

Medical AC-DC Adapter

MEA-160W Series / MEA-160A□C □AA

MEA-160A



Highlights & Features

- Extreme compact size
- Meet Efficiency Level VI / VII & CoC Tier 2
- Universal AC input range at 85-264 Vac
- Safety Approvals to IEC 60601-1 & IEC 62368-1
- Compliant with IEC 60601-1-2 Ed. 4 Requirements
- Low touch current (<0.1 mA Normal & single fault)
- 2 x MOPP isolation

Safety Standards



CB Certified for worldwide use

Model Number: MEA-160A□C GAA
Unit Weight: 450 grams (0.992 lb)
Dimensions (W × L × H): 65.0 × 150.0 × 32.0 mm
 2.56 × 5.90 × 1.26 inch

General Description

The MEA-160A series of external power supply come with universal AC input at 85 Vac to 264 Vac. Key features include 0.1mA low leakage current in normal and single fault conditions, and electric shock protection complying with 2 x MOPP. The MEA-160A series is certified according to EN 55011 for industrial, scientific and medical (ISM) radio-frequency equipment and meets EN 55032 for Information Technology Equipment (ITE) radio-frequency equipment. MEA-160A series has both medical and ITE safety approvals such as IEC 62368, CB certification and CCC approval. Designs are fully compliant with RoHS for environmental protection.

Model Information

Medical AC-DC Adapter

| Model Number | Input Voltage Range | Rated Output Voltage | Rated Output Current |
|-----------------|---------------------|----------------------|----------------------|
| MEA-160A12C GAA | 85-264 Vac | 12 Vdc | 12.5 A |
| MEA-160A15C GAA | | 15 Vdc | 10.67 A |
| MEA-160A19C GAA | | 19 Vdc | 8.42 A |
| MEA-160A24C GAA | | 24 Vdc | 6.67 A |

Model Numbering

| | | | | | | CC Code | |
|-------------------------------|--|-------------|--|-------------------------------------|-------|---|----------------|
| MEA – | 160 | A | □ | C | □ | □ | AA |
| Delta Medical Desktop Adapter | Max wattage in the product series (150 W for 12 V output 160 W for other output) | Family Code | Output Voltage (Single Output) 12 – 12 V 15 – 15 V 19 – 19 V 24 – 24 V | Input Connector Type C – C14 | Blank | Plug, Molding type and others G: 4 Pin Din | Delta Standard |



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Specifications

| Model Number | MEA-160A12C | MEA-160A15C | MEA-160A19C | MEA-160A24C |
|--------------|-------------|-------------|-------------|-------------|
|--------------|-------------|-------------|-------------|-------------|

Input Ratings / Characteristics

| | | | | | |
|------------------------------|--|-----|-------|-----|-----|
| Nominal Input Voltage | 100-240 Vac | | | | |
| Input Voltage Range | 85-264 Vac | | | | |
| Nominal Input Frequency | 50-60 Hz | | | | |
| Input Frequency Range | 47-63 Hz | | | | |
| Input Current (max.) | 2.2 A @ 100 Vac, 1 A @ 230 Vac | | | | |
| Efficiency | @ 115 Vac (typ) | 90% | 90.5% | 91% | 91% |
| | @ 230 Vac (typ) | 91% | 92.5% | 93% | 93% |
| Average Efficiency (min) | 89% | | | | |
| Efficiency @ 10% Load | 79% | | | | |
| Standby Power (max.) | 0.15 W @ 115 Vac & 230 Vac | | | | |
| Inrush Current (typ.) | 50 A @ 115 Vac, 100 A @ 230 Vac | | | | |
| Touch Current (max.) | 0.1 mA @ 264 Vac NC ¹⁾ , 0.1 mA @ 264 Vac SFC ²⁾ | | | | |
| Earth Leakage Current (max.) | 0.1 mA @ 264 Vac NC ¹⁾ , 0.1 mA @ 264 Vac SFC ²⁾ | | | | |
| Power Factor (typ) | 0.99 @ 115 Vac ; 0.95 @ 230 Vac | | | | |

