

SIMIREL Time, Monitoring and Coupling Relays and Converters

8



8/2	Introduction
Time relays	
8/5	General data
8/17	Time relays in 22.5 mm industrial casing
8/21	45 mm SIRIUS Design time relays
8/23	Time relays for front panel mounting
8/24	Time relays for mounting onto contactors
Monitoring relays	
Temperature monitoring relays	
8/26	General data
8/30	Analog adjustable relays
8/33	Digitally adjustable relays to DIN 3440
8/36	Digitally adjustable relays for up to 3 sensors
Thermistor motor protection	
8/39	For PTC sensors
Monitoring relays for electrical variables	
8/46	General data
Phases and voltage:	
8/49	- Phase failure and phase sequence monitoring
8/50	- Phase asymmetry monitoring
8/51	- Line monitoring
8/52	- Single-phase voltage monitoring
8/55	- Three-phase voltage monitoring
Current:	
8/56	- Single-phase current monitoring
Power factor:	
8/58	- Monitoring (motor load monitoring)
Insulation resistance:	
8/59	- For ungrounded AC voltage networks
8/61	- For ungrounded DC voltage networks
Other monitoring relays	
8/63	General data
8/64	Fill level
8/66	Speed

Coupling relays and converters	
Coupling relays with narrow type of construction	
8/68	General data
8/71	Relay connectors
8/77	Plug-in relay connectors
8/79	Semiconductor couplers
Coupling relays in industrial enclosure	
8/85	Relay connectors
Plug-in relays	
8/87	Relay connectors
Power relays	
8/95	With screw and tab connectors
Converters/isolation amplifiers	
8/100	Interface converters/isolation amplifiers
8/105	Project planning aids

Time, Monitoring and Coupling Relays and SIMIREL Converters

Introduction

Overview

The advantages at a glance



3RP



7PV



3RS10



3RN



3UG

		Order No.	Page
Time relays			
in 22.5 mm industrial enclosure	<ul style="list-style-type: none"> Low-cost favorites with monofunctions such as response delay, returning time, clock-pulse, star-delta function, multifunction Wide-range voltage designs 	3RP15	8/18
in 45 mm SIRIUS design	<ul style="list-style-type: none"> The solution for small mounting depths The low mounting height reduces the tier spacing 	3RP20	8/22
for front panel mounting	<ul style="list-style-type: none"> Analog and digital variants 	7PV	8/23
for mounting onto contactors	<ul style="list-style-type: none"> Saves space because the relay is mounted onto the contactor Wiring advantages thanks to direct contacting with contactor 	3RT19	8/24
Temperature monitoring relays			
<i>for monitoring the temperatures of solids, liquids, and gases</i>			
Analog	<ul style="list-style-type: none"> Separate versions for overshoot and undershoot For simple monitoring tasks For PT100 or thermoelements J and K Variable hysteresis 	3RS10, 3RS11	8/32
Digital, to DIN 3440	<ul style="list-style-type: none"> For two-step or three-step controls For monitoring heat generation plants For PT100/1000, KTY83/84, NTC or type J, K, T, E, N, R, S, and B thermoelements 	3RS10, 3RS11	8/35
Digital, for up to 3 sensors	<ul style="list-style-type: none"> For simultaneously monitoring several sensors Especially suited for monitoring motor winding temperatures For PT100/1000, KTY83/84, NTC 	3RS10	8/38
Thermistor motor protection			
for PTC thermistor detectors	<ul style="list-style-type: none"> Relays for monitoring motor winding temperatures with type A PTC sensors Integrated with ATEX license Closed-circuit principle Depending on the version: with open-circuit and short-circuit detection, protection against voltage failure, manual/automatic/remote RESET 1 CO, 1 NO + 1 NC, 2 CO, 1 NO + 1 CO or 2 CO, hard gold-plated 	3RN1	8/44
Monitoring relay for electrical variables			
<i>Line monitoring, especially for portable machines such as construction machines</i>			
Phase failure and phase sequence monitoring	<ul style="list-style-type: none"> Low-cost solution to prevent incorrect directions of rotation as well as overheating of the motor due to phase failure 	3UG35 11	8/49
Phase failure and phase sequence monitoring and detection of regenerative reverse voltages up to 90 %	<ul style="list-style-type: none"> Low-cost solution to prevent incorrect directions of rotation as well as overheating of the motor due to phase failure 	3UG35 13	8/49
Phase failure, phase sequence, and phase asymmetry monitoring	<ul style="list-style-type: none"> Monitoring of the direction of rotation as well as overheating of the motor due to asymmetrical voltages or phase failure 	3UG30 12	8/50
Phase failure, phase sequence, phase asymmetry monitoring, and symmetrical undervoltage	<ul style="list-style-type: none"> Monitoring of the direction of rotation as well as overheating of the motor due to asymmetrical voltages or phase failure Trips on mains overload 	3UG30 13	8/51
<i>Line monitoring for permanently installed machines and plants</i>			
Three-phase voltage monitoring with phase failure and asymmetry monitoring as well as symmetrical overvoltage and undervoltage (3UG30 42 with neutral conductor monitoring)	<ul style="list-style-type: none"> Units with internal power supply without separate auxiliary voltage Upper and lower threshold value for protecting the plant against unstable networks; can be adjusted separately 	3UG30 41, 3UG30 42	8/55
<i>Single-phase voltage monitoring</i>			
Voltage monitoring (threshold switch) with auxiliary voltage, switchable for overvoltage and undervoltage	<ul style="list-style-type: none"> Electrically isolated With or without memory Large measuring range with 3 steps Variable hysteresis 	3UG35 31, 3UG35 32	8/54
Voltage monitoring with internal power supply, version for overshoot and undershoot monitoring (3UG35 34) or window monitoring (3UG35 35)	<ul style="list-style-type: none"> Own auxiliary voltage not required Low wiring overhead Variable hysteresis With or without memory (3UG35 34) 	3UG35 34, 3UG35 35	8/54

The advantages at a glance



3TX 3RS18 LZX 3TG10 3RS17

	Order No.	Page
Monitoring relays for electrical variables		
<i>Single-phase current monitoring</i>		
Current monitoring with auxiliary voltage, switchable for overcurrent or undercurrent	<ul style="list-style-type: none"> Electrically isolated With or without memory Large measuring range with 3 steps Variable hysteresis 	3UG35 21, 3UG35 22 8/57
Power factor monitoring (motor load monitoring)	<ul style="list-style-type: none"> Upper and lower threshold value can be adjusted separately 	3UG30 14 8/58
<i>Insulation resistance</i>		
Monitoring of the insulation resistance for ungrounded AC or DC networks from 10 ... 110 kΩ	<ul style="list-style-type: none"> Test button With or without memory Switchable measuring range 	3UG30 81, 3UG30 82 8/60, 8/62
Other monitoring relays		
Fill level and resistance	<ul style="list-style-type: none"> As single-step or two-step controls for inlet or outlet monitoring of conducting liquids or as resistance threshold switch Variable, wide range from 5 ... 100 kΩ UNDER/OVER adjustable 	3UG35 01 8/64
Underspeed monitoring	<ul style="list-style-type: none"> Together with a sensor for monitoring continuous pulses With or without memory Adjustable ON delay 	3UG30 51 8/67
Interfaces with narrow type of construction		
Relay connector	<ul style="list-style-type: none"> Width 6.2 mm (1 NO, 1 CO), 12.5 mm and 17.5 mm Output interfaces Input interfaces with hard gold-plating 	3TX7 002, 3TX7 003, 3TX7 004, 3TX7 005 8/74, 8/75
Plug-in interface, complete with relay	<ul style="list-style-type: none"> Width 6.2 mm (1 NO, 1 CO) Replaceable relay 	3TX7 014-1..00 8/78
Plug-in interface, complete with relay and hard gold-plating	<ul style="list-style-type: none"> Width 6.2 mm (1 CO) 	3TX7 014-1..02 8/78
Semiconductor interfaces	<ul style="list-style-type: none"> Output 1 semiconductor, triac or transistor 	3TX7 002, 3TX7 004, 3TX7 005 8/83
Coupling relays in industrial casing		
Relay connector	<ul style="list-style-type: none"> Safe isolation up to 300 V between contacts and relay circuits 1, 2 and 3 changeover contacts Hard gold-plated contacts in combination and wide voltage range versions 	3RS18 8/86
Plug-in relays		
Relay connector with 1 or 2 changeover contacts	<ul style="list-style-type: none"> Switching capacity 16 A/8 A for LZX:RT; 6 A for LZX:RY Width 15.5 mm Socket alternatively with/without logic isolation 	LZX:RT, LZX:RY 8/90
Relay connector with 2, 3, and 4 changeover contacts	<ul style="list-style-type: none"> Switching capacity 12 A/10 A/6 A Width 27 mm Socket alternatively with/without logic isolation 	LZX:PT 8/90
Relay connector with 3 changeover contacts and circular base	<ul style="list-style-type: none"> Switching capacity 6 A 11-pole circular base Width 38 mm 	LZX:MT 8/92
Power relays		
With screw and tab connectors		3TG10 8/98
Converter/isolation amplifiers		
Converters for standard signals and non-standard variables	<ul style="list-style-type: none"> All terminals are protected against polarity reversing and overvoltage up to 30 V For electrical isolation and conversion of analog signals Short-circuit resistant outputs From 6.2 mm width Switchable multi-range converters Variants with manual/automatic switch for setpoint input or for the conversion of analog variables into frequency 	3RS17 8/102

Time, Monitoring and Coupling Relays and SIMIREL Converters

Introduction

Overview

SIMIREL offers everything one needs between the motor feeder and automation systems. Regardless whether time, monitoring or coupling relays or converters.

Advantages

- Comprehensive range – suitable for all situations
- Very simple operation
- Multifunctional – the relays are very versatile
- Practical graduated range of products – tailor-made solutions
- Many versions also with spring-loaded terminals.

Design

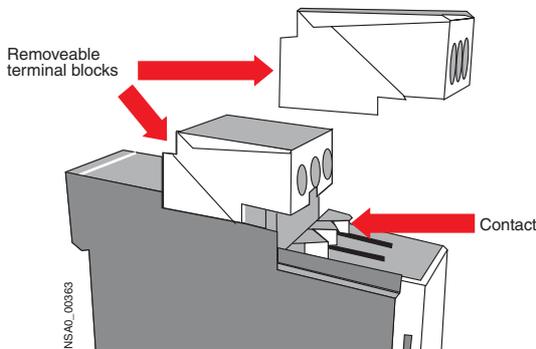
Removable terminals

The removable terminal is the innovative connection method by Siemens for the new relay casing with 22.5 mm and 45 mm width. This allows the complete terminal block to be quickly and easily assembled and disassembled. The connections do not have to be detached for this purpose.

Note:

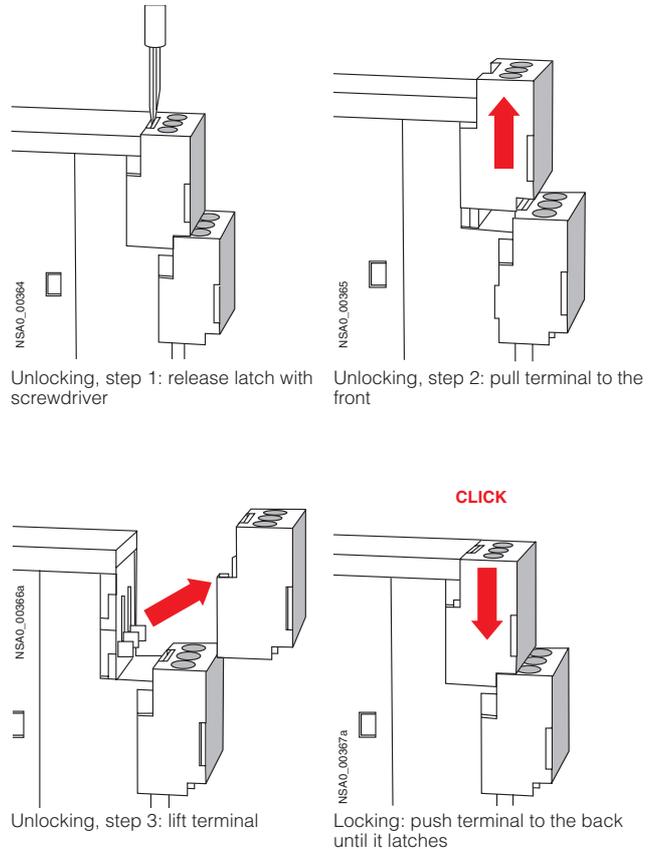
- The following devices will be converted by end 2004 and can be ordered using the same order number:
 - 3RP15 time relay in 22.5 mm industrial casing
 - 3RS10/3RS11 temperature monitoring relay
 - 3RN10 thermistor motor protection
 - Coupling relay in 3RS18 industrial casing
- Before the terminal blocks are removed, the unit must be de-energized.

Features



- Proven terminal technology
The new type of construction of the removable terminal means that the conductors remain easy to connect. The old conductor cross-sections can still be used.
- Different connection methods
All modules are available with screw-type and spring-loaded connections.
- Coding
The coding ensures that the terminal blocks cannot be mixed up (EN 50178).
- Withdrawal and vibration safety
The terminal blocks are latched to the casing. The terminal blocks can be detached with the help of a DIN VDE 0100-410 screwdriver. The terminal blocks cannot be detached unintentionally.
- Finger-safe
The contacts are finger-safe to DIN 61140, IEC 60529 even if the unit is removed.
- Labeling
All terminal connections are printed onto the terminal block which allows the unit to be factory-fitted.

Locking/unlocking the removable terminal



Customer benefits

- Quick replacement of the basic unit minimizes maintenance costs and reduces downtimes
- The coding of the terminals prevents mistakes during replacement.
- Configuration without unit possible
- Finger-safe during replacement
- Easy screw-type and spring-loaded connection

Accessories

Designation	DT	Order No.	PS*	Weight per PU approx. kg
Blank unit designation plates for 3RP, 3RN1, 3RS10, 3RS11, 3RS18				
20 mm x 7 mm pastel turquoise	A	3RT19 00-1SB20	340 units	0.067

Computer labeling system for individual labels available from: murrplastic Systemtechnik GmbH.

Technical specifications

Type		3RP20 05 3RP20 25	3RP15 05 3RP15 31 3RP15 32 3RP15 33	3RP15 11 3RP15 12 3RP15 13 3RP15 25 3RP15 55	3RP15 40	3RP15 60	3RP15 74 3RP15 76	3RP15 27	
Rated insulation voltage Pollution degree 3, Overvoltage category III	AC V	300; 500 for 3RP15 05-1BT20							
Working range at excitation¹⁾		0.85 ... 1.1 × U_s at AC; 0.8 ... 1.25 × U_s for DC; 0.95 ... 1.05 x rated frequency							
Rated power • Power consumption at 230 V AC, 50 Hz	W VA	1 4	2 6	2 6	2 2 ²⁾	2 6	2 6	1 1	
Rated operating currents I_e AC-15 at 230 V AC, 50 Hz AC-14; DC-13 DC-13 at 24 V DC-13 at 48 V DC-13 at 60 V DC-13 at 110 V DC-13 at 230 V	A	3 ³⁾ – 1 0.45 0.35 0.2 0.1						– 0.01 ... 0.6 – – – – –	
Required DIAZED fuse⁴⁾ Operational class gL/gG	A	4							
Operating frequency • when loaded with I_e 230 V AC • when loaded with 3RT10 16 contactor, AC 230 V	1/h 1/h	2500 5000							5000 5000
Recovery time	ms	150 ⁵⁾					300	150	50
Minimum ON period	ms	35	35 ⁶⁾	–	200 ⁷⁾	–			
Residual current with non-conducting output	mA	–							≤ 5
Voltage drop with conducting output	VA	–							≤ 3.5
Short-time loading capacity		–							10 (to 10 ms)
Setting accuracy with reference to scale value		typical ± 5%							
Repeat accuracy		≤ ± 1 %							
Mechanical endurance operating cycles		30 × 10 ⁶							100 × 10 ⁶
Permissible ambient temperature during operation during storage	°C °C	– 25 ... + 60 – 40 ... + 85							
Degree of protection acc. to EN 60529		Cover IP40 Terminals IP20							
Conductor cross-sections - Screw connection (to connect 1 or 2 conductors); for standard screwdriver (size 2 and Pozidriv 2) - Spring-loaded terminal (to connect 1 or 2 conductors; for 22.5 mm time relay use screwdriver with 3 mm blade or 8WA2 807 opening tool ⁸⁾)	solid finely stranded with end sleeve AWG conductors, solid or stranded terminal screw tightening torque solid finely stranded • with end sleeve • without end sleeve AWG conductors, solid or stranded	mm ² mm ² AWG NM	2 × (0.5 ... 1.5) 2 × (0.75 ... 2.5) 2 × (0.5 ... 1.5) 2 × (0.75 ... 2.5) 2 × (18 ... 14)	1 × (0.5 ... 4) 2 × (0.5 ... 2.5) 1 × (0.5 ... 2.5) 2 × (0.5 ... 1.5) 2 × (20 ... 14) M 3 M 3.5	mm ² mm ² mm ² AWG	2 × (0.25 ... 2.5) 2 × (0.25 ... 1.5) 2 × (0.25 ... 2.5) 2 × (0.25 ... 1.5) 2 × (24 ... 14)	2 × (0.25 ... 1.5) 2 × (0.25 ... 1) 2 × (0.25 ... 1.5) 2 × (24 ... 16)		

- 1) If nothing else is stated.
- 2) Maximum inrush current 1 A/100 ms.
- 3) For 3RP15 05-.R: NC contact → $I_e = 1$ A.
- 4) $I_k \geq 1$ kA, weld-free acc. to IEC 60947-5-1.
- 5) With 3RP15 05-.BW30/.AW30/.RW30 and 3RP15 25-.BW30, 10 to 250 ms, voltage-dependent.
- 6) Minimum ON period with 3RP15 05-.BW30, 150 ms, until instantaneous contact has switched.
- 7) For correct operation, observe minimum ON period.

Time Relays

General data

Type	3RP20 05 3RP20 25	3RP15 05 3RP15 31 3RP15 32 3RP15 33	3RP15 11 3RP15 12 3RP15 13 3RP15 25 3RP15 55	3RP15 40	3RP15 60	3RP15 74 3RP15 76	3RP15 27
Permissible mounting position	any						
Shock resistance Half-sine acc. to IEC 60068-2-27	g/ms 15/11						
Vibration resistance acc. to IEC 60068-2-6	Hz/mm 10 ... 55/0.35						
EMC tests acc. to basic specification	EN 61000-6-2/EN 61000-6-4						

Type	7PV33 48	7PV41 48	7PV43 48
Rated insulation voltage Overvoltage category C to DIN VDE 0110	AC V 250		
Working range of excitation	+ 10 ... - 15 %	24 V: - 15 ... + 30 % 115/230 V: - 15 ... + 10 %	
Rated power • Power consumption at 230 V AC, 50 Hz	W 1 VA 11		
Rated operating currents I_e AC-1 at AC 230 V, 50 Hz	A 8		
Operating frequency • when loaded with I_e AC 230 V • when loaded with 3RT16 contactor, AC 230 V	1/h 600 1/h -		
Recovery time	ms 50	100	
Minimum ON period	ms 50	100	
Setting accuracy with reference to upper limit of scale	± 0.03 % ± 10 ms	± 10 % -	
Repeat accuracy	± 0.03 % ± 10 ms	± 2 %	
Mechanical endurance operating cycles	5×10^6	2×10^7	
Permissible ambient temperature during operation during storage	°C - 10 ... + 60 °C - 30 ... + 70	- 20 ... + 60 - 25 ... + 70	
Degree of protection acc. to EN 60529	IP65	IP50	
Permissible mounting position	any		

acc. to IEC 61812-1/DIN VDE 0435 Part 2021

Type		3RT19 16-2C 3RT19 16-2D 3RT19 26-2C 3RT19 26-2D	3RT19 16-2E 3RT19 16-2F 3RT19 16-2G 3RT19 26-2E 3RT19 26-2F 3RT19 26-2G	3RT19 16-2L
Rated insulation voltage Pollution degree 3 Overvoltage category III to DIN VDE 0110	AC V	300		
Working range of excitation		0.8 ... 1.1 × U_s , 0.95 ... 1.05 × rated frequency		0.85 ... 1.1 × U_s , 0.95 ... 1.05 × rated frequency
Rated power • Power consumption at 230 V AC, 50 Hz	W VA	1 1		4 (1 W for 3RT1916-2L) 4
Rated operating currents I_e AC-140; DC-13	A	0.3 for 3RT19 16 0.5 for 3RT19 26		–
AC-15 at 230 V AC, 50 Hz	A	–		3
DC-13 at 24 V	A	–		1
DC-13 at 110 V	A	–		0.2
DC-13 at 230 V	A	–		0.1
Required DIAZED fuse Operational class gL/gG	A	–		4
Operating frequency • when loaded with I_e 230 V AC • when loaded with 3RT1016 contactor, AC 230 V	1/h 1/h	2500 2500		2500 5000
Recovery time	ms	50		150
Minimum ON period	ms	35		200 (with OFF-delay without auxiliary volt- age) 35 (with OFF-delay with auxiliary volt- age)
Residual current (two-wire)	mA	≤ 5		–
Voltage drop with conducting output	VA	≤ 3.5		–
Short-time loading capacity	A	10 (to 10 ms)		–
Setting accuracy with reference to upper limit of scale		≤ ± 15 %		
Repeat accuracy		≤ ± 1 %		
Mechanical endurance operating cycles		100 × 10 ⁶		10 × 10 ⁶
Permissible ambient temperature during operation during storage	°C °C	– 25 ... + 60 – 40 ... + 85		
Degree of protection acc. to EN 60529		Cover IP40 Terminals IP20		
Conductor connection solid finely stranded with end sleeve solid or stranded	mm ² mm ² AWG	2 × (0.5 ... 1.5), 2 × (0.75 ... 4) 2 × (0.5 ... 2.5) 2 × (18 ... 14)		
Terminal screw		M 3		
Tightening torque	NM	0.8 ... 1.2		
Permissible mounting position		any		
Shock resistance Half-sine acc. to IEC 60068-2-27	g/ms	15/11		
Vibration resistance acc. to IEC 60068-2-6	Hz/ mm	10 ... 55/0.35		
EMC tests acc. to basic specification		IEC 61000-6-2/IEC 61000-6-4		
Overvoltage protection Varistor		integrated into time relay		integrated into 3RT1916

Time Relays

General data

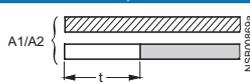
Functions

3RP15/3RP20/7PV function table

Function	Function chart	3RP20 time relay and 3RP19 01 label set	3RP15 time relay and 3RP19 01 label set	7PV time relay
		3RP20 05-A	3RP20 25	3RP15 05-A 3RP19 01-0A
			Identification letter	3RP15 1. 3RP15 25 3RP15 27 3RP15 3. 3RP15 40 3RP15 55 3RP15 7. 7PV33 7PV43
1 changeover contact				
with ON-delay		■	■	A
OFF-delay with auxiliary voltage		■	■	B ¹⁾
OFF-delay without auxiliary voltage		■	■	
ON-delay and OFF-delay with auxiliary voltage ($t = t_{on} = t_{off}$)		■	■	C ¹⁾
flashing, starting with interval (pulse/interval 1:1)		■	■	D
clock-pulse, starting with interval (dead interval, pulse time, and time setting ranges each separately adjustable)		■	■	
passing make contact		■	■	E
passing break contact with auxiliary voltage		■	■	F ¹⁾
pulse shaping with auxiliary voltage (pulse generation at the output does not depend on duration of energizing)		■	■	G ¹⁾
additive ON-delay with auxiliary voltage		■	■	H ¹⁾

1 normally open contact (semiconductor)

ON-delay
The two-wire time relay is connected in series with the load. Timing begins after application of the exciting voltage. The semiconductor output then becomes conducting, and the load is energized.



- Note on function with start contact: a new control signal at terminal B after the operating time has started resets the operating time to zero. This does not apply to "G", "G•" and "H", "H•", which are not retriggerable.
- For the flashing function, the start between interval "D" and pulse "D" is selectable.

- This function is indicated on the unit with the identification letter "C".
- This function is indicated on the unit with the identification letter "H".
- This function is indicated on the unit with the identification letter "B".

Function	Function chart	3RP20 time relay and 3RP19 01 label set	3RP15 time relay and 3RP19 01 label set							7PV							
		3RP20 05-B	3RP20 25	3RP15 05-B	3RP19 01-0B	3RP15 05-R	3RP19 01-0A	Identification letter	3RP15 1.	3RP15 25	3RP15 27	3RP15 3.	3RP15 40	3RP15 55	3RP15 60	3RP15 7.	7PV41

2 changeover contacts

with ON-delay		■		■		■	A		■							■	
ON-delay and instantaneous contact		■		■			A●										■
OFF-delay with auxiliary voltage		■		■		■	B ¹⁾										
OFF-delay with auxiliary voltage and instantaneous contact		■		■			B● ¹⁾										
OFF-delay without auxiliary voltage												■					
ON-delay and OFF-delay with auxiliary voltage ($t = t_{on} = t_{off}$)		■		■		■	C ¹⁾										
ON-delay and OFF-delay with auxiliary voltage and instantaneous contact ($t = t_{on} = t_{off}$)		■		■			C● ¹⁾										
flashing, starting with interval (pulse/interval)		■		■		■	D										
flashing, starting with interval (pulse/interval 1:1) and instantaneous contact		■		■			D●										
passing make contact		■		■		■	E										
passing make contact and instantaneous contact		■		■			E●										

1) Note on function with start contact: a new control signal at terminal B after the operating time has started resets the operating time to zero. This does not apply to G, G● and H, H●, which are not retriggerable.

Time Relays

General data

Function	Function chart	3RP20 time relay and 3RP19 01 label set	3RP15 time relay and 3RP19 01 label set													
		3RP20 05-B	3RP20 25	3RP15 05-B	3RP19 01-0B	3RP15 05-R	3RP19 01-0A	Identification letter	3RP15 1.	3RP15 25	3RP15 27	3RP15 3.	3RP15 40	3RP15 55	3RP15 60	3RP15 7.

2 changeover contacts

passing break contact with auxiliary voltage 							F ¹⁾									
passing break contact with auxiliary voltage and instantaneous contact 						F ¹⁾										
pulse shaping with auxiliary voltage (pulse generation at the output does not depend on duration of energizing) 					G ¹⁾											
pulse shaping with auxiliary voltage and instantaneous contact (pulse generation at the output does not depend on duration of energizing) 					G ¹⁾											
additive ON-delay with auxiliary voltage 					H ¹⁾											
additive ON-delay with auxiliary voltage and instantaneous contact 					H ¹⁾											
star-delta function 					YΔ											

2 normally open contacts

star-delta function YΔ 																
----------------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

3 normally open contacts

star-delta function with overtravel function ²⁾ (idling) 																
---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

1) Note on function with start contact: a new control signal at terminal B after the operating time has started resets the operating time to zero. This does not apply to G, G● and H, H●, which are not retriggerable.

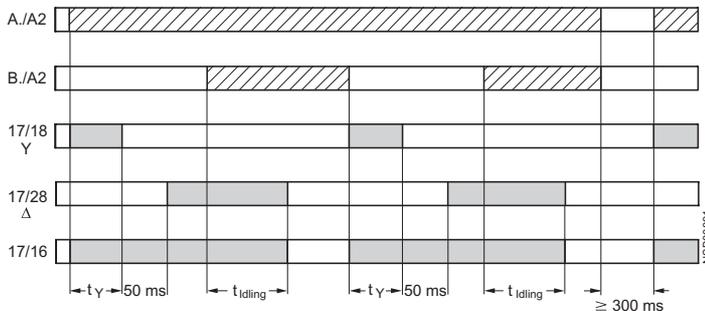
2) For function diagrams showing the various possibilities of operation of the 3RP15 60-1S.30 (see Page 8/11).

3RP15 function table

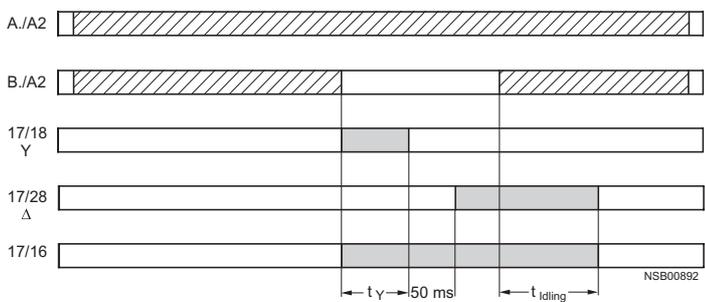
Possibilities of operation of the 3RP15 60-1S.30 time relay

-  Time relay energized
-  Contact closed
-  Contact open

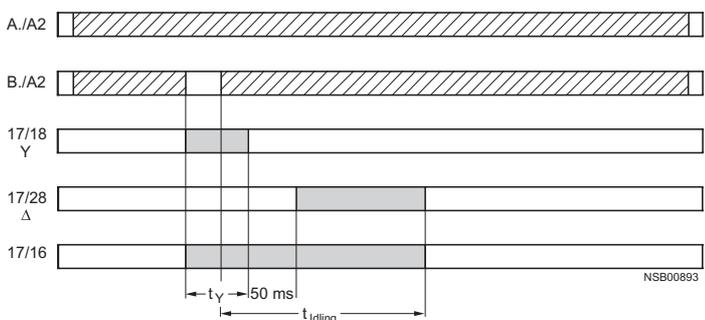
Operation 1



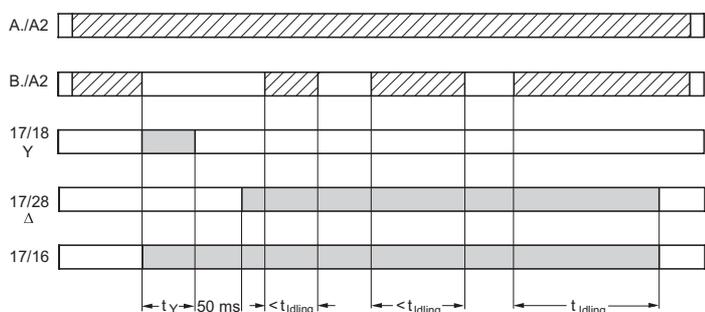
Operation 2



Operation 3



Operation 4



The following applies to all operations:
the pressure switch controls the timing via B./A2.

- t_Y = star time 1 to 20 s
- t_{idling} = idling time (overtravel time) 30 to 600 s

Operation 1:

Start contact B./A2 is opened when supply voltage A./A2 is applied.

The supply voltage is applied to A./A2 and there is no control signal on B./A2. This starts the $\Upsilon\Delta$ timing. The idling time (overtravel time) is started by applying a control signal to B./A2.

When the set time t_{idling} (30 to 600 s) has elapsed, the output relays (17/16 and 17/28) are reset. If the control signal on B./A2 is switched off (minimum OFF period 270 ms), a new timing is started.

Notes:

Observe response time (dead time) of 400 ms on energizing supply voltage until contacts 17/18 and 17/16 close.

Operation 2:

Start contact B./A2 is closed when supply voltage A./A2 is applied.

If the control signal B./A2 is already present when the supply voltage A./A2 is applied, **no** timing is started. The timing is only started when the control signal B./A2 is switched off.

Operation 3:

Start contact B./A2 closes while star time is running.

If the control signal B./A2 is applied again during the star time, the idling time starts and the timing is terminated normally.

Operation 4:

Start contact B./A2 opens while delta time is running and is applied again.

If the control signal on B./A2 is applied and switched off again during the delta time although the idling time has not yet elapsed, the idling time (overtravel time) is reset to zero. If the control signal is re-applied to B./A2, the idling time is restarted.

Application example based on standard operation (operation 1)

For example, use of 3RP15 60 for compressor control

Frequent starting of compressors strains the network, the machine, and the increased costs for the operator. The new time relay prevents frequent starting at times when there is high demand for compressed air. A special control circuit prevents the compressor from being switched off immediately when the required air pressure in the tank has been reached. Instead, the valve in the intake tube is closed and the compressor runs in idling mode for a specific time which can be set from 30 to 600 s.

If the pressure falls within this time, the motor does not have to be restarted again, but can return to nominal load operation from no-load operation.

If the pressure does not fall within this idling time, the motor is switched off.

The pressure switch controls the timing via B./A2.

The supply voltage is applied to A./A2 and the start contact B./A2 is open, i.e. there is no control signal on B./A2 when the supply voltage is applied. The pressure switch signals "too little pressure in system" and starts the timing via terminal B./A2. The compressor is started, enters $\Upsilon\Delta$ operation, and fills the pressure tank.

When the pressure switch signals "sufficient pressure", the control signal B./A2 is applied, the idling time (overtravel time) is started, and the compressor enters no-load operation for the set period of time between 30 to 600 s. The compressor is then switched off. The compressor is only restarted if the pressure switch responds again (low pressure).

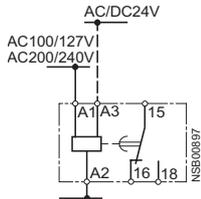
Time Relays

General data

Circuit diagrams

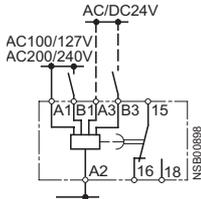
Internal circuit diagrams (terminal designation to DIN 46199, Part 5)

3RP15 05-A
3RP15 1
3RP15 25-A
3RP20 05
3RP20 25



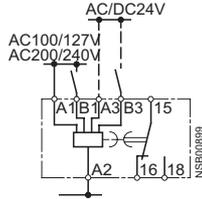
with ON-delay

3RP15 05-A
3RP15 3-A
3RP20 05



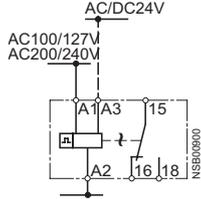
OFF-delay with auxiliary voltage

3RP15 05-A
3RP20 05



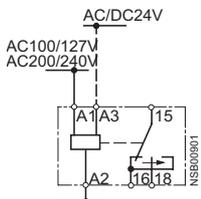
ON-delay and OFF-delay with auxiliary voltage

3RP15 05-A
3RP20 05



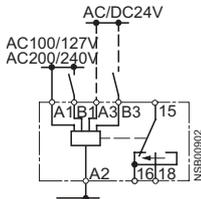
flashing

3RP15 05-A
3RP20 05



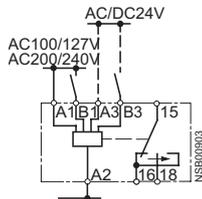
passing make contact

3RP15 05-A
3RP20 05



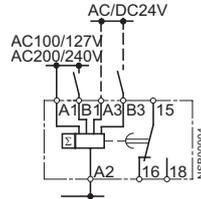
passing break contact with auxiliary voltage

3RP15 05-A
3RP20 00



pulse-forming with auxiliary voltage

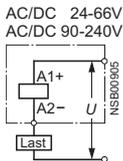
3RP15 05-A



additive ON-delay with auxiliary voltage

3RP15 27

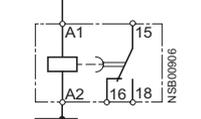
$U = AC/DC 24 \dots 66 V$
 $AC/DC 90 \dots 240 V$



ON-delay, two-wire design

3RP15 40-A

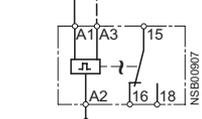
AC/DC 24V
AC/DC 100/127V
AC/DC 200/240V



OFF-delay without auxiliary voltage

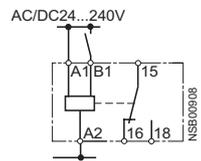
3RP15 55

AC/DC 24V
AC/DC 42V...48V
AC/DC 60V
AC/DC 100/127V
AC/DC 200/240V



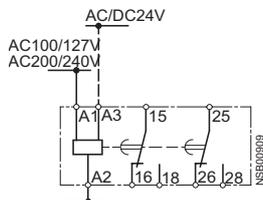
clock-pulse relay

3RP15 05-AW30



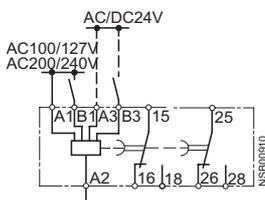
multi-function relay
(same functions as 3RP15 05-1A)

3RP15 05-B, 3RP15 25-1B



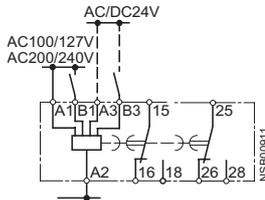
ON-delay, 3RP15 25-1B
also for AC/DC 42...48/60 V
(see Page 8/13 3RP15 25-1BR30)

3RP15 05-B



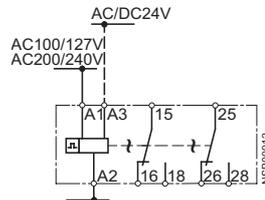
OFF-delay with auxiliary voltage

3RP15 05-B



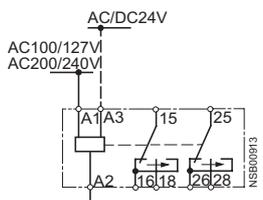
ON-delay and OFF-delay with auxiliary voltage

3RP15 05-B



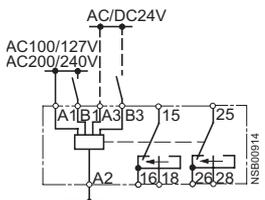
flashing

3RP15 05-B



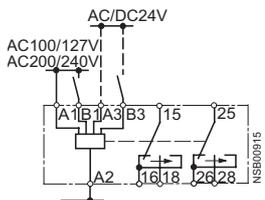
passing make contact

3RP15 05-B



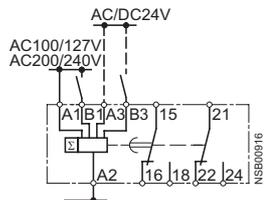
passing break contact with auxiliary voltage

3RP15 05-B



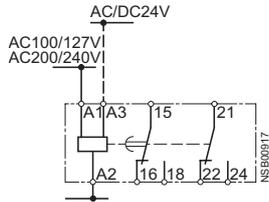
pulse-forming with auxiliary voltage

3RP15 05-B



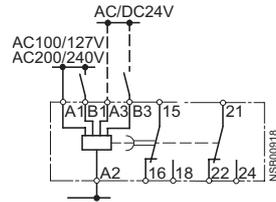
additive ON-delay with auxiliary voltage and instantaneous contact

3RP15 05-.B



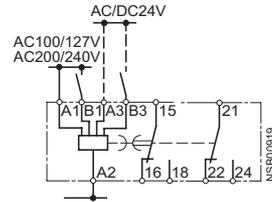
ON-delay and instantaneous contact

3RP15 05-.B



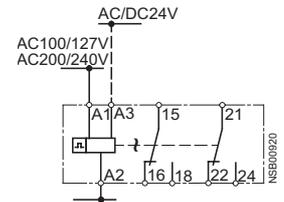
OFF-delay with auxiliary voltage and instantaneous contact

3RP15 05-.B



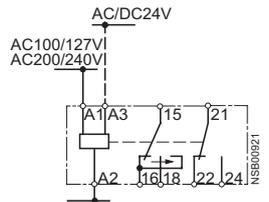
ON-delay and OFF-delay with auxiliary voltage and instantaneous contact

3RP15 05-.B



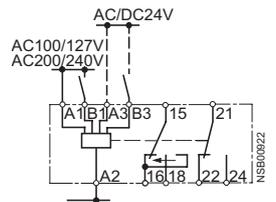
flashing and instantaneous contact

3RP15 05-.B



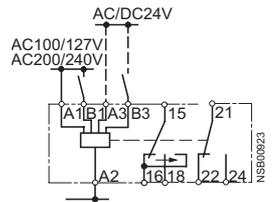
passing make contact and instantaneous contact

3RP15 05-.B



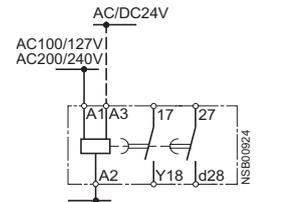
passing break contact with auxiliary voltage and instantaneous contact

3RP15 05-.B



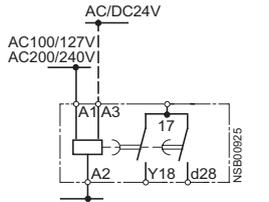
pulse-forming with auxiliary voltage and instantaneous contact

3RP15 05-.B



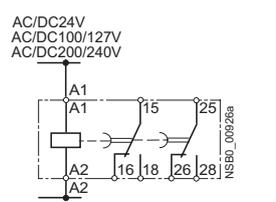
star-delta function

3RP15 74, 3RP15 76



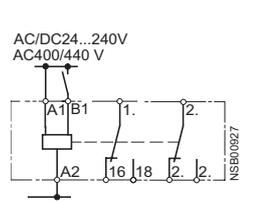
star-delta time relay

3RP15 40-.B



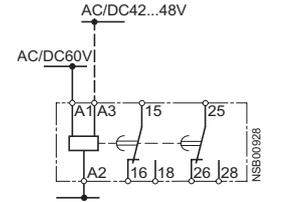
OFF-delay without auxiliary voltage

3RP15 05-.BW30/-1BT20/-RW30



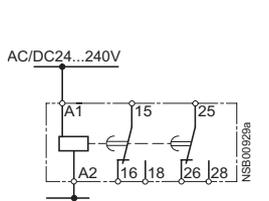
multi-function relay (for functions see function table)

3RP15 25-.BR30



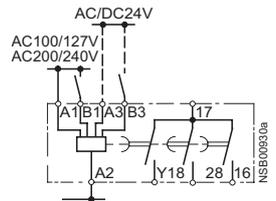
with ON-delay

3RP15 25-.BW30



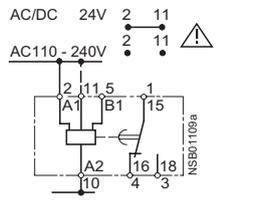
with ON-delay

3RP15 60-.S



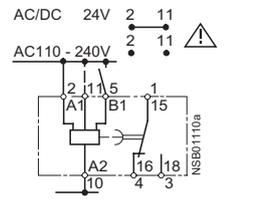
star delta time relay with overtravel function (idling)

7PV33 48-2AX34



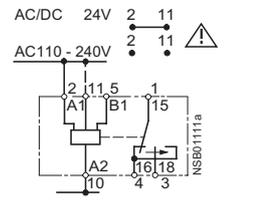
ON-delay (A)

7PV33 48-2AX34



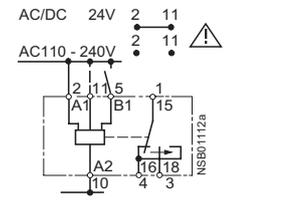
OFF-delay with auxiliary voltage (C)

7PV33 48-2AX34



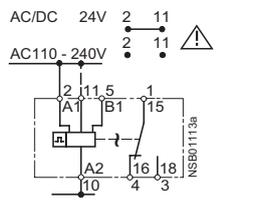
passing make contact (H)

7PV33 48-2AX34



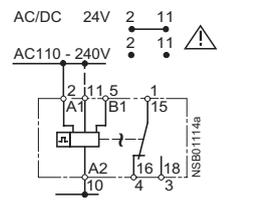
pulse-forming with auxiliary voltage (B)

7PV33 48-2AX34



flashing, starting with interval (D)

7PV33 48-2AX34



flashing, starting with pulse (Di)

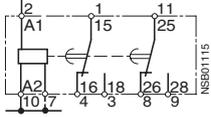
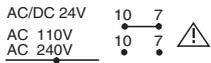
⚠ Important!

