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PSR-SCP- 24-230UC/ESAM4/3X1/1X2
PSR-SPP- 24-230UC/ESAM4/3X1/1X2

Safety Relay for Monitoring Emergency Stop and Safety Door Circuits With or Without Start Button Monitoring

INTERFACE

Data Sheet
102404_en_03

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1

2 Description

The **PSR-…- 24-230UC/ESAM4/3X1/1X2** safety relay can be used in safety circuits according to DIN EN 60204-1/ VDE 0113-1 and IEC 61508.

Depending on the external wiring, up to safety category 4 according to EN 954-1 or SIL 3 according to IEC 61508 can be achieved. The requirements of SIL 3 are met once the safety equipment has been in use for a maximum of 34 months or a function test is carried out (proof test).

Control is carried out via an emergency stop button or safety door switch (mechanical or electronic) via one or two channels with manual or automatic activation. A connected start button is monitored.

The relay has three enabling current paths and one signaling current path that meet stop category 0 according to DIN EN 60204-1/VDE 0113-1. The current paths are equipped with safe isolation. Values between 24 V and 230 V AC or DC are possible as the supply voltage. The maximum limiting continuous current is 6 A.

2.1 Features

- Emergency stop/safety door monitoring
- Safety category 4 according to EN 954-1
- Plug-in screw or spring-cage connection terminal blocks
- Single-channel or two-channel wiring
- Safe isolation
- Cross-circuit detection
- Housing width of 45 mm
- Three enable contacts and one alarm contact

WARNING: Risk of electric shock
Observe the safety instructions on page 4.

Make sure you always use the latest documentation.
It can be downloaded at www.download.phoenixcontact.com.

A conversion table is available on the Internet at
www.download.phoenixcontact.com/general/7000_en_00.pdf.

This data sheet is valid for all products listed on the following page:

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3 Ordering Data

Safety Relay

Description	Type	Order No.	Pcs./Pck.
Safety relay for monitoring emergency stop and safety door circuits with or without start button monitoring, with screw connection	PSR-SCP- 24-230UC/ESAM4/3X1/1X2	2981114	1
Safety relay for monitoring emergency stop and safety door circuits with or without start button monitoring, with spring-cage connection	PSR-SPP- 24-230UC/ESAM4/3X1/1X2	2981127	1

Documentation

Description	Type	Order No.	Pcs./Pck.
Application manual for PSR safety relays	UM EN SAFETY RELAY APPLICATION	2888712	1

4 Technical Data

Input Data		
Nominal input voltage U_N	24 V AC/DC ... 230 V AC/DC	
Permissible range	0.85 ... 1.1 x U_N	
Typical current consumption at U_N		
24 V DC	120 mA	
230 V AC	25 mA	
Voltage at input, start, and feedback circuit	24 V DC, approximately	
Maximum voltage drop (T_{amb} = 25°C) via S11-S12 and S21-S22 (e.g., two N/C contacts of an emergency stop button)	2 V DC, approximately (corresponds to 11 Ω)	
Typical response time		
Monitored/manual start	60 ms	
Automatic start	250 ms	
Typical release time (K1, K2)	20 ms	
Recovery time	1 s, approximately	
Surge protection	Suppressor diode	
Status indicators (K1, K2, Power)	Green LED	

Output Data			
Contact type	3 enabling current paths, 1 signaling current path		
Contact material	Silver tin oxide, gold-flashed ($AgSnO_2$, 0.2 µm Au)		
Maximum switching voltage	250 V AC/DC		
Minimum switching voltage	15 V AC/DC		
Limiting continuous current			
N/O contact	6 A		
N/C contact	6 A		
$I_{TH}=I_1^2+I_2^2+I_3^2$	50 A^2		
Maximum inrush current	6 A		
Minimum inrush current	25 mA		
Maximum shutdown power		Ohmic load τ = 0 ms	Inductive load τ = 40 ms
	24 V DC	144 W	42 W
	48 V DC	288 W	42 W
	110 V DC	77 W	42 W
	220 V DC	88 W	42 W
	250 V AC	1500 VA	
Minimum switching power	0.4 W		
Mechanical service life	10^7 cycles, approximately		