- 1) NC: Normal condition
- 2) SFC: Single fault condition

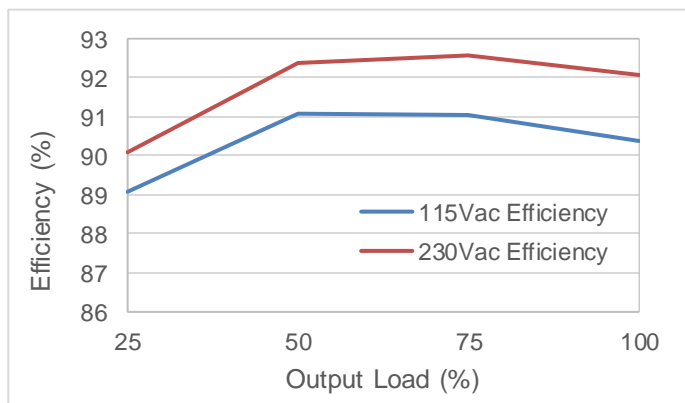


Figure 1-1 MEA-160A12C Efficiency versus Output Load

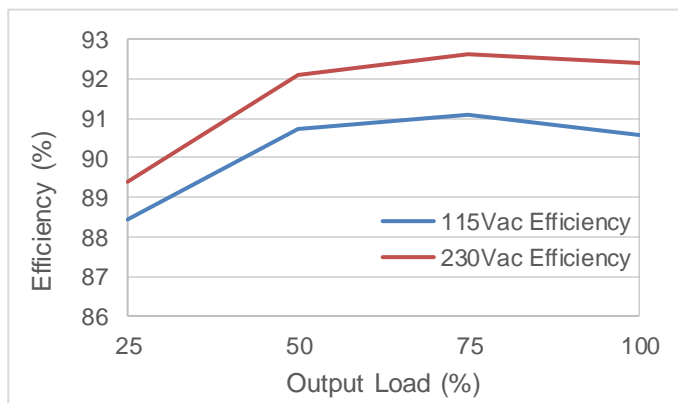


Figure 1-2 MEA-160A15C Efficiency versus Output Load

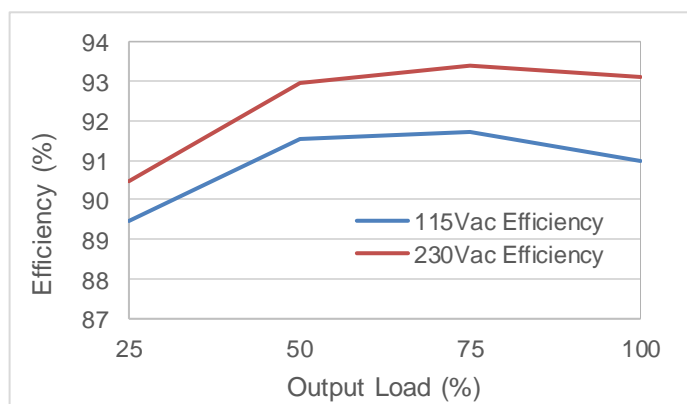


Figure 1-3 MEA-160A19C Efficiency versus Output Load

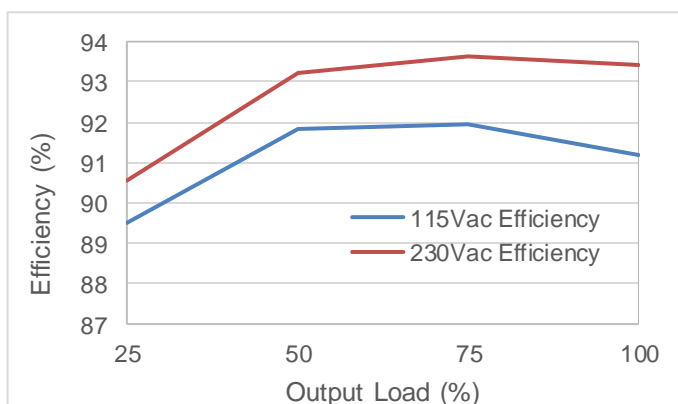


Figure 1-4 MEA-160A24C Efficiency versus Output Load



Medical AC-DC Adapter

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| Model Number | MEA-160A12C | MEA-160A15C | MEA-160A19C | MEA-160A24C |
|--------------|-------------|-------------|-------------|-------------|
|--------------|-------------|-------------|-------------|-------------|