The terminal designations for 7PV are different from the designations for the 3RP1 terminals.

Time Relays

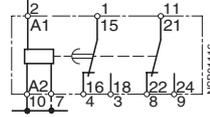
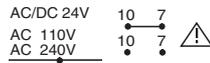
General data

7PV41 48-1BG30 7PV41 48-1BP30



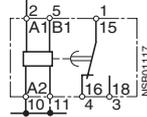
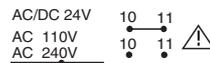
ON-delay (0)

7PV41 48-1BG30 7PV41 48-1BP30



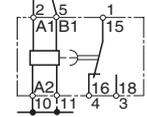
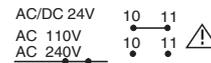
ON-delay and instantaneous contact (1)

7PV43 48-1AG30 7PV43 48-1AP30



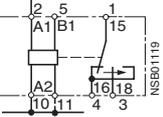
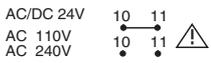
ON-delay (A)

7PV43 48-1AG30 7PV43 48-1AP30



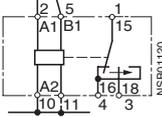
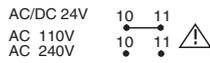
OFF-delay with auxiliary voltage (C)

7PV43 48-1AG30 7PV43 48-1AP30



passing make contact (H)

7PV43 48-1AG30 7PV43 48-1AP30

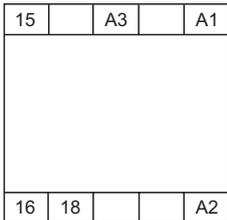


pulse-forming with auxiliary voltage (B)

⚠ Important!
The terminal designations for 7PV are different from the designations for the 3RP1 terminals

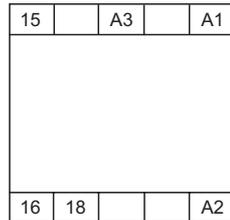
Position of the connection terminals

3RP20 05-.A



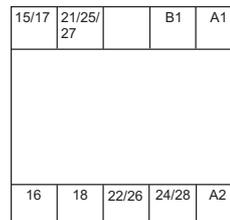
NSB0 01196a

3RP20 25-.A



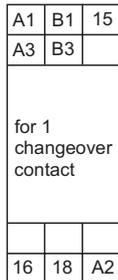
NSB0 01196a

3RP20 05-.BW30



NSB0 01392

3RP15 05-1A



NSB00996

3RP15 05-1AW



NSB01007

3RP15 05-1B.



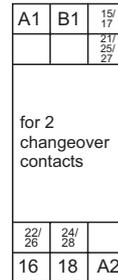
NSB01008

3RP15 05-1BT



NSB00999

3RP15 05-1BW



NSB00999

3RP15 05-1RW



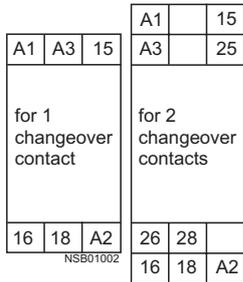
NSB01000

Position of the connection terminals

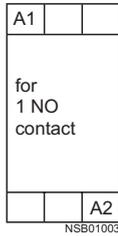
3RP15 1



3RP15 25-1A. or -1B. 1)



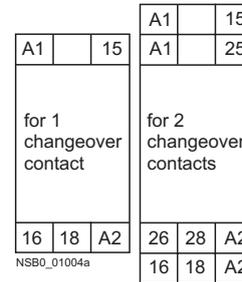
3RP15 27



3RP15 3.



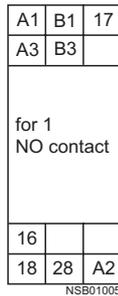
3RP15 40



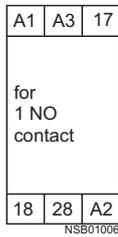
3RP15 55



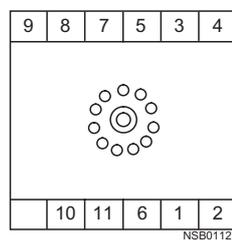
3RP15 60



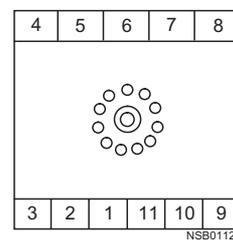
3RP15 7.



LZX socket: MR78750 for time relays 7PV33; 7PV4.



Socket 7PX9921 for time relays 7PV33; 7PV4.



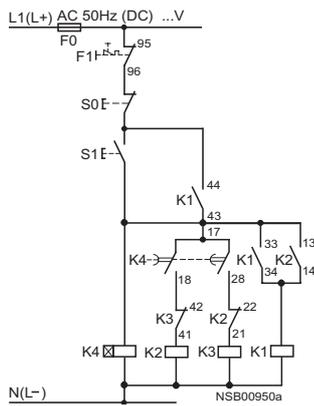
Note: all the diagrams show the view onto the connection terminals.

3RP15/3RP20/7PV circuit diagrams

Control circuits (example circuits) with 3RP15 74 and 3RP15 76 star-delta time relays

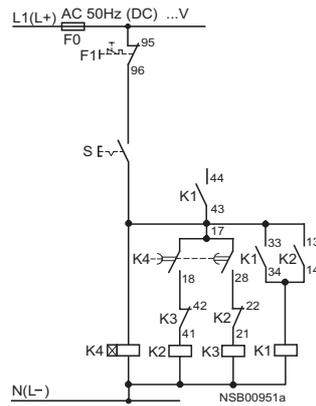
for pushbutton operation

Size S00 to S3



for maintained-contact operation

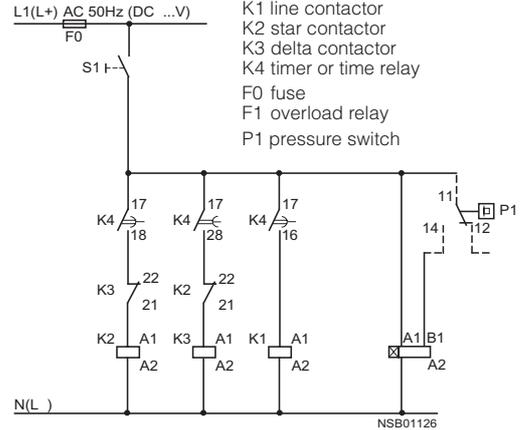
Size S00 to S3



Control circuit (example circuit) with 3RP15 60 star-delta time relays

Legend:

- S0 button "OFF"
- S1 button "ON"
- S maintained-contact button
- K1 line contactor
- K2 star contactor
- K3 delta contactor
- K4 timer or time relay
- F0 fuse
- F1 overload relay
- P1 pressure switch



The 17/18 contact is only closed on the star level; it is open on the delta level as well as when the power is switched off.

1) Depending on the version.

Time Relays

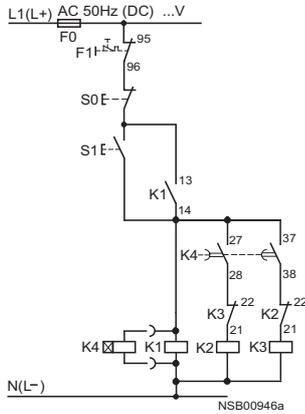
General data

3RT19 circuit diagrams

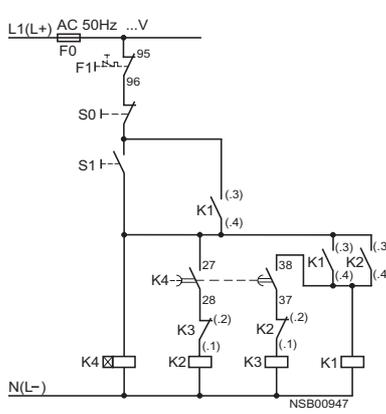
Control circuits (example circuits)
with delayed 3RT19 .6-2G star-delta auxiliary switch block.

for pushbutton operation

Size S00

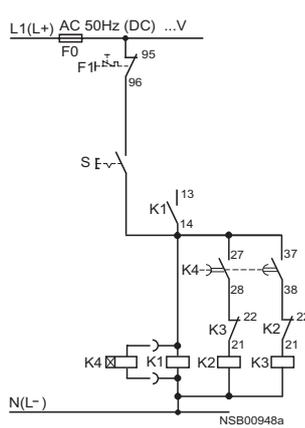


Sizes S0 to S3

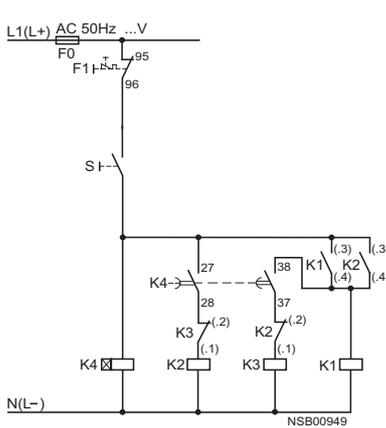


for maintained-contact operation

Size S00



Sizes S0 to S3



Legend:

- S0 "OFF" button
- S1 "ON" button
- S Maintained-contact switch

- K1 Line contactor
- K2 Star contactor
- K3 Delta contactor
- K4 Timer or time relay

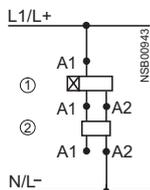
- F0 Fuse
- F1 Overload relay

Contact 27/28 of the solid-state time-delay auxiliary switch block with star-delta function is only closed on the star level. It is open on the delta level as well as when the power is switched off.

Solid-state time relay block

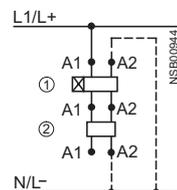
for size S00 to S3 3RT10 contactors and 3RH11 auxiliary contacts

3RT19 16-2C...



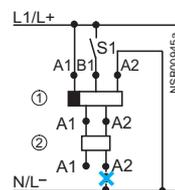
with ON-delay

3RT19 26-2C...



with ON-delay

3RT19 16-2D.../3RT19 26-2D...



OFF-delay
(with auxiliary voltage)

- ① time relay block
- ② contactor
- can be connected
- ✘ Do not connect!

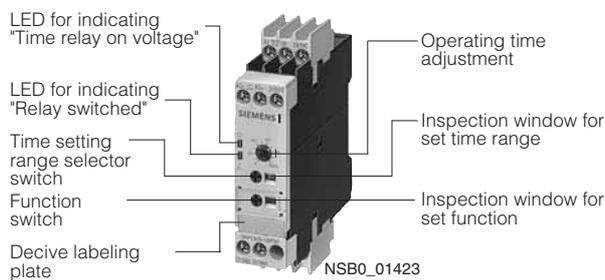
Overview

Standards

The time relays comply with:

- EN 60721-3-3 "Environmental conditions"
- EN 61812-1 (VDE 0435 Part 201) "Solid-state relays, time relays"
- EN 61000-6-2 and EN 61000-6-4 "Electromagnetic compatibility"
- EN 60947-5-1 (VDE 0660 Part 200) "Low-voltage controlgear, switchgear and systems – Electromechanical controlgear"

3RP15 time relays, width 22.5 mm



Accessories

Push-in lugs for screw mounting



Sealable cover



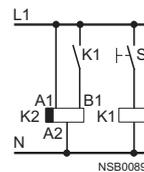
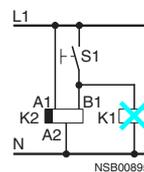
Label set for marking the multifunction relay



Functions

- Changing the time setting ranges and the functions are only effective when carried out in de-energized state.
- Start input B1 or B3 must only be triggered when the supply voltage is applied.
- The same potential must be applied to A1 and B1 or A3 and B3. With two-voltage versions, only one voltage range must be connected.
- The activation of loads parallel to the start input is not permissible when using AC control voltage (see circuit diagrams).
- Surge suppression is integrated in the time relay. This prevents the generation of voltage peaks on the supply voltage when the relay is switched on and off. No damping measures are integrated at the contacts.
- 3RP15 05-R must not be operated next to heat sources > 60 °C.

Parallel load on start input



Area of application

Time relays are used in control, starting, and protective circuits for all switching operations involving time delays. They guarantee a high level of functionality and a high repeat accuracy of timer settings.

Casing design

All time relays are suitable for snap-on mounting onto 35 mm standard mounting rails to EN 60715 or for screw fixing.

Time Relays

Time relays in 22.5 mm industrial enclosure

Selection and ordering data

Screw-type and spring-loaded connection

Solid-state time relays for general use in control systems and mechanical engineering with

- 1 changeover contact or 2 changeover contacts

- Single or selectable time setting ranges
 - Switching position indication by LED
 - Voltage indication by LED
- For function table, see General data.

Version	Time setting range t	Rated control supply voltage U_s	DT	Screw connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.
	adjustable by rotary switch to	AC 50/60 Hz	DC	Order No.				Order No.		
		V	V			kg				kg

3RP15 05 time relays, multifunction, 15 time setting ranges

The functions can be adjusted by means of rotary switches. Indicator labels can be used to adjust different functions of the 3RP15 05 time relay clearly and unmistakably. The corresponding labels can be ordered as an accessory. The same potential must be applied to terminals A. and B. 1)

with LED and	Time setting range t	Rated control supply voltage U_s	DT	Screw connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.	
 3RP15 05-1B	1 changeover contact, 8 functions	0.05 ... 1 s 0.15 ... 3 s 0.5 ... 10 s 1.5 ... 30 s	- 24/100 ... 127 24 24 ... 240 ⁴⁾	12 24 24 24 ... 240 ⁴⁾	A	▶	▶	▶	▶	▶	
	2 changeover contacts, 16 functions	0.05 ... 1 min 5 ... 100 s 0.15 ... 3 min 0.5 ... 10 min 1.5 ... 30 min	24/100 ... 127 24 24/200 ... 240 24 ... 240 ⁴⁾ 400 ... 440	24 24 24 24 ... 240 ⁴⁾ -	A	▶	▶	▶	▶	▶	
	2 changeover contacts, positively driven and hard gold-plated 8 functions ⁵⁾⁶⁾	0.05 ... 1 h 5 ... 100 min 0.15 ... 3 h 0.5 ... 10 h 1.5 ... 30 h 5 ... 100 h $\infty^2)$	24 ... 240 24 ... 240 24 ... 240 24 ... 240 -	24 ... 240 24 ... 240 24 ... 240 24 ... 240 -	A	▶	▶	▶	▶	▶	

3RP15 1. time relays, ON-delay, 1 time setting range

with LED and 1 changeover contact	Time setting range t	Rated control supply voltage U_s	DT	Screw connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.	
 3RP15 1-1A	0.5 ... 10 s	24/100 ... 127 24/200 ... 240	24 24	▶	A	▶	▶	▶	A	0.092	
	1.5 ... 30 s	24/100 ... 127 24/200 ... 240	24 24	▶	A	▶	▶	▶	A	0.092	
	5 ... 100 s	24/100 ... 127 24/200 ... 240	24 24	▶	A	▶	▶	▶	A	0.094	

3RP15 25 time relays, ON-delay, 15 time setting ranges

with LED and	Time setting range t	Rated control supply voltage U_s	DT	Screw connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.
 3RP15 25-1A...	1 changeover contact	0.05 ... 1 s 0.15 ... 3 s	24/100 ... 127 24/200 ... 240	24 24	▶	▶	▶	▶	A	0.093
	2 changeover contacts	0.5 ... 10 s 1.5 ... 30 s	42 ... 48/60 24/100 ... 127	42...48/60 ³⁾ 24	▶	▶	▶	▶	A	0.127
		0.05 ... 1 min 5 ... 100 s 0.15 ... 3 min 0.5 ... 10 min 1.5 ... 30 min	24/100 ... 127 24/200 ... 240 24 ... 240 ³⁾ 24 ... 240 ⁴⁾	24 24 24 ... 240 ⁴⁾ 24 ... 240 ⁴⁾	▶	▶	▶	▶	A	0.134
		0.05 ... 1 h 5 ... 100 min 0.15 ... 3 h 0.5 ... 10 h 1.5 ... 30 h 5 ... 100 h $\infty^2)$								

3RP15 27 time relays, ON-delay, two-wire design, 4 time setting ranges

1 NO contact (semiconductor)	Time setting range t	Rated control supply voltage U_s	DT	Screw connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.
 3RP15 27-1E...	0.05 ... 1 s 0.2 ... 4 s 1.5 ... 30 s 12 ... 240 s	24 ... 66 90 ... 240	24...66 ³⁾ 90...240 ⁴⁾	▶	A	▶	▶	▶	A	0.090

1) For functions, see 3RP19 01-0. label set.

2) At switch position ∞ , no timing. For test purposes (ON/OFF function) on site. Relay is constantly on when activated, or relay remains constantly off when activated. Depending on which function is set.

3) Operating range 0.8 to 1.1 x U_s .

4) Operating range 0.7 to 1.1 x U_s .

5) Positively driven: NO and NC are never closed simultaneously; contact gap ≥ 0.5 mm is ensured, minimum make-break capacity 12 V, 3 mA.

6) The changeover contacts are actuated simultaneously, as a result of which only 8 functions are selectable (no star-delta, no instantaneous contact).

Time relays in 22.5 mm industrial enclosure

Screw and spring-loaded connection

Solid-state time relays for general use in control systems and mechanical engineering with

- 1 changeover contact or 2 changeover contacts

- Single or selectable time setting ranges
- Switching position indication by LED
- Voltage indication by LED

For function table, see "Time relays, General data".

Version	Time setting range t adjustable by rotary switch to	Rated control supply voltage U_s AC 50/60 Hz DC	DT	Screwconnection Order No.	PS*	Weight per PU approx. kg	DT	Spring-loaded terminal Order No.	PS*	Weight per PU approx. kg				
3RP15 3. time relays, OFF-delay, with auxiliary voltage, 1 time setting range														
	with LED and 1 changeover contact. The same potential must be applied to terminals A and B.	0.5 ... 10 s 1.5 ... 30 s 5 ... 100 s	24/100 ... 127 24 24/200 ... 240 24 24/100 ... 127 24 24/200 ... 240 24 24/100 ... 127 24 24/200 ... 240 24	▶ ▶ ▶ ▶ ▶ ▶				3RP15 31-1AQ30 3RP15 31-1AP30 3RP15 32-1AQ30 3RP15 32-1AP30 3RP15 33-1AQ30 3RP15 33-1AP30	1 unit 1 unit 1 unit 1 unit 1 unit 1 unit	0.135 0.136 0.138 0.139 0.139 0.135	C A C C C C	3RP15 31-2AQ30 3RP15 31-2AP30 3RP15 32-2AQ30 3RP15 32-2AP30 3RP15 33-2AQ30 3RP15 33-2AP30	1 unit 1 unit 1 unit 1 unit 1 unit 1 unit	0.124 0.122 0.125 0.121 0.123 0.125
3RP15 40 time relays, OFF-delay, without auxiliary voltage, 7 time setting ranges¹⁾														
	with LED and 1 changeover contact	0.05 ... 1 s 0.15 ... 3 s 0.3 ... 6 s	24 100 ... 127 200 ... 240	24 ²⁾ 100...127 ³⁾ 200...240 ³⁾	▶ ▶ ▶			3RP15 40-1AB30 3RP15 40-1AJ30 3RP15 40-1AN30	1 unit 1 unit 1 unit	0.116 0.119 0.119	A A A	3RP15 40-2AB30 3RP15 40-2AJ30 3RP15 40-2AN30	1 unit 1 unit 1 unit	0.105 0.108 0.110
	2 changeover contacts	0.5 ... 10 s 1.5 ... 30 s 3 ... 60 s 5 ... 100 s	24 100 ... 127 200 ... 240	24 ²⁾ 100...127 ³⁾ 200...240 ³⁾	▶ ▶ ▶ ▶			3RP15 40-1BB30 3RP15 40-1BJ30 3RP15 40-1BN30	1 unit 1 unit 1 unit	0.159 0.161 0.161	A C A	3RP15 40-2BB30 3RP15 40-2BJ30 3RP15 40-2BN30	1 unit 1 unit 1 unit	0.136 0.136 0.136
3RP15 55 time relays, clock-pulse relay, 15 time setting ranges														
	with LED and 1 changeover contact	0.05 ... 1 s 0.15 ... 3 s 0.5 ... 10 s 1.5 ... 30 s 0.05 ... 1 min 5 ... 100 s 0.15 ... 3 min 0.5 ... 10 min 1.5 ... 30 min 0.05 ... 1 h 5 ... 100 min 0.15 ... 3 h 0.5 ... 10 h 1.5 ... 30 h 5 ... 100 h ∞ ⁴⁾	42 ... 48/60 24/100 ... 127 24 24/200 ... 240 24	42...48/60 ⁵⁾ A	▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶ ▶			3RP15 55-1AR30 3RP15 55-1AQ30 3RP15 55-1AP30	1 unit 1 unit 1 unit	0.111 0.111 0.111	C C A	3RP15 55-2AR30 3RP15 55-2AQ30 3RP15 55-2AP30	1 unit 1 unit 1 unit	0.102 0.100 0.104
3RP15 60 time relays, star-delta function, dead interval 50 ms and overtravel time, 1 time setting range														
	3 NO contacts ³⁾ (common contact root terminal 17) For function tables, see general data.	Star-delta 1 ... 20 s, overtravel time (idling) 30 ... 600 s	24/100 ... 127 24 24/200 ... 240 24	A	▶ ▶			3RP15 60-1SQ30 3RP15 60-1SP30	1 unit 1 unit	0.172 0.171	A C	3RP15 60-2SQ30 3RP15 60-2SP30	1 unit 1 unit	0.151 0.152
3RP15 7. time relays, star-delta function⁶⁾, dead interval 50 ms, 1 time setting range														
	1 NO contact instantaneous and 1 NO contact delayed (common contact root terminal 17)	1 ... 20 s 3 ... 60 s	24/100 ... 127 24 24/200 ... 240 24 24/100 ... 127 24 24/200 ... 240 24	▶ ▶ ▶ ▶				3RP15 74-1NQ30 3RP15 74-1NP30 3RP15 76-1NQ30 3RP15 76-1NP30	1 unit 1 unit 1 unit 1 unit	0.113 0.112 0.112 0.113	A A A A	3RP15 74-2NQ30 3RP15 74-2NP30 3RP15 76-2NQ30 3RP15 76-2NP30	1 unit 1 unit 1 unit 1 unit	0.100 0.100 0.102 0.104

1) Setting of output contacts in as-supplied state not defined (bistable relay). Application of the control voltage once results in contact changeover to the correct setting.

2) Operating range 0.7 to 1.25 x U_s .

3) Operating range 0.85 to 1.1 x U_s .

4) With selection ∞ , no timing. For test purposes (ON/OFF function) on site. For dead time "infinite", the relay is always off. For pulse time "infinite", the relay is always on.

5) Operating range 0.8 to 1.1 x U_s .

6) For typical circuit, see General data.

Time Relays

Time relays in 22.5 mm industrial enclosure

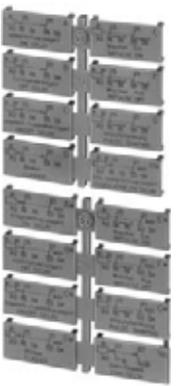
Version	Function	Code letter	Application	DT	Order No.	PS*	Weight per PU approx. kg
---------	----------	-------------	-------------	----	-----------	-----	--------------------------

Label sets

Accessory for 3RP15 05 (not included in the scope of supply). The label set offers the possibility of labeling time relays with the set function in English and German.



Complete set with 8 functions 1 set = 5 units	with ON-delay	A	for relays with 1 changeover contact and 3RP15 05-.RW30	▶	3RP19 01-0A	1 set	0.003
	OFF-delay with auxiliary voltage	B					
	ON-delay and OFF-delay with auxiliary voltage	C					
	flashing, starting with interval	D					
	passing make contact	E					
	passing break contact with auxiliary voltage	F					
	pulse-forming with auxiliary voltage	G					
	additive ON-delay with auxiliary voltage	H					



Complete set with 16 functions 1 set = 5 units	with ON-delay	A	for relays with 2 changeover contacts	▶	3RP19 01-0B	1 set	0.003
	OFF-delay with auxiliary voltage	B					
	ON-delay and OFF-delay with auxiliary voltage	C					
	flashing, starting with interval	D					
	passing make contact	E					
	passing break contact with auxiliary voltage	F					
	pulse-forming with auxiliary voltage	G					
	additive ON-delay with auxiliary voltage and instantaneous contact	H●					
	ON-delay and instantaneous contact	A●					
	OFF-delay with auxiliary voltage and instantaneous contact	B●					
	ON-delay and OFF-delay with auxiliary voltage and instantaneous contact	C●					
	flashing, starting with interval, and instantaneous contact	D●					
	passing make contact and instantaneous contact	E●					
	passing break contact with auxiliary voltage and instantaneous contact	F●					
	pulse-forming with auxiliary voltage and instantaneous contact	G●					
	star-delta function	ΥΔ					

Covering caps and push-in lugs



Push-in lug	for screw fixing		for relays with 1 or 2 changeover contacts	▶	3RP19 03	10 units	0.002
--------------------	------------------	--	--	---	-----------------	----------	-------



Sealable cap	for securing against unauthorized adjustment of setting knobs		for relays with 1 or 2 changeover contacts	▶	3RP19 02	5 units	0.004
---------------------	---	--	--	---	-----------------	---------	-------

Tools for opening spring-loaded terminal connections



8WA2 803

up to max. 2.5 mm ² conductor cross-sections. Length: approx. 100 mm; 3.5 x 0.5	(orange)	for all 3RP20 time relays with spring-loaded terminal connections		8WA2 804	1 unit	0.012
---	----------	---	--	-----------------	--------	-------



8WA2 804

Length: approx. 175 mm; 3.5 x 0.5	(green)	for all 3RP20 time relays with spring-loaded terminal connections		8WA2 803	1 unit	0.024
-----------------------------------	---------	---	--	-----------------	--------	-------



8WA2 807

Length: approx. 160 mm; 2.5 x 0.4	(green)	for all 3RP15 time relays with spring-loaded terminal connections		8WA2 807	1 unit	0.023
-----------------------------------	---------	---	--	-----------------	--------	-------

45 mm SIRIUS Design time relays

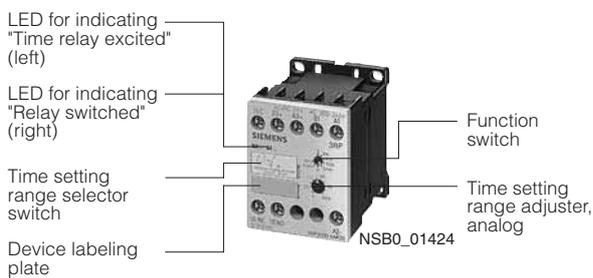
Overview

Standards

The time relays comply with:

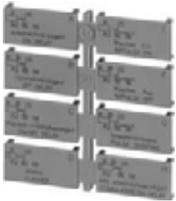
- EN 60721-3-3 "Environmental conditions"
- EN 61812-1 (VDE 0435 Part 201) "Solid-state relays, time relays"
- EN 61000-6-2 and EN 61000-6-4 "Electromagnetic compatibility"
- EN 60947-5-1 (VDE 0660 Part 200) "Low-voltage controlgear, switchgear and systems – Electromechanical controlgear"
- EN 61140 "Safe electrical isolation"

3RP20 time relay, width 45 mm



Accessories

Label set for marking the multifunction relay



Area of application

Time relays are used in control, starting, and protective circuits for all switching operations involving time delays. They guarantee a high level of functionality and a high repeat accuracy of timer settings.

Functions

- Changing the time setting ranges and the functions is only effective when carried out in de-energized state.
- Start input B1 or B3 must only be triggered when the supply voltage is applied.
- The same potential must be applied to A1 and B1 or A3 and B3. With two-voltage version, only one voltage range must be connected.
- The activation of loads parallel to the start input is not permissible when using AC (see diagrams).
- Surge suppression is integrated in the time relay. This prevents the generation of voltage peaks on the supply voltage when the relay is switched on and off. No additional damping measures are necessary.

Time relay with multifunction

The functions can be adjusted by means of rotary switches. Indicator labels can be used to adjust different functions of the 3RP20 05 time relay clearly and unmistakably. The corresponding labels can be ordered as an accessory. The same potential must be applied to terminals A. and B.

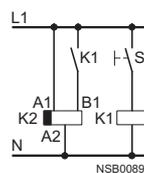
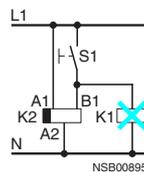
3RP20 05 with one changeover contact

corresponds to the functions of 3RP15 05-.A.

3RP20 05 with two changeover contacts

corresponds to the functions of 3RP15 05-.B.

Parallel load on start input



Time Relays

45 mm SIRIUS Design time relays

Selection and ordering data

Multifunction

The functions can be adjusted by means of rotary switches¹⁾. Indicator labels can be used to adjust different functions of the

3RP20 05 time relay clearly and unmistakably. The corresponding labels can be ordered as an accessory. The same potential must be applied to terminals A. and B..

Version	Time setting range t	Rated control supply voltage U_s		DT	Screw connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.
		AC 50-60 Hz	DC		Order No.		kg		Order No.		kg
		V	V								

3RP20 05 time relays, multifunction, 15 time setting ranges



3RP20 05-1BW30

with LED and 1 changeover contact, 8 functions ¹⁾²⁾	0.05 ... 1 s	24/100 ... 127	24	▶	3RP20 05-1AQ30	1 unit	0.118	▶	3RP20 05-2AQ30	1 unit	0.120
	0.15 ... 3 s	24/200 ... 240	24	▶	3RP20 05-1AP30	1 unit	0.118	▶	3RP20 05-2AP30	1 unit	0.121
	0.5 ... 10 s										
	1.5 ... 30 s										
	0.05 ... 1 min										
	5 ... 100 s										
	0.15 ... 3 min										
	0.5 ... 10 min										
	1.5 ... 30 min										
	0.05 ... 1 h										
	5 ... 100 min										
	0.15 ... 3 h										
	0.5 ... 10 h										
	1.5 ... 30 h										
	5 ... 100 h										
∞ ³⁾											

with LED and 2 changeover contacts, 16 functions ¹⁾	0.05 ... 1 s	24 ... 240 ⁴⁾	24 ... 240 ⁵⁾	▶	3RP20 05-1BW30	1 unit	0.128	▶	3RP20 05-2BW30	1 unit	0.131
	0.15 ... 3 s										
	0.5 ... 10 s										
	1.5 ... 30 s										
	0.05 ... 1 min										
	5 ... 100 s										
	0.15 ... 3 min										
	0.5 ... 10 min										
	1.5 ... 30 min										
	0.05 ... 1 h										
	5 ... 100 min										
	0.15 ... 3 h										
	0.5 ... 10 h										
	1.5 ... 30 h										
	5 ... 100 h										
∞ ³⁾											

3RP20 25 time relays, ON-delay, 15 time setting ranges



3RP20 25-1AP30

with LED and 1 changeover contact ²⁾	0.05 ... 1 s	24/100 ... 127	24	▶	3RP20 25-1AQ30	1 unit	0.106	▶	3RP20 25-2AQ30	1 unit	0.110
	0.15 ... 3 s	24/200 ... 240	24	▶	3RP20 25-1AP30	1 unit	0.106	▶	3RP20 25-2AP30	1 unit	0.108
	0.5 ... 10 s										
	1.5 ... 30 s										
	0.05 ... 1 min										
	5 ... 100 s										
	0.15 ... 3 min										
	0.5 ... 10 min										
	1.5 ... 30 min										
	0.05 ... 1 h										
	5 ... 100 min										
	0.15 ... 3 h										
	0.5 ... 10 h										
	1.5 ... 30 h										
	5 ... 100 h										
∞ ³⁾											

1) For functions, see 3RP19 01-0. label set, Page 8/20.

2) Units with safe electrical isolation.

3) With switch position ∞, no timing. For test purposes (ON/OFF function) on site. Relay is constantly on when activated, or relay remains constantly off when activated. Depending on which function is set.

4) Operating range 0.8 ... 1.1 x U_s .

5) Operating range 0.7 ... 1.1 x U_s .

Time relays for front panel mounting

Selection and ordering data

Version	Time setting range t	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx. kg
		AC 50-60 Hz	DC			
		V	V			
7PV41 48 time relays, ON-delay, 6 analog time setting ranges						
	with LED and	0.1 ... 1 s	24/110	24	▶ 7PV41 48-1BG30	1 unit
	2 delayed	1 ... 10 s	24/220 ... 240	24		▶ 7PV41 48-1BP30
	changeover contacts	0.1 ... 1 min				
	or	1 ... 10 min				
	1 delayed	0.1 ... 1 h				
	changeover contact	1 ... 10 h				
	+ 1 instantaneous					
	changeover contact					
7PV43 48 time relays, multifunction, 6 analog time setting ranges						
	with LED and 1	0.1 ... 1 s	24/110	24	▶ 7PV43 48-1AG30	1 unit
	changeover contact,	1 ... 10 s	24/220 ... 240	24		▶ 7PV43 48-1AP30
	ON-delay,	0.1 ... 1 min				
	OFF-delay with auxiliary voltage, pulse-forming, passing	1 ... 10 min				
	make contact ¹⁾	0.1 ... 1 h				
		1 ... 10 h				
7PV33 48 time relays, multifunction, digitally adjustable, 11 time setting ranges						
	with LCD display,	0.01 s ... 9999 h	24/110 ... 240	24	▶ 7PV33 48-2AX34	1 unit
	1 changeover contact, ON-delay,					
	OFF-delay with auxiliary voltage, flashing, pulse starting, interval starting,					
	passing make contact, pulse-forming, non-volatile setting parameters; the elapsed time is not saved ²⁾					

Version	Configuration	DT	Order No.	PS*	Weight per PU approx. kg
Sockets					
	Socket	11-pole socket with rear connection	▶ 7PX9 921	1 unit	0.051
		11-pole socket for DIN rail and mounting	▶ LZX:MT78750	1 unit	0.063

- 1) No parallel load on terminal B1 permitted!
 2) Possibility of connecting parallel load to terminal B1!

Note

7PV41 and 7PV43 are obsolete types! Do not plan with them in new applications and projects. A new development with a wider functionality and a modified base is due in the middle of 2004.

For new applications we recommend the use of 7PV33.

* This quantity or a multiple thereof can be ordered.

Time Relays

Time relays for mounting onto contactors

Selection and ordering data

for contactors	Auxiliary contacts Function	Rated control supply voltage U_s	Time setting range t DT	Order No.	PS*	Weight per PU approx.
Type		V	S			kg

For size S00,¹⁾ with screw connection



3RT19 16-2...

3RT10 1,
3RH11

Terminal designations to EN 46199 Part 5

• ON-delay (varistor integrated)

1 NO + 1 NC	AC/DC 24	0.05 ... 1	▶	3RT19 16-2EJ11	1 unit	0.085
A1/A2		0.5 ... 10	▶	3RT19 16-2EJ21	1 unit	0.084
		5 ... 100	▶	3RT19 16-2EJ31	1 unit	0.086
27/28	AC 100 ... 127	0.05 ... 1	C	3RT19 16-2EC11	1 unit	0.087
		0.5 ... 10	▶	3RT19 16-2EC21	1 unit	0.087
		5 ... 100	▶	3RT19 16-2EC31	1 unit	0.086
35/36	AC 200 ... 240	0.05 ... 1	A	3RT19 16-2ED11	1 unit	0.088
		0.5 ... 10	▶	3RT19 16-2ED21	1 unit	0.089
		5 ... 100	▶	3RT19 16-2ED31	1 unit	0.087

• OFF-delay without auxiliary voltage (varistor integrated)²⁾

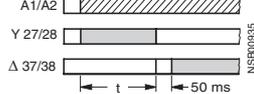
1 NO + 1 NC	AC/DC 24	0.05 ... 1	▶	3RT19 16-2FJ11	1 unit	0.087
A1/A2		0.5 ... 10	▶	3RT19 16-2FJ21	1 unit	0.086
		5 ... 100	▶	3RT19 16-2FJ31	1 unit	0.089
27/28	AC 100 ... 127	0.05 ... 1	C	3RT19 16-2FK11	1 unit	0.086
		0.5 ... 10	▶	3RT19 16-2FK21	1 unit	0.087
		5 ... 100	▶	3RT19 16-2FK31	1 unit	0.088
35/36	AC 200 ... 240	0.05 ... 1	A	3RT19 16-2FL11	1 unit	0.089
		0.5 ... 10	▶	3RT19 16-2FL21	1 unit	0.086
		5 ... 100	▶	3RT19 16-2FL31	1 unit	0.089

• OFF-delay with auxiliary voltage

1 changeover contact	AC/DC 24	0.5 ... 10	B	3RT19 16-2LJ21	1 unit	0.060
	AC 100 ... 127		B	3RT19 16-2LC21	1 unit	0.062
	AC 200 ... 240		B	3RT19 16-2LD21	1 unit	0.063

• Star-delta function (varistor integrated)

1 NO, delayed + 1 NO, instantaneous, dead time 50 ms	AC/DC 24	1.5 ... 30	▶	3RT19 16-2GJ51	1 unit	0.086
	AC 100 ... 127		D	3RT19 16-2GC51	1 unit	0.087
	AC 200 ... 240		▶	3RT19 16-2GD51	1 unit	0.088



For sizes S0 to S12³⁾, with screw connection



3RT19 26-2...

3RT10 2,
3RT10 3,
3RT10 4

• with ON-delay

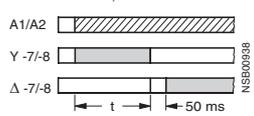
1 NO + 1 NC	AC/DC 24	0.05 ... 1	D	3RT19 26-2EJ11	1 unit	0.081
A1/A2		0.5 ... 10	▶	3RT19 26-2EJ21	1 unit	0.081
		5 ... 100	▶	3RT19 26-2EJ31	1 unit	0.082
-7/-8	AC 100 ... 127	0.05 ... 1	C	3RT19 26-2EC11	1 unit	0.083
		0.5 ... 10	▶	3RT19 26-2EC21	1 unit	0.083
		5 ... 100	▶	3RT19 26-2EC31	1 unit	0.083
-5/-6	AC 200 ... 240	0.05 ... 1	D	3RT19 26-2ED11	1 unit	0.085
		0.5 ... 10	▶	3RT19 26-2ED21	1 unit	0.085
		5 ... 100	▶	3RT19 26-2ED31	1 unit	0.085

• OFF-delay without auxiliary voltage²⁾

1 NO + 1 NC	AC/DC 24	0.05 ... 1	▶	3RT19 26-2FJ11	1 unit	0.083
A1/A2		0.5 ... 10	▶	3RT19 26-2FJ21	1 unit	0.084
		5 ... 100	▶	3RT19 26-2FJ31	1 unit	0.085
-7/-8	AC 100 ... 127	0.05 ... 1	D	3RT19 26-2FK11	1 unit	0.087
		0.5 ... 10	▶	3RT19 26-2FK21	1 unit	0.084
		5 ... 100	▶	3RT19 26-2FK31	1 unit	0.087
-5/-6	AC 200 ... 240	0.05 ... 1	D	3RT19 26-2FL11	1 unit	0.086
		0.5 ... 10	▶	3RT19 26-2FL21	1 unit	0.084
		5 ... 100	▶	3RT19 26-2FL31	1 unit	0.086

• star-delta function

1 NO, delayed + 1 NO, instantaneous, dead time 50 ms	AC/DC 24	1.5 ... 30	▶	3RT19 26-2GJ51	1 unit	0.084
	AC 100 ... 127		▶	3RT19 26-2GC51	1 unit	0.085



1 NO, delayed + 1 NO, instantaneous, dead time 50 ms	AC 200 ... 240		▶	3RT19 26-2GD51	1 unit	0.088
--	----------------	--	---	-----------------------	--------	-------

1) The terminals for the rated control supply voltage are connected to the contactor beneath by the integrated spring-type contacts of the solid-state time-delay auxiliary switch block when mounting.

2) Setting of output contacts in as-supplied state not defined (bistable relay). Application of the control voltage once results in contact changeover to the correct setting.

3) The terminals A1 and A2 for the rated control supply voltage of the solid-state time-delay auxiliary switch block must be connected to the corresponding contactor by connecting leads.

Time relays for mounting onto contactors

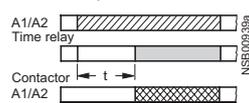
for contactors	Function	Rated control supply voltage U_s	Time setting range t	DT	Order No.	PS*	Weight per PU approx.
	Time relay energized Contact closed Contact open Contactor energized						
Type		V	S				kg

For size S00, with semiconductor output and screw connection

for mounting onto the front of contactors

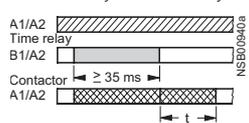
The electrical connection between the time-relay block and the contactor beneath is established automatically when it is snapped on.

- ON-delay, two-wire version (varistor integrated)



AC/DC 24 ... 66	0.05 ... 1	C	3RT19 16-2CG11	1 unit	0.051
	0.5 ... 10	▶	3RT19 16-2CG21	1 unit	0.051
	5 ... 100	▶	3RT19 16-2CG31	1 unit	0.054
AC/DC 90 ... 240	0.05 ... 1	A	3RT19 16-2CH11	1 unit	0.047
	0.5 ... 10	▶	3RT19 16-2CH21	1 unit	0.047
	5 ... 100	▶	3RT19 16-2CH31	1 unit	0.051

- OFF-delay with auxiliary voltage (varistor integrated)



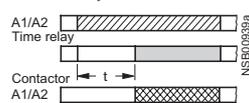
AC/DC 24 ... 66	0.05 ... 1	C	3RT19 16-2DG11	1 unit	0.052
	0.5 ... 10	C	3RT19 16-2DG21	1 unit	0.052
	5 ... 100	C	3RT19 16-2DG31	1 unit	0.057
AC/DC 90 ... 240	0.05 ... 1	D	3RT19 16-2DH11	1 unit	0.053
	0.5 ... 10	▶	3RT19 16-2DH21	1 unit	0.053
	5 ... 100	C	3RT19 16-2DH31	1 unit	0.052

For sizes S0 to S3, with semiconductor output and screw connection

for mounting onto coil terminals on top of the contactors

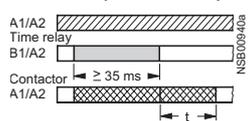
The electrical connection between the relay block and the corresponding contactor is established by screwing the two connecting pins of the time-relay block to coil terminals A1/A2 on top of the contactor.

- ON-delay, two-wire version (varistor integrated)



AC/DC 24 ... 66	0.05 ... 1	A	3RT19 26-2CG11	1 unit	0.048
	0.5 ... 10	A	3RT19 26-2CG21	1 unit	0.049
	5 ... 100	C	3RT19 26-2CG31	1 unit	0.048
AC/DC 90 ... 240	0.05 ... 1	▶	3RT19 26-2CH11	1 unit	0.048
	0.5 ... 10	▶	3RT19 26-2CH21	1 unit	0.047
	5 ... 100	▶	3RT19 26-2CH31	1 unit	0.048

- OFF-delay with auxiliary voltage (varistor integrated)



AC/DC 24 ... 66	0.05 ... 1	D	3RT19 26-2DG11	1 unit	0.050
	0.5 ... 10	C	3RT19 26-2DG21	1 unit	0.051
	5 ... 100	D	3RT19 26-2DG31	1 unit	0.051
AC/DC 90 ... 240	0.05 ... 1	C	3RT19 26-2DH11	1 unit	0.050
	0.5 ... 10	A	3RT19 26-2DH21	1 unit	0.050
	5 ... 100	C	3RT19 26-2DH31	1 unit	0.050

1) Not for 3RT10 4 contactor with 24 to 42 V rated control supply voltage.

