Power Requirements	Input Watts	Temperature Range	CFM*	RPM**
HG-501A	120 V, 60 Hz, 14 A	1680	260°C–399°C [500°F–750°F]	23	1700
HG-502A	230 V, 50/60 Hz, 7 A	1680	260°C–399°C [500°F–750°F]	23	1700
HG-751A-C	120 V, 60 Hz, 18 A	2160	399°C–538°C [750°F–1000°F]	23	1700
HG-752A	230 V, 50/60 Hz, 9 A	1740	399°C–538°C [750°F–1000°F]	23	1700

* CFM = Cubic feet per minute.
** RPM = Revolutions per minute.

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ThermoGun HG Hot-Air Heating Tool (Continued)

Accessories

A-160-HG reflector (Part Number 991017) for short lengths of tubing up to 19.05 [75] in diameter. Must be ordered separately.

A-170-HG reflector (Part Number 991018) for short lengths of tubing 19.05–50.8 [.75–2] in diameter. Must be ordered separately.

TG-23 reflector (Part Number 991026) for boots up to 44.45 [1.75] in diameter. Must be ordered separately.

Ordering Information

Model*	Housing Color	Part Number
HG-501A	Red	462047-000
HG-502A	Red	389363-000
HG-751A-C	Red	926935-000
HG-752A	Red	026239-000

Accessories	Tubing Application	Part Number
A-160-HG standard reflector	Diameters up to 19.05 mm [0.75 in]	991017-000
A-170-HG large tubing reflector	Diameters of 19.05–50.8 mm [0.75–2 in]	991018-000
TG-23 small boot reflector	Diameters up to 44.5 mm [1.75 in]	991026-000
TG-24 large boot reflector	—	991027-000

* Complete with bench stand.

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Unique Identification Program (UID)

Introduction

What is Unique Identification?

The UID program is designed by the Department of Defense (DoD) to enhance total asset visibility, improve life cycle item management and accountability, and enable clean financial audits.

UID DataMatrix is a globally unique and unambiguous mark that ensures data integrity and data quality throughout its life and supports multi-faceted business applications and users. The technology used to mark an item is the 2D DataMatrix ECC 200 Symbol.

Design

Tyco Electronics software & hardware (printers, ribbons) are capable of producing a high quality UID mark on Tyco Electronics labels and cable identification products. PrintEasy is powerful label design and printing software with DataMatrix capability and several enterprise database connectivity options for your UID printing and storage needs.

Print

The Tyco Electronics T300 Series and T400 Series thermal transfer printer range is specially designed to print on specialty label and cable identification products. These high performance, heavy duty printers provide crisp, high quality DataMatrix marks for your UID applications.

Read

DataMatrix symbols require a special 2-dimensional reader. Ordinary linear bar code scanners cannot read DataMatrix symbols used in UID. Tyco Electronics offers both standard (BSC-200) and high resolution (VLD-100) two dimensional readers.

Validate

To validate that construction of the UII string is correct per the MIL spec, Tyco Electronics offers validator products. The VLD-100 validator is a simple point and shoot imager that validates UII constructs. Simply scan the DataMatrix mark and know if the encoded information is to the spec or not!

Verify

To conform to quality standards called out in the MIL specifications, Tyco Electronics offers fixed mount verifiers that grade the UID code for its quality conformance. Detailed UID reports with the bar code pictures can be archived for future reference.

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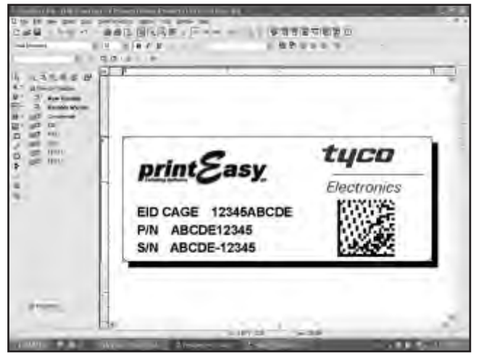
Unique Identification Program (UID)

Design

Product Facts

- **Support for 2D DataMatrix code, unlimited width & height**
- **Easy entry of special and unprintable control characters**
- **Excellent database connectivity options including Microsoft ODBC support including: Access, Btrieve, dBase, Excel, Oracle, Paradox, Clipper, FoxPro, Interbase, ASCII text files, SAP (mySAP.com and R/3)**
- **Variety of functions including concatenate, sequentially numbered variables and support for custom programming including visual basic scripting**
- **Minimum recommended computer configuration:**
  Computer — IBM compatible PC
  Processor — Intel Pentium processor, 200 MHz minimum
  Ram — 64 MB
  Operating System — 32-bit Windows 95, 98, ME, NT (Service Pack 6), 2000 or XP
  Disk Space Required — 50 to 205B free hard disk space (depending on edition used and options)
  Format — CDROM



Tyco Electronics PrintEasy software is powerful yet easy to use Windows based label design and printing software. With PrintEasy software, you can quickly and easily combine 2D DataMatrix text and graphics into professional quality labels. Carefully organized menus and pop-up dialogs display all your options in plain, easy to understand words.

The true WYSIWYG display allows you to create and view your labels with precision, giving you total control over your labels' appearance before printing. PrintEasy software is ideal for use with the Tyco Electronics range of thermal transfer printable pressure sensitive label products. PrintEasy software is pre-loaded with all of Tyco Electronics standard thermal transfer label templates, which allows you to simply select the Tyco Electronics part number you want to print and you are ready to go.

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T312M & T312S Series High Performance, Cost-Effective Thermal Transfer Printers

The T300 series printers are high performance, yet cost-effective thermal transfer printers with a 4.1" printhead. The rugged and durable metal construction makes them suitable for demanding industrial and commercial environments. The enhanced memory and 32 bit processor provide fast data processing and print speeds. Optional accessories are available for added convenience and efficiency.

The 300 dpi printhead on the T312M and T312S produces crisp, high quality text, bar codes and graphic images on Tyco Electronics thermal transfer printable cable identification and labeling products.

Printer Specifications

Print Head Width — 104 mm [4.09"]

Print Head Resolution — T312M/T312S*: 12 dpmm [305 dpi]

Print Speed (Maximum) — T312M/T312S: 203 mm/sec [8 inch/sec]

Media Sensor — Transmissive (adjustable) Reflective (fixed)

Memory — T312M/T312S: 6MB DRAM and 2MB Flash

Communication Interface — Bi-directional parallel (Centronics) and serial (RS232)

Printer Dimensions — T312M/T312S: 283 mm W x 495 mm D x 394 mm H [11.2" W x 19.5" D x 15.5" H]

Printer Weight — T312M/T312S: 25 kg [55 lbs]

Shipping Weight — T312M/T312S: 29 kg [63 lbs]

Media Specifications

Maximum Print Width — 104 mm [4.09"]

Maximum Media Width — 114 mm [4.48"]

Minimum Media Width — T312M/T312S: 20 mm [0.76"]

Maximum Media Roll Dia. — 203 mm [8.0"]

Media Core Diameter — 76 mm [3.0"]

Ribbon Wind — Ink side out

*Not available in Europe, Middle East or Africa

Product Order Code	Description
T312M-PRINTER	T312M thermal printer — standard
T312M-R-PRINTER	T312M thermal printer — internal rewind option
T312S-PRINTER	T312S thermal printer — standard
T312S-C-PRINTER	T312S thermal printer — cutter option
T312S-R-PRINTER	T312S thermal printer — internal rewind option

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Print (Continued)

The T424 Series printers are high performance thermal transfer printers suitable for a variety of mission critical applications.

With the highest print resolution of 600 dpi, the T424S produces unmatched quality of crisp, high quality text, bar codes and graphic images in a limited space — ideal for printing linear and DataMatrix codes on Tyco Electronics thermal transfer printable pressure sensitive label products.

Printer Specifications

Print Head Width — T424S* — 81 mm [3.2"]

Print Head Resolution — T424S* — 23.5 dpmm [600 dpi]

Print Speed (Maximum) — T424S — 102 mm/sec [4 inch/sec]

Media Sensor — Transmissive and reflective Reflective (fixed)

Memory — 16MB SDRAM and 4MB Flash

Communication Interface — Bi-directional parallel (Centronics), serial (RS232), and USB 2.0

Printer Dimensions — T424S* — 263.5 mm W x 495.3 mm D x 393.7 mm H [10.37" W x 19.5" D x 15.5" H]

Printer Weight — T424S* — 22.7 kg [50 lbs]

Shipping Weight — T424S* — 27 kg [59 lbs]

Media Specifications

Maximum Print Width — T424S* — 81 mm [3.2"]

Maximum Media Width — T424S* — 114 mm [4.5"]

Minimum Media Width — T424S* — 20 mm [0.76"]

Maximum Media Roll Dia. — 203 mm [8.0"]

Media Core Diameter — 76 mm [3.0"]

Ribbon Wind — Ink side out

Product Order Code	Description
T424S-PRINTER	T424S thermal printer — standard*

*Not available in Europe, Middle East or Africa

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UK: 44-208-420-8341

BSC-200 Hand Held Imager

Basic Imager for Bar Codes and 2D Symbols

The BSC-200 imager is a portable hand held solution for reading both linear bar codes and 2D symbols. The BSC-200 reads a wide range of bar code symbols created from a variety of printing and marking methods.

Read Area

The BSC-200 imager's advanced "dual decode zone" technology allows the user to easily capture 2D symbols and linear bar codes at varying distances from 2 to 20" (50.8 to 508 mm). This wide read area allows the symbols to be decoded fast and reliably.

Fast processing speeds also add to the BSC-200's ability to acquire and decode multiple symbologies, with no adjustment of the imager required.

Ease of Use

BSC-200 imagers feature point-and-click targeting with a red laser spot to quickly center the symbol in the field of view. Beeper, vibrator and multi-purpose LEDs provide real-time feedback to signal successful decoding.

Applications

The BSC-200 imager is a strong reading solution for applications needing to read linear bar codes and 2D symbologies with a portable handheld device.

System Integration

BSC-200 imagers are available in 2 configuration options:

- Batch: A wireless way to collect thousands of decoded symbols for later download, capable of performing more than 4000 reads from a single battery charge and buffers a minimum of 1 MB of data in non-volatile memory.(battery purchased separately)
- Cabled: Cabled units include USB, RS-232. (RS-232 available through the purchase of optional connector kit — contact Tyco Electronics)

Symbologies

The BSC-200 automatically discriminates between all major 2D matrix and linear bar code symbologies, and offers time stamp capabilities for logging data. Symbologies include:

2D Symbologies

- MaxiCode
- QR Code
- Aztec Code
- DataMatrix (ECC 200)

Stacked Symbologies

- UCC Composite
- PDF417 (with Macro support)
- Micro PDF417

Linear Bar Codes

- Codabar
- Codablock F
- GoCode
- Code 93
- RSS
- Code 39
- Code 128
- Standard postal codes
- UPC/EAN/JAN
- Int 2 or 5

BSC-200 Accessories

- Long-life 1300 mA lithium-ion battery
- Two-bay battery charger
- RS-232 kit

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

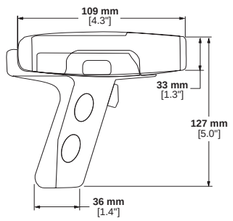
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

BSC-200 Hand Held Imager
(Continued)

Imager Mechanical
Height — 33 mm [1.3"]
Width — 46 mm [1.8"]
Depth — 109 mm [4.3"]
Weight — 71.5 g [2.5 oz.]
not including cable

Handle Mechanical
Height — 96.5 mm [3.8"]
Width — 30 mm [1.2"]
Depth — 36 mm [1.4"]
Weight — 59.8 g [1.2 oz.]

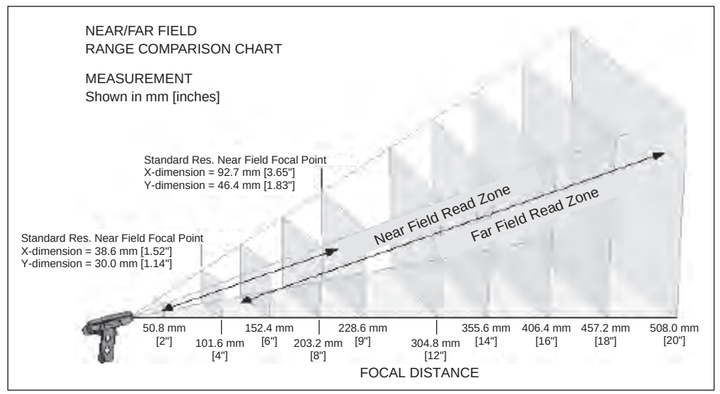
Additional Physical Characteristics
Battery Weight — 59.5 g [2.1 oz.]
Battery Blank — 13.6 g [.5 oz.]
Cable Length — 1.8 m [6']



Environmental Characteristics
Operating Temperature —
0° to 40°C [32° to 104°F]
Storage Temperature —
–20° to 60°C [–4° to 140°F]
Humidity —
5 to 90% (non-condensing)

CE Standards
Immunity — EN55024
ESD — EN61000-4-2
Radiated RF — EN61000-4-3
Keyed Carrier — ENV50204
EFT — EN61000-4-4
Conducted RF — EN61000-4-6
Emissions — EN55022, Class B
Radiated, Class B Conducted

Read (Continued)



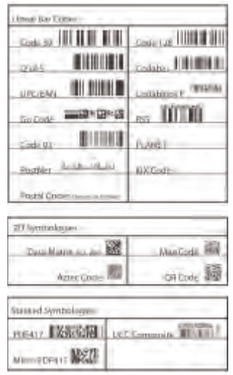
Read Ranges, Standard Resolution

Narrow Bar-Width	Read Range Distance
.191 mm [.0075"]	81 to 99 mm [3.2 o 3.9"]
.381 mm [.015"]	76 to 229 mm [3.0 to 9.0"]
.508 mm [.020"]	76 to 292 mm [3.0 to 11.5"]

Field of View, Standard Resolution

Distance inches [mm]	Decode Zone (1024 x 640 pixel, Default)
Near: 101.6 [4"]	38.6 x 30 mm [1.52 x 1.14"]
Far: 228.6 [9"]	92.7 x 46.4 mm [3.65 x 1.83"]

Symbology Types



Light Collection Options
Sensor — CMOS, progressive scan, 1.33 MP (1024 by 1280) 256 gray scale
Field of View —
Near — 21.5° horizontal by 16.2" vertical
Far — 22.9° horizontal by 11.6" vertical
Standard Resolution Focal Point —
Near — 101.6 mm [4"]
Far— 228.6 mm [9"]
Sensor Array —
Near field — 1024 by 640
Far field — 1024 by 640

Communication Protocols
Standard Interface — USB
Optional Interface — RS-232

Indicators
Status Indicators — Memory status, Battery power, Successful decode, and Connection status
Programmable Indicators — Beeper or Vibrate option; communicates scanner operation and communication functions to user

Image Output Options
Format — JPEG, Raw (uncompressed)
Time Stamp — Interval logging

Read Parameters
Pitch — ±60° (front to back)
Skew — ±60°
Tilt — 360°
Focal Range —
102 to 508 mm [4 to 20]
Rotational Tolerance — ±180°
Print Control Resolution — 25% (bar codes); 35% (PDF417); absolute dark/light reflectance differential, measure at 650 nm.
Target Beam — Visible Laser Diode at 630 nm, Class 2
Ambient Light Immunity — Sunlight: up to 9,000 ft. candles 96,890 lux
Shock — Withstands multiple drops of 2 meters [6.5'] to concrete

Electrical Characteristics
Power Requirements — 5 VDC (mA)
Typical — 310
Peak — 310
Sleep — 3

Safety Certifications
Designed for: FCC, CE

ISO Certification
Issued by RWTüV, USA Inc.
ISO 9001:2000 — Cert. No. 03-1212

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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VLD-100 Hand Held Imager/Validator

The VLD-100 Imager/ Validator is optimized to read both linear bar codes and 2D symbols. It is an aggressive hand held imager/validator for decoding symbols on low contrast substrates such as metal, plastic, rubber, polyester, vinyl, Kapton, polyvinyl fluoride and glass. The VLD-100 can read marking methods such as dot peen, thermal transfer and laser/ chemical etch. Containing custom optics and Tyco Electronics' decode algorithms, the VLD-100 combines the decoding power of Tyco Electronics' popular smart camera, VRF-100, into a portable hand held device.

Optical Options

The VLD-100 hand held imager/validator is available in:

- The high resolution version is custom designed to optimize resolution for reading small 2D symbols.

LightRay Optics Accessory

Tyco Electronic's LightRay Optics solution further enhances its ability to read directly marked parts. By directing the illumination toward the symbol at off-axis angles, the LightRay Optics increase symbol contrast and filters out texture noise. The LightRay Optics are designed so that it is positioned at the correct focal distance and angle. No training is needed to find the best angles for reading low contrast symbols. Either optical accessory easily attaches on to the end of the VLD-100. Two options are available: the LightRay Optics 100 Series and the LightRay Optics 200 Series.

Ease of Use

The VLD-100 features point-and-click targeting with a red laser spot to quickly center the symbol in the field of view. Beeper, vibrator and multi-purpose LEDs provide real-time feedback to signal successful decoding.

Applications

The VLD-100 provides outstanding performance validating challenging 2D codes.

Automotive and Aerospace: reads codes marked on steel, iron, aluminum, rubber, and glass parts by laser etch, dot peen, metal stamp, and thermal transfer products.

Electronics: reads codes laser etched on printed circuit boards and components.

Department of Defense: reads UID codes on a variety of substrates. Software enables it to validate UII code format for suppliers and constructs the UID string for DoD operators

System Integration

All Tyco Electronics imagers are available in 2 configuration options:

- Batch: A wireless way to collect thousands of decoded symbols for later download, capable of performing more than 4000 reads from a single battery charge and buffer a minimum of 1 MB of data in non-volatile memory.
- Cabled: Cabled units include USB, RS-232. (RS-232 available through the purchase of optional connector kit — contact Tyco Electronics)

Symbologies

The VLD-100 imager/validator reads all standard linear bar codes plus:

2D Symbologies

- DataMatrix (ECC 0200)
- QR Code
- MaxiCode
- Aztec Code

Stacked Symbologies

- UCC Composite
- PDF417 (Macro Support)
- Micro PDF417

LightRay Optics 100 Series generates off-axis diffuse illumination

LightRay Optics 200 Series generates dark field illumination

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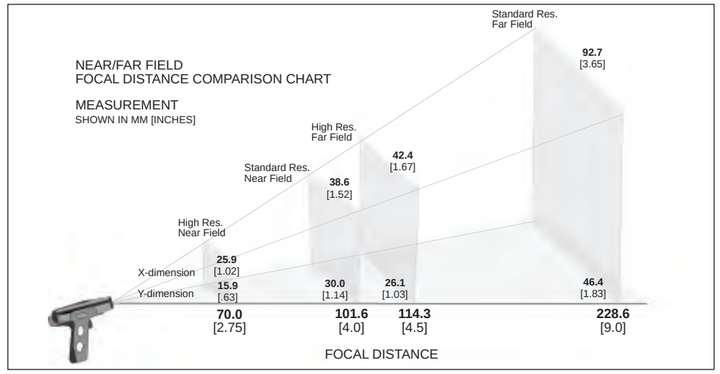
Validate (Continued)



VLD-100 Hand Held Imager/Validator (Continued)

Imager Mechanical

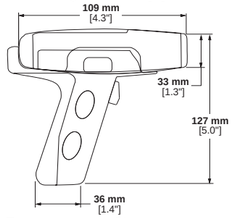
Height — 33 mm [1.3"]
Width — 46 mm [1.8"]
Depth — 109 mm [4.3"]
Weight — 71.5 g [2.5 oz.] not including cable

Handle Mechanical

Height — 96.5 mm [3.8"]
Width — 30 mm [1.2"]
Depth — 36 mm [1.4"]
Weight — 59.8 g [1.2 oz.]

Additional Physical Characteristics

Battery Weight — 59.5 g [2.1 oz.]
Battery Blank — 13.6 g [.5 oz.]
Cable Length — 1.8 m [6']



Environmental Characteristics

Operating Temperature — 0° to 40°C [32° to 104°F]
Storage Temperature — –20° to 60°C [–4° to 140°F]
Humidity — 5 to 90% (non-condensing)

CE Standards

Immunity — EN55024
ESD — EN 61000-4-2
Radiated RF — EN61000-4-3
Keyed Carrier — ENV50204
EFT — EN61000-4-4
Conducted RF — EN61000-4-6
Emissions — EN55022, Class B Radiated, Class B Conducted

Symbology Types

Linear Bar Codes — Code 39, Code 128, 12 of 5, RSS, UPC/EAN, Codabar, Codablock F, Go Code, Code 93, PLANET, PostNet, KIX code, Postal Codes
Stacked Symbologies — PDF 417, UCC Composite, Micro DF417
2D Symbologies — DataMatrix, MaxiCode, Aztec Code, QR Code
Note: VLD mode decodes DataMatrix ECC 0-200 and QR code only. Basic model decodes DataMatrix ECC 200 plus all other listed symbologies.

Indicators

LED Indicators — Memory status, Battery power, Successful decode, and Connection Status
Programmable Indicators — Beeper or Vibrate option; communicates scanner operation and communication functions to user

Image Output Options

Format — JPEG, Raw (uncompressed)
Time Stamp — Interval logging

Light Collection Options

Sensor — CMOS, progressive scan, 1.33 MP (1024 by 1280) 256 gray scale
High Resolution Field of View — Near and Far: 21° horizontal by 13° vertical
High Resolution Focal Point — Near: 70 mm [2.75"] Far: 115 mm [4.5"]
Sensor Array — Near Field: 1024 by 640 (default) Far Field: 1024 by 640 (default)

Communication Protocols

Standard Interface — USB
Optional Interface — RS-232

Electrical Characteristics

Power Requirements — 5 VDC (mA)
Typical — 310
Peak — 310
Sleep — 3

Safety Certifications

Designed for: FCC, CE

ISO Certification

Issued by RWTüV, USA Inc.
ISO 9001:2000 — Cert. No. 03-1212

Read Parameters

Pitch — ±60° (front to back)
Skew — ±60°
Tilt — 360°
Focal Range — 1 to 20 [25 to 508 mm]
Rotational Tolerance — ±180°
Print Control Resolution — 25% (bar codes); 35% (PDF417); absolute dark/light reflectance differential, measure at 650 nm.
Target Beam — Visible Laser Diode at 630 nm, Class 2
Ambient Light Immunity — Sunlight: up to 9,000 ft. candles 96,890 lux
Shock — Withstands multiple drops of 2 meter [6.5'] to concrete

Read Ranges, High Resolution

Narrow Bar-Width	Read Range Distance
.127 mm [.005"]	44.4 to 101.6 mm [1.75 to 4"]
.191 mm [.0075"]	44.4 to 101.6 mm [1.75 to 4"]
.254 mm [.010"]	44.4 to 120.6 mm [1.75 to 4.75"]
.381 mm [.015"]	44.4 to 152.4 mm [1.75 to 6"]
.508 mm [.020"]	44.4 to 165.1 mm [1.75 to 6.5"]

Read Ranges with LightRay Optics

LightRay Options	Read Range Distance
LightRay 100 Series	Contact to 6.35 mm [.25"]
LightRay 200 Series	Contact to 6.35 mm [.25"]

High Resolution, Near Field of View

Distance mm [inches]	Field of View Size (1024 x 640 pixel, Default)
50.8 mm [2"]	18.8 x 11.6 mm [.74 x .46"]
63.5 mm [2.5"]	23.5 x 14.5 mm [.93 x .57"]
69.9 mm [2.75"]	25.9 x 15.9 mm [1.02 x .63"]
76.2 mm [3"]	28.3 x 17.4 mm [1.11 x .68"]
88.9 mm [3.5"]	33.0 x 20.3 mm [1.30 x .80"]
101.6 mm [4"]	37.7 x 23.2 mm [1.48 x .91"]

High Resolution, Far Field of View

Distance mm [inches]	Field of View Size (1024 x 640 pixel, Default)
50.8 mm [2"]	18.8 x 11.6 mm [.74 x .46"]
63.5 mm [2.5"]	23.5 x 14.5 mm [.93 x .57"]
76.2 mm [3"]	28.2 x 17.4 mm [1.11 x .68"]
88.9 mm [3.5"]	32.9 x 20.3 mm [1.30 x .80"]
101.6 mm [4"]	37.6 x 23.2 mm [1.48 x .91"]
114.3 mm [4.5"]	42.4 x 26.1 mm [1.67 x 1.03"]
127 mm [5"]	47.1 x 28.9 mm [1.85 x 1.14"]
139.7 mm [5.5"]	51.8 x 31.8 mm [2.04 x 1.25"]
152.7 mm [6"]	56.5 x 34.7 mm [2.22 x 1.37"]
165.1 mm [6.5"]	61.2 x 37.6 mm [2.41 x 1.48"]

Field of View, LightRay Optics

LightRay Options	Field of View Size
LightRay 100 Series	Small Cir. 19.1 mm [.75"]*
LightRay 200 Series	Small Cir. 19.1 mm [.75"]*

*Large Circular TBD

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VRF-100 Production Ready DataMatrix Verifier

The VRF-100 is an ISO/IEC 15415 and AS9132-compliant DataMatrix verifier for use in production environments. The ISO/IEC 15426-2 is a certified DataMatrix verifier that helps to ensure that your marks will be verified accurately every time.

Unlike most verifiers that are mounted on stands designed for the lab environment, the VRF-100 Verifier is a fully-contained, compact device that is easy to integrate into the production environment. The VRF-100 Verifier is factory-calibrated to specific traceability standards with a fully-contained housing, making it easy to integrate into existing applications. No on-site calibration of optics or lighting is needed to verify marks with the Verifier. Simply present the part to the Verifier, trigger, and receive the symbol quality report.

Production-Ready

It is the first 2D verifier designed specifically for use in a production environment. Its compact, lightweight design makes the Verifier easy to integrate into production processes. A self-contained, factory-calibrated system with flexible mounting allows the Verifier to be adapted to any application quickly and easily.

Calibrated System

It provides the user with a ready-to-use, ISO/IEC 15426-2 calibrated system. Simply present the part, trigger, and the Verifier will output the results. The user is not required to focus the optics, set the light angles. Fixed optics and pre-set illumination angles make the verifier consistent, reliable and accurate.

Illumination Chamber

The Verifier's fully-enclosed illumination chamber provides the controlled lighting environment for accurate, repeatable verification. The chamber is specifically engineered to produce the illumination angles required by the ISO/IEC 15415 standard.

VRF Software

Offers complete symbol verification reports

ISO/ICE 15426-2 Certified

The Verifier is ISO/IEC 15426-2 certified. It is precisely engineered to meet rigorous verification standards, ensuring accurate and consistent verification.

ISO/IEC 15415 Compliant

The Verifier provides verification of 2D symbols for parameters:

- Symbol contrast
- Fixed pattern damage
- Modulation
- Reference decode algorithms
- Axial non-uniformity
- Grid non-uniformity
- Unused error correction
- Print growth (ungraded)

AS9132

Verifies DataMatrix symbols in accordance with the parameters called out in the AS9132 standard:

- Quiet Zone
- Dot ovality
- Cell fill
- Contrast
- Dot center offset
- Angle of distortion
- Symbol type

MIL STD 130

Requires verification of DataMatrix symbols to both ISO/IEC 15415 and AS9132 standards as required by the MIL STD 130 specification.

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Japan: 81-44-844-8013
UK: 44-208-420-8341

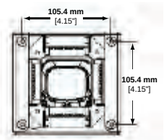
Verify (Continued)

VRF-100 Production Ready DataMatrix Verifier (Continued)

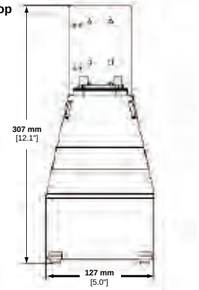
Mechanical Characteristics

Height — 307 mm [12.1"]
Width — 127 mm [5.0"]
Depth — 122 mm [4.8"]

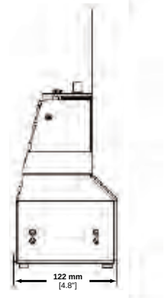
Front



Top



Side



Environmental Characteristics

Operating Temperature — 40°C [104°F] Max. (if mounted on non-metal surface)

Storage Temperature — –50° to 75°C [–58° to 167°F]

Humidity — Up to 90% (non-condensing)

Emissions/Immunity

ITE Disturbances — EN55022, 1998 (radiated and conducted), Class A

General Immunity — EN55024 — 1998 (residential)

Heavy Industrial Immunity — EN61000-6-2 — 1999

Light Source

Type — High output LEDs

External — (45°, 30°): 660 nM

Light Collection

CCD Array — 659 x 494 pixels

Symbology

DataMatrix (ECC 0-200)
Linear Bar Codes
Stacked Bar Codes

Symbol Verification Parameters

Max. Characters — 78

Verification Standards

ISO/IEC15415 (2D), AS9132

Video Input (Option)

Signal System — Progressive scan

No. of Scanning Lines — 525 lines/non-interlaced

Input — Analog 1 Vp-p

Video Output (Option)

Signal Systems — EIA

No. of Scanning Lines — 525 lines / 2:1 interlaced

Output — Analog 1 Vp-p /75 ohm

Indicators

LEDS — Read Performance, Power, Read Status, and Network Status

Beeper

Communication Protocols

Interface — RS-232, Ethernet

Electrical Characteristics

Power Requirements — Input, 10 to 28 VDC, 200 mV p-p max. ripple, 270 mA at 24 VDC (typ. CMOS), 333 mA at 24 VDC (typ. CCD)

Trigger, New Master, Input 1 — (Optoisolated) 5 to 28 VDC rated, (12 mA at 24 VDC)

Outputs 1/2/3 — (Optoisolated) 1 to 28 VDC rated, (I_{CE} < 100mA at 24 VDC, current limited by user).

Safety Certifications

Designed for: FCC, CE, cUL, UL

ISO Certification

Issued by RWTüV, USA Inc.
ISO 9001: 2000 — Cert No. 03-1212
ISO/IEC 15426-2

Pin. No.	Host RS232	Host & Aux RS232	Ethernet	In/ Out
1	Chassis ground[a]			
2	TxD			Out
3	RxD			In
4	RTS	TxD		Out
5	CTS	RxD		In
6	Output 1 (+)			Out
7	Signal Ground[b]			
8	Output 2 (+)			Out
9	Trigger (–)			In
10	Trigger (+)			In
11	Default configuration[c]			In
12	Input 1 (+)			In
13			RxD (+)	In
14			RxD (–)	In
15	Output 3 (+)			Out
16			TxD (–)	Out
17	Power Ground[d]			
18	Power +10 to 28 VDC			In
19			TxD (+)	Out
20	Output 1 (–)			Out
21	Output 2 (–)			Out
22	Output 3 (–)			Out
23	Input 1 (–)			In
24	New master (–)			In
25	New master (+)			In

[a] Chassis ground: used to connect chassis body to earth ground only. Not to be used as power or signal return.
[b] Signal ground: Used for communication and signal line grounds only. Not to be used as power or chassis return.
[c] The default is activated by connecting pin 11 to ground pin 7.
[d] Power ground: Used for power return only.

Caution: If using your own power supply, verify correct connection of power and ground lines. Incorrect connections or use of "Chassis ground," "Power ground," and "Signal ground" lines could cause equipment or software failure.

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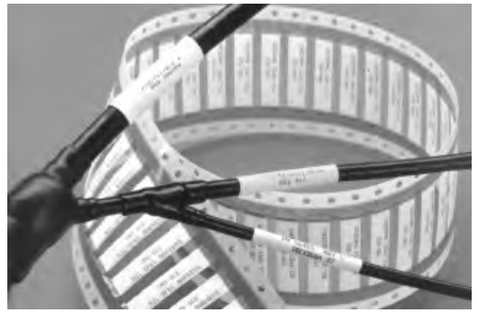
TMS-SCE — Military Grade Heat-Shrinkable Wire Identification Sleeves

Product Facts

- **Permanent identification sleeves**
- **Computer-printable**
- **Lightweight for aerospace applications**
- **Military specification material and print performance**
- **2:1 and 3:1 shrink ratio**
- **CSA Certified**
- **UL Recognized, VW all flame tubing test rated**
- **Quick recovery for heat sensitive areas**



TMS-SCE marker sleeves are designed to meet the wire and cable marking needs of manufacturers with high performance requirements. Made from durable, flame retarded, radiation-crosslinked heat-shrinkable polyolefin, TMS-SCE marker sleeves can be used in a wide variety of applications. The marker sleeves meet the performance requirements of SAE-AMS-DTL-23053/5 classes 1 and 3 and the TMS-SCE-2X products are made from tubing fully compliant with this specification. The marks are permanent immediately after printing and remain legible even when exposed to abrasion, aggressive cleaning solvents, and military fuels and oils. The sleeves meet the mark permanence requirements of SAE AS81531 4.6.2 and MIL-STD-202F both before and after shrinking.

Both 2:1 and 3:1 shrink ratios are available. The 2:1 products provide a thick, rugged sleeve wall and are particularly easy to handle. The lightweight 3:1 products provide extremely fast shrinking and cover a wider range of wire diameters, thus simplifying inventory.

The marker sleeves are designed to be printed by computer-driven dot matrix or thermal transfer printers, providing several advantages in terms of reduced errors, cycle time and cost.

Supplied in a thin, flat "ladder" format, the sleeves are held horizontally between two hole-punched polyester strips. This configuration feeds directly from the storage box into a Tyco Electronics recommended printer. Tyco Electronics-recommended ribbons should always be used. The ladder format provides automatic kitting of the marker sleeves in the desired sequence. A standard heat gun with reflector is used to shrink the sleeves onto the wire or cable.

Temperature Rating

Operating Temperature Range — –55°C to +135°C [–67°F to +275°F]

Minimum Recovery Temperature — +85°C [+185°F]

Maximum Storage Temperature — +40°C [+104°F]

Specifications/Approvals

Tyco Electronics — RW-2511

Military —
SAE-AMS-DTL-23053/5 classes1 and 3,
SAE AS81531 4.6.2,
MIL-STD-202F Method 215J

Industry —
UL Recognized — Standard 224, file E35586
CSA Certified — File 31929

Printer Information

Tyco Electronics Printer —
AM6310 (dot matrix)
T200 Series (thermal transfer, low volume)
T312M (thermal transfer)

Tyco Electronics Ribbon —
1892BK04-RIBBON (dot matrix)
TMS-101-RIBBON-4RPSCE (thermal transfer for T208M)
TMS-RJS-RIBBON-4RPSCE (thermal transfer for T312M)

Part Numbering System

TMS-SCE - 2X -1K-⅛-2.0-S1-9

- 9 — Color
- S — Scoring (optional)
- 2.0 — Sleeve length (2.0" nominal) (omit for 2X)
- ⅛ — Inside diameter, as supplied (in inches)
- 1K — Standard Pack (1,000 pieces)
- 2X — 2X is optional (2:1 shrink ratio: if left out, product will be 3:1)
- TMS-SCE — Product family

Catalog 1308940
Revised 8-06

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USA: 1-800-522-6752
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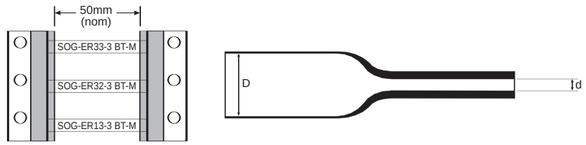
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

TMS-SCE — Military Grade Heat-Shrinkable Wire Identification Sleeves
(Continued)

Ordering Information



Available Sizes and Formats

Ordering Description	Inside Diameter Expanded D (minimum) mm	*inches*	Recovered d (maximum) mm	*inches*	Recommended Use Range mm	*inches*	Recovered Wall Thickness mm	*inches*	Weight (g/10 pcs.)
TMS-SCE-1K-3/32-2.0-<color>	2.36	*0.093*	0.79	*0.031*	0.81–1.90	*0.032–0.075*	0.53 ± 0.08	*0.021 ± 0.003*	1.50
TMS-SCE-2X-1K-3/32-<color>	2.36	*0.093*	1.17	*0.046*	1.27–1.90	*0.050–0.075*	0.64 ± 0.08	*0.025 ± 0.003*	2.04
TMS-SCE-1K-1/8-2.0-<color>	3.18	*0.125*	1.07	*0.042*	1.11–2.66	*0.044–0.105*	0.58 ± 0.08	*0.023 ± 0.003*	2.03
TMS-SCE-2X-1K-1/8-<color>	3.18	*0.125*	1.58	*0.062*	1.75–2.66	*0.069–0.105*	0.64 ± 0.08	*0.025 ± 0.003*	2.75
TMS-SCE-1K-3/16-2.0-<color>	4.75	*0.187*	1.57	*0.062*	1.75–4.06	*0.069–0.160*	0.58 ± 0.08	*0.023 ± 0.003*	2.68
TMS-SCE-2X-1K-3/16-<color>	4.75	*0.187*	2.36	*0.093*	2.54–4.06	*0.100–0.160*	0.64 ± 0.08	*0.025 ± 0.003*	3.62
TMS-SCE-1K-1/4-2.0-<color>	6.35	*0.250*	2.11	*0.083*	2.31–5.46	*0.091–0.215*	0.58 ± 0.08	*0.023 ± 0.003*	3.51
TMS-SCE-2X-1K-1/4-<color>	6.35	*0.250*	3.18	*0.125*	3.81–5.46	*0.150–0.215*	0.64 ± 0.08	*0.025 ± 0.003*	5.94
TMS-SCE-1K-3/8-2.0-<color>	9.53	*0.375*	3.18	*0.125*	3.47–8.12	*0.137–0.320*	0.61 ± 0.08	*0.024 ± 0.003*	5.04
TMS-SCE-2X-1K-3/8-<color>	9.53	*0.375*	4.75	*0.187*	5.59–8.12	*0.220–0.320*	0.64 ± 0.08	*0.025 ± 0.003*	8.50
TMS-SCE-1K-1/2-2.0-<color>	12.70	*0.500*	4.22	*0.166*	4.64–10.79	*0.183–0.425*	0.61 ± 0.08	*0.024 ± 0.003*	6.81
TMS-SCE-2X-1K-1/2-<color>	12.70	*0.500*	6.35	*0.250*	6.99–10.79	*0.275–0.425*	0.64 ± 0.08	*0.025 ± 0.003*	11.45
TMS-SCE-1K-3/4-2.0-<color>	19.05	*0.750*	6.35	*0.250*	6.99–16.25	*0.275–0.640*	0.61 ± 0.08	*0.024 ± 0.003*	12.03
TMS-SCE-2X-1K-3/4-<color>	19.05	*0.750*	9.53	*0.375*	10.16–16.25	*0.400–0.640*	0.76 ± 0.08	*0.030 ± 0.003*	20.63
TMS-SCE-1K-1-2.0-<color>	25.40	*1.000*	8.46	*0.333*	9.29–21.59	*0.366–0.850*	0.64 ± 0.08	*0.025 ± 0.003*	15.35
TMS-SCE-1K-1 1/2-2.0-<color>	38.10	*1.500*	19.05	*0.750*	20.95–33.02	*0.825–1.300*	0.51 ± 0.08	*0.020 ± 0.003*	27.51
TMS-SCE-1K-2-2.0-<color>	50.80	*2.000*	25.40	*1.000*	27.94–44.95	*1.100–1.750*	0.64 ± 0.08	*0.025 ± 0.003*	47.27
TMS-SCE-1K-2 1/4-2.0-<color>	57.15	*2.250*	19.05	*0.750*	22.32–50.80	*0.880–2.000*	0.76 ± 0.08	*0.030 ± 0.003*	42.06

Total width as supplied 90.18 mm (3.550 inches) including tape and carrier width.

Options

Prescoring	Perforated score to produce multiple markers from each sleeve.								
	Number of prescores		1 prescore		2 prescores		3 prescores		
	Code		S1		S2		S3		
Package sizes	Standard		1K — 1000-piece packs						
	Nonstandard		Smaller and larger pack sizes are available. Please contact Tyco Electronics.						
	Fanfolded		Fanfolded option available for use with dot matrix printers						
Colors	Standard	Yellow	White						
	Code	4	9						
	Nonstandard	Red	Pink	Orange	Green	Blue	Violet	Gray	Black
	Code	2	2L	3	5	6	7	8	0
	Note: 2X products meet the color requirements of MIL-STD-104 class 1; otherwise colors are pastel for print contrast.								
Ordering information:	Specify product name, pack size, sleeve size, prescore format, and color.								
Ordering example:	TMS-SCE-1K-1/8-2.0-S1-9 (scored once)								

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Heat Shrink/Cable Markers (Continued)

CM-SCE — Polyolefin Tie-On-Cable Marker Tags

Product Facts

- **Side entry provides access to big size and wire bundles as well as retrofit and repair capability**
- **Highly flame-retardant**
- **Highly resistant to abrasion, mechanical abuses, fluids, lubricants and solvents**
- **Ease of use: markers can be easily removed from the carrier**
- **Easy installation: only standard cable tie-wraps are needed to install markers. No extra steps required.**
- **Excellent print permanence when printing on the rough side of the marker**

CM-SCE markers are flat, rigid, non-adhesive labels that can be used to identify large cables and wire bundles in environments such as military and aerospace. Marker tags are applied to cables or wire bundles with cable ties.

Print performance meets or exceeds the requirements of SAE AS81531 4.6.2 and MIL-STD-202F.

Temperature Rating

Operating Temperature Range —
–55°C to +135°C [–67°F to +275°F]

Specifications/Approvals

Tyco Electronics — RW-2513

Military —
Mark permanence — SAE AS81531 4.6.2
Solvent resistance — MIL-STD-202F
Method 215J

Printer Information

Tyco Electronics Printer —
AM6310 (dot matrix)
T312M (thermal transfer)

Tyco Electronics Ribbon —
1892BK04-RIBBON (dot matrix)
1966-RIBBON (thermal transfer)

Part Numbering System

CM-SCE - 2.5K -¼ - 4H-9

- 9 — Color
- 4H — Tie-wrap holes
- ¼ — Markable height of marker (in.)
- 2.5K — Pack size
- CM-SCE — Product family

Catalog 1308940
Revised 8-06

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CM-SCE — Polyolefin Tie-On-Cable Marker Tags (Continued)

Ordering Information

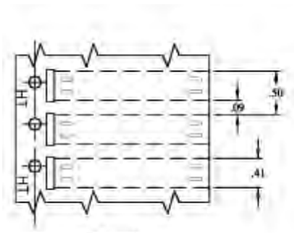

Figure 1
CM-SCE-¼ Inch

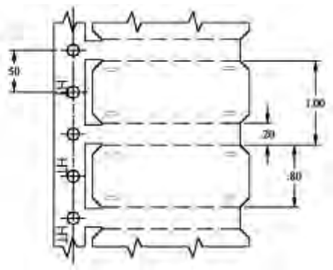

Figure 2
CM-SCE-½ Inch

Available Sizes and Formats

Ordering Description	Size	Markable Height mm	Markable Height *inches*	Markable Length mm	Markable Length *inches*	Recommended Use Range mm	Recommended Use Range *inches*
CM-SCE-¼-6H- <color>	¼	6.40	*0.250*	50.80	*2.000*	5.08–12.50	*0.200–0.492*
CM-SCE-¼-4H- <color>	¼	6.40	*0.250*	50.80	*2.000*	5.08–12.50	*0.200–0.492*
CM-SCE-TP-¼-4H- <color>*	¼	6.40	*0.250*	50.80	*2.000*	5.08–12.50	*0.200–0.492*
CM-SCE-½-4H- <color>	½	12.70	*0.500*	50.80	*2.000*	12.50 and up	*0.492 and up*
CM-SCE-TP-½-4H- <color>*	½	12.70	*0.500*	50.80	*2.000*	12.50 and up	*0.492 and up*
CM-SCE-½-6H- <color>	½	12.70	*0.500*	50.80	*2.000*	12.50 and up	*0.492 and up*
CM-SCE-TP-½-6H- <color>*	½	12.70	*0.500*	50.80	*2.000*	12.50 and up	*0.492 and up*

* For thermal transfer printing

Options

Tie-wrap holes	¼-inch tags	Four holes standard	
	½-inch tags	Four holes	Six holes
	Code	4H	6H
Fanfold	Code	Fx (substitute package size code for "x")	
Package sizes	Standard	250 pieces	
Colors	Standard	White	
	Code	9	
	Nonstandard	Yellow	
	Code	4	

Ordering information: Specify product name, markable height of marker, pack size, number of tie wraps and color.

Ordering example: CM-SCE-2.5K-¼-4H-9

Catalog 1308940
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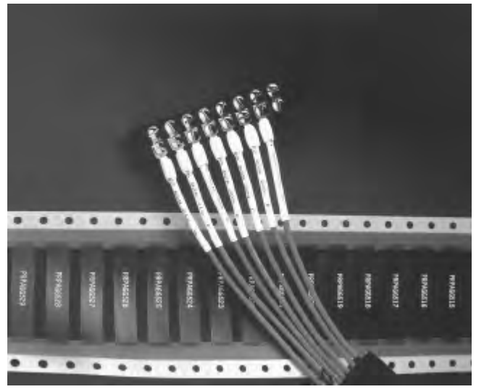
Heat Shrink/Cable Markers (Continued)

HT-SCE — High Temperature, Low Outgassing Heat-Shrinkable Wire Identification Sleeves

Product Facts

- Permanent identification sleeves
- High continuous operating temperature
- Extreme fluid resistance
- Low-vacuum outgassing
- Wide range of sleeve sizes for several wire and bundle diameters



Tyco Electronics's HT-SCE wire markers are designed for use in high temperature applications or where extreme resistance to fuels, lubricants and cleaning solvents is required. They are also ideal for applications in which low-vacuum outgassing is of high importance. The marker sleeves are made of highly flame retarded, heat-shrinkable fluoropolymer tubing.

HT-SCE markers are supplied as a thin, flat "ladder" of sleeves held horizontally between two polyester strips. This configuration feeds directly from the storage box into standard Tyco Electronics recommended printers, with no modifications necessary.

A strip of adhesive tape on each side of the sleeves holds them securely in place for printing and kitting, yet the sleeves pull easily from the carrier strips. A standard heat gun with reflector is used to shrink the sleeves onto the wire or cable to achieve a permanent mark.

After shrinking, HT-SCE markers meet the print performance requirements of SAE AS81531 4.6.2 and MIL-STD-202F. HT-SCE markers are supplied in boxes of 1000 sleeves and are available in nine diameter sizes. These cover substrates from 0.8 mm to 34.0 mm. Because of this versatility, customers need not carry a large inventory of markers.

Temperature Rating

Operating Temperature Range — –55°C to +225°C [–67°F to +437°F]

Minimum Recovery Temperature — +200°C [+392°F]

Maximum Storage Temperature — +40°C [+104°F]

Specifications/Approvals

Tyco Electronics — RW2512

Military —
SAE AS 81531 4.6.2
MIL-STD-202F Method 215J

Printer Information

Tyco Electronics Printer —
T312M (thermal transfer)

Tyco Electronics Ribbon —
TMS-RJS-RIBBON-4HT (thermal transfer)

Part Numbering System

HT-SCE - 1K - ¼ - 2.0 - S1 - 0

- Color
- Scoring (optional)
- Sleeve length (in.)
- Expanded inside diameter (in.)
- Pack size
- Product family

Catalog 1308940
Revised 8-06

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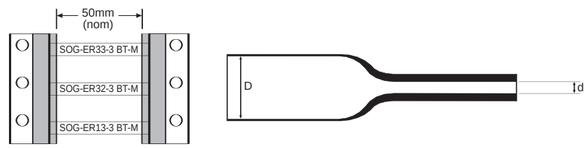
HT-SCE — High Temperature, Low Outgassing Heat-Shrinkable Wire Identification Sleeves

(Continued)

Ordering Information



Available Sizes and Formats

Ordering Description	Inside Diameter D (min) As Supplied mm	*inches*	d (max) After Recovery mm	*inches*	Recommended Use Range mm	*inches*
HT-SCE-1K-3⁄32 -2.0- <color>	2.36	*0.093*	0.79	*0.031*	0.81–1.90	*0.032–0.075*
HT-SCE-1K-1⁄8 -2.0- <color>	3.18	*0.125*	1.58	*0.062*	1.75–2.66	*0.069–0.105*
HT-SCE-1K-3⁄16 -2.0- <color>	4.75	*0.187*	2.36	*0.093*	2.54–4.06	*0.100–0.160*
HT-SCE-1K-1⁄4 -2.0- <color>	6.35	*0.250*	3.18	*0.125*	3.40–6.00	*0.134–0.236*
HT-SCE-1K-3⁄8 -2.0- <color>	9.53	*0.375*	4.75	*0.187*	5.30–8.10	*0.209–0.319*
HT-SCE-1K-1⁄2 -2.0- <color>	12.70	*0.500*	6.35	*0.250*	6.60–11.40	*0.260–0.449*
HT-SCE-1K-3⁄4 -2.0- <color>	18.00	*0.709*	9.00	*0.354*	9.90–15.30	*0.390–0.602*
HT-SCE-1K-1-2.0- <color>	25.40	*1.000*	12.70	*0.500*	13.30–23.00	*0.524–0.906*
HT-SCE-1K-1½ -2.0- <color>	38.10	*1.500*	19.05	*0.750*	20.95–34.00	*0.825–1.339*

Total width as supplied 90.18 mm (3.550 inches) including tape and carrier width.

Options

Prescoring	Perforated score to produce multiple marker sleeves from each HT-SCE sleeve			
	Number of prescores	1 prescore	2 prescores	3 prescores
	Code	S1	S2	S3
Package size	Standard	1K — 1000 piece packs		
	Nonstandard	Larger pack sizes are available. Please contact Tyco Electronics.		
Colors	Standard	White	Black	
	Code	9	0	
	Nonstandard	Pink	Blue	Yellow
	Code	2L	6	4

Ordering information: Specify product name, pack size, sleeve size, prescore, format and color.