Output Ratings / Characteristics

| | | | | | |
|--|--|-------------|-------------|-------------|-------------|
| Nominal Output Voltage | 12 Vdc | 15 Vdc | 19 Vdc | 24 Vdc | |
| Nominal Output Current | 12.5 A | 10.67A | 8.42 A | 6.67 A | |
| Output Power | 150 W | 160 W | 160 W | 160 W | |
| Line Regulation | ± 0.5% | | | | |
| Load Regulation | ± 6.5% | ± 5% | ± 5% | ± 4% | |
| PARD ³⁾ (20 MHz) | @ 25°C to 40°C | 150 mVp-p | 150 mVp-p | 190 mVp-p | 240 mVp-p |
| | @ -20°C to 0°C | < 360 mVp-p | < 450 mVp-p | < 570 mVp-p | < 720 mVp-p |
| Rise Time | < 50 ms @ 115 Vac & 230 Vac | | | | |
| Start-up Time | 350 ms (typ.) @ 115 Vac & 230 Vac | | | | |
| Hold-up Time | 28 ms typ. @ 115 Vac | | | | |
| E-Cap Load | 6000 uF | | | | |
| Dynamic Response (Overshoot & Undershoot O/P Voltage) | ± 10% @ 5-100% load; Slew rate 0.1A/μs (@ 100 Hz, 50% Duty Cycle) | | | | |

3) PARD is measured with an AC coupling mode, and in parallel to end terminal with 0.1 μF ceramic capacitor & 47 μF electrolytic capacitor. PSU need to burn in > 5 minutes when AMB ≤ 0°C

Mechanical

| | | |
|------------------------|--|----------------------|
| Case Chassis / Cover | PC | |
| Dimensions (W x L x H) | 65.0 x 150.0 x 32.0 mm (2.56 x 5.90 x 1.26 inch) | |
| Unit Weight | 450 grams (0.992 lb) | |
| Cable Length | 1200 mm | |
| Indicator | Green LED | |
| Terminal | Input | IEC 60320 C14 socket |
| | Output | 4 Pin Din |

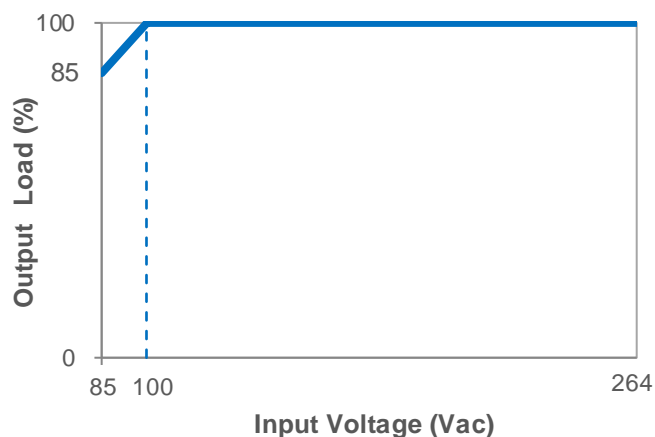
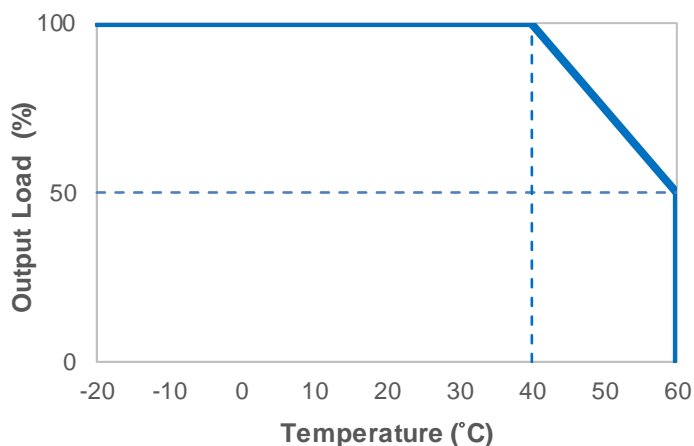
Environment