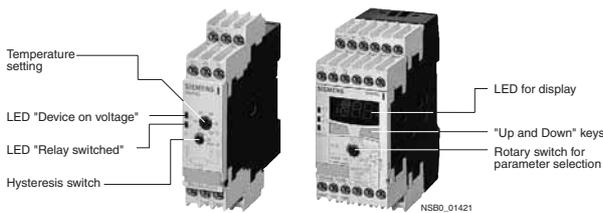
Monitoring Relays

Temperature Monitoring Relays

General data

Overview

The SIMIREL temperature monitoring relays 3RS10 and 3RS11 can be used for measuring temperatures in solid, liquid and gas media. The temperature is sensed by the sensor in the medium, evaluated by the device and monitored for overshoot or undershoot or for staying within an operating range (window function). The range comprises adjustable analog units with one or two threshold values, digital units to DIN 3440, which are also a good alternative to temperature controls for the low-end range, and digital units for up to 3 sensors which have been optimized for monitoring large motors.

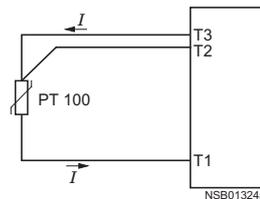


Temperature drift dependent on the length and cross-section of the leads with PT100 sensors and an ambient temperature of 20°C, in K:

Cable lengths in m	Cross-section in mm ²			
	0.5	0.75	1	1.5
0	0.0	0.0	0.0	0.0
10	1.8	1.2	0.9	0.6
25	4.5	3.0	2.3	1.5
50	9.0	6.0	4.5	3.0
75	13.6	9.0	6.8	4.5
100	18.1	12.1	9.0	6.0
200	36.3	24.2	18.1	12.1
500	91.6	60.8	45.5	30.2

3-wire measurement

To minimize the effects of the line resistances, a three-wire circuit is often used. Using the additional wire, two measuring circuits can be formed of which one is used as a reference. The signal evaluator can then automatically calculate the line resistance and take it into account.



Design

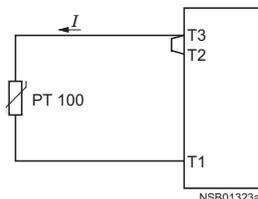
The temperature monitoring relays comply with:

- IEC 60721-3-3 "Environmental conditions"
- IEC 60947-5-1 "Low-voltage controlgear, switchgear and systems – Electromechanical controlgear"
- EN 61000-6-4 "Basic technical standard for emitted interference (Industry)"
- EN 61000-6-2 "Basic technical standard for immunity to interference (Industry)"
- DIN EN 50042 "Designations for terminals"
- UL/CSA
- DIN 3440 (3RS10 40, 3RS11 40, 3RS10 42, 3RS11 42).

Connection of resistance-type thermometers

2-wire measurement

When 2-wire temperature sensors are used, the resistances of the sensor and wiring are added. The resulting systematic error must be taken into account when the signal evaluator is calibrated. A jumper must be clamped between terminals T2 and T3 for this purpose.



Wiring errors:

The errors that are generated by the wiring comprise approximately 2.5 Kelvin/Ohm. If the resistance of the wiring is not known and cannot be measured, the wiring errors can also be estimated using the following table.

Connection of thermocouples

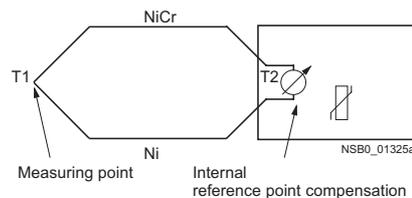
Based on the thermo-electrical effect, a differential temperature measurement will be performed between the measuring point and the signal evaluator.

This principle assumes that the signal evaluator knows the temperature at the clamping point (T2). For this reason, the 3RS11 temperature monitoring relay has an integral compensator that determines this comparison temperature and builds it into the result of the measurement.

The absolute temperature is therefore calculated from the ambient temperature of the signal evaluator and the temperature difference measured by the thermocouple.

Temperature detection is therefore possible (T1) without needing to know the precise ambient temperature of the clamping point at the signal evaluator (T2).

The connecting cable is only permitted to be extended using connecting leads that are made from the same material as the thermocouple. If a different type of conductor is used, an error will result in the measurement.



More information can be found on the Internet under

www.feldgeraete.de/76/produkte/fuw.html
www.ephy-mess.de

or from

EPHY-MESS GmbH

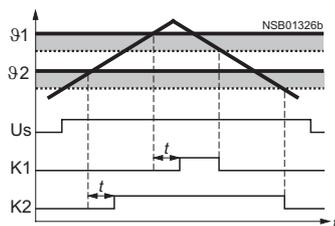
Functions

Once the temperature has reached the set threshold ϑ_1 , the output relay K1 changes its output state as soon as the set time t has elapsed (K2 responds in the same manner to ϑ_2). The time delay t can only be adjusted with digital units (the following applies to analog units $t = 0$).

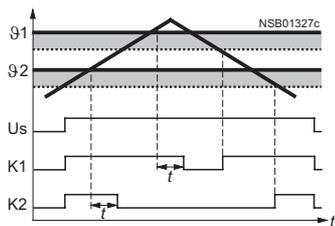
The relays return to their original state as soon as the temperature reaches the set hysteresis value.

Temperature overshoot

Open-circuit principle

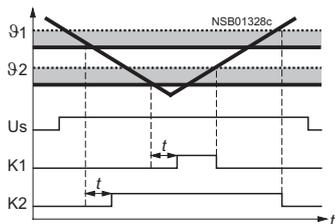


Closed-circuit principle

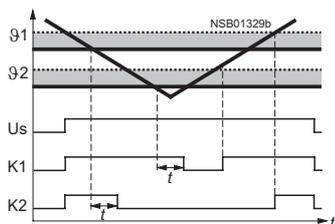


Temperature undershoot

Open-circuit principle



Closed-circuit principle

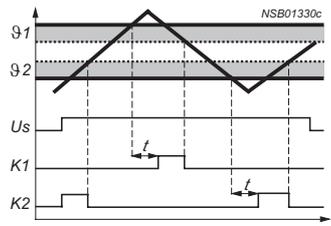


Window monitoring (digital units only)

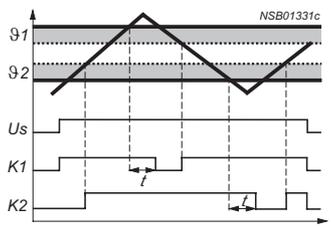
Once the temperature has reached the upper threshold ϑ_1 , the output relay K1 changes its output state as soon as the set time t has elapsed. The relay returns to its original state as soon as the temperature reaches the set hysteresis value.

K2 responds in the same manner to the lower threshold of ϑ_2 .

Open-circuit principle

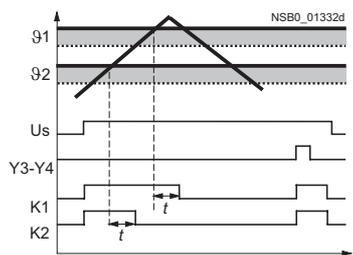


Closed-circuit principle



Principle of operation with memory function (3RS10 42, 3RS11 42), based on the example of temperature undershoot using the closed-circuit principle

Once the temperature has reached the upper threshold ϑ_1 , the output relay K1 changes its output state as soon as the set time t has elapsed. (K2 responds similarly to ϑ_2 .) The relay only returns to the original state when the temperature falls below the set hysteresis value and when terminals Y3 and Y4 have been briefly jumpered.



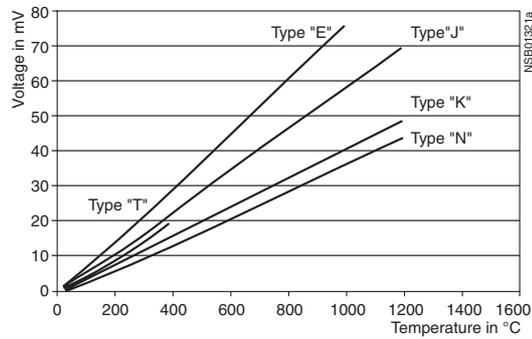
Monitoring Relays

Temperature Monitoring Relays

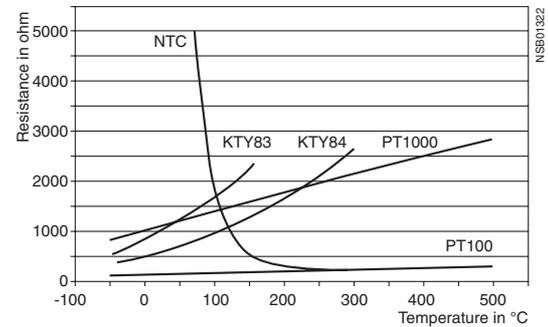
General data

Characteristics

For thermocouples



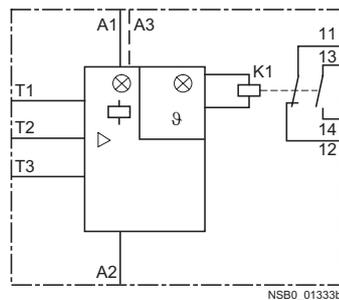
For resistance sensors



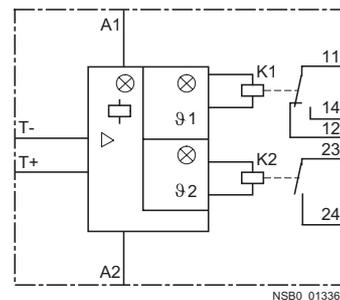
Circuit diagrams

Connection examples

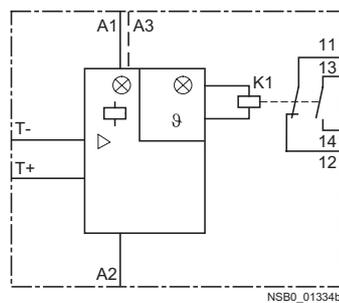
3RS10 00, 3RS10 10



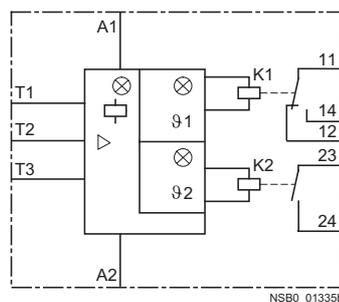
3RS11 20, 3RS11 21



3RS11 00, 3RS11 01



3RS10 20, 3RS10 30



General equipment designations

A1, A2, A3 terminals for rated control supply voltage

K1, K2, K3 output relay

Equipment designation for 3RS10 00, 3RS10 10, 3RS11 00, 3RS11 01, 3RS10 20, 3RS10 30, 3RS11 20, 3RS11 21

□ = LED: "Device connected to supply"

ϑ1 = LED: "Relay 1 tripped"

ϑ2 = LED: "Relay 2 tripped"

T1 to T3 = Sensor connection for resistance sensor

T+/T- Sensor connection for thermocouples

⚠ Important!

When resistance sensors with two-wire connection are used, T2 and T3 must be jumpered.

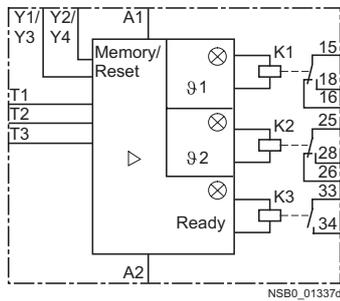
Monitoring Relays

Temperature Monitoring Relays

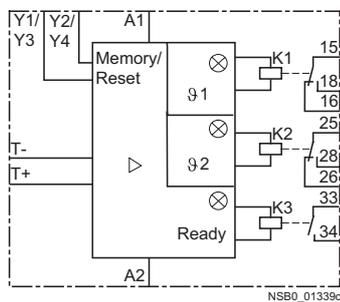
General data

Connection examples

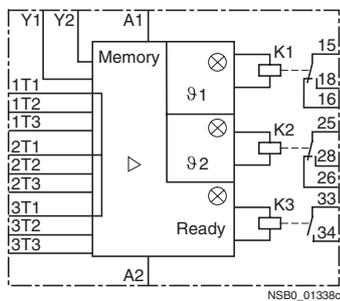
3RS10 40, 3RS10 42



3RS11 40, 3RS11 42



3RS10 41



General equipment designations

A1, A2, A3 terminals for rated control supply voltage

K1, K2, K3 output relay

Equipment designation for 3RS10 40, 3RS10 42, 3RS11 40, 3RS11 42

ø1 = LED: "Relay 1 tripped"

ø2 = LED: "Relay 2 tripped"

Ready = LED: "Device is ready for operation"

T1 to T3 = Sensor connection for resistance sensor

T+/T- = Sensor connection for thermocouples

Y1/Y2 connection for memory jumper for 3RS10 40, 3RS11 40 or

Y3/Y4 Reset input for 3RS10 42, 3RS11 42

⚠ Important!

When resistance sensors with two-wire connection are used, T2 and T3 must be jumpered.

General equipment designations

A1, A2, A3 terminals for rated control supply voltage

K1, K2, K3 output relay

Equipment designation for 3RS10 41

ø1 = LED: "Relay 1 tripped"

ø2 = LED: "Relay 2 tripped"

Ready = LED: "Device is ready for operation"

1T1 to 1T3 = Sensor connection for resistance sensor 1

2T1 to 2T3 = Sensor connection for resistance sensor 2

3T1 to 3T3 = Sensor connection for resistance sensor 3

Y1/Y2 connection for memory jumper

⚠ Important!

When resistance sensors with two-wire connection are used, T2 and T3 must be jumpered.

Monitoring Relays

Temperature Monitoring Relays

Analog adjustable relays

Overview

The analog SIMIREL temperature monitoring relays 3RS10 and 3RS11 can be used for measuring temperatures in solid, liquid and gas media. The temperature is sensed by the sensors in the medium, evaluated by the device and monitored for overshoot or undershoot. When the threshold values are reached, the output relay switches on or off depending on the setting.

Benefits

- All devices are available alternatively with spring-loaded terminals
- All units except for AC/DC 24 V feature electrical isolation
- Extremely easy operation using a rotary potentiometer
- Variable hysteresis
- Adjustable working principle for devices with 2 thresholds.

Area of application

The analog SIMIREL temperature monitoring relays 3RS10 and 3RS11 can be used in almost any application in which temperature overshoot or undershoot is not permitted, e.g.:

Monitoring of set temperature limit and output of alarm messages for:

- Motor and plant protection
- Switchgear cabinet temperature monitoring
- Freeze monitoring
- Temperature limits for process variables e.g. in the packaging industry or electroplating
- Controlling equipment and machines such as heating, climate and ventilation systems, solar collectors, heat pumps or warm water supplies.
- Bearing and gear oil monitoring.
- Monitoring of coolants.

Technical specifications

Type	3RS10 00	3RS10 10	3RS11 00	3RS11 01	3RS10 20	3RS10 30	3RS11 20	3RS11 21
General data								
Thermistor type	PT100		TC type J	TC type K	PT100		TC type J	TC type K
Width	mm 22,5							
Operating range	0.85 ... 1.1 × U _s							
Rated power	W/VA < 2/4							
Auxiliary circuit								
Contacts	1 NO + 1 NC				1 CO + 1 NO			
Rated operating currents I _e	A 3							
• AC-15 at 230 V AC, 50 Hz	A 3							
• DC-13 at:	A 1							
- 24 V	A 0.1							
- 240 V	A 0.1							
DIAZED fuse	A 4							
• Operational class gI/Gg	ka 1							
Short-circuit current (at 250 V)	ka 1							
Electrical endurance	100.000							
AC-15 at 3 A	100.000							
Mechanical endurance	3 × 10 ⁶							
mechanical operating cycles	3 × 10 ⁶							
Tripping unit								
• Measuring accuracy at 20 °C ambient temperature (T20)	typical < ± 5 % from upper limit of scale							
• Reference point accuracy	-		< ± 5 K		-		< ± 5 K	
• Deviations due to ambient temperature in % from measuring range	< 2		< 3		< 2		< 3	
• Hysteresis settings	2 to 20 % from upper limit of scale							
- for temperature 1	2 to 20 % from upper limit of scale							
- for temperature 2	5 % from upper limit of scale							
Sensor circuit								
• Typical sensor current	typical 1 %							
- PT100	typical 1 %		-		typical 1 %		-	
• Open-circuit detection	no							
• Short-circuit detection	no							
• 3-wire conductor connection ¹⁾	yes		-		yes		-	
Enclosure								
Environmental influences	°C - 25 ... 60							
Permissible ambient temperature	°C - 40 ... 80							
Permissible storage temperature	any							
Permissible mounting position	any							
Degree of protection to EN 60529	Terminals: IP20; cover: IP40							
Rated insulation voltage U _i (pollution degree 3)	V 300							
Conductor cross-section								
• Screw connection	M 3.5 (standard screwdriver, size 2 and Pozidriv 2)							
- Solid	mm ² 1 × (0.5 ... 4)/2 × (0.5 ... 2.5)							
- Finely stranded, with end sleeves	mm ² 1 × (0.5 ... 2.5)/2 × (0.5 ... 1.5)							
- AWG conductors, solid or stranded	AWG 2 × (20 ... 14)							
- Tightening torque	Nm 0.8 ... 1.2							
• Spring-loaded terminal	mm ² 2 × (0.25 ... 1.5)							
- Solid	mm ² 2 × (0.25 ... 1)							
- Finely stranded, with end sleeve	mm ² 2 × (0.25 ... 1.5)							
- Finely stranded, without end sleeves	mm ² 2 × (0.25 ... 1.5)							
- AWG conductors, solid or stranded	AWG 2 × (24 ... 16)							
- Corresponding opening tool	8WA2 807							
Vibration resistance to IEC 60068-2-6	Hz/mm 5 ... 26/0.75							
Shock resistance to IEC 60068-2-27	g/ms 15/11							

1) 2-wire connection of resistance sensors with wire jumper between T2 and T3.

Monitoring Relays

Temperature Monitoring Relays

Analog adjustable relays

Selection and ordering data

Analog adjustable evaluation units with one or two threshold values

For analog adjustable units, the threshold values and the hysteresis of 2 to 20 % are set via a rotary potentiometer. For units with

2 threshold values, the adjustable hysteresis only applies to threshold value 1. For the second threshold value, a fixed hysteresis of 5 % applies. The product range has been developed for applications where a setting accuracy of $\pm 5\%$ is sufficient.

Sensor	Function	Measuring range	Rated control supply voltage U_s AC 50-60 Hz	DT	Screw connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.
		°C	V		Order No.		kg		Order No.		kg

Analog adjustable, 1 threshold value, width 22.5 mm; closed-circuit principle; without memory; 1 NO + 1 NC

	PT100 (resistance sensor)	Over-shoot	- 50 ... + 50	AC/DC 24 V	A	3RS10 00-1CD00	1 unit	0.150 C	3RS10 00-2CD00	1 unit	0.125
			0 ... + 100	AC/DC 24 V	A	3RS10 00-1CK00	1 unit	0.190 C	3RS10 00-2CK00	1 unit	0.163
		0 ... + 200	AC/DC 24 V	A	3RS10 00-1CD10	1 unit	0.145 C	3RS10 00-2CD10	1 unit	0.125	
			AC 110/230 V	A	3RS10 00-1CK10	1 unit	0.189 C	3RS10 00-2CK10	1 unit	0.165	
		Under-shoot	- 50 ... + 50	AC/DC 24 V	B	3RS10 00-1CD20	1 unit	0.145 C	3RS10 00-2CD20	1 unit	0.121
			AC 110/230 V	A	3RS10 00-1CK20	1 unit	0.186 C	3RS10 00-2CK20	1 unit	0.165	
	3RS10 00-1CD10	Under-shoot	- 50 ... + 50	AC/DC 24 V	B	3RS10 10-1CD00	1 unit	0.150 C	3RS10 10-2CD00	1 unit	0.180
			AC 110/230 V	B	3RS10 10-1CK00	1 unit	0.186 C	3RS10 10-2CK00	1 unit	0.180	
		0 ... + 100	AC/DC 24 V	B	3RS10 10-1CD10	1 unit	0.150 C	3RS10 10-2CD10	1 unit	0.180	
			AC 110/230 V	A	3RS10 10-1CK10	1 unit	0.190 C	3RS10 10-2CK10	1 unit	0.180	
		0 ... + 200	AC/DC 24 V	B	3RS10 10-1CD20	1 unit	0.150 C	3RS10 10-2CD20	1 unit	0.125	
			AC 110/230 V	B	3RS10 10-1CK20	1 unit	0.191 C	3RS10 10-2CK20	1 unit	0.165	
Type J (thermocouple)	Over-shoot	0 ... + 200	AC/DC 24 V	B	3RS11 00-1CD20	1 unit	0.150 C	3RS11 00-2CD20	1 unit	0.125	
		AC 110/230 V	B	3RS11 00-1CK20	1 unit	0.190 C	3RS11 00-2CK20	1 unit	0.180		
	0 ... + 600	AC/DC 24 V	C	3RS11 00-1CD30	1 unit	0.149 C	3RS11 00-2CD30	1 unit	0.125		
		AC 110/230 V	C	3RS11 00-1CK30	1 unit	0.190 C	3RS11 00-2CK30	1 unit	0.180		
Type K (thermocouple)	Over-shoot	0 ... + 200	AC/DC 24 V	B	3RS11 01-1CD20	1 unit	0.150 C	3RS11 01-2CD20	1 unit	0.122	
		AC 110/230 V	B	3RS11 01-1CK20	1 unit	0.190 C	3RS11 01-2CK20	1 unit	0.180		
	0 ... + 600	AC/DC 24 V	B	3RS11 01-1CD30	1 unit	0.150 C	3RS11 01-2CD30	1 unit	0.125		
		AC 110/230 V	B	3RS11 01-1CK30	1 unit	0.190 C	3RS11 01-2CK30	1 unit	0.180		
	+ 500 ... + 1000	AC/DC 24 V	C	3RS11 01-1CD40	1 unit	0.150 C	3RS11 01-2CD40	1 unit	0.180		
		AC 110/230 V	C	3RS11 01-1CK40	1 unit	0.190 C	3RS11 01-2CK40	1 unit	0.180		

Analog adjustable for warning and tripping (2 threshold values), width 22.5 mm; open/closed-circuit principle switchable; without memory; 1 NO + 1 CO

	PT100 (resistance sensor)	Over-shoot	- 50 ... + 50	AC/DC 24 V	C	3RS10 20-1DD00	1 unit	0.166 C	3RS10 20-2DD00	1 unit	0.138	
			AC/DC 24 ... 240 V	A	3RS10 20-1DW00	1 unit	0.175 C	3RS10 20-2DW00	1 unit	0.149		
		0 ... + 100	AC/DC 24 V	A	3RS10 20-1DD10	1 unit	0.164 C	3RS10 20-2DD10	1 unit	0.143		
			AC/DC 24 ... 240 V	A	3RS10 20-1DW10	1 unit	0.175 C	3RS10 20-2DW10	1 unit	0.149		
		0 ... + 200	AC/DC 24 V	A	3RS10 20-1DD20	1 unit	0.166 C	3RS10 20-2DD20	1 unit	0.180		
			AC/DC 24 ... 240 V	A	3RS10 20-1DW20	1 unit	0.175 C	3RS10 20-2DW20	1 unit	0.180		
	3RS11 21-1DD40	Under-shoot	- 50 ... + 50	AC/DC 24 V	A	3RS10 30-1DD00	1 unit	0.165 C	3RS10 30-2DD00	1 unit	0.180	
			AC/DC 24 ... 240 V	A	3RS10 30-1DW00	1 unit	0.174 C	3RS10 30-2DW00	1 unit	0.180		
		0 ... + 100	AC/DC 24 V	A	3RS10 30-1DD10	1 unit	0.166 C	3RS10 30-2DD10	1 unit	0.180		
			AC/DC 24 ... 240 V	A	3RS10 30-1DW10	1 unit	0.175 C	3RS10 30-2DW10	1 unit	0.180		
		0 ... + 200	AC/DC 24 V	A	3RS10 30-1DD20	1 unit	0.163 C	3RS10 30-2DD20	1 unit	0.180		
			AC/DC 24 ... 240 V	B	3RS10 30-1DW20	1 unit	0.173 C	3RS10 30-2DW20	1 unit	0.152		
	Type J (thermocouple)	Over-shoot	0 ... + 200	AC/DC 24 V	A	3RS11 20-1DD20	1 unit	0.165 B	3RS11 20-2DD20	1 unit	0.140	
			AC/DC 24 ... 240 V	A	3RS11 20-1DW20	1 unit	0.175 B	3RS11 20-2DW20	1 unit	0.151		
		0 ... + 600	AC/DC 24 V	A	3RS11 20-1DD30	1 unit	0.167 B	3RS11 20-2DD30	1 unit	0.140		
			AC/DC 24 ... 240 V	A	3RS11 20-1DW30	1 unit	0.175 B	3RS11 20-2DW30	1 unit	0.151		
		Type K (thermocouple)	Over-shoot	0 ... + 200	AC/DC 24 V	B	3RS11 21-1DD20	1 unit	0.165 B	3RS11 21-2DD20	1 unit	0.142
				AC/DC 24 ... 240 V	B	3RS11 21-1DW20	1 unit	0.179 B	3RS11 21-2DW20	1 unit	0.152	
0 ... + 600	AC/DC 24 V		A	3RS11 21-1DD30	1 unit	0.162 B	3RS11 21-2DD30	1 unit	0.142			
	AC/DC 24 ... 240 V		B	3RS11 21-1DW30	1 unit	0.176 B	3RS11 21-2DW30	1 unit	0.152			
+ 500 ... + 1000	AC/DC 24 V	B	3RS11 21-1DD40	1 unit	0.167 B	3RS11 21-2DD40	1 unit	0.142				
	AC/DC 24 ... 240 V	A	3RS11 21-1DW40	1 unit	0.175 B	3RS11 21-2DW40	1 unit	0.152				

Monitoring Relays

Temperature Monitoring Relays

Digitally adjustable relays to DIN 3440

Overview

The 3RS10 and 3RS11 SIMIREL temperature monitoring relays can be used for measuring temperatures in solid, liquid and gas media. The temperature is sensed by the sensor in the medium, evaluated by the device and monitored for overshoot or undershoot or for staying within an operating range (window function). The 3RS10 40 and 3RS11 40 relays meet the requirements of DIN 3440 as temperature monitors; the 3RS10 42 and 3RS11 42 relays meet the requirements of DIN 3440 as temperature limiters; The relays are also an excellent alternative to temperature controls in the low-end performance range (2 or 3-point closed-loop control).

Benefits

- Very simple operation without complicated menu selections.
- Certification to DIN 3440.
- All devices are available alternatively with spring-loaded terminals
- Two- or three-step control can be configured quickly.

Area of application

The 3RS10 40, 3RS10 42, 3RS11 40 and 3RS11 42 SIMIREL temperature monitoring relays can be used in almost any application in which temperature overshoot or undershoot is not permitted, e.g.:

Monitoring of set temperature limits and output of alarm messages for:

- Plant and environment protection
- Temperature limits for process variables e.g. in the packaging industry or electroplating
- Temperature limits for district heating plants
- Exhaust temperature monitoring
- Controlling equipment and machines such as heating, climate and ventilation systems, solar collectors, heat pumps or warm water supplies.
- Motor, bearing and gear oil monitoring.
- Monitoring of coolants.

Functions

The short-circuit and wirebreak detection as well as the measuring range is limited, depending on the sensor type.

Measuring range in °C for thermocouples

Sensor type	Short-circuit	Open-circuit	3RS11 40 Measuring range in °C	3RS11 42 Measuring range in °C
j	-	X	-99 ... +999	-99 ... +1200
K	-	X	-99 ... +999	-99 ... +1350
T	-	X	-99 ... +400	-99 ... +400
E	-	X	-99 ... +999	-99 ... +999
N	-	X	-99 ... +999	-99 ... +999
S	-	X	-	0 ... 1750
R	-	X	-	0 ... 1750
B	-	X	-	400 ... 1800

Measuring range in °C for resistance sensors

Sensor type	Short-circuit	Open-circuit	3RS10 40 Measuring range in °C	3RS10 42 Measuring range in °C
PT100	X	X	50 ... +500	50 ... +750
PT1000	X	X	50 ... +500	50 ... +500
KTY 83-110	X	X	50 ... +175	50 ... +175
KTY 84	X	X	40 ... +300	40 ... +300
NTC ¹⁾	X	-	80 ... 160	80 ... 160

1) NTC type: B57227-K333-A1 (100 °C: 1.8 kΩ; 25 °C: 32.762 kΩ).

Monitoring Relays

Temperature Monitoring Relays

Digitally adjustable relays to DIN 3440

Technical specifications

Type	3RS10 40/3RS10 42		3RS11 40	3RS11 42
General data				
Width	mm	45		
Operating range	V	0.85 ... 1.1 × U _s		
Rated power	W/VA	< 4/7		
Auxiliary circuit				
Contacts		1 CO + 1 CO + 1 NO		
Rated operating currents I _o	A	3		
• AC-15 at 230 V AC, 50 Hz				
• DC-13 at:				
- 24 V	A	1		
- 240 V	A	0.1		
DIAZED fuse	A	4		
Operational class gI/Gg				
Electrical endurance		100.000		
AC-15 at 3 A				
Mechanical endurance		30 × 10 ⁶		
mechanical operating cycles				
Tripping unit				
• Measuring accuracy at 20 °C ambient temperature (T ₂₀)		< ± 2 K, ± 1 digit	< ± 5 K, ± 1 digit	< ± 7 K, ± 1 digit
• Reference point accuracy		–	< ± 5 K	
• Deviations due to ambient temperature in % from measuring range	%	0.05 per K deviation from T ₂₀		
• Measuring cycle	ms	500		
• Hysteresis settings - for temperature 1		1 ... 99 Kelvin, for both values		
• Adjustable delay time	S	0 ... 999		
Sensor circuit				
• Typical sensor current	mA	typical 1	–	–
- PT100				
- PT1000/KTY83/KTY84/NTC	mA	typical 0.2	–	–
• Open-circuit detection		yes ¹⁾	yes	yes
• Short-circuit detection		yes	no	no
• 3-wire conductor connection		yes ²⁾	–	–
Enclosure				
Environmental influences				
Permissible ambient temperature	°C	– 25 ... 60		
Permissible storage temperature	°C	– 40 ... 80		
Permissible mounting position		any		
Degree of protection acc. to EN 60529		Terminals: IP20; Cover: IP40		
Rated insulation voltage U _i (pollution degree 3)	AC V	300		
Conductor cross-section				
• Screw connection		M 3.5 (standard screwdriver, size 2 and Pozidriv 2)		
- Solid	mm ²	1 × (0.5 ... 4)/2 × (0.5 ... 2.5)		
- Finely stranded, with end sleeve	mm ²	1 × (0.5 ... 2.5)/2 × (0.5 ... 1.5)		
- AWG conductors, solid or stranded	AWG	2 × (20 ... 14)		
- Tightening torque	Nm	0.8 ... 1.2		
• Spring-loaded terminal				
- Solid	mm ²	2 × (0.25 ... 1.5)		
- Finely stranded, with end sleeve	mm ²	2 × (0.25 ... 1)		
- Finely stranded, without end sleeve	mm ²	2 × (0.25 ... 1.5)		
- AWG conductors, solid or stranded	AWG	2 × (24 ... 16)		
- Corresponding opening tool		8WA2 807 ³⁾		
Vibration resistance to IEC 68-2-6	Hz/mm	5 ... 26/0.75		
Shock resistance to IEC 68-2-27	g/ms	15/11		

1) Not for NTC B57227-K333-A1 (100 °C: 1.8 KΩ; 25 °C: 32.762 KΩ).

2) 2-wire connection of resistance sensors with wire jumper between T₂ and T₃.

3) See Accessories for 3RP15 solid-state time relays, Page 8/20.

Monitoring Relays

Temperature Monitoring Relays

Digitally adjustable relays to DIN 3440

Selection and ordering data

Digitally adjustable evaluation units to DIN 3440



Temperature monitoring relays are very easy to operate. The three-digit LED display always shows the current temperature. A separate relay with NO contact is included for sensor monitoring. The relay is switched off in parameterization mode.

The following parameters can be adjusted:

- Sensor type
- 2 threshold values, ϑ_1 , ϑ_2
- 1 hysteresis; applies to both thresholds (0 ... 99 k)
- 1 delay time; applies to both thresholds (0 ... 99 k)
- Open/closed-circuit principle switchable;
- Function: overshoot/undershoot or window monitoring

Wide-range voltage versions are electrically isolated. The temperature ranges depend on the sensor type (see Functions).

Sensor	Measuring range (measuring range limit depends on the sensor)	Rated control supply voltage U_s	DT	Screw connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.
	°C	V		Order No.		kg		Order No.		kg

Temperature sensors to DIN 3440, digitally adjustable, 2 threshold values, width 45 mm; 1 CO + 1 NO, memory function possible with external jumper. Device parameters are non-volatile



3RS10 40-1GD50

PT100/1000; KTY83/84; NTC (resistance sensors) ¹⁾	50 ... +500	24 AC/DC	A	3RS10 40-1GD50	1 unit	0.317 C		3RS10 40-2GD50	1 unit	0.267
		24 ... 240 AC/DC	A	3RS10 40-1GW50	1 unit	0.329 C		3RS10 40-2GW50	1 unit	0.281
TYPE J, K, T, E, N (thermocouple)	99 ... +999	24 AC/DC	A	3RS11 40-1GD60	1 unit	0.318 C		3RS11 40-2GD60	1 unit	0.269
		24 ... 240 AC/DC	A	3RS11 40-1GW60	1 unit	0.329 C		3RS11 40-2GW60	1 unit	0.300

Temperature sensors to DIN 3440, digitally adjustable, 2 threshold values manual/remote RESET, width 45 mm; 1 CO + 1 CO + 1 NO, tripping status and device parameters are non-volatile

PT100/1000; KTY83/84; NTC (resistance sensors) ¹⁾	50 ... +750	24 AC/DC	A	3RS10 42-1GD70	1 unit	0.317 C		3RS10 42-2GD70	1 unit	0.267
		24 ... 240 AC/DC	A	3RS10 42-1GW70	1 unit	0.329 C		3RS10 42-2GW70	1 unit	0.281
TYPE J, K, T, E, N, R, S, B (thermocouple)	-99 ... +1800	24 AC/DC	A	3RS11 42-1GD80	1 unit	0.318 C		3RS11 42-2GD80	1 unit	0.269
		24 ... 240 AC/DC	A	3RS11 42-1GW80	1 unit	0.329 C		3RS11 42-2GW80	1 unit	0.300

Version	Language used for labels	DT	Order No.	PS*	Weight per PU approx.
					kg

Accessories

Replaceable cover labels for digital devices

Devices to DIN 3440	German	C	3RS19 01-1A	5 units	0.006
	English	C	3RS19 01-1C	5 units	0.005

¹⁾ NTC type: B57227-K333-A1 (100 °C: 1.8 K Ω ; 25 °C: 32.762 K Ω).

Monitoring Relays

Temperature Monitoring Relays

Digitally adjustable relays for up to 3 sensors

Overview

The 3RS10 41 SIMIREL temperature monitoring relays can be used for measuring temperatures in solid, liquid and gas media. The temperature is sensed by the sensor in the medium, evaluated by the device and monitored for overshoot or undershoot or for staying within an operating range (window function). The signal evaluator can evaluate up to 3 resistance sensors at the same time and is specially designed for monitoring motor windings and bearings.

Benefits

- Very simple operation without complicated menu selections
- Space-saving with 45 mm width
- All devices are available alternatively with spring-loaded terminals
- 2 or 3-point closed-loop control can be configured quickly.

Area of application

The SIMIREL temperature monitoring relay 3RS10 41 can be used in almost any application in which several temperatures have to be monitored simultaneously for overshoot or undershoot or within a range.

Monitoring of set temperature limits and output of alarm messages for:

- Plant and environment protection
- Temperature limits for process variables e.g. in the packaging industry or electroplating
- Controlling equipment and machines such as heating, climate and ventilation systems, solar collectors, heat pumps or warm water supplies
- Motor, bearing and gear oil monitoring
- Monitoring of coolants.

Functions

The short-circuit and open-circuit detection as well as the measuring range is limited, depending on the sensor type.

Measuring range in °C for thermocouples

Sensor type	Open-circuit	Short-circuit	Measuring range in °C
PT100	X	X	50 ... +500
PT1000	X	X	50 ... +500
KTY 83-110	X	X	50 ... +175
KTY 84	X	X	40 ... +300
NTC	-	X	+80 ... +160

Monitoring Relays

Temperature Monitoring Relays

Digitally adjustable relays for up to 3 sensors

Technical specifications

Type	3RS10 41	
General data		
Width	mm	45
Operating range	V	0.85 ... 1.1 × U _s
Rated power	W/VA	< 4/7
Auxiliary circuit		
Contacts	1 CO + 1 CO + 1 NO	
Rated operating currents I_g		
• AC-15 at 230 V AC, 50 Hz	A	3
• DC-13 at:		
- 24 V	A	1
- 240 V	A	0.1
DIAZED fuse		
Operational class gI/Gg	A	4
Electrical endurance	100.000	
AC-15 at 3 A		
Mechanical endurance	30 × 10 ⁶	
mechanical operating cycles		
Tripping unit		
• Measuring accuracy at 20 °C ambient temperature (T₂₀)	< ± 2 K, ± 1 digit	
• Deviations due to ambient temperature in % from measuring range	%	0.05 per K deviation from T ₂₀
• Measuring cycle	ms	500
• Hysteresis settings - for temperature 1	1 ... 99 Kelvin, for both values	
• Adjustable delay time	S	0 ... 999
Sensor circuit		
• Typical sensor current		
- PT100	mA	typical 1
- PT1000/KTY83/KTY84/NTC	mA	typical 0.2
• Open-circuit detection	yes ¹⁾	
• Short-circuit detection	yes	
• 3-wire conductor connection	yes ²⁾	
Enclosure		
Environmental influences		
Permissible ambient temperature	°C	- 25 ... 60
Permissible storage temperature	°C	- 40 ... 80
Permissible mounting position	any	
Degree of protection acc. to EN 60529	Terminals: IP20; Cover: IP40	
Rated insulation voltage U_i (pollution degree 3)	AC V	300
Conductor cross-section		
• Screw connection	M 3.5 (standard screwdriver, size 2 and Pozidriv 2)	
- Solid	mm ²	1 × (0.5 ... 4)/2 × (0.5 ... 2.5) mm ²
- Finely stranded, with end sleeve	mm ²	1 × (0.5 ... 2.5)/2 × (0.5 ... 1.5) mm ²
- AWG conductors, solid or stranded	AWG	2 × (20 ... 14)
- Tightening torque	Nm	0.8 ... 1.2
• Spring-loaded terminal		
- Solid	mm ²	2 × (0.25 ... 1.5)
- Finely stranded, with end sleeve	mm ²	2 × (0.25 ... 1)
- Finely stranded, without end sleeve	mm ²	2 × (0.25 ... 1.5)
- AWG conductors, solid or stranded	AWG	2 × (24 ... 16)
- Corresponding opening tool	8WA2 807 ³⁾	
Vibration resistance to IEC 60068-2-6	5 ... 26 Hz/0.75 mm	
Shock resistance to IEC 60068-2-27	15 g/11 ms	

1) Not for NTC B57227-K333-A1 (100 °C: 1.8 kΩ; 25 °C: 32.762 kΩ).

2) 2-wire connection of resistance sensor with wire jumper between T2 and T3.

3) See Accessories for 3RP15 solid-state time relays, Page 8/20.

Monitoring Relays

Temperature Monitoring Relays

Digitally adjustable relays for up to 3 sensors

Selection and ordering data

Digitally adjustable signal evaluators

The digitally adjustable temperature monitoring relays are very simple to operate. The three-digit LED display always shows the current temperature. A separate relay with an NO contact is included for sensor monitoring. The relay is switched off in parameterization mode.

The following parameters can be adjusted:

- Sensor type
- 2 threshold values, ϑ_1 , ϑ_2
- 1 hysteresis; applies to both thresholds (0 ... 99 K)
- 1 delay time; applies to both thresholds (0 ... 999 s)
- Open/closed-circuit principle
- Function: overshoot or undershoot or window monitoring

Wide-range voltage versions are electrically isolated. The temperature ranges depend on the sensor type (see Function).

Sensor	Number of sensors	Measuring range	Rated control supply voltage U_s	DT	Screw connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.
		°C	V		Order No.		kg		Order No.		kg

Motor monitoring relays, digitally adjustable for up to 3 sensors, width 45 mm; 1 CO + 1 CO + 1 NO



3RS10 41-1GW50

PT100/1000; 1 to 3 sensors (resistance sensor) ¹⁾	KTY83/84; NTC (resistance sensor) ¹⁾	-50 ... + 500	AC/DC 24 ... 240 V	A	3RS10 41-1GW50	1 unit	0.333	C	3RS10 41-2GW50	1 unit	0.283
--	---	---------------	--------------------	---	-----------------------	--------	-------	---	-----------------------	--------	-------

Version	Language used for labels	DT	Order No.	PS*	Weight per PU approx.
---------	--------------------------	----	-----------	-----	-----------------------

Accessories

Replaceable cover labels for digital devices

Motor monitoring relay	German	C	3RS19 01-1B	5 units	0.006
	English	C	3RS19 01-1D	5 units	0.006

1) NTC type: B57227-K333-A1 (100 °C: 1.8 k Ω ; 25 °C: 32.762 k Ω)

Monitoring Relays Thermistor Motor Protection

For PTC sensors

Overview

Thermistor motor protection devices are used for direct monitoring of the motor winding temperature. For this purpose, the motors are equipped with temperature-dependent resistors (PTC) that are directly installed in the motor winding and abruptly change their resistance at their limit temperature.

Benefits

- Thanks to direct motor protection, overdimensioning of the motors is not necessary.
- No additional overload protection equipment is necessary.
- No settings on the device are necessary.
- Electronically optimized output thanks to variants with gold-plated contacts.
- Rapid error diagnosis thanks to variants that indicate open and short-circuit in the sensor circuit.
- Screw-type or spring-loaded terminals.

Area of application

Direct motor protection through temperature monitoring of the motor winding offers 100 % motor protection even under the most difficult ambient conditions, without the need to make adjustments on the device. Versions with gold-plated contacts ensure, in addition, a high switching reliability that is even higher than an electronic control:

- At increased ambient temperatures
- For high switching cycle frequency
- For long start-up and braking procedures
- In combination with frequency converters (low speeds).

Design

The 3RN1 tripping units are suitable for use in any climate and finger-safe according to DIN VDE 0106 Part 100 and meet the requirements of the basic technical standard EN 61000-6-2, EN 61000-6-4, "Electro-magnetic compatibility of I&C equipment in industrial process engineering" and DIN VDE 0660 Parts 302 and 303, IEC 60034-11-2, Section 1 and 2 "Thermal machine protection for rotating electrical machines, temperature sensors and tripping units" and "Positive temperature coefficient sensors and tripping units".

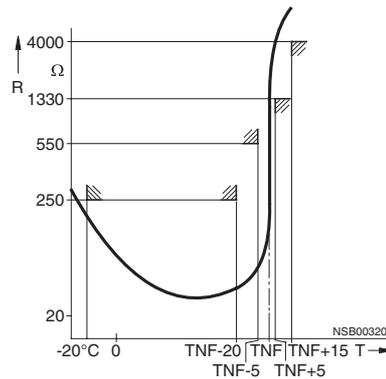
The terminals of the auxiliary contacts are designated in accordance with EN 50005.

