PHOENIX CONTACT
INNOVATION IN INTERFACE

PSR – Phoenix Safety Relay
PSR-ESD-T

– **Emergency stop/safety door monitoring**

– **Safety Category 3/4, EN 954-1**

– **Set delay time of 0.5 - 30 s**

– **Plug-in screw or spring-cage terminal blocks**

– **One or two-channel circuit**

– **Optional cross-circuit detection**

– **Safe isolation/basic insulation**

– **Optional manual or automatic start**

– **Three enable contacts without delay**

– **One alarm contact without delay**

– **Two enable contacts with delay**

– **Approvals:** (applied for)

1. Short Description

The **PSR-...-24DC/ESD/5X1/1X2/...T...** safety relay can be used in emergency stop devices according to EN 418 and in safety circuits according to DIN EN 60204-1/VDE 0113 Part 1. Depending on the external circuit, up to Safety Category 4 according to EN 954-1 can be achieved for undelayed contacts and Safety Category 3 according to EN 954-1 can be achieved for contacts with dropout delay.

One or two-channel control is available with manual or automatic activation. The connected start button is monitored.

The relay has three enable current paths and one signaling current path, which drop without delay according to Stop Category 0 (DIN EN 60204-1/ VDE 0113 Part 1).

Two other enable current paths drop with delay according to Stop Category 1 (DIN EN 60204-1/ VDE 0113 Part 1).

Function

The wiring for the S33, S34, S35, S10, S11, S12, S21, and S22 activation and input contacts should be appropriate to the field of application (see "Mounting and Startup" and "Application Examples").

When the supply voltage is applied to the A1/A2 or GND terminal blocks, the "Power" LED lights up. A voltage of 24 V DC is then provided at terminal blocks S11 and S21, which automatically monitors for a cross circuit. S12 and S22 are connected according to the relevant application examples. With an automatic start, a jumper must be connected to terminal blocks S33 and S35.

The **PSR-...-24DC/ESD/5X1/1X2/...T...** is started automatically after the safety door has closed. Contacts 13/14, 23/24, 33/34, 57/58, and 67/68 close and alarm contact 41/42 opens. LEDs "K1", "K2", "K3(t)", and "K4(t)" light up.

If the input circuit is opened, relays K1 and K2 drop without delay and the LEDs go out. Depending on the version, relays K3t and K4t drop with dropout delay.

Once the time has elapsed, the module is reactivated when the input circuits close and the start button (if available) is pressed.

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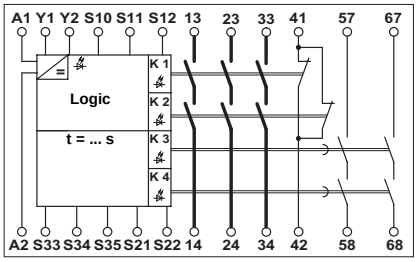
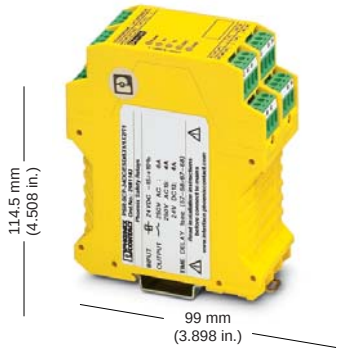
2. Technical Data





PSR-ESD-T

M 3

7/10

Housing width 45 mm (1.772 in.)

	Solid [mm²]	Stranded [mm²]	AWG
Connection data:	0.2 - 2.5	0.2 - 2.5	25 - 14

Stripping length: Screw version 7 mm (0.28 in.)
Spring-cage version 10 mm (0.39 in.)