| | | |
|-----------------------------|---|---|
| Surrounding Air Temperature | Operating | -20°C to +60°C |
| | Storage | -40°C to +85°C |
| Power De-rating | > 40°C de-rate power by 2.5% / °C | |
| Line De-rating | < 100 Vac de-rate power by 1% / Vac | |
| Operating Humidity | 20-90% RH (Non-Condensing) | |
| Operating Altitude | Up to 5,000 meters (up to 16,400 feet or 106-54kPa) | |
| Shock Test | Non-Operating | 50 G, 11 ms, 3 shocks for each direction |
| Vibration | Non-Operating | 5-500 Hz, 2.09 Grms, 20 minutes for each three axis |

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MEA-160W Series / MEA-160A □ C □ AA

Power De-rating Curve



Protections

| | |
|-------------------------------|--|
| Overvoltage (max.) | 150% max, Latch Mode |
| Overload / Overcurrent (max.) | 180% max of rated load current, Hiccup Mode, (Non-Latching, Auto-Recovery) |
| Over Temperature | Latch Mode |
| Short Circuit | Hiccup Mode, (Non-Latching, Auto-Recovery) |
| Degree of Protection | IP22 |
| Protection Against Shock | Class I |

Reliability Data

| | |
|--|--|
| MTBF (typ.) | 500K Hours based on Telecordia SR-332 (at 115 Vac, Max. load and 25°C Ambient) |
| Expected E-cap Life Time ⁴⁾ | 3 years (115 Vac, 100% load @ 25°C Ambient) |

4) The expected E-cap life is based on 12 hours of operation per day.

Safety Standards / Directives

| | | |
|--------------------|---|----------|
| Medical Safety | IEC 60601-1 CB Report, EN 60601-1 CAN/CSA-C22.2 No.60601-1 ANSI/AAMI ES 60601-1 | |
| ITE Safety | IEC 62368-1, UL 62368-1, PSE J 62368-1, CCC GB 4943.1, GB/T 9254.1, GB 17625.1 | |
| CE | In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU EN 60601-1: 2006 + A1: 2013 + A12: 2014+ A2: 2021 & EN 60601-1-2: 2015 + A1: 2021 | |
| UKCA | In conformance with Electrical Equipment (Safety) Regulations 2016 and Electromagnetic Compatibility Regulations 2016, Medical Devices Regulations 2002 (UK MDR 2002) | |
| Galvanic Isolation | Input to Output | 4000 Vac |
| | Input to PE | 1500 Vac |
| | Output to PE | 500 Vac |



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EMC (Compliant with IEC 60601-1-2 4th Ed. Requirements)

| | | |
|-----------------------------------|----------------|---|
| EMC / Emissions | | EN/BS EN 55011, EN/BS EN 55032 : Class B CISPR 11, CISPR 32 : Class B Compliance to FCC Title 47: Class B |
| Harmonic Current Emissions | IEC 61000-3-2 | Meet Class A |
| Immunity to | | |
| Voltage Flicker | IEC 61000-3-3 | |
| Electrostatic Discharge | IEC 61000-4-2 | Level 4 Criteria A ⁵⁾ Air Discharge: 15 kV Contact Discharge: 8 kV |
| Radiated Field | IEC 61000-4-3 | Criteria A ⁵⁾ 80 MHz-2700 MHz, 10 V/m AM modulation 385 MHz-5785 MHz, 28 V/m Pulse mode and other modulation |
| Electrical Fast Transient / Burst | IEC 61000-4-4 | Level 3 Criteria A ⁵⁾ : 2 kV |
| Surge | IEC 61000-4-5 | Level 3 Criteria A ⁵⁾ Common Mode ⁷⁾ : 2 kV Differential Mode ⁸⁾ : 1 kV |
| Conducted | IEC 61000-4-6 | Level 2 Criteria A ⁵⁾ 150 kHz-80 MHz, 3 Vrms, 6 Vrms at ISM bands and Amateur radio bands |
| Power Frequency Magnetic Fields | IEC 61000-4-8 | Criteria A ⁵⁾ Magnetic field strength 30 A/m |
| Voltage Dips | IEC 61000-4-11 | Criteria A ⁵⁾ 0% U _T , 0.5 cycle (10 ms) 0°/45°/90°/135°/180°/225°/270°/315°/360° Criteria A ⁵⁾ 0% U _T , 1 cycle (20 ms), 0° Criteria B ⁶⁾ 70% U _T , 25 cycle (500 ms), 0° Criteria B ⁶⁾ 0% U _T , 250 cycle (5000 ms), 0° |