Ordering example: HT-SCE-1K-1⁄4-2.0-S1-9

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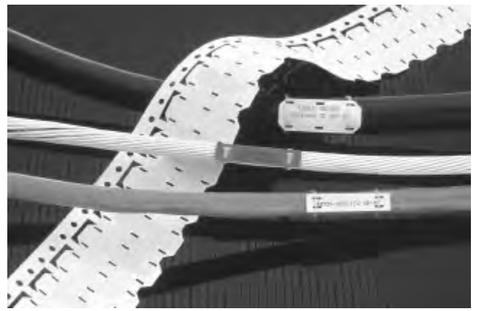
UK: 44-208-420-8341

Heat Shrink/Cable Markers (Continued)

HTCM-SCE — High Temperature Tie-On-Cable Marker Tags

Product Facts

- **Side entry provides access to big size cables and wire bundles as well as retrofit and repair capability**
- **High temperature use**
- **Highly flame-retardant**
- **Highly resistant to abrasion, mechanical abuses, fluids, lubricants and solvents**
- **Low vacuum outgassing for outer space applications**
- **Ease of use: markers can be easily removed from the carrier**
- **Easy installation: only standard cable tie-wraps are needed to install markers. No extra steps required.**
- **Excellent print permanence when printing on the rough side of the marker**



HTCM-SCE markers are flat, rigid, non-adhesive labels that can be used to identify large cables and wire bundles in high temperature environments and outer space applications where low vacuum outgassing is required. Marker tags are applied to cables or wire bundles using cable ties.

Print performance meets or exceeds the requirements of SAE AS81531 4.6.2 and MIL-STD-202F.

Temperature Rating

Operating Temperature Range — –55°C to +225°C [–67°F to +437°F]

Specifications/Approvals

Tyco Electronics — RW25244

Military —
Mark permanence — SAE AS81531 4.6.2
Solvent resistance — MIL-STD-202F Method 215J

Printer Information

Tyco Electronics Printer — T312M (thermal transfer)

Tyco Electronics Ribbon — TMS-RJS-RIBBON-4HT (thermal transfer)

Part Numbering System

HTCM-SCE - 2.5K -¼ - 4H-9

- 4H-9 — Color
- 4H — Tie-wrap holes
- ¼ — Markable height of marker (in.)
- 2.5K — Pack size
- HTCM-SCE — Product family

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HTCM-SCE — High Temperature Tie-On-Cable Marker Tags (Continued)

Ordering Information

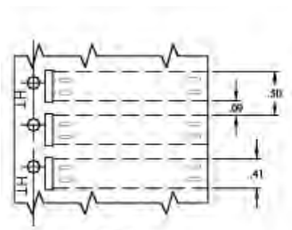

Figure 1
HTCM-SCE-¼ Inch

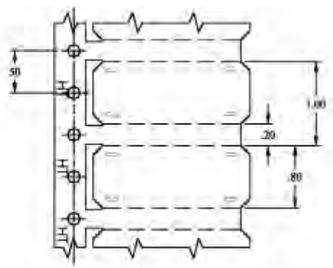

Figure 2
HTCM-SCE-½ Inch

Available Sizes and Formats

Ordering Description	Size	Markable Height mm	Markable Height *inches*	Markable Length mm	Markable Length *inches*	Recommended Use Range mm	Recommended Use Range *inches*
HTCM-SCE-TP-¼-4H- <color>	¼	6.40	*0.250*	50.80	*2.000*	5.08–12.50	*0.200–0.492*
HTCM-SCE-TP-½-4H- <color>	½	12.70	*0.500*	50.80	*2.000*	12.50 and up	*0.492 and up*
HTCM-SCE-TP-½-6H- <color>	½	12.70	*0.500*	50.80	*2.000*	12.50 and up	*0.492 and up*

Options

Tie-wrap holes	¼-inch tags	Four holes standard	
	½-inch tags	Four holes	Six holes
	Code	4H	6H
Fanfold	Code	Fx (substitute package size code for “x”)	
Package sizes	Standard	250 pieces	
Colors	Standard	White	
	Code	9	
	Nonstandard	Yellow	
	Code	4	

Ordering information: Specify product name, markable height of marker, pack size, number of tie wraps and color.

Ordering example: HTCM-SCE-2.5K-¼-4H-9

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Heat Shrink/Cable Markers (Continued)

HLX — Low Fire Hazard Cable Marker Tags

Product Facts

- **Recommended for use where combustion of products may endanger personnel or place delicate electronics at risk**
- **Several printable heights and widths available**

HLX cable markers are made from zero halogen, low smoke, low toxicity, radiation cross-linked, UV stabilized polyolefin sheet, formed into punched organized cable markers on a paper carrier.

They are used for identification of cables and wire bundles by computer-based printing onto markers. Markers are attached using cable ties. HLX markers are ideal for applications where limited fire hazard characteristics are necessary.

Part Numbering System

HLX 150 YW 1 TS 033 B

- Pack size
- Printable width (mm)
- Format
- Scoring
- Color
- Marker height
- Product family

Temperature Rating

Operating Temperature Range —
–30°C to +105°C [–22°F to +221°F]

Specifications/Approvals

Tyco Electronics — RW 2523

Military —
SAE AS81531 4.6.2
MIL-STD-202F Method 215J

Industry —
UL 224 (clause 14)
BS 4G 198 Part 3
ASTM D 2671

Printer Information

Tyco Electronics Printer —
T312M (thermal transfer)

Tyco Electronics Ribbon —
1966-RIBBON

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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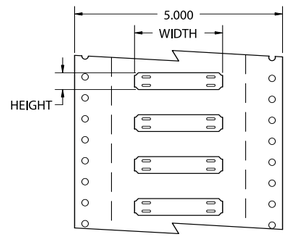
Heat Shrink/Cable Markers (Continued)

HLX — Low Fire Hazard Cable Marker Tags
(Continued)

Ordering Information



Available Sizes and Formats

Ordering Description	Marker Dimensions (W X H) mm	*inches*	Printable Area (W X H) mm	*inches*	Pack Size TS
HLX104<color>1<format>025B	45.00 x 10.40	*1.800 x 0.400*	25.00 x 10.40	*1.000 x 0.400*	1000
HLX104<color>1<format>033B	52.00 x 10.40	*2.100 x 0.400*	33.00 x 10.40	*1.300 x 0.400*	1000
HLX104<color>1<format>038B	58.00 x 10.40	*2.300 x 0.400*	38.00 x 10.40	*1.500 x 0.400*	1000
HLX104<color>1<format>050B	70.00 x 10.40	*2.750 x 0.400*	50.00 x 10.40	*2.000 x 0.400*	1000
HLX104<color>1<format>070B	90.00 x 10.40	*3.500 x 0.400*	70.00 x 10.40	*2.750 x 0.400*	1000
HLX150<color>1<format>025B	45.00 x 15.00	*1.800 x 0.600*	25.00 x 15.00	*1.000 x 0.600*	500
HLX150<color>1<format>033B	52.00 x 15.00	*2.100 x 0.600*	33.00 x 15.00	*1.300 x 0.600*	500
HLX150<color>1<format>038B	58.00 x 15.00	*2.300 x 0.600*	38.00 x 15.00	*1.500 x 0.600*	500
HLX150<color>1<format>050B	70.00 x 15.00	*2.750 x 0.600*	50.00 x 15.00	*2.000 x 0.600*	500
HLX150<color>1<format>070B	90.00 x 15.00	*3.500 x 0.600*	70.00 x 15.00	*2.750 x 0.600*	500
HLX203<color>1<format>025B	45.00 x 20.30	*1.800 x 0.800*	25.00 x 20.30	*1.000 x 0.800*	500
HLX203<color>1<format>033B	52.00 x 20.30	*2.100 x 0.800*	33.00 x 20.30	*1.300 x 0.800*	500
HLX203<color>1<format>038B	58.00 x 20.30	*2.300 x 0.800*	38.00 x 20.30	*1.500 x 0.800*	500
HLX203<color>1<format>050B	70.00 x 20.30	*2.750 x 0.800*	50.00 x 20.30	*2.000 x 0.800*	500
HLX203<color>1<format>070B	90.00 x 20.30	*3.500 x 0.800*	70.00 x 20.30	*2.750 x 0.800*	500
HLX253<color>1<format>025B	45.00 x 25.30	*1.800 x 1.000*	25.00 x 25.30	*1.000 x 1.000*	250
HLX253<color>1<format>033B	52.00 x 25.30	*2.100 x 1.000*	33.00 x 25.30	*1.300 x 1.000*	250
HLX253<color>1<format>038B	58.00 x 25.30	*2.300 x 1.000*	38.00 x 25.30	*1.500 x 1.000*	250
HLX253<color>1<format>050B	70.00 x 25.30	*2.750 x 1.000*	50.00 x 25.30	*2.000 x 1.000*	250
HLX253<color>1<format>070B	90.00 x 25.30	*3.500 x 1.000*	70.00 x 25.30	*2.750 x 1.000*	250

Options

Prescoring	Not available on these products — this should always be 1.		
Package sizes	Standard	B	
Colors	Standard	White	Yellow
	Code	WE	YW
	Nonstandard	Red	Blue
	Code	RD	BE
Format	TS — Thermal transfer (reel/single sided)		
Printable width on marker	025	25 mm *(1")*	
	033	33 mm *(1.3")*	
	038	38 mm *(1.5")*	
	050	50 mm *(2")*	
	070	70 mm *(2.75")*	

Ordering information: Specify product name, marker height, color, scoring option (always 1), format, printable width, and pack size.
Ordering example: HLX150YW1TS033B

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Heat Shrink/Cable Markers (Continued)

D-SCE — Fluid Resistant Computer-Printable Permanent Wire Identification Sleeves

Product Facts

- **Resistance to organic fluids, common fuels, lubricants and solvents**
- **3:1 shrink ratio**
- **Wide range of sizes for several wire and bundle diameters**
- **Formulated for use in aerospace, rail and construction equipment**
- **Dot matrix and thermal transfer printable — both print technologies meet all specifications and approvals listed**

D-SCE markers are used to identify wires and cables where exposure to organic fluids, especially oils, is required. D-SCE markers are designed to operate in these conditions at elevated temperatures for extended periods of time, making them ideal in aerospace, rail and construction industries. The D-SCE markers are suitable for use in environments with temperatures of –55°C to +135°C (–67°F to +275°F), and will provide strain relief, insulation and protection from mechanical abuse. The 3:1 shrink ratio markers* are assembled in a ladder format enabling sleeves to be printed on both sides for maximum data content and readability.

*See ordering description.

Temperature Rating

Operating Temperature Range —
–55°C to +135°C [–67°F to +275°F]

Minimum Recovery Temperature —
+135°C [+275°F]

Maximum Storage Temperature —
+40°C [+104°F]

Specifications/Approvals

Tyco Electronics — RW 2519

Military —
SAE-AMS-DTL-23053/6, Class 1 (material and performance requirements)
SAE AS81531 4.6.2
MIL-STD-202F Method 215J

Industry —
NF F 00 608 Category A and H

Printer Information

Tyco Electronics Printer —
AM6310 (dot matrix)
T312M (thermal transfer)

Tyco Electronics Ribbon —
1892BK04-RIBBON (dot matrix)
1966-RIBBON

Part Numbering System

D-SCE - 5K - 3.2 - 50 - S1- 4

- Color
- Scoring (optional)
- Sleeve length (mm)
- Expanded inside diameter (mm)
- Large packaging (optional)
- Product family

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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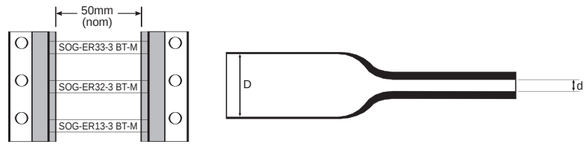
UK: 44-208-420-8341

D-SCE — Fluid Resistant Computer-Printable Permanent Wire Identification Sleeves

(Continued)

Ordering Information



Available Sizes and Formats

Ordering Description	Inside Diameter D (min) As Supplied mm	*inches*	d (max) After Recovery mm	*inches*	Recommended Use Range mm	*inches*
D-SCE-1K-2.4-50-<color>	2.39	*0.094*	0.79	*0.031*	0.81–1.90	*0.032–0.075*
D-SCE-1K-3.2-50-<color>	3.18	*0.125*	1.07	*0.043*	1.11–2.66	*0.044–0.105*
D-SCE-1K-4.8-50-<color>	4.75	*0.187*	1.57	*0.063*	1.75–4.06	*0.069–0.160*
D-SCE-1K-6.4-50-<color>	6.35	*0.250*	2.11	*0.084*	2.31–5.46	*0.091–0.215*
D-SCE-1K-9.5-50-<color>	9.53	*0.375*	3.18	*0.125*	3.47–8.12	*0.137–0.320*
D-SCE-1K-12-50-<color>	12.70	*0.500*	4.22	*0.167*	4.64–10.79	*0.183–0.425*
D-SCE-1K-18-50-<color>	19.05	*0.750*	6.35	*0.250*	6.99–16.25	*0.275–0.640*
D-SCE-1K-25-50-<color>	25.40	*1.000*	8.46	*0.333*	9.29–21.59	*0.366–0.850*
D-SCE-1K-38-50-<color>*	38.10	*1.500*	19.05	*0.750*	20.95–33.02	*0.825–1.300*

* 2:1 shrink ratio

Total width as supplied 90.18 mm (3.550 inches) including tape and carrier width.

Options

Prescoring	Perforated score to produce multiple marker sleeves from each D-SCE sleeve.			
	Standard	Side scored		
	Number of prescores	1 prescore	2 prescores	3 prescores
	Code	S1	S2	S3
Package sizes	Standard	1K — 1000 piece packages available for all D-SCE sizes		
	Nonstandard	Larger pack sizes are available. Please contact Tyco Electronics.		
Colors	Standard	White	Yellow	
	Code	9	4	
	Nonstandard	Pink	Blue	
	Code	2L	6	

Ordering information: Specify product name, pack size, sleeve size, prescore, format and color.

Ordering example: D-SCE-1K-6.4-50-S2-4

Catalog 1308940
Revised 8-06

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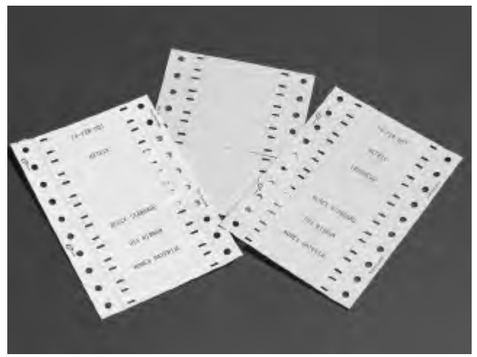
UK: 44-208-420-8341

Heat Shrink/Cable Markers (Continued)

NMX — Flame Retardant Polyaramid Cable Marker Tags

Product Facts

- **Extremely light weight**
- **Ultimate tensile strength and tear resistance**
- **Flame retardant**
- **Resistant to several avionics fluids, solvents and cleaners**
- **Dot matrix printable**
- **Available in white and yellow printable areas**



NMX cable marker tags are used for identification of cables and wire bundles by computer-based printing onto markers. The markers are attached using cable ties. They are ideal for aerospace and other cases where resistance to harsh environments and light weight are important.

Temperature Rating

Operating Temperature Range —
–40°C to +135°C [–40°F to +275°F]

Specifications/Approvals

Tyco Electronics — TTDS-030

Military —
SAE AS81531 4.6.2,
MIL-STD-202F Method 215J

Industry — DMS 2325, DMS 2409

Printer Information

Tyco Electronics Printer —
AM6310 (dot matrix)

Tyco Electronics Ribbon —
1892 BK01 (dot matrix)

Part Numbering System

NMX 25625 WE 2.5

- 2.5 — Pack size
- WE — Color
- 25625 — Product size
- NMX — Product family

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
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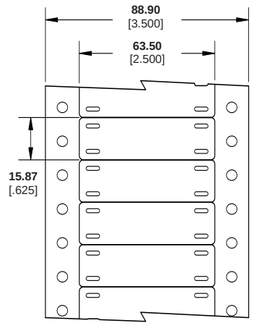
NMX — Flame Retardant Polyaramid Cable Marker Tags (Continued)

Ordering Information



Available Sizes and Formats

Ordering Description	Label Width		Label Height		Printable Width		Weight
	mm	*inches*	mm	*inches*	mm	*inches*	(g/10 pcs.)
NMX25625<color>2.5	63.50	*2.500*	15.87	*0.625*	50.80	*2.000*	2.5

Options

Package sizes	Standard	2500 pieces per pack
	Nonstandard	Larger pack sizes are available. Please contact Tyco Electronics.
Colors	White	Yellow
	WE	YE

Ordering information: Specify product name, product size, color and pack size.

Ordering example: NMX25625WE2.5

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Heat Shrink/Cable Markers (Continued)

NBC-SCE — Nuclear, Biological & Chemical Agent Resistant Heat-Shrinkable Wire Identification Sleeves

Product Facts

- Permanent identification sleeves
- Computer-printable
- 2:1 shrink ratio
- NBC application with the appropriate adhesive and oversleeve

Tyco Electronics NBC-SCE is used to identify wire and cables where extreme resistance to cleaning solvents is needed. The markers are suitable for use in wire harness systems requiring high fluid resistance and resistance to the effects of nuclear, biological and chemical agent exposure and decontamination.

The markers should be used with an appropriate transparent oversleeve whose ends are sealed with an appropriate epoxy adhesive.

NBC-SCE marker sleeves are suitable for use in environments with temperatures from –55°C to +225°C (–67°F to +275°F).

Temperature Rating

Operating Temperature Range — –55°C to +225°C [–67°F to +437°F]

Minimum Recovery Temperature — +200°C [+392°F]

Maximum Storage Temperature — +40°C [+104°F]

Specifications/Approvals

Tyco Electronics — RW2514

Military — SAE AS81531 4.6.2
MIL-STD-202F Method 215J

Printer Information

Tyco Electronics Printer — T312M (thermal transfer)

Tyco Electronics Ribbon — TMS-RJS-RIBBON-4HT (thermal transfer)

Part Numbering System

NBC-SCE-1K-¼-2.0-S1-9

- 9 — Color
- S1 — Scoring (optional)
- 2.0 — Sleeve length (in)
- ¼ — Expanded inside diameter (in)
- 1K — Large packaging (optional)
- NBC-SCE — Product family

Catalog 1308940
Revised 8-06

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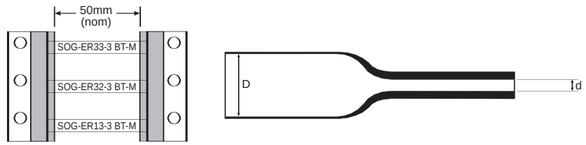
NBC-SCE — Nuclear, Biological & Chemical Agent Resistant Heat-Shrinkable Wire Identification Sleeves (Continued)

Ordering Information



Available Sizes and Formats

Ordering Description	Inside Diameter Expanded D (minimum) mm	*inches*	Recovered d (maximum) mm	*inches*	Recommended Use Range mm	*inches*	Recovered Wall Thickness mm	*inches*
NBC-SCE-1K-⅛- 2.0<color>	3.43	*0.135*	1.59	*0.062*	1.75–2.66	*0.069–0.105*	0.38 ± 0.08	*0.015 ± 0.003*
NBC-SCE-1K-¼- 2.0<color>	6.35	*0.250*	3.18	*0.125*	3.81–5.46	*0.150–0.215*	0.38 ± 0.08	*0.015 ± 0.003*
NBC-SCE-1K-½- 2.0<color>	12.70	*0.500*	6.35	*0.250*	6.99–10.79	*0.275–0.425*	0.38 ± 0.08	*0.015 ± 0.003*
NBC-SCE-1K-¾- 2.0<color>	19.05	*0.750*	9.53	*0.375*	10.16–16.25	*0.400–0.640*	0.38 ± 0.08	*0.015 ± 0.003*
NBC-SCE-1K-1- 2.0<color>	25.40	*1.000*	12.70	*0.500*	14.70–21.50	*0.578–0.846*	0.43 ± 0.10	*0.017 ± 0.004*
NBC-SCE-1K-1-½- 2.0<color>	38.10	*1.500*	19.05	*0.750*	20.95–33.02	*0.825–1.300*	0.43 ± 0.10	*0.017 ± 0.004*

Total width as supplied 90.18 mm (3.550 inches) including tape and carrier width.

Options

Prescoring	Perforated score to produce multiple marker sleeves from each NBC-SCE sleeve.			
	Number of prescores	1 prescore	2 prescores	3 prescores
	Code	S1	S2	S3
Package sizes	Standard	1000 piece packages available for all NBC-SCE sizes		
Colors	Standard	White		
	Code	9		

Ordering information: Please specify product name, pack size, sleeve size, prescore, format and color.

Ordering example: NBC-SCE-1K-⅛-2.0-9

Catalog 1308940
Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Heat Shrink/Cable Markers (Continued)

TMS-CCUV — Heat-Shrinkable UV Protection Sleeves

Product Facts

- **Exceptional clarity and stability**
- **Added UV-resistant sleeves**
- **Not printable**
- **Tough resistance to abrasion and industrial fluids**
- **Heat-shrink locking in place (no reliance on adhesives)**
- **Low profile**
- **Accommodates bent or flexing cable/wire bundles**
- **Can work as an NBC (nuclear, biological, chemical) System with NBC-SCE sleeves and appropriate adhesive**

TMS-CCUV clear heat-shrinkable sleeves are designed for over protection of TMS System Six identification products, to give increased protection for permanent, long-term environmental exposure. The clear CCUV heat-shrinkable sleeves are formulated to combine a long-term barrier to the effects of ultra-violet, with tough resistance to abrasion and industrial fluids. They are available in packs which match the product sizes and pack quantities of TMS System Six heat-shrinkable identification sleeves and cable markers.

The TMS CCUV sleeves are inherently low profile and use the action of heat-shrink to lock in place over the previously installed identification sleeves; except for cable markers which use a slide fitting CCUV sleeve which is held in place by the cable ties.

The action of heat-shrink locking of the CCUV sleeves means there is no reliance on the long term performance of adhesives to hold the outer protection layer in place, and also gives the ability to accommodate cables and wire bundles which may be bent or flexed during use.

Temperature Rating

Operating Temperature Range — –55°C to +150°C [–67°F to 302°F]

Minimum Recovery Temperature — +150°C [+302°F]

Maximum Storage Temperature — +40°C [+104°F]

Specifications/Approvals

Tyco Electronics — RW 2525

Military —
UL VW-1 rated
SAE-AMS-DTL-23053/18, Class 2

Part Numbering System

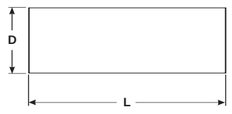
TMS-CCUV- SLEEVE-1- X- 65mm

- Sleeve length (mm)*
- Color (clear for all)*
- Sleeve reference
- Loose sleeves
- CCUV sleeve

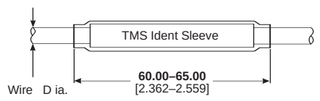
* not used in NBC-SCE 76 mm [3"] length sleeve options

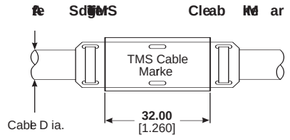
Ordering Information

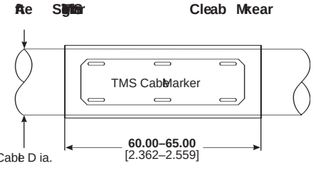
Before Shrinking



After Shrinking over TMS Cable Sleeve







Catalog 1308940
Revised 8-06

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TMS-CCUV — Heat-Shrinkable UV Protection Sleeves (Continued)

Available Sizes and Formats
(For use with heat shrink sleeves)

Ordering Description	Sleeve Length	Inside Diameter Minimum		Recovered Diameter Maximum		Wire Size Diameter		Sleeve Size Expanded Diameter TMS-SCE		RPS
	mm	mm	*inches*	mm	*inches*	mm	*inches*	mm	*inches*	US Wire Gauge
TMS-CCUV-SLEEVE-1-X-65 mm	65	3.20	*0.125*	1.60	*0.063*	1.80–2.80	*0.071–0.110*	2.40	*0.094*	N/A
TMS-CCUV-SLEEVE-1-X-65 mm	65	3.20	*0.125*	1.60	*0.063*	1.80–2.80	*0.071–0.110*	3.20	*0.125*	22–18
TMS-CCUV-SLEEVE-2-X-65 mm	65	4.80	*0.187*	2.40	*0.094*	2.60–3.70	*0.102–0.146*	4.80	*0.188*	18–12
TMS-CCUV-SLEEVE-2-X-65 mm	65	4.80	*0.187*	2.40	*0.094*	2.60–3.70	*0.102–0.146*	6.40	*0.250*	16–10
TMS-CCUV-SLEEVE-3-X-65 mm	65	6.40	*0.250*	3.20	*0.126*	3.50–5.10	*0.138–0.201*	9.50	*0.375*	8–4
TMS-CCUV-SLEEVE-4-X-65 mm	65	9.50	*0.375*	4.80	*0.189*	5.00–7.00	*0.197–0.275*	12.70	*0.500*	10–2
TMS-CCUV-SLEEVE-5-X-65 mm	65	12.70	*0.500*	6.40	*0.252*	6.90–10.60	*0.272–0.417*	19.00	*0.750*	6–250
TMS-CCUV-SLEEVE-6-X-65 mm	65	19.00	*0.750*	9.50	*0.374*	10.00–14.00	*0.394–0.551*	25.40	*1.000*	1–400
TMS-CCUV-SLEEVE-7-X-65 mm	65	25.40	*1.000*	12.70	*0.500*	13.30–21.00	*0.524–0.827*	25.40	*1.000*	1–400
TMS-CCUV-SLEEVE-8-X-65 mm	65	38.10	*1.500*	19.00	*0.748*	21.00–33.80	*0.827–1.331*	38.10	*1.500*	400–1000

Some TMS-SCE and RPS sleeve sizes may need to be recovered partially before CCUV sleeve is applied to protect them.

(For use with cable markers to secure/protect without cable ties)

Ordering Description	Sleeve Length	Inside Diameter Minimum		Recovered Diameter Maximum		Wire Size Diameter		Marker Height	
	mm	mm	*inches*	mm	*inches*	mm	*inches*	mm	*inches*
TMS-CCUV-SLEEVE-4-X-65 mm	65	9.50	*0.375*	4.80	*0.189*	5.00–8.00	*0.197–0.315*	6.40	*0.250*
TMS-CCUV-SLEEVE-5-X-65 mm	65	12.70	*0.500*	6.40	*0.252*	7.00–11.00	*0.275–0.433*	6.40	*0.250*
TMS-CCUV-SLEEVE-6-X-65 mm	65	19.00	*0.750*	9.50	*0.374*	12.00–17.00	*0.472–0.669*	12.70	*0.500*
TMS-CCUV-SLEEVE-7-X-65 mm	65	25.40	*1.000*	12.70	*0.500*	15.00–23.00	*0.590–0.905*	12.70	*0.500*

(For use with cable markers to protect with cable ties)

Ordering Description	Sleeve Length	Inside Diameter Minimum		Recovered Diameter Maximum		Wire Size Diameter		Marker Height	
	mm	mm	*inches*	mm	*inches*	mm	*inches*	mm	*inches*
TMS-CCUV-SLEEVE-9-X-32 mm	32	6.40	*0.250*	3.20	*0.126*	N/A		6.40	*0.250*
TMS-CCUV-SLEEVE-10-X-32 mm	32	12.70	*0.500*	6.40	*0.252*	N/A		12.70	*0.500*

(For use with NBC-SCE sleeves and adhesives sealing*)

Ordering Description	Sleeve Length	Inside Diameter Minimum		Recovered Diameter Maximum		Wire Size Diameter NBC-SCE		Sleeve Size Expanded Diameter NBC-SCE	
	mm	mm	*inches*	mm	*inches*	mm	*inches*	mm	*inches*
TMS-CCUV-SLEEVE-15	76	3.20	*0.125*	1.60	*0.063*	1.80–2.80	*0.071–0.110*	3.20	*0.125*
TMS-CCUV-SLEEVE-16	76	4.80	*0.187*	2.40	*0.094*	2.60–3.70	*0.102–0.146*	4.80	*0.188*
TMS-CCUV-SLEEVE-17	76	6.40	*0.250*	3.20	*0.126*	3.50–5.10	*0.138–0.201*	6.40	*0.250*
TMS-CCUV-SLEEVE-18	76	9.50	*0.375*	4.80	*0.189*	5.00–7.00	*0.197–0.275*	9.50	*0.375*
TMS-CCUV-SLEEVE-19	76	12.70	*0.500*	6.40	*0.252*	6.90–10.60	*0.272–0.417*	12.70	*0.500*
TMS-CCUV-SLEEVE-20	76	19.00	*0.750*	9.50	*0.374*	10.00–14.00	*0.394–0.551*	19.00	*0.750*
TMS-CCUV-SLEEVE-21	76	25.40	*1.000*	12.70	*0.500*	13.30–21.00	*0.524–0.827*	25.40	*1.000*
TMS-CCUV-SLEEVE-22	76	38.10	*1.500*	19.00	*0.748*	21.00–33.80	*0.827–1.331*	38.10	*1.500*

*For use with adhesives such as S-1255-04 and S-1264 please refer to RT1012 and RT1014 for specifications and adhesive details.

Options

Prescoring	Not available — supplied as cut pieces.	
Package Sizes	Standard	250 piece bags only
Colors	Standard	Clear only
Ordering information:	Specify product name, loose sleeve, sleeve reference, color and sleeve length.	
Ordering example:	For all Heat Shrink sleeves except NBC-SCE TMS-CCUV-SLEEVE-1-X- 65 mm For NBC-SCE TMS-CCUV-SLEEVE-22	

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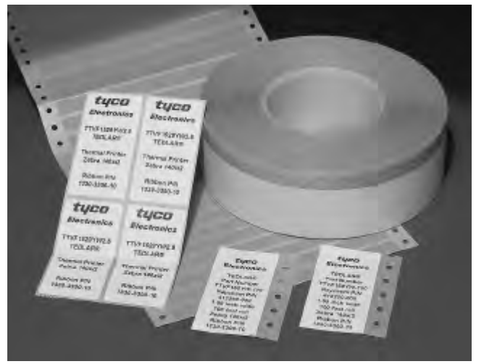
Performance Labels

VF/NPVF/VF-130 — Tedlar Color Coding Tapes and Labels

Product Facts

- Resists water, oil, conventional cleaning agents, and oil based solvents
- Filters UV light
- Exhibits high degree of resistance to aging
- Meets the requirements of MIL-M-87958
- Available in several colors to facilitate color-coding and clear for over laminating



This polyvinyl fluoride material is designed for use as a wire/cable marker, label and wrap-around in the general aviation industry. The product is ideal for a variety of harsh chemical environments and where non-igniting/self-extinguishing properties are a necessity. It is available in several application-defined types and sizes and can be used with various printing technologies.

VF Series

The VF series of Tedlar products is specifically designed for wire/cable labeling. The product is dot matrix or thermal transfer printable and is available in several continuous and die-cut formats to fit a wide range of cables/cable bundles. The product meets all the requirements of the BMS 13-47, DMS 2359 and GAT100BA specifications, the benchmarks for pressure-sensitive wrap-around labels in the aerospace industry.

NPVF Series

The NPVF Tedlar is a non-printable, 12.7mm [1/2 in] wide and 30.48m [100 ft] long continuous tape designed for use as a color-coded identifier for cables/cable bundles. Besides identifying the bundle this product is wrapped around, it also provides strength and rigidity to the bundle. The product has all the features of the VF series of Tedlar products except for printability.

VF-130 Series

The VF-130 series is a range of clear non-printable Tedlar tapes designed for use as an overlaminate on wires/bundle identifiers where additional UV protection is required. These tapes can be used over various types of identifiers like wrap around labels, heat-shrink labels, tie-on cable labels and pressure-sensitive markers.

Temperature Rating

Operating Temperature Range —
VF and NPVF —
–40°C to +130°C [–40°F to +266°F]
VF-130 —
–40°C to +105°C [–40°F to +221°F]
VF-130 —
–40°C to 105°C [–40°F to 221°F]

Specifications/Approvals

Tyco Electronics —
TTDS-005 (TTVF/DMVF)
TTDS-004 (NPVF)

Military —
MIL-M-87958
DMS 2359

Industry —
BMS-13-47
BACT 19
GAT100BA

Printer Information

Tyco Electronics Printer —
AM6310 (dot matrix)
T308S* (thermal transfer)

Tyco Electronics Ribbon —
1892BK01 (dot matrix)
1330-3300-10** (thermal transfer)

*Size dependent. Contact Tyco Electronics.

**Alternative printers and ribbons are available for special applications. Contact Tyco Electronics Identification for more information.

Part Numbering System (Continuous)

TTVF 200 YW-100

- YW-100 — Length (ft)
- YW-100 — Color
- 200 — Width (in)
- TTVF — Product family

Part Numbering System (Die-Cut)

TTVF 6004 GN 2.5

- 2.5 — Pack size
- GN — Color
- 6004 — Label size (Width X Height)
- TTVF — Product family

TEDLAR is a trademark of E. I. DuPont de Nemours and Company.

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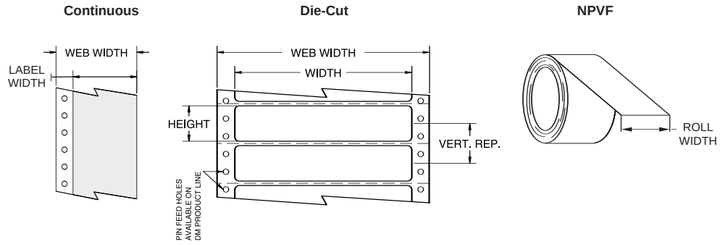
Performance Labels (Continued)

VF/NPVF/VF-130 — Tedlar Color Coding Tapes and Labels (Continued)

Ordering Information



Polyvinyl Fluoride VF Tedlar — Continuous Labels

Ordering Description	Printer Type	Label Width mm	*inches*	Label Length M	*FT*	Quantity Per Pack
<format>VF050<color> -180	DM/TT	12.70	*0.500*	54.86	*180*	Continuous
<format>VF075<color> -100	DM/TT	19.05	*0.750*	30.48	*100*	Continuous
<format>VF100<color> -100	DM/TT	25.40	*1.000*	30.48	*100*	Continuous
<format>VF150<color> -100	DM/TT	38.10	*1.500*	30.48	*100*	Continuous
<format>VF200<color> -100	DM/TT	50.80	*2.000*	30.48	*100*	Continuous
<format>VF300<color> -100	DM/TT	76.20	*3.000*	30.48	*100*	Continuous
<format>VF400<color> -100	DM/TT	101.60	*4.000*	30.48	*100*	Continuous

Polyvinyl Fluoride VF Tedlar — Die-Cut Labels

Ordering Description	Printer Type	Label Width mm	*inches*	Label Height mm	*inches*	Quantity Per Pack
<format>VF1029<color>2.5	DM/TT	25.40	*1.000*	73.66	*2.900*	2500
<format>VF1079<color>1	DM/TT	25.40	*1.000*	200.66	*7.900*	1000
<format>VF1529<color>2.5	DM/TT	38.10	*1.500*	73.66	*2.900*	2500
<format>VF1679<color>1	DM/TT	40.64	*1.600*	200.66	*7.900*	1000
<format>VF3015<color>1	DM/TT	76.20	*3.000*	38.10	*1.500*	1000
<format>VF3509<color>2.5	DM/TT	88.90	*3.500*	22.86	*0.900*	2500
<format>VF6004<color>2.5	DM/TT	152.40	*6.000*	10.16	*0.400*	2500

Options

Format	(TT) Thermal transfer printable						
	(DM) Dot matrix printable						
Colors	Yellow	White	Red	Blue	Green	Violet	Pink
Code	YW	WE	RD	BE	GN	VT	PK

Polyvinyl Fluoride NPVF Tedlar — Color Coding Tape

Ordering Description	Printer Type	Roll Width mm	*inches*	Label Length M	*FT*	Quantity Per Pack
NPVF050XX-100	N/A	12.70	0.500	30.48	100	Continuous

Options

Colors	Yellow	White	Red	Blue	Green	Violet	Pink	Black	Brown	Orange	Grey	Gold
Code	YW	WE	RD	BE	GN	VT	PK	BK	BN	OE	GY	GD

Polyvinyl Fluoride VF-130 Tedlar — Overlaminate Tapes

Ordering Description	Printer Type	Color	Label Width mm	*inches*	Label Length M	*FT*	Quantity Per Pack
NPVF150CL-100	N/A	Clear	38.10	1.500	30.48	100	Continuous
NPVF200CL-100	N/A	Clear	50.80	2.000	30.48	100	Continuous
NPVF300CL-100	N/A	Clear	76.20	3.000	30.48	100	Continuous
NPVF400CL-100	N/A	Clear	101.60	4.000	30.48	100	Continuous

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UK: 44-208-420-8341

Performance Labels (Continued)

RMK-6 — Computer-Printable Epoxy Coated Labels

Product Facts

- Printable by dot matrix printers
- Excellent fluid and abrasion resistance without an overlay
- High performance acrylic adhesive
- Low fire hazard properties
- Indoor use only

RMK-6 is a computer-printable labelstock with outstanding fluid and abrasion resistance, designed to be printed by impact dot matrix printers. When heat-cured after printing, its unique heat reactive epoxy surface "locks in" the image to combine the versatility and convenience of on-site printing with performance to meet the toughest conditions.

A high performance acrylic adhesive ensures simple installation while maintaining excellent adhesion.

Typical applications are rating plate labels, component identification, and pipe and cable wraparound markers. Outdoor use is not recommended.

Temperature Rating

Operating Temperature Range —
Wiring marking —
–40°C to +85°C [–40°F to +185°F]
Panel marking —
–40°C to +105°C [–40°F to +221°F]

Excursion Temperature —
+200°C for 2 hours

Storage Conditions —
Unopened — 12 months at temperatures not exceeding +35°C [+95°F].
Opened — 6 months at temperatures not exceeding +25°C [+77°F] and 80% relative humidity
Curing — 4–6 minutes at 160°C in an air circulating oven

Specifications/Approvals

Tyco Electronics — RW2520

Industry —
UL — MH17259 Group PGGU2

Printer Information

Tyco Electronics Printer —
AM6310 (dot matrix)

Tyco Electronics Ribbon —
1892BK04 (dot matrix)

Part Numbering System

RMK6 - 8.5

- 8.5 — Label height (mm)
- RMK6 - — Product family

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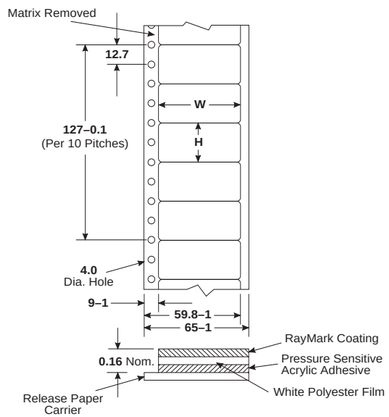
Performance Labels (Continued)

RMK-6 — Computer-Printable Epoxy Coated Labels (Continued)

Ordering Information



Available Sizes and Formats

Ordering Description	Label Height	Label Width	Package Quantity
	mm	mm	Labels Per Pack
RMK6-4.2	4.20	50.80	10000
RMK6-8.5	8.50	50.80	5000
RMK6-12.7	12.70	50.80	3000
RMK6-17.0	17.00	50.80	2500
RMK6-25.4	25.40	50.80	1500
RMK6-55.0	55.00	50.80	750
RMK6-WM*	*	50.80	*

*An uncut version for wraparound markers. Spool length = 40 meters.

Options

Colors	Standard	White

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Performance Labels (Continued)

RMK — Computer-Printable Epoxy Coated Labels in a Sheet Form

Product Facts

- High performance label material
- High performance acrylic adhesive
- A4 format sheet
- Printable by color inkjet printers with sheet feed
- Outstanding fluid and abrasion resistance without an overlay
- Low fire hazard properties
- Indoor use only

RMK is a computer-printable labelstock with outstanding fluid and abrasion resistance, designed to be printed by sheet fed inkjet printers. When heat-cured after printing its unique heat reactive epoxy surface "locks in" the image to combine the versatility and convenience of on-site printing with performance to meet the toughest conditions.

A high performance acrylic adhesive ensures simple installation while maintaining excellent adhesion. A wide range of label sizes are available, supplied in A4 sheets for feeding through standard inkjet printers.

Typical applications are replacement of engraved metal or plastic labels, signs and tallies rating plate labels and color coding.

Temperature Rating

Operating Temperature Range —
Wiring marking —
–40°C to +85°C [–40°F to +185°F]
Panel marking —
–40°C to +105°C [–40°F to +221°F]

Excursion Temperature —
+200°C for 2 hours

Storage Conditions —
Unopened — 12 months at temperatures not exceeding +35°C [+95°F]
Opened — 6 months at temperatures not exceeding +25°C [+77°F] and 80% relative humidity
Curing — 4–6 minutes at 160°C in an air circulating oven

Specifications/Approvals

Tyco Electronics — RW2518

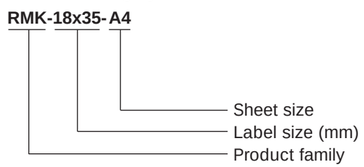
Printer Information

Various color inkjet printers can be used depending on the application, mainly HP800 or HP900 series if available.

Tyco Electronics Recommended Printer — Epson 1520

For further advice on possible alternative printers, contact Tyco Electronics.

Part Numbering System



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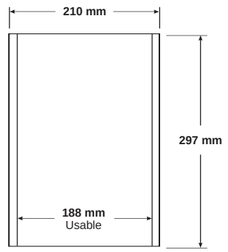
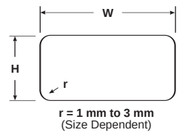
Performance Labels (Continued)

RMK — Computer-Printable Epoxy Coated Labels in a Sheet Form (Continued)

Ordering Information



A4 Sheet Dimensions



Label Dimensions

Available Sizes and Formats

Ordering Description	Label Height	Label Width	Labels Per Sheet
	mm	mm	
RMK-9x25-A4	9	25	132
RMK-10x19-A4	10	19	160
RMK-11x40-A4	11	40	72
RMK-18x20-A4	18	20	96
RMK-18x25-A4	18	25	72
RMK-18x35-A4	18	35	48
RMK-18x50-A4	18	50	36
RMK-25x30-A4	25	30	45
RMK-25x35-A4	25	35	36
RMK-25x50-A4	25	50	27
RMK-25x75-A4	25	75	18
RMK-25x100-A4	25	100	10
RMK-28x40-A4	28	40	32
RMK-30x13-A4	30	13	88
RMK-35x75-A4	35	75	12
RMK-50x13-A4	50	13	50
RMK-50x25-A4	50	25	30
RMK-50x100-A4	50	100	5
RMK-75x150-A4	75	150	3
RMK-87x13-A4	87	13	33
RMK-87x25-A4	87	25	18
RMK-150x150-A4	150	150	1
RMK-170x13-A4	170	13	11
RMK-170x25-A4	170	25	6
RMK-190x30-A4	190	30	5
RMK-200x13-A4	200	13	10
RMK-250x13-A4	250	13	11
RMK-250x25-A4	250	25	6
RMK-UNCUT-A4	Uncut		50 sheets

Options

Package size	Standard	50 sheets
Color	Standard	White

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

Dimensions are in millimeters and inches unless otherwise specified. Values not in italics are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Performance Labels (Continued)

TTP — Continuous Polyester for Decals

Product Facts

- **Efficient solution for expensive silk-screen printing**
- **Available in continuous format**
- **Several widths and colors available**
- **Interior and exterior aircraft use including flight entertainment and deck instrumentation**
- **Thermal transfer printable**
- **Printable in any combination of material and ribbon colors**

The system is designed for applications that require a high-durability label with all the features of a “silk-screened” label, only without the cost, time and inflexibility involved in obtaining a silk-screened product. The product utilizes high performance polyester with permanent acrylic adhesive. It is thermal transfer printable with all the capabilities of graphics, bar codes, logos and several fonts. The product is available in several colors although white, clear and metalized silver are available as standard. Typical applications include panel labels, fascias, decalcomanias and asset identification and rating plates. Typical industry use includes aerospace, defense, electronics and infrastructure.

Temperature Rating

Operating Temperature Range —
Clear —
–40°C to +125°C [–40°F to +257°F]
White, metalized and colors —
–29°C to +150°C [–20°F to +302°F]

Specifications/Approvals

Tyco Electronics — TTDS- 031
Military —
MIL-P-38477A (salt spray)
A-A-59485 (accelerated weather resistance and salt spray)
Industry — GAT 100BB

Printer Information

Tyco Electronics Printer —
T312S (thermal transfer)
Tyco Electronics Ribbon —
1330-0607-10 (thermal transfer)

Part Numbering System

TTP 200 CL-10

- Length
- Color
- Label width (in)
- Product name

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Revised 8-06

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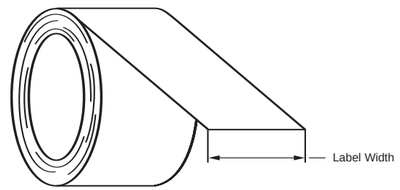
Performance Labels (Continued)

TTP — Continuous Polyester for Decals (Continued)

Ordering Information



Available Sizes and Formats

Ordering Description	Label Width		Roll Length		Quantity Per Pack
	mm	*inches*	meters	*feet*	
TTP200<color>-10	50.80	*2.000*	30.48	*100*	Continuous
TTP300<color>-10	76.20	*3.000*	30.48	*100*	Continuous
TTP400<color>-10	101.60	*4.000*	30.48	*100*	Continuous
TTP600<color>-10	152.40	*6.000*	30.48	*100*	Continuous

Note: Use TTPA prefix for high tack adhesive

Options

Colors	Standard	Clear	White	Metalized Silver	
	Code	CL	WE	MP	
Colors	Non Standard	Red	Green	Blue	Orange
	Code	RD	GN	BE	OE
Colors	Non Standard	Black	Yellow		
	Code	BK	YW		

Ordering example: TTP400WE-10 or TTPA400WE (for the high tack adhesive variant)

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Thermal Transfer

WP — White Polyester Labels

Product Facts

- Thermal transfer printable
- Excellent for use in PCB component labeling
- Ink receptive topcoat
- Excellent for bar code applications
- UL Listed and CSA Certified

Tyco Electronics WP is a thermal transfer printable white polyester film with a permanent acrylic adhesive. It is ideal for bar coding, PCB and component labeling, as well as general purpose labeling applications that require a high durability white label. WP is resistant to a variety of solvents while maintaining print quality. It is UL Listed and CSA Certified, and print performance and durability are reliable when used with Tyco Electronics' RHD series ribbon.

Specifications — TTDS -073
Adhesive — Permanent acrylic
Service Temperature — –40°C to +150°C [–40°F to +302°F]
Recommended Printer — T308S*
Recommended Ribbon — 1330-0607-10*

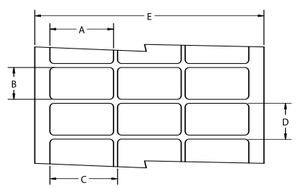
*Alternative printers and ribbons are available for special applications. Contact Tyco Electronics Identification for more information.