The 3RN1 tripping units are suitable for snap-mounting onto 35 mm standard rails according to EN 60715 or for screw-mounting using an adapter (accessories).

Any mounting position is possible.

For devices with the "Manual RESET" function, the blue Test/RESET button can be pressed for > 2 s to activate the test function and to simulate tripping.

If a Type A temperature sensor is connected to a Type A tripping unit, compliance with the operating temperatures is assured (on pick-up and reset) according to IEC 60034-11-2 (DIN VDE 0660 Part 303).



The characteristics of the Type A temperature sensors are described in the IEC 60034-11-2 (DIN VDE 0660 Part 303), DIN 44081 and DIN 44082 standards.

Use in areas subject to explosion hazard

The devices are approved for Equipment group II, Category (2) in Area "G" (areas that contain explosive gases, vapor, spray and air mixtures).

With PTB 01 ATEX 3218 ex II (2) G, compliance with guideline 94/9 EG Appendix II is confirmed. The safety devices must be selected with suitable settings for the safe operation of motors of the "Increased safety" (Eex e) and "Flameproof enclosure (Eex d) degrees of protection and are accessed outside the area subject to explosion hazard.

PTB 01 ATEX 3218 x II (2) G

The increased danger in areas subject to explosion hazard demands careful analysis of the operator's guide, the safety and commissioning instructions and the standard (EN 60 079-14 / VDE 0165) for electronic equipment in areas subject to gas explosion hazards.

A risk analysis must be performed for the complete plant or machine. If this risk analysis results in a minimal potential for danger (Safety Category 1), all 3RN1 TMS tripping units can be implemented taking into account the safety notes. In the case of plants or machines with a high potential risk, variants with integrated short-circuit detection in the sensor circuit are necessary.

Approvals for use in potentially explosive dust areas on request.

The units satisfy the requirements of the following classes:

Unit	Class
3RN10 00, 3RN10 10, 3RN10 11-C, 3RN10 12-C, 3RN10 22, 3RN10 62	DIN V 19250: AK2 EN 954-1: Category 1
3RN10 11-B, 3RN10 11-G, 3RN10 12-B, 3RN10 12-G, 3RN10 13	DIN V 19250: AK3 EN 954-1: Category 2

The measuring circuit leads must be routed as separate control leads. It is not permitted to use cores from the supply line of the motor or any other main supply cables. If extreme inductive or capacitive interference is expected as a result of power lines routed in parallel, shielded control leads must be used.

Monitoring Relays

Thermistor Motor Protection

For PTC sensors

Cable routing

Maximum cable length for sensor circuit cables

Conductor cross-section in mm ²	Cable length in m for tripping units	
	without short-circuit detection	with short-circuit detection ¹⁾
	3RN10 00, 3RN10 10 3RN10 11-.C 3RN10 12-.C 3RN10 22, 3RN10 62	3RN10 11-.B/-G 3RN10 12-.B/-G 3RN10 13
2.5	2 x 2800	2 x 250
1.5	2 x 1500	2 x 150
0.5	2 x 500	2 x 50

1) A short-circuit in the sensor circuit will be detected up to this maximum cable length.

Note:

Tripping of the thermistor protection relay even in combination with a converter must directly result in disconnection. This must be implemented with circuitry.

Mounting and installation must only be performed by qualified personnel who observe the applicable regulations! For assembly, use installation manual No.: 3ZX1012-0RN10-1AA1.

The 3RN10 is not intended for installation in hazardous areas. For installation in areas subject to explosion hazards, the 3RN1 must be enclosed in a flameproof casing.

For tripping units with a AC/DC 24 V control voltage, galvanic isolation must be secured with a battery network or a safety transformer to EN 61558.

When tripping units with auto-RESET function are used, a reset is performed automatically after the cooling time has expired. It must be ensured by means of an external interlock (latching with a separate On and Off button) that the machine to be monitored does not start up again spontaneously.

Units with the "auto-RESET" function must not be used in applications in which the unexpected restart can lead to personal injury or property damage.

In the case of tripping units without short-circuit detection, during commissioning or after modifications or maintenance work (assembly, disassembly) on the equipment, the sensor resistance must be measured using a suitable measuring instrument. For resistances < 50 Ω, the sensor circuit must be checked for a short-circuit.

If 3RN10 00 units are used to protect Eex e motors, separate monitoring of the control voltage is recommended because there is no Ready LED to indicate connection to the supply voltage.

If 3RN10 13-.BW01 units are used to protect Eex e motors, separate monitoring of the control voltage is recommended because the switching status of the auxiliary contacts does not change if the control voltage fails (use of a bistable relay is recommended).

Before commissioning, the effectiveness of the protection function must be checked.

Functions

The 3RN1 tripping units operate in accordance with the closed-circuit principle and therefore monitor themselves for open-circuit (except: warning output in the case of 3RN10 22). A momentary power failure of less than 50 ms does not change the status of the auxiliary contacts.

The 3RN10 11, 3RN10 12 and 3RN10 13 units with 2 changeover contacts are also equipped with short-circuit detection in the sensor circuit. The unit will trip in the event of a short-circuit in the sensor circuit (resistance in sensor circuit < 20 Ω).

All tripping units (except for AC/DC 24 V) feature galvanic isolation between the control circuit and the sensor circuit.

3RN10 00 compact tripping unit

The compact tripping unit is equipped with a red LED (TRIPPED) for the tripped display and a changeover contact.

After the unit has tripped, it is automatically reset once the thermistors have cooled down. The root of the changeover contact is connected to the control voltage (95 is connected to terminal A1).

This unit is particularly suitable in circuits in which the control circuit and signaling circuit have the same potential, e.g. in local control boxes.

Standard tripping units 3RN10 10, 3RN10 11, 3RN10 12, 3RN10 13

The standard units are equipped with two LEDs (READY and TRIPPED) for an operating and tripped display and are available with either 1 NO + 1 NC or with 2 CO contacts. They are available depending on the design with automatic RESET (3RN10 10), manual/remote RESET (3RN10 11) or manual/automatic and remote RESET (3RN10 12 and 3RN10 13). Remote RESET can be achieved by connecting an external pushbutton with a normally-open function to terminals Y1 and Y2. If terminals Y1 and Y2 are bridged, tripping will be followed by an automatic RESET.

The 3RN10 11, 3RN10 12 and 3RN10 13 units with 2 COs also have short-circuit monitoring in the sensor circuit.

The 3RN10 12 and the 3RN10 13 are non-volatile. This means that even if the control voltage fails, a trip that preceded it will be latched.

In the case of the 3RN10 13 tripping unit, tripping due to a short-circuit in the sensor circuit will be indicated by a flashing red LED. The monostable design also indicates open-circuit in the sensor circuit by flashing of the red LED.

3RN10 22 "Warning and disconnection" tripping unit

Two sensor circuits can be connected to one 3RN10 22 tripping unit that acts on one output relay with 1 NO contact for warning and 1 CO for disconnection. Temperature sensors with different rated response temperatures TNF are used to implement the "Warning" and "Disconnection" functions. When the "Warning" sensor circuit responds, a yellow LED is lit and when the "Disconnection" circuit responds, a red LED is lit.

The sensor circuits have a different reset response and operating behavior:

"Warning" (terminals 2T1, T2) only features automatic RESET and uses the open-circuit principle.

"Disconnection" (terminals 1T1, T2) can be changed from manual RESET to automatic RESET by bridging terminals Y1 and Y2. Remote RESET is implemented by connecting an external pushbutton with a normally-open function.

Monitoring Relays Thermistor Motor Protection

For PTC sensors

3RN10 62 tripping unit for multiple motor protection

Up to 6 sensor circuits can be connected to the 3RN10 62 tripping unit, all of which act on one output relay. The simultaneous protection of several motors (up to 6) is an advantage for multi-motor drives (e.g. if one motor is overloaded, all the other motors of the drive will be shut down). Apart from the red LED "TRIPPED", that signals the switching status of the tripping unit, a LED is assigned to each sensor circuit which indicates the sensor circuit that has responded. Unused sensor circuits must be short-circuited.

The reset response of the 3RN10 62 tripping units can be changed from manual RESET to automatic RESET by bridging terminals Y1 and Y2. Remote RESET is implemented by connecting an external pushbutton with a normally-open function.

Response of the tripping unit in the event of control voltage failure

Response	monostable	non-volatile monostable	bistable
	for	3RN10 00 3RN10 10 3RN10 11	3RN10 12 3RN10 13-...0 3RN10 22 3RN10 62
Failure of the control voltage	Unit trips	Unit trips	No change in state of the auxiliary contacts
Return of the control voltage without a preceding tripping operation	Unit resets	Unit resets	No change in state of the auxiliary contacts
Return of the control voltage after a preceding tripping operation	Unit resets	Unit remains tripped	No change in state of the auxiliary contacts

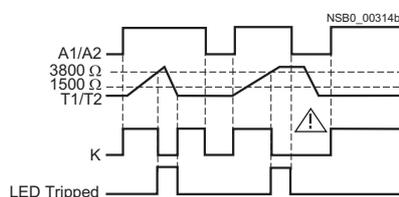
Safe electrical isolation

All circuits (outputs, control circuits, sensor and RESET circuits) of the multifunction tripping units 3RN10 13-1BW10 and 3RN10 13-1GW10 (wide voltage range, monostable output relay and screw-type terminals) are safely isolated from each other up to a rated voltage of 300 V according to DIN VDE 0100 Part 410/ DIN VDE 0106.

Function diagrams

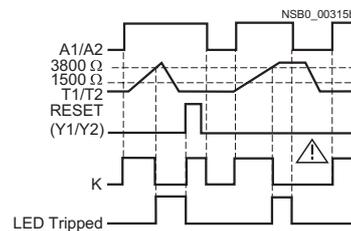
3RN10 00/3RN10 10

(Auto-RESET)

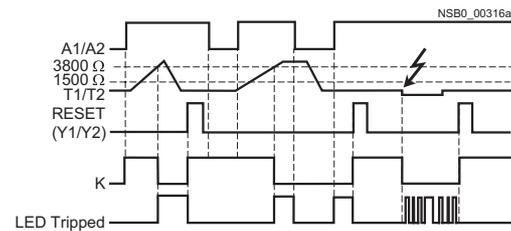


1) For versions with 2 COs (3RN10 1.G...), see 3RN10 13. function diagram for short-circuit response of sensor circuit

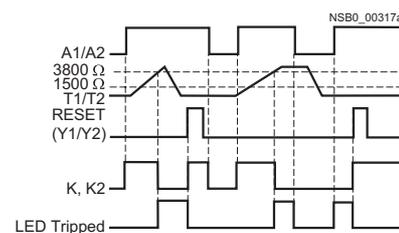
3RN10 11¹⁾



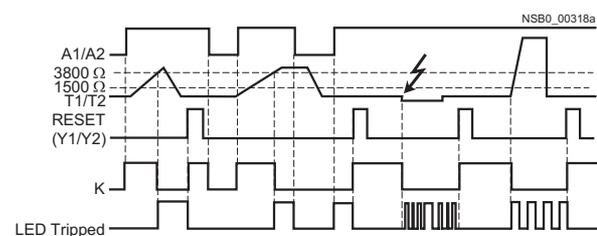
3RN10 13-...01 (bistable)



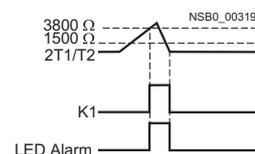
3RN10 12¹⁾/3RN10 22/3RN10 62



3RN10 13-...0



3RN10 22 only



Monitoring Relays

Thermistor Motor Protection

For PTC sensors

Technical specifications

Type	3RN10 00 Compact units	3RN10 10 Standard units	3RN10 11	3RN10 12	3RN10 13 Multifunc- tion units	3RN10 22 Warning + tripping	3RN10 62 Motor protec- tion
General data							
Width	mm	22.5					45
Number of connectable sensor circuits		1				2	6
Response in the event of control voltage failure		1)					
Manual RESET		no	yes				
Automatic RESET		yes	no	yes			
Remote RESET		no	yes ²⁾	yes			
TEST button		no	yes				
Short-circuit detection in sensor circuit		no	yes (for 2-CO units)		yes	no	
Short-circuit and open-circuit indication		no			yes ³⁾	no	
Warning and switching off in one unit		no				yes	no
Tripping unit							
Rated insulation voltage U_i (pollution degree 3)	V	300					
Permissible ambient temperature	°C	-25 ... +60					
Permissible storage temperature	°C	-40 ... +80					
EMC tests		EN 61000-6-2, EN 61000-6-4					
Degree of protection to EN 60529		IP20					
Conductor cross-section							
Screw connection							
• Solid							
	mm ²	M 3.5 (standard screwdriver, size 2 and Pozidriv 2)					
• Finely stranded, with end sleeves							
	mm ²	1 × (0.5 ... 4)/2 × (0.5 ... 2.5)					
• AWG conductors, solid or stranded							
	AWG	1 × (0.5 ... 2.5)/2 × (0.5 ... 1.5)					
• Tightening torque							
	Nm	2 × (20 ... 14)					
		0.8 ... 1.2					
Spring-loaded terminals							
• Solid							
	mm ²	2 × (0.25 ... 1.5)					
• Finely stranded, with end sleeve							
	mm ²	2 × (0.25 ... 1)					
• Finely stranded, without end sleeve							
	mm ²	2 × (0.25 ... 1.5)					
• AWG conductors, solid or stranded							
	AWG	2 × (24 ... 16)					
• Corresponding opening tool							
		8WA2 807 ⁴⁾					
Sensor circuit							
• Measuring circuit load $R_F \leq 1.5 \text{ k}\Omega$	mW	≤ 5					
• Voltage in sensor circuit at $R_F \leq 1.5 \text{ k}\Omega$	V	≤ 2					
• Response temperature (depends on sensor)	°C	60 ... 180					
• Coupling time (depends on sensor)	s	about 5					
Summation PTC resistance R_F (per sensor loop)	k Ω	≤ 1.5					
• Operating value	k Ω	3.4 ... 3.8					
• Return value	k Ω	1.5 ... 1.65					
• Response tolerance	°C	± 6					

1) See Overview.

2) Remote RESET possible by disconnecting control voltage.

3) Open-circuits are only indicated by monostable versions (3RN10 13-...0).

4) See Accessories for 3RP15 solid-state time relays, Page 8/20.

Monitoring Relays Thermistor Motor Protection

For PTC sensors

Type	3RN10 00 Compact units	3RN10 10 Standard units	3RN10 11	3RN10 12	3RN10 13 Multifunction units	3RN10 22 Warning + tripping	3RN10 62 Motor protection
Control circuit							
Rated control supply voltage U_s	1)						
Operating range • 110 V/230 V AC • 24 V to 240 V AC/DC • 24 V AC/DC	0.85 ... 1.1 × U_s 0.85 ... 1.1 × U_s 0.85 ... 1.2 × U_s for DC operation , 0.85 ... 1.1 × U_s for AC operation						
Rated power • AC • AC/DC • DC	W	< 2					
Max. mains buffering time	ms	50					
Auxiliary circuit							
Conventional thermal current I_{th}	A	5					
Rated operating current I_e • AC-15 240 V • DC-13 24 V	A	3	1 for units with 1 CO or 2 COs 2 for units with 1 NC + 1 NO		1 ²⁾	1	2
Short-circuit protection acc. to Alpha/Lovag Operational class gL/gG	A	6					
CSA and UL rated data, control circuit							
Rated control voltage 50/60 Hz • AC • DC	V	300					
Switching capacity	R	300/B 300					
Safe isolation up to 300 V	-				3RN10 13-1BW10	-	

1) See Selection and ordering data.

2) 2 A for 3RN10 13-.BW01 (bistable output relays).

Monitoring Relays

Thermistor Motor Protection

For PTC sensors

Selection and ordering data

Thermistor motor protection relays for PTC thermistors (Type A PTCs)

- Monostable version with closed-circuit principle, triggers in the event of control supply voltage failure

- 3RN10 13-.BW01: bistable version, does not trigger in the event of control supply voltage failure
- All units except for 24 V DC feature electrical isolation

RESET	Contacts	Rated control supply voltage U_s 50/60 Hz	DT	Screw connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.	
		V		Order No.		kg		Order No.		kg	
Compact signal evaluation units, width 22.5 mm, 1 LED											
	Terminal A1 is jumpered with the root of the changeover contact										
Auto	1 CO	24 AC/DC 110 AC 230 AC	▶ ▶ ▶	3RN10 00-1AB00 3RN10 00-1AG00 3RN10 00-1AM00	1 unit 1 unit 1 unit	0.109 A 0.150 ▶ 0.149 ▶	A	3RN10 00-2AB00 3RN10 00-2AG00 3RN10 00-2AM00	1 unit 1 unit 1 unit	0.099 0.137 0.137	
Standard evaluation units, width 22.5 mm, 2 LEDs											
	Auto	1 NO + 1 NC	24 AC/DC 110 AC 230 AC 24 ... 240 AC/DC	▶ ▶ ▶ ▶	3RN10 10-1CB00 3RN10 10-1CG00 3RN10 10-1CM00 3RN10 10-1CW00	1 unit 1 unit 1 unit 1 unit	0.127 A 0.167 A 0.167 A 0.138 A	A	3RN10 10-2CB00 3RN10 10-2CG00 3RN10 10-2CM00 3RN10 10-2CW00	1 unit 1 unit 1 unit 1 unit	0.111 0.149 0.150 0.119
		2 COs	24 AC/DC 110 AC 230 AC	A A A	3RN10 10-1BB00 3RN10 10-1BG00 3RN10 10-1BM00	1 unit 1 unit 1 unit	0.153 B 0.203 B 0.204 B	B	3RN10 10-2BB00 3RN10 10-2BG00 3RN10 10-2BM00	1 unit 1 unit 1 unit	0.139 0.139 0.180
		2 COs, hard gold-plated	24 AC/DC	A	3RN10 10-1GB00	1 unit	0.154 B	B	3RN10 10-2GB00	1 unit	0.139
	Manual/remote ¹⁾	1 NO + 1 NC	24 AC/DC 110 / 230 AC	▶ ▶	3RN10 11-1CB00 3RN10 11-1CK00	1 unit 1 unit	0.154 ▶ 0.179 ▶	▶	3RN10 11-2CB00 3RN10 11-2CK00	1 unit 1 unit	0.114 0.154
	Short-circuit detection for sensor circuit	2 COs	24 AC/DC 110 AC 230 AC	A A B	3RN10 11-1BB00 3RN10 11-1BG00 3RN10 11-1BM00	1 unit 1 unit 1 unit	0.155 B 0.205 C 0.204 A	B C A	3RN10 11-2BB00 3RN10 11-2BG00 3RN10 11-2BM00	1 unit 1 unit 1 unit	0.131 0.182 0.181
	Non-volatile ²⁾	1 NO + 1 NC	24 AC/DC 110 / 230 AC	▶ ▶	3RN10 12-1CB00 3RN10 12-1CK00	1 unit 1 unit	0.140 A 0.180 A	A	3RN10 12-2CB00 3RN10 12-2CK00	1 unit 1 unit	0.115 0.161
	Manual/ auto/remote	2 COs	24 AC/DC 110 AC 230 AC	A A A	3RN10 12-1BB00 3RN10 12-1BG00 3RN10 12-1BM00	1 unit 1 unit 1 unit	0.154 B 0.205 B 0.205 B	B B B	3RN10 12-2BB00 3RN10 12-2BG00 3RN10 12-2BM00	1 unit 1 unit 1 unit	0.130 0.130 0.181
	Non-volatile ²⁾ ; short-circuit detection in sensor circuit	2 COs	24 AC/DC	A	3RN10 12-1GB00	1 unit	0.155 B	B	3RN10 12-2GB00	1 unit	0.161
	Manual/ auto/remote	2 COs, hard gold-plated	24 AC/DC	A	3RN10 12-1GB00	1 unit	0.155 B	B	3RN10 12-2GB00	1 unit	0.161
	Non-volatile ²⁾ ; short-circuit and open-circuit detection and indication in sensor circuit; wide-range voltage with screw connection with safe isolation	2 COs	24 AC/DC 24 ... 240 AC/DC	▶ ▶	3RN10 13-1BB00 3RN10 13-1BW10	1 unit 1 unit	0.160 A 0.167 ▶	A	3RN10 13-2BB00 3RN10 13-2BW00	1 unit 1 unit	0.134 0.145
	Manual/ auto/remote	2 COs, hard gold-plated	24 ... 240 AC/DC	▶	3RN10 13-1GW10	1 unit	0.168 A	A	3RN10 13-2GW00	1 unit	0.143
Evaluation units for 2 sensor circuits, warning and switching off, width 22.5 mm, 3 LEDs											
	Test/RESET button, non-volatile ²⁾	1 NO + 1 CO	24 ... 240 AC/DC	▶	3RN10 22-1DW00	1 unit	0.167 A	A	3RN10 22-2DW00	1 unit	0.147
Signal evaluation units for 6 sensor circuits, warning and switching off, width 45 mm, 8 LEDs											
	Test/RESET button, non-volatile ²⁾	1 NO + 1 NC	24 ... 240 AC/DC	▶	3RN10 62-1CW00	1 unit	0.296 A	A	3RN10 62-2CW00	1 unit	0.246
Bistable evaluation units, width 22.5 mm											
	Test/RESET button, non-volatile ²⁾	2 COs	24 ... 240 AC/DC	A	3RN10 13-1BW01	1 unit	0.165 A	A	3RN10 13-2BW01	1 unit	0.139
Accessories											
	Push-in lugs for screw mounting			▶	3RP19 03	10 units	0.018				
	2 units required per 3RN1 thermistor motor protection device										
	1 package contains 10 units for 5 devices										

1) The unit can be reset with the RESET button or by disconnecting the control supply voltage.

2) For more information on protection against voltage failure, see Page 8/40.

Monitoring Relays Thermistor Motor Protection

For PTC sensors

Circuit diagrams

Connection diagrams

Representation with control voltage applied

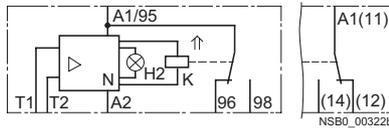
Representation with control voltage not applied

Representation with control voltage applied

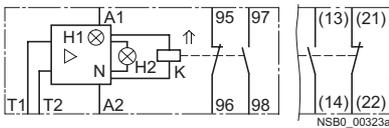
Representation with control voltage not applied

General item codes

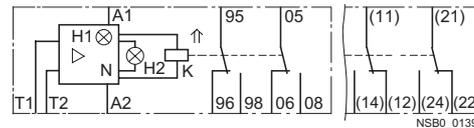
3RN10 00, 1 CO



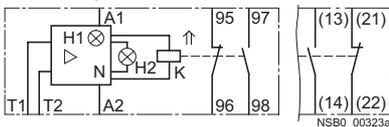
3RN10 10, 1 NO + 1 NC



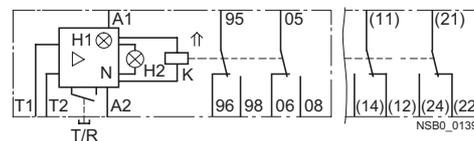
3RN10 10, 2 COs



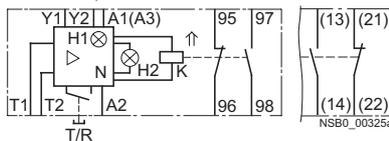
3RN10 11¹⁾, 1 NO + 1 NC



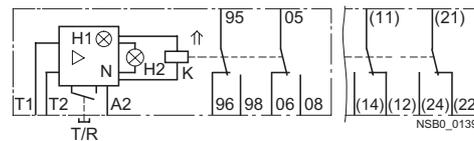
3RN10 11, 2 COs



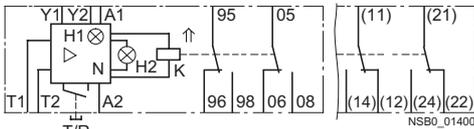
3RN10 12¹⁾, 1 NO + 1 NC



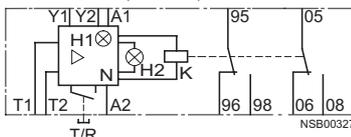
3RN10 11, 2 COs



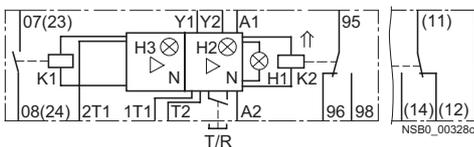
3RN10 13-...0 (monostable)



3RN10 13-...1 (bistable)



3RN10 22



3RN10 62



A1, A2, A3 Connections of the control voltage
N Amplifier
T/R TEST/RESET button
Y1, Y2 Connections for remote RESET (jumped = auto-RESET)
↑ The double arrow indicates an operating status which deviates from the standard representation of the contact according to DIN 40900, Part 7 (in this case: position of the contacts when control voltage is applied to terminals A1 and A2)

Item code for 3RN10

H1 "READY" LED
H2 "TRIPPED" LED
K Output relay
T1, T2 Connections of the sensor loop

Item code for 3RN10 22

H1 "READY" LED
H2 "TRIPPED" LED
H3 "ALARM" LED
K1, K2 Output relay
1T1 and 2T2 Connections of the sensor loop
2T1 and T2 Connections of the sensor loop

! Important!

Close unconnected sensor circuits

Item code for 3RN10 62

H1 to H6 LED for the tripped sensor loop
H7 "READY" LED
H8 "TRIPPED" LED
K "ALARM" LED
1T1, 1T2 Output relay
to Connections of the first sensor loop
6T1, 6T2 Connections of the sixth sensor loop

! Important!

Close unconnected sensor circuits

1) For units with combination voltages AC 230 V/110 V (3RN10 11-.CK00 and 3RN10 12-.CK00) the following applies:
A1 and A2: 230 V AC,
A3 and A2: 110 V AC.

Monitoring Relays

Monitoring Relays for Electrical Variables

General data

Overview

The solid-state monitoring relays are offered in the field-proven design with different functions. These relays are used to detect wear effects and potential faults at an early stage and to respond to them before more serious secondary damage can occur. With their minimal space requirements, high measuring accuracy and optimized functions for high reliability, they are easy to use.

For example, the monitoring modes "Overcurrent/overvoltage" and "Undercurrent/undervoltage" can be set for the relay for current and voltage monitoring using a DIP switch. Similarly, the latching/unlatching function as well as various delay times can be set.

Area of application

Depending on the relay type, these relays can be used for monitoring electrical and non-electrical variables. They respond, for example, as soon as the set value is reached and drop as soon as the value is below the set value.

According to the relay version, they can be used for device and system protection in AC and DC systems. Combined with circuit-breakers, they can, for example, be used for overload protection of motors in chain conveyors, packaging machines etc.

Technical specifications

Type	3UG30/3UG35	
Load capacity of the output relay	Rated operating current I_e	A max. 8
	AC-15/230 V	A 3
	DC-13/24 V	A 1
	DC-13/48 V	A 0.45
	DC-13/60 V	A 0.35
	DC-13/110 V	A 0.2
	DC-13/230 V	A 0.1
Minimum contact load	mA	5/17 V for a fault of 1 ppm
Output relay DIAZED fuse protection¹⁾	Operational class gl/Gg	A 4
Electrical endurance	Operating cycles	1×10^5
Mechanical endurance	Operating cycles	2×10^6
Ambient temperature	during operation	°C – 20 ... + 50
	during storage	°C – 30 ... + 70
Conductor connection	solid	mm ² 2 × (0.5 ... 2.5)
	finely stranded, with end sleeves	mm ² 2 × (0.5 ... 1.5)
Degree of protection	Terminals:	IP20
	Housing	IP40
Can be used in networks	3UG30 13/3UG35 11	AC V 660
	other 3UG3	AC V 480
Vibration resistance	to IEC 60068-2-6	Hz/mm 10 ... 150/0.035

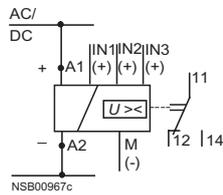
Note:

Fuse protection of the measurement circuit is not required for device protection. Conductor protection depends on the conductor cross-section used.

1) Short-circuits without any contact welding to EN 60947-5-1.

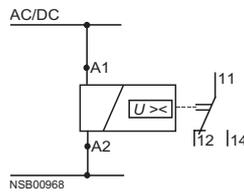
Circuit diagrams

Voltage monitoring relay, single-phase
3UG35 31, 3UG35 32



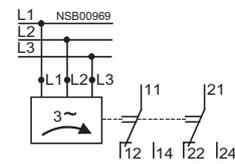
IN1/IN2/IN3: AC/DC

Voltage monitoring relay, single-phase
3UG35 34, 3UG35 35

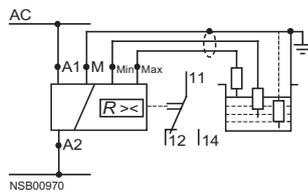


A1/A2: AC/DC

Phase monitoring relay, three-phase
3UG35 11

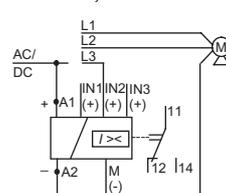


Level monitoring relay
3UG35 01



NSB00970

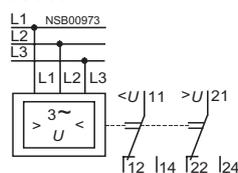
Current monitoring relay, single-phase
3UG35 21, 3UG35 22



NSB0_0971d

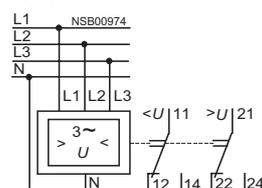
IN1/IN2/IN3: AC/DC

Voltage monitoring relay, three-phase
3UG30 41



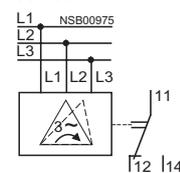
NSB00973

Voltage monitoring relay with N, three-phase,
3UG30 42



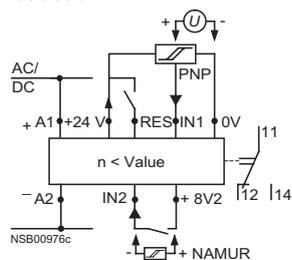
NSB00974

Asymmetry monitoring relay, three-phase
3UG30 12



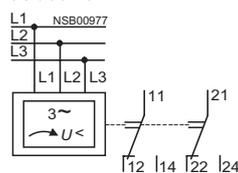
NSB00975

Underspeed monitoring relay
3UG30 51



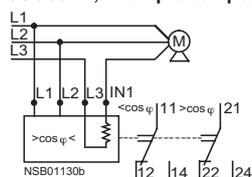
NSB00976c

Line monitoring relay, three-phase
3UG30 13



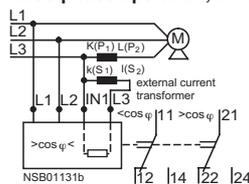
NSB00977

Power factor monitoring relay, single- and three-phase,
3UG30 14, three-phase operation, $I < 10 \text{ A}$



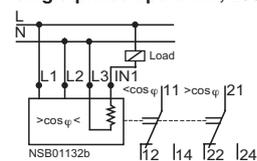
NSB01130b

Power factor monitoring relay, single- and three-phase,
3UG30 14, three-phase operation, $I > 10 \text{ A}$



NSB01131b

Power factor monitoring relay, single- and three-phase,
3UG30 14 single-phase operation, 230 V~



NSB01132b

Monitoring Relays

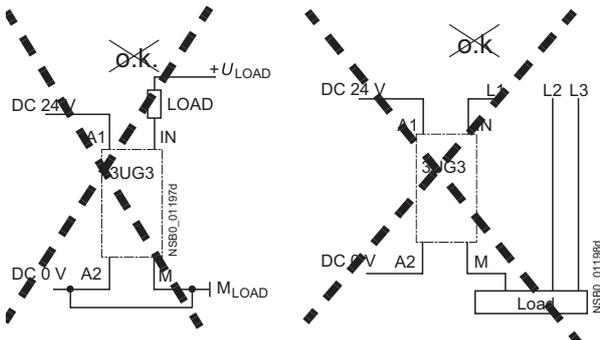
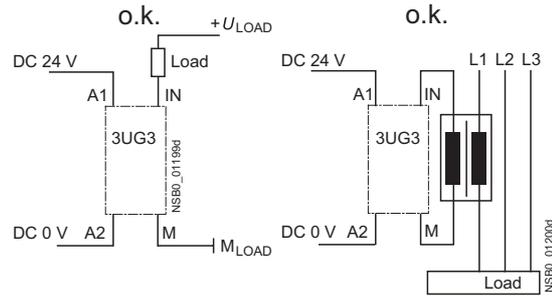
Monitoring Relays for Electrical Variables

General data

Connection diagram for DC 24 V

Current monitoring relay, single-phase
3UG35 21, 3UG35 22

For current relays with a DC 24 V supply voltage, A2 and M must not be jumpered in the device otherwise the relays will not function. The circuit diagrams below show that loads in DC measuring circuits must be upstream from the monitoring relay and that AC loads must only be connected via converters. Otherwise the monitoring relay will be damaged and the short-circuit current can cause damage to the plant.



Configuring note:

For measuring currents of 10 A and side-by-side mounting, the maximum ambient temperature is 40 °C

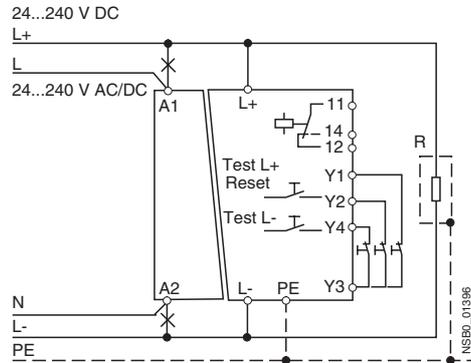
The internal configuration of the 3UG35 21/22 current monitoring relay for DC 24 V control supply voltage has been changed. In the new internal circuit the control supply voltage and the measuring-circuit voltage should not have the same reference potential.

In cases in which the load to be monitored and the monitoring relay are fed by the same power supply, the function of the current monitoring relay is no longer provided. The devices are, however, not destroyed as a result. Relief is provided in the form of a second power supply that is not directly connected to the control supply voltage.

Please therefore pay attention to the connection information shown in the circuit diagram for the new current monitoring relays!

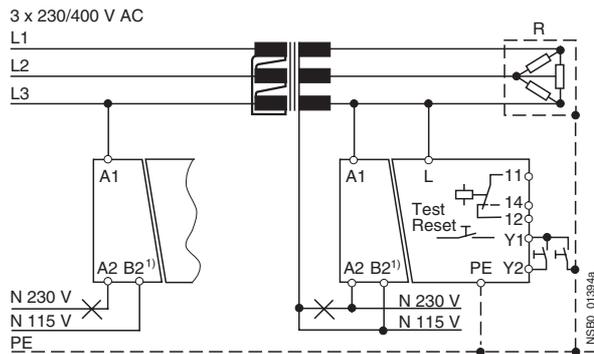
Connection diagram for 24...240 V DC

Insulation resistance
for ungrounded DC voltage networks



Connection diagram for networks up to 400 V AC

Insulation resistance
for ungrounded voltage networks



A1-B2/A1-A2 für AC 115 V/230 V ¹⁾ 3UG3081-1AK20 only
A1-A2 für AC/DC 24...240 V

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage: Phase failure and phase sequence monitoring

Functions

Depending on version, the 3UG35 11 and 3UG35 13 relays monitor the phase sequence and failure of one of the three phases. During operation, no adjustment is required. If the phase sequence is correct and none of the three phases have failed, the output relay picks up after the delay time T1 has elapsed and the LED is lit. On phase failure, the output relay trips after the delay time T2 has elapsed and the LED is no longer lit.

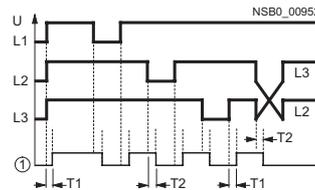
If a phase sequence fault is detected when the voltage is switched on, the relay will not pick up.

The 3UG35 11 relay does not detect any voltage feedback into the supply

The 3UG35 11 relay is not protected against feedback of voltage into the supply. If there is a risk of feedback from a motor in the case of phase failure or voltage loops through parallel loads, the 3UG35 13 with fixed operating point or 3UG30 13 relays with adjustable operating point can be used.

3UG35 13 for detection of phase failure

The fixed undervoltage detection ensures that the relay also trips in the case of voltage feedback from the motor. Feedback from the motor or caused by voltage loops will be detected at up to 90 % of the rated voltage.



- ① Output relay
- T1: Delay-time at rise
max. 200 ms
- T2: Delay-time at drop
max. 300 ms

Technical specifications

Type	3UG35 11	3UG35 13
Rated control supply voltage U_s	V 3 × 230 ... 400 (phase-to-phase)	see Selection data
Voltage tolerance	V 3 × 200 ... 460 (corresponds to 0.85 ... 1.15 × U_s)	0.8 ... 1.15 × U_s
Power consumption		
• at 200 V	VA 5	
• at 400 V	VA 20	
• at 460 V	VA 25	
Undervoltage detection fixed	% none	90
Frequency of the monitored line	Hz 50/60	
Delay time		
• T1 for correct phase sequence	ms max. 200	
• T2 for phase failure	ms approx. 300	

Selection and ordering data

Screw connection

Standard rail mounting
Width 22.5 mm

Phase monitoring relay, three-phase

- Monitoring of phase failure and phase sequence
- 1 yellow LED for indicating the relay state
- 2 changeover contacts



Version	Measuring range U_e	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx.
	AC 50/60 Hz	AC 50/60 Hz				kg
	V	V				
	No tripping following voltage feedback by the consumer load					
Measuring-circuit voltage = control supply voltage	3 × 230 ... 400 phase conductor voltage	3 × 230 ... 400 phase conductor voltage	▶	3UG35 11-1BQ50	1 unit	0.120
	Detection following voltage feedback by the consumer load of up to 90 %					
Measuring-circuit voltage = control supply voltage	3 × 230 phase conductor voltage	3 × 230	A	3UG35 13-1BL50	1 unit	0.112
	3 × 400 phase conductor voltage	3 × 400	A	3UG35 13-1BP50	1 unit	0.112

* This quantity or a multiple thereof can be ordered.

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage: Phase asymmetry monitoring

Functions

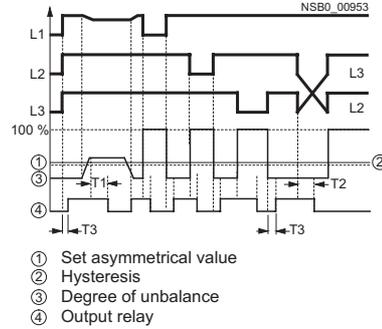
The relay monitors voltage imbalances in the three-phase system. If the phase sequence is correct and the imbalance is less than the set threshold value, the output relay picks up and the yellow LED is lit. The relay trips when one of the following faults occurs:

- Incorrect phase sequence on terminals L1-L2-L3
- Failure of a phase
- System imbalance greater than the set threshold.

A system imbalance means that the voltage of one of the phases rises or falls in relation to the voltage of the other two phases. This is used to detect voltage feedback from a running drive (e.g. on failure of a fuse) of up to 95 % of the rated voltage as a fault.

The time delay T1 is only effective in the case of imbalance faults and when phase L3 fails. Hysteresis prevents the output relay from continuously switching on and off when the system imbalance is close to the set value.

The relay does not respond to a symmetrical overvoltage or undervoltage.



Technical specifications

Rated control supply voltage U_s	V	see Selection data (L1/L2 also used to supply units)
Voltage tolerance		0.8 ... 1.2 × U_s
Maximum power consumption	W/VA	4/8
Frequency of the measuring-circuit voltage	Hz	50/60 switchable
Max. setting range for asymmetry value	%	adjustable to 5 to 20 % of the nominal supply voltage
Max. hysteresis	%	fixed at 10 % of set asymmetry value
Setting accuracy	%	± 20 referred to maximum asymmetry value
Repeat accuracy at constant parameters	%	± 1
Deviations with temperature fluctuations	%/°C	± 0.1
Delay time		
• T1 when relay drops	s	adjustable to 0.5 ... 10 ± 60 % or T2 in case of phase failure of L1 or L2
• T3 when relay picks up	s	max. 1
• T2 in case of phase failure L1 or L2	ms	max. 300
Mains buffering time	ms	10

Selection and ordering data

Screw connection

For mounting standard rail or screw fixing
Width 45 mm

Phase asymmetry monitoring relay, three-phase

- phase asymmetry monitoring
- phase sequence and phase failure monitoring
- 1 yellow LED for indicating the relay state flashes during operating time T
- 1 green LED for indicating applied control supply voltage
- 1 changeover contact



Version	Measuring-circuit voltage U_e AC 50/60 Hz	DT	Order No.	PS*	Weight per PU approx. kg
Measuring-circuit voltage = control supply voltage, asymmetry value and delay time, adjustable	3 × 230 phase-to-phase voltage	▶	3UG30 12-1AL50	1 unit	0.299
	3 × 400 phase-to-phase voltage	▶	3UG30 12-1AP50	1 unit	0.305

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage:
Line monitoring

Functions

The 3UG30 13 relay monitors the phase sequence, failure of a phase and undershoot of the set measuring voltage by 20%. If the phase sequence is correct and the monitored voltage corresponds to the value of the set measuring voltage, the output relay picks up and the LEDs for the operating voltage display and the relay status are lit.

If a phase fails, the output relay trips (in the case of failure of L3, only after the time T that can be set at the front) and the LED for relay status goes off.

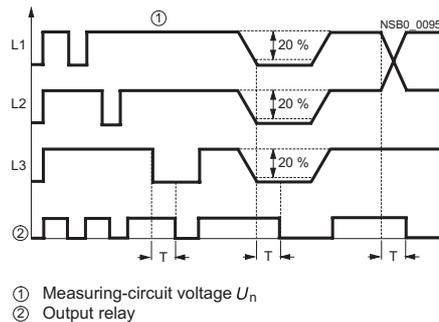
If the monitored voltage falls symmetrically (L1, L2 and L3 simultaneously) or asymmetrically (only one phase) by more than 20% of the set measuring voltage, the output relays will also trip after the set time T has elapsed and the associated LED goes off.

If the monitored voltage rises again above a hysteresis of between 2% and 10% of the set measuring voltage, the output relays pick up again and the LED is lit.

Note:

After failure of a phase on a rotating motor, a feedback voltage of up to 70% of the set rated motor voltage is recognized as a fault.

The setting for the measuring voltage can be increased to increase the percentage for the maximum detectable feedback into the supply.