5) Criteria A: Normal performance within the specification limits

6) Criteria B: Output out of regulation, or shuts down during test. Automatically restore to normal operation after test.

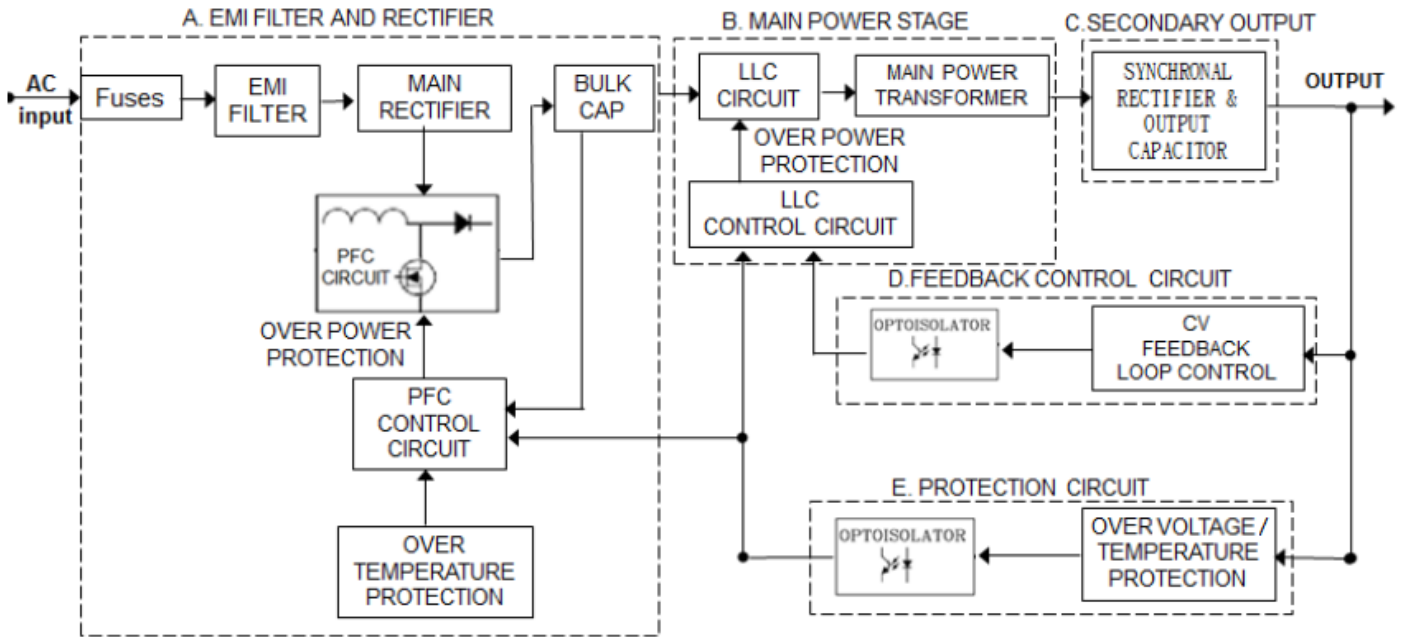
7) Asymmetrical: Common mode (Line to earth)

8) Symmetrical: Differential mode (Line to line)