Part Numbering System

WP- 040040-10- 9

- Color
- Pack size
- Label height (mm)
- Label width (mm)
- Product family

Ordering Information



Catalog 1308940
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Japan: 81-44-844-8013
UK: 44-208-420-8341

WP — White Polyester Labels (Continued)

Product Dimensions

Product Order Code	Package Quantity	Labels Across	Label Width (A) mm	*inches*	Label Height (B) mm	*inches*	Horizontal Repeat (C) mm	*inches*	Vertical Repeat (D) mm	*inches*	Web Width (E) mm	*inches*
WP-040040-25-9	25,000	20	4.0	*0.157*	4.0	*0.157*	4.0	*0.157*	7.2	*0.281*	86.0	*3.380*
WP-064064-25-9	25,000	12	6.4	*0.250*	6.4	*0.250*	6.4	*0.250*	9.5	*0.375*	82.2	*3.240*
* WP-080080-10-9	10,000	8	8.0	*0.315*	8.0	*0.315*	9.9	*0.390*	13.3	*0.525*	83.3	*3.280*
WP-089047-10-9	10,000	5	8.9	*0.350*	4.7	*0.185*	11.4	*0.450*	7.9	*0.313*	60.6	*2.386*
WP-095080-25-9	25,000	5	9.5	*0.375*	8.0	*0.315*	12.2	*0.480*	12.7	*0.500*	64.3	*2.531*
WP-095095-10-9	10,000	7	9.5	*0.375*	9.5	*0.375*	11.1	*0.437*	12.7	*0.500*	82.1	*3.230*
WP-127111-10-9	10,000	5	12.7	*0.500*	11.1	*0.437*	16.8	*0.662*	14.3	*0.563*	86.0	*3.380*
WP-127127-10-9	10,000	5	12.7	*0.500*	12.7	*0.500*	15.9	*0.625*	15.9	*0.625*	82.6	*3.250*
* WP-165051-25-9	25,000	4	16.5	*0.650*	5.1	*0.200*	17.8	*0.700*	8.3	*0.325*	75.8	*2.990*
WP-165102-10-9	10,000	5	16.5	*0.650*	10.2	*0.400*	19.1	*0.750*	13.8	*0.545*	99.1	*3.900*
WP-171171-10-9	10,000	5	17.1	*0.674*	17.1	*0.674*	19.7	*0.774*	20.3	*0.800*	101.8	*4.006*
* WP-178095-10-9	10,000	4	17.8	*0.700*	9.5	*0.375*	19.1	*0.750*	12.7	*0.500*	80.9	*3.190*
* WP-191064-10-9	10,000	4	19.1	*0.750*	6.4	*0.250*	21.6	*0.850*	9.5	*0.375*	89.9	*3.540*
WP-191114-15-9	15,000	3	19.1	*0.750*	11.4	*0.450*	22.2	*0.875*	14.7	*0.579*	69.5	*2.736*
* WP-203127-10-9	10,000	4	20.3	*0.800*	12.7	*0.500*	22.9	*0.900*	15.9	*0.625*	94.6	*3.730*
WP-229064-10-9	10,000	3	22.9	*0.900*	6.4	*0.250*	28.6	*1.125*	9.5	*0.375*	86.0	*3.390*
WP-254045-10-9	10,000	3	25.4	*1.000*	4.6	*0.180*	31.8	*1.250*	8.5	*0.333*	95.3	*3.750*
WP-254064-10-9	10,000	3	25.4	*1.000*	6.4	*0.250*	27.9	*1.100*	9.5	*0.375*	87.3	*3.436*
WP-254097-10-9	10,000	3	25.4	*1.000*	9.7	*0.380*	27.9	*1.100*	12.7	*0.500*	87.4	*3.440*
WP-254127-10-9	10,000	3	25.4	*1.000*	12.7	*0.500*	27.9	*1.100*	16.9	*0.666*	87.4	*3.440*
WP-254254-10-9	10,000	3	25.4	*1.000*	25.4	*1.000*	27.9	*1.100*	28.6	*1.125*	87.4	*3.440*
* WP-305047-10-9	10,000	2	30.5	*1.200*	4.7	*0.185*	33.0	*1.300*	7.8	*0.306*	69.5	*2.736*
WP-318064-10-9	10,000	1	31.8	*1.250*	6.4	*0.250*	N/A		9.5	*0.375*	37.9	*1.490*
WP-318097-10-9	10,000	1	31.8	*1.250*	9.7	*0.380*	N/A		12.7	*0.500*	37.8	*1.488*
WP-381064-10-9	10,000	1	38.1	*1.500*	6.4	*0.250*	N/A		9.5	*0.375*	44.5	*1.750*
* WP-381127-5-9	5,000	2	38.1	*1.500*	12.7	*0.500*	44.2	*1.740*	15.9	*0.630*	88.2	*3.470*
WP-381191-5-9	5,000	2	38.1	*1.500*	19.1	*0.750*	43.2	*1.700*	22.2	*0.875*	87.6	*3.450*
* WP-381381-2.5-9	2,500	2	38.1	*1.500*	38.1	*1.500*	44.5	*1.750*	40.8	*1.610*	88.9	*3.500*
* WP-381635-5-9	5,000	2	38.1	*1.500*	63.5	*2.500*	40.6	*1.600*	66.7	*2.630*	84.7	*3.340*
* WP-406254-1.5-9	1,500	2	40.6	*1.600*	25.4	*1.000*	55.9	*2.200*	38.1	*1.500*	102.9	*4.050*
WP-445064-10-9	10,000	1	44.5	*1.750*	6.4	*0.250*	N/A		9.5	*0.375*	50.4	*1.986*
WP-445102-5-9	5,000	1	44.5	*1.750*	10.2	*0.400*	N/A		12.7	*0.500*	50.4	*1.986*
WP-445445-2-9	2,000	1	44.5	*1.750*	44.5	*1.750*	N/A		47.6	*1.875*	50.4	*1.986*
WP-478175-5-9	5,000	1	47.8	*1.880*	17.5	*0.690*	N/A		24.4	*0.962*	66.0	*2.600*
WP-508064-10-9	10,000	1	50.8	*2.000*	6.4	*0.250*	N/A		9.5	*0.375*	56.9	*2.240*
WP-508095-5-9	5,000	1	50.8	*2.000*	9.5	*0.375*	N/A		12.7	*0.500*	57.2	*2.250*
WP-508127-5-9	5,000	1	50.8	*2.000*	12.7	*0.500*	N/A		15.9	*0.625*	56.9	*2.240*
WP-508254-5-9	5,000	1	50.8	*2.000*	25.4	*1.000*	N/A		28.6	*1.125*	57.2	*2.250*
WP-508318-2.5-9	2,500	1	50.8	*2.000*	31.8	*1.250*	N/A		34.9	*1.375*	56.9	*2.240*
WP-508508-3-9	3,000	1	50.8	*2.000*	50.8	*2.000*	N/A		54.6	*2.150*	54.0	*2.130*
WP-523841-1.5-9	1,500	1	52.3	*2.060*	84.1	*3.310*	N/A		88.9	*3.500*	58.2	*2.290*
WP-610419-2.5-9	2,500	1	61.0	*2.400*	41.9	*1.650*	N/A		45.5	*1.792*	67.3	*2.650*
WP-699191-5-9	5,000	1	69.9	*2.750*	19.1	*0.750*	N/A		23.3	*0.917*	76.2	*3.000*
WP-699254-5-9	5,000	1	69.9	*2.750*	25.4	*1.000*	N/A		28.6	*1.125*	76.2	*3.000*
WP-762254-5-9	5,000	1	76.2	*3.000*	25.4	*1.000*	N/A		28.6	*1.125*	82.3	*3.240*
WP-762381-2.5-9	2,500	1	76.2	*3.000*	38.1	*1.500*	N/A		41.3	*1.625*	82.3	*3.240*
WP-762508-2.5-9	2,500	1	76.2	*3.000*	50.8	*2.000*	N/A		54.0	*2.125*	82.6	*3.240*
WP-762127-1-9	1,000	1	76.2	*3.000*	127.0	*5.000*	N/A		129.5	*5.100*	79.4	*3.130*
WP-101508-2.5-9	2,500	1	101.6	*4.000*	50.8	*2.000*	N/A		54.6	*2.150*	104.1	*4.100*
WP-101635-2.5-9	2,500	1	101.6	*4.000*	63.5	*2.500*	N/A		66.7	*2.625*	107.7	*4.240*
WP-101762-1.8-9	1,800	1	101.6	*4.000*	76.2	*3.000*	N/A		79.4	*3.125*	104.1	*4.100*
WP-101101-1.3-9	1,300	1	101.6	*4.000*	101.6	*4.000*	N/A		104.8	*4.125*	104.1	*4.100*
WP-101165-0.85-9	850	1	101.6	*4.000*	165.1	*6.500*	N/A		168.3	*6.680*	104.9	*4.130*

* **Note:** Standard format not compatible with T200 Printers.

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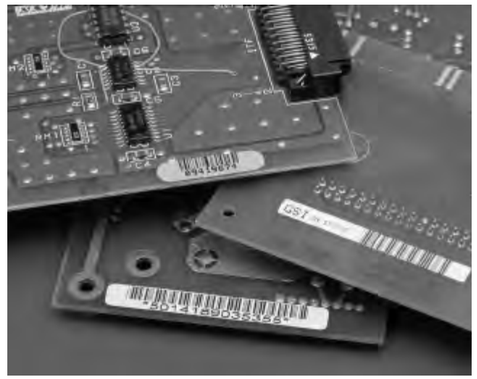
Thermal Transfer (Continued)



Kapton Labels

Product Facts

- UL Listed: T1K, T2K & TSK
- Thermal transfer printable
- High temperature permanent acrylic adhesive

T1K

- Gloss white topcoat
- Withstands surface mount board processes on either the top or bottom side of the board
- Low profile 1 mil film offers polyimide thermal performance at competitive cost
- Ideal for manual apply applications

T2K

- Gloss white topcoat
- Withstands surface mount board processes on either the top or bottom side of the board
- Ideal for auto apply applications

KTT

- Matte tan topcoat
- Withstands surface mount board processes on either the top or bottom side of the board
- Product approved for aerospace/defense applications
- Low outgassing

TSK

- High opacity gloss white topcoat
- Withstands surface mount board processes on either the top or bottom side of the board
- Deemed to be a static safe product in accordance with EIA 625, EIA 541. Test methods employed were in accordance with EOS/ESD S11.11.
- Ideal for auto apply applications

T2Y

- High opacity gloss white topcoat
- Economic alternative to T1K material
- Withstands surface mount board processes on either the top or bottom side of the board — can also be used on the top side of the board in mixed processes, but it is not recommended for the bottom side which is directly exposed to the wave solder environment

Tyco Electronics polyimide (Kapton) labels are all ideal for high temperature labeling requirements such as printed circuit boards. They are suitable for direct wave (bottom side) and IR reflow (top side) PCB applications. Tyco Electronics Kapton labels are designed to withstand the fluxes, cleaning solvents and molten solder encountered in the manufacture of printed circuit boards. They offer excellent contrast for bar code applications. Tyco Electronics Kapton labels are suitable for the harshest high temperature applications. For reliable print performance and durability, use with Tyco Electronics' RHT-45 series ribbon.

Part Numbering System

T1K-044033-10-9

- 9 — Color
- 10 — Pack size
- 044033 — Label height (mm) / Label width (mm)
- T1K — Product family

Specifications —
T1K — TTDS-034
T2K — TTDS-035
TSK — TTDS-085

Adhesive —
Permanent acrylic

Service Temperature —
T1K[1], T2K[2], TSK[2], KTT[2] —
–40°C to +260°C [–40°F to +500°F]
T2Y[3] —
–40°C to +232°C [–40°F to +450°F]

[1] Flash exposure to +472°C [+800°F]
[2] Flash exposure to +538°C [+1000°F]
[3] Flash exposure to +316°C [+600°F]

Recommended Printer —
T1K, T2K, TSK, T2Y, KTT — T312S*

Recommended Ribbon —
1330-0619-10*

* Alternative printers and ribbons are available for special applications. Contact Tyco Electronics Identification for more information.

KAPTON is a trademark of E. I. DuPont de Nemours and Company.

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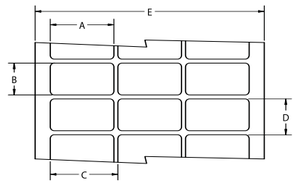
T1K — White Kapton Labels

Ordering Information



Product Dimensions

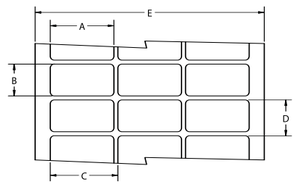
Product Order Code	Package Quantity	Labels Across	Label Width (A) mm	*inches*	Label Height (B) mm	*inches*	Horizontal Repeat (C) mm	*inches*	Vertical Repeat (D) mm	*inches*	Web Width (E) mm	*inches*
T1K-044033-10-9	10,000	20	4.4	*0.170*	3.3	*0.130*	4.4	*0.170*	9.5	*0.375*	92.4	*3.636*
T1K-064064-25-9	25,000	12	6.4	*0.250*	6.4	*0.250*	6.4	*0.250*	9.5	*0.375*	82.2	*3.240*
T1K-080080-10-9	10,000	8	8.0	*0.315*	8.0	*0.315*	9.9	*0.390*	13.3	*0.525*	83.3	*3.280*
T1K-095080-25-9	25,000	5	9.5	*0.375*	8.0	*0.315*	12.2	*0.480*	12.7	*0.500*	64.3	*2.531*
T1K-095095-10-9	10,000	7	9.5	*0.375*	9.5	*0.375*	11.1	*0.437*	12.7	*0.500*	82.1	*3.230*
T1K-127032-10-9	10,000	5	12.7	*0.500*	3.2	*0.125*	19.1	*0.750*	3.2	*0.250*	94.9	*3.736*
T1K-127111-10-9	10,000	5	12.7	*0.500*	11.1	*0.437*	16.8	*0.662*	14.3	*0.563*	86.0	*3.380*
T1K-127127-10-9	10,000	5	12.7	*0.500*	12.7	*0.500*	15.9	*0.625*	15.9	*0.625*	82.6	*3.250*
T1K-165051-25-9	25,000	4	16.5	*0.650*	5.1	*0.200*	17.8	*0.700*	8.3	*0.325*	75.8	*2.990*
T1K-171171-10-9	10,000	5	17.1	*0.674*	17.1	*0.674*	19.7	*0.774*	20.3	*0.800*	101.8	*4.006*
T1K-178095-10-9	10,000	4	17.8	*0.700*	9.5	*0.375*	19.1	*0.750*	12.7	*0.500*	80.9	*3.190*
T1K-191064-10-9	10,000	4	19.1	*0.750*	6.4	*0.250*	21.6	*0.850*	9.5	*0.375*	89.9	*3.540*
T1K-229064-10-9	10,000	3	22.9	*0.900*	6.4	*0.250*	28.6	*1.125*	9.5	*0.375*	86.0	*3.390*
T1K-254045-10-9	10,000	3	25.4	*1.000*	4.6	*0.180*	31.8	*1.250*	8.5	*0.333*	95.3	*3.750*
T1K-254064-10-9	10,000	3	25.4	*1.000*	6.4	*0.250*	27.9	*1.100*	9.5	*0.375*	87.3	*3.436*
T1K-254097-10-9	10,000	3	25.4	*1.000*	9.7	*0.380*	27.9	*1.100*	12.7	*0.500*	87.4	*3.440*
T1K-254127-10-9	10,000	3	25.4	*1.000*	12.7	*0.500*	27.9	*1.100*	16.9	*0.666*	87.4	*3.440*
T1K-254254-10-9	10,000	3	25.4	*1.000*	25.4	*1.000*	27.9	*1.100*	28.6	*1.125*	87.4	*3.440*
T1K-305047-10-9	10,000	2	30.5	*1.200*	4.7	*0.185*	33.0	*1.300*	7.8	*0.306*	69.5	*2.736*
T1K-318064-10-9	10,000	1	31.8	*1.250*	6.4	*0.250*	N/A		9.5	*0.375*	37.9	*1.490*
T1K-381020-10-9	10,000	1	38.1	*1.500*	2.0	*0.080*	N/A		10.7	*0.423*	44.1	*1.740*
T1K-381127-5-9	5,000	2	38.1	*1.500*	12.7	*0.500*	44.2	*1.738*	15.9	*0.625*	88.2	*3.472*
T1K-381381-2.5-9	2,500	2	38.1	*1.500*	38.1	*1.500*	44.5	*1.750*	40.8	*1.607*	88.9	*3.500*
T1K-445064-10-9	10,000	1	44.5	*1.750*	6.4	*0.250*	N/A		9.5	*0.375*	50.4	*1.986*
T1K-445102-5-9	5,000	1	44.5	*1.750*	10.2	*0.400*	N/A		12.7	*0.500*	50.4	*1.386*
T1K-508064-10-9	10,000	1	50.8	*2.000*	6.4	*0.250*	N/A		9.5	*0.375*	56.9	*2.240*
T1K-508095-5-9	5,000	1	50.8	*2.000*	9.5	*0.375*	N/A		12.7	*0.500*	57.2	*2.250*
T1K-508127-5-9	5,000	1	50.8	*2.000*	12.7	*0.500*	N/A		15.9	*0.625*	56.9	*2.240*

* **Note:** Kapton/polyimide labels not compatible with T200 Printers.

KAPTON is a trademark of E. I. DuPont de Nemours and Company.

T2K — White Kapton Labels

Ordering Information



Product Dimensions

Product Order Code	Package Quantity	Labels Across	Label Width (A) mm	*inches*	Label Height (B) mm	*inches*	Horizontal Repeat (C) mm	*inches*	Vertical Repeat (D) mm	*inches*	Web Width (E) mm	*inches*
T2K-044033-10-9	10,000	20	4.4	*0.170*	3.3	*0.130*	4.4	*0.170*	9.5	*0.375*	92.4	*3.636*
T2K-064064-25-9	25,000	12	6.4	*0.250*	6.4	*0.250*	6.4	*0.250*	9.5	*0.375*	82.2	*3.240*
T2K-080080-10-9	10,000	8	8.0	*0.315*	8.0	*0.315*	9.9	*0.390*	13.3	*0.525*	83.3	*3.280*
T2K-095080-25-9	25,000	5	9.5	*0.375*	8.0	*0.315*	12.2	*0.480*	12.7	*0.500*	64.3	*2.531*
T2K-095095-10-9	10,000	7	9.5	*0.375*	9.5	*0.375*	11.1	*0.437*	12.7	*0.500*	82.1	*3.230*
T2K-127032-10-9	10,000	5	12.7	*0.500*	3.2	*0.125*	19.1	*0.750*	3.2	*0.250*	94.9	*3.736*
T2K-127111-10-9	10,000	5	12.7	*0.500*	11.1	*0.437*	16.8	*0.662*	14.3	*0.563*	86.0	*3.380*
T2K-127127-10-9	10,000	5	12.7	*0.500*	12.7	*0.500*	15.9	*0.625*	15.9	*0.625*	82.6	*3.250*
T2K-165051-25-9	25,000	4	16.5	*0.650*	5.1	*0.200*	17.8	*0.700*	8.3	*0.325*	75.8	*2.990*
T2K-171171-10-9	10,000	5	17.1	*0.674*	17.1	*0.674*	19.7	*0.774*	20.3	*0.800*	101.8	*4.006*
T2K-178095-10-9	10,000	4	17.8	*0.700*	9.5	*0.375*	19.1	*0.750*	12.7	*0.500*	80.9	*3.190*
T2K-191064-10-9	10,000	4	19.1	*0.750*	6.4	*0.250*	21.6	*0.850*	9.5	*0.375*	89.9	*3.540*
T2K-229064-10-9	10,000	3	22.9	*0.900*	6.4	*0.250*	28.6	*1.125*	9.5	*0.375*	86.0	*3.390*
T2K-254045-10-9	10,000	3	25.4	*1.000*	4.6	*0.180*	31.8	*1.250*	8.5	*0.333*	95.3	*3.750*
T2K-254064-10-9	10,000	3	25.4	*1.000*	6.4	*0.250*	27.9	*1.100*	9.5	*0.375*	87.3	*3.436*
T2K-254097-10-9	10,000	3	25.4	*1.000*	9.7	*0.380*	27.9	*1.100*	12.7	*0.500*	87.4	*3.440*
T2K-254127-10-9	10,000	3	25.4	*1.000*	12.7	*0.500*	27.9	*1.100*	16.9	*0.666*	87.4	*3.440*
T2K-254254-10-9	10,000	3	25.4	*1.000*	25.4	*1.000*	27.9	*1.100*	28.6	*1.125*	87.4	*3.440*
T2K-305047-10-9	10,000	2	30.5	*1.200*	4.7	*0.185*	33.0	*1.300*	7.8	*0.306*	69.5	*2.736*
T2K-318064-10-9	10,000	1	31.8	*1.250*	6.4	*0.250*	N/A		9.5	*0.375*	37.9	*1.490*
T2K-381020-10-9	10,000	1	38.1	*1.500*	2.0	*0.080*	N/A		10.7	*0.423*	44.1	*1.740*
T2K-381064-10-9	10,000	1	38.1	*1.500*	6.4	*0.250*	N/A		9.5	*0.375*	44.5	*1.750*
T2K-381127-5-9	5,000	2	38.1	*1.500*	12.7	*0.500*	44.2	*1.738*	15.9	*0.625*	88.2	*3.472*
T2K-381381-2.5-9	2,500	2	38.1	*1.500*	38.1	*1.500*	44.5	*1.750*	40.8	*1.607*	88.9	*3.500*
T2K-445064-10-9	10,000	1	44.5	*1.750*	6.4	*0.250*	N/A		9.5	*0.375*	50.4	*1.986*
T2K-445102-5-9	5,000	1	44.5	*1.750*	10.2	*0.400*	N/A		12.7	*0.500*	50.4	*1.386*
T2K-508064-10-9	10,000	1	50.8	*2.000*	6.4	*0.250*	N/A		9.5	*0.375*	56.9	*2.240*
T2K-508095-5-9	5,000	1	50.8	*2.000*	9.5	*0.375*	N/A		12.7	*0.500*	57.2	*2.250*
T2K-508127-5-9	5,000	1	50.8	*2.000*	12.7	*0.500*	N/A		15.9	*0.625*	56.9	*2.240*

* **Note:** Kapton/polyimide labels not compatible with T200 Printers.

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Catalog 1308940
Revised 8-06

www.tycoelectronics.com

Dimensions are in millimeters and inches unless otherwise specified. Values not in italics are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

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Canada: 1-905-470-4425
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C. America: 57-1-254-4444

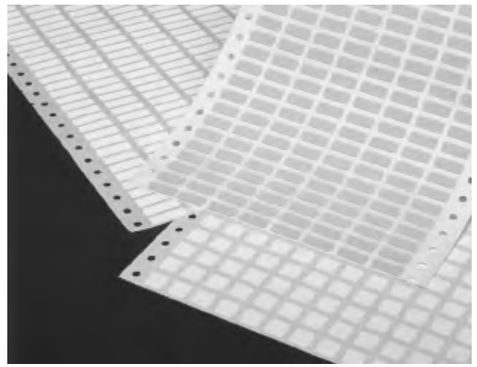
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Dot Matrix

K — Kapton Labels

Product Facts

- Dot matrix printable
- Matte finish for better print contrast
- Product approved for aerospace/defense applications
- Exceptional durability and tear resistance
- High temperature permanent acrylic adhesive
- Superior solvent and UV resistance
- Low outgassing



Tyco Electronics K is a dot matrix printable, 2 mil thick tan polyimide (Kapton) with a permanent acrylic adhesive that is ideal for high temperature labeling requirements such as printed circuit boards. It is suitable for direct wave (bottom side) and IR reflow (top side) PCB applications, and is designed to withstand the fluxes, cleaning solvents and molten solder encountered in the manufacture of printed circuit boards. With a flash exposure service temperature of +538°C (+1000°F), K is suitable for the harshest high temperature applications. For reliable print performance and durability, use with Tyco Electronics's RI Quick-Dry series ribbon.

Specifications — TTDS-007
Adhesive —
Permanent acrylic
Service Temperature* —
–40°C to +260°C [–40°F to +500°F]
Recommended Printer —
AM6310**
Recommended Ribbon —
1892BK01**

*Flash exposure to +538°C [+1000°F]

**Alternative printers and ribbons are available for special applications. Contact Tyco Electronics Identification for more information.

Part Numbering System

K-064064-10-1A

- Color
- Pack size
- Label height (mm)
- Label width (mm)
- Product family

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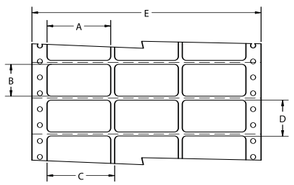
Japan: 81-44-844-8013
UK: 44-208-420-8341

K — Kapton Labels
(Continued)

Ordering Information



Product Dimensions

Product Order Code	Package Quantity	Labels Across	Label Width (A) mm	*inches*	Label Height (B) mm	*inches*	Horizontal Repeat (C) mm	*inches*	Vertical Repeat (D) mm	*inches*	Web Width (E) mm	*inches*
K-064064-10-1A	10,000	20	6.4	*0.250*	6.4	*0.250*	6.4	*0.250*	8.5	*0.333*	152.4	*6.000*
K-080080-10-1A	10,000	10	8.0	*0.315*	8.0	*0.315*	8.0	*0.315*	12.7	*0.500*	105.4	*4.150*
K-095095-10-1A	10,000	16	9.5	*0.375*	9.5	*0.375*	12.7	*0.500*	12.7	*0.500*	226.1	*8.900*
K-165051-10-1A	10,000	10	16.5	*0.650*	5.1	*0.200*	20.3	*0.800*	6.4	*0.250*	224.8	*8.850*
K-191064-10-1A	10,000	9	19.1	*0.750*	6.4	*0.250*	22.9	*0.900*	8.5	*0.333*	227.3	*8.950*
K-229064-10-1A	10,000	8	22.9	*0.900*	6.4	*0.250*	25.4	*1.000*	8.5	*0.333*	226.1	*8.900*
K-254095-10-1A	10,000	7	25.4	*1.000*	9.5	*0.375*	27.9	*1.100*	12.7	*0.500*	218.4	*8.600*
K-254127-10-1A	10,000	7	25.4	*1.000*	12.7	*0.500*	27.9	*1.100*	16.9	*0.666*	218.4	*8.600*
K-293064-10-1A	10,000	4	29.3	*1.150*	6.4	*0.250*	9.4	*0.370*	30.5	*1.200*	146.1	*5.750*

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Catalog 1308940
Revised 8-06

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South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

VF — Clear Tedlar Overlaminate

Product Facts

- UV and weather resistant
- Ideal to use as an overlaminate in combination with all printable Tyco Electronics labels
- Resistant to water, oil, cleaning agents and solvents

Adhesive — Permanent rubber-based

Service Temperature — –40°C to +105°C [–40°F to +221°F]

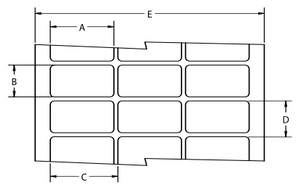
VF-X is a non-printable clear Tedlar designed for use as an overlaminate for labels where resistance to UV light and weathering is necessary. Adds further protection from chemicals, solvents, abrasion, heat and moisture.

Part Numbering System

VF 508318 2.5 X

- X — Color
- 2.5 — Pack size
- 318 — Label height (mm)
- 508 — Label width (mm)
- VF — Product family

Ordering Information



Product Dimensions

Product Order Code	Package Quantity	Labels Across	Label Width (A) mm	*inches*	Label Height (B) mm	*inches*	Horizontal Repeat (C) mm	*inches*	Vertical Repeat (D) mm	*inches*	Web Width (E) mm	*inches*
VF-191064-10-X	10,000	4	19.1	*0.750*	6.4	*0.250*	21.6	*0.850*	9.5	*0.375*	89.9	*3.540*
VF-229064-10-X	10,000	3	22.9	*0.900*	6.4	*0.250*	28.6	*1.125*	9.5	*0.375*	86.0	*3.390*
VF-254097-10-X	10,000	3	25.4	*1.000*	9.7	*0.380*	27.9	*1.100*	12.7	*0.500*	87.4	*3.440*
VF-254127-10-X	10,000	3	25.4	*1.000*	12.7	*0.500*	27.9	*1.100*	16.9	*0.666*	87.4	*3.440*
VF-381064-10-X	10,000	1	38.1	*1.500*	6.4	*0.250*	N/A		9.5	*0.375*	44.5	*1.750*
VF-381127-5-X	5,000	2	38.1	*1.500*	12.7	*0.500*	44.2	*1.738*	15.9	*0.625*	88.2	*3.472*
VF-381191-5-X	5,000	2	38.1	*1.500*	19.1	*0.750*	43.2	*1.700*	22.2	*0.875*	87.6	*3.450*
VF-406254-1.5-X	1,500	2	40.6	*1.600*	25.4	*1.000*	55.9	*2.200*	38.1	*1.500*	102.9	*4.050*
VF-508127-5-X	5,000	1	50.8	*2.000*	12.7	*0.500*	N/A		15.9	*0.625*	56.9	*2.240*
VF-508254-5-X	5,000	1	50.8	*2.000*	25.4	*1.000*	N/A		28.6	*1.125*	57.2	*2.250*
VF-508318-2.5-X	2,500	1	50.8	*2.000*	31.8	*1.250*	N/A		34.9	*1.375*	56.9	*2.240*
VF-699254-5-X	5,000	1	69.9	*2.750*	25.4	*1.000*	N/A		28.6	*1.125*	76.2	*3.000*
VF-762254-5-X	5,000	1	76.2	*3.000*	25.4	*1.000*	N/A		28.6	*1.125*	82.3	*3.240*
VF-762508-2.5-X	2,500	1	76.2	*3.000*	50.8	*2.000*	N/A		54.0	*2.125*	82.3	*3.240*
VF-101635-2.5-X	2,500	1	101.6	*4.000*	63.5	*2.500*	N/A		66.7	*2.625*	107.7	*4.240*

TEDLAR is a trademark of E. I. DuPont de Nemours and Company.

Catalog 1308940
Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

T200 Series — Portable Thermal Transfer Printers

The T200 series of printers are portable/desktop thermal transfer printers with a 4.1" print head offering an economical option for low volume customers who want to take advantage of thermal transfer printing technology. Their small, light weight design makes them ideal for applications requiring portability or in environments with multiple workstations where space is limited.

The T208M has a 200 dpi printhead; the T212M has a 300 dpi printhead for crisp, high quality text, bar codes and graphic images. Both printers are designed for use with Tyco Electronics range of TMS heat shrinkable wire marker sleeves and limited thermal transfer printable pressure sensitive label products.

T200 series printers are available with optional label spindle accessory. It externally holds a roll of labels on 3" core for easy dispensing.

Product Order Code	Description
T208M-PRINTER	T208M thermal printer — standard
T208M-C-PRINTER	T208M thermal printer — cutter option
T212M-PRINTER	T212M thermal printer — standard
T212M-C-PRINTER	T212M thermal printer — cutter option
T200-LABEL-SPINDLE	External label roll holder for T200 printers

Printer Specifications

Print Head Width — 104 mm [4.09"]

Print Head Resolution —
T208M — 8 dpmm [203 dpi]
T212M — 12 dpmm [305 dpi]

Print Speed (Maximum) —
51 mm/sec [2 inch/sec]

Media Sensor —
Transmissive (fixed)
Reflective (fixed

Memory —
T208M — 256KB SRAM and 512KB Flash
T212M — 512KB SRAM and 1MB Flash

Communication Interface —
Parallel (Centronics), serial (RS232), and USB

Printer Dimensions —
200 mm W x 247 mm D x 171 mm H [7.9" W x 9.75" D x 6.75" H]

Printer Weight — 1.81 kg [4 lbs]

Shipping Weight — 4 kg [9 lbs]

Media Specifications

Maximum Print Width —
104 mm [4.09"]

Maximum Media Width —
118 mm [4.65"]

Minimum Media Width —
28 mm [1.12"]

Maximum Media Roll Diameter —
127mm [5.0"]

Media Core Diameter —
25 mm [1.0"]

Ribbon Wind — Ink side out

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Printers (Continued)

T300 Series — High Performance, Cost Effective Thermal Transfer Printers

The T300 series printers are high performance, yet cost effective thermal transfer printers with a 4.1" printhead. The rugged and durable all metal construction makes them suitable for demanding industrial and commercial environments. The enhanced memory and 32 bit processor provide fast data processing and print speeds. Optional accessories are available for added convenience and efficiency.

The T308S and T308SN have a 200 dpi printhead for use with the Tyco Electronics range of thermal transfer printable pressure sensitive label products. The T308SN provides network capability for real time connectivity with the printer. With such connectivity, print jobs can be modified from any location over the Internet via Web-based tools. The T308SN printer is also capable of sending alerts via email enabled wired or wireless devices.

The 300 dpi printhead on the T312S, T312M and T312Z produces crisp, high quality text, bar codes and graphic images. The T312S and T312Z are for use with Tyco Electronics thermal transfer printable pressure sensitive label products. The color-coded operator cues and auto-calibration features make T312Z an affordable yet easy to use label printing system. The T312M is designed for use with Tyco Electronics TMS and HSI wire marker sleeves, as well as thermal transfer pressure sensitive label products.

Printer Specifications

Print Head Width — 104 mm [4.09"]

Print Head Resolution —
T308S — 8 dpmm [203 dpi]
T312M/T312S/T312Z* — 12 dpmm [305 dpi]

Print Speed (Maximum) —
T308S/T312M/T312S — 203 mm/sec [8 inch/sec]
T312Z* — 154 mm/sec [6 inch/sec]

Media Sensor —
Transmissive — adjustable
Reflective (fixed)

Memory —
T308S/T312M/T312S — 6MB DRAM and 2MB Flash
T308SN — Additional 8MB flash memory in PCMCIA socket
T312Z* — 4MB DRAM and 1MB Flash

Communication Interface —
Bi-directional parallel (Centronics) and serial (RS232)

Printer Dimensions —
T308S/T312M/T312S —
283 mm W x 495 mm D x 394 mm H [11.2" W x 19.5" D x 15.5" H]
T312Z* —
278 mm W x 475 mm D x 338 mm H [10.93" W x 18.69" D x 13.32" H]

Printer Weight —
T308S/T312M/T312S — 25 kg [55 lbs]
T312Z* — 15 kg [32.4 lbs]

Shipping Weight —
T308S/T312M/T312S — 29 kg [63 lbs]
T312Z* — 22 kg [49 lbs]

Media Specifications

Maximum Print Width —
104 mm [4.09"]

Maximum Media Width —
114 mm [4.48"]

Minimum Media Width —
T308S/T312M/T312S — 20 mm [0.76"]
T312Z* — 25.4 mm [1.0"]

Maximum Media Roll Diameter —
203 mm [8.0"]

Media Core Diameter —
76 mm [3.0"]

Ribbon Wind — Ink side out

*Not available in Europe, Middle East or Africa

Product Order Code	Description
T308S-PRINTER	T308S thermal printer — standard
T308S-C-PRINTER	T308S thermal printer — cutter option
T308S-R-PRINTER	T308S thermal printer — internal rewind option
T308SN-PRINTER	T308S thermal printer — network capabilities
T312S-PRINTER	T312S thermal printer — standard
T312S-C-PRINTER	T312S thermal printer — cutter option
T312S-R-PRINTER	T312S thermal printer — internal rewind option
T312M-PRINTER	T312M thermal printer — standard
T312M-R-PRINTER	T312M thermal printer — internal rewind option
T312Z-PRINTER	T312Z thermal printer — standard*
T312Z-P-PRINTER	T312Z thermal printer — passive peel* option

*Not available in Europe, Middle East or Africa

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Dimensions are in millimeters and inches unless otherwise specified. Values not in italics are metric equivalents.

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USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

AM6310 — Heavy Duty Dot Matrix Printer

Specifically designed by Tyco Electronics, the AM6310 is a heavy duty industrial dot matrix printer with a high impact 24-pin print head. Automatic media thickness detection and a high impact print head make the AM6310 the best industrial printer available for heavy gauge wire marker and tag materials, and the 24-pin print head produces high quality text printing with fast print speeds. Standard AM6310 printer models are designed to print on Tyco Electronics HSI wire marker sleeves and dot matrix pressure sensitive label and tag products. AM6310D models are equipped with dual tractor mechanism necessary for guiding TMS sleeve product range. Such dual tractor models can also print on HSI and dot matrix label and tag product range.

Printer Specifications

Print Head — 24-pin high-impact dot matrix

Print Speed —
Max. high-speed draft — 600 cps at 12 cpi
Letter quality — 160 cps at 12 cpi

Print Direction — Bi-directional, logic seeking

Control Panel — LCD, 12 keys, select-dial and quick access setup menu

Feed Mechanism — Tractor (single or dual)

Memory — 2 MB flash

Input Buffer — 80 KB

Communication Interface — Parallel port (Centronics 36-pin) and serial port (RS232/DB25)

Printer Dimensions —
483 mm W x 427 mm D x 208 mm H
19.0" W x 16.0" D x 8.2" H

Printer Weight — 18.1 kg [40 lbs]

Media Specifications

Maximum Print Width —
279 mm [11.0"]

Maximum Media Width —
305 mm [12.0"]

Minimum Media Width —
25 mm [1.0"]

Product Order Code	Description
AM6310-110V	Tyco Electronics AM6310 dot matrix printer — standard 110 V
AM6310-230V	Tyco Electronics AM6310 dot matrix printer — standard 230 V
AM6310D-110V	Tyco Electronics AM6310 dot matrix printer — dual tractor 110 V
AM6310D-230V	Tyco Electronics AM6310 dot matrix printer — dual tractor 230 V

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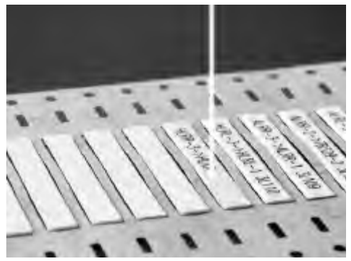
LMS-9000 — Laser Marker

Product Facts

- **Simultaneous double-sided laser marking option for marker sleeves saves considerable time and eliminates any margin for error**
- **Optional handling system designed to handle several Tyco Electronics products**
- **Laser marking and cutting for kitting in one integrated step eliminates post print cutting and kitting**
- **Virtually no product wastage during marking, thanks to a state of the art product recognition and jogging system**
- **Optional scoring and marking feature for label products**
- **Modular design for easy placement and re-installation**
- **Fully integrated software and hardware**
- **On screen diagnostics**
- **Meets all relevant US and European laser equipment standards**
- **Laser parameters pre-set and software controlled**



The LMS-9000 laser marker is a low maintenance laser marking system designed for high volume users. It is a highly automated system including cutting to length, postmark rewinding and double-sided, one step sleeve marking.

Integrated with WinTotal marker sleeve/label marking software, it is designed for Tyco Electronics wire identification sleeves and selected labels.

SPECIAL NOTE:

Tyco Electronics also offers a pre-printing service to customers who need high quality, durable, permanent laser markers, yet do not want to invest in the purchase of LMS-9000 equipment at this time. All pre-printed laser markers, labels or tags are produced to our exacting quality, manufacturing standards and meet applicable mark permanence specifications. A variety of System Six and HSI products including TMS-SCE, D-SCE, HT-SCE, HL, HLX, HS and HX are available for pre-print base materials along with many label materials.

Please contact your local Tyco Electronics representative to find out more about our laser pre-print services.

Product Order Code	Description
LMS-9000	Tyco Electronics LMS-9000 laser — standard

Note: Please contact your local Tyco Electronics representative for product configuration per your application.

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Thermal Transfer Ribbons

RJS-4RPSCE

Tyco Electronics RJS-4RPSCE is a high durability black resin thermal transfer ribbon tested and approved for use on Tyco Electronics TMS-SCE and RPS wire marker sleeve products. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications

Ribbon Width* — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T308S, T312M, T312Z**, T408M, T612M-DS
Compatible Materials — TMS-SCE, RPS, SB

Ordering Information

Product Order Code — TMS-RJS-RIBBON-4RPSCE
Description — Tyco Electronics 4RPSCE thermal transfer ribbon for T308S, T312S, T312M, T312Z**, T408M and T612M-DS printers

* Available in additional sizes by custom quotation
**Not available in Europe, Middle East or Africa

101-4RPSCE

Tyco Electronics 101-4RPSCE is a high durability black resin thermal transfer ribbon tested and approved for use on Tyco Electronics TMS-SCE, RPS wire marker sleeve products and SB self-laminating labels. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications

Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 74 meters [242 feet]
Ink — Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T208M, T212M
Compatible Materials — TMS-SCE, RPS, SB

Ordering information

Product Order Code — TMS-101-RIBBON-4RPSCE
Description — Tyco Electronics 4RPSCE thermal transfer ribbon for T208M and T212M printers

RJS-4HT

Tyco Electronics RJS-4HT is a high temperature black resin thermal transfer ribbon tested and approved for use on Tyco Electronics HT-SCE high temperature wire marker sleeve products. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications

Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T312M, T408M, T612M-DS
Compatible Materials — HT-SCE, HTCM-SCE-TP (T312M only)

Ordering information

Product Order Code — TMS-RJS-RIBBON-4HT
Description — Tyco Electronics 4HT thermal transfer ribbon for T312M, T408M and T612M-DS printers

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Revised 8-06

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Thermal Transfer Ribbons
(Continued)

101-4HT

Tyco Electronics 101-4HT is a high temperature black resin thermal transfer ribbon tested and approved for use on Tyco Electronics HT-SCE high temperature wire marker sleeve products. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 74 meters [242 feet]
Ink — Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T208M, T212M
Compatible Materials — HT-SCE

Ordering Information
Product Order Code — TMS-101-RIBBON-4HT
Description — Tyco Electronics 4HT thermal transfer ribbon for T208M and T212M printers

RJS-4ZH

Tyco Electronics RJS-4ZH is a high durability black resin thermal transfer ribbon tested and approved for use on Tyco Electronics ZH-SCE zero halogen wire marker sleeve products. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T312M, T408M,
Compatible Materials — ZH-SCE

Ordering Information
Product Order Code — TMS-RJS-RIBBON-4ZH
Description — Tyco Electronics 4ZH thermal transfer ribbon for T312M and T408M

T200-4ZH

Tyco Electronics 101-4ZH is a high durability black resin thermal transfer ribbon tested and approved for use on Tyco Electronics ZH-SCE zero halogen wire marker sleeve products. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 74 meters [242 feet]
Ink — Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T208M, T212M
Compatible Materials — ZH-SCE

Ordering Information
Product Order Code — T200–RIBBON–4ZH
Description — Tyco Electronics 4ZH thermal transfer ribbon for T208M and T212M printers

1910

Tyco Electronics 1910 is a high durability high contrast resin/wax thermal transfer ribbon tested and approved for use on the HLX-zero halogen cable marker tape and the HXTM-FB rail tags. For reliable print performance use with Tyco Electronics recommended printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Resin/wax
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T312M, T408M
Compatible Materials — HLX, HXTM-FB

Ordering Information
Product Order Code — 1910-RIBBON-4T300
Description — Tyco Electronics 1910 thermal transfer ribbon for T312M and T408M printers

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Revised 8-06

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Thermal Transfer Ribbons
(Continued)

1966-RIBBON

Tyco Electronics 1966-RIBBON is an ultra-high durability black resin thermal transfer ribbon tested and approved for use on Tyco Electronics HX, HX-SCE and D-SCE wire marker sleeves as well as CM-SCE-TP and HLX cable markers. See right for compatible materials. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printer — T312MS
Compatible Materials — CM-SCE-TP, D-SCE, HLX, HS, HX, HXTM-FB

Ordering Information
Product Order Code — 19660-RIBBON
Description — Tyco Electronics 1966 thermal transfer ribbon for T312M

T200-RIBBON-1966

Tyco Electronics T200-RIBBON-1966 is an ultra-high durability black resin thermal transfer ribbon tested and approved for use on Tyco Electronics HX-SCE wire marker sleeves. See right for compatible materials. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 74 meters [242 feet]
Ink — Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printer — T312MS
Compatible Materials — HX-SCE

Ordering Information
Product Order Code — T200-RIBBON-1966
Description — Tyco Electronics 1966 thermal transfer ribbon for T212M

1950

Tyco Electronics 1950 is a high durability black resin/wax thermal transfer ribbon tested and approved for use on Tyco Electronics thermal transfer printable H.S.I. wire marker sleeves and HL cable marker products. See right for compatible materials. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Resin/wax
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printer — T312M
Compatible Materials — HC, HL, HS

Ordering Information
Product Order Code — 1950-RIBBON-4T300
Description — Tyco Electronics 1950 thermal transfer ribbon for T312M

RHQ

Tyco Electronics RHQ is a high durability black resin thermal transfer ribbon tested and approved for use on Tyco Electronics thermal transfer printable pressure sensitive labels. See right for compatible materials. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width* — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Wax/Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T308S, T312M, T312S, T312Z**, T408M
Compatible Materials — SB, NC, WP, HW, MP, HM, MV

Ordering Information
Product Order Code — 1330-0606-10
Description — Tyco Electronics RHQ thermal transfer ribbon for all T300 and T400 printers

*Available in additional sizes by custom quotation
**Not available in Europe, Middle East or Africa

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Revised 8-06

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Japan: 81-44-844-8013
UK: 44-208-420-8341

Thermal Transfer Ribbons
(Continued)

RHD

Tyco Electronics RHD is a high durability black resin thermal transfer ribbon tested and approved for use on Tyco Electronics thermal transfer printable pressure sensitive labels. See right for compatible materials. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width* — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T308S, T312M, T312S, T312Z**, T408M
Compatible Materials — CP, HM, HMM, HPK, HW, MP, MV, NC, PVF, TN, TTP, WP, WV, TP

Ordering Information
Product Order Code — 1330-0607-10
Description — Tyco Electronics RHD thermal transfer ribbon for all T300 and T400 printers

*Available in additional sizes by custom quotation
**Not available in Europe, Middle East or Africa

RHD-T200

Tyco Electronics RHD-T200 is a high durability black resin thermal transfer ribbon tested and approved for use on Tyco Electronics thermal transfer printable pressure sensitive labels. See right for compatible materials. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 74 meters [242 feet]
Ink — Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T208M, T212M
Compatible Materials — HM, HMM, HW, MP, MV, NC, TN, TTP, WP, WV

Ordering Information
Product Order Code — 1330-0607-T200
Description — Tyco Electronics RHD thermal transfer ribbon for T208M and T212M printers

RHT

Tyco Electronics RHT is a high temperature black resin thermal transfer ribbon tested and approved for use on Tyco Electronics thermal transfer printable Kapton labels. See right for compatible materials. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width* — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T308S, T312M, T312S, T312Z**, T408M
Compatible Materials — T1K, T2K, TSK, T2Y, KTT

Ordering Information
Product Order Code — 1330-0619-10
Description — Tyco Electronics RHT thermal transfer ribbon for all T300 and T400 printers

*Available in additional sizes by custom quotation
**Not available in Europe, Middle East or Africa

RS

Tyco Electronics RS is a high quality black wax thermal transfer ribbon tested and approved for use on Tyco Electronics thermal transfer printable paper labels. See right for compatible material. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width* — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Wax
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T308S, T312M, T312S, T312Z**, T408M
Compatible Materials — EP

Ordering Information
Product Order Code — 1330-0600-10
Description — Tyco Electronics RS thermal transfer ribbon for all T300 and T400 printers

*Available in additional sizes by custom quotation
**Not available in Europe, Middle East or Africa

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Catalog 1308940
Revised 8-06

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Thermal Transfer Ribbons
(Continued)

RS-T200

Tyco Electronics RS-T200 is a high quality black wax thermal transfer ribbon tested and approved for use on Tyco Electronics thermal transfer printable paper labels. See right for compatible material. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 74 meters [242 feet]
Ink — Wax
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T208M, T212M
Compatible Materials — EP

Ordering Information
Product Order Code — 1330-0600-T200
Description — Tyco Electronics RS thermal transfer ribbon for T200 printers

3300

Tyco Electronics 3300 is a high durability black resin thermal transfer ribbon tested and approved for use on Tyco Electronics thermal transfer printable pressure sensitive labels. See right for compatible materials. For reliable print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width* — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Resin
Standard Color — Black
Ribbon Wind Direction — Ink side out
Compatible Printers — T308S, T312S, T312M, T408M
Compatible Materials — PVF, TTVF

Ordering Information
Product Order Code — 1330-3300-10
Description — Tyco Electronics 3300 thermal transfer ribbon for all T300 and T400 printers

*Available in additional sizes by custom quotation

T300–WH

White resin based ribbons are available to print on Tyco Electronics TMS-SCE wire marker sleeve products. For print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Resin
Standard Color — White
Ribbon Wind Direction — Ink side out
Compatible Printers — T308S, T312S, T312Z**, T312M and T-408M
Compatible Materials — TMS-SCE (T312M only), CP, TTP

Ordering Information
Product Order Code — T300–RIBBON–WH
Description — Tyco Electronics thermal transfer ribbon for T300 and T400 printers

**Not available in Europe, Middle East or Africa

T300–WH–4HT

White resin based ribbons are available to print on Tyco Electronics HT-SCE wire marker sleeve products. For print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 114 mm [4.49 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Resin
Standard Color — White
Ribbon Wind Direction — Ink side out
Compatible Printers — T312M, T408M
Compatible Materials — HT-SCE

Ordering Information
Product Order Code — T300–RIBBON–WH–4HT
Description — Tyco Electronics thermal transfer white ribbon for all T308M, T312M and T408M printers

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Revised 8-06

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Thermal Transfer Ribbons
(Continued)

T200–WH

White resin based ribbons are available to print on Tyco Electronics TMS-SCE wire marker sleeve products. For print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 70 meters [230 feet]
Ink — Resin
Standard Color — White
Ribbon Wind Direction — Ink side out
Compatible Printers — T208M, T212M
Compatible Materials — TMS-SCE, HM, MP, MV, TTP

Ordering Information
Product Order Code — T200-RIBBON-WH
Description — Tyco Electronics thermal transfer white ribbon for T200 printers

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T200–WH–4HT

White resin based ribbons are available to print on Tyco Electronics HT-SCE wire marker sleeve products. For print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 74 meters [242 feet]
Ink — Resin
Standard Color — White
Ribbon Wind Direction — Ink side out
Compatible Printers — T208M, T212M
Compatible Materials — HT-SCE

Ordering Information
Product Order Code — T200–RIBBON–WH–4HT
Description — Tyco Electronics thermal transfer white ribbon for T200 printers

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RHCA

RHCA resin based ribbons are specifically designed to print on polyester or metalized polyester Tyco Electronics label products. For print performance and durability use with Tyco Electronics recommended compatible printers. It is not suitable to print on paper or self-laminating products.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 91 meters [300 feet]
Ink — Resin
Standard Color — Red, Blue and Green (see ordering information below)
Ribbon Wind Direction — Ink side out
Compatible Printers — T308S, T312M, T312S, T312Z* and T408M
Compatible Materials — CP, HW, HM, HPK, HMM, MP, MV, PVF, WP, WV

Ordering Information
Product Order Codes —
1330-0620-10 (Red)
1330-0621-10 (Blue)
1330-0622-10 (Green)
Description — Tyco Electronics thermal transfer color ribbon for all T300 and T400 printers

*Not available in Europe, Middle East or Africa

RHCB

RHCB wax-resin based ribbons are specifically designed to print on paper and self-laminating Tyco Electronics label products. For print performance and durability use with Tyco Electronics recommended compatible printers.

General Specifications
Ribbon Width — 110 mm [4.33 inches]
Ribbon Length — 300 meters [984 feet]
Ink — Wax-Resin
Standard Color — Red, Blue and Green (see ordering information below)
Ribbon Wind Direction — Ink side out
Compatible Printers — T308S, T312M, T312S, T312Z* and T408M
Compatible Materials — EP, SB

Ordering Information
Product Order Codes —
1330-0630-10 (Red)
1330-0631-10 (Blue)
1330-0632-10 (Green)
Description — Tyco Electronics thermal transfer color ribbon for all T300 and T400 printers

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Revised 8-06

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Ribbons (Continued)

Dot Matrix Ribbons

RIBBON A

Tyco Electronics RIBBON A is a permanent black ink dot matrix ribbon tested and approved for use on Tyco Electronics TMS-SCE wire marker sleeves and RMK-6 products on the LQ870 printer. See right for compatible materials.

General Specifications
Ink — Standard
Standard Color — Black
Compatible Printer — LQ870
Compatible Materials — CM-SCE, D-SCE, RMK-6, RPS, TMS-SCE

Ordering Information
Product Order Code — TMS-SYSTEM-SIX-RIBBON-A
Description — Tyco Electronics dot matrix Ribbon A for LQ870 printer

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QUICK-DRY LQ870

Tyco Electronics QUICK-DRY LQ870 is a quick drying indelible black ink dot matrix ribbon tested and approved for use on Tyco Electronics dot matrix printable pressure sensitive labels on the LQ870 printer. See right for compatible materials.

General Specifications
Ink — RI Quick-Dry
Standard Color — Black
Compatible Printers — LQ870
Compatible Materials — C, DMVF, E, HLTM, K, M, NMX, PV, TW

Ordering Information
Product Order Code — 1330-0037-00
Description — Tyco Electronics Quick-Dry dot matrix ribbon for LQ870 printer

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STANDARD AM6310

Tyco Electronics STANDARD AM6310 is a permanent black ink dot matrix ribbon tested and approved for use on Tyco Electronics wire marker sleeves and cable marker products on the AM6310 printer. See right for compatible materials.

General Specifications
Ink — Standard
Standard Color — Black
Compatible Printers — AM6310, AM6310D
Compatible Materials — CM-SCE, D-SCE*, HC, HL, HLTM-FB, HM, HS, RMK-6, RPS*, TMS-SCE*, MultiMark

Ordering Information
Product Order Code — 1892BK04-RIBBON
Description — Tyco Electronics standard dot matrix ribbon for AM6310 printer

*Available only with AM6310D models

HIGH-PERF AM6310

Tyco Electronics HIGH-PERF AM6310 is a high performance, permanent black ink dot matrix ribbon tested and approved for use on Tyco Electronics wire marker sleeves and cable marker products on the AM6310 printer. See right for compatible materials.