Description	Delay Time [s]	Type	Order No.	Pcs. Pkt.
Safety relay, Category 3/4, with screw terminal block	0.5	**PSR-SCP-24DC/ESD/5X1/1X2/0T5**	**29 81 10 1**	1
	1	**PSR-SCP-24DC/ESD/5X1/1X2/T1**	**29 81 14 3**	1
	1.5	**PSR-SCP-24DC/ESD/5X1/1X2/1T5**	**29 81 16 9**	1
	2	**PSR-SCP-24DC/ESD/5X1/1X2/T2**	**29 81 12 5**	1
	2.5	**PSR-SCP-24DC/ESD/5X1/1X2/2T5**	**29 81 20 8**	1
	3	**PSR-SCP-24DC/ESD/5X1/1X2/T3**	**29 81 22 4**	1
	4	**PSR-SCP-24DC/ESD/5X1/1X2/T4**	**29 81 24 0**	1
	5	**PSR-SCP-24DC/ESD/5X1/1X2/T5**	**29 81 26 6**	1
	6	**PSR-SCP-24DC/ESD/5X1/1X2/T6**	**29 81 28 2**	1
	10	**PSR-SCP-24DC/ESD/5X1/1X2/T10**	**29 81 08 8**	1
	15	**PSR-SCP-24DC/ESD/5X1/1X2/T15**	**29 81 30 5**	1
	20	**PSR-SCP-24DC/ESD/5X1/1X2/T20**	**29 81 32 1**	1
	30	**PSR-SCP-24DC/ESD/5X1/1X2/T30**	**29 81 34 7**	1
Safety relay, Category 3/4, with spring-cage terminal block	0.5	**PSR-SPP-24DC/ESD/5X1/1X2/0T5**	**29 81 13 0**	1
	1	**PSR-SPP-24DC/ESD/5X1/1X2/T1**	**29 81 15 6**	1
	1.5	**PSR-SPP-24DC/ESD/5X1/1X2/1T5**	**29 81 17 2**	1
	2	**PSR-SPP-24DC/ESD/5X1/1X2/T2**	**29 81 19 8**	1
	2.5	**PSR-SPP-24DC/ESD/5X1/1X2/2T5**	**29 81 21 1**	1
	3	**PSR-SPP-24DC/ESD/5X1/1X2/T3**	**29 81 23 7**	1
	4	**PSR-SPP-24DC/ESD/5X1/1X2/T4**	**29 81 25 3**	1
	5	**PSR-SPP-24DC/ESD/5X1/1X2/T5**	**29 81 27 9**	1
	6	**PSR-SPP-24DC/ESD/5X1/1X2/T6**	**29 81 29 5**	1
	10	**PSR-SPP-24DC/ESD/5X1/1X2/T10**	**29 81 09 1**	1
	15	**PSR-SPP-24DC/ESD/5X1/1X2/T15**	**29 81 31 8**	1
	20	**PSR-SPP-24DC/ESD/5X1/1X2/T20**	**29 81 33 4**	1
	30	**PSR-SPP-24DC/ESD/5X1/1X2/T30**	**29 81 35 0**	1

Technical Data

Input Data		
Nominal input voltage U_N		24 V DC
Permissible range		0.85 - 1.1 x U_N
Typical current consumption at U_N		150 mA DC
Voltage at input, start, and feedback circuit		23 V DC, approximately
Maximum voltage drop for S11/S12 and S21/S22		2 V DC, approximately, corresponds to 11 Ω
(e.g., two N/C contacts of an emergency stop button)		(at U_N = 24 V DC and T_{amb} = 25°C [77°F])
Typical response time at U_N		70 ms
	Monitored/manual start	600 ms
	Automatic start	20 ms
Typical release time (K1, K2) at U_N		Delay time according to the description on page 2 ±20%
Delay time (K3, K4) at U_N		1 s, approximately
Output Data		
Contact type		3 enable current paths without delay, 2 with delay 1 signaling current path
Contact material		Silver tin oxide, ($AgSnO_2$)
Maximum switching voltage		250 V AC/DC
Minimum switching voltage		15 V AC/DC
Limiting continuous current		6 A (N/O contact, N/C contact)
$I_{TH}^2 = I_1^2 + I_2^2 + I_3^2 + I_4^2 + I_5^2$		On request
Maximum inrush current		6 A
Minimum switching current		25 mA
Maximum shutdown power		Ohmic load / Inductive load
		τ = 0 ms / τ = 40 ms
	24 V DC	144 W / 42 W
	48 V DC	288 W / 42 W
	110 V DC	110 W / 42 W
	220 V DC	88 W / 42 W
	250 V AC	1500 VA
Minimum switching power		0.4 W
Mechanical life		10^7 cycles, approximately
Switching capacity according to	Cycles: 360/h	24 V (DC13) 4 A; 230 V (AC 15) 4 A
DIN EN 60947-5-1/VDE 0660 Part 200	3600/h	24 V (DC13) 2.5 A; 230 V (AC 15) 3 A
Minimum switching power		> 50 mW
Mechanical life		10^7 cycles, approximately
Short-circuit protection of the output	without delay	6 A fast-blow, 4 A slow-blow
circuits, external	with delay	NEOZED 10 A gL/gG