Medical AC-DC Adapter

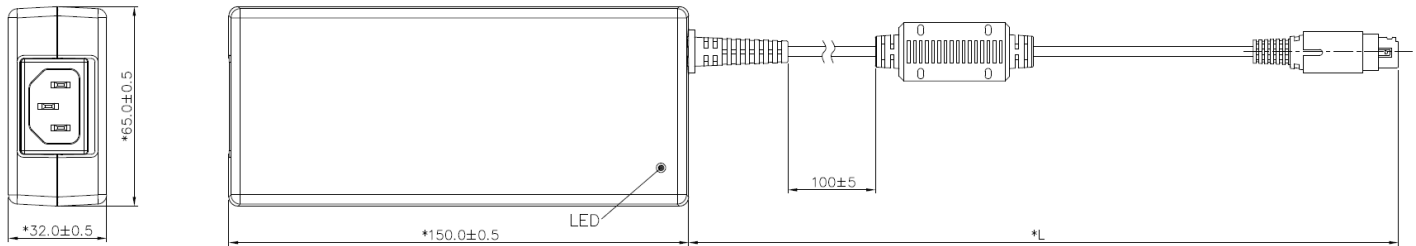
MEA-160W Series / MEA-160A □ C □ AA

Block Diagram

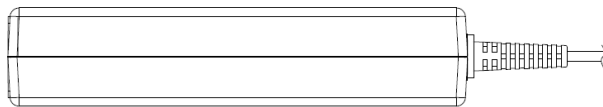


Dimensions

W x L x H: 65.0 x 150.0 x 32.0 mm (2.56 x 5.90 x 1.26 inch)



IEC 60320-1 C14



| POWER DIN 4 Pins with Lock | CC Code | Voltage | Cable Type | Cable Length (L) | Pin Assignment | |
|------------------------------|---------|---------|---------------------|------------------|----------------|----|
| KYCON KPPX-4P Equivalent | GAA | 12V | UL2464 #14AWG*2C | 1200+/-50 | 1 | +V |
| | | 15V | UL2464 #14AWG*2C | | 2 | +V |
| | | 19V | UL2464 #16AWG*2C | | 3 | -V |
| | | 24V | UL2464 #18AWG*2C | | 4 | -V |

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MEA-160W Series / MEA-160A □ C □ AA

Functions

Start-up Time

The time required for the output voltage (V_o) to reach 90% of its set value, after the input AC voltage is applied.

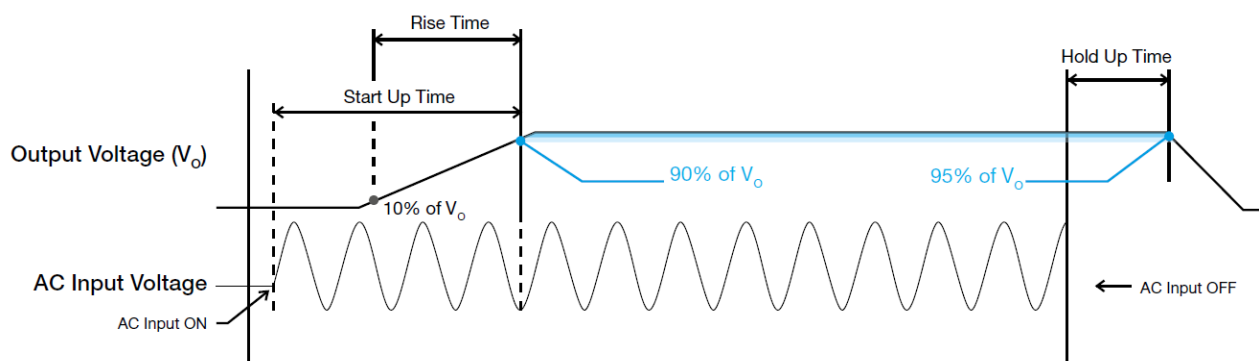
Rise Time

The time required for the output voltage (V_o) to change from 10% to 90% of its steady state value.

Hold-up Time

Hold up time is the time when the AC input collapses and output voltage retains regulation for a certain period of time. The time required for the output to reach 95% of its set value, after the input voltage is removed.