General Specifications
Ink — High performance
Standard Color — Black
Compatible Printers — AM6310, AM6310D
Compatible Materials — HM, HX

Ordering Information
Product Order Code — 1892BK03-HIGH-PERF-RIBBON
Description — Tyco Electronics high performance dot matrix ribbon for AM6310 printer

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QUICK-DRY AM6310

Tyco Electronics QUICK-DRY AM6310 is a quick drying indelible black ink dot matrix ribbon tested and approved for use on Tyco Electronics dot matrix printable pressure sensitive labels on the AM6310 printer. See right for compatible materials.

General Specifications
Ink — RI Quick-Dry
Standard Color — Black
Compatible Printers — AM6310, AM6310D
Compatible Materials — C, DMVF, E, HLTM, HPC, HPTM, K, M, NMX, PV, TW

Ordering Information
Product Order Code — 1892BK01
Description — Tyco Electronics Quick-Dry dot matrix ribbon for AM6310 printer

Catalog 1308940
Revised 8-06

www.tycoelectronics.com

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USA: 1-800-522-6752
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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

WinTotal — Wire Marker and Label Printing Software

Product Facts

- **Powerful wire marker design and print software**
- **Familiar Windows user environment**
- **Pre-loaded with Tyco Electronics identification products**
- **Powerful import and export functions: reads wire lists from spreadsheets, databases and text files from CAD systems**
- **Printer multi-tasking**
- **Multiple on-screen languages**

Label Design

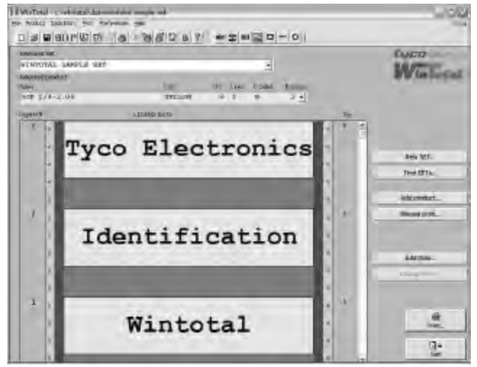
- **WYSIWYG label design and display**
- **Align text left, right, justified or center**
- **Built-in printer font support**
- **Windows True Type fonts**
- **Lines, boxes and graphic images**
- **Resize, rotate and stretch text, graphics and bar codes**
- **Thumbnail preview of saved labels**

Printing

- **Set and batch printing capabilities**
- **Multiple application port printing (MAPP)**
- **Double-sided marker printing**
- **Local or network printer support**
- **Number of identical or serialized copies selectable from database**

Serialization

- **Increment or decrement by any interval**
- **Numeric, alphanumeric and custom base serialization**



Database Options

- **Microsoft ODBC support, including: Access, Excel and dBase**
- **ASCII text files**
- **AutoCad importing**

Data Management

- **Visual Basic scripting for custom data processing**
- **Shareable data fields**
- **Multiple products within one set or batch**

WinTotal software is a powerful 32-bit label/marker design package that makes wire marker printing simple in an industrial environment. Running in the familiar Windows environment, the package is pre-loaded with all the Tyco Electronics wire identification products to facilitate marker design. The software features a highly graphical user interface to simplify operator training and minimize errors. The Windows environment gives access to a huge array of font options, including non-English fonts such as Chinese, Japanese and Hebrew (when used with appropriate operating systems or add-on software), and also allows simple importing and manipulation of graphics and logos. Bar code printing is available.

WinTotal software supports all common wire identification needs, including:

- Manual printing
- Automatic set printing from spreadsheets, databases or other CAD systems (including Tyco Electronics's HarnWare harness design software package)
- Incremental alpha and numeric fields
- Double-sided marker printing
- Automatic or manual routing or multiple printers
- Paper output option
- Wraparound marker production
- User-defined products
- Programmable buttons for repeated data insertion

The software can be password protected at different levels to prevent unauthorized use, and can be run on networked computers so that the design function can be separated from printing. The display can be set to several different languages, and a full on-screen Help function is incorporated.

Running behind the simple WinTotal user interface is a powerful label-making package, so the software can be used to design and print general labeling applications such as rating plates and shipping labels.

Minimum Recommended Computer Configuration

Computer — IBM-compatible PC

Processor — Intel Pentium processor, 400 MHz minimum

RAM — 64 MB minimum (128 MB for Windows NT, 2000 and XP)

Operating System — Windows 95, 98, ME or NT (Service pack 6), 2000 and XP

Disk Space Required — 25 MB minimum

Other Technical Information

Bar Code Types — Codabar, code 39, code 93, code 128, EAN-13, EAN-8, UPC-E, Interleaved 2/5, ITF (DUN14), PDF 417, DataMatrix

Company Logo or Graphics — Can be imported in BMP, PCX, MSP, WMF, JPG, JIF, GIF formats

Text and Graphics — Can be rotated, moved or resized

Ordering Information

Ordering Description — TMS-WINTOTAL-SWARE

Product Description — Tyco Electronics Wire Marker Printing Software — Windows, 32 bit

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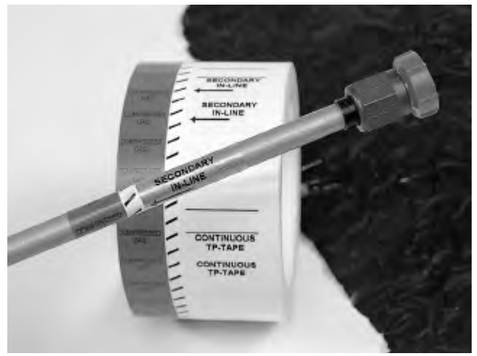
Tube and Pipe ID Labels

TP Tape — High Performance Color-Coded Cost Saving System for Tube Identification

Product Facts

- **Continuous operating temperature of –40°C to +163°C [–40°F to +325°F]**
- **Resists exposure to water, oil, conventional cleaning agents, oil-based solvents and other fluids commonly associated with commercial and military aircraft**
- **Color coded to meet MIL-STD-595B requirements**
- **Meets MIL-STD-1247 standards for hydraulic lines, fuel lines, oxygen lines, inerting fluid lines, etc**
- **Performance tested to RW 2068, a punishing standard for aggressive fluid and temperature resistance in military and commercial aircraft**
- **Available in die-cut or continuous formats to cover all ranges of tube diameters**
- **Die-cut version available in white or yellow printable area**
- **Continuous version available in white* or clear printable area**

*To be used only with TP-CLEAR-CONT over-laminating product



The system is designed for use as a thermal transfer printable, self-laminating identification for the various types of tubes in the aerospace, defense and marine industry. Made from polyester with a permanent acrylic adhesive, this cost saving system allows you to print on a unique range of pre color-coded labels on demand and eliminates the use and maintenance of paints, stencils, hot-stamps and etching tools. The system even does the job in a fraction of the time compared to similar technologies.

Temperature Rating

Operating Temperature Range —
–40°C to +163°C [–40°F to +325°F]

Specifications/Approvals

Tyco Electronics — RW 2526

Military —
MIL-T-9906C (except initial peel)
MIL-STD-595B
MIL-STD-1247
MIL-STD-101B

Printer Information

Tyco Electronics Printer —
T308S** (thermal transfer)

Tyco Electronics Ribbon —
1330-0607-10 (thermal transfer)

**Alternative printers and ribbons are available for special applications. Contact Tyco Electronics Identification for more information.

Part Numbering System

TP3 - PNEU - 1.250

- 1.250 — Size (1.250: for tube with OD of 1.250")
- PNEU — Tube type (PNEU: for pneumatic lines)
- TP3 — Product type (TP3: TP Tape type 3, 1.1 turns of printable legend around tube)

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Revised 8-06

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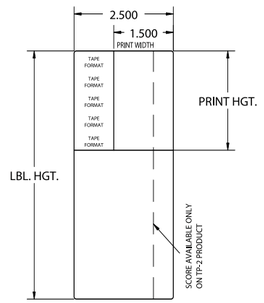
TP Tape — High Performance Color-Coded Cost Saving System for Tube Identification

(Continued)

Ordering Information



Available sizes and formats

Order Description	Printer Type	Label Width mm	Label Width *inches*	Fits Tube Diameter mm	Fits Tube Diameter *inches*	Labels Per Pack
TP<format>-(XXXX)-0.188	Thermal	63.50	*2.500*	4.77	*0.188*	2500
TP<format>-(XXXX)-0.250	Thermal	63.50	*2.500*	6.35	*0.250*	2000
TP<format>-(XXXX)-0.312	Thermal	63.50	*2.500*	7.92	*0.312*	2000
TP<format>-(XXXX)-0.375	Thermal	63.50	*2.500*	9.52	*0.375*	1500
TP<format>-(XXXX)-0.500	Thermal	63.50	*2.500*	12.70	*0.500*	1500
TP<format>-(XXXX)-0.625	Thermal	63.50	*2.500*	15.88	*0.625*	1000
TP<format>-(XXXX)-0.750	Thermal	63.50	*2.500*	19.05	*0.750*	1000
TP<format>-(XXXX)-0.875	Thermal	63.50	*2.500*	22.21	*0.875*	750
TP<format>-(XXXX)-1.000	Thermal	63.50	*2.500*	25.40	*1.000*	750
TP<format>-(XXXX)-1.125	Thermal	63.50	*2.500*	28.58	*1.125*	500
TP<format>-(XXXX)-1.250	Thermal	63.50	*2.500*	31.75	*1.250*	500
TP<format>-(XXXX)-1.375	Thermal	63.50	*2.500*	34.93	*1.375*	500
TP<format>-(XXXX)-1.500	Thermal	63.50	*2.500*	38.10	*1.500*	500
TP<format>-(XXXX)-1.625	Thermal	63.50	*2.500*	41.28	*1.625*	400
TP<format>-(XXXX)-1.750	Thermal	63.50	*2.500*	44.45	*1.750*	400
TP<format>-(XXXX)-CONT	Thermal	63.50	*2.500*	50.80+	*2.000+*	100 ft continuous

Options

Format	None	Standard TP Tape
	2	For a slit at 2 inches from the left edge (total width 2" instead of 2.5")
	3	For 1.1 turns of color-coded label around the pipe instead of 1.5 turns
	4	For white printable area instead of yellow
	WE	For white/slit product for European markets, use order description: TP-WE(XXXX)ST-(size)

Identification code (XXXX)

AIRCON	Air conditioning	HYDRO	Hydraulic	PYRO	Pyrotechnic
BATACT	Battery activator	INAIR	Instrument air	RAIN	Rain repellent
COMGAS	Compressed gas	INERT	Inert fluid	RCAT	Rocket catalyst
COOL	Coolant	LUBE	Lubrication	RFUEL	Rocket fuel
DEICE	Deicing fluid	MC	Miscellaneous	ROXI	Rocket oxidizer
ELECT	Electrical conduit	MONO	Mono propellant	SOLV	Solvent
FIRE	Fire protection	OXYGEN	Breathing oxygen	VAC	Vacuum
FUEL	Fuel	PNEU	Pneumatic	WATER	Water injection

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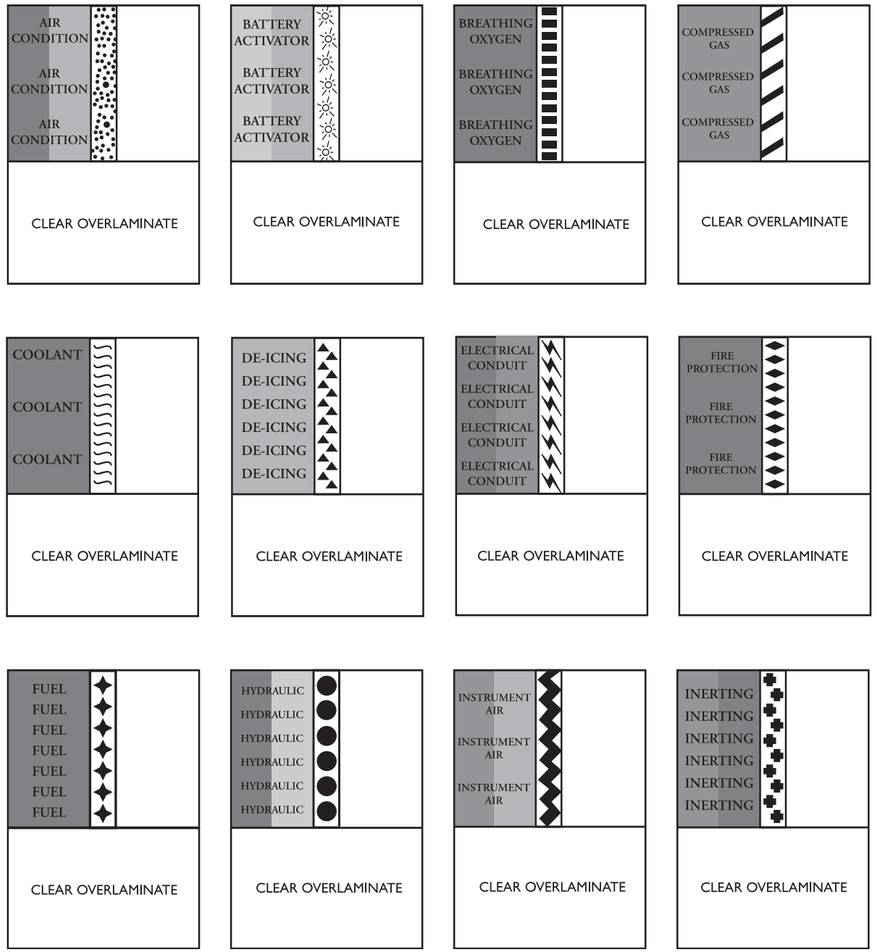
Tube and Pipe ID Labels (Continued)

TP Tape — High Performance Color-Coded Cost Saving System for Tube Identification (Continued)

Colors	Brown	Red	Orange	Yellow	Green
Code	10076	11136	12197	13655	14187

Colors conform to Federal Standard FED-STD-595B.

Continuous format TP Tape is supplied with respective legends imprinted, as shown below. Die cut formats are not printed. For example, TP3AIRCON-CONT will have AIR CONDITION printed on each label. TP3AIRCON-0.625 will not.



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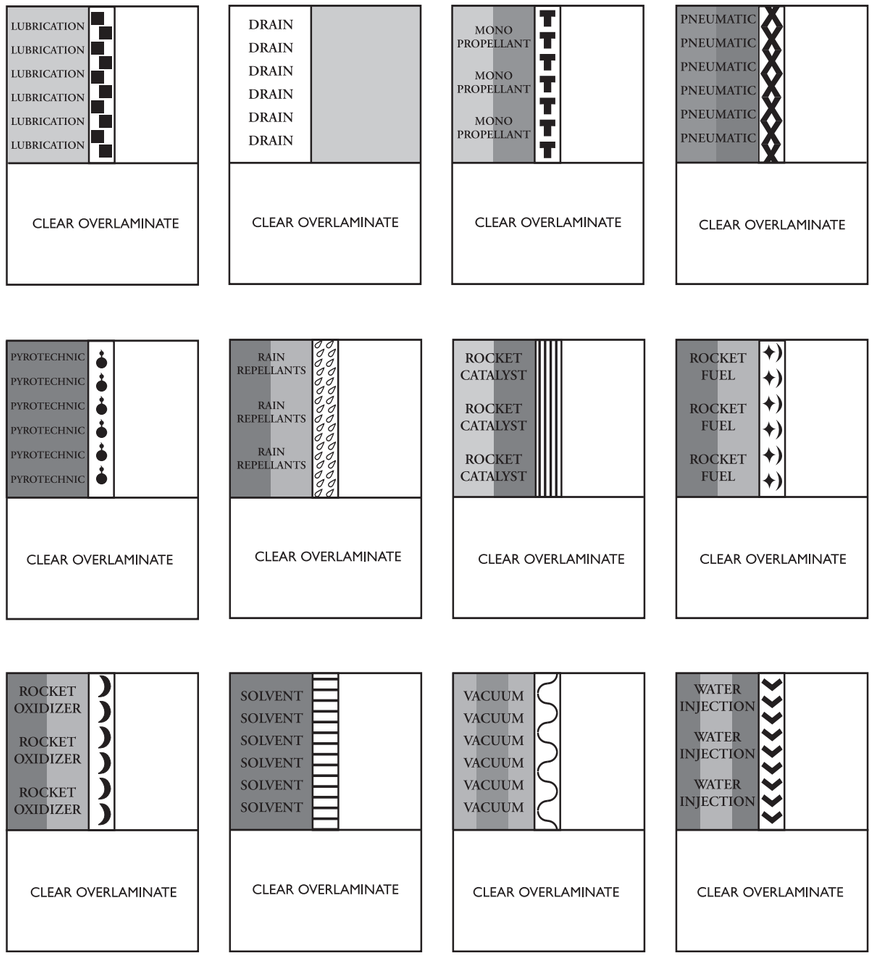
Tube and Pipe ID Labels (Continued)

TP Tape — High Performance Color-Coded Cost Saving System for Tube Identification
(Continued)

Colors	Blue	Grey	Black	White	Pink	Light Green
Code	15102	16473	17038	17925	21668	24664

Colors conform to Federal Standard FED-STD-595B

Continuous format TP Tape is supplied with respective legends imprinted, as shown below. Die cut formats are not printed. For example, TP3AIRCON-CONT will have AIR CONDITION printed on each label. TP3AIRCON-0.625 will not.



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Japan: 81-44-844-8013
UK: 44-208-420-8341

Printer/Material/Ribbon Compatibility Cross Reference

Printer	Compatible Materials	Standard Ribbon
T312M	TMS-SCE	TMS-RJS-RIBBON-4RPSCE
	RPS	TMS-RJS-RIBBON-4RPSCE
	HT-SCE	TMS-RJS-RIBBON-4HT
	ZH-SCE	TMS-RJS-RIBBON-4ZH
	CM-SCE-TP	1966-RIBB0N
	D-SCE	1966-RIBB0N or TMS-RJS-RIBBON-4DSCE
	HS/HC	1950-RIBBON-4T300
	HX	1966-RIBB0N
	HX-SCE	1966-RIBBON
	HL	TMS-RJS-RIBBON-4RPSCE or 1950-RIBBON-4T300
	HLX	1966-RIBB0N
	HXTM-FB	1966-RIBB0N
	HPK	1330-0607-10
	HPKTM	1330-0607-10
	HLTM	1330-0607-10
	HTCM-SCE-TP	TMS-RJS-RIBBON-4HT
	TP Tape	1330-0607-10
	Polyvinyl Fluoride (Tedlar) (TTVF/PVF)	1330-3300-10
	Decals (TTP)	1330-0607-10
	Self-Lams (SB)	TMS-RJS-RIBBON-4RPSCE
	Self-Lams (PVF)	1330-3300-10
	Self-Lams (SP)	1330-0607-10
	Polyimide (Kapton) (T1K/T2K/TSK/KTT/T2Y)	1330-0619-10
	Nylon Cloth (NC)	1330-0606-10
	Polyesters (WP/MP/CP/HW/HM/MV)	1330-0607-10
	Destructible Polyethylene (TN)	1330-0607-10
	White Vinyl (WV)	1330-0607-10
	Paper (EP)	1330-0600-10
T308S or T312S	Self-lams (SB)	TMS-RJS-RIBBON-4RPSCE
	Self-Lams (PVF)	1330-3300-10
	Self-Lams (SP)	1330-0607-10
	Polyesters (CP/WP/MP/HW/HM, HMM//MV)	1330-0607-10
	Polyimide (Kapton) (T1K/T2K/TSK/KTT/T2Y)	1330-0619-10
	Polyvinyl Fluoride (Tedlar) (TTVF/PVF)	1330-3300-10
	TP Tape	1330-0607-10
	HPK	1330-0607-10
	HPKTM	1330-0607-10
	HLTM	1330-0607-10
	Decals (TTP)	1330-0607-10
	Nylon cloth (NC)	1330-0606-10
	Destructible Polyethylene (TN)	1330-0607-10
	White Vinyl (WV)	1330-0607-10
	Paper (EP)	1330-0600-10
T208M or T212M	TMS-SCE	TMS-101-RIBBON-4RPSCE
	RPS	TMS-101-RIBBON-4RPSCE
	HT-SCE	TMS-101-RIBBON-HT
	ZH-SCE	TMS-T200-RIBBON-4ZH
	D-SCE	TMS-101-RIBBON-4DSCE
	HX-SCE	1966-RIBBON (T212M only)
	HPK	1330-3300-101TT
	Paper (EP)	1330-0600-T200
	Polyvinyl Fluoride (Tedlar) (TTVF/PVF)	1330-3300-101TT
	Decals (TTP)	1330-0607-T200
	Self-Lams (SB)	TMS-RJS-RIBBON-4RPSCE
	Self-Lams (PVF)	1330-3300-101TT
	Self-Lams (SP)	1330-0607-T200
	Nylon cloth (NC)	1330-0607-T200
	Polyesters (WP/MP/HW/HM/HMM/MV)	1330-0607-T200
	Destructible Polyethylene (TN)	1330-0607-T200
	White Vinyl (WV)	1330-0607-T200

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Printer/Material/Ribbon Compatibility Cross Reference (Continued)

Printer	Compatible Materials	Standard Ribbon
T408M	TMS-SCE	TMS-RJS-RIBBON-4RPSCE
	RPS	TMS-RJS-RIBBON-4RPSCE
	HT-SCE	TMS-RJS-RIBBON-4HT
	ZH-SCE	TMS-RJS-RIBBON-4ZH
	D-SCE	TMS-RJS-RIBBON-4DSCE
	HL	TMS-RJS-RIBBON-4RPSCE
	HLX	1910-RIBBON-4T300
	HXTM-FB	1910-RIBBON-4T300
	Self-Lams (SB)	TMS-RJS-RIBBON-4RPSCE
	Self-Lams (PVF)	1330-3300-101TT
	Self-Lams (SP)	1330-0607-10
	Polyesters (WP/MP/HW/HM/MV)	1330-0607-10
	Polyimide (Kapton) (T1K/T2K/TSK/KTT/T2Y)	1330-0619-10
	Polyvinyl Fluoride (Tedlar) (TTVF/PVF)	1330-3300-10
	TP Tape	1330-0607-10
	HPK	1330-0607-10
	HPKTM	1330-0607-10
	HLTM	1330-0607-10
	Decals (TTP)	1330-0607-10
	Nylon Cloth (NC)	1330-0606-10
	Destructible Polyethylene (TN)	1330-0607-10
	White Vinyl (WV)	1330-0607-10
	Paper (EP)	1330-0600-10
T612M-DS	TMS-SCE	TMS-RJS-RIBBON-4RPSCE
	RPS	TMS-RJS-RIBBON-4RPSCE
	HT-SCE	TMS-RJS-RIBBON-4HT
	D-SCE	TMS-RJS-RIBBON-4DSCE
AM 6310	TMS-SCE	1892BK04-RIBBON
	RPS	1892BK04-RIBBON
	D-SCE	1892BK04-RIBBON
	CM-SCE	1892BK04-RIBBON
	HS/HC	1892BK04-RIBBON
	HX	1892BK03-HIGH-PERF-RIBBON
	HL	1892BK04-RIBBON
	MultiMark	1892BK04-RIBBON
	NMX	1892BK01
	RMK-6	1892BK04-RIBBON
	HPC	1892BK01
	HLTM	1892BK01
	HPTM	1892BK01
	HLTM-FB	1892BK04-RIBBON
	Polyvinyl Fluoride (Tedlar) (DMVF)	1892BK01
	Self-Lams (TW/PV)	1892BK01
	Polyimide (Kapton) (K)	1892BK01
	Vinyl Cloth (CW)	1892BK01
	Polyesters (E/M)	1892BK01
LQ870	TMS-SCE	TMS-SYSTEMS-SIX-RIBBON-A
	RPS	TMS-SYSTEMS-SIX-RIBBON-A
	D-SCE	TMS-SYSTEMS-SIX-RIBBON-A
	CM-SCE	TMS-SYSTEMS-SIX-RIBBON-A
	NMX	1330-037-00
	RMK-6	TMS-SYSTEMS-SIX-RIBBON-A
	Polyvinyl Fluoride (Tedlar) (DMVF)	1330-037-00
	Self-Lams (TW/PV)	1330-037-00
	Polyimide (Kapton) (K)	1330-037-00
	Vinyl Cloth (CW)	1330-037-00
	Polyesters (E/M)	1330-037-00

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Data Bus (MIL-STD-1553B) Components

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METRIC
Dimensions in this section are millimeters over inches

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South America: 55-11-2103-6000
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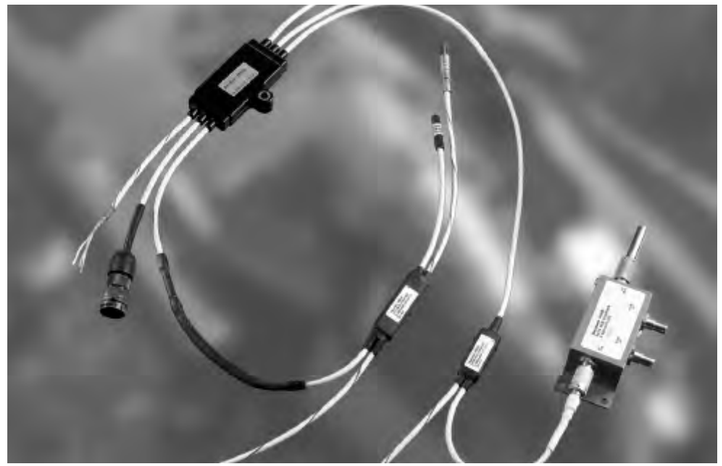
Introduction



The full line of Raychem data bus products offers a complete system of interconnection hardware for all MIL-STD-1553B multiplexing needs.

Available components include:

- Couplers (micros, boxes, flat packs)
- Data bus cables
- Triax connectors and contacts with strain relief
- One-piece triaxial contacts for MIL-C-38999 connectors (size 8 cavity)
- Bus and stub terminators
- Cable marker sleeves (TMS)
- Lightweight couplers (see pages 14-8 to 14-10)
- Space components (see pages 14-11 to 14-13)
- Harness design (Harn*Ware*)

All Raychem data bus components offer:

- High packaging density and weight savings
- Design flexibility
- High performance (to 150°C [302°F] rating)

Raychem MIL-STD-1553B data bus components are also specified in the Air Force drawings listed in Air Force Drawing 8340707.

Tyco Electronics also supplies complete Raychem data bus networks in accordance with customer harness drawings. Using factory-built harnesses eliminates unnecessary splices and connectors, reducing the cost and increasing the reliability of the networks. Factory-built harnesses are pre-tested and ready for installation.

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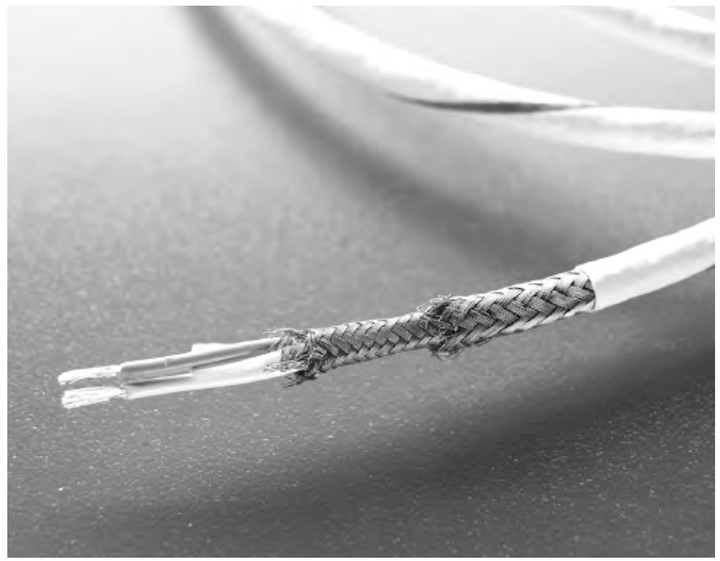
Cables

Product Facts

- Light weight
- Highly flexible
- Flame resistant
- Chemical resistant to all aircraft fluids
- Solder iron resistant
- Defined shielding levels



Applications

Tyco Electronics manufactures a line of Raychem SPEC 55 data bus cables that meet or exceed the performance requirements of MIL-STD-1553B.

SPEC 55 insulation is a high-temperature, radiation-crosslinked, modified ETFE material that can be used in wire constructions rated up to 200°C [392°F].

Note: Tyco Electronics will build harnesses with any customer specified cables and/or connectors.

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Cables (Continued)

Specifications/Approvals

Series	Military
SPEC 55 insulation	MIL-W-22759/32–/35 MIL-W-22759/41–/46

Product Selection

Cable Type		Part Number
24 AWG Single Optimized Shield		10612
24 AWG Double Optimized Shield		10613
24 AWG EMP Hardened		10614
24 AWG Flat Shield, Unfilled		7724 H 0664

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In-Line Microcouplers: One- and Two-Stub

Product Facts

- Environmental sealing
- No connectors
- Very small size
- Light weight (1 stub: 10 g max.; 2 stubs: 15 g max.)
- In-line profile that makes wire bundle mounting possible
- 360° continuous low-impedance cable-shield terminations
- Reliable solder termination of all components
- Potted circuit elements for maximum durability and in-use reliability
- Ease of installation
- Altitude immersion resistance
- Optional eyelet configurations for bulkhead mounting
- Mean time between failures > 1,000,000 hours

Applications

The low-profile configuration of these couplers enables avionics system designers to plan for optimum coupler locations. Microcouplers are supplied with Raychem SPEC 55 data bus cables, including EMP-hardened versions. They are also available assembled with other components into a complete data bus harness.

Specifications/Approvals

Series	Military	Raychem
D-500-04	MIL-STD-1553B	D-6020

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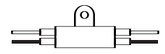
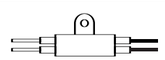
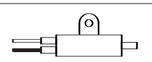
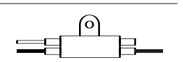
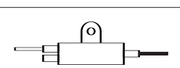
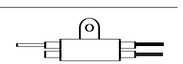
In-Line Microcouplers: One- and Two-Stub (Continued)

Single Stub		Double Stub	
D-500-0455-1-YYY-ZZZ		D-500-0455-2-YYY-ZZZ	
D-500-0465-1-YYY-ZZZ		D-500-0465-2-YYY-ZZZ	
D-500-0456-1-YYY-ZZZ		D-500-0456-2-YYY-ZZZ	
D-500-0466-1-YYY-ZZZ		D-500-0466-2-YYY-ZZZ	
D-500-0457-1-YYY-ZZZ		D-500-0457-2-YYY-ZZZ	
D-500-0467-1-YYY-ZZZ		D-500-0467-2-YYY-ZZZ	
D-500-0458-1-YYY-ZZZ		D-500-0458-2-YYY-ZZZ	
D-500-0468-1-YYY-ZZZ		D-500-0468-2-YYY-ZZZ	

Note:
1. Bus cable
2. Stub cable

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In-Line Microcouplers: One- and Two-Stub (Continued)

Microcoupler Part Numbering System

D-500-04W W-X-YYY-ZZZ

Standard Cable Length
012 = 12 in (1 ft)
078 = 78 in (6.5 ft)
079 = 79 in (2 m)
120 = 120 in (10 ft)
236 = 236 in (6 m)
240 = 240 in (20 ft)
360 = 360 in (30 ft)

Cable Type
612 = 1061224 AWG single optimized shield
613 = 1061324 AWG double optimized shield
614 = 1061424 AWG EMP hardened
H06 = 7724H0664 (24 AWG Flat Wire Unfilled)

Number of Stubs
1 or 2

Design
5 = Without internal terminator
6 = Same as 5 but with reverse bus
7 = With internal terminator
8 = Same as 7 but with reverse bus

Boot
5 = Without mounting eyelet
6 = With mounting eyelet

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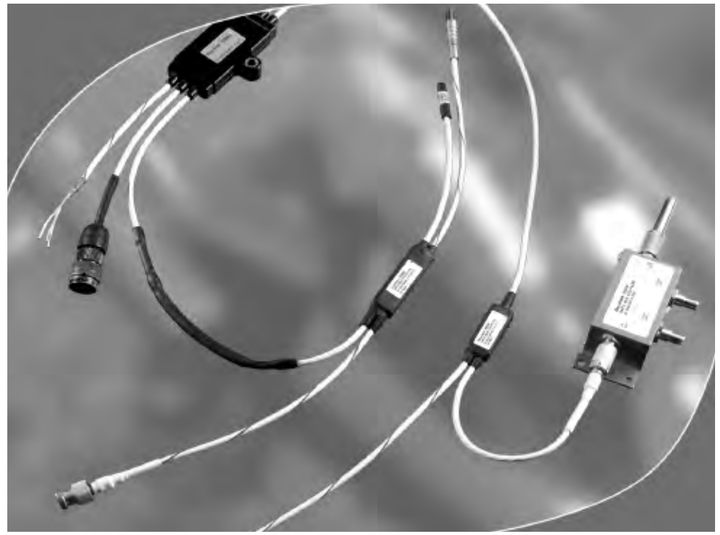
Ultra Lightweight In-Line Microcouplers 1- Through 6-Stub

Product Facts

- Environmental sealing
- No connectors
- Very small size
- Ultra Light weight (1 stub: 6.5 g max.; 2 stubs: 9.5 g max.)
- In-line profile that makes wire bundle mounting possible
- 360° continuous low-impedance cable-shield terminations
- Reliable solder termination of all components
- Potted circuit elements for maximum durability and in-use reliability
- Ease of installation
- Altitude immersion resistance
- Mean time between failures > 1,000,000 hours



Applications

Building on over 20 years of experience and continuous improvement in data bus, including pioneering in-line microcouplers, Tyco Electronics introduces a new family of ultra light-weight In-line Raychem Microcouplers, available in 1- through 6-stub configurations.

These couplers offer the same high performance and reliability as Raychem current microcouplers, but their weight is further reduced. They are available in configurations up to 6-stub, and minimize weight there is no option with a mounting eyelet.

Combined with Raychem 24 AWG data bus cables, these ultra light couplers allow designers to significantly reduce weight. An unfilled flat braid cable is available for additional weight savings.

They are also available assembled with other customer specified components into a complete factory-built and tested data bus harness.

Specifications/Approvals

Series	Military	Raychem
D-500-L4xx	MIL-STD-1553B	D-6020 (same as current microcouplers)

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UK: 44-208-420-8341

Ultra Lightweight In-Line Microcouplers 1- Through 6-Stub (Continued)

Lightweight In-Line Couplers Part Numbering System

D-500-L4 5 W -X -YYY -ZZZ

Cable Length
012 = 12 in
078 = 78 in
079 = 79 in
120 = 120 in
236 = 236 in
240 = 240 in
360 = 360 in

Cable Type
612 = 10612 (24 AWG single optimized shield)
613 = 10613 (24 AWG double optimized shield)
614 = 10614 (24 AWG EMP hardened)
H06 = 7724H0664 (24 AWG flat shield, unfilled)
Lightest cable

Number of Stubs
1, 2, 3, 4, 5 or 6

Design
5 = Without internal terminator
7 = With internal terminator

Style
5 = Without eyelet

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UK: 44-208-420-8341

Ultra Lightweight In-Line Microcouplers 1- Through 6-Stub (Continued)

Product Selection

D-500-L455-X-YYY-ZZZ

End View Left Side		End View Right Side
	1 stub	
	2 stub	
	3 stub	
	4 stub	
	5 stub	
	6 stub	

D-500-L456-X-YYY-ZZZ

End View Left Side		End View Right Side
	1 stub	
	2 stub	
	3 stub	
	4 stub	
	5 stub	
	6 stub	

D-500-L457-X-YYY-ZZZ

End View Left Side		End View Right Side
	1 stub	
	2 stub	
	3 stub	
	4 stub	
	5 stub	
	6 stub	

D-500-L458-X-YYY-ZZZ

End View Left Side		End View Right Side
	1 stub	
	2 stub	
	3 stub	
	4 stub	
	5 stub	
	6 stub	

Legend
Bus cable ○
Stub cable ●

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Box Couplers

Product Facts

- Light, robust coupler modules with connector versatility
- Up to eight stub connectors can be arrayed on the “face” of the box coupler. Bus connectors can also be on the “face” or on the “side” of the box
- Designed with Raychem D-621 series corrosion-resistant threaded-type or bayonet-type connectors

Applications

The multiport capability of these couplers (up to eight stubs) enables avionics system designers to interconnect black boxes with minimum wire runs. Box couplers are supplied with Raychem triaxial threaded or bayonet connectors.

Note: Tyco Electronics also designs and manufactures customized Raychem data bus box couplers.

Specifications/Approvals

Series	Military	Raychem
D-500-0255	MIL-STD-1553	D-6021

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Box Couplers (Continued)

Product Selection

Coupler Type	Part Number			
	Threaded	Bayonet A*	Bayonet B*	Bayonet C*
Face - 1 Stub	D-500-0255-511-1	D-500-0255-513-1	D-500-0255-515-1	D-500-0255-517-1
Face - 2 Stub	D-500-0255-521-1	D-500-0255-523-1	D-500-0255-525-1	D-500-0255-527-1
Face - 3 Stub	D-500-0255-531-1	D-500-0255-533-1	D-500-0255-535-1	D-500-0255-537-1
Face - 4 Stub	D-500-0255-541-1	D-500-0255-543-1	D-500-0255-545-1	D-500-0255-547-1
Face - 5 Stub	D-500-0255-551-1	D-500-0255-553-1	D-500-0255-555-1	D-500-0255-557-1
Face - 6 Stub	D-500-0255-561-1	D-500-0255-563-1	D-500-0255-565-1	D-500-0255-567-1
Face - 7 Stub	D-500-0255-571-1	D-500-0255-573-1	D-500-0255-575-1	D-500-0255-577-1
Face - 8 Stub	D-500-0255-581-1	D-500-0255-583-1	D-500-0255-585-1	D-500-0255-587-1
Side - 1 Stub	D-500-0255-512-1	D-500-0255-513-2	D-500-0255-515-2	D-500-0255-517-2
Side - 2 Stub	D-500-0255-522-1	D-500-0255-523-2	D-500-0255-525-2	D-500-0255-527-2
Side - 3 Stub	D-500-0255-532-1	D-500-0255-533-2	D-500-0255-535-2	D-500-0255-537-2
Side - 4 Stub	D-500-0255-542-1	D-500-0255-543-2	D-500-0255-545-2	D-500-0255-547-2
Side - 5 Stub	D-500-0255-552-1	D-500-0255-553-2	D-500-0255-555-2	D-500-0255-557-2
Side - 6 Stub	D-500-0255-562-1	D-500-0255-563-2	D-500-0255-565-2	D-500-0255-567-2
Side - 7 Stub	D-500-0255-572-1	D-500-0255-573-2	D-500-0255-575-2	D-500-0255-577-2
Side - 8 Stub	D-500-0255-582-1	D-500-0255-583-2	D-500-0255-585-2	D-500-0255-587-2

* The bayonet polarization listed is for the bus connector. All stub connectors are Bayonet D polarization. Polarizations are depicted as follows (jack view):

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Discrete Connectors

Product Facts

- Compliance with MIL-STD-1553B hardware requirements
- Light weight
- Removable pin or socket contacts
- Termination with Raychem MIL-STD-1553B data bus cables, including EMP-hardened versions
- Continuous 360° shield coverage
- Rugged constructions
- Termination time of 1 to 2 minutes
- Inspectable solder terminations
- Low-skill assembly
- Reworkable and repairable terminations
- Strain relief built into the design
- Low-voltage drop and high reliability because of precisely controlled solder terminations
- Threaded and bayonet coupling styles
- Low total installed cost
- 1000-hour salt spray resistance
- Lower-cost connectors, for benchtop and mock-up

Applications

Designed specifically for MIL-STD-1553B data bus applications, the D-621 connector is intended to be a perfect match for the Raychem airworthy data bus cable. Together they provide durable, reliable, and reworkable interconnection hardware for the MIL-STD-1553B market.

Specifications/Approvals

Series	Military	Raychem
DK-621	MIL-STD-1553B	D-6025

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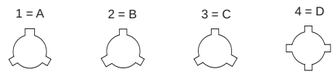
Discrete Connectors (Continued)

Connector Kit Part Numbering System

DK-621-04 XX-XX

Contact (supplied in DK-621 kits only)
P = Pin
S = Socket

Polarization (bayonet styles only) (jack view)



Basic Connector Configurations
Threaded styles
11 = Plug
12 = Jack
Bayonet styles
33 = Plug, A polarization
34 = Jack, A polarization
35 = Plug, B polarization
36 = Jack, B polarization
37 = Plug, C polarization
38 = Jack, C polarization
39 = Plug, D polarization
40 = Jack, D polarization

D-621 connector, kitted with accessories

Example:

DK-621-0434-1P = D-621 connector, kitted with accessories, jack bayonet style with A polarization and pin contact.

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Accessories

Product Facts

- A single source for all harness components
- Products designed to work together

Applications

Tyco Electronics manufactures all the products needed to build a MIL-STD-1553B data bus network. In addition to the main components (couplers, connectors, contacts, and cables), Tyco Electronics supplies the accessory components that may be necessary to complete a data bus system.

These include:

- Bus and stub terminators (spliced-in and connectorized D-621 series).
- Cable splice kits.
- EMI/environment-resistant connector caps.
- Braid terminators and strain relief tubing (for rework applications).
- Cable marking materials.

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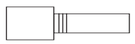
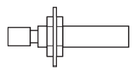
Accessories (Continued)

Product Selection



D-621 Plug



D-621 Jack

Splice-in

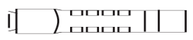
Bus and Stub Terminators

Spliced-in	12-inch Cable				
77-ohm 10612 cable	D-500-0463-612				
77-ohm 10613 cable	D-500-0463-613				
77-ohm 10614 cable	D-500-0463-614				
77-ohm 7724H0664 cable	D-500-0463-H06				
D-621 Series—Plug	**Threaded**	**Bayonet A**	**Bayonet B**	**Bayonet C**	**Bayonet D**
77-ohm pin contact	D-621-0413	D-621-0453	D-621-0454	D-621-0455	D-621-0456
77-ohm socket contact	D-621-0415	D-621-0469	D-621-0470	D-621-0471	D-621-0472
3000-ohm pin contact	D-621-0417	D-621-0457	D-621-0458	D-621-0459	D-621-0476
3000-ohm socket contact	D-621-0407	D-621-0473	D-621-0474	D-621-0475	D-621-0460
D-621 Series—Jack	**Threaded**	**Bayonet A**	**Bayonet B**	**Bayonet C**	**Bayonet D**
77-ohm pin contact	D-621-0418	D-621-0477	D-621-0478	D-621-0479	D-621-0480
77-ohm socket contact	D-621-0406	D-621-0461	D-621-0462	D-621-0463	D-621-0464
3000-ohm pin contact	D-621-0423	D-621-0481	D-621-0482	D-621-0483	D-621-0484
3000-ohm socket contact	D-621-0424	D-621-0465	D-621-0466	D-621-0467	D-621-0468
D-621 Series—L	**Lanyard 7”**	**—**	**—**	**—**	**—**

Connector Caps

D-621 Series	Threaded	Bayonet A	Bayonet B	Bayonet C	Bayonet D
Plug cap for jack connector Supplied with 7” Lanyard	D-600-0083	D-600-0068	D-600-0068	D-600-0068	D-600-0065

Cable Splice Kits



Cables	Flexible Crimp
All data bus cables	D-150-0708-5

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UK: 44-208-420-8341

Accessories (Continued)

Terminator and Connector and Compatibility — Bayonet and Threaded Connectors

Panel Thickness	Connector	Contact	Terminator Reference	Mate with	
				Standard Connector	Long Reach Connector
Bayonet Connectors					
Polarity A					
77 Ohm bus terminator	Plug	Pin	D-621-0453(-L)	DK-621-0434-1S	DK-621-0550-1S
	Plug	Socket	D-621-0469(-L)	DK-621-0434-1P	DK-621-0550-1P
	Jack	Pin	D-621-0477(-L)	DK-621-0433-1S	—
	Jack	Socket	D-621-0461(-L)	DK-621-0433-1P	—
3K Ohm stub terminator	Plug	Pin	D-621-0457(-L)	DK-621-0434-1S	DK-621-0550-1S
	Plug	Socket	D-621-0473(-L)	DK-621-0434-1P	DK-621-0550-1P
	Jack	Pin	D-621-0481(-L)	DK-621-0433-1S	—
	Jack	Socket	D-621-0465(-L)	DK-621-0433-1P	—
Polarity B					
77 Ohm bus terminator	Plug	Pin	D-621-0454(-L)	DK-621-0436-2S	DK-621-0548-2S
	Plug	Socket	D-621-0470(-L)	DK-621-0436-2P	DK-621-0548-2P
	Jack	Pin	D-621-0478(-L)	DK-621-0435-2S	—
	Jack	Socket	D-621-0462(-L)	DK-621-0435-2P	—
3K Ohm stub terminator	Plug	Pin	D-621-0458(-L)	DK-621-0436-2S	DK-621-0548-2S
	Plug	Socket	D-621-0474(-L)	DK-621-0436-2P	DK-621-0548-2P
	Jack	Pin	D-621-0482(-L)	DK-621-0435-2S	—
	Jack	Socket	D-621-0466(-L)	DK-621-0435-2P	—
Polarity C					
77 Ohm bus terminator	Plug	Pin	D-621-0455(-L)	DK-621-0438-3S	DK-621-0546-3S
	Plug	Socket	D-621-0471(-L)	DK-621-0438-3P	DK-621-0546-3P
	Jack	Pin	D-621-0479(-L)	DK-621-0437-3S	—
	Jack	Socket	D-621-0463(-L)	DK-621-0437-3P	—
3K Ohm stub terminator	Plug	Pin	D-621-0459(-L)	DK-621-0438-3S	DK-621-0546-3S
	Plug	Socket	D-621-0475(-L)	DK-621-0438-3P	DK-621-0546-3P
	Jack	Pin	D-621-0483(-L)	DK-621-0437-3S	—
	Jack	Socket	D-621-0467(-L)	DK-621-0437-3P	—
Polarity D					
77 Ohm bus terminator	Plug	Pin	D-621-0456(-L)	DK-621-0440-4S	DK-621-0551-4S
	Plug	Socket	D-621-0472(-L)	DK-621-0440-4P	DK-621-0551-4P
	Jack	Pin	D-621-0480(-L)	DK-621-0439-4S	—
	Jack	Socket	D-621-0464(-L)	DK-621-0439-4P	—
3K Ohm stub terminator	Plug	Pin	D-621-0460(-L)	DK-621-0440-4S	DK-621-0551-4S
	Plug	Socket	D-621-0476(-L)	DK-621-0440-4P	DK-621-0551-4P
	Jack	Pin	D-621-0468(-L)	DK-621-0439-4S	—
	Jack	Socket	D-621-0484(-L)	DK-621-0439-4P	—
Threaded Connectors					
77 Ohm bus terminator	Plug	Pin	D-621-0413(-L)	DK-621-0412-S	DK-621-0512-S
	Plug	Socket	D-621-0415(-L)	DK-621-0412-P	DK-621-0512-P
	Jack	Pin	D-621-0418(-L)	DK-621-0411-S	—
	Jack	Socket	D-621-0406(-L)	DK-621-0411-P	—
3K Ohm stub terminator	Plug	Pin	D-621-0417(-L)	DK-621-0412-S	DK-621-0512-S
	Plug	Socket	D-621-0407(-L)	DK-621-0412-P	DK-621-0512-P
	Jack	Pin	D-621-0423(-L)	DK-621-0411-S	—
	Jack	Socket	D-621-0424(-L)	DK-621-0411-P	—

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Accessories (Continued)

Triaxial Connectors and Terminator Compatibility — Bayonet and Threaded Connectors

Panel Thickness	Connector	Contact	Connector Reference	Mate with		
				Connector	77 Ohm Bus Terminator	3K Ohm Stub Terminator
Bayonet Connectors						
Polarity A						
	Plug	Pin	DK-621-0433-1P	DK-621-0434-1S	D-621-0461(-L)	D-621-0465 (-L)
	Plug	Socket	DK-621-0433-1S	DK-621-0434-1P	D-621-0477(-L)	D-621-0481(-L)
Standard	Jack	Pin	DK-621-0434-1P	DK-621-0433-1S	D-621-0461(-L)	D-621-0473(-L)
2.4mm max.	Jack	Socket	DK-621-0434-1S	DK-621-0433-1P	D-621-0453(-L)	D-621-0457(-L)
Long Reach	Jack	Pin	DK-621-0550-1P	DK-621-0433-1S	D-621-0469(-L)	D-621-0473(-L)
12.5mm max.	Jack	Socket	DK-621-0550-1S	DK-621-0433-1P	D-621-0453(-L)	D-621-0457(-L)
Polarity B						
	Plug	Pin	DK-621-0435-2P	DK-621-0436-2S	D-621-0462(-L)	D-621-0474 (-L)
	Plug	Socket	DK-621-0435-2S	DK-621-0436-2P	D-621-0478(-L)	D-621-0458(-L)
Standard	Jack	Pin	DK-621-0436-2P	DK-621-0435-2S	D-621-0470(-L)	D-621-0474(-L)
2.4mm max.	Jack	Socket	DK-621-0436-2S	DK-621-0435-2P	D-621-0454(-L)	D-621-0458(-L)
Long Reach	Jack	Pin	DK-621-0448-2P	DK-621-0435-2S	D-621-0470(-L)	D-621-0467(-L)
12.5mm max.	Jack	Socket	DK-621-0448-2S	DK-621-0435-2P	D-621-0454(-L)	D-621-0483(-L)
Polarity C						
	Plug	Pin	DK-621-0437-3P	DK-621-0438-3S	D-621-0463(-L)	D-621-0467(-L)
	Plug	Socket	DK-621-0437-3S	DK-621-0438-3P	D-621-0479(-L)	D-621-0483(-L)
Standard	Jack	Pin	DK-621-0438-3P	DK-621-0437-3S	D-621-0471(-L)	D-621-0475(-L)
2.4mm max.	Jack	Socket	DK-621-0438-3S	DK-621-0437-3P	D-621-0455(-L)	D-621-0459(-L)
Long Reach	Jack	Pin	DK-621-0446-3P	DK-621-0437-3S	D-621-0471(-L)	D-621-0475(-L)
12.5mm max.	Jack	Socket	DK-621-0446-3S	DK-621-0437-3P	D-621-0455(-L)	D-621-0459(-L)
Polarity D						
	Plug	Pin	DK-621-0439-4P	DK-621-0440-4S	D-621-0464(-L)	D-621-0468(-L)
	Plug	Socket	DK-621-0439-4S	DK-621-0440-4P	D-621-0480(-L)	D-621-0484(-L)
Standard	Jack	Pin	DK-621-0440-4P	DK-621-0439-4S	D-621-0472(-L)	D-621-0476(-L)
2.4mm max.	Jack	Socket	DK-621-0440-4S	DK-621-0439-4P	D-621-0456(-L)	D-621-0460(-L)
Long Reach	Jack	Pin	DK-621-0551-4P	DK-621-0439-4S	D-621-0472(-L)	D-621-0476(-L)
12.5mm max.	Jack	Socket	DK-621-0551-4S	DK-621-0439-4P	D-621-0456(-L)	D-621-0460(-L)
Threaded Connectors						
	Plug	Pin	DK-621-0411-P	DK-621-0412-S	D-621-0406(-L)	D-621-0424(-L)
	Plug	Socket	DK-621-0411-S	DK-621-0412-P	D-621-0418(-L)	D-621-0423(-L)
Standard	Jack	Pin	DK-621-0412-P	DK-621-0411-S	D-621-0415(-L)	D-621-0407(-L)
2.4mm max.	Jack	Socket	DK-621-0412-S	DK-621-0411-P	D-621-0413(-L)	D-621-0417(-L)
Long Reach	Jack	Pin	DK-621-0412-P	DK-621-0411-S	D-621-0415(-L)	D-621-0407(-L)
12.5mm max.	Jack	Socket	DK-621-0412-S	DK-621-0411-P	D-621-0413(-L)	D-621-0417(-L)

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Accessories (Continued)

Triaxial Connectors and Terminator Compatibility — to European norme 3716

Panel Thickness	Connector	Contact	Connector Reference	Mate with		
				Connector	77 Ohm Bus Terminator	3K Ohm Stub Terminator
Triaxial Connectors						
	Plug	Pin	DK-3716-F101-TP	DK-621-E102-TS	D-621-E077-S	D-621-E03K-S
	Plug	Socket	DK-3716-F101-TS	DK-621-E102-TP	D-621-E077-P	D-621-E03K-P
	Plug	Pin	DK-3716-F201-TP	DK-621-E202-TS	D-621-E077-S	D-621-E03K-S
	Plug	Socket	DK-3716-F201-TS	DK-621-E202-TP	D-621-E077-P	D-621-E03K-P
Standard 2.4 mm max.	Jack	Pin	DK-3716-E102-TP	DK-621-F101-TS	D-621-F077-S	D-621-F03K-S
	Jack	Socket	DK-3716-E102-TS	DK-621-F101-TP	D-621-F077-P	D-621-F03K-P
	Jack	Pin	DK-3716-E202-TP	DK-621-F201-TS	D-621-F077-S	D-621-F03K-S
	Jack	Socket	DK-3716-E202-TS	DK-621-F201-TP	D-621-F077-P	D-621-F03K-P
Long Reach 12.5 mm max.	Jack	Pin	DK-3716-E112-TP	DK-621-F101-TS	D-621-F077-S	D-621-F03K-S
	Jack	Socket	DK-3716-E112-TS	DK-621-F101-TP	D-621-F077-P	D-621-F03K-P
	Jack	Pin	DK-3716-E212-TP	DK-621-F201-TS	D-621-F077-S	D-621-F03K-S
	Jack	Socket	DK-3716-E212-TS	DK-621-F201-TP	D-621-F077-P	D-621-F03K-P

Panel Thickness	Connector	Contact	Terminator Reference	Mate with	
				Standard Connector	Long Reach Connector
Terminators					
77 Ohm bus terminator	Plug	Pin	DK-3716-F077-P	DK-3716-E#02-TS	DK-3716-E#12K-TS
	Plug	Socket	DK-3716-F077-S	DK-3716-E#02-TP	DK-3716-E#12K-TP
	Jack	Pin	DK-3716-F077-P	DK-3716-E#01-TS	—
	Jack	Socket	DK-3716-F077-S	DK-3716-E#01-TP	—
3K Ohm stub terminator	Plug	Pin	DK-3716-E03K-P	DK-3716-E#02-TS	DK-3716-E#12K-TS
	Plug	Socket	DK-3716-E03K-S	DK-3716-E#02-TP	DK-3716-E#12K-TP
	Jack	Pin	DK-3716-E03K-P	DK-3716-E#01-TS	—
	Jack	Socket	DK-3716-E03K-S	DK-3716-E#01-TP	—

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Triaxial Size 8 Contacts

Product Facts

- One-step termination
- Termination time of 1 to 2 minutes
- No requirements for special termination tools
- No requirements for special skills
- Reworkable and repairable terminations
- Strain relief
- Continuous 360° shield coverage
- Triaxial mating face for least susceptibility to damage
- Rugged construction, because only two parts are being soldered together
- Inspectable solder terminations
- Low voltage drop and high reliability due to precisely controlled solder termination

Applications

Contacts provide full shield coverage with a simple, quick, and reliable termination system. 24 AWG twisted-pair data bus cables are terminated with triaxial SolderTacts contacts, which fit size 8 cavities of MIL-C-38999, Series 1, 3, or 4 connectors.