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Output Data (Continued)

Switching capacity according to DIN EN 60947-5-1/VDE 0660-200	Cycles		DC13	AC15
	3600/h:	24 V	2.5 A	–
		230 V	–	3 A
	360/h:	24 V DC/4 A		
		230 V AC/4 A		
Short-circuit protection of the output circuits, external	6 A fast-blow, 4 A slow-blow			

General Data

Permissible ambient operating temperature	-20°C ... +55°C
Nominal operating mode	100% operating factor
Degree of protection according to VDE 0470-1	
Housing	IP40
Connection terminal blocks	IP20
Installation location	IP54, minimum
Mounting position	Any
Air and creepage distances between the circuits	
Basic insulation[1]	According to DIN EN 50178:1998-04
Impulse voltage withstand level	4 kV[1]
Pollution degree	2
Surge voltage category	III
Dimensions (W x H x D)	
Screw connection	45 mm x 114.5 mm x 99 mm
Spring-cage connection	45 mm x 114.5 mm x 112 mm
Conductor cross-section	
Screw connection	0.2 mm² ... 2.5 mm² (24 - 12 AWG)
Spring-cage connection	0.2 mm² ... 1.5 mm² (24 - 16 AWG)
Stripping length	
Screw connection	7 mm
Spring-cage connection	8 mm
Housing material	Polyamide PA, not reinforced

[1] Safe isolation, reinforced insulation, and 6 kV between the input circuit and the output contact current paths (13-14, 23-24, 33-34) and between the output contact current paths (13-14, 23-24, 33-34) themselves.

Tests/Approvals

TÜV	Functional Safety TÜV FS TÜV Rheinland Group Type Approved
UL/CUL	c UL us LISTED

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4.1 Block Diagram

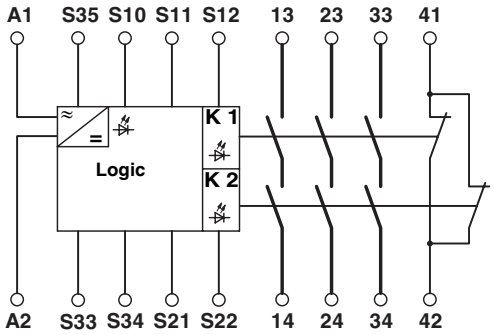

Figure 1 Block diagram

5 Safety Notes

WARNING: Risk of electric shock

During operation, parts of electrical switching devices carry hazardous voltages.

- Before working on the device, disconnect the power.
- 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, assembly, modifications, and upgrades may only be carried out by a skilled electrical engineer.

WARNING: Risk of automatic machine restart

- For emergency stop applications, the machine must be prevented from restarting automatically by a higher-level control system.
- Protective covers must not be removed when operating electrical switching devices.

WARNING: Danger due to faulty devices

The devices may be damaged following an error and correct operation can no longer be ensured.

- In the event of an error, replace the device immediately.
- Repairs to the device, especially if the housing must be opened, may only be carried out by the manufacturer or authorized persons. Otherwise the warranty is invalidated.

ATTENTION: Risk of damage to equipment due to incorrect installation

- For reliable operation, the safety relay must be installed in housing protected from dust and humidity (IP54).
- Carry out wiring according to the application. Use the connection examples on page 8 for this.
- The cabling must be protected against external short circuits and damage, and automatic disconnecting switches must be used.

ATTENTION: Risk of damage to equipment due to noise emission

When operating relay modules, the operator must meet the requirements for noise emission for electrical and electronic equipment (EN 61000-6-4) on the contact side and, if required, take appropriate measures.