Technical specifications

Rated control supply voltage U_s	V	see Selection data (L1/L2 also used to supply units)
Voltage tolerance	V	see Selection data
Maximum power consumption	W/VA	5/8
Frequency of the monitored line	Hz	50/60
Measuring-circuit voltage of the monitored line		adjustable within the associated measuring range, absolute scale for U_s
Undervoltage detection	%	-20 ± 10 of the set measuring-circuit voltage
Hysteresis		
• with symmetrical undervoltage	%	fixed, 2...5 of the set measuring-circuit voltage
• with asymmetrical undervoltage	%	fixed, 5...10 of the set measuring-circuit voltage
Delay time T	on detection of a line fault	s adjustable 0.2 ... 10; ± 50%
Response time	on detection of a disturbance	ms 400
Availability time	after application of U_s	ms 500
Operating frequency	at max. make-break capacity	1/h 360
Mains buffering time		ms 10

Selection and ordering data

Screw connection

For mounting onto standard rail or screw fixing
Width 45 mm

Line monitoring relay, three-phase

- phase failure and phase sequence monitoring
- monitoring of the variable measuring-circuit voltage
- 1 yellow LED for indicating the relay state
- 1 green LED for indicating applied control supply voltage
- 2 changeover contacts

Version	Measuring range U_s AC 50/60 Hz V	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx. kg
 Measuring-circuit voltage = control supply voltage, measuring-circuit voltage and delay time adjustable	Phase conductor voltage					
	3 × 180 ... 260			▶ 3UG30 13-1BL60	1 unit	0.317
	3 × 320 ... 460			▶ 3UG30 13-1BP60	1 unit	0.313
	3 × 380 ... 550			▶ 3UG30 13-1BR60	1 unit	0.356
	3 × 460 ... 660			▶ 3UG30 13-1BS60	1 unit	0.355

* This quantity or a multiple thereof can be ordered.

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage: Single-phase voltage monitoring

Functions

The relays monitor single-phase voltages against the set threshold. The products differ not only with respect to their measuring ranges and voltage types but also with regard to their functions:

- Supplied from an external auxiliary supply (3UG35 31/3UG35 32)
- Internal power supply and no auxiliary supply (3UG35 34/3UG35 35)
- Overshoot/undershoot, latching/unlatching, selectable (3UG35 31/3UG35 32/3UG35 34)
- Window principle with upper and lower threshold (3UG35 35)

The latching/unlatching function can be set for the 3UG35 31, 3UG35 32 and 3UG35 34 relays using a DIP switch on the bottom of the device. The 3UG35 34 relay has an internal power supply, i.e. in the following diagram, A1/A2 is replaced by the measuring-circuit voltage.

Advantages of the products that are supplied from an external supply

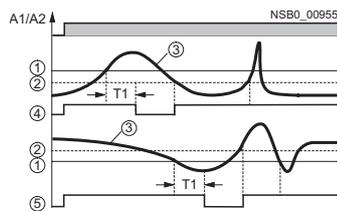
- Extremely low loading on the measuring signals
- Large measuring range is necessary

Advantages of the products that are supplied from an internal supply

- No separate supply voltage is necessary
- Low wiring overheads

Voltage monitoring without memory (NO MEMORY)

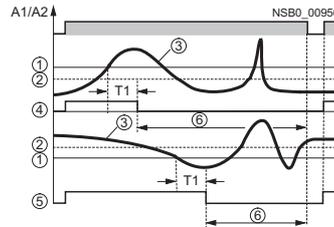
As soon as the measuring-circuit voltage reaches the set threshold, the output relay changes its output state as soon as the set time T1 has elapsed. The relay returns to its original state as soon as the measuring-circuit voltage reaches the set hysteresis value.



- ① Threshold value U_e
- ② Hysteresis
- ③ Measuring-circuit voltage
- ④ Output relay Function OVER
- ⑤ Output relay Function UNDER

with memory (MEMORY)

If the set threshold is reached, the output relay changes its state as soon as the set time T1 has elapsed and it remains latched in this position even when the measuring-circuit voltage reaches the set hysteresis value. The relay is reset (RESET) by switching the supply voltage off and on again.



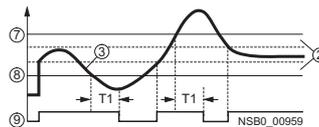
- ① Threshold value U_e
- ② Hysteresis
- ③ Measuring-circuit voltage
- ④ Output relay Function OVER
- ⑤ Output relay Function UNDER
- ⑥ Storage MEMORY

3UG35 35 relay, internal power supply with windows-type technology

The 3UG35 35 relay monitors the applied voltage using the windows principle. The upper and lower thresholds are set and monitored. As soon as the monitored voltage leaves the set range, the output relay trips after the set time T1 has elapsed.

Configuring note:

When the upper and lower threshold are too close, the tolerances of the setting accuracy and of the two hysteresis settings can result in undefined output states.



- ② Hysteresis
- ③ Measuring-circuit voltage
- ⑦ Upper peak value
- ⑧ Lower peak value
- ⑨ Output relay

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage:
Single-phase voltage monitoring

Technical specifications

Monitoring relays with external power supply

Type	3UG35 31	3UG35 32	
Rated control supply voltage U_s	V	see Selection data (for AC voltages with electrical isolation by means of transformer, 24 V DC without electrical isolation)	
Voltage tolerance	0.8 ... 1.15 × U_s		
Maximum power consumption	W/VA	4/5	
Rated insulation voltage U_i Pollution degree 2 Overvoltage category III to DIN VDE 0110	AC V	300	
Frequency of the measuring-circuit voltage	Hz	40 ... 500 and DC	
Threshold value U_e	%	adjustable to 10 ... 100 of the selected measuring range	
Hysteresis	%	adjustable from 5 to 50 % of the set threshold value	
Setting accuracy	%	± 10 referred to upper limit of measuring range	
Repeat accuracy at constant parameters	%	± 0.1	
Delay time T1 after reaching the threshold	s	adjustable to 0.1 ... 3 ± 10 %	
Availability time after application of U_s	ms	max. 500	
Mains buffering time	ms	10	
Measuring range inputs			
• IN1-M	- sensitivity - input resistance - overvoltage strength	V 0.2 ... 2 kΩ 2 V 4	15 ... 150 150 200
• IN2-M	- sensitivity - input resistance - overvoltage strength	V 1 ... 10 kΩ 10 V 20	30 ... 300 300 350
• IN3-M	- sensitivity - input resistance - overvoltage strength	V 6 ... 60 kΩ 60 V 120	60 ... 600 ¹⁾ 600 650
Function mode setting			
• Overvoltage or undervoltage		slide switch in lower part of unit	
• With or without memory		slide switch in lower part of unit	

1) Observe rated insulation voltage.

Monitoring relays with internal power supply

Type	3UG35 34	3UG35 35
Rated control supply voltage U_s	V	see Selection data
Voltage tolerance	see Selection data, min./max. values	
Maximum power consumption	W/VA	2/7
Frequency of the measuring-circuit voltage	Hz	50/60 and DC
Threshold value U_e		absolute scale for U_e
Hysteresis	%	adjustable from 5 to 20 of the set threshold value
Setting accuracy	%	± 10 referred to upper limit of measuring range
Repeat accuracy at constant parameters	%	0.3
Delay time T1 after reaching the threshold	s	adjustable to 0.1 ... 3 ± 10 %
Measuring range inputs		
• IN1-M	Min. sensitivity Overvoltage strength	A1/A2: A see Selection data, measuring range of the corresponding version V see Selection data, upper limit of rated control supply voltage
Function mode setting		
• Overvoltage or undervoltage	slide switch	fixed: overvoltage and undervoltage
• With or without memory	slide switch	fixed: without memory

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage: Single-phase voltage monitoring

Selection and ordering data

Monitoring relays with external power supply

Screw connection

Mounting onto standard rail
Width 22.5 mm

Voltage monitoring relay, single-phase

- Overvoltage and/or undervoltage monitoring for DC and AC voltages
- 1 yellow LED for indicating the relay state
- 1 green LED for indicating applied control supply voltage
- 1 changeover contact



Version	Measuring range U_e AC/DC	Rated control supply voltage U_s		DT	Order No.	PS*	Weight per PU approx.
		AC 50/60 Hz	DC				
	V	V	V				kg
electrical isolation: AC: yes DC: no adjustable threshold and hysteresis	0.2 ... 60 (3 ranges)	24		A	3UG35 31-1AC20	1 unit	0.155
		120		D	3UG35 31-1AG20	1 unit	0.155
		230		▶	3UG35 31-1AL20	1 unit	0.157
				24 ¹⁾	▶	3UG35 31-1AC40	1 unit
	15 ... 600 (3 ranges)	24		▶	3UG35 32-1AC20	1 unit	0.161
		120		▶	3UG35 32-1AG20	1 unit	0.161
		230		▶	3UG35 32-1AL20	1 unit	0.159
				24 ¹⁾	▶	3UG35 32-1AC40	1 unit

1) The rated control supply voltage and the measuring circuit are not electrically isolated.

Monitoring relays with internal power supply

Screw connection

For mounting onto standard rail
Width 22.5 mm

Voltage monitoring relay, single-phase

Absolute scale

- Overvoltage and/or undervoltage mode, depending upon version
- 3UG35 34:
1 yellow LED for indicating the relay state and 1 green LED for indicating applied control supply voltage
- 3UG35 35:
1 yellow LED for indicating the relay state and 1 yellow LED each for U_{min} and U_{max} :
 U_{min} = flashing, U_{max} = off
- 1 changeover contact



3UG35 34



3UG35 35

Version	Measuring range U_e AC/DC	Rated control supply voltage U_s		DT	Order No.	PS*	Weight per PU approx.
		AC 50/60 Hz	DC				
	V	V	V				kg
Measuring-circuit voltage = control supply voltage no adjustable threshold and hysteresis	20 ... 80 65 ... 260	15 ... 150	15 ... 150	▶	3UG35 34-1AC50	1 unit	0.107
		50 ... 275	50 ... 275	▶	3UG35 34-1AM50	1 unit	0.107
Measuring-circuit voltage = control supply voltage upper and lower threshold value can be adjusted separately	20 ... 80 65 ... 260	15 ... 150	15 ... 150	▶	3UG35 35-1AC50	1 unit	0.108
		50 ... 275	50 ... 275	▶	3UG35 35-1AM50	1 unit	0.107

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage: Three-phase voltage monitoring

Functions

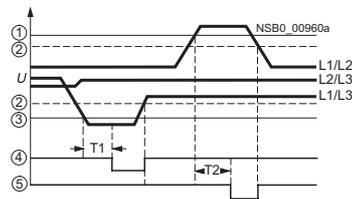
The output relay has tripped, provided that the values of the three phase conductor voltages in the case of 3UG30 41 or the three star voltages of the phases with reference to the neutral conductor in the case of 3UG30 42 lie between the lower and upper threshold. These are set separately on the front using two potentiometers.

When the value of one voltage lies outside this range, the corresponding output relay will trip after elapse of a delay time T1 or T2 that can be set separately on the front.

A fixed hysteresis of 3% prevents the output relay from continuously switching on and off when the measuring-circuit voltage is close to the threshold.

The monitoring relay detects voltage feedback from running drives up to the level of the set minimum threshold U_{min} .

The phase sequence is not monitored. The 3UG30 42 relay also responds to failure of the neutral conductor.



- ① Threshold value U_{max}
- ② Hysteresis
- ③ Threshold value U_{min}
- ④ Output relay $U < U_{min}$ (terminal 11, 12, 14)
- ⑤ Output relay $U > U_{max}$ (terminal 21, 22, 24)

Technical specifications

Type	3UG30 41	3UG30 42
Rated control supply voltage U_s	V 400 phase conductor voltage (L1/L2 also used to supply units)	400 phase conductor voltage/ 230 star voltage (L1/L2 also used to supply units)
Voltage tolerance	0.8 ... 1.2 $\times U_s$	
Maximum power consumption	W/VA 4/8	
Frequency of the measuring-circuit voltage	Hz 50/60	
Threshold value U_n	min. 0.85 ... 0.98 $\times U_n$ (340 ... 392 V phase/phase) max. 1.02 ... 1.15 $\times U_n$ (408 ... 460 V phase/phase)	
Monitoring	undervoltage and overvoltage failure L1/L2/L3	undervoltage and overvoltage failure L1/L2/L3/N
Hysteresis	fixed	% up to 3 of the set threshold
Setting accuracy	% ± 10	
Delay time T1/T2 after reaching the threshold	s adjustable to 0.1 ... 10; $\pm 50\%$	
Response time	on occurrence of a fault	ms 500
Availability time after application of U_s	s 3	
Mains buffering time	ms 10	

Selection and ordering data

Screw connection

For mounting onto standard rail and screw fixing
Width 45 mm

- Three-phase voltage monitoring relay with/without N conductor
- Upper and lower threshold value can be adjusted separately
 - 1 changeover contact for undervoltage and 1 changeover contact for overvoltage
 - 1 yellow LED each for indicating undervoltage or overvoltage
 - 1 green LED for indicating applied control supply voltage

Version	Measuring-circuit voltage U_e AC 50/60 Hz	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx. kg
 3UG30 41	3UG30 41 Measuring-circuit voltage = control supply voltage; upper and lower threshold can be adjusted individually, hysteresis fixed	400 (phase to phase)	400	▶	3UG30 41-1BP50	1 unit 0.313
	3UG30 42 Measuring-circuit voltage = control supply voltage with monitoring N conductor, upper and lower threshold adjustment can be adjusted individually, hysteresis fixed	400 (phase to phase) 230 (phase to N conductor)	400 230	▶	3UG30 42-1BP50	1 unit 0.313

* This quantity or a multiple thereof can be ordered.

Monitoring Relays

Monitoring Relay for Electrical Variables

Current: Single-phase current monitoring

Functions

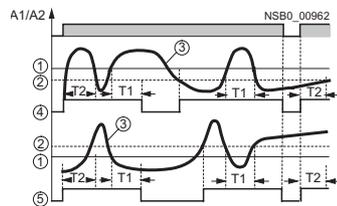
The relays monitor single-phase currents against the set threshold. The products differ with regard to their measuring ranges and voltage types.

If the load on a motor changes, the motor current also changes. This effect can be used to monitor loading on a motor by means of the current. Thus wear effects on tools, blocked loads, etc. are detected. It is also possible to check the functionality of load in this way. If current is flowing, the load is functioning. The relay can also be used as a trigger for analog signals.

The latching/non-latching function can be set for the relay using a DIP switch underneath the relay. It is also possible to set two delay times.

Current monitoring without memory (NO MEMORY)

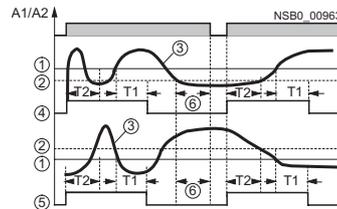
As soon as the value of the monitored AC or DC current reaches the threshold set on the front, the output relay trips after the set time T1 has elapsed. The relay picks up immediately again when the current reaches the hysteresis value again.



- ① Threshold value I_e
- ② Hysteresis
- ③ Monitored measured current
- ④ Output relay Function OVER
- ⑤ Output relay Function UNDER

Current monitoring with memory (MEMORY)

If the set threshold is reached, the output relay trips as soon as the set time T1 has elapsed and it remains stored in this position even when the measured current reaches the set hysteresis value. The relay is reset by switching the supply voltage off and on again.



- ① Threshold value I_e
- ② Hysteresis
- ③ Monitored measured current
- ④ Output relay Function OVER
- ⑤ Output relay Function UNDER
- ⑥ Storage

ON delay T1 and T2:

Due to the ON delay T2, current peaks (OVER function) or current falls (UNDER function), that can occur when switching on, do not cause a change in relay status, e.g. for suppression of the inrush current on motor starting. The delay time T1 prevents the relay from continuously switching on and off when the measured current is close to the set threshold.

Note:

Please see the connection diagrams and notes under General data, circuit diagrams.

Monitoring Relays

Monitoring Relay for Electrical Variables

Current:
Single-phase current monitoring

Technical specifications

Type		3UG35 21	3UG35 22
Rated control supply voltage U_s	V	see Selection data (for AC voltages with electrical isolation by means of transformer, 24 V DC without electrical isolation)	
Voltage tolerance		0.8 ... 1.15 × U_s	
Maximum power consumption	W/VA	4/5	
Frequency of the measured current	Hz	40 ... 500 and DC	
Threshold I_e	%	adjustable to 10 ... 100 of the selected effective range	
Hysteresis	%	adjustable from 5 to 50 of the set threshold value	
Setting accuracy ¹⁾	%	± 10 referred to upper limit of effective range	
Repeat accuracy	at constant parameters	% ± 0.1	
Deviations	at voltage fluctuations	% ≤ 0.5	
	with temperature fluctuations	% / °C ± 0.05	
Delay time	T2, ON-delay	s 1 ... 20 ± 10%	
	T1 after reaching the threshold	s 0.1 ... 3 ± 10%	
Effective range inputs			
• IN1-M			
	- sensitivity	A 0.002 ... 0.02	0.1 ... 1
	- input resistance	Ω 5	0.1
	- overvoltage strength, continuous	A 0.04	2
	- overvoltage strength < 1 s	A 1	17
• IN2-M			
	- sensitivity	A 0.01 ... 0.1	0.5 ... 5
	- input resistance	Ω 1	0.02
	- overvoltage strength, continuous	A 0.2	10
	- overvoltage strength < 1 s	A 5	20
• IN3-M			
	- sensitivity	A 0.05 ... 0.5	1 ... 10 ²
	- input resistance	Ω 0.2	0.01
	- overvoltage strength, continuous	A 1	13
	- overvoltage strength < 1 s	A 8	50
Max. voltage in monitoring circuit and permissible potential difference	AC V	480	
	DC V	300	
Function mode setting		slide switch in lower part of unit	
• overcurrent and undercurrent		slide switch in lower part of unit	
• with or without memory			

1) With sinusoidal currents. Measuring principle: arithmetic mean-value generation.

2) For continuous currents of 10 A and devices mounted side by side, the ambient temperature must not exceed +40 °C.

Selection and ordering data

Screw-type connection

For mounting onto standard rail or screw fixing
Width 22.5 mm

Current monitoring relay, single-phase

- Overvoltage and undervoltage monitoring of DC and AC voltages
- 1 yellow LED for indicating the relay state
- 1 green LED for indicating applied control supply voltage
- 1 changeover contact



Version	Effective range U_e AC/DC	Rated control supply voltage U_s AC 50/60 Hz DC	DT	Order No.	PS*	Weight per PU approx. kg
electrical isolation AC: yes DC: no adjustable threshold and hysteresis	0.002 ... 0.5 (3 ranges)	24	▶	3UG35 21-1AC20	1 unit	0.273
		120	A	3UG35 21-1AG20	1 unit	0.157
		230	▶	3UG35 21-1AL20	1 unit	0.157
	0.1 ... 10 (3 ranges)	24	▶	3UG35 21-1AC40	1 unit	0.118
		120	▶	3UG35 22-1AC20	1 unit	0.158
		230	▶	3UG35 22-1AG20	1 unit	0.156
		24 ¹⁾	▶	3UG35 22-1AL20	1 unit	0.158
		24 ¹⁾	▶	3UG35 22-1AC40	1 unit	0.117

1) The rated control supply voltage and the measuring circuit are not electrically isolated, see also Page 8/46.

Monitoring Relays

Monitoring Relay for Electrical Variables

Power factor monitoring (motor load monitoring)

Functions

The 3UG30 14 monitoring relay is used for monitoring the load of motors by measuring the phase angle between voltage and current, i.e. the power factor. The output relays respond as long as the power factor lies between the upper and lower thresholds. These are set separately on the front using two potentiometers.

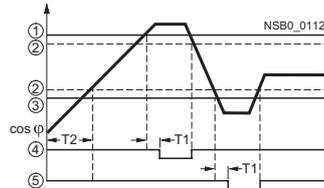
When the value of the power factor lies outside this range, the corresponding output relay will drop after a delay time T1 that can be set on the front has elapsed. A fixed hysteresis prevents the output relay from continuously switching on and off when the measured value is close to the threshold. The ON delay T2 can be used to suppress the effects of motor start-up.

Important!

It is important to ensure that the phases are connected in the correct sequence L1-L2-L3, otherwise the power factor will be evaluated incorrectly.

Note:

Power factor monitoring relays are connected in series after the motor contactor to ensure that the delay time for bridging start-up elapses after switch-on. For this reason, the output relay must not be connected in series with the supply voltage of the motor contactor, otherwise it would not be possible to switch on the load feeder.



- ① Threshold value U_{max}
- ② Hysteresis
- ③ Threshold value U_{min}
- ④ Output relay $\cos \varphi > \cos \varphi_{max}$
(terminals 21, 22, 24)
- ⑤ Output relay $\cos \varphi < \cos \varphi_{min}$
(terminals 11, 12, 14)

Technical specifications

Rated control supply voltage U_s	V	see Selection data (L1/L2 also used to supply units)
Voltage tolerance	V	0.85 ... 1.15 $\times U_s$
Maximum power consumption	VA	3
Frequency of the monitored line	Hz	50 ... 60
Effective range of power factor		0.1 ... 0.99 for lower and upper threshold
Hysteresis fixed	%	10 for p.f. ≤ 0.4 10 ... 30 for p.f. < 0.4
Setting accuracy	%	± 10 referred to upper limit of effective range
Repeat accuracy at constant parameters	%	± 0.8
Deviations for temperature deviations	%	$\pm 0.05/K$
Delay time	s	0.5 ... 20 ; $\pm 20\%$ 0.3 ... 3 ; $\pm 20\%$
Input circuit		
• Current range	A	0.5 ... 10
• Peak current (< 1 s)	A	50
• Input resistance L1/L2/L3	k Ω	2
• Input resistance current, IN1	Ω	0.02

Note: currents > 10 A only with current converter.

Selection and ordering data

Screw connection

For mounting onto standard rail and screw fixing
Assembly width 45 mm

- Relay for power factor monitoring, single and three-phase
- monitoring of the power factor for undershoot/overshoot for motor underload and overload
 - upper and lower threshold value can be adjusted separately
 - 1 changeover contact each for undershoot/overshoot
 - 1 yellow LED each for indicating of undershoot/overshoot
 - 1 green LED for indicating the applied control supply voltage flashes with 1 Hz, during the operating time T1
flashes with 2 Hz, if $p.f._{min} \geq p.f._{max}$

Version	Measuring range U_e	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx. kg
	p.f.	Phase conductor voltage AC 50/60 Hz V				
 3UG30 14	Measured voltage = control supply voltage	0.1 ... 0.99	3 \times 230	B	3UG30 14-1BL60 3UG30 14-1BP60 3UG30 14-1BR60 3UG30 14-1BS60	1 unit 0.311
			3 \times 400	▶		1 unit 0.308
			3 \times 480	B		1 unit 0.355
			3 \times 575	B		1 unit 0.350

3UG30 14

Monitoring Relays

Monitoring Relay for Electrical Variables

Insulation resistance
for ungrounded AC voltage networks

Overview

- Relay for monitoring the isolation resistance between the ungrounded single or three-phase AC supply and a protective ground conductor
- Measuring principle with superimposed DC voltage
- Two selectable measuring ranges of 1 ... 110 k Ω
- Stepless setting within the measuring range
- Selectable:
 - Auto reset function with fixed hysteresis or
 - Storage of the tripping operation
- Test function with test button and terminal connections on the front
- Switching output: 1 changeover contact
- Isolation fault indication with a red LED
- Supply voltage indication with a green LED
- Electro-magnetically compatible according to EN 61000-6-4 and EN 61000-6-2

Area of application

The 3UG30 81 monitoring relay is suitable for isolation monitoring of AC systems with one or three phases in ungrounded networks (IT networks).

Supply voltage

The 3UG30 81-1AK20 has alternative voltage terminals. Only one supply voltage is permitted to be connected to it! Terminals A1 and A2 are used to connect AC 230 V and terminals A1 and B2 are used to connect AC 115 V.

The 3UG30 81-1AW30 has a wide-range input of AC/DC 24 V to 240 V on terminals A1 and A2.

Functions

The monitoring relay measures the isolation resistance between the ungrounded AC supply and an associated protective ground conductor.

A superposed DC measuring voltage is used to perform the measurement.

The monitoring relay is divided into two ranges for an isolation resistance range from 1 to 100 k Ω . A range switch on the front can be used to switch over between a 1 to 11 k Ω range and a 10 to 110 k Ω range. Within the selected range, the monitoring relay can be steplessly adapted to the respective isolation conditions.

If the isolation resistance undershoots the set threshold, the output relay is excited and the red LED (fault display) is lit.

If the isolation resistance exceeds 1.6 times (corresponding to 60 % hysteresis) the set threshold, the output relay will return to the rest position.

Test functions

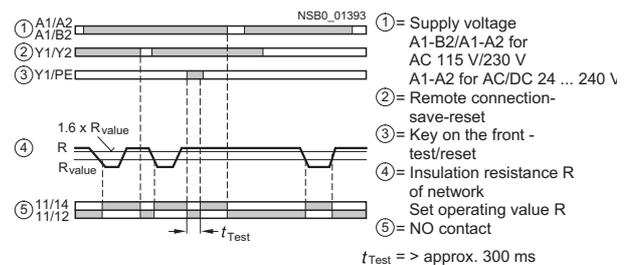
The "Test" button on the front can be used to simulate a ground fault. If the "Test" button is pressed for at least 300 ms, the output relay is energized and the fault LED lights up. An external test button can be connected to terminals Y1 and Y2. The function is activated through a normally-open contact.

Storage of the fault

If terminals Y1 and Y2 are jumpered, the monitoring relay is set to fault storage mode. If the set isolation resistance is undershot, the output relay is excited and remains tripped even after the isolation resistance rises above 1.6 times the set value again. Fault storage can be reset by briefly pressing the RESET button, briefly jumpering the Y1 and PE/ground terminals or by switching off the supply voltage.

Note:

The monitoring relay is designed for AC supply systems. Series-connected rectifiers must be galvanically isolated from the measuring relay that is to be monitored.



Monitoring Relays

Monitoring Relay for Electrical Variables

Insulation resistance for ungrounded AC voltage networks

Technical specifications

			3UG30 81
Control circuit			
Operating range of the control supply voltage			- 15 % ... + 10 %
Rated power	AC/DC 24 ... 240 V	VA/W	8/2
	AC 110/130 V	VA	3
	AC 220 ... 240 V	VA	3
Frequency of the rated control supply voltage			Hz 50 ... 60
Measurement circuit L/PE/ground			
• Response value		kΩ	1 ... 110
• Minimum internal resistance for AC		kΩ	100
• Minimum internal resistance for DC		kΩ	100
• DC measurement voltage		V	DC30
• Insulation voltage		V	AC 415
• Reset/test function terminals			Y1-Y2
• Maximum cable length		m	10
• ON-delay		s	1
Output relay			1 changeover contact, open-circuit principle
General data			
Rated insulation voltage U_i	between supply, measurement, and output circuit	V	400 acc. to IEC 60947-1
Overvoltage category	acc. to IEC 60664		III
Pollution degree	acc. to IEC 60664		3
Rated impulse withstand voltage U_{imp}	acc. to VDE 0435, Part 303	kV	4
Degree of protection	acc. to EN 60529		IP50 enclosure, IP20 terminals
Shock resistance	acc. to IEC 60068-2-27	g/ms	10
Vibration resistance	acc. to IEC 60068-2-6	Hz/mm	10-55/0.35
Permissible ambient temperature		°C	- 25 ... 65
• during operation		°C	- 40 ... 85
• during storage			
Permissible mounting position			any
Conductor cross-section	solid	mm ²	2 × 0.75 ... 2.5
	finely stranded with end sleeve	mm ²	2 × 0.75 ... 2.5

Selection and ordering data

	Effective range U_e	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx.
	kΩ	V				
Isolation monitors for ungrounded AC networks						
	10 ... 110	AC 115/ 230	A	3UG30 81-1AK20	1 unit	0.327
	10 ... 110	AC/DC 24 ... 240	A			
Accessories						
	sealable, transparent cover		A	3UG32 08-1A	1 unit	0.010

Monitoring Relays

Monitoring Relay for Electrical Variables

Insulation resistance
for ungrounded DC voltage networks

Overview

- Relay for monitoring the isolation resistance between ungrounded purely DC networks and a protective-ground conductor
- Measuring principle for differential current measurement
- Response threshold can be set continuously from 10 to 110 k Ω
- Selectable
 - Auto reset function with hysteresis or
 - Storage of the tripping operation
- Front selector switch for open-circuit and closed-circuit principle for the output relay
- Test function with test buttons on the front for L+ and L- and over terminal connections
- Switching output: 1 changeover contact
- Isolation fault indicator for L+ and L- through two red LEDs
- Supply voltage indication with a green LED
- Electro-magnetically compatible according to EN 61000-6-4 and EN 61000-6-2

Area of application

The 3UG30 82 monitoring relay has been designed for isolation monitoring in ungrounded, purely DC networks with or without filtering. It is mainly used to monitor ungrounded DC voltage networks as well as to monitor battery-powered systems.

Supply voltage

Due to the electrical isolation of the supply voltage and the measurement circuit, the relay can be used for DC networks in which the auxiliary voltage is either supplied externally or where the network to be monitored also serves as the power supply.

Note:

If the monitoring relay is supplied with an AC 230 V voltage, for example, the terminals A1 and L+ as well as A2 and L- must not be connected with each other!

Functions

The monitoring relay measures the insulation voltage between the positive and negative supply voltage in an ungrounded DC voltage network and a corresponding protective conductor.

The measurement is based on the DC residual current measurement principle. The response value can be adjusted steplessly in the range from 10...110 k Ω and thus can be adapted to the corresponding conditions. If the insulation resistance falls below the set response value, the output relay triggers (depending on the setting of the open/closed-circuit principle selector switch) and a fault LED lights up.

A ground fault is evaluated separately for L+ and L- and indicated by means of a corresponding LED.

Note:

Due to the measurement principle, a symmetrical ground fault on terminals L+ and L- cannot be evaluated.

Test function

A ground fault can be simulated using the Test L+ and Test L- buttons on the front. If the test button is pressed for at least 1 s, the status of the output relay changes and the corresponding fault LED lights up.

An external test button can be connected to terminals Y1-Y3 for L+ and terminals Y4-Y3 for L-. The function is triggered by means of a NO contact.

Storage of the fault

If terminals Y1 and Y2 are linked, the monitoring relay is set to fault storage mode.

If the insulation resistance falls below the set value, the output relay triggers (depending on the setting of the open/closed circuit selector switch), and stays in this state even if the insulation resistance rises again above the hysteresis value (typical: 2 times the set value). This fault storage can be deleted by pressing and releasing the L+ RESET button, opening the Y2-Y3 connection or by switching off the supply voltage.

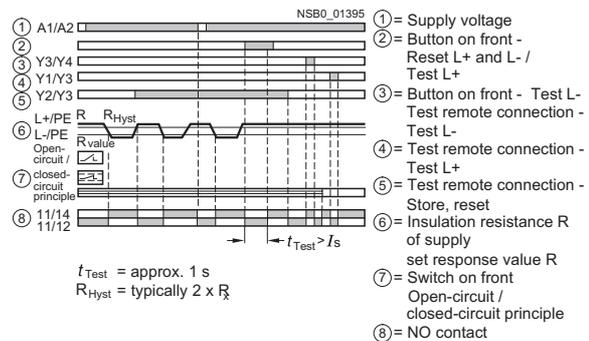
Open/closed-circuit principle selector switch

The function principle of the output relay can be adjusted by means of a selector switch on the front panel.

If the relay is to respond in the event of a fault (contact symbol open), the open-circuit principle must be selected. If the relay however is to trigger in the event of a fault (contact symbol closed), the closed-circuit principle must be selected.

Note:

The position of the selector switch has no effect upon the fault LEDs. The LEDs always light up if the insulation resistance on L+ or L- falls below the set value.



Monitoring Relays

Monitoring Relay for Electrical Variables

Insulation resistance for ungrounded DC voltage networks

Technical specifications

		3UG30 82
Control circuit		
Operating range of the control supply voltage		
Rated power	AC/DC 24 ... 240 V V	VA/W 8/2
Frequency of the rated control supply voltage		
		Hz 50 ... 60
Measurement circuit		
• response value		kΩ 10 ... 110
• minimum internal resistance for DC		kΩ 57
• measurement DC voltage		V 24 ... 240
• max. DC insulation voltage (L+/PE/ground, L-/PE/ground)	DC V	300
• reset/test function terminals		Y1/Y3, Y4/Y3
• maximum cable length	m	10
• ON-delay	s	1
Output relay		
1 changeover contact, open-circuit or closed-circuit principle		
General data		
Rated insulation voltage U_i	between supply, measurement, and output circuit	V 400
Overvoltage category	acc. to IEC 60664	III
Pollution degree	acc. to IEC 60664	3
Rated impulse withstand voltage U_{imp}	acc. to VDE 0435, Part 303	V 4000
Degree of protection	acc. to EN 60529	IP50 enclosure, IP20 terminals
Shock resistance	acc. to IEC 60068-2-27	g/ms 10
Vibration resistance	acc. to IEC 60068-2-6	Hz/mm 10-55/0.35
Permissible ambient temperature		
• during operation	°C	-25 ... +65
• during storage	°C	-40 ... +85
Permissible mounting position		
any		
Conductor cross-section		
	solid	mm ² 2 × 0.75 ... 2.5
	finely stranded with end sleeve	mm ² 2 × 0.75 ... 2.5

Selection and ordering data

Effective range U_e	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx.
kΩ	V				kg
Isolation monitors for ungrounded DC networks					
10 ... 110	AC/DC 24 ... 240 V	A	3UG30 82-1AW30	1 unit	0.241
Accessories					
	sealable, transparent cover	A	3UG32 08-1A	1 unit	0.010



Overview

Electronic monitoring relays are offered in the well-proven design with different functions. These relays are used to detect wear effects and potential faults at an early stage and to respond to them before more serious secondary damage can occur. With their minimal space requirements, high measuring accuracy and optimized functions for high reliability, they are easy to use.

Area of application

Relays for level control are used for single-point and two-point level control. With a resistance measurement in the fluid, the limits determined by the probe are monitored and the output relay is switched. A range of probes that have been optimized for tank level monitoring are available as accessories.

The relay for speed falls below monitoring is particularly suited to checking belt slip or tears. In addition, any continuous pulse signal can be monitored, e.g. for checking smooth running of a belt, monitoring cycle times or as a watchdog for a control.

Technical data

Type	3UG30/3UG35		
Load capacity of the output relay	rated operating current I_e	A	max. 8
	AC-15/230 V	A	3
	DC-13/24 V	A	1
	DC-13/48 V	A	0.45
	DC-13/60 V	A	0.35
	DC-13/110 V	A	0.2
	DC-13/230 V	A	0.1
Minimum contact load		mA	5/17 V for a fault of 1 ppm
Output relay, DIAZED fuse¹⁾	Operational class gI/Gg	A	4
Electrical endurance	Operating cycles		1×10^5
Mechanical endurance	Operating cycles		2×10^6
Ambient temperature	during operation	°C	-20 ... +50
	during storage	°C	-30 ... +70
Conductor connection	solid	mm ²	$2 \times (0.5 \dots 2.5)$
	finely stranded, with end sleeve	mm ²	$2 \times (0.5 \dots 1.5)$
Degree of protection	Terminals		IP20
	Enclosure		IP40
Can be used in networks	3UG30 13/3UG35 11	AC V	660
	other 3UG3	AC V	480
Vibration resistance	acc. to IEC 60068-2-6	Hz/mm	10 ... 55/0.35

Note:

Fuse protection of the measurement circuit is not required to protect the device. Conductor protection depends on the conductor cross-section used.

1) Short-circuits without contact welding to EN 60947-5-1.

Monitoring Relays

Other Monitoring Relays

Fill level

Functions

The principle of operation is based on measuring the electrical resistance of the liquid between two immersion sensors and a reference terminal. If the measured value is lower than the sensitivity set at the front, the output relay changes its switching state. In order to exclude electrolytic phenomena in the liquid, the sensors are supplied with alternating current.

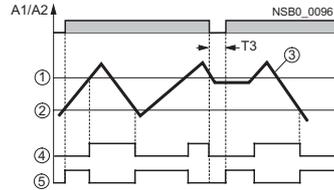
Two-level control: the output relay changes its switching state as soon as the liquid level reaches the maximum sensor, while the minimum sensor is submerged. The relay returns to its original switching state as soon as the minimum sensor no longer has contact with the liquid.

For safe resetting, the supply voltage must be interrupted for at least 0.5 s (T3).

The delay times T1 and T2 of the output relay have not been included in the diagram in order to enhance clarity.

Note:

It is also possible to connect other resistance sensors to the Min and Max terminals in the range 5 ... 100 kΩ e.g. photoresistors, temperature sensors, encoders based on resistance etc. The monitoring relay can therefore also be used for other applications apart from monitoring the levels of conductive liquids.



- ① Maximum level 1)
- ② Minimum level 1)
- ③ Monitored level
- ④ Output relay Function OVER
- ⑤ Output relay Function UNDER

1) Determined by the arrangement of the probes in the monitored liquid.

Technical specifications

Rated control supply voltage U_s	V	see Selection data (electrical isolation by means of a transformer)
Voltage tolerance		0.85 ... 1.1 × U_s
Maximum power consumption	W/VA	3/6
Function	Inlet or outlet monitoring	UNDER/OVER slide switch at the front
Sensitivity	adjustable	kΩ 5 ... 100
Setting accuracy	at maximum sensitivity	% ± 30
Repeat accuracy	at constant parameters	% ± 1
Sensor length	max.	m 100
Electrode voltage	max.	V 24 (50/60 Hz)
Electrode current	max.	mA 1 (50/60 Hz)
Conductor capacity	of the sensor cable ¹⁾	nF 10
Delay time		
• T1 at Max/M terminal	ms	typically 500 (ON-delay with OVER, OFF-delay with UNDER)
• T2 at MIN/M terminal	ms	typically 300 (OFF-delay with OVER, ON-delay with UNDER)
Mains buffering time	ms	300

1) The sensor cable need not necessarily be shielded, but it is not recommended to lay this cable parallel to the power supply lines. It is also possible to use a shielded cable, whereby the shield has to be connected to the M terminal.

Selection and ordering data

Screw connection

Standard rail mounting
Width 22.5 mm

Level monitoring relay for conductive liquids

- inlet or outlet monitoring adjustable
- sensitivity adjustment by potentiometer
- 1 yellow LED for indicating the relay state
- 1 green LED for indicating applied control supply voltage
- 1 changeover contact

Design	Sensitivity	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx.
	kΩ	AC 50/60 Hz V				kg
 Inlet or outlet monitoring (UNDER/OVER function) adjustable	5 ... 100	24	▶	3UG35 01-1AC20	1 unit	0.143
		120	▶	3UG35 01-1AG20	1 unit	0.142
		230	▶	3UG35 01-1AL20	1 unit	0.144

Accessories
Sensors for level monitoring

Version	Assignment Cable	Electrode	Application	DT	Order No.	PS*	Weight per PU approx. kg
		brown white green	center electrode not assign-able	The electrodes can be cut or bent to the required length before or after installation. The Teflon insulation must be removed over a length of approx. 5 mm. Application: for 2-point liquid level control in an insulating tank. One electrode each for the min. and max. value and a common reference electrode.	▶	3UG32 07-3A	1 unit 0.254
		brown white	not assign-able	For installation, see 3UG32 07-3A Application: for alarm indication in the event of overflow or low level and for 2-step liquid-level control, when the conductive tank is used as the reference electrode.	▶	3UG32 07-2A	1 unit 0.230
		brown white green	gland not assign-able	Thanks to the small space requirements due to lateral fitting, ideal for use in small containers and pipes, as a leak monitor and level monitor or for warning of water entering an enclosure.	▶	3UG32 07-2B	1 unit 0.128
		brown white	gland electrode	As a max. value electrode for lateral fitting or for alarm indication in conductive tanks or pipes.	▶	3UG32 07-1B	1 unit 0.122
		brown white	gland electrode	For high flow velocities or for alarm indication in conductive tanks or pipes.	A	3UG32 07-1C	1 unit 0.144

Monitoring Relays

Other Monitoring Relays

Speed

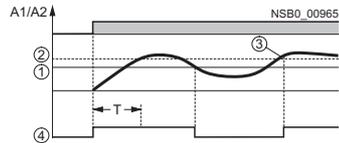
Functions

The underspeed monitoring relay operates according to the principle of retriggerable OFF-delay. During the time (value) set on the front panel, another pulse must arrive at input IN1 or IN2 to ensure that the output relay remains picked up. The monitoring relay evaluates the rising edge of the signal, i.e. a continuous signal is also recognized as a missing pulse. If the retrigger pulse does not arrive, indicating a reduction in speed, the output relay drops. In order to be able to start a drive, the output relay remains picked up during the ON-delay time T , even if the speed is still below the set value (motor starting override time).

The monitoring relay can be used for all functions where a continuous pulse signal needs to be monitored (belt travel monitoring, completeness monitoring, passing monitoring, clock-time monitoring).

Speed monitoring without memory (NO MEMORY)

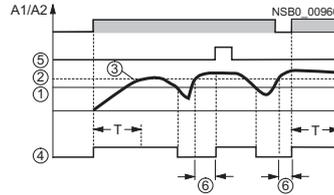
When the speed of the drive drops below the set value, the output relay drops. It picks up again when the speed is greater than the set value plus the fixed hysteresis.



- ① Set value
- ② Hysteresis
- ③ Actual value
- ④ Output relay

Speed monitoring with memory (MEMORY)

When the output relay drops, this state remains stored even when the speed reaches a permissible value again. The stored state can be ended by a control signal at the reset terminal or by interrupting the supply voltage for at least 200 ms.



- ① Set value
- ② Hysteresis
- ③ Actual value
- ④ Output relay
- ⑤ Reset
- ⑥ Storage (MEMORY)

Technical specifications

Type	3UG30 51		
Rated control supply voltage U_s	V	see Selection data (for AC voltages with electrical isolation by means of transformer, 24 V DC without electrical isolation)	
Voltage tolerance	0.85 ... 1.15 × U_s		
Maximum power consumption	W/VA	4/5	
Set value	%	adjustable to 10 ... 100 of the selected time setting range	
Hysteresis	%	typically 5 of the set value	
Setting accuracy	%	10 referred to upper limit of time setting range	
Repeat accuracy	%	± 0.5	
Deviations	with temperature fluctuations	%/°C	0.1
ON-delay T	s adjustable to 0.3 ... 30 ± 10%		
Signal input IN1¹⁾	(input resistance 16 kΩ)	V	max. voltage 30, 3-wire sensor, pnp operation
Signal input IN2¹⁾	(input resistance 1 kΩ)	floating contact, 2-wire NAMUR sensor	
Voltage level for reliable operation	level 1	V	4.5 ... 30
	level 0	V	0 ... 1
Sensor supply	+24 V/0 V	mA	max. 50 at DC 24 V (20 ... 35 V)
	+8 V2	mA	1 DC 8.2 V
Measuring range, selectable (rotary switch on front)	time setting range		
• 0.1 ... 1 s	- frequency	Hz	10 ... 1
	- revolutions	min ⁻¹	600 ... 60
• 1 ... 10 s	- frequency	Hz	1 ... 0.1
	- revolutions	min ⁻¹	60 ... 6
• 0.1 ... 1 min	- frequency	Hz	0.17 ... 0.017
	- revolutions	min ⁻¹	10 ... 1
• 1 ... 10 min	- frequency	Hz	0.017 ... 0.0017
	- revolutions	min ⁻¹	1 ... 0.1
- minimum pulse duration of signal		ms	5
- minimum interval between 2 pulses		ms	5
Function mode setting	With or without memory	rotary switch on front panel	
Availability time after application of U_s	ms		200
Mains buffering time	ms		10

1) The sensors are not included in the scope of supply.