Raychem size 8 triaxial data bus contacts for MIL-C-38999 connectors have interfaces that comply with MIL-C-39029/90 and /91 to provide ease of termination, and intermateability with more cumbersome crimp contacts.

These contacts provide a fast and convenient method of implementing MIL-STD-1553B connections in MIL-STD-1760 applications.

Specifications/Approvals

Series	Raychem
Size 8	D-6002

Product Selection

Cable Type	Pin	Socket
10612	DK-602-0156-N-1	DK-602-0157-N-1
10613	DK-602-0156-N-2	DK-602-0157-N-2
10614	DK-602-0156-N-3	DK-602-0157-N-3

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Space-Grade Data Bus Components

Product Facts

- Complete line of space-qualified MIL-STD-1553B components
- Low outgassing levels that meet NASA requirements
- Light weight
- Rugged construction

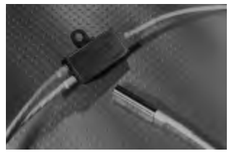

Figure 1. In-line couplers and terminators

Figure 2. Threaded triaxial connectors

Figure 3. Bayonet triaxial connectors

Figure 4. Splice kit

Applications

Tyco Electronics full line of Raychem data bus products includes space-grade couplers, terminators, triaxial connectors, and SolderShield splices. These space-grade components meet the low outgassing requirements of NASA specification SP-R-0022A and can be used in outer-space applications.

Raychem space-grade components are designed in a variety of configurations and are currently available either as discrete items or as Raychem- assembled harnesses. Using factory-built harnesses eliminates unnecessary splices and connectors, reducing the cost and increasing the reliability of the networks.

Specification control drawings describe the design features and performance characteristics of Raychem space-grade couplers, terminators, connectors, and splices. The space-grade data bus couplers, terminators, and connectors have tin/nickel-plated metallic parts and baked silicone rubber components. For strain relief they include low-outgassing tubing. Unlike parts intended for aircraft applications, these components do not have polymeric environmental covers.

The table on the next page lists Raychem standard space-grade data bus components with their part numbers and descriptions. New components will become available per customer request.

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Space-Grade Data Bus Components (Continued)

Specifications/Approvals

Series	Raychem
Space-grade data bus components	D-6022

Space-Grade In-Line Coupler Part Numbering System

D-500-94 W W -X -YYY -ZZZ

Cable Length
012 = 12 in
078 = 78 in
079 = 79 in
120 = 120 in
236 = 236 in
240 = 240 in
360 = 360 in

Cable Type
S16 = 7724S1664 (24 AWG single optimized shield)
S36 = 7724S3664 (24 AWG double optimized shield)
S86 = 7724S8664 (24 AWG EMP hardened)
H06 = 7742H0664 flat shield, unfilled (lightest cable)

Number of Stubs
1, 2, 3, or 4

Design
5 = Without internal terminator
6 = Same as 5 but with reverse bus
7 = With internal terminator
8 = Same as 7 but with reverse bus

Style
5 = Without mounting eyelet
6 = With mounting eyelet

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UK: 44-208-420-8341

Space-Grade Data Bus Components (Continued)

Space-Grade Connectors Part Numbering System

DK-621 -09 XX -X X

Contact (installed, DK-621 kits only)
P = Pin*
S = Socket*
*May be ordered separately as D-602-0126 (pin) and D-602-0127 (socket)

Polarization (bayonet styles only) (jack view)

Basic Connector Configurations
Threaded styles:
11 = Plug
12 = Jack

Bayonet styles:
33 = Plug, A polarization
34 = Jack, A polarization
35 = Plug, B polarization
36 = Jack, B polarization
37 = Plug, C polarization
38 = Jack, C polarization
39 = Plug, D polarization
40 = Jack, D polarization

D-621 Connector, Kitted with Accessories

Space-Grade Terminators Part Numbering System

D-500-9463- ZZZ

Cable Type
612 = 10612 (24 AWG single optimized shield)
613 = 10613 (24 AWG double optimized shield)
614 = 10614 (24 AWG EMP hardened)
H06 = 7724H0664 flat shield, unfilled (lightest cable)

Space-Grade Splice Kit = D-150-9708-5

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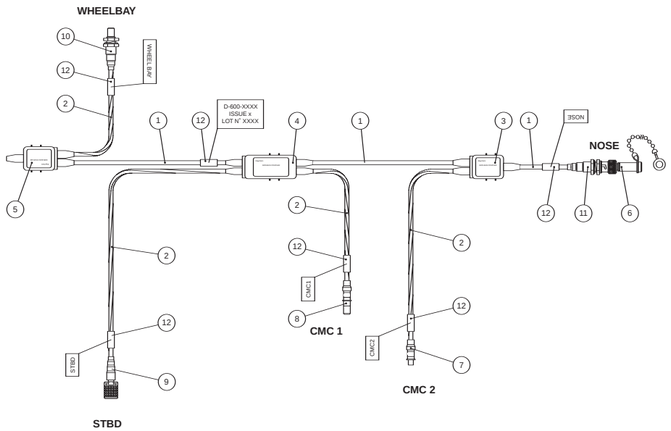
UK: 44-208-420-8341

Customer-Specified Harness Assemblies and Harn*Ware* Harness Design Software

Tyco Electronics supplies complete Raychem data bus networks in accordance with customer harness drawings, with any customer-specified cables and/or connectors. Using factory-built harnesses eliminates unnecessary splices and connectors, reducing the cost and increasing the reliability of the networks. Factory-built harnesses are pre-tested and ready for installation.

Harn*Ware* Harness Design Software allows designers to draw a data bus harness in a matter of minutes, while selecting Raychem or others' components; a bill of materials is automatically generated.

Sample Drawing/Parts List



Parts List

Item	Description	Part Number	Spec/Remarks	Qty	Unit
1	Data bus Cable	10613-9	Raychem	5.3	M
2	Data bus Cable	10613-96	Raychem	7	M
3	Data bus Coupler	D-500-0455-1	Raychem	1	Pc
4	Data bus Coupler	D-500-0455-2	Raychem	1	Pc
5	Data bus Coupler	D-500-0457-1	Raychem	1	Pc
6	Data bus Terminator	D-621-0469-L	Raychem	1	Pc
7	Data bus Contact	DK-602-0156-N-2	Raychem	1	Pc
8	Data bus Contact	DK-602-0157-N-2	Raychem	1	Pc
9	Data bus Connector	DK-621-0411-P	Raychem	1	Pc
10	Data bus Connector	DK-621-0412-P	Raychem	1	Pc
11	Data bus Connector	DK-621-0434-1P	Raychem	1	Pc
12	Marker Sleeve	TMS-SCE-3/16-2.0-9	Raychem	6	Pc

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Revised 8-06

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USA: 1-800-522-6752
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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
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Series 7000 Industrial

Product Facts

- **Available in On-Delay, True Off-Delay, and On/Off-Delay**
- **Timing from 0.1 seconds to 60 minutes in linear increments**
- **Oversize time-calibrated adjustment knobs, serrated with high-resolution markings visible from all angles make this one of the most practical, easily-set timer available**
- **Inherent Transient Immunity**
- **Operating Voltages range from 6 to 550 VAC and 12 to 550 VDC with special voltages available**
- **Available in 2-pole or 4-pole models**
- **Many enclosure options: Explosion proof, Dust tight, Watertight, Hermetically-sealed, NEMA 1**
- **Auxiliary timed and instantaneous switches can be added for greater switching flexibility**
- **Numerous mounting options: Surface mount, Panel mount, Octal plug-in mounting**
- **Options and Accessories: Quick-connect terminals, Dial Stops, and Transient protection module**
- **Front Terminals — easy-to-reach screw terminals, all on the face of the unit, clearly identified**
- **Modular Assembly — timing head, coil assembly and switchblock are all individual modules, with switches field-replaceable**
- **Seismic & radiation tested E7000 models are available. Consult factory for details and special ordering information**
- **File No. E15631**

  File No. LR29186

Exception: 7032 models and certain models with accessories are not agency approved.

Construction

There are three main components of Series 7000 Timing Relays:

Calibrated Timing Head uses no needle valve, recirculates air under controlled pressure through a variable orifice to provide linearly adjustable timing. Patented design provides instant recycling, easy adjustment and long service life under severe operating conditions.

Precision-Wound Potted Coil module supplies the initial motive force with minimum current drain. Total sealing without external leads eliminates moisture problems, gives maximum insulation value.

Snap-Action Switch Assembly — custom-designed over-center mechanism provides greater contact pressure up to transfer time for positive, no flutter action. Standard switches are DPDT arrangement, with flexible beryllium copper blades and silver-cadmium oxide contacts. Special "timing-duty" design for positive wiping action, sustained contact pressure and greater heat dissipation during long delay periods.

Each of these subassemblies forms a self-contained module which is then assembled at the factory with the other two to afford a wide choice of operating types, coil voltages, and timing ranges.

The squared design with front terminals and rear mounting permits the grouping of Series 7000 units side-by-side in minimum panel space. Auxiliary switches may be added in the base of the unit, without affecting the overall width or depth.

Operation

Two basic operating types are available. "On-Delay" models provide a delay period on energization, at the end of which the switch transfers the load from one set of contacts to another. De-energizing the unit during the delay period immediately recycles the unit, readying it for another full delay period on re-energization.

In "Off-Delay" models the switch transfers the load immediately upon energization, and the delay period does not begin until the unit is de-energized. At the end of the delay period the switch returns to its original position. Re-energizing the unit during the delay period immediately resets the timing, readying it for another full delay period on de-energization. No power is required during the timing period.

In addition to these basic operating types, "Double-Head" models offer sequential delays on pull-in and drop-out in one unit, as described on page 15-4. With the addition of auxiliary switches the basic models provide two-step timing, pulse actuation for interlock circuits, or added circuit capacity.

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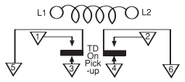
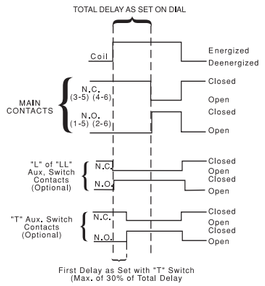
Series 7000 Industrial (Continued)

On-Delay Model 7012



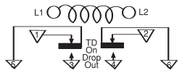


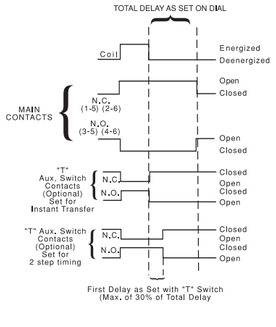
(Delay on pickup)

Applying continuous voltage to the coil (L1-L2) starts a time delay lasting for the preset time. During this period the normally closed contacts (3-5 and 4-6) remain closed. At the end of the delay period the normally closed contacts break and the normally open contacts (1-5 and 2-6) make. The contacts remain in this transferred position until the coil is deenergized, at which time the switch instantaneously returns to its original position.

De-energizing the coil, either during or after the delay period, will recycle the unit within 50 msec. It will then provide a full delay period upon re-energization, regardless of how often the coil voltage is interrupted before the unit has been permitted to "time-out" to its full delay setting.

Off-Delay Model 7022





(Delay on drop-out)

Applying voltage to the coil (for at least 50 msec) will instantaneously transfer the switch, breaking the normally closed contacts (1-5 and 2-6), and making the normally open contacts (3-5 and 4-6). Contacts remain in this transferred position as long as the coil is energized. The time delay begins immediately upon de-energization. At the end of the delay period the switch returns to its normal position.

Re-energizing the coil during the delay period will immediately return the timing mechanism to a point where it will provide a full delay period upon subsequent de-energization. The switch remains in the transferred position.

Auxiliary Switch Options

To increase the versatility of the basic timer models, auxiliary switches may be added to either on-delay or off-delay types. They switch additional circuits, provide two-step timing action, or furnish electrical interlock for sustained coil energization from a momentary impulse, depending on the type selected and its adjustment. Because of their simple attachment and adjustment features, they can be installed at the factory or in the field, by any competent mechanic. All auxiliary switches are SPDT with UL listings of 10A @ 125, 250, or 480 VAC. A maximum of one Code T or two Code L auxiliary switches may be added to each relay. The L or LL switch is available with on-delay relays only.

The T switch is available with both the on-delay and off-delay relays.

Auxiliary Switch Options for On-Delay Instant Transfer (Auxiliary Switch Code L, maximum of 2 per relay.)

1. Energizing coil begins time delay and transfers auxiliary switch.
2. Main switch transfers after total preset delay.
3. De-energizing coil resets both switches instantly.

Auxiliary switch is nonadjustable.

Two-Step Timing (Auxiliary Switch Code T, maximum of 1 per relay.)

1. Energizing coil begins time delay.
2. After first delay auxiliary switch transfers.
3. Main switch transfers after total preset delay.
4. De-energizing coil resets both switches instantly. First delay is independently adjustable, up to 30% of overall delay. (Recommended maximum 100 seconds.)

Auxiliary Switch Options for Off-Delay

In these models the same auxiliary switch provides either two-step timing or instant transfer action, depending on the adjustment of the actuator.

Two-Step Timing (Auxiliary Switch Code T, maximum of 1 per relay.)

1. Energizing coil transfers main and auxiliary switches instantly.
2. De-energizing coil begins time delay.
3. After first delay auxiliary switch transfers.
4. Main switch transfers after total preset delay. First delay is independently adjustable, up to 30% of overall delay. (Recommended maximum 100 seconds.)

Instant Transfer (Auxiliary Switch Code L, maximum of 1 per relay.)

1. Energizing coil transfers main and auxiliary switches instantly.
2. De-energizing coil resets auxiliary switch and begins time delay.
3. Main switch transfers after total preset delay. Auxiliary switch is factory adjusted to give instant transfer operation, but may be easily adjusted in the field to provide two-step timing.

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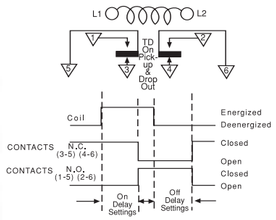
Series 7000 Industrial (Continued)

On-Delay, Off-Delay Model 7032



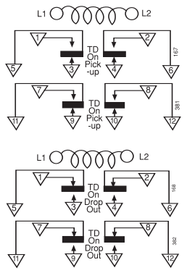
(Double Head)

The Double Head model provides delayed switch transfer on energization of its coil, followed by delayed resetting upon coil de-energization. Each delay period is independently adjustable.

In new circuit designs or the improvement of existing controls now using two or more conventional timers, the Double Head unit offers distinct advantages.

Its compact design saves precious panel space, while the simplified wiring reduces costly interconnection.

Four Pole Model 7014, 7024



With the addition of an extra switch block at the bottom of the basic unit, this version of the Series 7000 offers four pole switch capacity with simultaneous timing or two-step timing. The two-step operation is achieved by factory adjustment to your specifications.

For two-step operation, a maximum timing ratio between upper and lower switches of 3:2 is recommended. Once adjusted at the factory, this ratio remains constant regardless of changes in dial settings.

(Ex: If upper switch transfer is set on dial at 60 sec., minimum time on lower switch should be 40 sec.)

This Series 7000 unit offers many of the performance features found in basic models — voltage ranges, timing and switch capacities are virtually identical.

Four pole models add approximately 1.25 [31.75] to the maximum height of the basic model, approximately .125 [3.18] to the depth. They are designed for vertical operation only.

Surge/Transient Protection Option

Transient Suppressor Option “V”

Product Facts

- **Protect electronic control circuits from voltage transients generated by the timer coil**
- **Fast response to the rapidly rising back E.M.F.**
- **High performance clamping voltage characteristics**
- **U.L. recognized, (except varistor and coil together)**
- **Timer NOT polarity sensitive**

The Surge/Transient Protection Option protects electronic control circuits from transients and surges which are generated when the timer coil is activated. Built with a minimum of moving parts, the unit provides a fast response to rapidly rising voltage transients. The accurate, precision-made device is not polarity sensitive and permits the user to initiate, delay, sequence and program equipment actions over a wide range of applications under the most severe operating conditions.

It consists of a specially modified coil case, varistor, varistor cover, terminal extensions and cup washers so that normal terminations can be used. The varistor will not affect the operating characteristics of the 7000 Timer. The varistor has bilateral and symmetrical voltage and current characteristics and therefore can be used in place of the back-to-back zener diodes. This characteristic also means that the coil will not be polarity sensitive.

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Series 7000 Industrial (Continued)

Specifications

All values shown are at normal operating voltage and 77°F [25°C] unless otherwise noted.

Operating Modes

Model 7012/7014 — On-Delay (Delay on pick-up)

Model 7022/7024 — Off-Delay (Delay on drop-out)

Model 7032 — On-Delay, Off-Delay (Double Head)

Timing Adjustment

Timing is set by simply turning the dial to the desired time value. In the zone of approximately 25° separating the high and low end of timing ranges A, D, E, and K, instantaneous operation (no time delay) will occur. All other ranges produce an infinite time delay when the dial is set in this zone.

Models 7014 and 7032 are available with letter-calibrated dials only. The upper end of the time ranges in these models may be twice the values shown.

Linear Timing Ranges

Time Range

Code	Models 7012, 7022, 7024	Models 7014, 7032
A	.1 to 1 Sec.	.2 to 2 Sec.
B	.5 to 5 Sec.	.7 to 7 Sec.
C	1.5 to 15 Sec	2 to 20 Sec.
D	5 to 50 Sec.	10 to 100 Sec.
E	20 to 200 Sec.	30 to 300 Sec.
F	1 to 10 Min.	1.5 to 15 Min.
H	3 to 30 Min.	3 to 30 Min.
I	6 to 60 Min.	Not Avail.
J	3 to 120 Cyc.	Not Avail.
K	1 to 300 Sec.	Not Avail.

Repeat Accuracy

For delays of 200 seconds or less —

7012*, 7022, 7024	±5%
7014*	±10%
7032	±15%

For delays greater than 200 seconds —

7012*, 7022, 7014*, 7024	±10%
7032	±15%

*The first time delay afforded by Model 7012 with H (3 to 30 min.) and I (6 to 60 min.) time ranges or Model 7014 with H time range will be approximately 15% longer than subsequent delays due to coil temperature rise.

Reset Time — 50 msec. (except model 7032)

Relay Release Time — 50 msec. for on-delay models (7012/7014)

Relay Operate Time — 50 msec. for off-delay models (7022/7024)

Operating Voltage Coil Data (for DPDT)

Coil Part Number	Code Letter	Rated Voltage	Operating* Voltage Range @ 60 Hz	Rated Voltage	Operating Voltage Range @ 50 Hz
7000 AC	A	120	102-132	110	93.5-121
	B	240	204-264	220	187-242
	C	480	408-528		
	D	550	468-605		
	E	24	20.5-26.5		
	F			127	108-140
	G			240	204-264
	H	12	10.2-13.2		
	I	6	5.1-6.6		
	J	208	178-229		
	K		Dual Voltage Coil (Combines A & B)		
	L		Special AC Coils (L1, L2, etc.)		
7010 DC	M	28	22.4-30.8		
	N	48	38.4-52.8		
	O	24	19.2-26.4		
	P	125	100-137.5		
	Q	12	9.6-13.2		
	R	60	48-66		
	S	250	200-275		
	T	550	440-605		
	U	16	12.8-17.6		
	V	32	25.8-35.2		
	W	96	76.8-105.6		
	Y	6	4.8-6.6		
	Z	220	176-242		
	X		Special DC Coils (X1, X2, etc.)		

Minimum operating voltages are based on vertically mounted 7012 units. 7012 horizontally mounted or 7022 vertically or horizontally mounted units will operate satisfactorily at minimum voltages approximately 5% lower than those listed. AC units drop out at approximately 50% of rated voltage. DC units drop out at approximately 10% of rated voltage.

All units may be operated on intermittent duty cycles at voltages 10% above the listed maximums (intermittent duty — maximum 50% duty cycle and 30 minutes "on" time.)

* Four pole Models: Operational voltage range 90% to 110% for AC units; 85% to 110% for DC units.

Surge/Transient Protection Option Characteristics (For D.C. Timers only)

Coil Voltage Nominal (DC)	Max. Excess Energy Capacity (Joule)	Max De-energization Transient Voltage
12 V	0.4 J	48 V
24 V	1.8 J	93 V
28 V	1.8 J	93 V
32 V	2.5 J	135 V
48 V	3.57 J	145 V
60 V	6 J	250 V
96 V	10 J	340 V
110 V	10 J	340 V
125 V	10 J	340 V
220 V	17 J	366 V
250 V	17 J	366 V

Surge Life

Applied 100,000 times continuously with the interval of 10 seconds at room temperature. Below 68 VAC — 12A; Above 68 VAC — 35A.

Temperature Range

Operating —
-22°F to +167°F [-30° C to +75° C]

Storage —
-40°F to +167°F [-40° C to +75° C]

Output/Life Contact Ratings

Contact Capacity in Amperes (Resistive Load)

Contact Voltage	Min. 100,000 Operations	Min. 1,000,000 Operations
30 VDC	15.0	7.0
110 VDC	1.0	0.5
120 V 60 Hz	20.0	15.0
240 V 60 Hz	20.0	15.0
480 V 60 Hz	12.0	10.0

10 Amps resistive, 240 VAC.

1/4 Horsepower, 120 VAC/240 VAC per pole.

15 Amps 30 VDC per pole.

5 Amps, general purpose, 600 VAC per pole.

Dielectric — Withstands 1500 volts RMS 60 Hz between terminals and ground. Withstands 1,000 volts RMS 60 Hz between non-connected terminals. For dielectric specification on hermetically sealed models consult factory.

Insulation Resistance —
500 Megohms with 500 VDC applied.

Temperature Range —
Operating —
-20°F to +165°F [-29°C to 74°C]
Storage —
-67°F to +165°F [-55°C to 74°C]

Temperature Variation — Using a fixed time delay which was set and measured when the ambient temperature was 77°F [25°C], the maximum observed shift in the average of three consecutive time delays was -20% at -20°F [-29°C] and +20% at 165°F [74°C].

Mounting/Terminals — Normal mounting of the basic unit is in a vertical position, from the back of the panel. A front mounting bracket is also supplied with each basic unit, for installation from the front of the panel. **All units are calibrated for vertical operation.** Basic models (7012, 7022) may also be horizontally mounted, and will be adjusted accordingly **when Accessory Y1 is specified in your order.**

Standard screw terminals (8-32 truss head screws supplied) are located on the front of the unit, with permanent schematic markings. Barrier isolation is designed to accommodate spade or ring tongue terminals, with spacing to meet all industrial control specifications.

The basic Series 7000 may also be panel mounted with the addition of a panel mount kit that includes all necessary hardware and faceplate. This offers the convenience of "out-front" adjustment, with large calibrated dial skirt knob. The faceplate and knob blend with advanced equipment and console designs, while the body of the unit and its wiring are protected behind the panel.

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Series 7000 Industrial (Continued)

Specifications (Continued)

Other mounting options include plug-in styles and special configurations to meet unusual installation requirements. Contact factory for details.

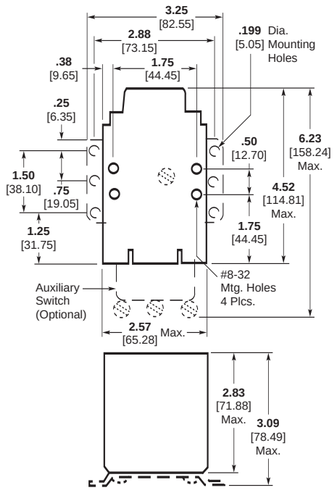
Power Consumption — Approximately 8 watts power at rated voltage.

Approximate Weights —

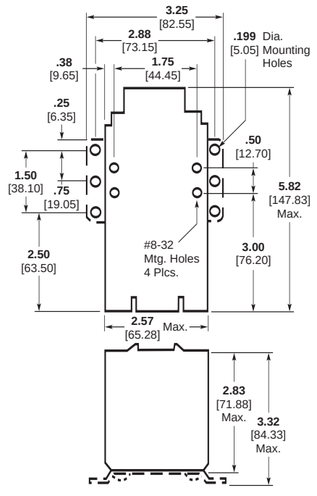
Models 7012, 7022 . . . . . 2 lbs. 4 oz.
7014, 7024 . . . . . 2 lbs. 10 oz
7032 . . . . . 3 lbs. 5 oz.

Weight may vary slightly with coil voltage.

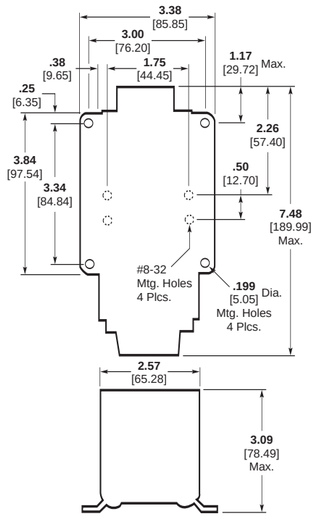
Basic Models 7012, 7022



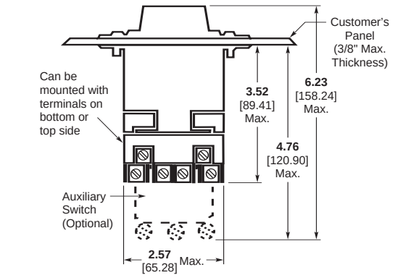
Models 7014, 7024



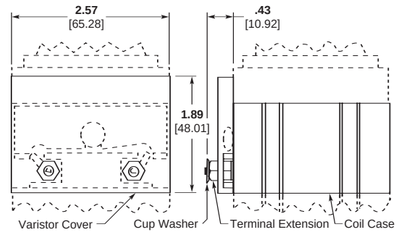
Model 7032



Panel Mount Option "X"



Surge/Transient Protection Option



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Ordering Information

Catalog Numbering Code

70 1 2 A D GZ

Model Series
7000 Timing Relay

Operation
1 — On-Delay
2 — Off-Delay
3 — On-Delay
Off-Delay
(Double Head)

Contact Arrangement
2-Double Pole
Double Throw
**4-Four Pole
Double Throw

Coil Voltage

AC
A — 120 V 60 Hz
110 V 50 Hz
B — 240 V 60 Hz
220 V 50 Hz
C — 480 V 60 Hz
D — 550 V 60 Hz
E — 24 V 60 Hz
F — 127 V 50 Hz
G — 240 V 50 Hz
H — 12 V 60 Hz
J — 208 V 60 Hz
K — Dual Voltage
(combines A & B)
L — Special AC Coils
(L1, L2, etc.)

DC
M — 28 VDC
N — 48 VDC
O — 24 VDC
P — 125 VDC
Q — 12 VDC
R — 60 VDC
S — 250 VDC
T — 550 VDC
U — 16 VDC
V — 32 VDC
W — 96 VDC
Y — 6 VDC
Z — 220 VDC
X — Special DC Coils
(X1, X2, etc.)

A1 Single quick-connect terminals[4]
A2 Double quick-connect terminals[4]
B Plug-in connectors[4]
GZ Enclosure with Bottom Knockouts[1]
H2 Hermetically Sealed Enclosure[1,4] 8 pin solder
H3 Hermetically Sealed Enclosure[1,4] 8 pin octal
H4 Hermetically Sealed Enclosure[1,4] 8 screw term block
***H6** Hermetically Sealed Enclosure[1,4] 11 pin octal
***H7** Hermetically Sealed Enclosure[1,4] 11 pin solder
***H8** Hermetically Sealed Enclosure[1,4] 11 screw term. block
I1 Tamper-proof Cap, opaque black (Cannot be combined with Option X)
I2 Tamper-proof Cap, transparent (Cannot be combined with Option X)
K Explosion-proof Enclosure[1]
L Auxiliary Switch, instant transfer[2] 7012 only[6]
LL Two Auxiliary Switches, instant transfer[2] (On Model 7014 factory installed only)[6]
M Dust-tight Gasketing[4,5]
P Octal Plug Adapter[4] (Can be combined only with options I1, I2, M, S, X, or Y1)
S Dial Stops
T Auxiliary Switch, two-step timing[2,6]
V Transient/Surge Protection (for DC coil voltage only)
W Watertight Enclosure[1]
X Panelmount includes hardware and adjustment for horizontal operation ⇨ [4]
Y1 Horizontal calibration, for horizontal operation without panelmounting[4]
Y2 Horizontal calibration, with Compensating Spring for vertical operation[4]

Timing Range

Models 7012, 7022, 7024
Code
A — .1 to 1 sec.
B — .5 to 5 sec.
C — 1.5 to 15 sec.
D — 5 to 50 sec
E — 20 to 200 sec.
F — 1 to 10 min.
H — 3 to 30 min.
I — 6 to 60 min.
J — 3 to 120 cyc.
K — 1 to 300 sec.

†**Models 7014, 7032**
For Model 7032 specify separate time range code for each head. Example: AB.
Any two ranges may be selected.
Code
A — .2 to 2 sec.
B — .7 to 7 sec.
C — 2 to 20 sec.
D — 10 to 100 sec
E — 30 to 300 sec.
F — 1.5 to 15 min.
H — 3 to 30 min.

Notes:
[1] Cannot be combined with B, P or X Options.
[2] Cannot be combined with B, P or Y2 Options.
[3] Cannot be combined with GZ, H, I1, I2, K, W or Y1 Options.
[4] Not available on 4-Pole Models.
[5] Not available with L, T or LL options
[6] Not available on hermetically sealed units.
* Sized to accommodate one L or T Auxiliary Switch.
** Not available on On-Delay, Off-Delay (Double Head) model.
† Available with letter calibrated dials only. Upper end of time range may be twice the value shown.
†† 120 cycles = 2 sec.

Catalog 1308940
Revised 8-06

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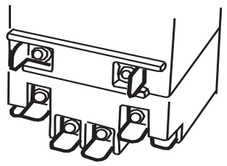
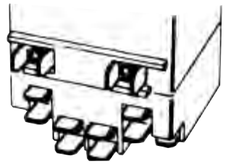
Series 7000 Industrial (Continued)

Ordering Options

A1 — Single Quick-Connect Terminals

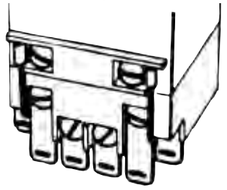


A2 — Double Quick-Connect Terminals



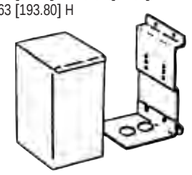
B — Plug-In Connectors

Use with Accessory "C" or "D" below.

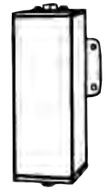


GZ — Total Enclosure

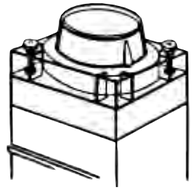
With knockouts for bottom connection.
3.16 [80.26] W x 3.84 [97.54] D x
7.63 [193.80] H



H — Hermetically Sealed Enclosure

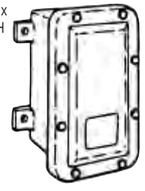


I — Tamper Proof Cover



K — Explosion proof Enclosure

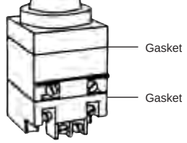
(Meets requirements for Class I, Groups C & D locations).
7.50 [190.5] W x
6.00 [152.4] D x
10.38 [263.6] H



L — Auxiliary Switch

LL — Auxiliary Switch

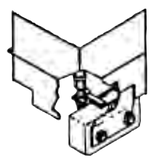
M — Dust-tight



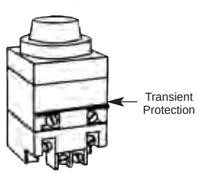
P — Octal Plug Adapter

S — Dial Stops

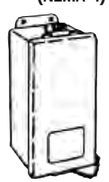
T — Auxiliary Switch



V — Transient/Surge Protection



W — Watertight Enclosure (NEMA-4)



4.75 [120.6] W x
4.44 [112.8] D x
9.75 [247.6] H

X — Panelmount Kit

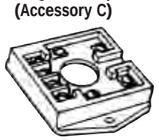
Mounting hardware included.

Accessories

(Not available for 7032 models)

Ordering options can only be ordered as factory installed options.

Plug-In Receptacle (Accessory C)



Screw Terminals Catalog No. 700137. For use with "B" Option.

Plug-In Receptacle (Accessory D)

Quick Connect Terminals Catalog No. 700141. For use with "B" Option.

Catalog 1308940
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Series 2100 Miniature

Product Facts

- High Repeat Accuracy over voltage and temperature extremes
- Hermetically sealed units are designed for high shock and vibration applications
- Instant recycling — easy linear adjustment
- Exclusive Dial Head adjustment — no needle valves
- Delay ranges from milliseconds to 3 minutes
- DPDT contacts
- Inherent transient immunity
- True Off-Delay timing

Design & Construction

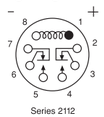
Sealed patented timing head circulates air under controlled pressure through a variable orifice to provide adjustable timing. Circular-path Dial Head principle replaces traditional needle valve.

Snap-action switch assembly provides sustained contact pressure during timing cycles. Specially designed over center mechanism assures flutter-free load transfer after extended delay periods.

Precision-wound solenoid assembly supplies the basic motive force when the control circuit is closed. These assemblies are mounted in a rigid self-supporting framework within a steel enclosure. This rugged construction promotes alignment of all operating members, the key to this unit's long trouble-free operation.

Operation

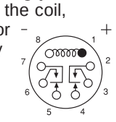
Series 2112 (On-Delay) — Applying rated voltage to the solenoid coil starts the preset time delay. At the end of the delay period the NC contacts break and the NO contacts make. Contacts remain in this position until the coil is de-energized, when the switch instantaneously returns to its original position. De-energizing the coil, either during or after the delay period, will immediately (within 25 msec.) recycle the unit. It will then provide another full delay period on re-energization.



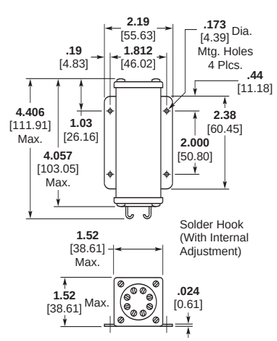
Series 2112

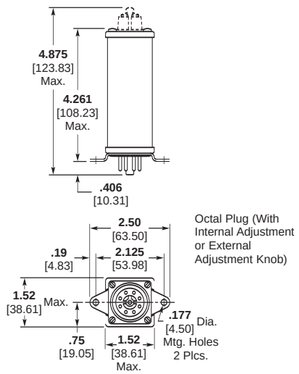
Series 2122 (Off-Delay) — Applying a rated voltage to the coil for at least 75 msec. (for accurate timing) will instantaneously transfer the switch, breaking the NC contacts and making the NO contacts. Contacts remain in this position as long as the coil is energized. The preset time delay period begins as soon as the coil is de-energized, at the end of which the switch returns to its original position.

No power is required during the timing period. Re-energizing the coil, either during or after the delay period, will immediately start a new cycle with full delay period.



Series 2122





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Series 2100 Miniature (Continued)

Specifications

—4

—5

—9

All values listed are at nominal operating voltage and 77°F [25°C] unless noted.

Operating Mode —
Series 2112 — On-Delay (Delay on Pull-in);
Series 2122 — Off-Delay (Delay on Drop-out)

Timing Adjustment — All standard models offer easy linear adjustment over one of nine timing ranges listed below. For applications requiring frequent readjustment, the external knob model is recommended. For tamper-proof installation or where readjustment is infrequent, the internal key model may be preferred. This model requires removal of the cover plate for timing adjustment. Hermetically sealed models provide a slotted adjusting screw under the cap nut on the top cover.

Timing Ranges —

Code	Seconds
A	.03 to .1
B	.1 to .3
C	.15 to 1.0
D	.375 to 3.0
E	.750 to 10.0
F	1.0 to 30.0
G	2.0 to 60.0
H	5.0 to 120.0
J	5.0 to 180.0
K	1.5 to 30.0 Cyc.
L	3.0 to 120.0 Cyc.

Repeat Accuracy —
NORMAL VERTICAL POSITION
+5% at 77°F [25°C]
+7% at 185°F [85°C]
+8% at -67°F [-55°C]
The average time between -67°F [-55°C] and 185°F [85°C] will be within ± 20% of the average @ 77°F [25°C] with a proportionally reduced effect at lesser extremes.

In extremely short delay settings an additional 8 msec. variation may result on AC models due to "half cycle" alternating current effect.

SETTING TOLERANCE: Factory time setting, when specified, subject to additional +5% tolerance.

Position Sensitivity —
HORIZONTAL POSITION — Approximately 5% increase from the initial time in the vertical position.
INVERTED POSITION — Approximately 10% increase from the initial time in the vertical position.

Reset Time —
2112 Series — 25 msec.;
2122 Series — 75 msec.

Relay Release Time —
25 msec. (2112 Series)

Relay Operate Time —
75 msec. (2122 Series)

Operating Voltage — Coil Data

Code	Nominal Operating Voltage	Resistance Ohms ±10%
M	12 VDC	30
N	28 VDC	131
P	48 VDC	500
R	110 VDC	3200
S	120 V 60 Hz (2112 Series)	190
S	120 V 60Hz (2122 Series)	285
T	240 V 60Hz	765
U	115 V 400Hz	2600
Y	125 VDC	3380

Transients — Insensitive to transients of ± 1500 VAC for 10 milliseconds.

Dielectric — 1000V RMS @ 60Hz between non-connected terminals.

Contact Rating (DPDT Contacts) —
Inductive — 2 Amps @ 30 VDC, .75 Amps @ 110 VDC, 3 Amps @ 120 V 60 Hz, 2 Amps @ 120 V 400 Hz, 1.5 Amps @ 240 V 60 Hz.
Resistive — 10 Amps @ 30 VDC, 1 Amp @ 110 VDC, 10 Amps @ 120 V 60 Hz, 10 Amps @ 120 V 400 Hz, 5 Amps @ 240 V 60 Hz.

Based on 100,000 operations electrical, 1,000,000 mechanical. Inductive and capacitive load should not have inrush currents that exceed five times normal operating load.

Ambient Temperature Range —
-55°F to 85°F [-67°C to 185°C]

Weight — Maximum, any unit - 17 ozs.

Mounting/Terminals — Chassis mounting tabs, octal plugs and external (-4) or internal (-5) adjustment. Panel mounting back plate, internal adjustment, and solder hook terminals (-9).

These are minimum standards; where more severe environmental conditions must be met, please consult the factory.

Ordering Information — Industrial Models

21 1 2 D 4 N B

Model Series
2100 Timing Relay

Operation
1 — On-Delay
2 — Off-Delay

Contact Arrangement
2 — Double Pole Double Throw

Operating Current
A — AC
D — DC

Physical Characteristics

Enclosure	Adjustment	Connector	Mounting
4 — Unsealed	Ext. Knob	Octal Plug	Chassis Mount
5 — Unsealed	Internal Key	Octal Plug	Chassis Mount
9 — Unsealed	Internal Key	Solder Hook	Solder Hook

Coil Voltage
M — 12 VDC
N — 28 VDC
P — 48 VDC
R — 110 VDC
S — 120 VAC 50/60 Hz
T — 240 VAC 60 Hz
Y — 125 VDC

Timing Range
A — .03 to .1 sec.
B — .1 to .3 sec.
C — .15 to 1.0 sec.
D — .375 to 3.0 sec.
E — .750 to 10.0 sec.
F — 1.0 to 30.0 sec.
H — 5.0 to 120.0 sec.
J — 5.0 to 180.0 sec.
K — 1.5 to 30.0 cyc.
L — 3.0 to 120.0 cyc.

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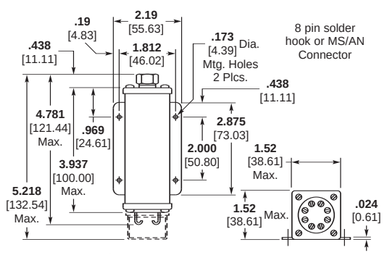
UK: 44-208-420-8341

Series 2100 Hermetically Sealed

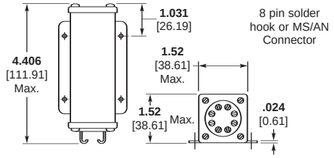
Specifications

Dielectric — Withstands 1,000 Volts RMS at 60 Hz between non-connected terminals.

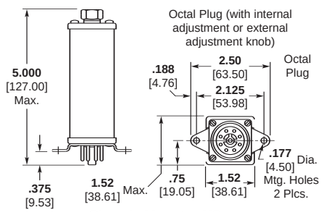
Other — AGASTAT Miniature Timing Relays also conform to applicable requirements covering: Moisture, Ozone, Humidity, Sunshine, Sand/Dust, Acoustic Noise, Salt Spray, and Prolonged Storage.



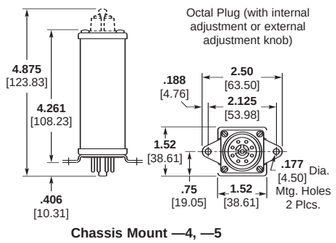
Panel Mount —H1, —H3



Panel Mount —9



Chassis Mount —H2



Chassis Mount —4, —5

Ordering Information — Hermetically Sealed

21 1 2 D H1 N B

Model Series
2100 Timing Relay

Operation
1 — On-Delay
2 — Off-Delay

Contact Arrangement
2 — Double Pole
Double Throw

Operating Current
A — AC
D — DC

Physical Characteristics

Enclosure	Adjustment	Connector	Mounting
H1 Hermet. Seal	Ext. Screw	Solder Hook	Panel Mount
H2 Hermet. Seal	Ext. Screw	Octal Plug	Chassis Mount
H3 Hermet. Seal	Ext. Screw	"AN" Conn.	Panel Mount

Timing Range
A — .03 to .1 sec.
B — .1 to .3 sec.
C — .15 to 1.0 sec.
D — .375 to 3.0 sec.
E — .750 to 10.0 sec.
F — 1.0 to 30.0 sec.
G — 2.0 to 60.0 sec.
H — 5.0 to 120.0 sec.
J — 5.0 to 180.0 sec.
K — 1.5 to 30.0 cyc.
L — 3.0 to 120.0 cyc.

Coil Voltage
M — 12 VDC
N — 28 VDC
P — 48 VDC
R — 110 VDC
S — 120 VAC 60 Hz
T — 240 VAC 60 Hz
U — 115 VAC 400 Hz
Y — 125 VDC

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tyco Electronics

W23/W31 Series

Toggle or Push/Pull Actuator Thermal Circuit Breaker

Product Facts

- 0.5 amp to 50 amp ratings may be used as on/off switch
- Cannot be reset against overload
- W23 has visible trip indicator
- Screw termination
- Trip-free operation
- W23 and W31 are UL 1077 Recognized as Supplementary Protectors, File E69543, and CSA Accepted as Supplementary Protectors (Appliance Component Protectors), File LR15734

W23

W31

Specifications

Electrical Data @ +25°C

Calibration — Will continuously carry 100% of rating, may trip between 101% and 134% of rating at 77°F [25°C]. Must trip at 135% in one hour.

Maximum Operating Voltages — 50 VDC or 250 VAC (to 400 Hz).

Interrupting Capacity — 0.5-25 amp models — 2,500 amps at 50 VDC, 1000 amps at 250 VAC. 26-50amp models — 1000 amps at 50 VDC or 250 VAC.

Resettable Overload Capacity — Ten times rated current.

Dielectric Strength — Over 1,500 volts RMS.

Current Rating in Amps	Maximum Resistance in Ohms ± 30%
1	.61
5	.03
10	.01
15	.006
20	.004
30	.003
40	.002
50	.002

Mechanical/Environmental Data

Endurance Cycling — More than 6,000 cycles at 100% of rating, or 10,000 mechanical cycles.

Humidity — Will meet requirements of MIL-STD-202, Method 106.

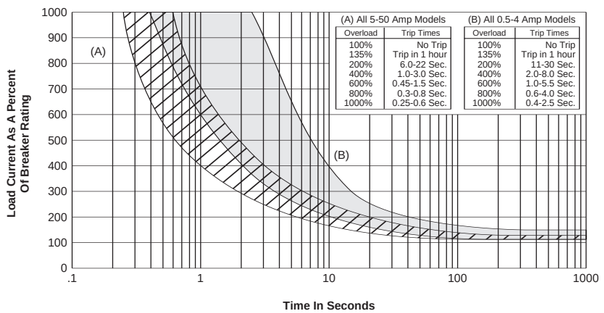
Salt Spray — Will meet requirements of MIL-STD-202, Method 101, Test Condition B.

Termination — Two #8-32 screw terminals.

Mounting —
W23 — Threaded bushing, 3/8 [9.53 mm] diameter.
W31 — Threaded bushing, 15/32 [11.91 mm] diameter, with or without anti-rotation flats.

Weight — Less than 2 oz. [57g].

Time Vs. Current Trip Curve @ +25°C



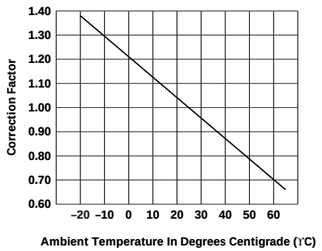
(A) All 5-50 Amp Models

Overload	Trip Times
100%	No Trip
135%	Trip in 1 hour
200%	6.0-22 Sec.
400%	1.0-3.0 Sec.
600%	0.45-1.5 Sec.
800%	0.3-0.8 Sec.
1000%	0.25-0.6 Sec.

(B) All 0.5-4 Amp Models

Overload	Trip Times
100%	No Trip
135%	Trip in 1 hour
200%	11-30 Sec.
400%	2.0-8.0 Sec.
600%	1.0-5.5 Sec.
800%	0.6-4.0 Sec.
1000%	0.4-2.5 Sec.

Ambient Compensation Chart



To use this chart: Read up from the ambient temperature to the curve, and across to find a correction factor. Multiply the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve.