General Data

Permissible ambient operating temperature		-20°C to +55°C (-4°F to +131°F)
Nominal operating mode		100% operating factor
Protection according to VDE 0470 Part 1		According to VDE 0470 Part 1
- Housing		IP40
- Connection terminal blocks		IP20
- Mounting location		IP54, minimum
Mounting position		Any
Air and creepage distances between circuits		According to DIN EN 50 178:1998-04, Basic insulation[1)]
Impulse voltage withstand level		4 kV[1)]
Pollution degree		2
Surge Voltage Category		III
Dimensions (W x H x D)	PSR-SCP-24DC/ESD/5X1/1X2/...T...	45 mm x 99 mm x 114.5 mm (1.772 x 3.898 x 4.508 in.)
	PSR-SPP-24DC/ESD/5X1/1X2/...T...	45 mm x 112 mm x 114.5 mm (1.772 x 4.409 x 4.508 in.)
Cable cross section		0.2 - 2.5 mm^2 (25 - 14 AWG)
Housing material		Polyamide PA, not reinforced

Note: When operating relay modules the operator must meet the requirements for emitted interference for electrical and electronic equipment (EN 50081-2) on the contact side and, if required, take appropriate measures.

[1)] Safe isolation, reinforced insulation, and 6 kV rated voltage between the output contact paths (13/14, 23/24, and 33/34) and the other circuits, and between the output contact paths themselves (13/14, 23/24, and 33/34).

3. Connection Notes and Safety Instructions

3.1. Safety Instructions

– Please observe the safety regulations of electrical engineering and industrial safety and liability associations.
– Disregarding these safety regulations may result in death, serious personal injury or damage to equipment.
– Startup, mounting, modifications, and upgrades should only be carried out by a skilled electrical engineer.
– Before working on the device, disconnect the power.
– For emergency stop applications, the machine must be prevented from restarting automatically by a higher-level control system.
– During operation, parts of electrical switching devices carry hazardous voltages.
– Protective covers must not be removed when operating electrical switching devices.
– In the event of an error, replace the device immediately.
– Repairs, especially if the housing must be opened, should only be carried out by the manufacturer or authorized persons. Otherwise the warranty is invalidated.
– Keep the instruction sheet in a safe place.

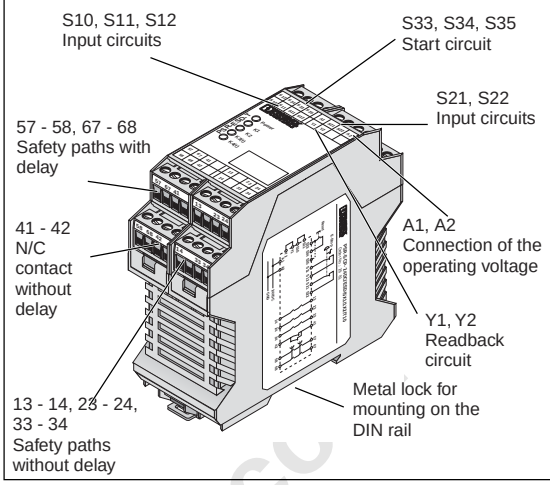
3.2. Connection Notes

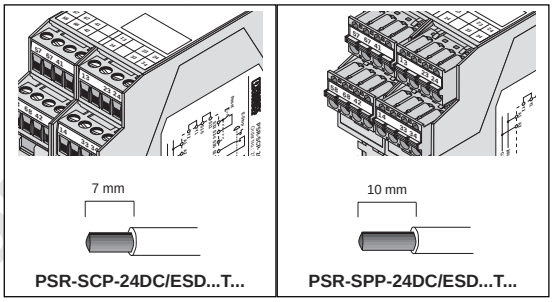
For reliable operation, the emergency stop safety relay must be installed in a housing protected from dust and humidity with IP54 protection.