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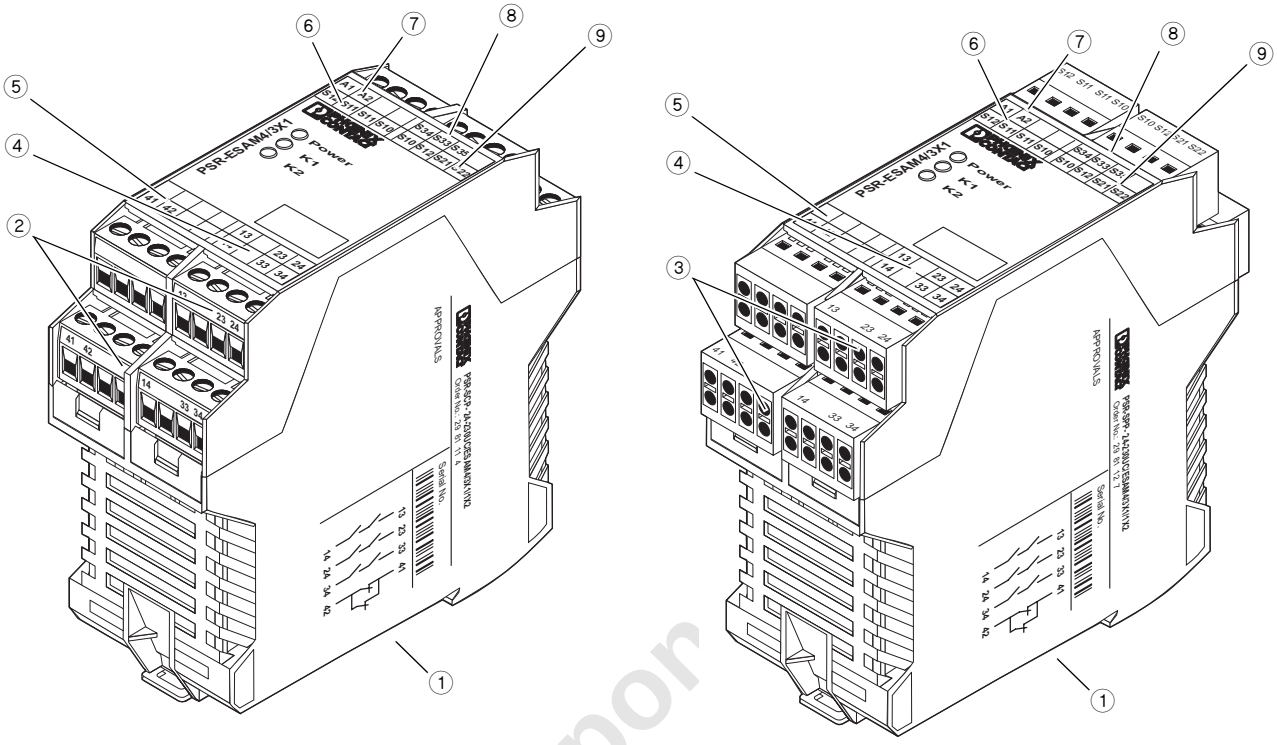
6 Structure



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PSR-SPP- 24-230UC/ESAM4/3X1/1X2

Figure 2 Structure

1 Metal lock for mounting on the DIN rail
2 COMBICON plug-in screw terminal blocks
3 COMBICON plug-in spring-cage terminal blocks
4 13-14, 23-24, 33-34: Safety current paths
5 41-42: N/C contact
6 S10, S11, S12: Input circuits
7 A1, A2: Supply voltage connection
8 S33, S34, S35: Start circuit
9 S21, S22: Input circuit

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7 Function

Wire activation and input contacts S33, S34, S35, S10, S11, S12, S21, S22 according to the application (see "Connection Notes" on page 6 and "Connection Examples" on page 8).

When the nominal input voltage is applied at terminal blocks A1-A2 or GND, the "Power" LED lights up.