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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Toggle or Push/Pull Actuator Thermal Circuit Breaker (Continued)

Ordering Information

Typical Part Number: **W 23 — X 1 A 1 G — 5**

Designator
W = Circuit breaker

Series Number
23 = Single pole, push/pull

Circuit Function
X = Series trip

Button
1 = Black with white amp rate marking and white trip band

Mounting Bushing
A = 3/8 - 24 threaded bushing .375 [9.53] long, silver color

Terminals (See drawings for relative terminal positions):
1 = Screw terminals situated 90° to each other with #8-32 screws and washers installed
3 = Screw terminals situated parallel to each other pointing upward with #8-32 screws and washers installed

Mounting Hardware
A = Knurled nut/hex nut installed
G = Two hex nuts/lockwasher installed
Z = No mounting hardware supplied

Amp Rating

0.5	3	7.5	20	35
1	4	10	25	40
2	5	15	30	50

Stock Items - The following items are normally maintained in stock for immediate delivery.

W23-X1A1G-1	W23-X1A1G-7.50	W23-X1A1G-25	W23-X1A1G-50
W23-X1A1G-2	W23-X1A1G-10	W23-X1A1G-30	
W23-X1A1G-3	W23-X1A1G-15	W23-X1A1G-35	
W23-X1A1G-5	W23-X1A1G-20	W23-X1A1G-40	

Ordering Information

Typical Part Number: **W 31 — X 2 M 1 G — 5**

Designator
W = Circuit breaker

Series Number
31 = Single pole, toggle actuator

Circuit Function
X = Series trip

Mounting Bushing
1 = 15/32-32 threaded bushing .320 [8.13] long, round, silver color
2 = 15/32-32 threaded bushing .320 [8.13] long, double “D,” silver color

Toggle
M = Silver color metal toggle, round, with amp rate marking on end

Terminals (See drawing for relative terminal positions):
1 = Screw terminals situated 90° to each other with #8-32 screws and washers installed
5 = Screw terminals situated parallel to each other pointing downward with #8-32 screws and washers installed

Mounting Hardware
A = Knurled nut/hex nut installed
G = Two hex nuts/lockwasher installed
Z = No mounting hardware supplied

Amp Rating

0.5	3	7.5	20	35
1	4	10	25	40
2	5	15	30	50

Stock Items - The following items are normally maintained in stock for immediate delivery.

W31-X2M1G-1	W31-X2M1G-10	W31-X2M1G-35
W31-X2M1G-2	W31-X2M1G-15	W31-X2M1G-40
W31-X2M1G-3	W31-X2M1G-20	W31-X2M1G-50
W31-X2M1G-5	W31-X2M1G-25	
W31-X2M1G-7.50	W31-X2M1G-30	

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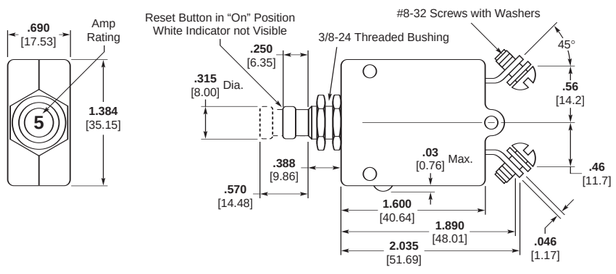
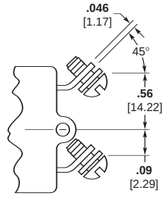
Japan: 81-44-844-8013
UK: 44-208-420-8341

W23 Outline Dimensions

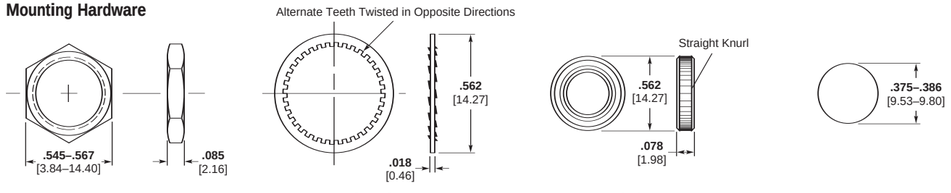
Terminal Style 1



Terminal Style 3



Mounting Hardware



Hex Nut
(55-001D - Silver Color)

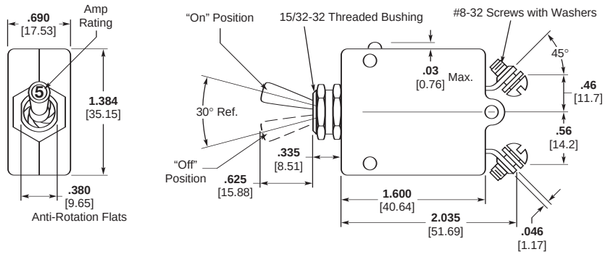
Lockwasher
(88-006B - Silver Color)

Knurled Nut
(55-008A - Silver Color)

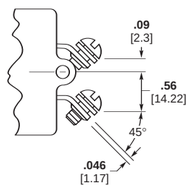
Suggested Mounting Holes

W31 Outline Dimensions

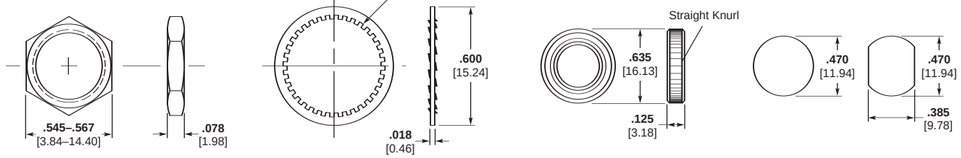
Terminal Style 1



Terminal Style 5



Mounting Hardware



Hex Nut
(55-001B - Silver Color)

Lockwasher
(88-002B - Silver Color)

Knurled Nut
(55-010B - Silver Color)

Suggested Mounting Holes

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Magnetic Hydraulic Circuit Breakers

Product Facts

- Designed for the international market
- Ratings to 50 amps
- Heavy duty #10-32 stud connections (W9)
- Optional 10 amp auxiliary switch
- Several delay curve options
- Trip free operation
- UL Recognized as Supplementary Protector under UL 1077, File E69543
- CSA Accepted as a Supplementary Protector, File LR15734
- VDE Approved to VDE 0642/EN 60 934 (Circuit Breakers for Equipment) License No. 73782

Typical Resistance and Impedance

Current (Amps)	DC Resistance (Ohms)	50/60 Hz. Impedance (Ohms)
0.2	90	90
1.0	1.2	1.2
2.0	0.28	0.28
5.0	0.04	0.04
10.0	0.013	0.013
20.0	0.004	0.005
30.0	0.0027	0.002
40.0	0.002	0.002
50.0	0.0015	0.0015

Tolerance: 0.1 – 4.99 ± 15%; 5 – 9.99 ± 20%; 10 – 15 ± 25%; 16 – 30 ± 50%.

Specifications

Electrical Data

Auxiliary Switch — See Auxiliary Switch Ratings Table 2 for details.

Calibration — Breakers will hold 100% of rated current. Breakers may trip between 101% and 124% of rated load (134% for AC/DC units). Breakers must trip at 125% of rated load and above (135% for AC/DC units).

Dielectric Strength — 50/60 or 400 Hz. — 1500V; DC — 1100V.

Insulation Resistance — 100 Megohms at 500 VDC.

Endurance — 10,000 on/off cycles — 6000 at rated load, 4000 at no load. Units tested at six cycles per minute, 1 second on and 9 seconds off at 25°C ambient.

Mechanical/Environmental Data

Operating Temperature — -40°F to +185°F [-40°C to +85°C].

Humidity — Meets requirements of MIL-STD-202 method 103.

Shock — Tested per MIL-STD-202, method 213, test condition C (100g @ 6 ms).

Vibration — Tested per MIL-STD-202, method 201, 10-55 Hz., 0.06 [1.52 mm] total excursion in 2 planes.

Fungus and Moisture Resistance — Special moisture resistant finish applied to all ferrous parts. Plastic parts are made of inherently fungus resistant material.

Marking — W6 units have ON and OFF molded on the rocker of rocker actuated units (rocker actuated VDE units have international "1" and "0"). W9 units have ON and OFF molded into the area at the base of the toggle. International "1" and "0" symbols are marked on the toggle for both W6 and W9.

Mounting — Panel mounted units are mounted with two #6-32 screws from the front of the panel. Metric models for use with M3 x 0.5 screws are available. To maintain published performance specifications, units should not be mounted more than 90° from their normal upright position.

Weight — Approximately 2.5 ounces per pole.

Approvals and Ratings Table 1

W6 Series UL/CSA (All Circuit Functions)

Maximum Voltage	Frequency (Hz)	Current Phase	Capacity (Amps)	Interrupting Rating (Amps)
65	DC	—	0.2-50	2,000
277	50/60	1	0.2-20	5,000
277	50/60	1	21-50	2,500
277/480	50/60	3Ø-Wye	0.2-20	5,000

W9 Series UL/CSA (All Circuit Functions)

65	DC	—	0.2-50	2,000
277	50/60	1	0.2-50	5,000
277/480	50/60	3Ø-Wye	0.2-20	5,000

W6 Series VDE (Circuit Function X)

Maximum Voltage	Frequency (Hz)	Current Phase	Capacity (Amps)	Interrupting Rating (Amps)
65	DC	—	0.2-50	2,000
250	50/60	1	0.2-30	5,000
250	50/60	1	31-50	2,000
415/240	50/60	3Ø	0.2-30	5,000

W9 Series VDE (Circuit Function X)

65	DC	—	0.2-50	2,000
250	50/60	1	0.2-30	5,000
250	50/60	1	31-50	2,000
415/240	50/60	3Ø	0.2-30	5,000

Approvals and Ratings Table 2

UL/CSA

Switch Number	Voltage 50/60 Hz.	Current (Amps)	Terminals W x T x L
A	125	10	**.093 x .020 x .250** 2.36 x .51 x 6.40

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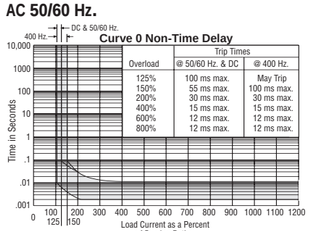
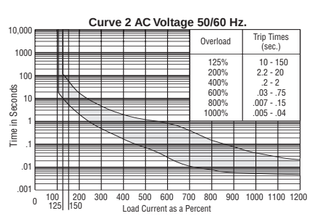
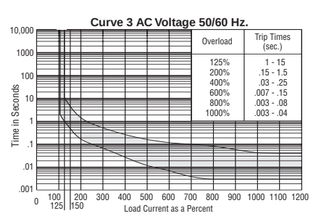
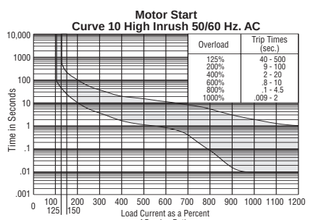
Time vs. Current Trip Curves for W6 Series and W9 Series

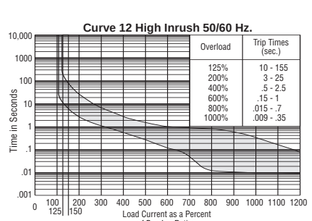
AC 50/60 Hz.

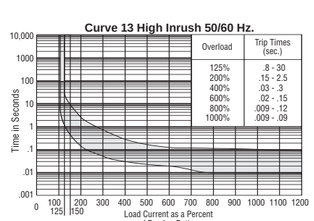




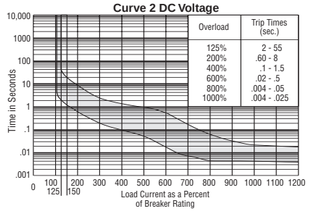


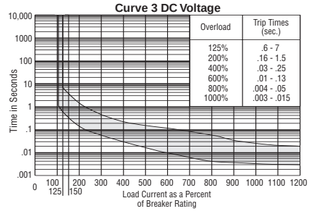


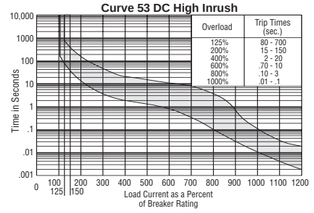




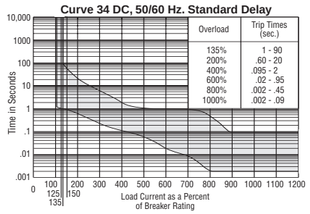
DC







AC/DC



Note: For instantaneous curves for all voltages refer to Curve 0 Non-Time Delay under the AC 50/60 Hz. heading.

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Magnetic Hydraulic Circuit Breakers (Continued)

Pulse Tolerance Specifications

Pulse tolerance is defined as a single pulse of a half sine wave (1/2 cycle or 8 milliseconds) that will not trip the breaker. An inertia wheel for increased pulse tolerance is available by specifying "P" after the time delay curve number in the ordering information. The table at right lists pulse tolerance values of standard and inertia delay models.

Voltage	Time Delay Curve	Pulse Tolerance Value	
		Standard	Inertia Delay
AC 50/60 Hz.	2	7.5	18
	3	6	18
	10	18	30
	12	18	30
	13	18	30

To determine pulse tolerance multiply breaker rating by value in table. For example, a 2A breaker with time delay curve 3 has a standard pulse tolerance of 12A (2A x 6). The same breaker with an inertia delay has a pulse tolerance of 36A (2A x 18).

Ordering Information — W6 Series

Typical Part Number: **W 67 — X 2 Q 1 2 — 20**

Circuit Breaker Mounting
W = #6-32 mounting threads
M = M3.0 x 0.5 mounting threads

Number of Poles
67 = Single pole 68 = Two pole 69 = Three pole 70 = Four pole

Circuit Function (Only X is VDE approved)
A = Series trip with auxiliary switch (.093" QC) X = Series trip

Actuator (One actuator per pole)
1 = Black toggle 3 = Black rocker 5 = Red rocker 9 = Red toggle
2 = White toggle 4 = White rocker 6 = Grey rocker

Termination
Q = .250" QC (DIN 46 244) 25A Max. VDE S = #8-32 screw T = #10-32 screw
Note: "T" termination must be used for all ratings of 31 amps or above.

VDE Approval
Blank = UL/CSA approved breaker
V = VDE approved breaker without auxiliary switch

Amp Rating (Consult Tyco Electronics for other values)

0.20	0.75	2.0	3.5	6.0	8.0	11.0	20.0	35.0	50.0
0.25	1.0	2.5	4.0	7.0	9.0	12.0	25.0	40.0	
0.50	1.5	3.0	5.0	7.5	10.0	15.0	30.0	45.0	

Time Delay Curve
0 = Instantaneous
2 = Standard delay
3 = Short delay
53 = DC high inrush
10 = AC high inrush (Motor start)
12 = AC high inrush version of #2
13 = AC high inrush version of #3
34 = Combination AC/DC standard delay
Notes: Curves may be specified with increased pulse tolerance for 1/2 cycle by adding "P" after curve. See delay curve section for availability and details.

Maximum Line Voltage (See Table 1 for current ranges)
UL/CSA Types 1 = 277 VAC, 50/60 Hz; 2 = 277/480; 5 = 65 VDC; 7 = AC/DC 277 VAC or 65 VDC (Delay curve 34 must be specified)
VDE Types 1 = 250 VAC, 415/240 VAC; 5 = 65 VDC; 7 = AC/DC 250 VAC, 415/240 VAC, 65 VDC (Delay curve 34 must be specified)

Stock Items - We recommend that our authorized distributors stock the following items for immediate delivery.

W67-A2Q12-5	W67-X2Q12-5	W67-X2Q13-1	W67-X2Q13-25	W67-X2Q52-15	W68-X2Q12-5	W68-X2Q12-30	W69-X2Q12-15
W67-A2Q12-10	W67-X2Q12-7	W67-X2Q13-2	W67-X2Q13-30	W67-X2Q52-20	W68-X2Q12-7	W68-X2Q13-15	W69-X2Q12-20
W67-X2Q10-3	W67-X2Q12-10	W67-X2Q13-3	W67-X2Q50-5	W67-X2Q52-30	W68-X2Q12-10	W68-X2Q110-10	W69-X2Q12-25
W67-X2Q10-5	W67-X2Q12-15	W67-X2Q13-10	W67-X2Q50-10	W67-X2Q110-15	W68-X2Q12-15	W68-X2Q110-20	W69-X2Q12-30
W67-X2Q12-2	W67-X2Q12-20	W67-X2Q13-15	W67-X2Q52-5	W67-X2Q110-20	W68-X2Q12-20	W69-X2Q12-5	W69-X2Q110-20
W67-X2Q12-3	W67-X2Q12-30	W67-X2Q13-20	W67-X2Q52-10	W68-X2Q12-3	W68-X2Q12-25	W69-X2Q12-10	W69-X2Q110-30

Ordering Information — W9 Series

Typical Part Number: **W 91 — X 1 1 2 — 20**

Circuit Breaker Mounting
W = #6-32 mounting threads
M = M3.0 x 0.5 mounting threads

Number of Poles
91 = Single pole 92 = Two pole 93 = Three pole 94 = Four pole

Circuit Function (Only X is VDE approved)
A = Series trip with auxiliary switch (.093" QC) X = Series trip

Actuator (One actuator per pole)
1 = Black toggle 2 = White toggle

Maximum Line Voltage (See Table 1 for current ranges)
UL/CSA Types 1 = 227 VAC, 50/60 Hz; 2 = 277/480; 5 = 65 VDC; 7 = AC/DC 277 VAC or 65 VDC (Delay curve 34 must be specified)
VDE Types 1 = 250 VAC, 415/240 VAC; 5 = 65 VDC; 7 = AC/DC 250 VAC, 415/240 VAC, 65 VDC (Delay curve 34 must be specified)

VDE Approval
Blank = UL/CSA approved breaker
V = VDE approved breaker without auxiliary switch

Amp Rating (Consult Tyco Electronics for other values)

0.20	0.75	2.0	3.5	6.0	8.0	11.0	20.0	35.0	50.0
0.25	1.0	2.5	4.0	7.0	9.0	12.0	25.0	40.0	
0.50	1.5	3.0	5.0	7.5	10.0	15.0	30.0	45.0	

Time Delay Curve
0 = Instantaneous
2 = Standard delay
3 = Short delay
53 = DC high inrush
10 = AC high inrush (Motor start)
12 = AC high inrush version of #2
13 = AC high inrush version of #3
34 = Combination AC/DC standard delay
Notes: Curves may be specified with increased pulse tolerance for 1/2 cycle by adding "P" after curve. See delay curve section for availability and details.

Stock Items - We recommend that our authorized distributors stock the following items for immediate delivery.

W91-X112-1	W91-X112-15	W91-X113-15	W91-X152-40	W92-X112-5	W92-X112-30	W92-X1110-30	W93-X112-30
W91-X112-2	W91-X112-20	W91-X150-5	W91-X152-50	W92-X112-7	W92-X112-40	W93-X112-5	W93-X112-40
W91-X112-3	W91-X112-40	W91-X152-10	W91-X1110-20	W92-X112-10	W92-X112-50	W93-X112-10	W93-X112-50
W91-X112-5	W91-X112-50	W91-X152-15	W92-X112-1	W92-X112-15	W92-X113-15	W93-X112-15	W93-X1110-20
W91-X112-7	W91-X113-5	W91-X152-20	W92-X112-2	W92-X112-20	W92-X113-20	W93-X112-20	W93-X1110-30
W91-X112-10	W91-X113-10	W91-X152-30	W92-X112-3	W92-X112-25	W92-X1110-20	W93-X112-25	

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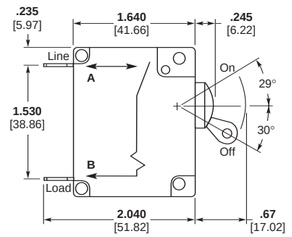
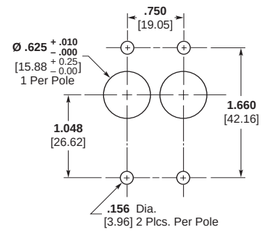
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Magnetic Hydraulic Circuit Breakers (Continued)

Outline Dimensions — Toggle Actuator Models

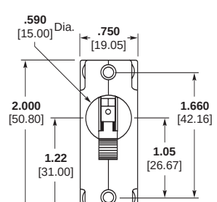
W6 Series





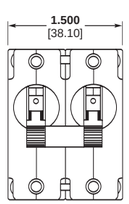
Panel Mounting Cutout

W6 Series

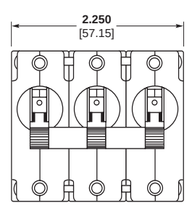


1 Pole

.14 [3.56] Dp. Typ.
M3 x 0.5 Optional

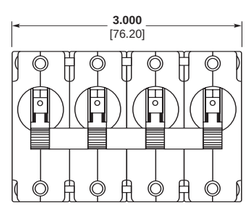


2 Pole

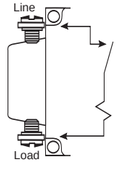


3 pole

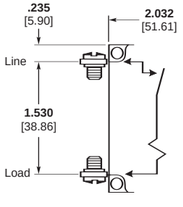
4 Pole



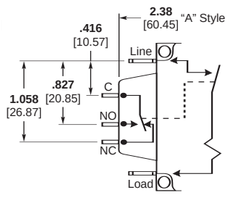
Note:
Multi-pole models furnished with separate handle tie hardware.



VDE Models
W/Screw Terminals



UL/CSA Models
W/Screw Terminals



UL/CSA/VDE Models
W/Aux. Switch

Notes:
1. Terminal protrusion dimensions are referenced from back of mounting panel.
2. Main terminals are male quick connect type .250 [6.35] wide x .031 [.79] thick x .377 [9.58] long. Optional 8-32 x .250 [6.35] or 10-32 x .250 [6.35] screw type.
3. Panel mounting cutout detail mtg. detail tol.: ±.005 [.13] unless noted. Add additional cutouts to correspond to number of poles. Outline drawing tolerance ± .015 [.38] unless noted.

Catalog 1308940
Revised 8-06

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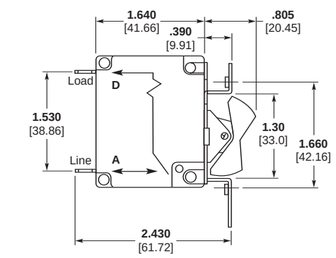
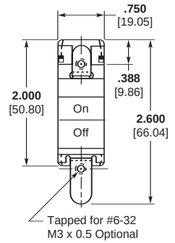
Magnetic Hydraulic Circuit Breakers (Continued)

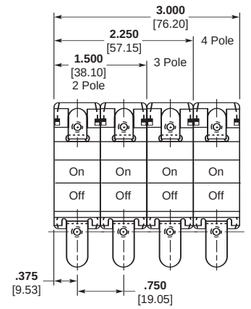
Outline Dimensions — Rocker Actuator Models

W6 Series

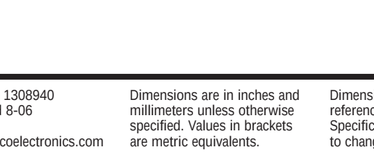




1 Pole



2, 3 & 4 Pole



Panel Mounting Cutout

VDE Rocker Marking

Notes:
1. Outline drawing tolerance ± .015 [0.38] unless noted.
2. Mounting Detail Tol.: ± .005 [0.13] unless noted.

15 Relays

Catalog 1308940
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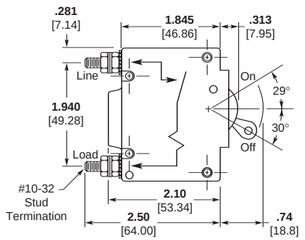
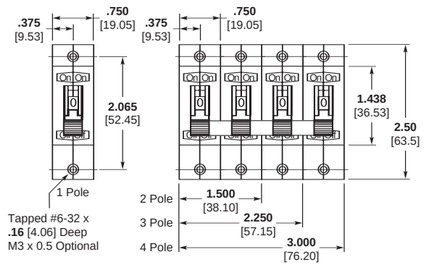
Magnetic Hydraulic Circuit Breakers (Continued)

Outline Dimensions

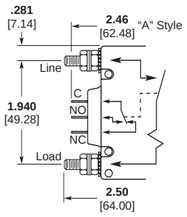
W9 Series



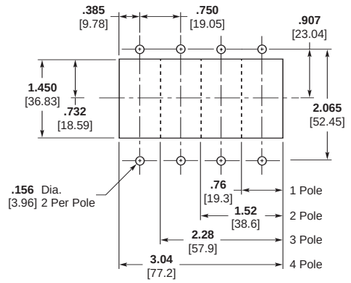
Series Trip Model



Series Trip Model



Series Trip Model With Common Enclosed Auxiliary Switch



Panel Mounting Cutout Detail

Notes:
1. Terminal protrusion dimensions are referenced from the back of the mounting panel.
2. Mounting detail tolerance ± .005 [0.13] unless noted.
3. Outline drawing tolerance ± .015 [0.38] unless noted.

Catalog 1308940
Revised 8-06

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UK: 44-208-420-8341

10 Amp Rotary Relay For Demanding Shock & Vibration Applications

Product Facts

- AC and DC coils, latching and non-latching
- 4PDT through 24PDT contact arrangements
- Contacts will not chatter when relays are subjected to high-impact shock blows of 2000 ft.-lbs

Small 4PDT

Medium 24PDT

Specifications

Contact Data

Arrangements — 4 Form C (4PDT) through 24 Form C (24 PDT).

Contact Ratings

Single Contacts	Two Contacts in Series
10 A, 115 VAC	3 A, 440 VAC
3 A, 28 VDC	15 A, 115 VAC
0.8 A, 125 VDC	1.5 A, 125 VDC

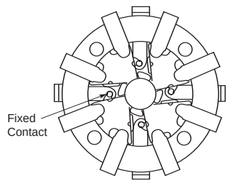
The above AC contact ratings are based on contact loads having a 50% power factor. The DC contact ratings are based on resistive loads.

Operate Data @ 77°F [25°C]

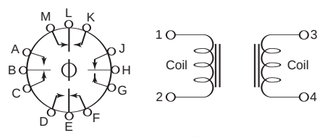
Type	Typ. Operate Time (ms)	Typ. Release Time (ms)
Small AC Non-Latching	5 to 12	5 to 18
Small DC Non-Latching	15 to 30	5 to 15
Small AC Latching	6 to 12	N/A
Small DC Latching	10 to 16	N/A
Medium AC Non-Latching	6 to 12	6 to 20
Medium DC Non-Latching	65 to 90	10 to 30
Medium AC Latching	8 to 14	N/A
Medium DC Latching	30 to 80	N/A

Latching Two-Position Types — Except for the latching feature, MDR latching relays utilize the same general construction as non-latching types. They have two sets of coils and provide a latching two-position operation.

Contact Section



Contacts Shown With Coil 1-2 De-Energized and Coil 3-4 Energized.



Coils Must be Energized Alternately, Not Simultaneously.

Environmental Data

Temperature Range —
Standard models — 0°F o +149°F [0°C to +65°C]
Special order models — 0°F to +194°F [0°C to +90°C]

Mechanical Data

Termination — #5-40 screw terminals supplied

Weight (Approx.) —
Small —
4 & 8PDT — 32 oz. [0.914 kg];
12PDT — 33 oz. [0.943 kg]
Medium —
16PDT — 72 oz. [2.04 kg];
24PDT — 74 oz. [2.10 kg]

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10 Amp Rotary Relay For Demanding Shock & Vibration Applications (Continued)

Ordering Information and Coil Characteristics — No models in this series are maintained in stock.

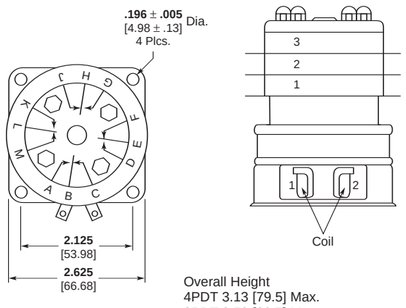
Type	Part Number	Contacts	Coil Voltage (60 Hz. for AC)	Coil Current (Amps)	DC Coil Resistance (Ohms)	Coil Power* (Watts)	Breakdown (Volts RMS)
Small Non-Latching	MDR-131-1	4PDT	115 VAC	0.215	66	6.5	1,230
	MDR-131-2	4PDT	440 VAC	0.045	1,256	5.1	1,880
	MDR-135-1	4PDT	28 VDC	0.362	76	10.0	1,308
	MDR-137-8	4PDT	125 VDC	0.082	1,520	10.3	2,375
	MDR-134-1	8PDT	115 VAC	0.215	66	6.5	1,230
	MDR-134-2	8PDT	440 VAC	0.045	1,256	5.1	1,880
	MDR-136-1	8PDT	28 VDC	0.362	76	10.0	1,308
	MDR-138-8	8PDT	125 VDC	0.082	1,520	10.3	2,375
	MDR-163-1	12PDT	115 VAC	0.230	62	6.9	1,230
	MDR-163-2	12PDT	440 VAC	0.055	940	6.3	1,880
Medium Non-Latching	MDR-170-1	16PDT	115 VAC	0.620	8.4	17.0	1,230
	MDR-170-2	16PDT	440 VAC	0.160	107	17.0	1,880
	MDR-172-1	16PDT	28 VDC	0.667	42	18.7	1,308
	MDR-173-1	16PDT	125 VDC	0.125	1,024	16.0	2,375
	MDR-141-1	24PDT	115 VAC	0.620	8.4	17.0	1,230
	MDR-141-2	24PDT	440 VAC	0.160	107	17.0	1,880
	MDR-167-1	24PDT	28 VDC	0.667	42	18.7	1,308
Small Latching	MDR-67-2	4PDT	115 VAC	0.150	210	5.5	1,230
	MDR-4091	4PDT	440 VAC	0.020	4,500	3.0	1,880
	MDR-67-3	4PDT	28 VDC	0.778	36	21.8	1,308
	MDR-5060	4PDT	125 VDC	0.164	760	20.6	2,375
	MDR-4076	8PDT	115 VAC	0.150	210	5.5	1,230
	MDR-4092	8PDT	440 VAC	0.020	4,500	3.0	1,880
	MDR-5035	8PDT	28 VDC	0.778	36	21.8	1,308
	MDR-5061	8PDT	125 VDC	0.164	760	20.6	2,375
Medium Latching	MDR-6064	12PDT	115 VAC	0.380	24	12.0	1,230
	MDR-7020	12PDT	28 VDC	0.316	88.6	8.8	1,308
	MDR-66-4	16PDT	115 VAC	0.380	24	12.0	1,230
	MDR-7036	16PDT	125 VDC	0.083	1,500	10.4	2,375

*Actual Wattmeter readings.

Outline Dimensions

Tolerances: Decimals ± .010 [±.25] Unless Otherwise Specified.

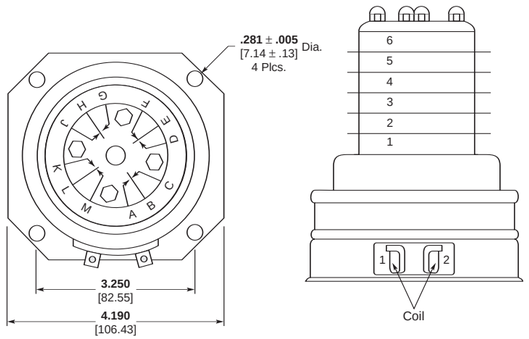
Small Models



Overall Height
4PDT 3.13 [79.5] Max.
8PDT 3.53 [89.7] Max.
12PDT 3.88 [98.6] Max.

Coil and Contact Terminal Screws #5-40 Supplied.

Medium Models



Overall Height
12PDT 4.63 [117.6] Max.
16PDT 5.00 [127.0] Max.
24PDT 5.75 [146.1] Max.

Coil and Contact Terminal Screws #5-40 Supplied.

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CII — High Performance Signal Level Relays

T0-5 Relays

- Hermetically Sealed
- Standard or Sensitive Coils
- Optional Diodes/Transistors

Sensitive Version

Standard Version

Standard Version

P/N Series	Contact Form	Contact Rating	Coil Voltage	Temperature Rating	Vibration	Shock	Mil-Spec	Standard Coil	Sensitive Coil	Diode Version	Dual Diode Version	Transistor Version	Long Life Version	Spreader Pads	RF Performance (GHz)
HM	2 Form C	Up to 1A	5 to 30 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●						●	1
HMD	2 Form C	Up to 1A	5 to 30 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●		●				●	1
HS	2 Form C	Up to 1A	5 to 48 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●					●	1
HSD	2 Form C	Up to 1A	5 to 48 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●	●				●	1
MA	2 Form C	Up to 1A	5 to 30 Vdc	-65° to +125°C	30 G's	75 G's	M39016/9	●						●	1.5
1MA	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/7	●						●	1.5
MAD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/15	●		●				●	1.5
1MAD	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/23	●		●				●	1.5
MADD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/20	●			●			●	1.5
1MADD	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/24	●			●			●	1.5
MAT	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M28776/1	●				●		●	1.5
1MAT	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M28776/5	●				●		●	1.5
MAV	2 Form C	Up to 1A	5 to 30 Vdc	-65° to +125°C	380 G's	150 G's	M39016/9 Design	●						●	
MAVD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	380 G's	150 G's	M39016/15 Design	●		●				●	
MAVDD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	380 G's	150 G's	M39016/20 Design	●			●			●	
MS	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/11		●					●	1.5
1MS	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	M39016/10		●					●	1.5
MSD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/16		●	●				●	1.5
1MSD	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	M39016/25		●	●				●	1.5
MSDD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/21		●		●			●	1.5
1MSDD	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	M39016/26		●		●			●	1.5
MST	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M28776/3		●			●		●	1.5
1MST	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	M28776/4		●			●		●	1.5
MSV	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	380 G's	150 G's	M39016/11 Design		●					●	
MSVD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	380 G's	150 G's	M39016/16 Design		●	●				●	
MSVDD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	380 G's	150 G's	M39016/21 Design		●		●			●	
PRMA	2 Form C	Up to 1A	5 to 30 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●						●	1.5
PR1MA	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●						●	1.5
PRMAD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●		●				●	1.5
PR1MAD	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●		●				●	1.5
PRMADD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●			●			●	1.5
PR1MADD	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●			●			●	1.5
PRMAT	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●				●		●	1.5
PR1MAT	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●				●		●	1.5
PRMS	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●					●	1.5
PR1MS	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●					●	1.5
PRMSD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●	●				●	1.5
PR1MSD	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●	●				●	1.5
PRMSDD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●		●			●	1.5
PR1MSDD	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●		●			●	1.5
PRMST	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●			●		●	1.5
PR1MST	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●			●		●	1.5

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Catalog 1308940
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CII — High Performance Signal Level Relays (Continued)

.100 Grid Relays

- Hermetically Sealed
- Standard or Sensitive Coils
- Optional Diodes/MOSFETs

Sensitive Version

MOSFET Version

Surface Mount Version

P/N Series	Contact Form	Contact Rating	Coil Voltage	Temperature Rating	Vibration	Shock	Mil-Spec	Standard Coil	Sensitive Coil	Diode Version	Dual Diode Version	MOSFET Version	Surface Mount Version	Mounting Pads	RF Performance (GHz)
HC	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●						●	1
HCD	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●		●				●	1
HCS	2 Form C	Up to 1A	5 to 48 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●					●	1
HCSD	2 Form C	Up to 1A	5 to 48 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●	●				●	1
SHC	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●					●		1
SHCD	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●		●			●		1
SHCS	2 Form C	Up to 1A	5 to 48 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●				●		1
SHCSD	2 Form C	Up to 1A	5 to 48 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●	●			●		1
MGA	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/17	●						●	1.5
MGAD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/18	●		●				●	1.5
MGADD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/19	●			●			●	1.5
MGAT	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M28776/6	●				●		●	1.5
SMGA	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/17 Design	●					●		1.5
SMGAD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/18 Design	●		●			●		1.5
SMGADD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/19 Design	●			●		●		1.5
MGS	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/41		●					●	1.5
MGSD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/42		●	●				●	1.5
MGSDD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/43		●		●			●	1.5
MGST	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M28776/7		●			●		●	1.5
SMGS	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/41 Design		●				●		1.5
SMGSD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/42 Design		●	●			●		1.5
SMGSDD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/43 Design		●		●		●		1.5
PRMGA	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●						●	1.5
PRMGAD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●		●				●	1.5
PRMGADD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●			●			●	1.5
PRMGAT	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●				●		●	1.5
PRMGS	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●					●	1.5
PRMGSD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●	●				●	1.5
PRMGSDD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●		●			●	1.5
PRMGST	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●			●		●	1.5

* Commercial-Off-The-Shelf

High Frequency Relays

- Hermetically Sealed
- Standard or Sensitive Coils
- Standard or High Performance Versions
- Excellent RF Performance

Standard TO-5 Package

Sensitive Grid Package

P/N Series	Contact Form	Contact Rating	Coil Voltage	Temperature Rating	Vibration	Shock	Mil-Spec	Standard Coil	Sensitive Coil	Ground Pins	TO-5 Package	Grid Package	RF Performance (GHz)
MW3	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●		●	●		3
MW3S	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●	●	●		3
MW4	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●				●	4
MW4S	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●			●	4
MW6	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●				●	6
MW6S	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●			●	6
MW3HP	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	Commercial	●		●	●		3
MW3HPS	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	Commercial		●	●	●		3
MW4HP	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	Commercial	●				●	4
MW4HPS	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	Commercial		●			●	4
MW6	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	Commercial	●				●	6
MW6HPS	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	Commercial		●			●	6

RF Performance Excellence - MW series high frequency relays are designed to provide excellent insertion loss repeatability over the frequency range from DC to 6 GHz. Exceptional isolation performance makes the MW series relays the logical choices for high performance RF applications.

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CII — High Performance Subminiature Relays

1/5 Size Relays

- Hermetically Sealed
- Optional Terminals
- Optional Mounting Styles

4 Pole Grid

2 Pole Standard

4 Pole Grid

P/N Series	Contact Form	Contact Rating	Coil Voltage	Temperature Rating	Vibration	Shock	Mil-Spec	Standard Coil	Grid Version	Latching Design	Low Profile	Optional Diode	Optional Dual Diode	Long Life Version	Excellent RF Switching
3SBC	2 Form C	Up to 2A	5 to 36 Vdc	-65° to +125°C	30 G's	100 G's	M39016/13, 37, 38	●			●	●	●		●
3SBH	4 Form C	Up to 2A	6 to 36 Vdc	-65° to +125°C	30 G's	100 G's	M39016/14, 53, 54	●	●		●	●	●		
3SBM	4 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	30 G's	150 G's	M39016/31, 35, 36	●	●	●	●	●	●		
3SCC	2 Form C	Up to 2A	5 to 36 Vdc	-40° to +125°C	30 G's	100 G's	Commercial	●			●			●	●
3SDH	4 Form C	Up to 2A	6 to 36 Vdc	-40° to +125°C	30 G's	100 G's	Commercial	●	●		●			●	

Half Size Relays

- Hermetically Sealed
- Optional Terminals
- Optional Mounting Styles

2 Pole Version

1 Pole Version

Coaxial Cables Version

P/N Series	Contact Form	Contact Rating	Coil Voltage	Temperature Rating	Vibration	Shock	Mil-Spec	Standard Coil	Bifilar Coil	Sensitive Coil	Latching Design	Optional Diode	Long Life Version	Coaxial Cables	Excellent RF Switching
C	1 Form C	Up to 10A	6 to 26.5 Vdc	-65° to +125°C	20 G's	100 G's	M39016 Design	●							
HFC	2 Form C	Up to 2A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●							
HFC4A	2 Form C	Up to 4A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●							
HFC5A	2 Form C	Up to 5A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●							
HFW	2 Form C	Up to 2A	5 to 48 Vdc	-65° to +125°C	30 G's	100 G's	M39016/6	●							●
HFW4A	2 Form C	Up to 4A	5 to 48 Vdc	-65° to +125°C	30 G's	100 G's	M39016/6 Design	●							●
HFW5A	2 Form C	Up to 5A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	M39016/6 Design	●							●
HMB	2 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	M39016/22		●						●
HMS	2 Form C	Up to 2A	5 to 36 Vdc	-65° to +125°C	20 G's	100 G's	M39016/44			●					●
LR	4 Form C	Up to 2A	5 to 48 Vdc	-65° to +125°C	30 G's	100 G's	M39016 Design	●			●				
LS	2 Form C	Up to 2A	5 to 48 Vdc	-65° to +125°C	30 G's	100 G's	Commercial	●			●				
RFK	1 or 2 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +85°C	20 G's	100 G's	Commercial	●						●	●
SR	4 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	20 G's	100 G's	M39016/40	●							
SS	6 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	20 G's	100 G's	M39016 Design	●							

Full Size Relays

- Hermetically Sealed
- Optional Terminals
- Optional Mounting Styles

Standard Full Size

Tall Full Size

10 Amp Full Size

** 07 relay is also qualified to MS 27245 & MS27247

P/N Series	Contact Form	Contact Rating	Coil Voltage	Temperature Rating	Vibration	Shock	Mil-Spec	Standard Coil	Bifilar Coil	Special Wiring Available	Latching Design	Optional Diode	Multi-pole Configurations	Coaxial Cables	Excellent RF Switching
02	2 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	20 G's	100 G's	M5757/8	●					●		
07	2 Form C	Up to 10A	6-120 Vdc, 115 Vac	-65° to +125°C	30 G's	100 G's	M5757/23**	●				●			
3SAM	2 Form C	Up to 2A	6 to 24 Vdc	-65° to +125°C	30 G's	150 G's	M39016/32	●	●	●	●				
3SDM	2 Form C	Up to 2A	6 to 24 Vdc	-65° to +125°C	30 G's	150 G's	M39016 Design	●		●	●				
FW	2 Form C	Up to 3A	6.3 to 110 Vdc	-65° to +125°C	20 G's	100 G's	M5757/10	●							●
FW5A	2 Form C	Up to 5A	6.3 to 110 Vdc	-65° to +125°C	20 G's	100 G's	M5757/10 Design	●							●
RD4	4 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	20 G's	100 G's	M5757/7	●					●		
RD6	6 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	20 G's	100 G's	M5757/1	●					●		
RFB	1 or 2 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +85°C	20 G's	100 G's	M5757 Design	●						●	●
SF	2 Form C	Up to 2A	1.8 to 40 Vdc	-65° to +125°C	15 G's	100 G's	M5757/13 Design	●							●
SF5A	2 Form C	Up to 5A	1.8 to 40 Vdc	-65° to +125°C	15 G's	100 G's	M5757/13 Design	●							●

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CII — High Reliability Space Relays

Products

Half Size Non-Latching
1, 2, 4, 6 Form C configurations, low level to 10 amps switching

Half Size Latching
2 and 4 Form C configurations, low level to 2 amps switching

1/5 Size Non-Latching
2 and 4 Form C configurations, low level to 2 amps switching

1/5 Size Latching
4 Form C, low level to 2 amps switching

T0-5/.100 Grid
2 Form C, round and square outlines, low level to 1 amp switching

Services

CII Hi-Rel products from Tyco Electronics are extensively tested to assure that your reliability standards and requirements are met or exceeded. Our services include:

- Precision cleaning
- Small particle inspection
- Particle impact noise detection
- Serialized test data
- High shock testing
- Test profiles can be tailored to individual customer requirements.

- High vibration testing
- X-ray testing
- Qualification testing

Features

- High shock ratings
- High vibration ratings
- Latching versions
- Class 100 cleanroom
- Welded assemblies

Applications

- Space satellites (telecommunications)
- Weather tracking
- Surveillance
- Infrared observation instrumentation
- Missile systems
- Torpedo guidance circuits

CII — High Performance Solid State Relays

DS11 Series	DS13 Series	JDS9-1Y	JPS10 Series	PS12-1Y
COTS Version Available	COTS Version Available	COTS Version Available	COTS Version Available	COTS Version Available
DESC 88062 Qualified	DESC 90091 Qualified	M28750/9 Qualified	M28750/10 Qualified	DESC 86031Qualified
60 Vdc Output Voltage	60 Vdc Output Voltage	250 Vrms Output Voltage	250 Vrms Output Voltage	250 Vrms Output Voltage
2 Adc Output Current	2 Adc Output Current	2 Arms Output Current	25 Arms Output Current	10 Arms Output Current
• Hermetically sealed DIP package • Thick film hybrid construction • Optically isolated • Low on-resistance (MOSFET output) • Optional switch status, short circuit protection, trip status	• Hermetically sealed DIP package • Thick film hybrid construction • Optically isolated • Low on-resistance (MOSFET output) • Optional switch status, short circuit protection, trip status	• Hermetically sealed DIP package • Thick film hybrid construction • Optically isolated • Zero voltage turn-on • High transient immunity • 3.8-32 Vdc current regulated input	• Rugged encapsulated module • Optically isolated • Zero voltage turn-on • High transient immunity • 3.8-32 Vdc current regulated input	• Rugged encapsulated module • Optically isolated • Zero voltage turn-on • High transient immunity • 3.8-32 Vdc current regulated input

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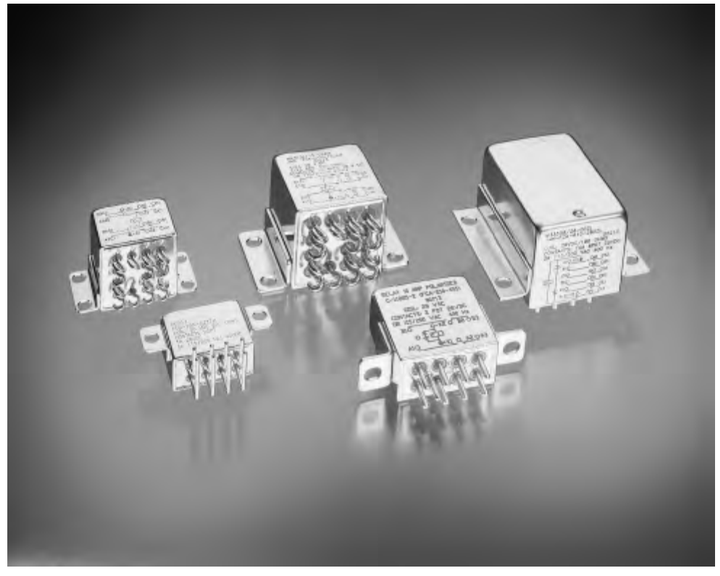
Product Facts

- 5-25 Amp contacts
- 1-6 Form C (SPDT - 6PDT)
- Hermetically sealed
- All welded construction
- Standard size (FCA) and miniature (FCB) models
- Balanced force
- Permanent magnet drive
- Various mounting and termination options
- AC and DC coils
- Suppression available
- QPL approved versions
- Complements our growing line of relays for military / aerospace applications
  - CII signal-level and solid state relays
  - HARTMAN power relays, contactors, sensors and panels
  - KILOVAC contactors and high voltage relays
  - WILMAR protective relays



Overview of Specifications

Series	FCA-125	FCB-205	FCA-210	FCA-212
Applicable Mil-Spec*	M6106/19	M83536/1 & 2	M83536/9 & 10	—
Max. Contact Rating	25 Amps	5 Amps	10 Amps	12 Amps
Contact Form	SPDT	DPDT	DPDT	DPDT
Case Dimensions † L x W x H	1.025 x .525 x 1.125 ‡ (26.04 x 13.34 x 31.91)	.810 x .410 x .640 (20.57 x 10.41 x 16.26)	1.025 x .525 x 1.125 ‡ (26.04 x 13.34 x 31.91)	1.025 x .525 x 1.125 ‡ (26.04 x 13.34 x 31.91)
Weight	1.6 oz. (45.4 grams)	.54 oz. (15.4 grams)	1.6 oz. (45.4 grams)	1.6 oz. (45.4 grams)
Temperature Range	-70°C to +125°C	-70°C to +125°C	-70°C to +125°C	-70°C to +125°C
Shock §	200G, 6 ms	200G, 6 ms	200G, 6 ms	200G, 6 ms
Vibration, Sinusoidal §	30G, 33-3000 hz	30G, 70-3000 hz	30G, 33-3000 hz	30G, 33-3000 hz
Altitude	300,000 ft	300,000 ft	300,000 ft	300,000 ft

Series	FCB-310	FCA-325	FCB-405	FCA-410	FCA-610
Applicable Mil-Spec*	—	M83536/32 & 33	M83536/5 & 6	M83536/15 & 16	M83536/25 & 26
Max. Contact Rating	10 Amps	25 Amps	5 Amps	10 Amps	10 Amps
Contact Form	3PDT	3PDT	4PDT	4PDT	6PDT
Case Dimensions † L x W x H	.810 x .810 x .640 (20.57 x 20.57 x 16.26)	1.015 x 1.015 x 1.00 (25.79 x 25.79 x 25.4)	.810 x .810 x .640 (20.57 x 20.57 x 16.26)	1.015 x 1.015 x 1.00 (25.79 x 25.79 x 25.4)	1.483 x 1.053 x 1.010 (37.67 x 26.75 x 25.65)
Weight	.99 oz. (28.15 grams)	2.89 oz. (82 grams)	.83 oz. (26.4 grams)	2.72 oz. (77 grams)	4.16 oz. (117.94 grams)
Temperature Range	-70°C to +125°C	-70°C to +125°C	-70°C to +125°C	-70°C to +125°C	-70°C to +125°C
Shock §	200G, 6 ms	200G, 6 ms	200G, 6 ms	200G, 6 ms	50G, 6-9 ms
Vibration, Sinusoidal §	30G, 70-3000 hz	30G, 33-3000 hz	30G, 70-3000 hz	30G, 70-3000 hz	20G, to 3000 hz
Altitude	300,000 ft	300,000 ft	300,000 ft	300,000 ft	300,000 ft

* Not all models in the series are QPL listed.
† Case dimensions are exclusive of any mounting brackets.
‡ DC coil model case height is 1.010 (28.65).
§ Shock and vibration specifications vary by model within a given series.
Consult our website or catalog 1654761 for more detailed specifications on the products in this line.