Ensure the wiring is appropriate to the field of application. Follow the application examples (page 6).

To maintain the UL, use copper cables, which are designed for operating temperatures of 75°C (167°F).

Connection diagram





PSR-SCP-24DC/ESD...T...

PSR-SPP-24DC/ESD...T...

4. Mounting and Startup

For reliable operation, the emergency stop safety relay must be installed in a housing protected from dust and humidity with IP54 protection.

Mount the emergency stop safety relay on a DIN rail. Ensure the wiring is appropriate to the field of application. Follow the application examples (page 6). In general, the safety relay is wired according to the following specifications:

4.1. Closing the Activation Circuit and Feedback Circuit

Automatic activation:
Connect a jumper between S33 and S35 and a jumper between Y1 and Y2.

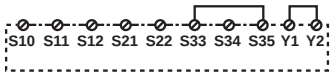


Figure 06

Monitored reset:
Connect a reset button between terminal blocks S33 and S34 and a jumper between Y1 and Y2.

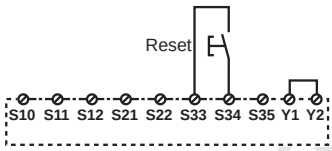


Figure 07

Monitored reset with monitored contact expansion:
Connect a reset button between terminal blocks S33 and S34 and the N/C contacts of the expansion contactors to Y1 and Y2.

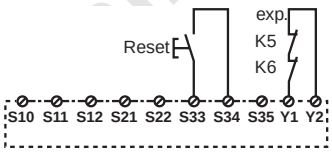


Figure 08

Automatic activation with monitored contact expansion:
Connect a jumper to terminal blocks S33 and S35 and the N/C contacts of the expansion contactors to Y1 and Y2.

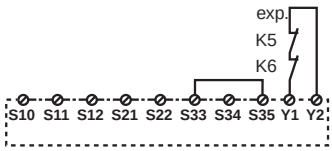


Figure 09

4.2. Closing the Input Circuit (Emergency Shutdown)

Two-channel with cross-circuit protection:
Connect the N/C contacts of the tripping device to S11/S12 and S21/S22 and jumper S10/S11 and Y1/Y2.

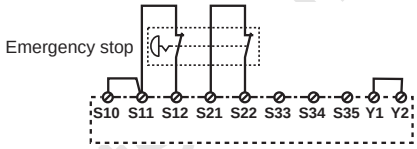


Figure 10

One-channel:
Connect the N/C contact of the tripping device to S11/S12. Jumper S21/S22, S10/S12, and Y1/Y2.
Safety Category 4 can only be achieved if automatic disconnecting switches are used and the cables are installed in separate cable sheaths.

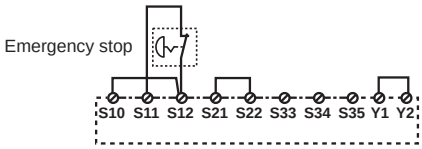


Figure 11

Two-channel without cross-circuit protection:
Connect the N/C contacts of the tripping device to S10/S11 and S11/S12 and jumper S21/S22 and Y1/Y2.

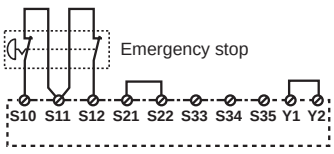


Figure 12

5. Application Examples

5.1 Two-Channel Emergency Stop Circuit With Cross-Circuit Detection and Monitored Reset Button (Jumper S33/S35: Automatic Activation)

Suitable for up to Safety Category 4.