Selection and ordering data

Screw-type connection

For snap-on mounting onto 35 mm standard mounting rail and screw fixing
 Assembly width 45 mm

Underspeed monitoring relay

- 4 measuring ranges adjustable on front panel
- 1 green LED for indicating applied control supply voltage
- 1 yellow LED for indicating the relay state, flashes during operating time T
- 1 changeover contact

Version	Measuring range	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx.
	revolutions/min ⁻¹	AC 50/60 Hz V	DC			kg
 Measuring range with or without memory, start-up override 0.3 ... 30 s, electrical isolation AC: yes DC: no	0.1 ... 600 (4 ranges)	24		▶ 3UG30 51-1AC20	1 unit	0.273
		120		▶ 3UG30 51-1AG20	1 unit	0.274
		230	24 ¹⁾	▶ 3UG30 51-1AL20	1 unit	0.272
				▶ 3UG30 51-1AC40	1 unit	0.161

1) The rated control supply voltage and the measuring circuit are not electrically isolated.

Coupling Relays and Converters

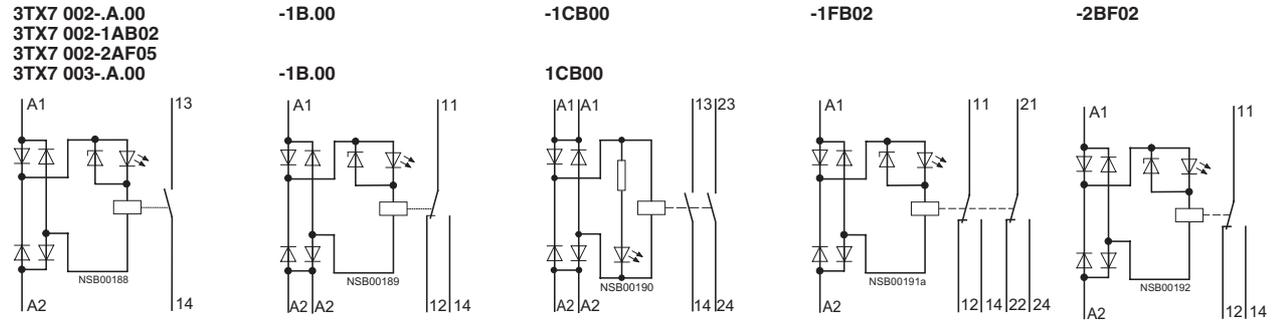
Coupling Relays with Narrow Type of Construction

General data

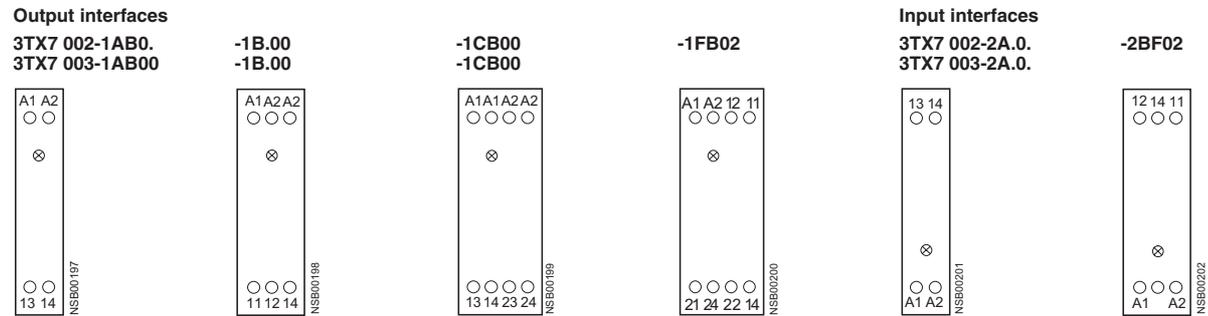
Circuit diagrams

Relay connectors – connection diagrams

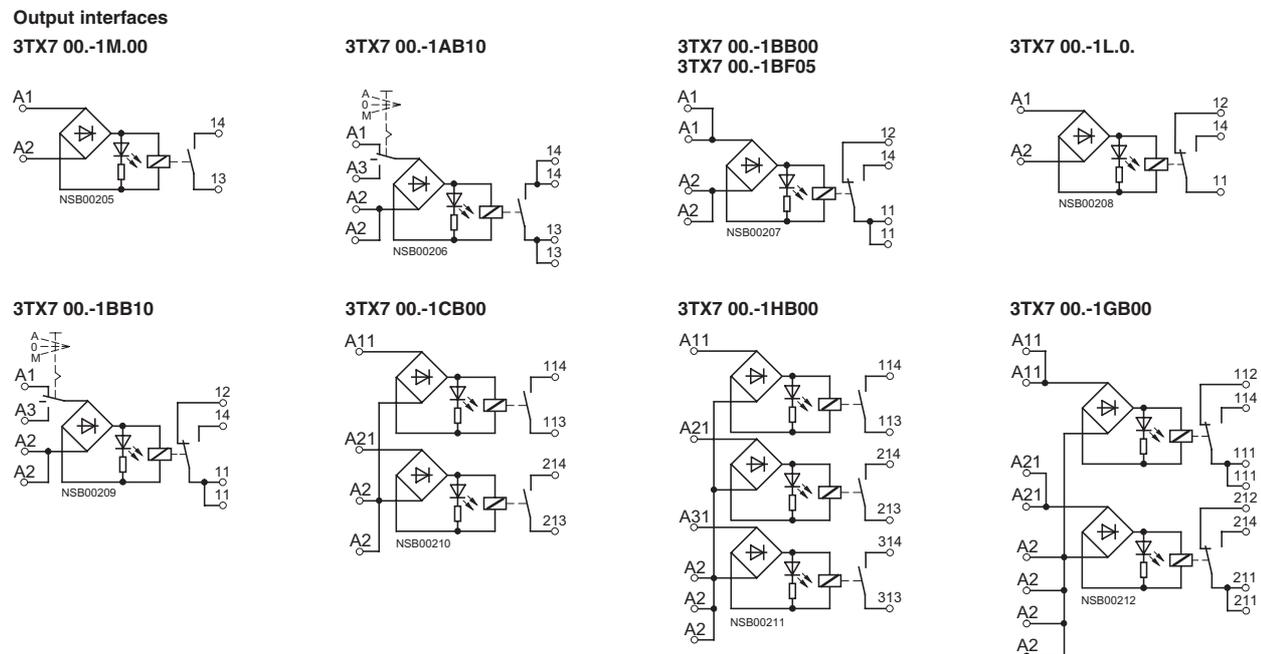
Terminal designations acc. to EN 50005



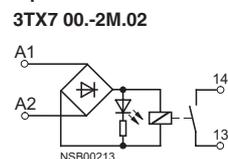
Relay connectors – position of the terminals



Relay connectors – connection diagrams



Input interfaces



A = automatic
 0 = neutral position
 M = manual

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

General data

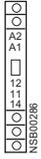
Relay connectors – position of the terminals

Output interfaces

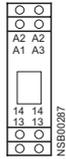
3TX7 004
-1M.00



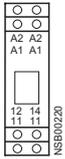
-1L.0.



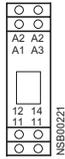
-1AB10



-1B.0.



-1BB10



-1CB00



-1HB00



-1GB00

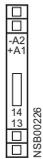


Input interfaces

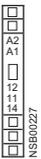
3TX7 004-2M...



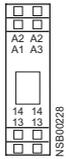
3TX7 005
-1M.00



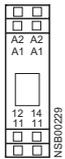
-1L.0.



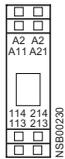
-1AB10



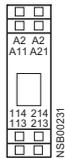
-1BB00



-1BB10



-1CB00



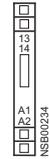
-1HB00



-1GB00



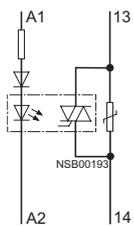
3TX7 005-2M...



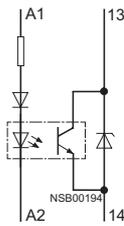
Semiconductor interfaces – connection diagrams

Terminal designations acc. to EN 50005

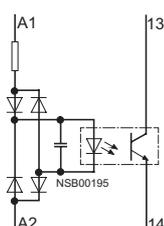
3TX7 002-3AB00



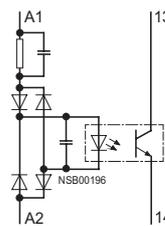
-3AB01



-4AB00



-4AG00



Semiconductor interfaces – position of the interfaces

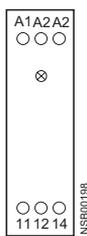
Output interfaces

3TX7 002-3AB0.



Input interfaces

3TX7 002-4A.0.



Coupling Relays and Converters

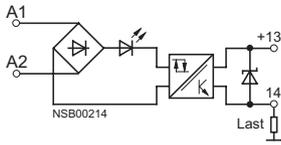
Coupling Relays with Narrow Type of Construction

General data

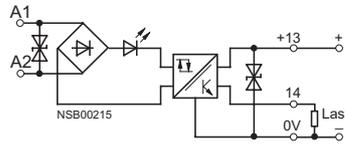
Semiconductor interfaces – connection diagrams

Output interfaces

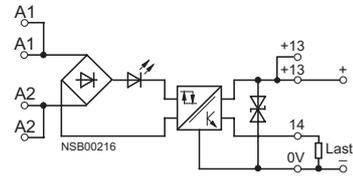
3TX7 00.-3AB04
3TX7 00.-3PB41



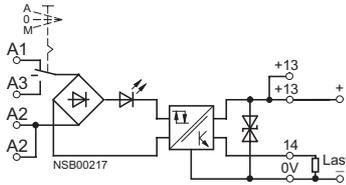
3TX7 00.-3PB54
3TX7 00.-3PG74
3TX7 00.-3PB74



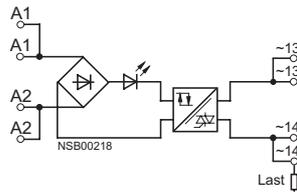
3TX7 00.-3AC04



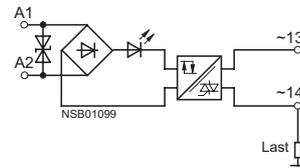
3TX7 00.-3AC14



3TX07 00.-3AC03

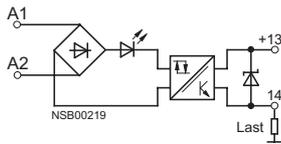


3TX7 00.-3RB43



Input interfaces

3TX7 00.-4AB04
3TX7 00.-4P.24

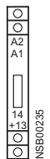


8

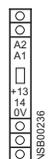
Semiconductor interfaces – position of the interfaces

Output interfaces

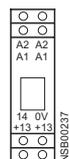
3TX7 004
-3AB04,
-3PB41



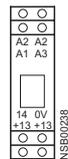
-3PB54,
-3PB74,
-3PG74



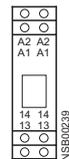
-3AC04



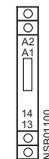
-3AC14



-3AC03

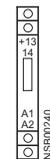


-3RB43



Input interfaces

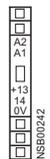
3TX7 004-4AB04
3TX7 004-4P.24



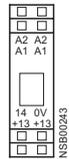
3TX7 005
-3AB04,
-3PB41



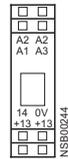
-3PB54,
-3PB74,
-3PG74



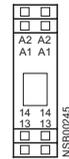
-3AC04



-3AC14



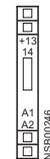
-3AC03



-3RB43



3TX7 005-4AB04
3TX7 005-4P.24



A = automatic
0 = neutral position
M = manual

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Relay connectors

Overview

AC and DC operation

DIN VDE 0110 Part 1, DIN VDE 0435, DIN VDE 0660 and EN 50005

In the coupling elements in double-decker format, the connections are arranged on two levels; the units are extremely compact. Connection method: screw-type connection or spring-loaded terminal. For test purposes, versions are available with manual 0 automatic switches.

The input and output coupling elements differ with regard to the positioning of the terminals and the LEDs. For equipment identification purposes, each coupling element has a blank legend plate.

In accordance with the technical specifications of electronic systems, the coupling elements have a lower power consumption.

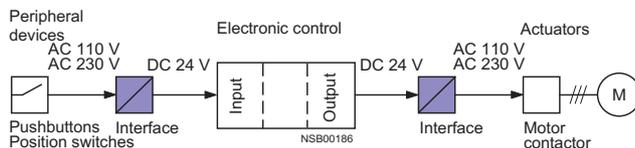
Design

Note on mounting

Snap-on mounting is possible on horizontal and vertical rails. In the case of vertical rails and closely mounted units, the maximum permissible ambient temperature $T_u = 40\text{ °C}$. Any service position is possible.

If the coupling elements are operated continuously 24 hours per day (100% ON time) at the maximum permissible rated control supply voltage and the maximum permissible ambient temperature, it is recommended that no similar equipment or other units that generate heat are placed directly adjoining the coupling elements because this can reduce the service life of the couplers.

A clearance of $> 10\text{ mm}$ to the right and left of the coupling element reduces the risk of a premature failure under these conditions of application.



Functions

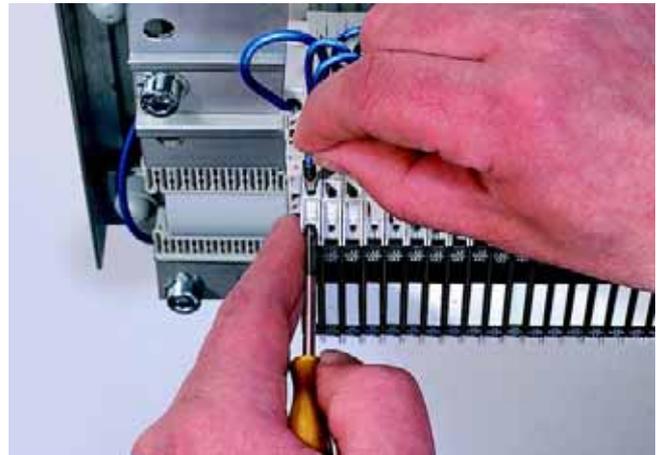
Surge suppression

The coupling links have been tested with 1×10^5 operating cycles at AC-15 operation with the values specified in the Technical specifications.

If inductive loads are connected, the service life of the relay connectors can be increased.

Note:

If capacitive loads without series resistors are switched, which limit temporary peak currents, microscopic welding of the relay contacts may result.



Connecting a lead to the spring-loaded terminals

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Relay connectors

Technical specifications

Type	3TX7 002-/3TX7 003-	
General data		
Rated insulation voltage U_i (pollution degree 3)	V	300
Safe isolation ¹⁾ between the coil and the contacts acc. to DIN VDE 0106 Part 101	V	up to AC 300 V
Degree of protection	Connections Enclosures	IP20 IP30
Short-circuit protection acc. to IEC 60947-5-1 (weld-free protection at $I_k \geq 1$ kA) Fuse-links, operational class gL/gG	A	4
Permissible ambient temperature	during operation during storage	°C -25 ... +60 °C -40 ... +80
Conductor cross-sections		
• Screw-type connections		
- solid	mm ²	1 × (0.25 ... 4)
- finely stranded with or without end sleeve	mm ²	1 × (0.5 ... 2.5)
- terminal screw		M 3
• Spring-loaded terminals (for 3TX7 003):		
- solid or finely stranded	mm ²	1 × (0.08 ... 2.5)
- finely stranded with end sleeve	mm ²	1 × (0.25 ... 1.5)

1) For 3TX7 00.-1FB02, no safe isolation acc. to DIN VDE 0106 Part 101.

Type	3TX7 002-/3TX7 003-				1AB02	1AB00	1BB00 1FB02	1CB00	2AB00	2AE00	1BF00 2BF02	2AF00	2AF05
Control side													
• Operating range		0.8 ... 1.25 × U_s				0.8 ... 1.1 × U_s							
• Power consumption at U_s	W	0.75	0.75	0.75	1.2	0.75	0.75	1.2	1.2	1.2	1.2	1.2	1.2
• Release voltage	% of U_s	≥ 10											≥ 25
• Max. permissible conductor length (min. conductor cross-section: 0.75 mm ²)	m	300	300	300	300	300	15	7	7	7	7	7	350
• Permissible residual current of the electronic circuit (for 0 signal)	mA	2	2	2	4	2	0.4	0.35	0.35	0.35	0.35	0.35	4
• Switching times at U_s		- ON-delay - OFF-delay											
	ms	< 8											
	ms	< 10											
• Function display		yellow LED											
Load side													
• Rated currents²⁾		A 6											
• Conventional thermal current I_{th}	A	6											
• Rated operating currents I_e acc. to utilization categories (DIN VDE 0660) (3TX7 002-1CB00: AC-15, $I_e = 2$ A)													
- AC-15													
- at 24 V	A	3											
- at 110 V	A	3											
- at 230 V	A	3											
- DC-13													
- at 24 V	A	1.0											
- at 110 V	A	0.2											
- at 230 V	A	0.1											
• Operating current with resistive load to DIN VDE 0435 (relay standard) and DIN VDE 0660													
- AC-12	A	6											
- at 24 V	A	6											
- at 110 V	A	6											
- at 230 V	A	6											
- DC-12	A	6											
- at 24 V	A	0.2											
- at 110 V	A	0.2											
- at 230 V	A	0.2											
• Operating voltage	V	24 ... 250											
• Min. contact load for 3TX7 00.-...02	mA	AC/DC 1 V, 0.1											
• Mechanical endurance	Oper. cycles	20 × 10 ⁶											
• Electrical endurance at I_e	Oper. cycles	1 × 10 ⁵											
• Operating frequency	Oper. cycles/h	5000											
• Contact material for 3TX7 00.-...02		Ag/Ni 0.15 hard gold-plated											
• Power limit hard gold plating for 3TX7 00.-...02													
- Voltage	V	30											
- Current	mA	20											

Note: If inductive loads are connected in parallel, the service life of the relay connectors can be increased.

1) No safe isolation for 3TX7 00.-1FB02

2) Capacitive loads can result in micro-welding on the contacts

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Relay connectors

Type	3TX7 004/3TX7 005	
General data		
Rated insulation voltage U_i (pollution degree 3)	V	300
Safe isolation between the coil and the contacts acc. to DIN VDE 0106 Part 101	AC V	up to 300
Degree of protection	Connections Enclosures	IP20 IP30
Short-circuit protection acc. to IEC 60947-5-1 (weld-free protection at $I_k \geq 1$ kA) fuse-links, operational class gL/gG	A	4
Permissible ambient temperature	during operation during storage	°C -25 ... +60 °C -40 ... +80
Conductor cross-sections		
• Screw connections (for 3TX7 004):		
- solid	mm ²	1 × (0.25 ... 4)
- finely stranded with end sleeve	mm ²	1 × (0.5 ... 2.5)
- finely stranded without end sleeve	mm ²	1 × (0.5 ... 2.5)
- terminal screws		M 3
• Spring-loaded terminals (for 3TX7 005):		
- solid or finely stranded	mm ²	1 × (0.08 ... 2.5)
- finely stranded with end sleeve	mm ²	1 × (0.25 ... 1.5)
Control side		
• Operating range	at DC 17 ... 40 V at $U_s =$ AC/DC 24 V at $U_s =$ AC/DC 110 and 230 V	- 0.7 ... 1.25 × U_s 0.8 ... 1.1 × U_s
• Power consumption at U_s		approx. 0.5 W/channel; 3TX7 00-...05: 1 W at DC/6 VA at AC
• Permissible residual current of the electronics (for 0 signal)		
- Width 6.2 mm	mA	2
- $U_s = 24$ V	mA	0.5
- $U_s > 24$ V	mA	2.5
- From 12.5 mm width		
Exceptions: 3TX700.-1LH00, 3TX700.-1BF05	mA	1.5 5 ($U_s =$ AC 230 V) 0.5 ($U_s =$ AC 230 V)
• Switching times at U_s	- ON-delay - OFF-delay	ms < 8 ms < 15
• Function display		yellow LED

Type	3TX7 004/3TX7 005	-1.F00 -2ME02 -2MF02	-1.B.. -2MB02	1.H0.	-1BF05
Max. permissible conductor length (min. conductor cross-section: 0.75 mm ²)					
• AC	m 40	400	on request	350	
• DC	m 2000	2000	on request	2000	

Type	3TX7 00.-1A/1B-/1C-/1H/1G		3TX7 00.-.L/M	
Load side				
Rated operating currents $I_e^{1)}$				
• Conventional thermal current I_{th}	A	6	6	
• Rated operating current I_e according to utilization categories (DIN VDE 0660)				
- AC-15				
- at 24 V	A	3	2	
- at 110 V	A	3	2	
- at 230 V	A	3	2	
- DC-13				
- at 24 V	A	1	1	
- at 110 V	A	0.2	0.2	
- at 230 V	A	0.1	0.1	
• Operating current with resistive load to DIN VDE 0435 (relay standard) and DIN VDE 0660				
- AC-12				
- at 24 V	A	6	6	
- at 110 V	A	6	6	
- at 230 V	A	6	6	
- DC-12				
- at 24 V	A	6	6	
- at 110 V	A	0.3	0.3	
- at 230 V	A	0.2	0.2	
• Power limit/hard gold plating	- Voltage - Current	V 30 mA 20	30 20	
• Operating voltage	AC/DC	V 17 ... 250	17 ... 250	
• Endurance	- mechanical - electrical (at I_e)	Operating cycles Operating cycles	20 × 10 ⁶ 1 × 10 ⁶	20 × 10 ⁶ 0.5 × 10 ⁶
• Operating frequency		Operating cycles 1/h	5000	5000

Note: If inductive loads are connected in parallel, the service life of the relay connectors can be increased.

1) Capacitive loads can result in micro-welding on the contacts

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Relay connectors

Selection and ordering data

AC and DC operation • for snap-on mounting onto 35 mm standard mounting rail

Rated control supply voltage U_s	Contacts Version		Width	DT	Screw-type connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.
	S	W									
AC 50/60 Hz	S	W	mm								
3TX7 002 and 3TX7 003 relay connectors											
Output interfaces											
AC/DC 24 V	1	–	11.5	▶	3TX7 002-1AB00	1 unit	0.032	▶	3TX7 003-1AB00	1 unit	0.030
AC/DC 24 V	1 (hard gold-plated)	–		▶	3TX7 002-1AB02	1 unit	0.032		–		
AC/DC 24 V	–	1	17.5	▶	3TX7 002-1BB00	1 unit	0.043	▶	3TX7 003-1BB00	1 unit	0.038
AC/DC 230 V	–	1		▶	3TX7 002-1BF00	1 unit	0.044	A	3TX7 003-1BF00	1 unit	0.039
AC/DC 24 V	2 ¹⁾	–	22.5	▶	3TX7 002-1CB00	1 unit	0.055	▶	3TX7 003-1CB00	1 unit	0.050
AC/DC 24 V	–	2 (hard gold-plated) ¹⁾		▶	3TX7 002-1FB02	1 unit	0.055		–		
Input interfaces											
AC/DC 24 V	1	–	11.5	▶	3TX7 002-2AB00	1 unit	0.032	A	3TX7 003-2AB00	1 unit	0.030
AC/DC 110 V	1	–		▶	3TX7 002-2AE00	1 unit	0.032		–		
AC/DC 230 V ¹⁾	1	–	11.5	▶	3TX7 002-2AF00	1 unit	0.033	A	3TX7 003-2AF00	1 unit	0.031
AC/DC 230 V ¹⁾	1	–		▶	3TX7 002-2AF05	1 unit	0.038		–		
AC/DC 230 V	–	1 (hard gold-plated) ²⁾	17.5	▶	3TX7 002-2BF02	1 unit	0.043		–		



3TX7 002



3TX7 003

Note:

For coil voltages which are not listed, see DC power supplies SITOP power e.g. 6EP1 331-2BA10 and 6EP1 731-2BA00 in "Transformers and power supplies".

- 1) The same potential must be applied to 2 NO/2 CO relays.
- 2) Observe max. permissible conductor length, see Technical specifications.

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Relay connectors

Rated control supply voltage U_s	Contacts Version		Channel	Manual-0-automatic switch for testing purposes	Width	DT	Screw-type connection			Spring-loaded terminal		
	S	W					PS*	Weight per PU approx.	DT	PS*	Weight per PU approx.	
AC 50/60 Hz	S	W			mm		Order No.	kg		Order No.	kg	

Relay connectors 3TX7 004 and 3TX7 005

Output interfaces

AC/DC 24 V	–	1	1	without	6.2	▶	3TX7 004-1LB00	1 unit	0.033	▶	3TX7 005-1LB00	1 unit	0.029
AC/DC 230 V	–	1	1	without	6.2	▶	3TX7 004-1LF00	1 unit	0.035	▶	3TX7 005-1LF00	1 unit	0.030
AC/DC 230 V	–	1	1	without	12.5 ¹⁾	▶	3TX7 004-1BF05	1 unit	0.057	A	3TX7 005-1BF05	1 unit	0.053
DC 17/40 V	–	1	1	without	6.2	▶	3TX7 004-1LH00	1 unit	0.033	A	3TX7 005-1LH00	1 unit	0.029
AC/DC 24 V	–	1 (hard gold-plated)	1	without	6.2	▶	3TX7 004-1LB02	1 unit	0.033	▶	3TX7 005-1LB02	1 unit	0.028
AC/DC 24 V	1	–	1	without	6.2	▶	3TX7 004-1MB00	1 unit	0.038	▶	3TX7 005-1MB00	1 unit	0.034
AC/DC 230 V	1	–	1	without	6.2	▶	3TX7 004-1MF00	1 unit	0.037	▶	3TX7 005-1MF00	1 unit	0.034
AC/DC 24 V	–	1	1	with	12.5	▶	3TX7 004-1BB10	1 unit	0.052	C	3TX7 005-1BB10	1 unit	0.048

Input interfaces

AC/DC 24 V	1 (hard gold-plated)	–	1	without	6.2	▶	3TX7 004-2MB02	1 unit	0.037	C	3TX7 005-2MB02	1 unit	0.034
AC/DC 110 V	1 (hard gold-plated)	–	1	without	6.2	▶	3TX7 004-2ME02	1 unit	0.037	C	3TX7 005-2ME02	1 unit	0.031
AC/DC 230 V	1 (hard gold-plated)	–	1	without	6.2	▶	3TX7 004-2MF02	1 unit	0.038	C	3TX7 005-2MF02	1 unit	0.034



3TX7 004-1LB0.



3TX7 005-2MB02

Note:

For replacement products, see interfaces with 3RS18 industrial enclosure or other 3TX70 products.

For coil voltages which are not listed, see DC power supplies SITOP power e.g. 6EP1 331-2BA10 and 6EP1 731-2BA00 in "Transformers and power supplies".

1) For long conductors.

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Relay connectors

Accessories

	For interface	Version	DT	Order No.	PS*	Weight per PU approx. kg
	Type					
Connecting comb	3TX7 004	24 terminals, blue, width 6.2 mm	▶	3TX7 004-8AA00	1 unit	0.017
						
Connecting lead	3TX7 002, 3TX7 003, 3TX7 004, 3TX7 005	24 terminals with supply cable, blue	A	3TX7 004-8BA00	1 unit	0.050
						

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Plug-in relay connectors

Benefits

The wire is fed in and screwed down from the front. This results in faster wiring time and wiring errors are prevented.

Overview

Coupling elements are used to connect signals to and from a PLC. The plug-in relays enable the relay to be replaced at the end of its service life without the need for any changes in the wiring.

For easy bridging of the signals, each terminal can be jumpered using an external connecting comb.

Technical specifications

Type	3TX7 01.-1		
General data			
Rated insulation voltage U_i (pollution degree 3)	V	300	
Safe isolation between the coil and the contacts acc. to DIN VDE 0106 Part 101	V	up to AC 300 V	
Degree of protection	Connections Enclosures	IP20 IP40	
Short-circuit protection acc. to IEC 60947-5-1 (weld-free protection at $I_k \geq 1$ kA) Fuse-links, operational class gL/gG	A	4	
Permissible ambient temperature	during operation during storage	°C	-25 ... +55 -40 ... +80
Conductor cross-sections			
• Screw connections		mm ²	1 × (0.5 ... 2.5)
- solid		mm ²	1 × (0.5 ... 1.5)
- finely stranded with or without end sleeve			M 3
- terminal screw			
Type	3TX7 01.-1.M	3TX7 01.-1.B	3TX7 01.-1.E/F
Control side			
• Operating range	0.9 ... 1.1 × U_s	0.7 ... 1.25 × U_s	0.8 ... 1.1 × U_s
• Power consumption at U_s	W	0.5	
• Release voltage	% of U_s	10	
• Max. permissible conductor length (min. conductor cross-section: 0.75 mm)	- AC - DC	m	7 2000
• Permissible residual current of the electronic circuit (for 0 signal)		mA	2
• Operating times at U_s	- ON-delay - OFF-delay	ms	< 5 < 5
• Function display			yellow LED
• Protection circuit	- DC - AC		flywheel diode + reverse voltage protection Varistor
Type	3TX7 01.-1		
Load side			
Rated currents¹⁾		A	5
• Conventional thermal current I_{th}		A	3
• Rated operating currents I_e		A	3
- AC-15	- at 24 V - at 110 V - at 230 V	A	3
- DC-13	- at 24 V - at 110 V - at 230 V	A	1 0.2 0.1
• Operating voltage	AC/DC	V	24 ... 250
• Min. contact load	- standard contact - hard gold-plated contacts		AC/DC 17 V, 5 mA at 1 ppm fault ²⁾ AC/DC 5 V, 1 mA for 1 ppm fault ²⁾
• Mechanical endurance		Operating cycles	20
• Electrical endurance for I_e acc. to AC-15		Operating cycles	100000
• Operating frequency		Operating cycles 1/h	5000

Note: If inductive loads are connected in parallel, the service life of the relay connectors can be increased.

- 1) Capacitive loads can result in micro-weldings on the contacts
- 2) 1 ppm = one fault per one million operating cycles.

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Plug-in relay connectors

Selection and ordering data

Rated control supply voltage U_s	Contacts		DT	Screw connection	PS*	Weight per PU approx. kg
	S	W				
				Order No.		kg
Plug-in interface, complete with relay						
	DC 24 V	1	–	A	3TX7 014-1AM00	1 unit 0.035
	DC 24 V	–	1	A	3TX7 014-1BM00	1 unit 0.035
	AC/DC 24 V	–	1	A	3TX7 014-1BB00	1 unit 0.035
	AC/DC 115 V	–	1	A	3TX7 014-1BE00	1 unit 0.045
	AC/DC 230 V	–	1	A	3TX7 014-1BF00	1 unit 0.045

3TX7014-1BM00

Plug-in base interface, complete with relay and hard gold-plating¹⁾						
DC 24 V	–	1 hard gold-plated	A	3TX7 014-1BM02	1 unit	on request
AC/DC 24 V	–	1 hard gold-plated	A	3TX7 014-1BB02	1 unit	0.035
AC/DC 115 V	–	1 hard gold-plated	A	3TX7 014-1BE02	1 unit	on request
AC/DC 230 V	–	1 hard gold-plated	A	3TX7 014-1BF02	1 unit	on request

Coil voltage	Used for	DT	Order No.	PS*	Weight per PU approx. kg
--------------	----------	----	-----------	-----	--------------------------

Individual relay modules²⁾, 1 changeover contact						
DC 24 V	Complete unit DC 24 V	A	3TX7 014-7BQ00	1 unit	on request	
DC 24 V	Complete unit, DC 24 V, hard gold-plated	A	3TX7 014-7BQ02	1 unit	on request	
DC 24 V	Complete unit AC/DC 24 V	A	3TX7 014-7BM00	1 unit	0.035	
DC 24 V	Complete unit, DC 24 V, hard gold-plated	A	3TX7 014-7BM02	1 unit	0.035	
DC 24 V	Complete unit AC/DC 115 V and 230 V	A	3TX7 014-7BP00	1 unit	on request	
DC 24 V	Complete unit AC/DC 115 V and 230 V, hard gold-plated	A	3TX7 014-7BP02	1 unit	on request	

Connecting comb 16-pole, blue						
	for jumpering the same potentials, 16-pole, 6 A current-carrying capacity	A	3TX7 014-7AA00	1 unit	on request	



Note:

Start of delivery of the socket interfaces with screw-type connection, expected at the beginning of 2004, units with spring-loaded terminals at the end of 2004.

1) The variants with hard gold-plated contacts with high contact reliability (also for low currents) are especially suitable for electronic inputs of programmable logic controllers.

2) The order number is **not** printed on the relays.

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Semiconductor couplers

Area of application

AC and DC operation

DIN VDE 0110 Part 1, DIN VDE 0435, DIN VDE 0660 and EN 50 005 optocoupler: DIN VDE 0884, DIN VDE 0411 Part 500, IEC 61131-2 (programmable logic controllers).

In the coupling elements in double-decker format, the connections are arranged on two levels; the units are extremely compact. Connection method: screw-type connection or spring-loaded terminal. For test purposes, versions are available with manual 0 automatic switches.

The input and output coupling elements differ with regard to the positioning of the terminals and the LEDs. For equipment identification purposes, each coupling element has a blank legend plate.

In accordance with the technical specifications of electronic systems, the coupling elements have a lower power consumption.

Design

Note on mounting

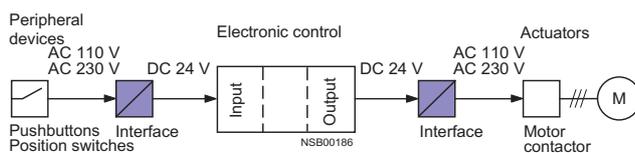
Snap-on mounting is possible on horizontal and vertical rails. In the case of vertical rails and closely mounted units, the maximum permissible ambient temperature $T_u = 40\text{ °C}$. Any service position is possible.

If the coupling elements are operated continuously 24 hours per day (100% ON time) at the maximum permissible rated control supply voltage and the maximum permissible ambient temperature, it is recommended that no similar equipment or other units that generate heat are placed directly adjoining the coupling elements because this can reduce the service life of the couplers.

A clearance of $> 10\text{ mm}$ to the right and left of the coupling element reduces the risk of a premature failure under these conditions of application.

Optocouplers switch using semiconductors. These are not subject to wear; welding is not possible.

The 6.2 mm wide optocouplers have an opening in the right-hand side of the casing. They can, like relay connectors, be mounted side-by-side without gaps.

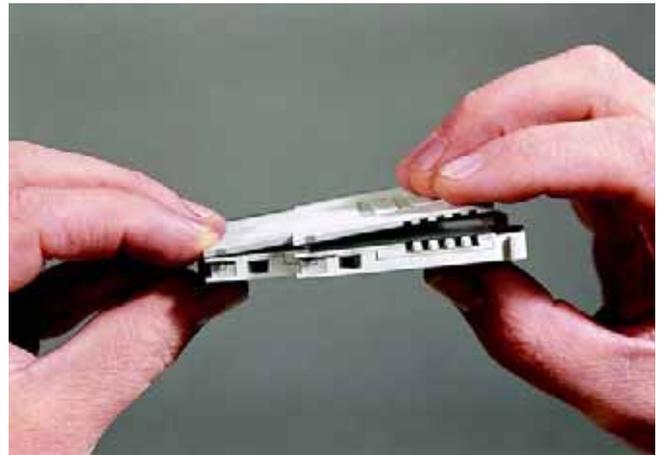


Functions

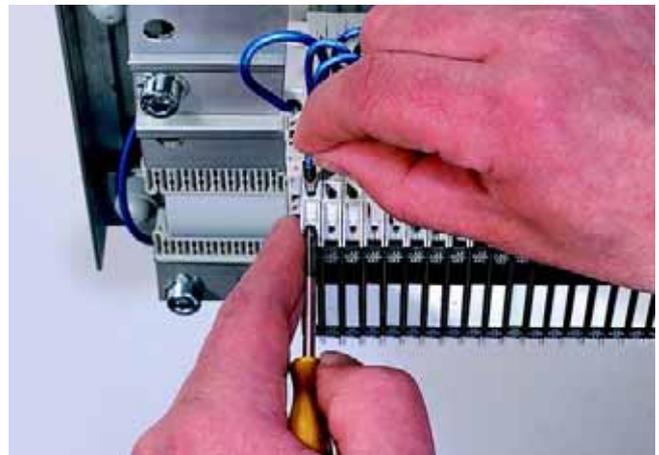
Surge suppression

In the case of optocouplers, the contact element is a semiconductor. These are not subject to wear; so welding is not possible.

With semiconductors, the switching current is not dependent on the inductance of the load, i.e. the switching current for a DC-13 load is the same as that for an inductive DC-12 load. This means that coupling elements with a semiconductor output are particularly suitable for inductive loads such as solenoid valves. It is not relevant to specify the number of operating cycles because this does not affect the service life of the semiconductor provided it is not overheated.



To provide shock-hazard protection in the case of modules of 6.2 mm width (e.g. 3TX7 004-3AB04) with an opening in the casing, the single module or the last module in a row must be fitted with a cover plate.



Connecting a lead to the spring-loaded terminals

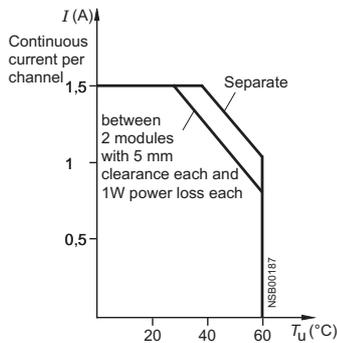
Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Semiconductor couplers

Technical specifications

Type	3TX7 002/3TX7 003	
General data		
Derating diagram for 3TX7 002-3AB01 Load current depending on ambient temperature T_u	Rated insulation voltage U_i (pollution degree 3)	V 300
	Optoelectronic coupling element for safe isolation acc. to DIN VDE 0660 Part 101	V ... 300
	Conductor cross-sections solid finely stranded with or without end sleeve terminal screws	mm ² 1 × (0.25 ... 4) mm ² 1 × (0.5 ... 2.5) M 3
	Permissible ambient temperature during operation during storage	°C -25 ... +60 °C -40 ... +80



Type	3TX7 002-	3AB00	3AB01	4AB00	4AG00
Control side					
Operating range	V	DC 17 ... 30	DC 11 ... 30	AC/DC 17 ... 30	AC 88 ... 264
Control side current input	<ul style="list-style-type: none"> • at DC 17 V • at DC 24 V • at DC 30 V • at AC/DC 17 V • at AC/DC 24 V • at AC/DC 30 V • at AC 88 V • at AC 230 V • at AC 264 V 	mA < 18 mA < 20 mA < 22 mA – mA – mA – mA – mA – mA –	< 5 < 7 < 8.5 – – – – –	– – < 10 < 14 < 18 – – –	– – – – < 9 < 24 < 28
Release voltage	V	> 5	> 8	> 5	> 40
Operating times					
• ON-delay	at DC 17 V at DC 24 V at DC 30 V at AC/DC 17 V at AC/DC 24 V at AC/DC 30 V at AC 88 V at AC 230 V at AC 264 V	ms < 10 ms < 10 ms < 10 ms – ms – ms – ms – ms – ms –	< 0.1 < 0.1 < 0.1 – – – – –	– – < 1 < 1 < 1 – – –	– – – – < 18 < 20 < 22
• OFF-delay	at DC 17 V at DC 24 V at DC 30 V at AC/DC 17 V at AC/DC 24 V at AC/DC 30 V at AC 88 V at AC 230 V at AC 264 V	ms < 10 ms < 10 ms < 10 ms – ms – ms – ms – ms – ms –	< 0.1 < 0.1 < 0.1 – – – – –	< 18 < 25 < 30 < 18 < 25 < 30 – – –	– – – < 10 < 20 < 25
Function display		yellow LED	yellow LED	yellow LED	yellow LED
Max. permissible conductor length (min. conductor cross-section: 0.75 mm ²)	AC DC	m m	– 2000	– 2000	1000 2000
Load side					
• Rated operating current I_e	A	1.8	1.5 (see derating diagram)	0.1	0.1
• Short-time loading capacity	A ms	20 20	4 0.2	1 20	1 20
• Contacts		1 NO, Triac	1 NO, transistor	1 NO, transistor	1 NO, transistor
• Switching voltage¹⁾ (working range)	effective AC 50/60 Hz DC	V V	48 ... 264	≤ 60	≤ 30 ≤ 60
• Minimum load current	mA	60	–	–	–
• Voltage drop (conducting)	V	≤ 1.5	≤ 1.1	≤ 1.7	≤ 0.3
• Leakage current of the electronics (for 0 signal)	mA	< 5	< 0.1	< 0.1	< 0.001
• Operating frequency at I_e	Hz	1	1	5	5

1) Observe minimum operating voltage for 3TX7 002-3AB00.

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Semiconductor couplers

Type	3TX7 004/3TX7 005	
General data		
Rated insulation voltage U_i (pollution degree 3)	V	300
Safe isolation acc. to DIN VDE 0106 Part 101	V	... 300
Permissible ambient temperature		
• during operation	°C	- 25 ... + 60
• during storage	°C	- 40 ... + 80
Conductor cross-sections		
• Screw connections (for 3TX7 004):		
- solid	mm ²	1 × (0.25 ... 4)
- finely stranded with end sleeve	mm ²	1 × (0.5 ... 2.5)
- finely stranded without end sleeve	mm ²	1 × (0.5 ... 2.5)
- terminal screws		M 3
• Spring-loaded terminals (for 3TX7 005):		
- solid or finely stranded	mm ²	1 × (0.08 ... 2.5)
- finely stranded with end sleeve	mm ²	1 × (0.25 ... 1.5)

Type	3TX7 004- 3TX7 005-	3AB04/ 4AB04	3AC.4	3AC03	3PB54	4PG24
Control side						
• Operating range	V	11 ... 30 DC	11 ... 30 DC	11 ... 30 DC	11 ... 30 DC	110 ... 230 AC/DC
• Power consumption						
- at DC 24 V	W	≤ 0.5	≤ 0.5	≤ 0.25	≤ 0.2	-
- at AC 230 V	W	-	-	-	-	≤ 1.5
• Release voltage	V	6	5	6	9	20
• Permissible residual current of the electronic circuit (for 0 signal)	mA	2.3	2.6	1.5	1.5	0.4
• Operating times						
- ON-delay	ms	2.5	0.3	10	0.3	1
- OFF-delay	ms	8	4	10	0.3	6
• Function display		yellow LED	yellow LED	yellow LED	yellow LED	yellow LED
• Max. permissible conductor length (min. conductor cross-section: 0.75 mm ²)	m	1700	2000	2000	2000	40
Load side						
Operating voltage	V	≤ 48 DC	≤ 30 DC	24 ... 250 V AC	≤ DC 30 V	≤ DC 30 V
Operating current	A	0.5	5	2	1.5	0.1
• Short-time loading capacity						
	A	1.5	Short-circuit resistant ¹⁾	100	Short-circuit resistant ²⁾	0.2
	ms	20		20		3
• Contacts		1 NO contact, transistor	1 NO contact, transistor	1 NO contact, triac	1 NO contact, transistor	1 NO contact, transistor
• Minimum load current	mA	-	500 ³⁾	50	-	-
• Voltage drop (conducting)	V	≤ 1	≤ 0.5	≤ 1.6	≤ 0.5	≤ 1.5
• Leakage current for 0 signal	mA	< 0.1	< 0.1	< 6	< 0.1	< 0.1
• Operating frequency for resistive load	Hz	50	50	1	500	500

1) In the event of a short-circuit or overload, the semiconductor output switches off. In order to operate the unit again, it must be temporarily disconnected from the power supply.

2) In the event of a short-circuit or overload, the current is limited by the semiconductor output.

3) If the current falls below the minimum load current, the built-in semiconductor detects an open-circuit in the load circuit. The control must be temporarily switched off for resetting.