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CII — High Performance Timers and Sensors

Timers - Solid State Output

1800/1900 Series

Delay on operate, adjustable or fixed time delay, optional mounting styles

4800 Series

Interval timers, fixed time delay, optional mounting styles

6001/6155 Series

Delay on operate, fixed time delay, 14 pin metal DIP, thick film hybrid, meets Mil-R-83726/13

Timers - Relay Output

1600/1700 Series

Delay on operate, adjustable or fixed, AC or DC input, optional mounting styles

4600/4700 Series

Interval timers, adjustable or fixed, AC or DC input, optional mounting styles

5600/5700 Series

Delay on release, adjustable or fixed, optional mounting styles

2400 Series

Delay on operate, miniature package, fixed, optional mounting styles

Sensors

1300/1350 Series

Voltage sensors, DC and AC input, optional mounting styles

1400 Series

Phase sensors, 60 or 400 Hz, optional mounting styles

7000 Series

Frequency sensors, 50 to 440 Hz, digital logic design, optional mounting styles

High Performance DC Solid State Relay / Power Controller

NEW PRODUCT

KSR-201

60 Vdc Output Voltage

2.5 Adc Output Current

Built-in Circuit Protection

- Combines isolated load switching and circuit protection capabilities
- Fast acting, bounce free switching
- Carries full rated current (2.5A) without heat sinking to 90 C
- Low output on-resistance and voltage drop
- Meets surge requirement of MIL-STD-1275 & MIL-STD-740A
- Nuclear tolerance tested
- Hermetically sealed package
- Thick film hybrid construction

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Revised 8-06

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

CII — Custom High Performance Solenoids

Product Facts

CII solenoids have been custom-designed and built to exacting aerospace and government specifications for more than 60 years. These "top-end" devices are engineered for applications where extreme temperatures and other severe environmental conditions may exist. High altitude, shock, acceleration and vibration associated with aircraft and missile systems are conditions which our solenoids meet with predictable reliability.

CII solenoids are used extensively in various types of air, fuel, and hydraulic valve actuators in aircraft, aerospace, medical equipment and other high reliability applications. Other typical uses include door locking and unlocking, hatch and fin latching/unlatching mechanisms, bomb rack and thrust reversing interlocks, engine throttle control and other critical designs.

Product Options

Our linear motion, tubular solenoid line ranges from models only one-half inch in diameter producing ounces of force at short strokes, to three-inch diameter models capable of 100 pounds force at one-inch strokes. Push, pull or combination motion is available.

Continuous or intermittent coils for virtually any DC voltage typically encountered in aerospace applications can be provided. AC voltages can be handled, as well, through the use of internal rectifiers. Dual coil models with low holding power may be appropriate in power sensitive equipment.

For service in harsh environments, we can build solenoids with plunger seals. As required, we can make solenoids water-resistant, fuel-resistant and with encapsulated coils. All ferrous parts are plated for protection against corrosion.

We use 200°C magnet wire insulation as our standard, and we offer higher-rated insulation as an option. Coil leads are normally provided with TEFLON or TEFZEL insulation, or we can use customer-specified mil-type connectors on the solenoids.

CII solenoids are nominally rated at 100,000 operations; however, solenoid life is related to load and duty cycle. Trade-offs in application details can provide life into the millions.

The usual operating and storage temperature range of CII solenoids is -65°C to +125°C.

Solenoids may be provided with either a flat or conical plunger face. Our solenoid engineers, with nearly 100 years combined experience, will determine the optimum plunger shape for each application.

We can supply solenoids with plungers that are internally or externally threaded, as well as clevis plungers. Additionally, we can design captive plunger solenoids, as well as units with a spring assist. For mounting purposes we can fit a solenoid with a threaded bushing or with an application-specific mounting flange.

Complete U.S. government approved qualification test facilities are on-site at our North Carolina production facility.

A prototype solenoid, custom built to a customer's requirements, can usually be shipped within 30 days.

To request a prototype, please complete our Solenoid Application Information Form on the reverse side of this page and return it to our solenoid design team.

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Application Information Form

Customer Firm Name: _____

Customer Name: _____

Customer Address: _____

_____

Telephone number: _____

Email address: _____

Voltage:_____±_____% AC or DC (circle one)

Maximum allowable current:_____ Amps

Actuating force: _____(Energy produced when coil is energized at start of stroke)

Holding force: _____(Energy required at zero stroke, plunger seated on butt flange with coil energized).

Stroke: _____ inches or millimeters (circle one)

Duty cycle: Time On:_____ Time Off:_____

Cycle rate:_____ cycles per hour

Type of operation: Push or Pull (circle one)

Temperature range if other than -65°C to +125°C: _____

Coil connections: _____Leads or Mil-type connector (circle one)

Approximate dimensions:_____

Type of mounting: _____

Applicable Mil-specs:_____

Special environmental considerations (i.e., exposure to salt spray, jet fuel, water, sand and dust): _____

_____

_____

End application of solenoid:_____

_____

_____

_____

Special tests: _____

_____

Application Type: ❑ New Design ❑ Replacement

Approximate quantity (annual requirement): _____

Please return completed form to Sarah Welch, product manager for CII custom solenoids.
Fax: 828-338-1103 E-mail: swelch@tycoelectronics.com

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HARTMAN — High Performance AC Contactors

Side Stable Contactors
Latching Contactors
Center Off Contactors

FEATURES:
- High reliability
- Meets requirements of MIL-R-6106
- Hermetic or gasket seal available
- Repairable
- Easily tailored to customer requirements

P/N	Current Rating	Description
DH-7YC	25 Amps	4PST N.O., 115/208 VAC, 400 Hz
B-347A	25 Amps	3PDT, Double Break, 115/220 VAC, 400 Hz
DH-14B-3	25 Amps	3PDT, 115/200 VAC, 400 Hz
B-252	30 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz
B-140C	30 Amps	3PDT, Center Off, 120 VAC, 60 Hz
N-415A-1	30 Amps	3PDT, Double Break, 115/200 VAC, 400 Hz
SA106E	30 Amps	3PDT, 115 VAC, 400/60 Hz
DH-7ZAB	50 Amps	3PDT, 115/200 VAC, 400 Hz
D-7GRZ	50 Amps	3PDT, 115/200 VAC, 400 Hz
NN-301	50 Amps	SPDT w/Time Delay on Pickup, 115 VAC, 400 Hz
D-7GR	50 Amps	3PDT, 115/200 VAC, 400 Hz
N-421A	50 Amps	3PST N.C., 115/200 VAC, 400 Hz
D-18F	50 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz
DR-18E-5	50 Amps	2SPST, Center Off, 115/208 VAC, 400 Hz
B-227	60 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz
B-138S	60 Amps	3PST N.O., 115/200 VAC, 300-600 Hz
DH-7BC	60 Amps	3PDT, 115/208 VAC, 400 Hz
BR-329BC	60 Amps	2PST N.O., 115 VAC, 60 Hz
SA120B	60 Amps	3PDT, Side Stable, 115/200 VAC, 400 Hz
NH-505	90 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz
D-25BD	100 Amps	3PDT, 115/200 VAC, 400 Hz

P/N	Current Rating	Description
D-31TFA	100 Amps	3PDT, Center Off, 115/208 VAC, 400 Hz
B-233R	120 Amps	3PDT, 115/200 VAC, 400 Hz
BH-201B	120 Amps	3PST N.O., 115/200 VAC, 400 Hz
D-100A	120 Amps	3PST N.O., 115/200 VAC, 400 Hz
B-435K-3	140 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz
B-233T	160 Amps	3PDT, 115/200 VAC, 400 Hz
B-451	175 Amps	3PST, Magnetic Latch, 115/200 VAC, 400 Hz
B-312D-1	175 Amps	3PST N.O., 120/208 VAC, 50/60 Hz
B-499	35/200A	3PDT, Double Break, 115 VAC, 400 Hz/28 VDC
BR-301AY	200 Amps	3PST N.O., 115/200 VAC, 400 Hz
B-393P	200 Amps	3PDT, Center Off, 120/208 VAC, 50/60/400 Hz
B-345LS	225 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz
B-394	250 Amps	3PDT, 115/200 VAC, 400 Hz
BH-124AA	250 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz
BH-360A	250 Amps	3PDT, 115/200 VAC, 400 Hz
B-430-1	275 Amps	3PST, Magnetic Latch, 115/200 VAC, 400 Hz
B-429A-1	300 Amps	3PST N.O., 115/200 VAC, 400 Hz
B-874L	335 Amps	3PST, 200 VAC, 400 Hz
B-429CA	350 Amps	3PST N.O., 120/208 VAC, 400 Hz
B-479A-1	350 Amps	3PST, Magnetic Latch, 120/208 VAC, 400 Hz
B-484	500 Amps	3PST, Magnetic Latch, 115/200 VAC, 400 Hz

HARTMAN — High Performance DC Contactors

Side Stable Contactors
Latching Contactors
Center Off Contactors

FEATURES:
- High reliability
- Meets requirements of MIL-R-6106
- Hermetic or gasket seal available
- Repairable
- Easily tailored to customer requirements

P/N	Current Rating	Description
A-837D	15/3A	Latching Armature Relay, 28 VDC
C-28	25 Amps	2PST N.O., Latching, 40 VDC
D-7TD	50 Amps	2SPST 1 N.O. 1 N.C., 28 VDC
D-7AC	50 Amps	2SPST 1 N.O. 1 N.C., 28 VDC
DH-7KC-1	50 Amps	4PST 2 N.O. 1 N.C., 28 VDC
N-208	50 Amps	SPDT, Double Break, Magnetic Latch, 28 VDC
NN-233C	60 Amps	SPDT, Double Break, 28 VDC
SD167A	100 Amps	SPST, Side Stable, 28 VDC
D-32AB	100 Amps	2SPST, Center Off, Double Break, 28 VDC
N-417E	100 Amps	SPDT, Double Break, 28 VDC
A-885Y	100 Amps	SPDT N.O. & N.C., 28 VDC
NN-307	100 Amps	SPST, Double Break, 28 VDC
SDH128	100 Amps	SPDT, Side Stable, 28 VDC
NN-449B	100 Amps	SPDT, Double Break, 28 VDC
DH-16CH	131 Amps	SPST, Latching, 31 VDC
A-1077F	200 Amps	SPST N.O., 28 VDC

P/N	Current Rating	Description
A-871F	200 Amps	SPDT N.O. & N.C., 28 VDC
A-1077B	230 Amps	SPDT, 28 VDC
AH-965H	300 Amps	SPDT N.O. & N.C., 28 VDC
A-1019	300 Amps	2PDT, Center Off, 28 VDC
A-876M	300 Amps	SPDT N.C., 28 VDC
K-300	300 Amps	SPST N.O., 28 VDC
SD130A	400 Amps	SPST N.O., Double Break, 28 VDC
A-400B	400 Amps	SPST N.O., 28 VDC
K-400	400 Amps	SPST N.O., 28 VDC
A-981S	400 Amps	SPDT, 28 VDC
AH-703F	400 Amps	SPST N.O., 28 VDC
A-922F	600 Amps	2PST N.O., 28 VDC
A-712T	600 Amps	SPST N.O., 28 VDC
A-931F	600 Amps	SPST N.O., 28 VDC
A-792ST	1000 Amps	SPST N.O., 28 VDC
A-882	1600 Amps	SPST N.O., 28 VDC

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HARTMAN — High Performance AC/DC Contactors

Side Stable Contactors

FEATURES:
- High reliability
- Meets requirements of MIL-R-6106
- Hermetic or gasket seal available
- Lightweight construction
- Easily tailored to customer requirements

P/N	Current Rating	Description
C-8B	15 Amps	2PDT N.C., 28 VDC, 60 or 400 Hz
DH-7PF	50 Amps	4PST 2N.O. 2N.C., 28 VDC or 115 VAC, 400 Hz
D-14D	50 Amps	2SPST 1N.O. 1N.C., 28 VDC or 115 VAC, 400 Hz
BH-316A	50 Amps	3PST, 28 VDC or 115 VAC, 400 Hz

HARTMAN — DC Reverse Current Contactors

Specialty Contactors

FEATURES:
- High reliability
- Meets requirements of MIL-R-6106
- Gasket sealed
- Repairable
- Easily tailored to customer requirements

P/N	Current Rating	Description
A-718AAP	100 Amps	SPST N.O., 28 VDC, Cutout Reverse Current
A-700AQ-4	200 Amps	SPST N.O., 28 VDC, Cutout Reverse Current
A-700ZF	300 Amps	SPST N.O., 28 VDC, Cutout Reverse Current
A-701D	400 Amps	SPST N.O., 28 VDC, Cutout Reverse Current
A-702AAP	600 Amps	SPST N.O., 28 VDC, Cutout Reverse Current
A-791M	1000 Amps	SPST N.O., 28 VDC, Cutout Reverse Current

HARTMAN — Sensors & Monitors

Voltage & Current Sensors
Phase Rotation Sensors
Ground Power Monitors
Frequency Sensors

FEATURES:
- High reliability
- Meets requirements of MIL-R-6106
- Hermetic or gasket seal available
- Lightweight construction units available
- Epoxy encapsulated units available

P/N	Current Rating	Description
AVR-869C		SPDT, 28 VDC, 3∅ Sequence Relay
E-312P	5 Amps	SPDT, 28 VDC, 400 Hz, Overvoltage Sensor
E-381	5 Amps	SPDT, 130 VAC, 400 Hz, Undervoltage Sensor
E-308AA	7.5 Amps	SPDT, 120 VDC, 60 Hz, 3∅ Undervoltage Sensor
E-329E	10 Amps	3PDT, 115 VAC, Drop Out Time Delay
E-308AH	10 Amps	3PDT, 115 VAC, Drop Out Time Delay
E-312A-1	10 Amps	2PDT, 440 VAC, 400 Hz, 3∅ Voltage Sensor
E-348	0.25 Amp	SPST N.O., 28 VDC, Overload Relay
E-308	3 Amps	SPDT, 28 VDC, Adjustment Pick-Up Voltage
AVR-834	3 Amps	SPDT, 28 VDC, DC Voltage Sensor
E-311P	10 Amps	2PDT, 28 VDC, Drop Out Time Delay
QR-50AF	0.25 Amp	SPST, 115 VAC, Encapsulated Current Indicator
QR-50DA	0.25 Amp	SPST, 115 VAC, Encapsulated Current Indicator
E-387	1 Amp	SPDT, 115 VAC, 400 Hz, Current Sensor
E-145AK-4	5 Amps	SPST, 115 VAC, 3∅ Current Sensor
BE-500G-1	50 Amps	3PST N.O., 120 VAC, Overload Current Sensor
Q-50B	0.25 Amps	SPDT, 28 VDC, Encapsulated Current Indicator
Q-50AC	0.3 Amp	SPDT, 28 VDC, Encapsulated Current Indicator
CH-27	0.75 Amp	2PDT, 28 VDC, Current Sensor
CH-26	1 Amp	SPST, 28 VDC, Current Sensor
A-848KK	75 Amps	2PST, 28 VDC, Automatic Drop Out
A-772XTB	200 Amps	SPST N.O., 28 VDC, Delayed Drop Out
A-701P-1	400 Amps	SPST N.O., 28 VDC, Remote Reset
A-701P-3	500 Amps	SPST N.O., 28 VDC, Remote Reset
A-792CA	600 Amps	2PST N.O., 28 VDC, Automatic Drop Out
E-326	1 Amp	115 VAC, 400 Hz, 3∅ Rotation Sensor
E-326A	1 Amp	115 VAC, 60 Hz, 3∅ Rotation Sensor
E-341	2 Amps	SPDT, 208 VAC, 400 Hz, 3∅ Rotation Sensor
E-326E	5 Amps	SPDT, 460 VAC, 60 Hz, 3∅ Rotation Sensor
E-145Z	25 Amps	2PST, 120/208 VAC, 400 Hz, Phase Loss Relay
E-145Y	60 Amps	2PST, 120/208 VAC, 400 Hz, Phase Loss Relay
E-327AD	1 Amp	2PST, 115 VAC, Ground Power Monitor
E-384	3 Amps	SPDT, 28 VDC, Under Frequency Sensor

HARTMAN — Plug-In Contactors

Side Stable Contactors
Latching Contactors
Center Off Contactors

FEATURES:
- Fast installation/removal time
- Improved maintenance safety
- High reliability
- Meets requirements of MIL-R-6106
- Lightweight construction

P/N	Current Rating	Description
BP-353	50 Amps	3PST N.O., 115/200 VAC, 400 Hz
DP-25BD	100 Amps	3PDT, 115/200 VAC, 400 Hz
DP-31C	100 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz
BPE-494	175 Amps	3PST N.O., ELCU, 115/200 VAC, 400 Hz
BP-494	275 Amps	3PST N.O., 115/200 VAC, 400 Hz
BP-493-1	385 Amps	3PST, Magnetic Latch, 115/200 VAC, 400 Hz

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HARTMAN — DC Automatic Dropout Contactors

Time Delay Relays
Phase Imbalance Sensors
Automatic Drop Out Contactors

FEATURES:
- High reliability
- Meets requirements of MIL-R-6106
- Hermetic or gasket seal available

P/N	Current Rating	Description
E-55	2 Amps	4PDT, 28 VDC, Time Delay
B-178	60 Amps	3PST, 120/208 VAC, 400 Hz, Phase Sensor

P/N	Current Rating	Description
A-757D	600 Amps	SPST, 28 VDC, Automatic Dropout @ 180 Amps

HARTMAN — AC & DC High Voltage Contactors

AC Contactors
DC Contactors
Center Off Contactors
Latching Contactors

FEATURES:
- High reliability
- Meets requirements of MIL-R-6106
- Hermetic or gasket seal available
- Lightweight construction units available
- Repairable

P/N	Current Rating	Description
CR-21A	5 Amps	3PST N.O., 440 VAC, 60 Hz or 380 VAC, 50 Hz
B-329P	20 Amps	3PST N.O., Dbl. Break, 260/450 VAC, 400 Hz
BR-393E	20 Amps	3PDT, Center Off, Dbl. Break, 380 VAC, 50 Hz
B-138DL	50 Amps	3PST N.O., 200 VAC, 400 Hz
B-140AA	60 Amps	3PDT, Center Off, 200 VAC, 400 Hz
B-138XAH	60 Amps	3PDT, 200 VAC, 400 Hz
B-312CS	100 Amps	3PST N.O., 380 VAC, 50 Hz
B-125N	150 Amps	3PST N.O., 208 VAC, 400 Hz
B-493E	160 Amps	3PST, Magnetic Latch, 230 VAC, 400 Hz

P/N	Current Rating	Description
B-459	250 Amps	3PDT, Center Off, 208 VAC, 400 Hz
B-460	250 Amps	6PST, 208 VAC, 400 Hz
B-461	250 Amps	3PDT, Center Off, 120/208 VAC, 400 Hz
BH-125TH	250 Amps	3PST N.O., 208 VAC, 400 Hz
B-124GL	250 Amps	3PDT, Center Off, Dbl. Break, 208 VAC, 400 Hz
AV-875	60 Amps	SPST N.O., 270 VDC
A-751D-1	150 Amps	SPST N.O., 110 VDC
A-754JD	150 Amps	SPST N.O., 120 VDC
A-751YC	650 Amps	SPST N.O., 340 VDC

HARTMAN — Space Contactors

DC Latching Contactors

FEATURES:
- High reliability
- Meets requirements of MIL-R-6106
- Hermetically sealed
- Lightweight construction
- High shock, vibration, and acceleration levels

P/N	Current Rating	Description
N-409D	50 Amps	2PDT, Double Break, Magnetic Latch, 28 VDC

P/N	Current Rating	Description
N-208H	50 Amps	SPDT, Double Break, Magnetic Latch, 40 VDC

HARTMAN — Power Distribution Systems

Modular Units
Standard Panels

FEATURES:
- Primary and secondary power distribution
  - Main power contactors
  - Secondary power contactors/relays
  - Current and voltage sensing
  - Logic/control signals
- Contactors/circuit breaker plug-in units
- Power management capabilities
- Value added
- Space saving/weight saving designs
- Custom designs for specific applications

Modular Units

- Utilizes plug-in line replaceable modules installed on a panel mounting system, or back-plane. LRMs may be contactors, circuit breakers, sensing units, ELCUs, etc.
- Designed as a fault-free zone with no moving parts. Intended as a permanent installation on mother vehicle.

FEATURES:
- Weight savings over standard discrete components
- Value added
- Ease of maintenance
- Reduced OEM labor

Standard Panels

- Utilizes actuator and contact assemblies from discrete contactors, bussed together and packaged in one or more enclosures with external power and control connections.
- Optional current/voltage sensing, fuses, circuit breakers, power monitors, etc.

FEATURES:
- Lightest power distribution approach
- Value added
- Ease of maintenance
- Reduced OEM labor

These are just some of the HARTMAN products capabilities from Tyco Electronics:

- Voltage, Current & Power Sensing
- Over & Reverse Current
- Over & Under Voltage
- Over & Under Frequency
- Ground Fault & Detection
- Time Delay
- Phase Sequence, Unbalance & Failure
- Impedance Relays
- Ripple Detection
- Positive, Negative & Zero Sequence Voltage
- Signal Amplification
- Turbine Starting
- Trip-Free, Electrical & Mechanical Interlocking
- Electrical & Magnetic Latching
- Polarization
- Power Switching

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KILOVAC — High Voltage DC Relays & Contactors

28 Vdc

Aerospace Power Relays
Hi-Rel Satellite Relays
Power Controllers

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
AL50	50 amps	Yes	No	SPST-NO
AL90	90 amps	Yes	No	SPST-NO
AL150	150 amps	Yes	No	SPST-NO
AL350	350 amps	Yes	No	SPST-NO
AL500	500 amps	Yes	No	SPST-NO

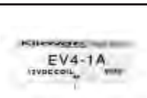
270 Vdc

Aerospace Power Relays
Hi-Rel Satellite Relays
Power Controllers

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
AP5A	5 amps	Yes	No	SPST-NO
AP5B	5 amps	Yes	No	SPST-NC
AP5C	5 amps	Yes	No	SPDT
AP5P	5 amps	Yes	No	SPST-Latch
AP5R	5 amps	Yes	No	SPDT-Latch
AP10A	10 amps	Yes	No	SPST-NO
AP10B	10 amps	Yes	No	SPST-NC
AP10P	10 amps	Yes	No	SPST-Latch
AP11A	10 amps	Yes	No	SPST-NO
AP44P	15 amps	Yes	No	SPST-Latch
AP50X	50 amps	Yes	No	SPST-NO
AP90X	90 amps	Yes	No	SPST-NO
AP150X	150 amps	Yes	No	SPST-NO
AP265X	265 amps	Yes	No	SPST-NO
AP265P	265 amps	Yes	No	SPST-NO
AP350X	500 amps	Special	No	SPST-NO
CAP200	500 amps	Yes	No	SPST-NO
MAP200	500 amps	Yes	No	SPST-NO
PD5A	5 amps	Yes	No	SPST-NO
PD5B	5 amps	Yes	No	SPST-NC
PD10A	10 amps	Yes	No	SPST-NO
PD10B	10 amps	Yes	No	SPST-NC
PD10P	10 amps	Yes	No	SPST-Latch
PD90X	90 amps	Yes	No	SPST-NO
PD150X	150 amps	Yes	No	SPST-NO

12-1800 Vdc

Electric Vehicle Relays
Specialty DC Power Relays
and Contactors
Integrated Sensing



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
EV4	4 amps	Make Only	No	SPST-NO
EV200	500 amps	Yes	No	SPST-NO
LEV200	500 amps	Yes	No	SPST-NO
EV250A	500 amps	Yes	No	SPST-NO
EV250B	500 amps	Yes	No	SPST-NC
EV500	600 amps	Yes	No	SPST-NO

* Consult Tyco Electronics for Power Switching Level

2.0 kV

High Voltage Reed Relay
Vacuum Relay

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S06CBA	6 amps	Carry Only	Yes	SPST-NO
K45C	15 amps	Carry Only	Yes	SPDT

3.0 kV

High Voltage Reed Relay

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S02DNA	2 amps	Carry Only	No	SPST-NO

3.5 kV

Vacuum Relays
Gas Filled Relays

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
HC-5	8 amps	Make Only	No	SPDT
HC-3	15 amps	Yes	Yes	SPDT
HC-1	25 amps	Carry Only	Yes	SPDT

5.0 kV

High Voltage Reed Relays
Vacuum Relays

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S06FNA	6 amps	Carry Only	Yes	SPST-NO
K41A	30 amps	Yes	Yes	SPST-NO
K41B	30 amps	Yes	Yes	SPST-NC
K41C	30 amps	Yes	Yes	SPDT
K41P	25 amps	Carry Only	Yes	SPST-Latch
K41R	25 amps	Carry Only	Yes	SPDT-Latch
K40P	35 amps	Carry Only	Yes	SPST-Latch

7.5 kV

Medical Relays
Gas Filled Relays

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
KM-13	10 amps	Make Only	No	DPDT
KM-17	10 amps	Make Only	No	DPDT

9 kV

High Voltage Reed Relay

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S06HBA	6 amps	Carry Only	Yes	SPST-NO

Catalog 1308940
Revised 8-06

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KILOVAC — High Voltage DC Relays & Contactors (Continued)

8 kV
High Voltage Reed Relays
Vacuum Relays
Gas Filled Relays

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S06JNB	6 amps	Carry Only	Yes	SPST-NC
HC-6	8 amps	Make Only	No	SPDT
H-18	10 amps	Yes	Yes	SPDT
K47A	12 amps	Yes	Yes	SPST-NO
K47B	12 amps	Yes	Yes	SPST-NC
HC-4	15 amps	Yes	No	SPDT
HC-2	25 amps	No	No	SPDT
K44P	50 amps	Yes	Yes	SPST-Latch

10 kV
High Voltage Reed Relays
Vacuum Relays

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S05LTA	5 amps	Yes	No	SPST-NO
S05LTB	5 amps	Yes	No	SPST-NC
K81A	10 amps	Special	No	SPST-NO
K81B	10 amps	Special	No	SPST-NC
K81C	10 amps	Special	No	SPDT
K43A	25 amps	Special	Yes	SPST-NO
K43B	25 amps	Special	Yes	SPST-NC
K43C	25 amps	Special	Yes	SPDT
K43R	24 amps	Carry Only	Yes	SPDT-Latch
K43P	24 amps	Carry Only	Yes	SPST-Latch

12 kV
Vacuum Relays

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
H-14	30 amps	Carry Only	Yes	DPDT
H-16	30 amps	Carry Only	Yes	DPDT

15 kV
High Voltage Reed Relays
Vacuum Relays
Gas Filled Relays

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S05MTA	5 amps	Carry Only	No	SPST-NO
KC-15	12 amps	Make Only	No	SPDT
KC-16	12 amps	Make Only	No	SPDT
KC-14	15 amps	Yes	No	SPDT
KC-18	15 amps	Yes	No	SPDT
H-8	15 amps	Yes	No	SPDT
K49P	25 amps	Yes	Yes	SPST-Latch
K89P	25 amps	Yes	Yes	SPST-Latch
KC-12	30 amps	Yes	Yes	SPDT
H-26	30 amps	Carry Only	Yes	4PDT
KC-8	30 amps	Yes	Yes	SPDT
KC-2	50 amps	Carry Only	Yes	SPDT
KC-11	50 amps	Carry Only	Yes	SPDT

20 kV
Vacuum Relay

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
H-19	30 amps	Special	Yes	DPDT

25 kV
Vacuum Relays
Gas Filled Relays

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
KC-38	15 amps	Make Only	No	SPST-NC
K62A	18 amps	Special	No	SPST-NO
K62B	18 amps	Special	No	SPST-NC
K62C	18 amps	Special	No	SPDT
H-17	30 amps	Special	Yes	SPDT
KC-28	30 amps	Make Only	No	SPST-NO
KC-32	45 amps	Special	No	SPST-NC
KC-30	55 amps	Carry Only	Yes	SPST-NC
KC-22	65 amps	Special	No	SPST-NO
KC-20	110 amps	Carry Only	Yes	SPST-NO

30 kV
Vacuum Relays

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
H-23	30 amps	Carry Only	Yes	SPST-NC
H-24	30 amps	Carry Only	Yes	SPST-NO

35 kV
Gas Filled Relays

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
K61A	10 amps	Make Only	No	SPST-NO
K61B	10 amps	Make Only	No	SPST-NC
K61C	10 amps	Make Only	No	SPDT
K60C	10 amps	Make Only	No	SPDT

50 kV
Vacuum Relays
Gas Filled Relays

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
K64C	10 amps	Make Only	No	SPDT
H-25	30 amps	Special	No	SPDT

70 kV
Gas Filled Relays

P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
K70A	10 amps	Make Only	No	SPST-NO
K70B	10 amps	Make Only	No	SPST-NC
K70C	10 amps	Make Only	No	SPDT

* Consult Tyco Electronics for Power Switching Level

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KILOVAC — Protective Relays

DIN Rail or Screw Mounted

- Voltage Sensitive Relays
- Paralleling Relays
- Current Sensitive Relays
- Frequency Sensitive Relays
- Phase Sequence Relays

ANSI/IEEE C37.90-1978
UL File No. E58048
CSA File No. LR61158
DIN EN50022-35

WD2759-XXX Over/Under Voltage Relay

WD2759 Series AC voltage sensing relays provide voltage monitoring and protection in AC systems. Sensing voltages, number of phases, over & under voltage setpoint, and time delay are user configured. The relay operates when the externally adjustable trip point is reached. An external time delay control is provided with an adjustment of .5 to 10 seconds.

Specifications	
Nominal Operating Voltage	120, 208, 277 or 480 Vac
Nominal Frequency Range	50-400 Hz
Contact Form	C - 1 ea for UV and OV
Contact Ratings	5A @ 240 Vac
Time Delay Adjustment	0.5 to 10 secs
Dimensions	2.9"W x 2.9"H x 4.4"D
Weight	0.9 lbs

Sense Voltage	120	208	277	480
UV Adj	72-120	125-208	166-277	288-480
OV Adj	120-168	208-291	277-388	480-672

Control Voltage	-001	-002	-003
Input Vdc	18 to 54	13.5 to 32	100 to 200
Input Vac			100 to 140

WD25 Paralleling Relay

WD25 paralleling relays are used to ensure that two AC circuits are synchronized. When voltage, phase relationship, and frequency are within the selected limits the output relay will energize. Optional "dead bus" feature allows the generator to energize a dead bus. "Double dead bus" feature permits the paralleling when either bus is "hot" and the other bus is "dead".

Specifications	
Operating Voltage	120, 208, 277 or 480 Vac
Frequency Range	40-400 Hz
Contact Form	2 Form C
Dimensions	2.9"W x 2.9"H x 4.4"D
Weight	0.9 lbs

Sense Voltage	120	208	277	480
Sync Voltage	6-30% of Nominal Voltage			
Dead Bus Volt.	10-70% of Nominal Voltage			

Control Voltage	-001	-002	-003
Input Vdc	18 to 54	13.5 to 32	100 to 200
Input Vac			100 to 140

WD5051-XXX Single Phase Over Current Relay

WD5051 AC current sensing relays provide current monitoring and protection in single phase AC systems. Nominal sensing current, instantaneous over current (IOC) setpoint, time over current (TOC) setpoint, and time over current time delay are user configured. WD5051 current relays operate when the externally adjustable trip point is reached.

Specifications	
Sense Current	1, 3, 6 or 10 amps (selectable)
Contact Form	Form C - 1 ea for IOC and TOC
TOC Time Delay	0.5 to 20 secs
Dimensions	2.9"W x 2.9"H x 4.4"D
Weight	0.9 lbs

Sense Current	1 amp	3 amps	6 amps	10 amps
IOC	.2 - 1.2	.6 - 3.6	1.2 - 7.2	2 - 12
OV Adj	.2 - 1.2	.6 - 3.6	1.2 - 7.2	2 - 12

Control Voltage	-001	-002	-003
Input Vdc	18 to 54	13.5 to 32	100 to 200
Input Vac			100 to 140

WD5051-3-XXX Three Phase Over Current Relay

WD5051-3 AC current sensing relays provide current monitoring and protection in three phase AC systems. Nominal sensing current, instantaneous over current (IOC) setpoint, time over current (TOC) setpoint, and time over current time delay are user configured. WD5051 current relays operate when the externally adjustable trip point is reached.

Specifications	
Sense Current	1, 3, 6 or 10 amps (selectable)
Contact Form	Form C - 1 ea for IOC and TOC
TOC Time Delay	0.5 to 20 secs
Dimensions	2.9"W x 2.9"H x 4.4"D
Weight	0.9 lbs

Sense Current	1 amp	3 amps	6 amps	10 amps
IOC	.2 - 1.2	.6 - 3.6	1.2 - 7.2	2 - 12
OV Adj	.2 - 1.2	.6 - 3.6	1.2 - 7.2	2 - 12

Control Voltage	-001	-002	-003
Input Vdc	18 to 54	13.5 to 32	100 to 200
Input Vac			100 to 140

WD81OU-XXX Over/Underfrequency Relay

WD81OU over/underfrequency relays are used to provide frequency monitoring and protection. The relay operates at voltages from 120 to 480 Vac and at nominal frequencies of 50, 60, and 400 Hz. External controls include nominal frequency selection, underfrequency (UF) trip set, overfrequency (OF) trip set, and OF and UF trip time delays.

Specifications	
Nominal Operating Freq.	50, 60 or 400 Vac
Nominal Sensing Voltage	20 to 480 Vac
Frequency Range	40-400 Hz
Contact Form	Form C - 1 ea for OF and UF
Time Delay Adjustment	0.5 to 10 secs
Dimensions	2.9"W x 2.9"H x 4.4"D
Weight	0.9 lbs

Sense Frequency	50	60	400
UF Adj	40 - 50	48 - 60	360 - 400
OF Adj	50 - 60	60 - 72	400 - 480

Control Voltage	-001	-002	-003
Input Vdc	18 to 54	13.5 to 32	100 to 200
Input Vac			100 to 140

WD47-XXX Phase Sequence Relay

WD47 Series phase sequence relays are designed to monitor the correct phase rotation and loss of phase of three phase AC systems from 50 to 400 Hz. An incorrect phase sequence or loss of any phase will cause the WD47 relay to pickup. When the phase sequence is corrected or the lost phase is restored the contacts dropout.

Specifications	
Operating Voltage	120 to 480 Vac
Frequency Range	50-400 Hz
Contact Form	2 Form C
Dimensions	2.9"W x 2.9"H x 4.4"D
Weight	0.9 lbs

Control Voltage	-001	-002	-003
Input Vdc	18 to 54	13.5 to 32	100 to 200
Input Vac			100 to 140

Tyco Electronics also offers a range of WILMAR protective relays in metal enclosures for screw mounting. Many meet military requirements.

Catalog 1308940
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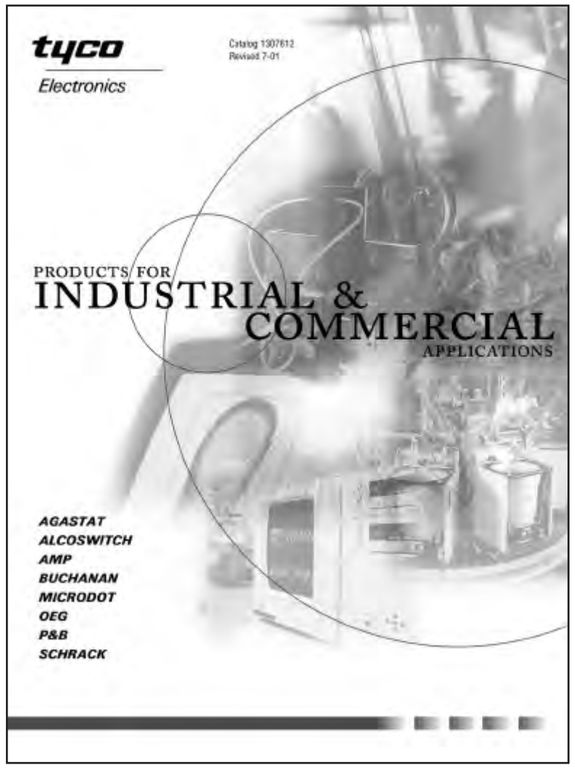
Introduction

Tyco Electronics manufactures a vast array of COTS products ideally suited to aerospace & defense applications. Our “Products for Industrial & Commercial Applications” catalog is an excellent source for COTS products. It’s full of proven interconnects, switches and terminal blocks carrying the AMP, MICRODOT, BUCHANAN, and ALCOSWITCH names.



Catalog Includes:

- Input/Output Connectors
- PCB and Wire Connectors
- Backplane/High Speed Connectors
- Ribbon Cable and Flexible Flat Cable Products
- Terminals and Splices
- Pin and Socket Connectors
- RF Coax Connectors
- Terminal Blocks
- Sockets
- Switches
- Fiber Optic Products
- Specialty Products
- Tooling

Ordering Information:

- CD-ROM Version No. 1308356

Important Reminder:

Customers should always double check the Tyco Electronics product specification against their product performance needs when using a Commercial-Off-The-Shelf (COTS) Product on an Aerospace and Defense platform.

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Electronics

Additional Aerospace Products

Magnetic Contactless Sensor

- Binary position sensor. No power required
- Drive Frequencies: 0 Hz to 10 KHz (600,000 RPM)
- High output voltage pulse 3.5 VDC
- Sensing distance .95 [24]

Catalog 1308214

Rotational Sensor

- Resolver angular displacement sensor
- Shock and vibration resistant
- Temp. range -67° to 302°F [-55° to 150°C]
- Rugged & wear free, no brushes
- Absolute angular position over entire rotation

Catalog 1308215

Heavy Power Line Filters

- 100 dB of attenuation from 12 kHz-10 GHz
- Stand-alone and NEMA I style facility filters
- Designed in accordance with MIL-F-15733
- UL Listed in accordance with UL 1283
- High Altitude Electromagnetic Pulse (HEMP) products available

Catalog 1654001

EMI Filters

- Broad range of current and performance capabilites
- High frequency filters
- For Tempest applications to protect confidential information
- IEC connectors, wires leads, and .250 [6.35] or stud terminals available

Catalog 1654455

Cable Assemblies

Typical cable solutions include:

- RF coax semi-rigid, RG flexible, ribbon coax, RF test assemblies
- Z-PACK 2mm HM assemblies
- Flexible flat cable, flexible circuits
- Jacketed assemblies: Subminiature-D, ARINC rack & panel connectors

PCB Assemblies

- Through-hole PCB assembly
- Low-to-mid volume, high connector content focus
- J-STD-001 solderability compliance
- PC Board & flexible circuit soldering
- Encapsulation, potting & conformal coatings
- Testing capabilities for over 3000 points

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Cross Reference

	Specification	Product Type	Section Number
Terminals & Splices	SAE AS7928 Class 1 & 2	PIDG Insulated Terminals	7
	SAE AS7928 Class 1 & 2	PIDG Uninsulated Terminals	
	MIL-S-81824/1	Raychem MiniSeal Splices	
	SAE AS83519/1 & /2	Raychem Shield Terminations	
Connectors and Contacts	MIL-C-21097/11, /13, /14, to /17	AMP-BLADE Two-Piece Connectors	1
	MII-DTL-24308	AMPLIMITE Connectors	5
	MIL-DTL-55302/23–/27, /110, /113, /129, /130, /156	AMP Box Contact Connectors	1
	MIL-DTL-55302/117–/119	AMP Mini-Box Connectors	
	MIL-DTL-55302/127–/128	AMPMODU Connectors	
	MIL-DTL-55302/173–/182	AMP-HDI Connectors	
	MIL-DTL-55302/120–/124	Microdot MCEM Connectors	5
	MIL-C-81659	ARINC 404 Connectors	4
	SAE AS81714	Terminal Junction System	5
	SAE AS-39029/1, /11, /12	TJ & ARINC Contacts	4, 5
	SAE AS39029/57, /58, /63 & /64	AMPLIMITE Contacts	5
	SAE AS39029/73, /74	Raychem SolderTacts Contacts	8
	MIL-DTL-83505/6	HOLTITE Contact	Ref. Cat. 1307612
	MIL-DTL-83513	Microminiature Rectangular Connectors	1
	MIL-DTL-83723	Raychem Circular Connectors	5
	DSCC Dwg. 94031-94046	Nanominiature Rectangular Connectors	
RF Products	MIL-PRF-39012	RF Products - N, BNC, TNC & SMA	2
	MIL-PRF-55339	M/A-COM RF Coax Adapters	—
	MIL-C-83517	M/A-COM RF Products	—
	SE AS39029/73, /74	Raychem Contacts	8
	MIL-DTL-22520/36	SMA Crimping Tool	2
Wire & Cable	SAE-AS22759	SPEC 44 and SPEC 55 Wire	10
	MIL-DTL-24640	SPEC 44 Cable	
	MIL-W-81044	Wire, crosslinked polyalkene, crosslinked alkane-imide polymer, or polyarylene insulation (SPEC 44)	
	MIL-C-85485	ElectroLoss FilterLine Wire and Cable	
Space Products	NASA S-311-P-10 & -4	AMPLIMITE Non-magnetic	5
	NASA S-311-448	Fiber Optics	3
	NASA S-311-P-754	CII Relays	15
	NASA S-311-P-13	Raychem Wire	10
Heat Shrink Molded Parts	AMS-DLT-23053	Insulation Sleeving	12
	SAE-AS31091	Boot-straight	
	SAE-AS31171	Boots-right angle	
	MIL-PRF-46846	Tubing	
	SAE-AS81765	Insulating components	

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Cross Reference (Continued)

	Specification	Product Type	Section Number
Tooling	MIL-I-81969/1	Insertion/Extraction Tools	See PN Index for listing of the following tools: 91035, 91066, 91067, 465199, 592105
	MIL-DTL-22520/36	SMA Crimping Tool	2
	MIL-DTL-22520/37, /39	Raychem Splice Crimping Tool	7
Relays	AN3303-2, AN3308-2, AN3320-1 & AN3324-1	Contactors/Hartman & CII	15
	MIL-PRF-6106/15 & /26, MS-24185 & MS27750		
	MIL-PRF-6106	Mid-Range Electromechanical/CII	
	MIL-PRF-83536		
	MIL-R-83725/1, /2, /4, /5, /10, /16, /17, /18, /21–/24	High Power/Kilovac	
	MIL-PRF-28750	Solid State/CII	
	DSCC Dwg. 86031 & 86062		
	MIL-R-39016	Low Power Electromechanical/CII	
	MIL-R-5757, MS27245 & MS27247		
	MIL-M-83726/13	Hybrid & Solid State Time Delay Relays/CII	
	MIL-PRF-28776	CII Hybrid	

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Equivalents and Conversions

Decimal Equivalents

Fraction of Inch	Decimal of Inch	Decimal Millimeters	Fraction of Inch	Decimal of Inch	Decimal Millimeters
1/64	.0156	0.3969		.5118	13.0000
1/32	.0313	0.7938	33/64	.5156	13.0969
	.0394	1.0000	17/32	.5313	13.4938
3/64	.0469	1.1906	35/64	.5469	13.8906
1/16	.0625	1.5875		.5512	14.0000
5/64	.0781	1.9844	9/16	.5625	14.2875
	.0787	2.0000	37/64	.5781	14.6844
3/32	.0938	2.3813		.5906	15.0000
7/64	.1094	2.7781	19/32	.5938	15.0813
	.1181	3.0000	39/64	.6094	15.4781
1/8	.1250	3.1750	5/8	.6250	15.8750
9/64	.1406	3.5719		.6299	16.0000
5/32	.1563	3.9688	41/64	.6406	16.2719
	.1575	4.0000	21/32	.6563	16.6688
11/64	.1719	4.3656		.6693	17.0000
3/16	.1875	4.7625	43/64	.6719	17.0656
	.1969	5.0000	11/16	.6875	17.4625
13/64	.2031	5.1594	45/64	.7031	17.8594
7/32	.2188	5.5563		.7087	18.0000
15/64	.2344	5.9531	23/32	.7188	18.2563
	.2362	6.0000	47/64	.7344	18.6531
1/4	.2500	6.3500		.7480	19.0000
17/64	.2656	6.7469	3/4	.7500	19.0500
	.2756	7.0000	49/64	.7656	19.4469
9/32	.2813	7.1438	25/32	.7813	19.8438
19/64	.2969	7.5406		.7874	20.0000
5/16	.3125	7.9375	51/64	.7969	20.2406
	.3150	8.0000	13/16	.8125	20.6375
21/64	.3281	8.3344		.8268	21.0000
11/32	.3438	8.7313	53/64	.8281	21.0344
	.3543	9.0000	27/32	.8438	21.4313
23/64	.3594	9.1281	55/64	.8594	21.8281
3/8	.3750	9.5250		.8661	22.0000
25/64	.3906	9.9219	7/8	.8750	22.2250
	.3937	10.0000	57/64	.8906	22.6219
13/32	.4063	10.3188		.9055	23.0000
27/64	.4219	10.7156	29.32	.9063	23.0188
	.4331	11.0000	59/64	.9219	23.4156
7/16	.4375	11.1125	15/16	.9375	23.8125
29/64	.4531	11.5094		.9449	24.0000
15/32	.4688	11.9063	61/64	.9531	24.2094
	.4724	12.0000	31/32	.9688	24.6063
31/64	.4844	12.3031		.9843	25.0000
1/2	.5000	12.7000	63/64	.9844	25.0031
			1	1.0000	25.4000

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Equivalents and Conversions (Continued)

Conversion Factors

Length	Area	Volume	Mass
Inches x 25.40 = Millimeters	Sq. inches x 6.452 = Sq. centimeters	Cu. inches x 16.39 = Cu. centimeters	Ounces x 28.35 = Grams
Millimeters x 0.03937 = Inches	Sq. centimeters x 0.1550 = Sq. inches	Cu. cm. x 0.06102 = Cu. inches	Grams x 0.03527 = Ounces
Feet x 0.3048 = Meters	Sq. feet x 0.0929 = Sq. meters	Cu. feet x 0.02832 = Cu. meters	Pounds x 0.4536 = Kilograms
Meters x 3.281 = Feet	Sq. meters x 10.76 = Sq. feet	Cu. meters x 35.31 = Cu. feet	Kilograms x 2.205 = Pounds
Miles x 1.609 = Kilometers	Sq. miles x 2.59 = Sq. kilometers		Kilograms/km x 0.6214 = Pounds/kft
Kilometers x 0.6214 = Miles	Sq. kilometers x 0.3861 = Sq. miles		Pounds/kft x 1.4881 = Kilograms/km
Ohms/km x 0.3048 = Ohms/kft	Circular mils x 0.7854 = Sq. mil		

Prefixes (SI), Values, and Symbols

Prefix	Value	Symbol	Prefix	Value	Symbol
Tera	1012	T	Deci	10-1	d
Giga	109	G	Centi	10-2	c
Mega	106	M	Milli	10-3	m
Kilo	103	k	Micro	10-6	µ
Hecto	102	h	Nano	10-9	n
Deca	101	da	Pico	10-12	p

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Revised 8-06

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

Supporting Information

Temperature Conversion Formula

°C = (°F -32) ÷ 1.8
°F = (°C x 1.8) + 32

°F	°C	°F	°C	°F	°C	°F	°C
-103	-75.00	-30	-34.44	25	-3.89	65	18.33
-101.2	-74.00	-28	-33.33	26	-3.33	66	18.89
-99.4	-73.00	-26	-32.22	27	-2.78	67	19.44
-97.6	-72.00	-24	-31.11	28	-2.22	68	20.00
-95.8	-71.00	-22	-30.00	29	-1.67	69	20.56
-94.0	-70.00	-20	-28.89	30	-1.11	70	21.11
-92.2	-69.00	-18	-27.78	31	-0.56	71	21.67
-90.4	-68.00	-16	-26.67	32	0.00	72	22.22
-88.6	-67.00	-14	25.56	33	0.56	73	22.78
-86.8	-66.00	-12	-24.44	34	1.11	74	23.33
-85.0	-65.00	-10	-23.33	35	1.67	75	23.89
-83.2	-64.00	-8	-22.22	36	2.22	77	25.00
-81.4	-63.00	-6	-21.11	37	2.78	77	25.00
-79.6	-62.00	-4	-20.00	38	3.33	78	25.56
-77.8	-61.00	-2	-18.89	39	3.89	79	26.11
-76.0	-60.00	0	-17.78	40	4.44	80	26.67
-74.2	-59.00	1	-17.22	41	5.00	81	27.72
-72.4	-58.00	2	-16.67	42	5.56	82	27.78
-70.6	-57.00	3	-16.11	43	6.11	83	28.33
-68.8	-56.00	4	-15.56	44	6.67	84	28.89
-67.0	-55.00	5	-15.00	45	7.22	85	29.44
-65.2	-54.00	6	-14.44	46	7.78	86	30.00
-63.4	-53.00	7	-13.89	47	8.33	87	30.56
-61.6	-52.00	8	-13.33	48	8.89	88	31.11
-59.8	-51.00	9	-12.78	49	9.44	89	31.67
-58.0	-50.00	10	-12.22	50	10.00	90	32.22
-56.2	-49.00	11	-11.67	51	10.56	91	32.78
-54.4	-48.00	12	-11.11	52	11.11	92	33.33
-52.6	-47.00	13	-10.56	53	11.67	93	33.89
-50.8	-46.00	14	-10.00	54	12.22	94	34.44
-49.0	-45.00	15	-0.44	55	12.78	95	35.00
-47.2	-44.00	16	-8.89	56	13.33	96	35.56
-45.4	-43.00	17	-8.33	57	13.89	97	36.11
-43.6	-42.00	18	-7.78	58	14.44	98	36.67
-41.8	-41.00	19	-7.22	59	15.00	99	37.22
-40	-40.00	22	-6.11	60	15.56	100	37.78
-38	-38.89	21	-6.11	61	16.11	101	38.33
-36	-37.78	22	-5.56	62	16.67	102	38.88
-34	-36.67	23	-5.00	63	17.22	103	39.44
-32	-35.56	24	-4.44	64	17.78	104	40.00

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°C = (°F -32) ÷ 1.8
°F = (°C x 1.8) + 32
(Continued)

°F	°C	°F	°C	°F	°C	°F	°C
105	40.55	145	62.78	185	85.00	325	162.78
106	41.11	146	63.33	186	85.55	330	165.56
107	41.66	147	63.88	187	86.11	335	168.33
108	42.22	148	64.44	189	87.22	340	171.11
109	42.77	149	65.00	189	87.22	345	173.89
110	43.33	150	65.56	190	87.78	350	176.67
111	43.88	151	66.11	191	88.33	355	179.44
112	44.44	152	66.66	192	88.88	360	182.22
113	45.00	153	67.22	193	89.44	365	185.00
114	45.55	154	67.77	194	90.00	370	187.78
115	46.11	155	68.33	195	90.55	375	190.55
116	46.66	156	68.88	196	91.11	380	193.33
117	47.22	157	69.44	197	91.66	385	196.11
118	47.77	158	70.00	198	92.22	390	198.89
119	48.33	159	70.55	199	92.77	395	201.67
120	48.89	160	71.11	200	93.33	400	204.44
121	49.44	161	71.66	205	96.11	405	207.22
122	50.00	162	72.22	210	98.89	410	210.00
123	50.55	163	72.77	215	101.67	415	212.78
124	51.11	164	73.33	220	104.44	425	215.56
125	51.67	165	73.89	225	107.22	425	218.33
126	52.22	166	74.44	230	110.00	430	221.11
127	52.77	167	75.00	235	112.78	435	223.89
128	53.33	168	75.55	240	115.56	440	226.67
129	53.88	169	76.11	245	118.33	445	229.44
130	54.44	170	76.67	250	121.11	450	232.22
131	55.00	171	77.22	255	123.89	455	235.00
133	56.11	172	77.77	260	126.67	460	237.78
133	56.11	173	78.33	265	129.44	465	240.55
134	56.66	174	78.88	270	132.22	470	243.33
135	57.22	175	79.44	275	135.00	475	246.11
136	57.77	176	80.00	280	137.78	480	248.89
137	58.33	177	80.55	285	140.55	485	251.67
138	58.88	178	81.11	290	143.33	490	254.44
139	59.44	179	88.66	295	146.11	495	257.22
140	60.00	180	82.22	300	148.89		
141	60.55	181	82.77	305	151.67		
142	61.11	182	83.33	310	154.44		
143	61.66	183	83.88	315	157.22		
144	62.22	184	84.44	320	160.00		

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Glossary of Terms

A

abrasion-resistance A measure of the ability of a wire or wire covering to resist damage by mechanical means.

accelerated aging A test in which voltage, temperature, or other test parameters are increased above normal operating values to obtain observable deterioration in a relatively short time. The plotted results give service life within the context of the test.

adapter A device usually attached to the rear of connectors that provides for the attachment of harnessing components, such as strain-relief clamps, heat-shrinkable boots, and braid.

adhesive (hot melt) Dual-wall tubing and precoated molded parts whose inner layer melts and flows when heated, fills voids in the areas being covered, and forms a mechanical bond to the substrate. Unlike an encapsulant, an adhesive forms a mechanical bond to the substrate.

adhesive liner Lining that melts and flows inside a sleeve or molded part, filling any voids in between the substrate and the sleeve or molded part. DuraSeal has an adhesive liner.

aging Change in the properties of a material over time and under specific conditions. Generally refers to environmental stimulus such as heat and light.

altitude immersion seal A seal able to withstand substantial pressure change (for example, from sea level to 75,000 feet).

amnesia The tendency over time for a heat-shrinkable elastomeric tubing or molded part to fail to recover completely to its specified recovered size. See shelf life.

ampacity See current-carrying capacity.

amplitude The magnitude of variation in a changing quantity from its zero value. The word requires modification — as with adjectives such as peak, maximum, rms, etc. — to designate the specific amplitude in question.

arc voltage voltage that continues to pass through a surge protector during activation of GDT(approx. 20 volts)

ASTM (American Society for Testing and Materials) A nonprofit industry-wide organization that formulates test methods and material specifications, and publishes standards, testing methods, recommended practices, definitions, and other materials.

attenuation A reduction in power. It occurs naturally during wave travel through lines, waveguides, space or a medium such as water. It may be produced intentionally by placing an attenuator in a circuit. The amount of attenuation is generally expressed in decibels per unit of length.