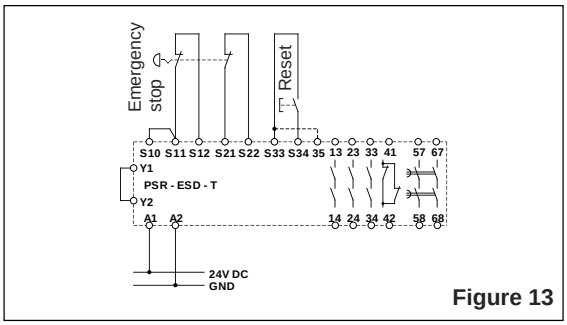


Figure 13

5.2 One-Channel Emergency Stop Circuit With Monitored Reset Button (Jumper S33/S35: Automatic Activation)

Suitable for up to Safety Category 2**.

** Safety Category 4 can only be achieved if automatic disconnecting switches are used and the cables are installed in separate cable sheaths.

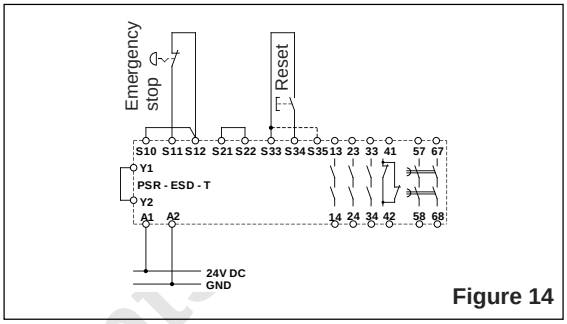


Figure 14

5.3 Two-Channel Limit Switch Monitoring With Solid-State Output and Monitored Reset Button (Jumper S33/S35: Automatic Activation)

Depending on the limit switch, suitable for up to Safety Category 4.

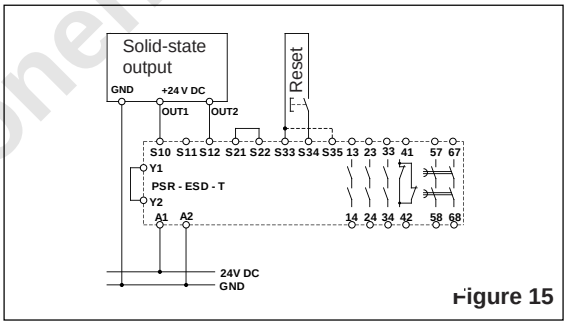


Figure 15

5.4 Two-Channel Safety Door Circuit With Cross-Circuit Detection and Monitored Reset Button (Jumper S33/S35: Automatic Activation)

Suitable for up to Safety Category 4.

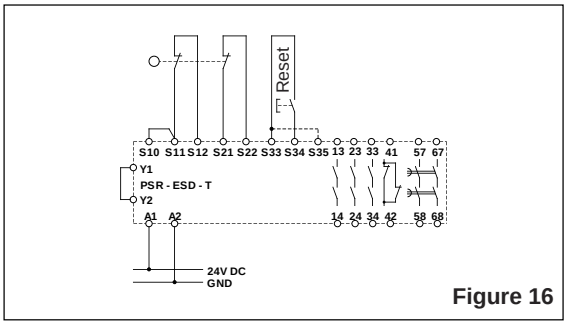


Figure 16

5.5 One-Channel Safety Door Circuit With Monitored Reset Button (Jumper S33/S35: Automatic Activation)

Suitable for up to Safety Category 2**.

** Safety Category 4 can only be achieved if automatic disconnecting switches are used and the cables are installed in separate cable sheaths.

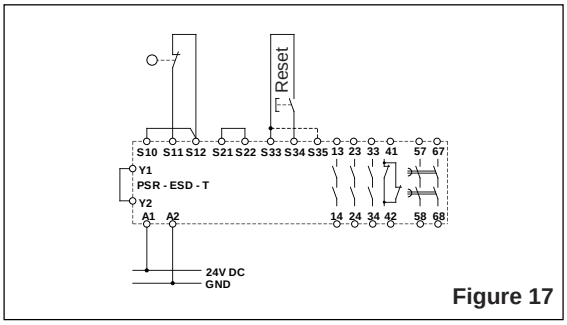


Figure 17