When the safety door is closed or the emergency stop button is deactivated, the PSR-…- 24-230UC/ESAM4/3X1/1X2 is started automatically or manually depending on the external wiring (see "Activation and Feedback Circuit Wiring" on page 7). Contacts 13-14, 23-24, and 33-34 close and alarm contact 41-42 opens. LEDs "K1" and "K2" light up.

If the input circuit is opened, relays K1 and K2 drop out without delay and the LEDs go out.

The module can be reactivated if the input circuits are closed and the module is restarted either manually or automatically.

For additional connection examples, see page 8.

8 Connection Notes

WARNING: Risk of electric shock

During operation, parts of electrical switching devices carry hazardous voltages.

- Before working on the device, disconnect the power.

ATTENTION: Risk of damage to equipment due to incorrect installation

- For reliable operation, the safety relay must be installed in housing protected from dust and humidity (IP54).
- Carry out wiring according to the application. Use the connection examples for this.
- The cabling must be protected against external short circuits and damage, and automatic disconnecting switches must be used.

In order to comply with UL approval, use copper cables that are designed for operating temperatures > 75°C. For reliable and safe-to-touch contacts, strip the cable ends as follows:

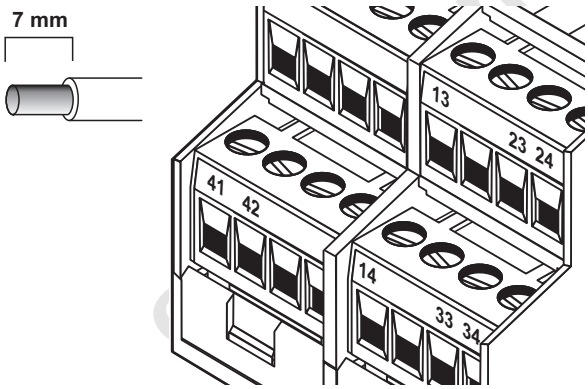

Figure 3 PSR-SCP- 24-230UC/ESAM4/3X1/1X2

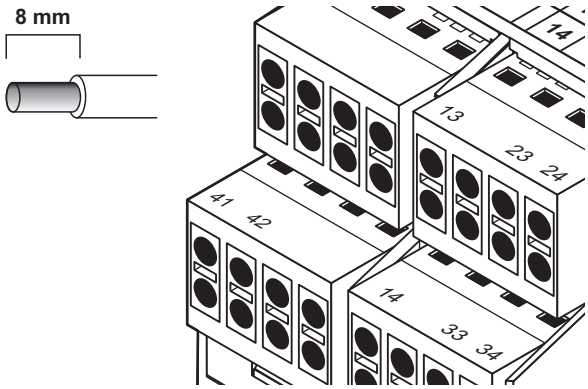

Figure 4 PSR-SPP- 24-230UC/ESAM4/3X1/1X2

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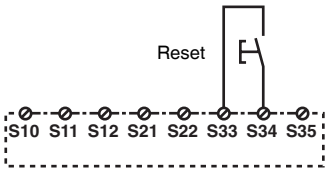
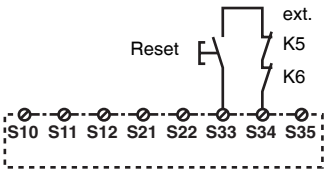
Wire the safety relay as follows:

8.1 Activation and Feedback Circuit Wiring

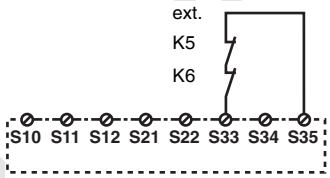


Automatic activation: Connect the jumper between S33 and S35

Monitored reset: Connect the reset button between terminal blocks S33 and S34

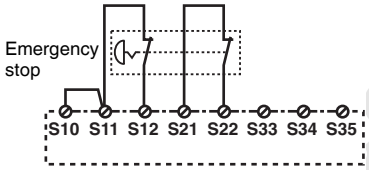


Monitored reset with monitored contact extension: Connect the reset button and the N/C contacts of the extension contactors in series to terminal blocks S33 and S34.