AWG (American Wire Gauge) The recognized method (in the United States) of specifying conductor size. The higher the gauge number, the smaller the conductor size.

B

back mounted A connector attached to the inside of a panel or box with its mounting flanges inside the equipment.

band marking A continuous circumferential band applied to a wire at regular intervals for identification.

bare conductor A conductor not covered with insulating material.

barrel 1.) Connector barrel: The section of the terminal, splice, or contact that accommodates the stripped conductor. 2.) Insulation barrel: The section of the terminal, splice, or contact that accommodates the conductor insulation. 3.) Open barrel: The section of a cap that accommodates the conductor.

batch number See lot number.

bayonet coupling A quick-coupling device for plug and receptacle connectors. Mating is accomplished by rotation of the two parts under pressure.

beaming Crosslinking by means of high-energy electrons.

bellmouth Flared at the mouth. The rear of a properly crimped wire barrel will have a slight flare (bellmouth) to relieve the strain on the wire strands as they leave the area of high compression and take their natural "lay". A bellmouth condition may also be present in front of the wire barrel.

binder A spiral wrapping of a thread to hold together the members of a cable.

blocking The sticking together of insulated wires; usually caused by heat.

BNC connector A radio frequency connector covered by Military Specification. It has an impedance of 50 or 75 ohms, and is designed to operate in the 0 to 4 GHz frequency range. It features quick connect/disconnect by pin and cam bayonet coupling.

body Main or largest portion of a connector to which other portions are attached.

bonding temperature Temperature above which adhesive melts and flows sufficiently to form an adhesive bond between substrates.

braid A weave of metal fibers used as a shield covering for an insulated conductor or group of insulated conductors. When flattened it may be used as a grounding strap.

braid angle The angle between the braid strands and the axis of the cable.

breakdown voltage The voltage at which an insulator or dielectric fails to maintain the applied voltage.

breakout A region in a harness assembly where a wire or a group of wires is detached to form a separate, terminated branch. Also known as a transition.

brittle temperature The temperature below which a material becomes brittle, often measured by a cold impact test.

broad-band E Interference generated over a wide range of frequencies (e.g., automotive ignition noise).

bulkhead A term used to define a mounting style of connectors. Bulkhead connectors are designed to be inserted into a panel cutout from the rear (component side) of the panel.

bunch stranding A method of twisting individual strands to form a finished stranded conductor. Specifically, a number of strands twisted together in a common direction and with a uniform pitch (or twist) per inch.

bus A communal circuit over which data or power is transmitted.

C

cable Two or more wires in a twisted or parallel configuration. Also, a shielded wire.

cable clamp A mechanical clamp attached to the cable side of a termination assembly to support the cable or wire bundle. It provides strain relief and absorbs vibration and shock that would otherwise be transmitted by the cable terminations.

cable clamp adapter A mechanical adapter that attaches to the rear of a termination assembly to allow the attachment of a cable clamp.

cable sealing clamp A device consisting of a gland nut designed to seal around the jacket of a cable.

cabler A machine that mechanically assembles a group of insulated wires.

cabling The act of twisting together two or more insulated components to form a cable.

capacitance The property of an electrical conductor (dielectric in a capacitor) that permits the storage of energy as a result of electrical displacement. The basic unit of capacitance is the farad, however, measurement is more commonly in microfarads or picofarads.

carrier A group of strands or ends used to form a finished braid.

cavity A metallic enclosure in some types of tubes and circuits within which resonant fields may be excited at the microwave frequency to which the cavity is tuned. Usually referred to as resonant cavity. See also: contact cavity.

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Glossary of Terms (Continued)

characteristic impedance The ratio of voltage to current at any point along a transmission line on which there are no standing waves.

chemical resistance The ability of an insulation to withstand the presence of materials—such as acids, bases, water, salt water, and fuels—that can deteriorate the insulation, or that, if penetrable to the conductor, can cause dielectric loss of insulating qualities.

Cheminax cables Raychem's registered trade name for coaxial cables.

circuit The interconnection of a number of electrical elements or parts to accomplish a desired function.

circular mil area (CMA) A unit of area equal to the area of a circle whose diameter is 1 mil (0.001 inch). Used chiefly in specifying cross-sectional areas of conductors. (See AMP Brochure No. 4402-8, Computing Circular Mil Area for AMP Terminals and Splices).

clocking The arrangement of connector inserts, jackscrews, polarizing pins, sockets, keys/keyways, or housing configurations to prevent the mismating or cross-mating of connectors. See also polarization.

closed entry contact A female contact designed to prevent the entry of a pin or probing device having a cross-sectional dimension (diameter) greater than the mating pin.

coax See coaxial cable.

coaxial cable A transmission line consisting of two conductors concentric with and insulated from each other. In its flexible form it consists of either a solid or stranded center conductor surrounded by a dielectric. A braid is then woven over the dielectric to form an outer conductor. A weatherproof plastic covering, usually vinyl, is placed on top of the braid.

cold bend A test conducted by wrapping tubing or cable around a mandrel or by bending it in an arc while at a low temperature.

cold flow Permanent deformation of polymeric materials (insulation) at ambient temperature due to mechanical force or pressure (not due to heat softening).

cold impact A test performed by subjecting a component to a specified impact during exposure to low temperature. It measures the brittleness of the material.

cold joint A soldered joint made with insufficient heat. (Solder hasn't completely flowed and wet the substrate.)

color code A means of identifying cable components using solid colors or stripes. Also, the scheme that assigns a number from 0 to 9 for each of 10 colors.

color stability The time and temperature ranges within which the color of a material will remain within the specified color limit.

component A wire or cable that is combined with other wires or cables to make a multicomponent cable.

compound An insulating or jacketing material made by formulating polymeric materials and additives.

Compound Under Strands (CUS) A problem that occurs when loose stranding, or overheating during extrusion, allows compounds to get under individual strands of conductor.

concentric stranding A method of stranding conductor. Specifically, the final conductor is built up in layers so that the inner diameter of a succeeding layer is always equal to the outer diameter of the underlying layer.

concentricity Ratio (expressed as a percentage) of the thinnest to the heaviest wall thickness. Measured on expanded or recovered tubing, or wire insulation, or jacketing.

conductivity The capability of a material to carry electrical current, usually expressed as a percentage of copper conductivity (copper being 100%). Specifically, the ratio of the current flow to the potential difference causing the flow. The reciprocal of resistance.

conductor The metallic strand or strands used to carry an electric current.

conductor resistance The resistance to flow of the electrical current along a conductor. Expressed in ohms/1000 feet. (Usually referenced to 20°C).

conduit A tubular raceway for holding wires or cables.

configuration Arrangement of contacts in a multiple-contact connector.

connector A device used to physically and electrically connect two or more conductors.

connector classes Categories based on shape, function, and smallest-size contact in a series.

connector insert In connectors with metal shells, the part that holds contacts in proper arrangement while electrically insulating them from each other and from the shell.

contact The element in a connector that makes the actual electrical connection. Also the parts of a connector that actually carry the electrical current, and are touched together or separated to control the flow.

contact crimp A contact whose rear portion is a hollow cylinder that accepts the conductor. A crimping tool is applied to swage or form the contact metal firmly against the conductor. Sometimes referred to as a solderless contact.

contact durability The number of insertion and withdrawal cycles that a connector must be capable of withstanding while remaining within the performance levels of the applicable specification.

contact engaging and separating force Force required to either engage or separate contacts. Values are generally established for maximum and minimum forces.

contact inspection hole A hole, perpendicular to the cylindrical rear portion of screw machined contacts, used to check the depth to which wire has been inserted into the barrel.

contact resistance Measurement of electrical resistance of mated contacts when assembled in a connector under typical service use. Electrical resistance is determined by measuring from the rear of the electrical area of one contact to the rear of the contact area of the mating contact (excluding both crimps) while carrying a specified test current.

contact size The diameter of the engagement end of a pin contact; also related to the current-carrying capacity of a contact.

contact, two-piece A contact made of two separate parts joined by swedging, brazing or other means of fastening to form a single contact. While this provides the mechanical advantages of two metals, it also has the inherent electrical disadvantage of difference in conductivity.

continuity A continuous path for the flow of current in an electrical circuit.

continuous operating temperature Maximum temperature at which a component will maintain an acceptable lifetime performance, based on accelerated aging prediction.

continuous service Conditions (time, temperature, environment) that describe the lifetime requirements of a component.

core 1.) In cables, a component or assembly of components over which additional components, such as a shield or a sheath, are applied.
2.) Inner wall of dual-wall heat-shrinkable tubing.

corona A discharge of electricity appearing as a bluish-purple glow on the surface of, and adjacent to, a conductor when the voltage gradient exceeds a certain critical value. It is caused by the ionization of surrounding air by high voltage.

coupling ring The portion of a plug that aids in the mating and demating of a plug and receptacle and holds the plug to the receptacle.

cover, electrical connector An item specifically designed to cover the mating end of a connector for mechanical and/or environmental protection. Also known as a dust cover.

coverage A calculated percentage that defines the completeness with which a braid or shield covers the surface of the underlying insulated conductor or conductors.

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Glossary of Terms (Continued)

crimp The final configuration of a terminal barrel after the necessary compression forces have been applied to cause a functional union between the terminal barrel and the wire.

crimp height A top to bottom measurement of the crimped barrel, using a crimp height comparator in the prescribed manner. (Refer to AMP Instruction Sheet 7424).

crimping dies A term used to identify the shaping tools that, when moved toward each other, produce a certain desirable shape to the barrel of the terminal or contact that has been placed between them. Crimping dies are often referred to as die sets or as die inserts.

crimping head Tooling containing jaws and linkage for use in pneumatic or hydraulic powered units to crimp loose-piece contacts/terminals that may be too large for hand tool applications.

crimping tool A term commonly used to identify a hand held mechanical device that is used to crimp a contact, terminal or splice.

crosslinking The formation of bonds between molecular chains in a polymer by means of chemical catalyzation or electron bombardment. The properties of the resulting thermosetting material are usually improved.

crosslinking by irradiation A method of crosslinking polymers that makes a nonflowing material. This generally improves the properties of the polymer.

crosstalk A magnetic or electrostatic coupling which causes the unwanted transfer of energy from one circuit (disturbing circuit) to another circuit (disturbed circuit)

crystallinity The portion of polymer chains that are ordered in a regular (as opposed to amorphous) structure or a crystal lattice. Crystallinity tends to improve mechanical properties and fluid resistance. Crystalline or semi-crystalline materials have a well-defined melting point (shrink temperature) at which the structure becomes disordered and the polymer flows.

CSA (Canadian Standards Association) An agency that has developed standard specifications for products with particular emphasis on safety in the end use.

curing See thermoset.

current A movement or flow of electrons. Also, the measure of this flow, expressed in amperes.

current-carrying capacity The maximum current an insulated conductor is capable of carrying without exceeding its insulation- and /or jacket-temperature limitations under specified ambient conditions. Also known as ampacity.

current rating The maximum continuous electrical flow of current recommended for a given situation. It is expressed in amperes.

cutout The hole, usually round or rectangular, cut into a metal panel in order to mount a connector. The cutout may also include holes for mounting screws or bolts.

cut-through resistance Resistance of solid material to penetration by an object (typically a closely controlled knife edge) under conditions of pressure, temperature, and other elements.

cycle One complete sequence of values of an alternating quantity, including a rise to maximum in one direction and return to zero; a rise to maximum in the opposite direction and return to zero. The number of cycles occurring in one second is called the frequency.

D

dB Abbreviation — see decibel.

D.C. sparkover voltage defined as the maximum voltage across a device before it discharges the energy to ground when subjected to a slowly rising voltage ramp. A rate of rise of 100V/s is usually chosen for testing purposes.

decibel A unit expressing the ratio of two voltages, currents or powers. It is equal to 20 times the common logarithm of the ratio of two voltages across or two currents through equal loads, or 10 times the common logarithm of the two powers. One decibel is approximately the smallest change in audible power that can be recognized by the human ear.

die closure Term used to designate a crimping area (crimping chamber) when the dies are fully closed or bottomed. Die closure is checked with go/no go plug gage to insure that the crimp produced by the tooling satisfies the crimp height specification.

dielectric A material that serves as an insulator. The amount of resistance to voltage in a given insulation.

dielectric breakdown The voltage required to cause an electrical failure or breakthrough of the insulation. Determined by a destructive test. See also breakdown voltage.

dielectric constant (also K) The ratio of the capacitance between two electrodes with a solid, liquid, or gaseous dielectric, to the capacitance with air between the electrodes. Also called permittivity and specific inductive capacity. Generally low values are desirable for insulation.

dielectric strength The maximum voltage a dielectric can withstand without rupture. Usually expressed as volts per mil.

dielectric withstanding voltage The maximum potential gradient that a dielectric material can withstand without failure.

Direct Current Resistance (DCR) The resistance offered by any circuit to the flow of direct current.

direction of lay The lateral direction in which the strands or elements of a cable run over the top of the cable as they recede from the observer. Expressed as right-hand or left-hand lay.

discontinuity Rated interconnection: a broken connection (open circuit) or the loss of a specified connection characteristic. Transient phenomena: Short term (temporary) interruption or unacceptable variation in current or voltage.

dissipation Unusable or lost energy, such as the production of unused heat in a circuit.

dissipation factor The ratio between the permittivity and the conductivity of a dielectric.

distortion An unwanted change or addition to a signal or waveform when it is amplified. This definition excludes noise which is an extraneous signal superimposed on the desired signal.

drain wire In a cable, an uninsulated conductor laid over the component, or components, in a foil-shield cable. Used as a ground connection.

dummy load A dissipative device used at the end of a transmission line or waveguide to convert transmitted energy into heat, so essentially no energy is radiated outward or reflected back to its source.

dust cover See cover, electrical connector.

E

EID See Expanded ID.

elastic memory The ability of a crosslinked polymer to be deformed to some predetermined shape, hold that shape for a period, and then return to its original shape upon the application of heat.

elastomer A material that exhibits very low or zero crystallinity and a high degree of flexibility (rubber is a synonym).

electromagnetic compatibility (EMC) The ability of an electronic device to operate in its intended environment without its performance being affected by EMI and without generating EMI that will affect other equipment.

electromagnetic interference (EMI) Unwanted electrical or electromagnetic energy that causes undesirable responses, degrading performance or complete malfunctions in electronic equipment. See also: noise.

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Glossary of Terms (Continued)

electromotive force (emf) See voltage.

elongation The ultimate elongation, or elongation at rupture. Expressed as a percentage of original length.

EMI Abbreviation for electromagnetic interference.

encapsulant Description related to the way dual-wall tubing products and precoated molded parts melt and flow when heated, filling any void in the area being covered. Unlike an adhesive, an encapsulant does not form a mechanical bond to the substrate.

encapsulation Covering and sealing.

end The number of fibers or strands per carrier in braiding operations.

environmentally sealed A unit is provided with gaskets, seals, grommets, potting or other means to keep out moisture, dust, air or dirt which might reduce or impair its performance.

epoxy A family of thermosetting resins usually used as adhesives or encapsulants.

ETFE (Ethylenetetrafluoroethylene) A fluoropolymer used as base resin for SPEC 55 wire and HCTE.

Expanded ID (EID) The specified minimum (as supplied) internal diameter of tubing.

expansion ratio An expression of how much larger the inside diameter of a tubing is before shrinking. Specifically, the relationship of the minimum (expanded) inside diameter of tubing to the maximum (recovered) inside diameter, expressed as a ratio. See also shrink ratio.

extraction tool A tool used for removing contacts from a connector body.

extrusion A process that conveys plastic insulation material, generally via a screw, through forming dies and subsequently cools the insulation material to form a predetermined shape.

F

feedthrough A connector or terminal block, usually having double-ended terminals, which permits distribution and bussing of electrical circuits. Also used to describe a bushing in a wall or bulkhead, separating compartments at different pressure levels, with terminations on both sides.

ferrule A short tube used to make solderless connections to shielded or coaxial cable. Also molded into the plastic inserts of multiple contact connectors to provide strong, wear-resistant shoulders on which contact retaining springs can bear.

filler A material used in a cable construction to fill large interstices, thus providing a round construction; can be shaped, round, or in mastic forms. A nonfunctional member used in a cable to provide a more circular cross section.

flame-resistant A descriptor applied to a material that is inherently resistant to burning.

flame retardant A descriptor applied to a material that has been made or treated so as to resist burning.

flat braid A braided shield composed of flat strands.

flat cable A cable with each component in a single, flat plane.

flat conductor A conductor having a rectangular cross section, as opposed to a round or square cross section.

flex life A measure of the susceptibility of a conductor or other device to failure due to fatigue from repeated bending.

fluoropolymer A polymer that contains atoms of fluorine.

flux A liquid or solid that, when heated, exercises a cleaning and protective action upon surfaces. Used to promote or facilitate fusion during soldering or welding.

frequency modulation (fm) A scheme for modulating a carrier frequency in which the amplitude remains constant but the carrier frequency is displaced in frequency proportionally to the amplitude of the modulating signal. An fm broadcast is practically immune to atmospheric and man-made interference.

fretting corrosion A form of excellerated oxidation that appears at the interface of contacting materials undergoing slight cyclic relative motion. All non-nobel metals (tin) are susceptible to some degree of fretting corrosion and will suffer contact resistance increases.

front mounted A connector is said to be front mounted when it is attached to the outside of the mating side of a panel. A front mounted connector can only be installed or removed from the outside of the equipment.

front release contacts Connector contacts that are released from the front side of the connector and then removed from the back, wire side of the connector.

full recovery temperature, minimum See recovery temperature.

G

gauge A term used to denote the physical size of a wire. See also AWG.

giga A prefix meaning one billion (10^9).

gigahertz (GHz) One billion cycles per second (10^9 cps).

ground A connection, intentional or accidental, between an electrical circuit and the earth or some conducting body (e.g. chassis) serving in place of earth.

grounding conductor A conductor that provides a current return path from an electrical device to ground.

H

hardness A general term that correlates with strength, rigidity, and resistance to abrasion or penetration. Measured on Shore or Rockwell scales. See also shore.

harness A system providing electrical connection between two or more points.

heat aging A test that subjects components or materials to temperatures above normal operating values to evaluate changes in performance in order to predict service life. See also accelerated aging.

heat shock A test to determine the stability of a material by continuously exposing it to an extremely high temperature for a short period of time. The test was developed both to demonstrate that the material is crosslinked and to observe any problems in dripping, cracking, or flowing.

heat-shrinkable A type of plastic material that has been cross-linked. A term describing tubes, sleeves, caps, boots, films or other forms of plastic which shrink to encapsulate, protect or insulate connections, splices, terminations and other configurations.

hermetic Airtight, impervious to external influence, as in a hermetic package. Often used to describe metal-to-metal solder or weld-sealed packages.

hermetic seal Hermetically sealed connectors are usually multiple contact connectors where the contacts are bonded to the connector by glass or other materials and permits maximum leakage rate of gas through the connector of 1.0 micron ft./hr. at one atmosphere pressure for special applications.

hertz (Hz) International standard term for cycles per second. Named after the German physicist Heinrich R. Hertz (e.g., 60 cycles per second is equal to 60 hertz or 60 Hz).

hookup wire and cable Wiring used to connect various points in electronic assemblies.

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Revised 8-06

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Glossary of Terms (Continued)

hot-melt adhesive An adhesive that becomes activated by heating. When heated, it melts, flows over the substrate surface, and forms an adhesive bond. Reheating causes the adhesive to remelt.

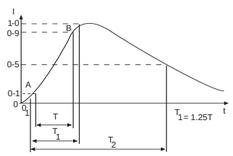
I

ID (Internal Diameter) The inside or internal diameter of a tubing.

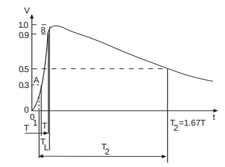
impedance (Z) The total opposition offered by a component or circuit to the flow of alternating or varying current. Impedance is expressed in ohms and is similar to the actual resistance in a direct current circuit. In computations, impedance is handled as a complex ratio of voltage to current.

impedance match A condition in which the impedance of a component or circuit is equal to the internal impedance of the source, or the surge impedance of a transmission line. This gives maximum transfer of energy from the source to the load, as well as minimum reflection and distortion.

impulse discharge current is defined as the peak current of an impulse which the device can withstand ten times (5 of each polarity at fixed time intervals) without substantially affecting device performance. The test normally used to determine this capacity uses the 8/20ms waveform as depicted at right where T1=8ms and T2=20ms.



impulse sparkover voltage defined as the maximum level of voltage across a device before it discharges the energy to ground when subjected to a voltage impulse. The three common waveform profiles used to determine this capacity are:



impulse test A high-voltage test designed to locate pinholes in the insulation of a wire or cable by applying a voltage while the wire or cable is being drawn through an electrode.

inductance One cause of reactance. An electromagnetic phenomenon in which the expanding and collapsing of a magnetic field surrounding a conductor or device tends to impede changes in current. The effects of inductance become greater as frequencies increase. The basic unit for inductance is the henry.

input impedance The impedance that exists between the input terminals of an amplifier or transmission line when the source is disconnected. The circuit, signal level and frequency must be specified.

insert Meltable thermoplastic ring placed within a SolderSleeve device. Aids in encapsulation and sealing.

insert (connector) Part that holds the contacts in their proper arrangement and electrically insulates them from each other and from the shell.

insert arrangement (connector) The number, spacing, and arrangement of contacts in a termination assembly.

insert cavity (connector) A defined hole in the connector insert into which the contacts are inserted.

insertion loss The loss in load power due to the insertion of a component, connector or device at some point in a transmission system. Generally expressed in decibels as the ratio of the power received at the load before insertion of the apparatus, to the power received at the load after insertion.

insertion tool (connector) A tool used to insert removable contacts into a connector.

inspection hole A hole placed at one end of a contact barrel to permit visual inspection, to ensure that the conductor has been inserted to the proper depth in the barrel prior to crimping or soldering.

insulated terminal A solderless terminal with an insulated sleeve over the barrel to prevent a short circuit in certain installations.

insulation crimp The area of a terminal splice or contact that has been formed around the insulation of a wire.

insulation, electrical A nonconductive material usually surrounding or separating two conductive materials. Often called the dielectric in cables designed for high-frequency use.

insulation grip The ability of certain crimped terminals to hold firmly in place both the conductor and a small portion of insulation. This prevents the conductor from being exposed due to insulation receding away from the terminal.

insulation resistance The electrical resistance between two conductors separated by an insulating material.

insulation, thermal A nonconductive material that prevents the passage of heat.

interconnection The joining of one individual device with another.

interface The two surfaces of a multiple-contact connector that face each other when the connector is assembled.

interference An electrical or electromagnetic disturbance that causes undesirable response in electronic equipment.

interstice In a cable construction, the space or void left between or around the cabled components.

irradiation In insulations, the exposure of the material to high-energy emissions for the purpose of favorably altering the molecular structure via crosslinking.

J

jack A connecting device into which a plug can be inserted to make circuit connections. The jack may also have contacts which open or close to perform switching functions when the plug is inserted or removed. See also: receptacle.

jacket 1.) A material covering over a wire or cable assembly. 2.) Outer covering of a dual-wall heat-shrinkable tubing.

jackscrew A screw attached to one half of a two-piece, multiple-contact connector and used to draw both halves together and to separate them.

K

Kapton DuPont's trade name for polyimide film.

key (connector) A short pin or other projection that slides into a mating slot or groove to guide two parts being assembled.

keying (connector) Mechanical arrangement of guide pins and sockets, keying plugs, contacts, bosses, slots, keyways, inserts, or grooves in a connector housing, shell or insert that allows connectors of the same size and type to be lined up; used in situations where there is danger of making a wrong connection.

keyway The slot or groove in which a key slides.

kV (kilovolt) A unit equal to 1000 volts.

Kynar Trade name (of Elf Atochem North America) for polyvinylidene fluoride and its copolymers.

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Glossary of Terms (Continued)

L

lacing cord or twine Used for lacing and tying cable forms, hookup wires, cable ends, cable bundles, and wire harness assemblies. Available in various materials and impregnants.

lanyard A device, attached to certain quick-disconnect connectors, that permits uncoupling and separation of connector halves by a pull on a wire or cable.

lay Refers to direction or sometimes the ratio of lay length to core diameter.

lay length A term used in cable manufacturing to denote the distance of advance of one member, or a group of spirally twisted members in one turn, measured axially. The lay of any helical element of a cable or conductor is the axial length of a turn of the helix of that element.

life cycle A test to determine the length of time before failure in a controlled, usually accelerated environment.

line impedance Impedance as measured across the terminals of a transmission line; frequently the characteristic impedance of the line.

liner See core.

longitudinal change (shrink tubing) The change in length of tubing when recovered. Expressed in the percent of change from the original length.

loss Electrical energy that is dissipated as heat.

loss factor The product of the power factor and dielectric constant of an insulating material.

lot number The number that identifies one production run of material. Also known as a batch number.

low-loss dielectric An insulating material that has a relatively low dielectric loss, such as polyethylene or Teflon.

lug A termination, usually crimped or soldered to a conductor, that allows connection to be made with a retaining screw.

M

marking A printed identification number or symbol applied to the surface of a wire or cable.

matched impedance The coupling of two circuits in such a way that the impedance of one circuit equals the impedance of the other.

mate To join two connectors in a normal engaging mode.

maximum discharge current defined as the peak current of an impulse which the device can withstand once without substantially affecting device performance.

mega (M) A prefix meaning one million (10^6).

megarad A unit for measuring radiation dosage.

melt/flow index Measurement of the flow of thermoplastic material under given conditions of temperature and pressure. Expressed as grams per unit of time.

melting point The temperature at which crystallinity disappears when crystalline material is heated.

MIL A unit equal to one one-thousandth of an inch (.001"); used in measuring the diameter of a conductor or thickness of insulation over a conductor.

Military Specification Military requirements. The demand imposed upon a system to meet a military operational need.

MIL-SPEC Abbreviation for Military Specification, which is a document the U.S. Government issues to define a product that will be used in military end-use applications.

milking off Action that occurs when the inner layer (the encapsulant or adhesive) of the tubing or molded part acts as a lubricant, allowing the tubing to slip off the substrate (because the tubing wants to recover to a smaller diameter).

minimum full recovery temperature See recovery temperature.

mismatch The condition in which the impedance of a source does not match or equal the impedance of the connected load. This reduces power transfer by causing reflection.

MO (Manufacturing Order) A series of operation-work-order cards identifying materials to be used and the type and quantity of products to be manufactured. An MO is controlled and issued by Production Control to the manufacturing operation.

MOD Code (Material Modification Code) A code designating a particular stage in the production process. Most MOD codes describe the way the product is packaged.

MS (Manufacturing Specification) A set of process instructions used in the manufacturing of tubing products. Customer Logistics, Product Management, or Manufacturing Engineering initiate the MS; Manufacturing Engineering controls it. The product design and quality parameters are provided to Manufacturing Engineering by Product Development and Quality Assurance. Successful trial runs of a new product or design usually precede the initiation of an MS (see SMO). A proprietary Raychem document, an MS is not available to customers.

multiconductor More than one component within a single-cable complex.

multiple-conductor cable A combination of two or more components cabled together.

N

narrow-band EMI generated from a device operating at a specific and limited range of frequencies. See also: electromagnetic interference (EMI).

N Connector A large radio frequency connector covered by Military Specification. It has an impedance of 50 ohms and is designed to operate in the 0 to 11 GHz frequency range. It has a threaded coupling and is physically larger than a TNC connector.

nick A small cut or notch in conductor strands or insulation.

noise An extraneous signal in an electrical circuit, capable of interfering with the desired signal. Classes of noise include burst of popcorn noise, intermediate frequency noise at low audio frequencies, white (thermal) noise, etc. Signals from power supply or ground line coupled into an amplifier output may be considered noise.

nominal A descriptor applied to a dimension representing the center of the range of tolerance or a value if no tolerance is applied.

O

"O" crimp An insulation support crimp for open barrel terminals and contacts. In its crimped form it resembles an "O" and conforms to the shape of the round wire insulation. "O" crimp is also used to describe the circumferential crimps used on COAXICON ferrules.

OFT (Optional Flame Test) Canadian Standards Association's test for flame-retardance. Tubing with an OFT rating is highly flame-retardant.

ohm The unit of measurement for electrical resistance. A circuit is said to have a resistance of one ohm when an applied emf of one volt causes a current of one ampere to flow.

operating temperature The maximum internal temperature at which a system, harness, or connector may operate in continuous service; generally expressed as a time and temperature.

operating temperature range The range between the maximum and the minimum internal temperature of insulation in a system, harness, or connector in continuous service. The lower limit is determined by low-temperature flex test.

Optional Flame Test See OFT.

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Glossary of Terms (Continued)

P

packaging The process of physically locating, connecting, and protecting devices or components.

panel The side or front (usually metal) of a piece of equipment on which connectors are mounted.

panel mount A method of fixing a connector to a board, panel or frame. The mounted connector is usually the receptacle or female connector. The plug or male connector is usually the removable portion.

PC (Production Control) Group responsible for directing and regulating the movement of goods through the entire manufacturing cycle, from the requisitioning of raw materials to the delivery of the finished products.

PCN See RPN.

peripheral seal A seal provided around the periphery of connector inserts to prevent the ingress of fluids or contaminants at the perimeter of mated connectors.

permeability (chemical) The passage or diffusion (or rate of passage) of a gas, vapor, liquid or solid through a barrier without physically or chemically affecting it.

permeability (magnetic) The measure of how much better a material is than air as a path for magnetic lines of force. Air is assumed to have a permeability of 1.

permittivity See dielectric constant.

pick The number of crossovers of braiding units per inch of cable.

pigtail A short conductor or wire extending from an electrical or electronic device to serve as a jumper or ground connection.

pin contact An electrical terminal, usually in a connector. Normally a smaller termination than a lug.

plastic deformation Change in dimensions under a load that does not recover when the load is removed.

plasticizer A softener or lubricant added to a compound to make it easier to process or more flexible in use.

plating The overlaying of a thin coating of metal on metallic components to improve conductivity, facilitate soldering, or prevent corrosion.

plug The part of a connector that is normally "removable" from the other, permanently mounted part; usually that half of a two-piece connector that contains the pin contacts.

plug connector An electrical connector that is intended to be attached to the free end of a conductor, wire, cable, or bundle, and that couples or mates to a receptacle connector.

poke through A term describing stray wires in a solder joint that poke through the insulation.

polarization (connectors) A mechanical arrangement of inserts or the shell configuration (referred to as clocking in some instances) that prohibits the mating of mismatched plugs and receptacles. See also clocking.

polyamide A polymer formed by the reaction of a diamine and a diacid. Nylons are commercial polyamides characterized by toughness, solvent resistance, and sharp melting point.

polymer A material of high molecular weight formed by the chemical union of monomers.

polyolefin A family of polymers (such as polyethylene and polypropylene) made from olefin monomers.

potting The permanent sealing of the cable end of a connector with a compound or material that thermosets into an elastomer, to exclude moisture and/or to provide strain relief.

pre-etching The act of surface preparation before encapsulating.

pretinned Description of an electrical component to which solder has been applied prior to soldering.

pretinned solder cup Solder cup whose inner surfaces have been precoated with a small amount of solder.

preform Usually, the solder ring in a SolderSleeve device.

primary insulation The inner member of a dual-wall wire insulation. The insulation applied directly on the conductor. Also referred to as the core. See also core.

printed circuit board (pcb) An insulating board serving as a base for a printed circuit. When the printing process is completed, the board may include printed components, as well as printed wiring.

propagation delay Time required for an electronic digital device, or transmission network to transfer information from its input to its output.

propagation delay time The time between the application of a digital input waveform and the corresponding change in input waveform. It is measured between reference points on the waveforms. The time is generally different for positive-going and negative-going waveforms.

pulse A change in the level, over a relatively short period of time, of a signal whose value is normally constant.

pulse width The length of time that the pulse voltage is at the transient level. Electronic pulse widths are usually in the millisecond (10^{-3}), microsecond (10^{-6}) or nanosecond (10^{-9}) range.

push-back That property of a braid or shield that allows the braid or shield to be pushed back easily along the cable core.

PVC (Polyvinyl chloride) A polymer compound used as wire insulation.

PVDF Polyvinylidene fluoride.

Q

quality assurance Systematic, planned, and documented activities designed to provide confidence that a product will meet specifications.

quality control Activities that monitor, measure, and control the characteristics of a material, component, or product to documented specifications.

quick disconnect A type of connector shell that permits rapid locking and unlocking of two connector halves.

R

RA flux Rosin-activated flux.

radiation crosslinking The act of crosslinking a material with ionizing radiation. (Most Raychem products are radiation crosslinked, with an electron beam as the form of ionizing radiation.) See also crosslinking by irradiation.

rated temperature The maximum temperature at which a component can operate for extended periods with acceptable changes in its basic properties.

rated voltage The maximum voltage at which an electric component can operate for extended periods without undue degradation.

rear release contacts Connector contacts designed to be released and removed from the rear (wire side) of the connector. The removal tool engages the contact from the rear and pulls the contact out of the connector contact retainer.

receptacle Usually the fixed or stationary half of a two-piece multiple contact connector. Also the connector half usually mounted on a panel and containing socket contacts.

recover (heat-shrinkable components) Activation of the elastic memory principle (usually with heat) to cause a tubing or molded part to return to its original size.

Recovered ID (RID) In heat-shrink tubing, the guaranteed maximum internal diameter of tubing after being freely recovered.

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Glossary of Terms (Continued)

recovery temperature The minimum temperature required to fully shrink a product, that is, for the product to recover completely.

removable contact A contact that can be mechanically joined to or removed from an insert. Usually special tools are required to lock the contact in place or remove it for repair or replacement.

residual impulse defined as the voltage that will pass through the device prior to activation of the GDT.

residual voltage defined as the small amount of voltage left on the line after an impulse passes.

resistance A measure of the difficulty in moving electrical current through a conductor or insulation when a voltage is applied. It is measured in ohms.

resonance A frequency at which captive reactance and inductive reactance are equal and therefore cancel one another's effects.

RF Abbreviation for radio frequency.

RG/U Symbol used to designate coaxial cables that are made to Government Specification (e.g., RG-58U; in this designation the "R" means radio frequency, the "G" means Government, the "58" is the number assigned to the government approval, and the "U" means it is a universal specification).

ribbon cable Flat cable with conductors that have been individually insulated together. Its structure is usually characterized by individual colors of insulation for each conductor, although a single color may be used for all conductors.

RID See Recovered ID.

rise time The time required for a component or logic circuit to change from the quiescent to the transient state when an input is applied. (i.e. elapsed time between application of input and attainment of full output level).

RMA flux Rosin-mildly-activated flux.

root mean square (rms) The effective value of an alternating current, corresponding to the direct current value that will produce the same heating effect.

rope lay A type of conductor lay that uses stranded conductors as components to build a larger conductor.

RPN (Raychem Product Number) A 10-digit number (such as 123456-4-001) assigned to every standard product and every product manufactured on a special manufacturing order (SMO). The first 6 digits represent the PCN (Product Control Number), followed by a 1-digit MOD Code, and finally a 3-digit suffix. See also MOD Code and SMO.

RT and RW specifications Specification that describes standard product properties. Qualification and acceptance inspection criteria are incorporated into RT and RW specifications. RT and RW specifications are issued and controlled by the Specifications Group.

S

SCD (Specification Control Drawing) Drawing that defines configuration and material parameters. Issued and controlled by the specifications group, SCDs are frequently used in conjunction with RT Specifications for Thermofit products.

scoop-proof A feature that prevents the damage of contacts during misaligned mating.

sealant Soft, tacky, pliable material that seals where mechanical strength is not required.

sealed Environmentally protected by the thermoplastic inserts or core of encapsulant/ adhesive that has melted down around the substrate.

sealing plug A plug that is inserted to fill an unoccupied contact aperture in a termination assembly.

secant modulus A measure of material stiffness; stiffer material has a higher secant modulus. More specifically, the secant modulus is the ratio of stress (nominal) to corresponding strain at any specified point on the stress-strain curve.It is expressed in force per unit area (usually kilograms per square centimeters or pounds per square inch), and reported together with the specified stress or strain.

semi-rigid A cable containing a flexible inner core and a relatively inflexible sheathing.

service life Period of time during which the product is expected to perform satisfactorily.

service loop The extra cable required at a breakout to facilitate maintenance and servicing.

service rating The maximum voltage or current that a termination is designed to carry continuously.

sheath The outer covering of a jacket over the insulated conductors to provide mechanical protection for the conductors. Also known as the external conduction surface of a shielded transmission line.

shelf life Generally, the length of time a product or material may be stored without deterioration. Specifically, the length of time during which shrink tubing will retain its expanded ID and return to its recovered ID. Usually not a concern—except for some "amnesic" materials. See amnesia.

shell (connector) The outside case, usually metallic, into which the insert (body) and contacts are assembled. Shells of mating connector halves usually provide for proper alignment and polarization as well as for protection of projecting contacts.

shield/shielding (cable) A conducting envelope, composed of metal strands, which enclose a wire, group of wires or cable so constructed that substantially every point on the surface of the underlying insulation is at ground potential or at some predetermined potential with respect to ground.

shield/shielding (circuit) The metal sleeving surrounding one or more of the conductors in a wire circuit to prevent interference, interaction or current leakage. Shielding protects a circuit against crosstalk.

Shielding Effectiveness (SE) The reduction in field strength resulting from interposing a metallic barrier between a source and receptor of electromagnetic energy.

shock (mechanical) (1) An abrupt impact applied to a stationary object. (2) An abrupt or nonperiodic change in position, characterized by suddenness, and by the development of substantial internal forces.

shore A scale for comparing hardness. Higher Shore values represent harder materials. The hardness of a polymer, for example, is usually represented as Shore A or Shore D, with D being harder.

shrink ratio An expression of how much the inside diameter of shrink tubing will reduce in size when recovered. The inverse of the expansion ratio. See also expansion ratio.

shrink temperature, minimum The minimum temperature at which a product begins to recover.

SHV Abbreviation for standard high voltage.

signal cable A cable designed to carry current of less than 12 amperes per conductor.

sine wave A wave which can be expressed as the sine of a linear function of time, space or both. A waveform, often viewed on an oscilloscope, of a pure alternating current or voltage.

skew Any out-of-squareness of the cut end of a piece of tubing after shrinking.

skin effect The tendency of alternating currents to flow near the surface of the conductor, thus being restricted to a small part of the total cross-sectional area. This effect increases the resistance and becomes more marked as the frequency rises.

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Glossary of Terms (Continued)

sleeve The insulated or metallic covering over the barrel of a terminal.

SMO (Special Manufacturing Order) An order to evaluate manufacturing and production capability for a new or changed design for a customer and to provide development samples of potential products for customers. SMO products are separate and distinct from standard products. New, potential products are usually run as SMO products for a minimum of three times before being considered for manufacture as a standard product.

solder An alloy that melts at relatively low temperatures and is used to join metals with higher melt points.

solder contact A contact or terminal having a cup, hollow cylinder, eyelet or hook to accept a wire for a conventional soldered termination.

solder cup A tubular end of a terminal into which a wire conductor is inserted prior to being soldered.

solderability The property of a metal surface that allows it to be readily wetted by molten solder. See also wetting.

soldering A process of joining metallic surfaces with solder without melting the base metal.

SolderSleeve device A device of flux-coated solder preform encapsulated in a heat-recoverable plastic sleeve. Upon the application of heat, the flux and solder will melt and flow as the sleeve recovers, forcing the solder around and onto the metallic parts being joined, thus forming an electrically insulated and strain-relieved joint.

solid conductor A conductor composed of one single strand.

solvent resistance The ability of a material to retain physical and electrical properties after being immersed in specific solvents.

SPC Silver-plated copper.

SPC (Statistical Process Control) The use of statistical techniques such as control charts to analyze a process or its output so as to take appropriate actions to achieve and maintain a state of control and to improve the capability of the process.

specific gravity The ratio of the density (mass per unit volume) of a material to that of water.

specific inductive capacity See dielectric constant.

splice A joint connecting conductors with good mechanical strength and conductivity; a terminal that permanently joins two or more wires.

standard high voltage (SHV) A quick connect/disconnect connector series employing a bayonet lock coupling and designated to operate safely up to 5000 volts AC. It is the industry standard connector specified by the National Bureau of Standards (NBS) for high voltage use by the Atomic Energy Commission (AEC).

standing-wave Distribution of current and voltage on a transmission line, resulting from two sets of waves traveling in opposite directions.

standing wave ratio The ratio between maximum and minimum current or voltage along a line. It is a measure of the mismatch between the load and the line. It is equal to 1 when the line impedance is perfectly matched to the load. (In which case the maximum and minimum are the same, as current and voltage do not vary along the line). The perfect match would be a 1 to 1 ratio.

strain relief The technique for or act of removing or lessening the strain or stress on a joint, splice, or termination. SolderSleeve devices provide strain relief.

strain relief clamp See cable clamp.

strand A single unit of a conductor.

stranded conductor A conductor composed of more than one single strand. The strands in stranded conductors are usually twisted or braided together.

strip To remove insulation from a wire or cable.

stripe A continuous longitudinal or spiral color strip applied on the surface of a wire, cable, or tubing for identification.

substrate The material—such as a wire, post, or tab—over which an interconnection device is used.

super high frequency (shf) The Federal Communications Commission designation for the band from 3,000 to 30,000 MHz in the radio spectrum.

surface resistance The ratio of the direct current applied to an insulation system to the current that passes across the surface of the system.

T

tape wrap A term denoting a spirally or longitudinally applied tape material wrapped around insulated or uninsulated wire and used as a mechanical barrier.

TC Tinned copper.

tear test A test to determine the tear strength of an insulating material. Usually includes exposure to given thermal conditions or a programmed series of conditions for prescribed periods of time.

temperature rating The maximum temperature at which the insulating material may be used in continuous operation without loss of its basic properties. Usually time dependent.

tensile The amount of axial load (longitudinal stress) required to break or pull the wire from the crimped barrel of the terminal, splice or contact.

tensile strength The greatest longitudinal stress that a substance or union can bear without tearing or pulling apart. In crimped terminations, it is the greatest longitudinal stress that a terminal can bear without the wire separating from the terminal.

thermal rating The effect of heat or cold applied at such a rate that nonuniform thermal expansion or contraction occurs within a given material or combination of materials. In electrical terminations, the effect can cause inserts and other insulation material to pull away from the metal parts.

thermal shock The effect of heat or cold applied at such a rate that nonuniform thermal expansion or contraction occurs within a given material or combination materials. The effect can cause inserts and other insulation materials to pull away from metal parts.

thermochromic indicator Special compound that changes color when the proper wetting temperature has been reached in the solder joint.

thermoplastic A material that softens (melts and flows) when heated and becomes firm when cooled. A type of plastic that can be remelted a number of times without any important change in properties. Nylon, GE's Lexan, and PVC—examples of this type of plastic—are resilient after molding.

thermoset A material that hardens or sets when heated and, once set, cannot be resoftened by heating. This application of heat is called "curing."

thermosetting plastic A type of plastic in which an irreversible chemical reaction takes place while the plastic is being molded under heat and pressure.

thermosetting adhesive A curing adhesive that requires heat to promote curing. This type of plastic will not soften when reheated. See epoxy.

time-delay A circuit that delays the transmission of an impulse for a definite and desired period of time.

TNC Connector A radio frequency connector covered by Military Specification. It has an impedance of 50 ohms and is designed to operate in a 0 to 11 GHz frequency range. Reliability is assured by a threaded coupling that can be safely wired to prevent accidental disconnect.

tolerance The total amount by which a quantity is allowed to vary from nominal; thus, the tolerance is half the algebraic difference between the maximum and minimum limits.

Catalog 1308940
Revised 8-06

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Glossary of Terms (Continued)

traceability The ability to trace the history, application, or location of an item and like items or activities by means of recorded identification. The lot number/manufacturing order (MO) number, or SMO number used to identify items or groups of items is traceable back to inspection and procurement records.

transmission cable Two or more transmission lines. If the structure is flat, it is sometimes called flat transmission cable to differentiate it from a round structure such as a jacketed group of coaxial cables. See also transmission line.

transmission line A signal-carrying circuit with controlled electrical characteristics; used to transmit high-frequency or narrow-pulse signals.

triaxial cable A concentrically constructed cable, with a common axis, composed of a center connector, first shield, and second shield, all insulated from each other.

U

UG Symbol used to describe coaxial connectors that were made to a Government specification. This specification is now obsolete.

UL (Underwriters' Laboratories) A nonprofit independent testing organization that operates a listing service for electrical and electronic materials and equipment.

ultra-high frequency (uhf) A Federal Communications Commission designation for the band from 300 to 3000 MHz on the radio spectrum. In television — channels 14 to 83 or 470 to 890 MHz.

ultraviolet degradation The degradation caused by long-time exposure of a material to sunlight or other ultraviolet rays.

V

velocity of propagation The ratio of the speed of a radio frequency wave within a cable or dielectric as compared with the same wave in free space.

very high frequency (vhf) A Federal Communications Commission designation for the band from 30 to 300 MHz on the radio spectrum.

voice-frequency (vf) Any frequency within that part of the radio frequency range essential to speech transmission of a commercial quality (i.e., 300 to 3400 Hz). Also referred to as telephone frequency.

volt (V) The unit of measurement for electromotive force (emf). It is equivalent to the force required to produce 1 ampere through a resistance of 1 ohm.

voltage (E) The term most often used to designate electrical pressure that exists between two points and is capable of producing a flow of current when a closed circuit is connected between the two points. Voltage is measured in volts, millivolts, microvolts and kilovolts. The terms electromotive force (emf), potential, potential difference and voltage drop are often referred to as voltage.

voltage breakdown The voltage necessary to cause insulation failure.

voltage drop The voltage developed across a component or conductor by the flow of current through the resistance or impedance of that component or conductor.

voltage hold over refers to the maximum line voltage at which recovery of the GDT to its inactive state will take place within a specified period of time (normally 150ms) after an induced lightning pulse (normally 10/1000ms) has been applied.

voltage rating The voltage that may be continuously applied to wire.

volume resistivity Reciprocal of conductivity; the resistance of a material to the flow of electrical current, usually expressed in ohm-cm.

VSWR (Voltage Standing Wave Ratio) A measure of the uniformity of impedance along a transmission line, or the quality of the impedance match between a line and the source or load.

VW-1 A rating determined by the Underwriters' Laboratories' (UL) optional Vertical Wire Flame Test—the most difficult flame test for tubing. Tubings with a VW-1 rating are highly flame-retardant.

W

wall thickness The thickness of the applied insulation or jacket.

water absorption test A method to determine the water uptake of a material. It is time and temperature dependent.

water blocking The sticking together of insulated wires; usually caused by heat.

wavelength The distance between two points which are in phase on adjacent waves. It is the distance traveled by the wave in the same span of one cycle. Electromagnetic waves (both light and radio) have a speed in space of about 300,000,000 meters (186,000 miles) per second. Thus wavelength in meters is equal to 300,000,000 divided by frequency.

wetting (solder) The formation of a relatively uniform, smooth, unbroken, and adherent film of solder to a base metal. Also, the free flow of solder alloy, with proper application of heat and flux, on a metallic surface to produce an adherent bond.

wicking The longitudinal flow of a liquid in a wire or cable construction due to capillary action. (This may also apply to solder.)

wire A single conductor covered with insulation.

wire dress The orderly arrangement of wires and laced harnesses.

withstanding voltage The test voltage an electrical connector can withstand for one minute without showing evidence of electrical breakdown when the voltage is applied between conductors and grounding devices of the connectors in various combinations.

Z

Z Letter symbol used to represent impedance in ohms.

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Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

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Revised 8-06

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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
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Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

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Revised 8-06

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C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 52-55-1106-0800
C. America: 57-1-254-4444

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-208-420-8341

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Revised 8-06

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Hong Kong: 852-2735-1628
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