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Semiconductor couplers

Type	3TX7 004-/ 3TX7 005-	3P.74	3PB41	3RB43	4PB24
Control side					
• Operating range	V	110 ... 230 AC/DC	11 ... 30 DC	18 ... 30 DC	11 ... 30 DC
• Power consumption					
	- at DC 24 V	W –	≤ 0.5	≤ 0.3	≤ 0.2
	- at AC 230 V	W ≤ 1.5	–	–	–
• Release voltage	V	25	5	12	6
• Permissible residual current of the electronic circuit (for 0 signal)	mA	1	1.5	4	1.2
• Operating times					
	- ON-delay	ms 1.5	4	0.2	0.2
	- OFF-delay	ms 75	6	10	1
• Function display		yellow LED	yellow LED	yellow LED	yellow LED
• Max. permissible conductor length (min. conductor cross-section: 0.75 mm ²)	m	40	2000	2000	2000
Load side					
Operating voltage	V	≤ DC 30	≤ DC 200	AC 24 ... 250	≤ DC 30
Operating current	A	3	0.75	0.5	0.1
• Short-time loading capacity					
	A	Short-circuit resistant ¹⁾	3	0.8	0.2
	ms		2	3	3
• Contacts		1 NO contact, transistor	1 NO contact, transistor	1 NO contact, triac	1 NO contact, transistor
• Minimum load current	mA	–	–	10	–
• Voltage drop (conducting)	V	≤ 0.5	≤ 2	≤ 1.5	≤ 1.5
• Leakage current of the electronics (for 0 signal)	mA	≤ 0.1	≤ 0.1	≤ 1	≤ 0.1
• Operating frequency for resistive load	Hz	10	50	50	500

1) In the event of a short-circuit or overload, the current is limited by the semiconductor output.

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Semiconductor couplers

Selection and ordering data

AC and DC operation • for snap-on mounting onto 35 mm standard mounting rail

Rated control supply voltage U_s	Contacts		Width	DT	Screw connection			PS*	Weight per PU approx.	DT	Spring-loaded terminal		
	Version				Order No.						Order No.		
AC 50/60 Hz			mm				kg					kg	

3TX7 002 semiconductor interfaces



3TX7 002

Output interfaces		Width	DT	Screw connection			PS*	Weight per PU approx.	DT	Spring-loaded terminal		
DC 24 V				Order No.						Order No.		
1 triac	–	12.5	▶	3TX7 002-3AB00	1 unit	0.033			–			
1 triac	–	11.5	▶	3TX7 002-3AB01	1 unit	0.035			–			
Input interfaces		Width	DT	Screw connection			PS*	Weight per PU approx.	DT	Spring-loaded terminal		
AC/DC 24 V				Order No.						Order No.		
1 transistor	–	12.5	▶	3TX7 002-4AB00	1 unit	0.031			–			
AC 110 ... 240 V	1 transistor	12.5	▶	3TX7 002-4AG00	1 unit	0.035			–			

Control	Operating voltage	Operating current	Manual-0-automatic switch for testing purposes	Width	DT	Screw connection			PS*	Weight per PU approx.	DT	Spring-loaded terminal		
AC 50/60 Hz	A	mm		Order No.			kg	Order No.						kg

3TX7 004 and 3TX7 005 semiconductor interfaces



3TX7 004-3AB04 with cover plate

Output interfaces		Width	DT	Screw connection			PS*	Weight per PU approx.	DT	Spring-loaded terminal		
DC 24 V				Order No.						Order No.		
DC 24 V	≤ 48 V DC	0.5	without	6.2	▶	3TX7 004-3AB04	1 unit	0.034	▶	3TX7 005-3AB04	1 unit	0.031
DC 24 V	≤ DC 30 V	1.5	without	6.2	▶	3TX7 004-3PB54	1 unit	0.029	▶	3TX7 005-3PB54	1 unit	0.024
DC 24 V	≤ DC 30 V	3	without	6.2	▶	3TX7 004-3PB74	1 unit	0.032	A	3TX7 005-3PB74	1 unit	0.027
AC/DC 110 ... 230 V	≤ DC 30 V	3	without	6.2	▶	3TX7 004-3PG74	1 unit	0.033	A	3TX7 005-3PG74	1 unit	0.027
DC 24 V	≤ DC 30 V	5	without	12.5	▶	3TX7 004-3AC04	1 unit	0.056	▶	3TX7 005-3AC04	1 unit	0.047
DC 24 V	≤ DC 30 V	5	with	12.5	C	3TX7 004-3AC14	1 unit	0.053	C	3TX7 005-3AC14	1 unit	0.051
DC 24 V	≤ 200 V DC	0.75	without	6.2	▶	3TX7 004-3PB41	1 unit	0.035	A	3TX7 005-3PB41	1 unit	0.032
DC 24 V	24 ... 250 V AC	0.5	without	6.2	▶	3TX7 004-3RB43	1 unit	0.041	A	3TX7 005-3RB43	1 unit	0.032
DC 24 V	24 ... 250 V AC	2	without	12.5	▶	3TX7 004-3AC03	1 unit	0.060	C	3TX7 005-3AC03	1 unit	0.056
Input interfaces		Width	DT	Screw connection			PS*	Weight per PU approx.	DT	Spring-loaded terminal		
AC/DC 110 ... 230 V				Order No.						Order No.		
DC 24 V	≤ DC 30 V	0.1	without	6.2	▶	3TX7 004-4PG24	1 unit	0.034	▶	3TX7 005-4PG24	1 unit	0.031
DC 24 V	≤ DC 30 V	0.1	without	6.2	▶	3TX7 004-4PB24	1 unit	0.034	A	3TX7 005-4PB24	1 unit	0.031
DC 24 V ¹⁾	≤ 48 V DC	0.5	without	6.2	C	3TX7 004-4AB04	1 unit	0.034	C	3TX7 005-4AB04	1 unit	0.034

Note:

For replacement products, see interfaces with 3RS18 industrial enclosure or other 3TX70 products.

For coil voltages which are not listed, see DC power supplies SITOP power e.g. 6EP1 331-2BA10 and 6EP1 731-2BA00 in "Transformers and power supplies".

1) Discontinued products: will no longer be manufactured from the beginning of 2004.

Coupling Relays and Converters

Coupling Relays with Narrow Type of Construction

Semiconductor couplers

	For interface	Version	DT	Order No.	PS*	Weight per PU approx. kg
Connecting comb	Type					
	3TX7 004	24 terminals, blue, width 6.2 mm	▶	3TX7 004-8AA00	1 unit	0.017
Connecting lead	3TX7 002, 3TX7 003, 3TX7 004, 3TX7 005	24 terminals with supply, blue	A	3TX7 004-8BA00	1 unit	0.050
						
Cover plate	3TX7 004-3AB04, 3TX7 004-4AB04, 3TX7 005-3AB04, 3TX7 005-4AB04, 3TX7 005-4PB24	RAL 7035, light gray	▶	3TX7 004-8CE00	1 unit	0.016
						

Coupling Relays and Converters

Coupling Relays in Industrial Enclosure

Relay connectors

Overview

The new 3 RS18 coupling relays are couplers in the well-proven standard 22.5 mm time-delay relay enclosure. The series comprises relays with 1, 2 and 3 changeover contacts with screw-type and spring-loaded terminals for combined voltages and wide voltage ranges.

Benefits

- Wide voltage range: one product for all voltages
- The industrial enclosure supports the same connection methods as the time-delay relay including spring-loaded terminals, 2 wires can be clamped
- Versions with electronically optimized outputs (gold-plated)
- Up to 3 changeover contacts with only 22.5 mm width.

Area of application

Typical applications are found wherever electronically optimized contacts are required and equipment with a wide voltage range is implemented.

Technical specifications

Type	3RS18..-....1	3RS18..-....0
General data		
Rated insulation voltage U_i pollution degree 3	V 300	
Safe isolation acc. to DIN VDE 0106 between the coil and the contacts	V 300	
Degree of protection acc. to EN 60529		
• Enclosure	IP20	
• Cover	IP40	
Permissible ambient temperature		
• during operation	°C -25 ... +60	
• during storage	°C -40 ... +80	
Permissible mounting position	any	
Shock resistance Half-sine acc. to IEC 60028-2-27	15/11	
Vibration resistance acc. to IEC 60068-2-6	10 ... 55/0.35	
Electromagnetic compatibility (EMC) Tests according to basic specification	IEC 61000-6-2/IEC 61000-6-4	
Conductor cross-section		
• Screw connection		
- Solid	mm ² 1 × (0.5 ... 4)/2 × (0.5 ... 2.5)	
- Finely stranded with end sleeve	mm ² 2 × (0.5 ... 2.5)	
- AWG conductors, solid or stranded	mm ² 2 × (20 ... 14)	
- Terminal screw	Nm M 3.5	
- Tightening torque	Nm 0.8 ... 1.2	
- Corresponding opening tool	Standard screwdriver, size 2 or Pozidrive 2	
• Spring-loaded terminal		
- Solid	mm ² 2 × (0.25 ... 1.5)	
- Finely stranded with end sleeve	mm ² 2 × (0.25 ... 1)	
- Finely stranded without end sleeve	mm ² 2 × (0.25 ... 1.5)	
- AWG conductors, solid or stranded	AWG 2 × (24 ... 16)	
- Corresponding opening tool	Screwdriver with 3 mm blade or 8WA2 807 opening tool	
Control side		
• Operating range	0.85 ... 1.1 × U_s	
• Rated power		
- max. DC	W 1	
- max. AC	VA 8	
• Mains buffering		
- depends on version	ms 5 ... 100	
• Max. permissible conductor length		
- 330 pF/m AC	m 200	1 changeover contact
- min. cross-section 0.75 mm ² DC	m 1500	100
		2000
• Permissible OFF-state current of the electronic circuit (for 0 signal)	mA 2	
• Function display	yellow LED	

Coupling Relays and Converters

Coupling Relays in Industrial Enclosure

Relay connectors

Type	3RS18..-....1	3RS18..-....0
Load side		
• Conventional thermal current I_{th}	A 6	
• Rated operating currents I_e		
- AC-15		
- at 24 V	A 3	
- at 110 V	A 3	
- at 230 V	A 3	
- at 400 V	A 3	
- DC-13		
- at 24 V	A 1	
- at 110 V	A 0.2	
- at 230 V	A 0.1	
• Operating current for resistive load		
- AC-12		
- at 24 V	A 5	
- at 115 V	A 5	
- at 230 V	A 5	
- at 400 V	A 5	
- DC-12		
- at 24 V	A 5	
- at 115 V	A 0.2	
- at 230 V	A 0.2	
• Operating voltage		
- max. AC	V 400	
- max. DC	V 250	
• Contact material	AgNi 0.15 hard gold-plated	AgSnO ₂
• Min. contact load		
- Standard contact	-	DC 17 V, 5 mA for 1ppm fault
- Hard gold-plated contacts	DC 5 V, 1 mA for 1ppm fault	-
• Endurance		
- Mechanical operating cycles	20 × 10 ⁶	
- Electrical (at I_e) operating cycles	1 × 10 ⁶	
• Operating times		
- max. ON-delay at U_s	ms 8 (for 3RS18 00-..W0. < 30)	
- max. OFF-delay at U_s	ms 30 (for 3RS18 00-..W0. < 150)	
• Operating frequency	Oper. cycles/h 5000	
Short-circuit protection	A 4	
Weld-free fuse, operational class gL/gG at $I_k \geq 1$ kA		

8

Selection and ordering data

Rated control supply voltage U_s	Contacts Version	DT	Screw connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.
50/60 Hz	W		Order No.		kg		Order No.		kg

Coupling relays in 22.5 mm industrial enclosure



Wide-range voltage	Contacts	DT	Order No.	PS*	Weight per PU approx.	DT	Order No.	PS*	Weight per PU approx.
24 ... 240 V AC/DC	2	B	3RS18 00-1BW00	1 unit	0.145	B	3RS18 00-2BW00	1 unit	0.128
	3	B	3RS18 00-1HW00	1 unit	0.170	B	3RS18 00-2HW00	1 unit	0.147
	3 ¹⁾	B	3RS18 00-1HW01	1 unit	0.170	B	3RS18 00-2HW01	1 unit	0.147
Combination voltage AC/DC 24 V and AC 110 ... 120 V	1	B	3RS18 00-1AQ00	1 unit	0.116	B	3RS18 00-2AQ00	1 unit	0.104
	2	B	3RS18 00-1BQ00	1 unit	0.142	B	3RS18 00-2BQ00	1 unit	0.123
	3	B	3RS18 00-1HQ00	1 unit	0.173	B	3RS18 00-2HQ00	1 unit	0.147
	3 ¹⁾	B	3RS18 00-1HQ01	1 unit	0.173	B	3RS18 00-2HQ01	1 unit	0.147
AC/DC 24 V and AC 220 ... 240 V	1	B	3RS18 00-1AP00	1 unit	0.116	B	3RS18 00-2AP00	1 unit	0.104
	2	B	3RS18 00-1BP00	1 unit	0.142	B	3RS18 00-2BP00	1 unit	0.123
	3	B	3RS18 00-1HP00	1 unit	0.170	B	3RS18 00-2HP00	1 unit	0.147
	3 ¹⁾	B	3RS18 00-1HP01	1 unit	0.170	B	3RS18 00-2HP01	1 unit	0.147

1) Hard gold-plated.

Design

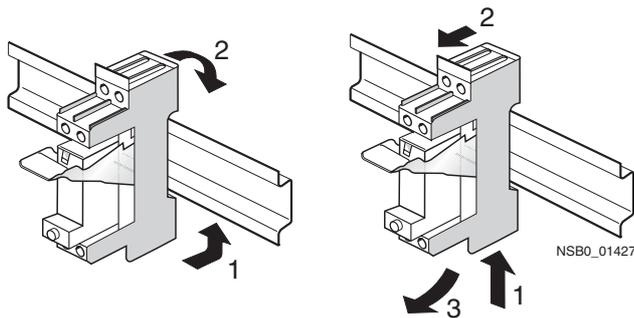
Plug-in relay coupling elements can be ordered complete or as single modules.

Mounting

The relays are plugged into the socket and this is snapped onto the 35 mm EN 50022 standard rail.

Note:

For the plug-in relay coupling elements LZX of Series RT, the spring element must be hung onto the standard rail from below and fixed in place.



A fixing bracket can be ordered for the MT series that additionally fixes the relay into a plug-in socket (under conditions of increased mechanical stress). For the RT and PT series, a combined fixing and ejection bracket is available which can be used to remove the relay where access is difficult, for example, when relays are mounted side-by-side.

They can be mounted as required.

Functions

In accordance with the technical specifications of electronic systems, the coupling elements have a lower power consumption. In the versions equipped with LEDs, these indicate the switching status. The LZX:PT/MT relay connectors have a test button. This can be used to force the relay connector into the tripped state and to lock it. This is indicated by a raised orange-colored lever.

Surge suppression

The 24 V DC relays LZX:RT and LZX:PT with LEDs can be supplied with, all others without integral surge suppression (free-wheeling diode connected in parallel with A1/A2). The positive supply voltage must be connected to coil terminal A1.

Logical disconnection

The terminals for the contacts and the terminals for the coil are arranged on separate levels, e.g. above for contacts and below for coil. Logical disconnection is not identical to safe isolation.

Safe isolation

For safe isolation, transfer of the voltage of one circuit to another circuit is prevented to a suitable degree of safety (see DIN VDE 106, Part 101).

Coupling Relays and Converters

Plug-In Relays

Relay connectors

Technical specifications

Relay type	RT print relay, 8- and 11-pole, (12.7 mm) 1 CO/2 CO				PT industrial relay, 8-, 11-, and 14-pole, (22.5 mm) 2 CO/3 CO/4 CO				
AC and DC operation									
Rated control supply voltage $U_s^1)$	V	DC 24	AC 24	AC 115	AC 230	DC 24	AC 24	AC 115	AC 230
Rated insulation voltage U_i	V	250				250			
Pollution degree		3				3			
Overvoltage category		III				III			
Safe isolation between the coil and the contacts acc. to DIN VDE 0106		... 250 V (with socket LZXR:RT78626) no (for complete units)				no			
Degree of protection relay/socket		IP 67/IP 20				IP 50/IP 20			
Permissible ambient temperature									
• during operation	°C	- 40 ... + 70				- 40 ... + 70 (+ 50 for base assembly)			
• during storage	°C	- 40 ... + 80				- 40 ... + 80			
Conductor cross-sections									
• solid	mm ²	2 × 2.5				2 × 2.5			
• finely stranded with or without end sleeve	mm ²	2 × 1.5				2 × 1.5			
Control side									
Operating range									
• at 20 °C	V	16.8 ... 52	18 ... 52	86.3 ... 127	172 ... 264	18 ... 40.	19.2 ... 39.6	92 ... 190	184 ... 380
Power consumption at U_s		0.4 W	0.5 VA	0.75 VA	0.75 VA	0.5 W	1 VA	1 VA	1 VA
Release voltage	V	2.4	7.2	34.5	69	3.6	7.2	34.5	69
Protection circuit		Freewheel diode for complete unit	no	no	no	Freewheel diode in LED module	no	no	no
Max. permissible conductor length at $U_s^2)$ (min. cross-section 0.75 mm ²)		> 2000 m	30 m (with LED), 20 m (without LED)			> 2000 m	500 m	200 m	50 m
Load side									
Operating voltage									
• AC/DC	V	24 ... 250				24 ... 250			
Rated currents ³⁾									
Conventional thermal current I_{th}	A	16/8 (1 CO/2 CO)				12/10/6 (2 CO/3 CO/4 CO)			
Rated operating current I_o AC-15 according to utilization categories (DIN VDE 0660)	A	6/3				5/5/4			
Rated operating current I_o DC-13 according to utilization categories (DIN VDE 0660)	A	2 at 24 V 0.27 at 230 V				5 at 24 V 0.5 at 230 V			
Short-circuit protection	A	10				6			
$I_k \geq 1$ kA acc. to IEC 60947-5-1 fuse links, operational class gL/gZ DIAZED									
Shock resistance	g/ms	10/11				9/11			
Half-sine acc. to IEC 60068-2-27									
Vibration resistance									
floating sine acc. to IEC 60068-2-6 30 Hz... 150 Hz									
• Opening the normally-closed contacts along the critical axis	g	5				approx. 7			
• Closing the normally-open contacts	g	> 20				> 20			
Min. contact load (reliability: 1ppm)		standard 17 V, 10 mA; hard gold-plated 17 V/ 0.1 mA				standard 17 V, 10 mA; hard gold-plated 20 mV/ 1 mA			
Mechanical endurance	Oper. cycles	30 × 10 ⁶	10 × 10 ⁶			10 × 10 ⁶			
Electrical endurance (resistive load at 250 V AC)	Oper. cycles	1 × 10 ⁵	1 × 10 ⁵			1 × 10 ⁵			
Operating frequency		7200 operating cycles/h				6/600 operating cycles/min (with/without load)			
Make-time	typically/ms	7				15			
Break-time	typically/ms	3				10			
Bounce time	typically/ms	2				5			
Contact material		AgNi 90/10				AgNi 90/10			

1) AC voltages, 50 Hz; for 60 Hz operation, the lower response value must be increased by 10 %; the power loss will be reduced slightly.

2) The max. conductor length depends on the conductor capacity and the cable installation. It can be increased by means of parallel load on A1/A2.

3) Capacitive loads can result in micro-weldings on the contacts.

Coupling Relays and Converters

Plug-In Relays

Relay connectors

Relay type	MT industrial relay, 11-pole (35.5 mm) 3 COs				
AC and DC operation					
Rated control supply voltage U_s ¹⁾	V	DC 24 V	AC 24 V	AC 115 V	AC 230
Rated insulation voltage U_i	V	250		250	
Pollution degree		3		3	
Overvoltage category		III		III	
Safe isolation between the coils and the contacts to DIN VDE 0106		no		no	
Degree of protection relay/socket		IP 50/IP 20			
Permissible ambient temperature					
• during operation	°C	-45 ... +60	-45 ... +50	-45 ... +50	-45 ... +50
• during storage	°C	-45 ... +80	-45 ... +80	-45 ... +80	-45 ... +80
Conductor cross-sections					
• solid	mm ²	2 × 2.5			
• finely stranded with or without end sleeve	mm ²	2 × 1.5			
Control side					
Operating range					
• at 20 °C	V	18 ... 38	19.2 ... 38	92 ... 137	184 ... 264
Power consumption at U_s		1.2 W	2.3 VA	2.3 VA	2.3 VA
Release voltage	V	2.4	9.6	46	92
Protection circuit		no			
Max. permissible conductor length at U_s ²⁾ (min. cross-section: 0.75 mm ²)		> 2000 m	on request	on request	80 m
Load side					
Operating voltage					
• AC/DC	V	AC/DC 24 ... 250			
Rated currents ³⁾					
Conventional thermal current I_{th}	A	10			
Rated operating current I_o DC-13 according to utilization categories (DIN VDE 0660)	A	2 at 24 V 0.27 at 230 V			
Rated operating current I_o AC-15 according to utilization categories (DIN VDE 0660)	A	5 at 24 V and 230 V			
Short-circuit protection	A	10			
$I_k \geq 1$ kA acc. to IEC 60947-5-1 fuse links, operational class gL/gZ DIAZED					
Shock resistance	g/ms	13/11			
Half-sine acc. to IEC 60068-2-27					
Vibration resistance					
floating sine acc. to IEC 60068-2-6 30 Hz... 150 Hz					
• Opening the normally-closed contacts along the critical axis	g	2			
• Closing the normally-open contacts	g	> 20			
Min. contact load (reliability: 1 ppm)		DC 12 V/10 mA			
Mechanical endurance	Oper. cycles	20 × 10 ⁶			
Electrical endurance (resistive load at 250 V AC)	Oper. cycles	4 × 10 ⁵			
Operating frequency	Oper. cycles/h	6000			
Make-time	typi- cally/ms	12			
Break-time	typi- cally/ms	5			
Bounce time	typi- cally/ms	4			
Contact material		AgNi 90/10			

1) AC voltages, 50 Hz; for 60 Hz operation, the lower response value must be increased by 10 %; the power loss will reduce slightly.

2) The max. conductor length depends on the conductor capacity and the cable installation. It can be increased by means of parallel load on A1/A2.

3) Capacitive loads can result in micro-weldings on the contacts.

Coupling Relays and Converters

Plug-In Relays

Relay connectors

Selection and ordering data

Version	Rated control supply voltage U_s	Contacts	Width mm	DT	Order No.	PS*	Weight per PU approx. kg	
Complete units, 11- and 14-pole, PT series								
	Complete unit with socket for snap-on mounting on 35 mm standard mounting rail consisting of: plug-in relay, standard socket, LED module (DC-24-V-LED with free-wheel diode, AC without freewheel diode), fixing/ejection bracket and label	DC 24 V	3 COs	27	A	LZX:PT3A5L24	1 unit	0.099
		AC 24 V			A	LZX:PT3A5R24	1 unit	0.099
		AC 115 V			A	LZX:PT3A5S15	1 unit	0.099
		AC 230 V			A	LZX:PT3A5T30	1 unit	0.099
	DC 24 V AC 24 V AC 115 V AC 230 V	4 COs	27	A	LZX:PT5A5L24	1 unit	0.099	
					LZX:PT5A5R24	1 unit	0.100	
					LZX:PT5A5S15	1 unit	0.099	
					LZX:PT5A5T30	1 unit	0.099	
	Complete unit with socket (logical isolation) for snap-on mounting on 35 mm standard mounting rail comprising: plug-in relay with safe isolation, LED module (DC-24-V-LED with free-wheel diode, AC without freewheel diode), fixing/ejection bracket and label	DC 24 V	3 COs	27	A	LZX:PT3B5L24	1 unit	0.106
		AC 24 V			A	LZX:PT3B5R24	1 unit	0.107
		AC 115 V			A	LZX:PT3B5S15	1 unit	0.105
		AC 230 V			A	LZX:PT3B5T30	1 unit	0.106
DC 24 V AC 24 V AC 115 V AC 230 V	4 COs	27	A	LZX:PT5B5L24	1 unit	0.112		
				LZX:PT5B5R24	1 unit	0.112		
				LZX:PT5B5S15	1 unit	0.112		
				LZX:PT5B5T30	1 unit	0.112		
Complete units, 8-pole, 5 mm pinning, RT series								
	Complete unit with socket for snap-on mounting onto 35 mm standard mounting rail comprising: print relay, standard socket, LED module (DC-24-V-LED with free-wheel diode, AC without freewheel diode), fixing/ejection bracket and label	DC 24 V	1 CO	15.5	A	LZX:RT3A4L24	1 unit	0.057
		DC 24 V	2 COs		A	LZX:RT4A4L24	1 unit	0.057
		AC 230 V	1 CO		A	LZX:RT3A4T30	1 unit	0.057
		AC 230 V	2 COs		A	LZX:RT4A4T30	1 unit	0.060
	AC 24 V AC 24 V AC 115 V AC 115 V	1 CO	15.5	A	LZX:RT3A4R24	1 unit	0.060	
					LZX:RT4A4R24	1 unit	0.060	
					LZX:RT3A4S15	1 unit	0.060	
					LZX:RT4A4S15	1 unit	0.060	
	Complete unit with socket (logical isolation) for snap-on mounting onto 35 mm standard mounting rail comprising: print relay with safe isolation, LED module (DC-24-V-LED with free-wheel diode, AC without freewheel diode), fixing/ejection bracket and label	DC 24 V	1 CO	15.5	A	LZX:RT3B4L24	1 unit	0.065
		DC 24 V	2 COs		A	LZX:RT4B4L24	1 unit	0.065
		AC 230 V	1 CO		A	LZX:RT3B4T30	1 unit	0.064
		AC 230 V	2 COs		A	LZX:RT4B4T30	1 unit	0.064
AC 24 V AC 24 V AC 115 V AC 115 V	1 CO	15.5	A	LZX:RT3B4R24	1 unit	0.064		
				LZX:RT4B4R24	1 unit	0.064		
				LZX:RT3B4S15	1 unit	0.064		
				LZX:RT4B4S15	1 unit	0.065		
Complete units, 5-pole, 3.2 mm pinning, RY series								
	Complete unit with socket (logical isolation) for snap-on mounting on 35 mm standard mounting rail comprising: print relay, standard socket, LED module (DC-24-V-LED with free-wheel diode, AC without freewheel diode), fixing/ejection bracket and label	DC 24 V	1 CO	15.5	A	LZX:RY1A4L24	1 unit	0.048

Note:

Logical isolation: the terminals for the contacts and the terminals for the coil are arranged on separate levels, e.g. above for contacts and below for coil. Logical isolation is not identical to safe isolation.

Safe isolation: safe isolation prevents voltage of one circuit affecting another circuit with sufficient protection (DIN VDE 106 Part 101).

Coupling Relays and Converters

Plug-In Relays

Relay connectors

Version	Rated control supply voltage U_s	Contacts Change-over contacts	Width	DT	Order No.	PS*	Weight per PU approx.	
			mm				kg	
Print relays, 8- and 11-pole, 5 mm pinning, RT series								
Individual modules for customer assembly								
	Print relay with hard gold plating	DC 24 V	1 CO	12.7	A	LZX:RT315024	1 unit 0.016	
		AC 24 V	1 CO	12.7	▶	LZX:RT315524	1 unit 0.013	
		AC 230 V	1 CO	12.7	D	LZX:RT315730	1 unit 0.015	
	Print relay	DC 24 V	1 CO	12.7	▶	LZX:RT314024	1 unit 0.016	
		DC 24 V	2 COs	12.7	▶	LZX:RT424024	1 unit 0.015	
		AC 24 V	1 CO	12.7	▶	LZX:RT314524	1 unit 0.007	
		AC 24 V	2 COs	12.7	▶	LZX:RT424524	1 unit 0.014	
		AC 115 V	1 CO	12.7	A	LZX:RT314615	1 unit 0.013	
		AC 115 V	2 COs	12.7	▶	LZX:RT424615	1 unit 0.012	
		AC 230 V	1 CO	12.7	▶	LZX:RT314730	1 unit 0.003	
		AC 230 V	2 COs	12.7	▶	LZX:RT424730	1 unit 0.010	
		–	1/2 COs	15.5	▶	LZX:RT78625	1 unit 0.041	
		–	1/2 COs	15.5	▶	LZX:RT78626	1 unit 0.046	
	Socket for mounting onto standard mounting rail	–	1/2 COs	15.5	▶	LZX:RT78625	1 unit 0.041	
		–	1/2 COs	15.5	▶	LZX:RT78626	1 unit 0.046	
	Socket for mounting onto standard mounting rail with safe isolation	–	1/2 COs	15.5	▶	LZX:RT78625	1 unit 0.041	
		–	1/2 COs	15.5	▶	LZX:RT78626	1 unit 0.046	
	LED module red	with freewheel diode	DC 24 V	–	15.5	▶	LZX:RPML0024	1 unit 0.003
		without freewheel diode	AC/DC 24 V	–	▶	LZX:RPML0524	1 unit 0.003	
		–	AC/DC 110 ... 230 V	–	▶	LZX:RPML0730	1 unit 0.003	
	LED module green	with freewheel diode	DC 24 V	–	15.5	▶	LZX:RPMG0024	1 unit 0.003
		without freewheel diode	AC 24 ... 60 V	–	A	LZX:RPMG0524	1 unit 0.003	
		–	AC 110 ... 230 V	–	▶	LZX:RPMG0730	1 unit 0.003	
	Fixing/ejection bracket	–	–	15.5	▶	LZX:RT16016	10 units 0.020	
		–	–	–	▶	LZX:RY16040	20 units 0.040	
	Label	–	–	–	▶	LZX:RPMU0548	1 unit 0.004	
		–	–	–	▶	LZX:RPMU0730	1 unit 0.003	
	RC element	AC 24 ... 48 V	–	A	LZX:RPMU0548	1 unit 0.004		
		AC 110 ... 230 V	–	▶	LZX:RPMU0730	1 unit 0.003		
	Freewheel diode with connection to A1	DC 6 ... 230 V	–	▶	LZX:RPMT00A0	1 unit 0.002		
		–	–	–	▶	LZX:RPMT00A0	1 unit 0.002	
Print relays, 5-pole, RY series								
Individual modules for customer assembly								
	Print relay	DC 24 V	1 CO	10.7	A	LZX:RY213024	1 unit 0.009	
		Label on unit: RY213024, RY613024 or JS24N-K	–	–	–	–	–	
		–	–	–	–	–	–	
	Socket for mounting onto standard mounting rail	–	1 CO	15.5	A	LZX:RY78626	1 unit 0.035	
		–	–	–	A	LZX:RY16016	10 units 0.020	
	Fixing/ejection bracket	–	–	–	▶	LZX:RY16016	10 units 0.020	
		–	–	–	▶	LZX:RY16016	10 units 0.020	

Note:

For coil voltages which are not listed, see DC power supplies SITOP power e.g. 6EP1 331-2BA10 and 6EP1 731-2BA00 in "Transformers and power supplies".

Coupling Relays and Converters

Plug-In Relays

Relay connectors

Version	Rated control supply voltage U_s	Con- tacts	Width	DT	Order No.	PS*	Weight per PU approx. kg		
		Change- over contact	mm						
Industrial relays, 8-, 11-, and 14-pole, PT series									
Individual modules for customer assembly									
 LZX:PT570024	Mini industrial relay with test bracket and mechanical contact position indicator, without LED ¹⁾	DC 24 V	2	22.5	▶	LZX:PT270024	1 unit 0.030		
		DC 24 V	3		▶	LZX:PT370024	1 unit 0.031		
		DC 24 V	4		▶	LZX:PT570024	1 unit 0.034		
		AC 24 V	2		A	LZX:PT270524	1 unit 0.030		
		AC 24 V	3		A	LZX:PT370524	1 unit 0.031		
		AC 24 V	4		▶	LZX:PT570524	1 unit 0.031		
		AC 115 V	2		D	LZX:PT270615	1 unit 0.029		
		AC 115 V	3		A	LZX:PT370615	1 unit 0.030		
		AC 115 V	4		▶	LZX:PT570615	1 unit 0.030		
		AC 230 V	2		▶	LZX:PT270730	1 unit 0.029		
		AC 230 V	3		▶	LZX:PT370730	1 unit 0.030		
		AC 230 V	4		▶	LZX:PT570730	1 unit 0.030		
	 LZX:PT78702	with hard gold-plating	DC 24 V	4	22.5	▶	LZX:PT580024	1 unit 0.031	
			AC 24 V	4		▶	LZX:PT580524	1 unit 0.031	
		AC 230 V	4		▶	LZX:PT580730	1 unit 0.031		
Relay without test bracket		DC 24 V	4	22.5	▶	LZX:PT520024	1 unit 0.031		
		AC 24 V	4		A	LZX:PT520524	1 unit 0.032		
		AC 230 V	4		A	LZX:PT520730	1 unit 0.031		
Socket for mounting onto standard mounting rail		–	2	27	▶	LZX:PT78702	1 unit 0.051		
		–	3		▶	LZX:PT78703	1 unit 0.062		
		–	4		▶	LZX:PT78704	1 unit 0.063		
 LZX:RPML0024		LED module red	with freewheel diode	DC 24 V	–	15.5	▶	LZX:RPML0024	1 unit 0.003
		without freewheel diode	AC/DC 24 V	–		▶	LZX:RPML0524	1 unit 0.003	
	 LZX:PT16016	green	with freewheel diode	AC/DC 110 ... 230 V	–		▶	LZX:RPML0730	1 unit 0.003
			without freewheel diode	DC 24 V	–	15.5	▶	LZX:RPMG0024	1 unit 0.003
			without freewheel diode	AC 24 ... 60 V	–		A	LZX:RPMG0524	1 unit 0.003
			without freewheel diode	AC/DC 110 ... 230 V	–		▶	LZX:RPMG0730	1 unit 0.003
		Fixing/ejection bracket	–	–	15.5	▶	LZX:PT16016	10 units 0.020	
		Label	–	–		▶	LZX:PT16040	20 units 0.040	
		RC element	AC 24 ... 48 V	–		A	LZX:RPMU0548	1 unit 0.004	
			AC 110 ... 230 V	–		▶	LZX:RPMU0730	1 unit 0.003	
	Freewheel diode with connection to A1	DC 6 ... 230 V	–		▶	LZX:RPMT00A0	1 unit 0.002		
Industrial relays, 11-pole, MT series									
Individual modules for customer assembly									
 LZX:MT326024	Industrial relay with test bracket without LED	DC 24 V	3	35.5	A	LZX:MT321024	1 unit 0.088		
	with LED	DC 24 V	3		▶	LZX:MT323024	1 unit 0.089		
	without LED	AC 24 V	3		A	LZX:MT326024	1 unit 0.089		
	with LED	AC 24 V	3		A	LZX:MT328024	1 unit 0.089		
	without LED	AC 115 V	3		A	LZX:MT326115	1 unit 0.087		
	with LED	AC 115 V	3		A	LZX:MT328115	1 unit 0.093		
	without LED	AC 230 V	3		A	LZX:MT326230	1 unit 0.089		
	with LED	AC 230 V	3		A	LZX:MT328230	1 unit 0.089		
	With test bracket, with LED, with freewheel diode	DC 24 V	3	35.5		LZX:MT3230C4	1 unit 0.090		
	 LZX:MT78750	Socket for mounting onto standard mounting rail	–	–	38	▶	LZX:MT78750	1 unit 0.063	
Fixing bracket		–	–	38	▶	LZX:MT28800	1 unit 0.001		

Note:

For coil voltages which are not listed, see DC power supplies SITOP power e.g. 6EP1 331-2BA10 and 6EP1 731-2BA00 in "Transformers and power supplies".

1) The test bracket is designed to be non-latching. If the test bracket is pressed further until 90° has been reached, two small lugs break off and the test bracket can be latched in position.

Accessories

Version	DT	Order No.	PS*	Weight per PU approx. kg
---------	----	-----------	-----	-----------------------------

for PT relays



LZX:PT78802

Logical socket
with logical arrangement of the contacts
2 changeover contacts
3 changeover contacts
4 changeover contacts

A	LZX:PT78802	1 unit	0.063
A	LZX:PT78803	1 unit	0.070
A	LZX:PT78804	1 unit	0.075



LZX:PT78604

Base with top slide, pinning 3.5 mm
2 different conductor cross-sections can be connected
2 changeover contacts
4 changeover contacts

A	LZX:PT78602	1 unit	0.043
A	LZX:PT78604	1 unit	0.051

Note:
Accessories, LED modules LZX: RPM und fixing/ejection bracket LZX:PT16016 can not be used with these bases!

Version	Rated control supply voltage U_s	Width mm	DT	Order No.	PS*	Weight per PU approx. kg
---------	------------------------------------	-------------	----	-----------	-----	-----------------------------

for PT and RT relays



LZX:RPML0024



LZX:PT16016

LED module

red	with freewheel diode	DC 24 V	15.5	▶	LZX:RPML0024	1 unit	0.003
	without freewheel diode	AC/DC 24 V		▶	LZX:RPML0524	1 unit	0.003
		AC/DC 110 ... 230 V		▶	LZX:RPML0730	1 unit	0.003
green	with freewheel diode	DC 24 V	15.5	▶	LZX:RPMG0024	1 unit	0.003
	without freewheel diode	AC 24 ... 60 V		A	LZX:RPMG0524	1 unit	0.003
		AC/DC 110 ... 230 V		▶	LZX:RPMG0730	1 unit	0.003

Fixing/ejection bracket

for RT range	–	15.5	▶	LZX:RT16016	10 units	0.020
for PT range			▶	LZX:PT16016		

Label

for RT range	–	–	▶	LZX:RY16040	20 units	0.040
for PT range				LZX:PT16040		

RC element

	AC 24 ... 48 V	–	A	LZX:RPMU0548	1 unit	0.004
	AC 110 ... 230 V	–	▶	LZX:RPMU0730	1 unit	0.003

Freewheel diode

with connection to A1	DC 6 ... 230 V	–	▶	LZX:RPMT00A0	1 unit	0.002
-----------------------	----------------	---	---	---------------------	--------	-------

for RY relays

Base

3.2 mm pinning, 1 changeover contact			A	LZX:RY78626	1 unit	0.035
--------------------------------------	--	--	---	--------------------	--------	-------

Fixing/ejection bracket

A	LZX:RY16016	10 units	0.020
---	--------------------	----------	-------

Coupling Relays and Converters

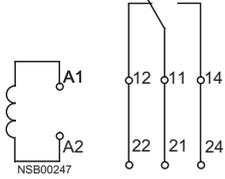
Plug-In Relays

Relay connectors

Circuit diagrams

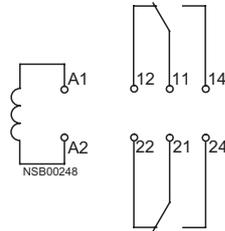
LZX:RT3

1-pole



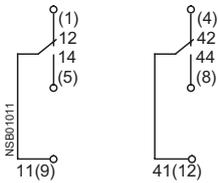
LZX:RT4

2-pole



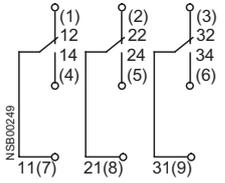
LZX:PT270

2-pole



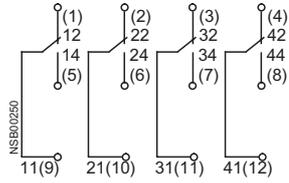
LZX:PT370

3-pole



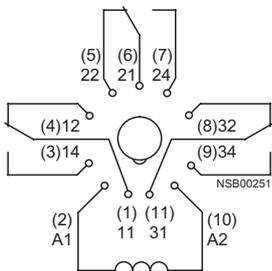
LZX:PT570

4-pole



LZX:MT32

3-pole



Values in brackets: socket designations.
Without brackets: contact/coil designations.

Coupling Relays and Converters

Power Relays

With screw and tab connectors

Overview

Design

The 3TG10 contactors with 4 main contacts are available with 6.3 ... 0.8 mm screw-type connections or tab connectors. The designs with screw-type connections are climate-proof and finger-safe in accordance with DIN VDE 0106 Part 100.

The 3TG10 contactors are small, their width is 36 mm.

Area of application

Because they are hum-free they are suitable for use in household appliances and distribution boards in office and residential areas.

They can also be used for applications where there is little space such as air conditioners, heating systems, pumps, and fans, i.e. for simple electrical controls.

AC and DC operation

EN 60947-4-1 (VDE 0660 Part 102)

Surge suppression

The 3TG10 contactors have an integrated protective circuit against opening surges.

Overload and short-circuit protection

The 3UA7 overload relay can be used for overload protection. This applies to mounting onto contactors and installation as a single unit.

Information about short-circuit protection by means of contactors can be found in the Technical specifications.

Coupling Relays and Converters

Power Relays

With screw and tab connectors

Technical specifications

Type		3TG10	
General data			
Endurance			
• mechanical	Op. cycles	3 million	
• electrical	Op. cycles	0.1 million	
- AC-1 at I_e	Op. cycles	0.4 million	
- AC-3 at I_e			
Rated insulation voltage U_i (pollution degree 3)		V	400
Rated impulse voltage strength U_{imp}		kV	4
Safe isolation between the coil and the contacts acc. to DIN VDE 0106 Part 101		V	up to 300
Permissible ambient temperature		°C	- 25 ... + 55
		°C	- 50 ... + 80
Degree of protection acc. to DIN EN 60947-1 and EN 60529		IP00, drive system IP20	
Power input of the solenoids (for cold coil and $1.0 \times U_s$)		VA	4.4
AC operation 45 ... 450 Hz	p.f.	W	0.9 (hum-free)
DC operation			4
Coil voltage tolerance		0.85 ... $1.1 \times U_s$	
Operating times (break-time = OFF-delay + arcing time)			
• ON-delay			
- Activation	- DC operation	NO	ms 11 ... 50
	- AC operation	NO	ms 10 ... 50
- Deactivation	- DC operation	NC	ms 21 ... 39
	- AC operation	NC	ms 20 ... 30
• OFF-delay			
- Activation	- DC operation	NC	ms 5 ... 45
	- AC operation	NC	ms 5 ... 45
- Deactivation	- DC operation	NO	ms 19 ... 35
	- AC operation	NO	ms 20 ... 30
• Arcing time			
			ms 10 ... 15
Shock resistance			
• Rectangular pulse	AC and DC operation	g/ms	5.1/5 and 3.5/10
• Sine pulse	AC and DC operation	g/ms	7.9/5 and 5.2/10
Operating frequency z in operating cycles/hour rated operation		1/h	1000
	acc. to AC-2	1/h	500
	acc. to AC-3	1/h	1000
	No-load operating frequency	1/h	10000
Short-circuit protection			
Fuse-links			
Operational class gL/gG NH type 3NA, DIAZED type 5SB			
NEOZED type 5SE acc. to DIN EN 60947-4-1/ (VDE 0660 Part 102)	• Type of coordination "1"	A	25
Miniature circuit-breaker	• Type of coordination "2"	A	10
	C characteristic	A	10
AC capacity			
Utilization category AC-1, switching resistive loads			
Rated operating current I_e up to 400 V at 55 °C ¹⁾		A	20 for screw-type connection, 16 for tab connector
Rated power U_e of three-phase loads p.f. = 1, 230/220 V		kW	7.5 (13 at 400 V)
• for screw-type connection		kW	6 (10 at 400 V)
• for tab connector		mm ²	2.5
Minimum conductor cross-section with I_e			
AC capacity			
Utilization category AC-2 and AC-3			
Rated operating currents I_e up to 400 V		A	8.4
Rated power of motors with slip ring or squirrel-cage rotor at 50 Hz and 60 Hz and at 400 V		kW	4
Utilization category AC-5a (permissible nominal impedance: $\geq 0.5 \Omega$)			
switching of gas discharge lamps			
• Per main conducting path at 50 Hz/230 V	18 W ²⁾	0.37 A ⁴⁾	43
	36 W ²⁾	0.43 A ⁴⁾	37
	58 W ²⁾	0.67 A ⁴⁾	24
• Per main conducting path at 230 V, lead-lag circuit	18 W ²⁾	$2 \times 0.11 A^4$	2×81
	36 W ²⁾	$2 \times 0.21 A^4$	2×42
	58 W ²⁾	$2 \times 0.32 A^4$	2×28
Switching of gas discharge lamps with compensation, electronic ballast per main conducting path with 50 Hz at 230 V			
• Shunt compensation			
	18 W ²⁾	4.5 μF^3	0.11 A ⁴⁾
	36 W ²⁾	4.5 μF^3	0.21 A ⁴⁾
	58 W ²⁾	7.0 μF^3	0.32 A ⁴⁾
• With electronic ballast (single lamp)	18 W ²⁾	6.8 μF^3	0.10 A ⁴⁾
	36 W ²⁾	6.8 μF^3	0.18 A ⁴⁾
	58 W ²⁾	10.0 μF^3	0.27 A ⁴⁾
• With electronic ballast (two lamps)	18 W ²⁾	10.0 μF^3	0.18 A ⁴⁾
	36 W ²⁾	10.0 μF^3	0.35 A ⁴⁾
	58 W ²⁾	22.0 μF^3	0.52 A ⁴⁾
Utilization category AC-5b per main conducting path with 50 Hz at 230 V		kW	1.6

1) If the three main conducting paths carry a load of 20 A, the following applies if $I > 10 A$ for the fourth conducting path: permissible ambient temperature 40 °C.