■ Graph illustrating the Start-up Time, Rise Time, and Hold-up Time

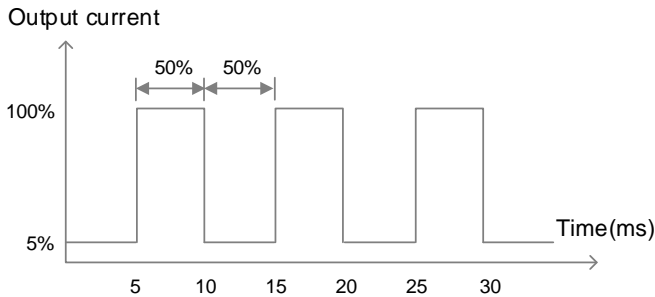


Medical AC-DC Adapter

MEA-160W Series / MEA-160A □ C □ AA

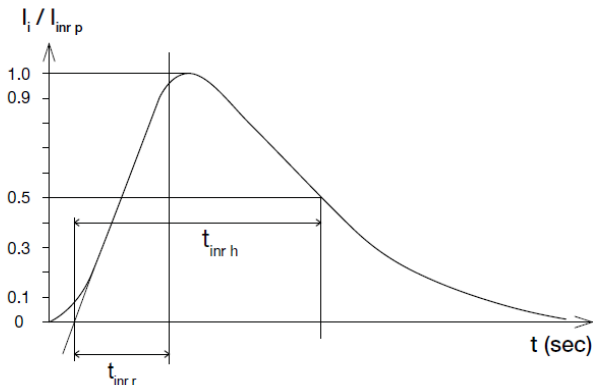
Dynamic Response

The power supply output voltage will remain within $\pm 10\%$ of its steady state value, when subjected to a dynamic load change from 5 to 100% of its rated current.



Inrush Current

Inrush current is the input current that occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent cycles of AC voltage.



Overvoltage Protection

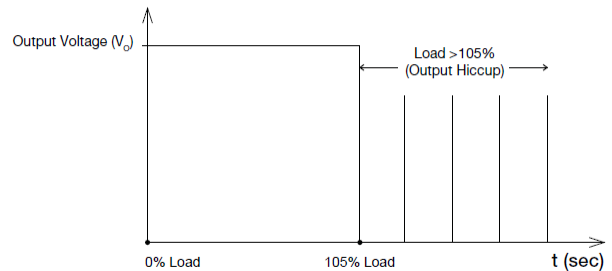
The power supply's overvoltage circuit will be activated when its internal feedback circuit fails. The output voltage shall not exceed its specifications defined on Page 4 under "Protections". Power supply will latch off, and require removal/re-application of input AC voltage in order to restart.

Short Circuit Protection

The power supply's output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate in "Hiccup mode", as shown in the illustration in the OLP/OCP section on this page. The power supply will return to normal operation after the short circuit is removed.

Overload & Over current Protections

The power supply's Overload (OLP) and Over current (OCP) Protections will be activated when output current is between 105% and 180% of I_o (Max load). Upon such an occurrence, V_o will start to drop. Once the power supply has reached its maximum power limit, the protection will be activated. and the power supply will go into "Hiccup mode" (Auto-Recovery). The power supply will recover once the fault condition causing the OLP and OCP is removed and I_o is back within the specified limit.



Over Temperature Protection

As mentioned above, the power supply also has Over Temperature Protection (OTP). This is activated when the overload condition persists for an extended duration and the output current is below the overload trigger point but >100% load. In the event of a higher operating condition at 100% load, the power supply will run into OTP when the surrounding air temperature is higher than the operating temperature. When activated, the output voltage will latch off and require removal/re-application of input AC voltage in order to restart.

Medical AC-DC Adapter

MEA-160W Series / MEA-160A C AA

Certificate



Delta has been certified as meeting the requirement of ISO 13485: 2003 and EN ISO 13485:2012 for the design and manufacture of switching power supply and adaptor for medical device.



Delta is approved for the UL Total Certification Program (TCP) approved client laboratory for IEC 62368-1. Delta also has participated UL Client Test Data Program (CTDP) for IEC 60601.



Meet DOE Level VI Efficiency Requirement.

Manufacturer and Authorized Representatives Information

Manufacturer

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