2) Rated power per lamp.

3) Capacitor capacity.

4) Rated operating current per lamp.

Coupling Relays and Converters

Power Relays

With screw and tab connectors

Load ratings with DC		
Utilization category DC-1, switching of resistive loads ($L/R \leq 1$ ms)		
Rated operating currents I_e		
• 1 series-connected conducting path	up to 24 V 60 V 110 V 220 V/240 V	A 16 A 6 A 2 A 0.8
• 2 series-connected conducting paths	up to 24 V 60 V 110 V 220 V/240 V	A 16 A 16 A 6 A 1.6
• 3 series-connected conducting paths	up to 24 V 60 V 110 V 220 V/240 V	A 18 A 18 A 16 A 6
• 4 series-connected conducting paths	up to 24 V 60 V 110 V 220 V/240 V	A 20 A 20 A 20 A 20
Utilization category DC-3 and DC-5, shunt-wound and series-wound motors ($L/R \leq 1$ ms)		
Rated operating currents I_e		
• 1 series-connected conducting path	up to 24 V 60 V 110 V 220 V/240 V	A 10 A 0.5 A 0.15 A –
• 2 series-connected conducting paths	up to 24 V 60 V 110 V 220 V/240 V	A 16 A 5 A 0.35 A –
• 3 series-connected conducting paths	up to 24 V 60 V 110 V 220 V/240 V	A 16 A 16 A 10 A 1.75
• 4 series-connected conducting paths	up to 24 V 60 V 110 V 220 V/240 V	A 18 A 16 A 10 A 2
Conductor cross-section for version		
with screw-type connection		
• Finely stranded with end sleeve (DIN 46228 Form A/D/C)	mm ²	M 3 2 × (0.75 ... 2.5)
• Solid	mm ²	2 × (1 ... 2.5)
with tab connector		
• Finely stranded 6.3 mm push-on sleeve acc. to DIN 46245/46247	mm ²	0.5 ... 1
- 6.3 ... 1 mm ²	mm ²	1 ... 2.5
- 6.3 ... 2.5 mm ²		
CSA and UL rated data (screw-type connection)		
Rated insulation voltage	AC V	600
Continuous current		
• Enclosed	A	20
• Open	A	20
Maximum horsepower ratings (CSA and UL approved values)		
Rated power of three-phase motors with 60 Hz		
• 1-phase	at 115 V 200 V 230 V 460 V 575 V 600 V	0.5 1 1.5 – – –
• 3-phase	at 115 V 200 V 230 V 460 V 575 V 600 V	– 3 3 5 5 5

Short-circuit protection for overload, see overload relay and protective devices.

Coupling Relays and Converters

Power Relays

With screw and tab connectors

Selection and ordering data

Rated data Utilization category				Main contacts	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx.
AC-1 Switching of resistive loads at 55 °C		AC-2 and AC-3		Version NO NC					
Operating current I_e at 400 V	Power of three-phase loads at 50 Hz, 400 V	Operating current I_e at 400 V ¹⁾	Power of three-phase loads at 50 Hz, 400 V						
A	kW	A	kW						kg

with screw-type connections, 4-pole
for screw and snap-on mounting onto 35 mm standard mounting rail • hum-free

AC operation											
	20	13	8.4	4	4	–	230 V, 45 ... 450 Hz	▶	3TG10 10-0AL2	1 unit	0.156
							110 V, 45 ... 450 Hz	A	3TG10 10-0AG2	1 unit	0.158
							24 V, 45 ... 450 Hz	▶	3TG10 10-0AC2	1 unit	0.157
					3	1	230 V, 45 ... 450 Hz	▶	3TG10 01-0AL2	1 unit	0.157
							110 V, 45 ... 450 Hz	A	3TG10 01-0AG2	1 unit	0.158
							24 V, 45 ... 450 Hz	▶	3TG10 01-0AC2	1 unit	0.157
DC operation											
	20	13	8.4	4	4	–	24 V DC	▶	3TG10 10-0BB4	1 unit	0.157
					3	1	24 V DC	▶	3TG10 01-0BB4	1 unit	0.157

3TG10..-0

with 6.3 × 0.8 mm tab connectors, 4-pole
for screw and snap-on mounting onto 35 mm standard mounting rail • hum-free

AC operation											
	16	10	8.4	4	4	–	230 V, 45 ... 450 Hz	▶	3TG10 10-1AL2	1 unit	0.145
							110 V, 45 ... 450 Hz	D	3TG10 10-1AG2	1 unit	0.185
							24 V, 45 ... 450 Hz	▶	3TG10 10-1AC2	1 unit	0.145
					3	1	230 V, 45 ... 450 Hz	▶	3TG10 01-1AL2	1 unit	0.144
							110 V, 45 ... 450 Hz	D	3TG10 01-1AG2	1 unit	0.146
							24 V, 45 ... 450 Hz	D	3TG10 01-1AC2	1 unit	0.147
DC operation											
	16	10	8.4	4	4	–	24 V DC	A	3TG10 10-1BB4	1 unit	0.146
					3	1	24 V DC	D	3TG10 01-1BB4	1 unit	0.146

3TG10..-1

1) The parallel connections can be reduced by one pole. The rated operating currents apply to each pole. The parallel connections are insulated.

Accessories

For contactor	max. rated operating currents I_e /AC-1 (at 55 °C) of the contactors	max. conductor cross-sections	DT	Order No.	PS*	Weight per PU approx.
Type	A	mm ²				kg
Parallel connections (neutral jumpers)						
3-pole, without connection terminal¹⁾²⁾ 3TG10	16 neutral jumpers can be reduced by one pole	–	▶	3RT19 16-4BA31	1 unit	0.003
3-pole, with connection terminal¹⁾³⁾ 3TG10	40	25	▶	3RT19 16-4BB31	1 unit	0.015
4-pole, with connection terminal¹⁾⁴⁾ 3TG10	50	25	C	3RT19 16-4BB41	1 unit	0.015

1) The parallel connections can be reduced by one pole. The rated operating currents apply to each pole. The parallel connections are insulated.

2) Replacement for 3TX44 90-2C.

3) Replacement for 3TX44 90-2A.

4) Replacement for 3TX44 90-2B.

Coupling Relays and Converters

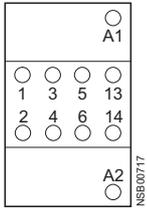
Power Relays

With screw and tab connectors

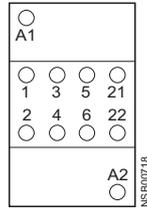
Circuit diagrams

Position of the terminals

3TG10 10
1 NO contact

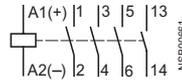


3TG10 01
1 NC contact

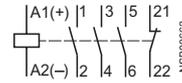


Internal circuit diagrams

3TG10 10
1 NO contact
Ident. no.: 10E



3TG10 01
1 NC contact
01E



Coupling Relays and Converters

Converters/Isolation Amplifiers

Interface converters/isolation amplifiers

Overview

In automation and control engineering it will always be necessary to work with analog signals. The interfaces for analog signals that have established themselves as the standard are 0 to 10 V and 0/4 to 20 mA.

Interface converters perform the coupling function for analog signals on both the input side and the output side. They are indispensable when processing analog values with electronic controls. Under harsh industrial conditions in particular, it is often necessary to transmit analog signals over long distances. This means that galvanic isolation is essential due to the different supply systems. The resistance of the wiring causes potential differences and losses which must be prevented. Electromagnetic disturbance and overvoltages can affect the signals on the input side in particular or even destroy the analog modules. All terminals of the 3RS17 interface converters are safe up to a voltage of DC 30 V and protected against switching poles. Short-circuit protection is an especially important function for the outputs.

The devices are EMC-tested according to

- EN 61000-6-4 (basic technical standard for emitted interference),
- EN 61000-6-2 (basic technical standard for immunity to interference).

The analog signals comply with

- IEC 60381-1/2.

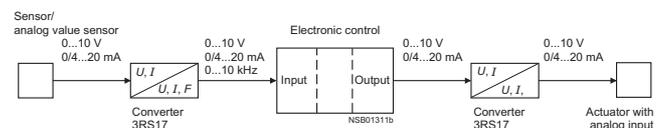
Area of application

Converters are used in analog signal processing for

- Galvanic isolation
- Conversion of normalized and non-normalized signals
- Matching of gain and impedances
- Conversion to a frequency for processing by a digital input
- Overvoltage and EMC protection
- Short-circuit protection of the outputs
- Potential multiplication.

Application example:

Interface converter in analog signal evaluation



3RS17 25 manual/automatic converter

For special applications in which analog signals have to be simulated, or during plant commissioning when the actual process value is not yet available, the 3RS17 25 devices feature an adjustable potentiometer for entering setpoints manually and a manual/automatic switch.

The potentiometer for the 3RS17 25 devices is used to simulate analog output signals when the changeover switch is set to "Manual" and the control supply voltage is applied, without the need for an analog input signal; and the scale ranges from 0 % to 100 %.

Example:

When it is set for an output of 4 mA to 20 mA, the 0 % scale value on the potentiometer represents an output current of 4 mA and the 100 % scale value represents an output current of 20 mA. In the "Auto" switch position, the output signal follows the input signal proportionally regardless of the potentiometer setting.

Coupling Relays and Converters

Converters/Isolation Amplifiers

Interface converters/isolation amplifiers

Technical specifications

Type 3RS17		24 V AC/DC	24 ... 240 V AC/DC
General data			
Operating range of the supply voltage			
• DC		0.7 ... 1.25 × U _n	0.7 ... 1.1 × U _n
• AC		0.8 ... 1.2 × U _n	0.8 ... 1.1 × U _n
Rated power (own requirements)	W	typically 0.3	typically 0.75
Electrical isolation input/output		Active disconn.: 1500 V, 50 Hz, 1 min Passive disconn.: 500 V, 50 Hz, 1 min	4000 V, 50 Hz, 1 min
Rated insulation voltage Pollution degree 2 Overvoltage category III to DIN VDE 0110	V	50	300
Ambient temperature			
during operation	°C	- 25 ... + 60	
during storage	°C	- 40 ... + 85	
Conductor cross-sections			
Screw-type connections			
• Conductor cross-section			
- solid	mm ²	1 × (0.25 ... 4)	
- finely stranded with or without end sleeve	mm ²	1 × (0.5 ... 2.5)	
• Terminal screws		M 3	
Spring-loaded terminal			
• Solid or finely stranded	mm ²	1 × (0.08 ... 2.5)	
• Finely stranded with end sleeve	mm ²	1 × (0.25 ... 1.5)	
Degree of protection	Enclosure acc. to EN 60529 Terminals acc. to EN 60529	IP30 IP20	
Permissible mounting position		any	
Mounting onto standard rail EN 50022	mm	35	
Vibration resistance IEC 60068-2-6	Hz/mm	10-55/0,35	
Shock resistance IEC 60068-2-27	g/ms	15/11	
Input			
Impedance	Voltage inputs	kΩ	330
	Current inputs, active	Ω	100
Input voltage max.	Voltage inputs	V	AC/DC 30
	Current inputs, active	V	AC/DC 30
Response current	Current inputs, passive	μA	100/250 (6.2 mm width)
Voltage drop	Current inputs, passive	V	2.7 at 20 mA
Output			
Impedance	Voltage output, 0 ... 10 V	Ω	55
Output load, max.	• Current 0/4 ... 20 mA, active	Ω	400
	• Current 0 ... 20 mA, passive	Ω	1000 at 20 mA, 400 at 20 mA (6.2 mm width)
	• Frequency		2400
Output current, max. for supply voltage	• Voltage output, 0 ... 10 V	mA	21
	• Frequency	mA	10
Short-circuit current	• Voltage output, 0 ... 10 V	mA	40
	• Current output, 0 ... 20 mA, passive	mA	corresponds to the input current
	• Frequency	mA	15
Protection of the outputs			short-circuit resistant
Max. overvoltage at output		V	30
Accuracy			
Total errors at 23 °C	• Active discon.	Frequency	% 0.1
	U, I		% 0.1 ¹⁾
Linearity error	• Active discon.	Frequency	% 0.02
	U, I		% 0.02
Deviation through ambient temperature	• Active disconnector	Frequency	0 ... 50 Hz: 7.5 mHz/K; 0 ... 100 Hz: 15 mHz/K; 0 ... 1 kHz: 0.15 Hz/K;
		U, I	0 ... 10 kHz: 1.5 Hz/K
	• Passive disconnector		0 ... 10 V: 1.5 mV/K; 0/4 ... 20 mA: 3 μA/K
			6.2 mm width: 100 ppm/K of measured value
			12.5 mm width: with load < 600 Ω: < 50 ppm/K of measured value;
			with load ≥ 600 Ω: < 175 ppm/K of measured value
Transmission error	• Passive discon.		% 0.1
Measured value load error		%/Ω	0.06/100
Limit frequency at 3 dB	• Active discon.	Frequency	Hz 30
	U, I		Hz 30
	• Passive discon.		Hz 50
Rise time (10 to 90 %)	• Active discon.	Frequency	10 + 1 period
	U, I		ms 10
Settling time at 1 % accuracy	• Active discon.	Frequency	30 + 1 period
	U, I		ms 30
Remaining ripple	• Active discon.	U, I	mV _{eff} < 5
	• Passive discon.		mV _{eff} < 8

The accuracy refers to the measurement range end value if not otherwise stated.

1) For 3RS17 06: 0.1 % for selected output 4 ... 20 mA;
0.3 % for selected output 0 ... 20 mA or 0 ... 10 V.

Coupling Relays and Converters

Converters/Isolation Amplifiers

Interface converters/isolation amplifiers

Selection and ordering data

Screw-type connection and spring-loaded terminals

All converters except the passive single interface converters have a yellow LED for indicating "Power on".

Input	Output	Width	Supply voltage	Electrical isolation	DT	Screw-type connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.
		mm	V			Order No.		kg		Order No.		kg

Single interface converters, active



0 ... 10 V:	0 ... 10 V:	6.2	AC/DC 24	2 paths	A	3RS17 00-1AD00	1 unit	0.053	A	3RS17 00-2AD00	1 unit	0.047
0 ... 10 V:	0 ... 20 mA	6.2	AC/DC 24	2 paths	A	3RS17 00-1CD00	1 unit	0.052	A	3RS17 00-2CD00	1 unit	0.047
0 ... 10 V:	4 ... 20 mA	6.2	AC/DC 24	2 paths	A	3RS17 00-1DD00	1 unit	0.052	A	3RS1 700-2DD00	1 unit	0.047
0 ... 20 mA	0 ... 10 V:	6.2	AC/DC 24	2 paths	A	3RS17 02-1AD00	1 unit	0.052	C	3RS17 02-2AD00	1 unit	0.047
0 ... 20 mA	0 ... 20 mA	6.2	AC/DC 24	2 paths	A	3RS17 02-1CD00	1 unit	0.052	A	3RS17 02-2CD00	1 unit	0.045
0 ... 20 mA	4 ... 20 mA	6.2	AC/DC 24	2 paths	A	3RS17 02-1DD00	1 unit	0.052	A	3RS17 02-2DD00	1 unit	0.048
4 ... 20 mA	0 ... 10 V:	6.2	AC/DC 24	2 paths	A	3RS17 03-1AD00	1 unit	0.052	A	3RS17 03-2AD00	1 unit	0.047
4 ... 20 mA	0 ... 20 mA	6.2	AC/DC 24	2 paths	A	3RS17 03-1CD00	1 unit	0.052	C	3RS17 03-2CD00	1 unit	0.049
4 ... 20 mA	4 ... 20 mA	6.2	AC/DC 24	2 paths	A	3RS17 03-1DD00	1 unit	0.053	A	3RS17 03-2DD00	1 unit	0.047

Switchable multi-range converters, active



0 ... 10 V	0 ... 10 V	6.2	AC/DC 24	2 paths	A	3RS17 05-1FD00	1 unit	0.053	A	3RS17 05-2FD00	1 unit	0.048
0 ... 20 mA	0 ... 20 mA	17.5	AC/DC 24 ... 240	3 paths	A	3RS17 05-1FW00	1 unit	0.099	A	3RS17 05-2FW00	1 unit	0.092
4 ... 20 mA, switchable	4 ... 20 mA, switchable											
0 ... 10 V	0 ... 50 Hz	6.2	AC/DC 24	2 paths	A	3RS17 05-1KD00	1 unit	0.053	C	3RS17 05-2KD00	1 unit	0.047
0 ... 20 mA	0 ... 100 Hz	17.5	AC/DC 24 ... 240	3 paths	A	3RS17 05-1KW00	1 unit	0.099	A	3RS17 05-2KW00	1 unit	0.092
4 ... 20 mA, switchable	0 ... 1 kHz switchable											

Switchable universal converters, active



0 ... 60 mV	0 ... 10 V	17.5	AC/DC 24	2 paths	A	3RS17 06-1FD00	1 unit	0.082	A	3RS17 06-2FD00	1 unit	0.078
0 ... 100 mV	0 ... 20 mA			3 paths	A	3RS17 06-1FE00	1 unit	0.082	A	3RS17 06-2FE00	1 unit	0.077
0 ... 300 mV	4 ... 20 mA, switchable		AC/DC 24 ... 240	3 paths	A	3RS17 06-1FW00	1 unit	0.099	A	3RS17 06-2FW00	1 unit	0.094
0 ... 500 mV	switchable											
0 ... 1 V												
0 ... 2 V												
0 ... 5 V												
0 ... 10 V												
0 ... 20 V												
2 ... 10 V												
0 ... 5 mA												
0 ... 10 mA												
0 ... 20 mA												
4 ... 20 mA												
+/- 5 mA												
+/- 20 mA												
switchable												

Switchable multi-range converters, with manual/automatic switch and setting potentiometer as manual analog signal transmitter, active



0 ... 10 V	0 ... 10 V	17.5	AC/DC 24	2 paths	A	3RS17 25-1FD00	1 unit	0.085	A	3RS17 25-2FD00	1 unit	0.078
0 ... 20 mA	0 ... 20 mA		AC/DC 24 ... 240	3 paths	A	3RS17 25-1FW00	1 unit	0.102	A	3RS17 25-2FW00	1 unit	0.095
4 ... 20 mA, switchable	4 ... 20 mA, switchable											

Input	Output	Width	Number of channels	Electrical isolation	DT	Screw-type connection	PS*	Weight per PU approx.	DT	Spring-loaded terminal	PS*	Weight per PU approx.
		mm				Order No.		kg		Order No.		kg

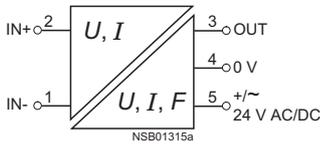
Single interface converters, passive



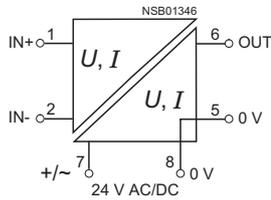
0/4 ... 20 mA	0/4 ... 20 mA:	6.2	1-channel	2 paths	A	3RS17 20-1ET00	1 unit	0.049	A	3RS17 20-2ET00	1 unit	0.044
0/4 ... 20 mA	0/4 ... 20 mA:	12.5	1-channel	2 paths	A	3RS17 21-1ET00	1 unit	0.059	A	3RS17 21-2ET00	1 unit	0.057
0/4 ... 20 mA	0/4 ... 20 mA:	12.5	2-channel	2 paths	A	3RS17 22-1ET00	1 unit	0.070	A	3RS17 22-2ET00	1 unit	0.066

Circuit diagrams

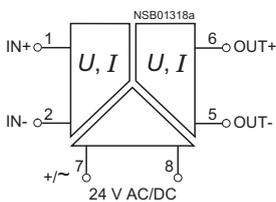
3RS17 00-..D..
 3RS17 02-..D..
 3RS17 03-..D..
 3RS17 05-..D..



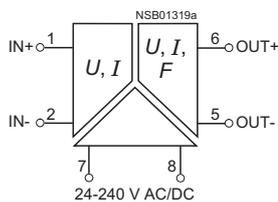
3RS17 06-..FD00



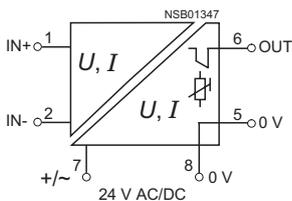
3RS17 06-..FE00



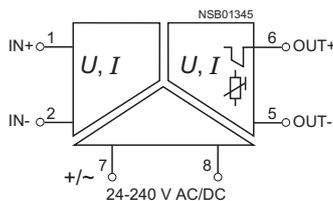
3RS17 0-..W00



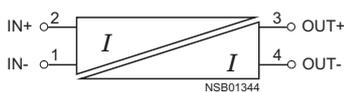
3RS17 25-..FD00



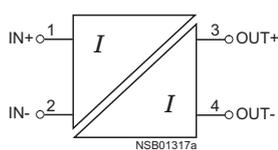
3RS17 25-..FW00



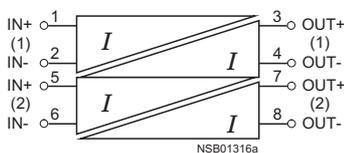
3RS17 20-..ET00



3RS17 21-..ET00



3RS17 22-..ET00



Coupling Relays and Converters

Converters/Isolation Amplifiers

Interface converters/isolation amplifiers

Further information

Configuration

Active interface converters

Active interface converters provide maximum flexibility for the application by the use of an external supply voltage. Configuration with active interface converters is extremely easy because input and output resistances and voltage drops are compensated by the auxiliary supply. They support complete voltage isolation as well as conversion from one signal type to another or amplification. The load of the measured value transmitter is negligible.

Passive interface converter

Passive interface converters do not require an external supply voltage. This advantage can only be used by current signals that are converted 1:1. Amplification or conversion is not possible. The converters are used for complete galvanic isolation of current signals and to protect the inputs and outputs. Passive isolators do not operate reaction-free, any load on the output produces an equal load on the input. When the passive converter is to be used, the output performance of the sensor and the input resistance of the analog input must be analyzed. This technique is being increasingly implemented in the case of pure current signals.

Calculation guide for passive converter

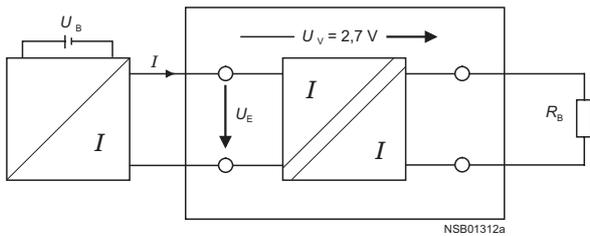
Important: please note the following when using passive isolators:

When the output is open, the input becomes high-resistant and the current-driving voltage of the measuring transducer U_E must be sufficient to drive the maximum current of 20 mA over the passive isolator with a voltage loss of $U_V = 2.7$ V and the load R_B .

This means that:

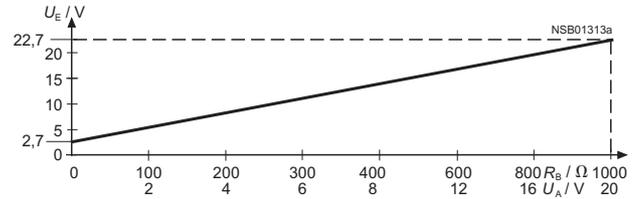
$$U_B \geq U_E = 2.7 \text{ V} + 20 \text{ mA} \times R_B$$

Distribution of the voltages in the case of passive isolators



Input voltage depending on the load at $I_a = 20$ mA

The following diagram shows the input voltage U_E as a function of the load R_B taking into account the voltage loss U_V . If the load is known, the y-axis shows the minimum voltage that has to be supplied by the current source in order to drive the maximum current of 20 mA over the passive isolator and load.



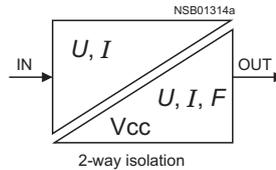
Current carrying capacity of the outputs

A maximum output resistance is specified for current signals. This resistance value specifies how large the input resistance of the next device connected in series can be as a result of the power of the converter.

For voltage signals, the maximum current that can be drawn from the output is the decisive factor.

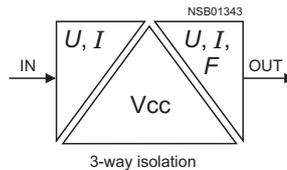
2-way isolation

In the case of 2-way isolation, the input is galvanically isolated from the output. The "null potential" of the supply voltage is the same as the reference potential for the analog output signal.



3-way isolation

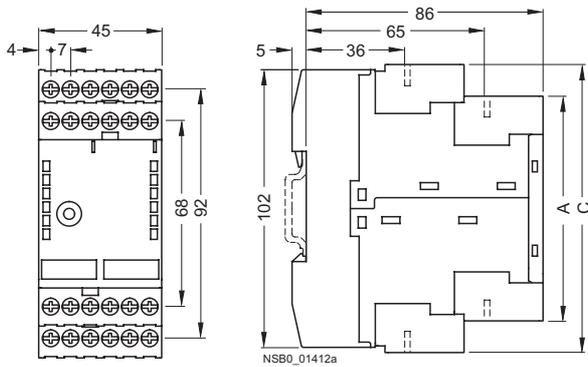
For the 3-path isolation, each circuit is electrically isolated from the other circuits i.e. input, output, and supply voltage do not have a potential connection.



Dimension drawings

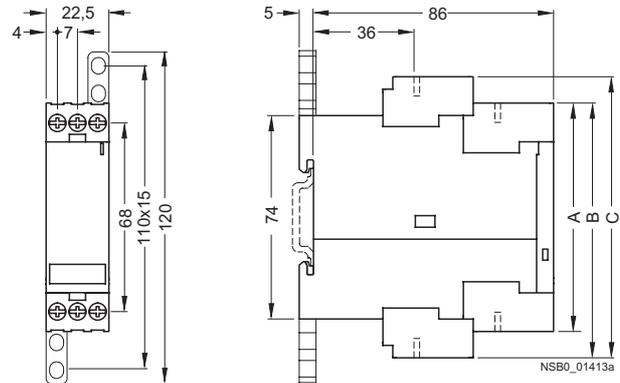
Time relay in 22.5 mm industrial enclosure, temperature monitoring relay, thermistor motor protection and coupling relay in industrial enclosure

3RS10/3RS11 digital
3RN10 62



	A	C
	3RS10, 3RS11, 3RN10 62	
Standard terminal		
Spring-type terminal	84,3	107,6
Screw-type terminal	81	104
Removeable terminal		
Spring-type terminal	84	108
Screw-type terminal	83	106

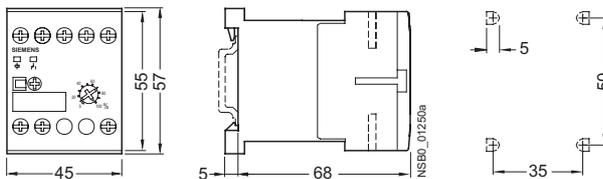
3RP15, 3RS10/3RS11 analog
3RN1 with 1 ... 2 sensor circuits, 3RS18



	A	B	C
	3RN10 00 3RS18 00-A 3RP15 1 3RP15 25-A 3RP15 27 3RP15 40-A 3RP15 55 3RP15 7	3RN10 10 3RS18 00-B	3RN10 11, 3RN10 12 3RN10 13, 3RN10 22 3RS11 0, 3RS11 1 3RS1 .2, 3RS1 .3 3RS18 00-H, 3RP15 05 3RP15 25-B, 3RP15 3 3RP15 40-B, 3RP15 60
Standard terminal			
Spring-type terminal	81,6	91	101,6
Screw-type terminal	80	90	100
Removeable terminal			
Spring-type terminal	84	94	103
Screw-type terminal	83	92	102

Time relay in the 45 mm SIRIUS Design

3RP20

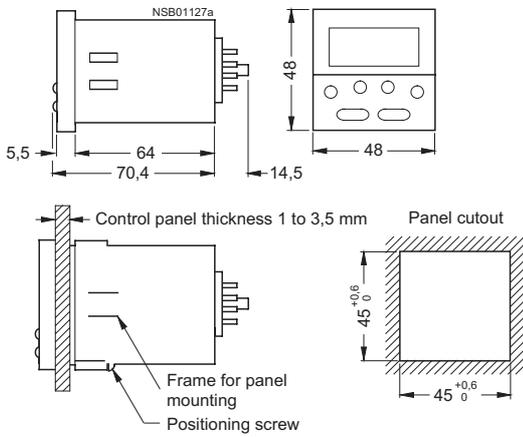


Time, Monitoring and Coupling Relays and SIMIREL Converters

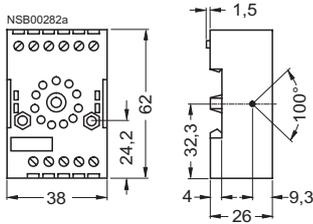
Project planning aids

Time relays for mounting onto the front panel

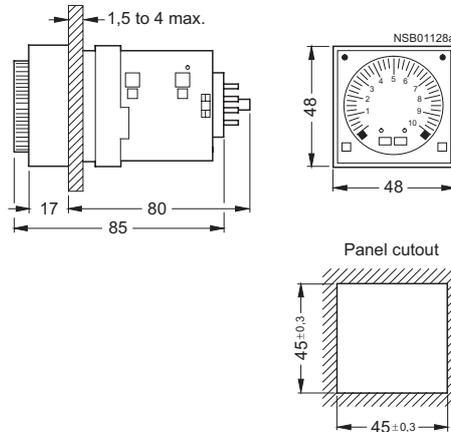
7PV33



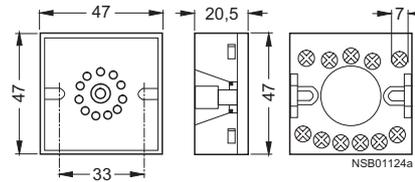
Accessories: LZX socket: MR78750 for 7PV33; 7PV4



7PV41/7PV43



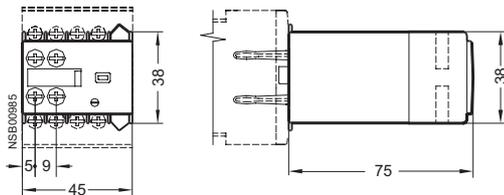
Accessories: 7PX9921 socket with rear connection



Time relays for mounting onto contactors

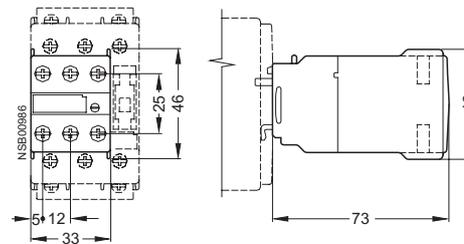
3RT19 16-2E, -2F, -2G, -2L ...

Solid-state time-delay auxiliary switch blocks



for size S00 contactors and auxiliary contactors

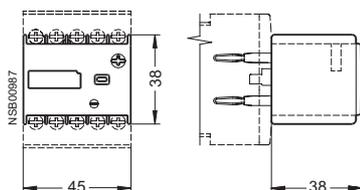
3RT19 26-2E, -2F, -2G ...



for size S0 to S3 contactors and auxiliary contactors

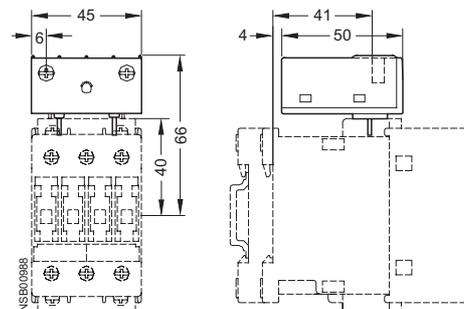
3RT19 16-2C ...

Solid-state time-delay blocks with ON-delay



for mounting onto the front of contactors for size S00

3RT19 26-2C ...



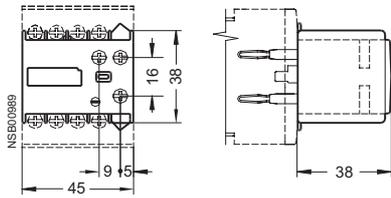
for mounting at the top or bottom of the contactors for sizes S0 to S3

Time, Monitoring and Coupling Relays and SIMIREL Converters

Project planning aids

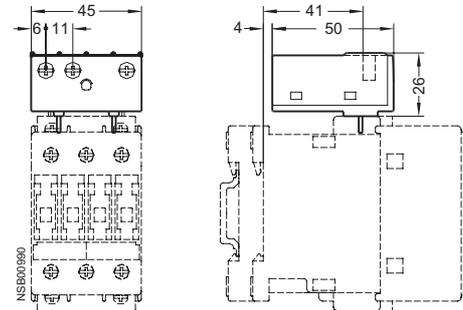
Time relays for mounting onto contactors

3RT19 16-2D ... solid-state time-delay blocks, OFF-delay



for mounting onto the front of size S00 contactors

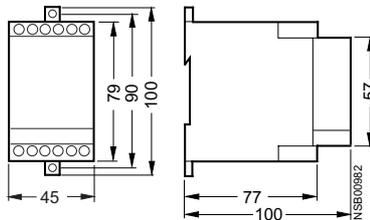
3RT19 26-2D ...



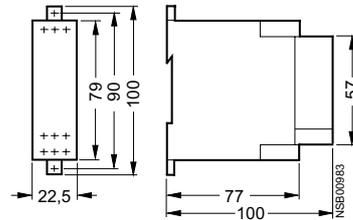
for mounting at the top or bottom of the contactors for sizes S0 to S3

Monitoring relays

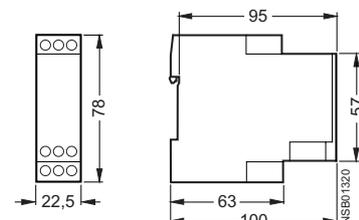
3UG30



3UG35 (without 3UG35 11)

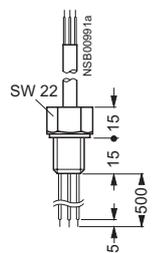


3UG35 11

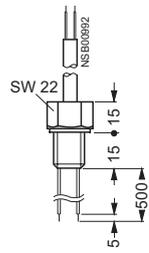


Sensors for level monitoring

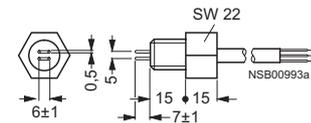
**3UG32 07-3A
Three-pole wire electrode**



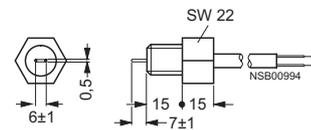
**3UG32 07-2A
Two-pole wire electrode**



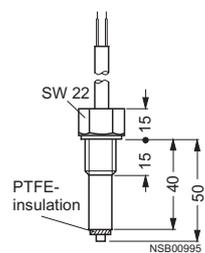
**3UG32 07-2B
Two-pole bow electrode**



**3UG32 07-1B
Single-pole bow electrode**



**3UG32 07-1C
Single-pole electrode, rugged design**

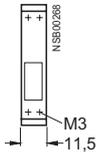


Project planning aids

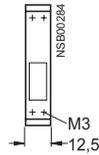
Coupling relays with narrow type of construction

3TX7 002, 3TX7 003 coupling links in terminal block design

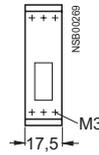
3TX7 00 .-1AB . . .
3TX7 00 .-2A . . .
3TX7 002-3AB01



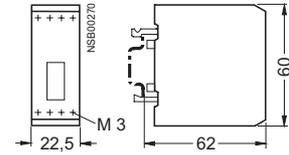
3TX7 002-3AB00,
3TX7 002-4A . . .



3TX7 00 .-1BB00,
3TX7 00 .-1BF00,
3TX7 002-2BF02

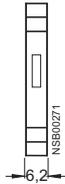


3TX7 00 .-1CB00,
3TX7 002-1BF02

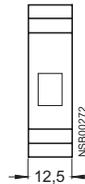


3TX7 004, 3TX7 005 coupling links in two-tier design

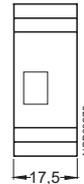
Relay coupling links
3TX7 00 .-1MB00,
3TX7 00 .-1MF00,
3TX7 00 .-1L . 0 . .
3TX7 00 .-2M . . .



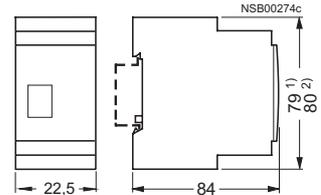
Relay coupling links
3TX7 00 .-1AB10,
3TX7 00 .-1BB00,
3TX7 00 .-1BB10,
3TX7 00 .-1CB00,
3TX7 00 .-1BF05



Relay coupling links
3TX7 00 .-1HB00



Relay coupling links
3TX7 00 .-1GB00



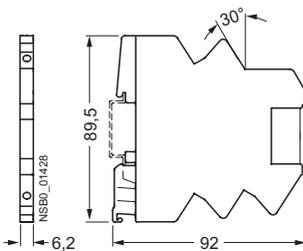
Semiconductor coupling links

3TX7 00 .-3AB04,
3TX7 00 .-4AB04,
3TX7 00 .-3PB . . .
3TX7 00 .-3PG74,
3TX7 00 .-3RB43,
3TX7 00 .-4P . 24

Semiconductor coupling links

3TX7 00 .-3AC04,
3TX7 00 .-3AC14,
3TX7 00 .-3AC03

3TX7 014



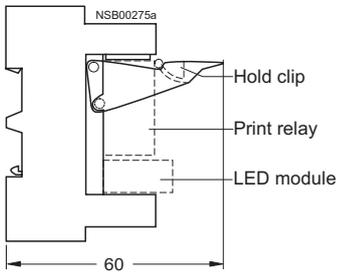
- 1) Dimensions for 3TX7 004 coupling links (screw-type connections).
- 2) Dimensions for 3TX7 005 coupling links (spring-loaded terminals).

Time, Monitoring and Coupling Relays and SIMIREL Converters

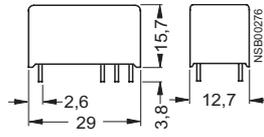
Project planning aids

Plug-in relays

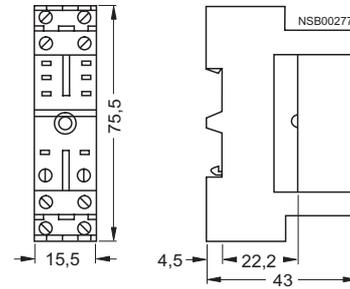
LZX:RT3/RT4 complete unit



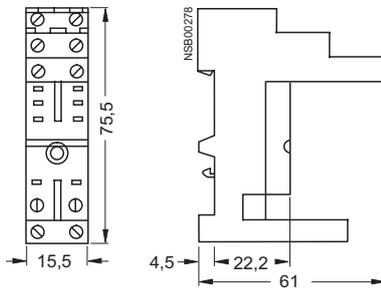
LZX:RT3/RT4 print relay



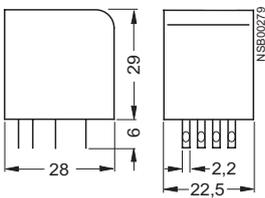
LZX:RT78625 socket for print relay



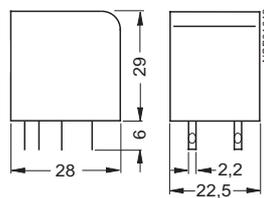
LZX:RT78626 socket with safe isolation for print relay



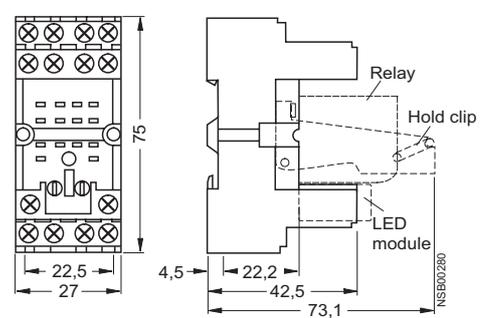
LZX:PT570 industrial relay



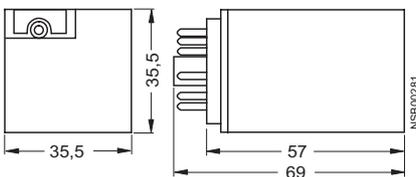
LZX:PT270 industrial relay



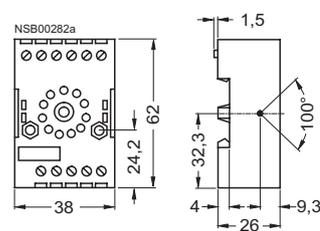
LZX:PT78704 socket for industrial relay



LZX:MT32 industrial relay



LZX:MT78750 socket for industrial relay

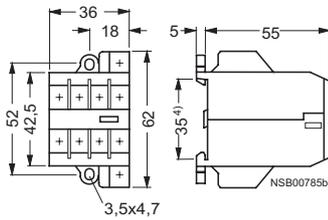


Project planning aids

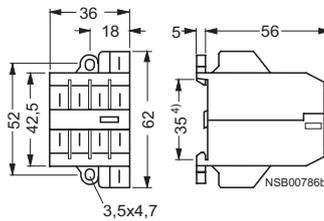
Power relays

AC and DC operation

3TG10 ...-0..
with screw-type connections

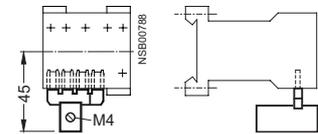


3TG10 ...-1..
with tab connectors



Accessories for 3TG10

Parallel connections, 4-pole, with 3RT19 16-4BB41 connection terminal

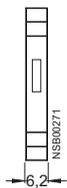


The parallel connections can be reduced by one pole.

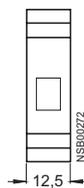
Converter/isolation amplifiers

3RS17

6.2 mm type of construction



12.5 mm type of construction



17.5 mm type of construction



- 1) Width for 3RS17 25 is approx. 90 mm.
- 2) Dimensions for screw-type connection.
- 3) Dimensions for spring-loaded terminal.

- 4) Can be snapped onto 35 mm standard mounting rail.