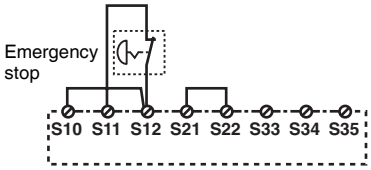


Automatic activation with monitored contact extension: Connect the N/C contacts of the extension contactors to terminal blocks S33 and S35

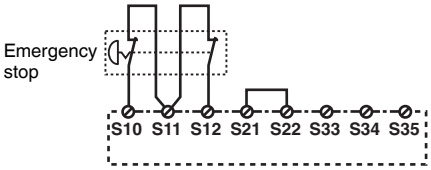
8.2 Input Circuit Wiring (Emergency Stop Circuit)



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



Single-channel: Connect the N/C contact of the tripping device to S11-S12. Jumper S21-S22 and S10-S12. [1]



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

[1] Safety category 4 can only be achieved if automatic disconnecting switches are used and the cables are installed in separate cable sheaths

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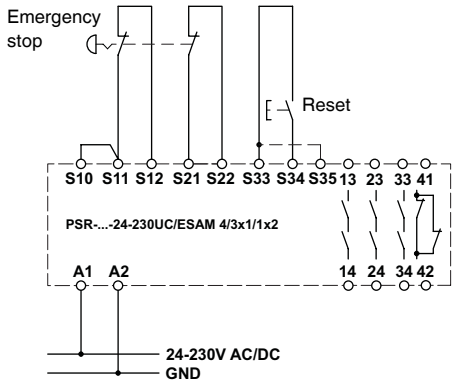
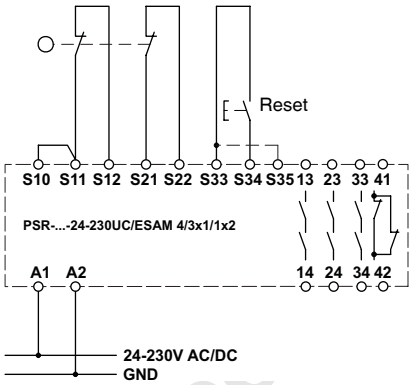
9 Connection Examples



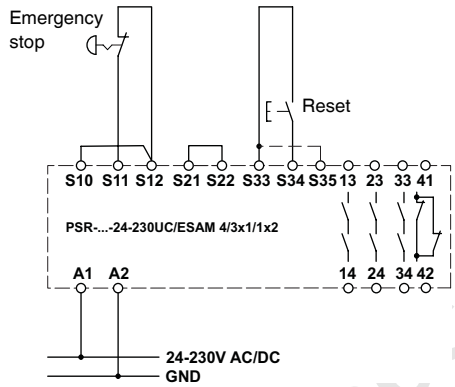
Two-channel emergency stop circuit with cross-circuit detection and monitored reset button

- Automatic activation with jumper at S33-S35
- Suitable up to safety category 4



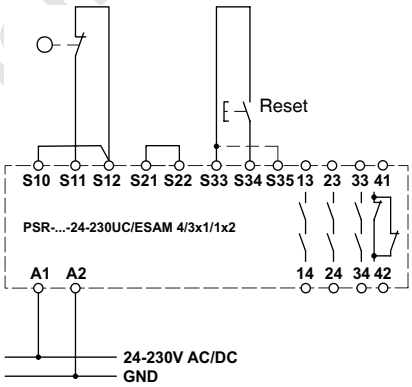
Two-channel safety door circuit with cross-circuit detection and monitored reset button

- Automatic activation with jumper at S33-S35
- Suitable up to safety category 4



Single-channel emergency stop circuit with monitored reset button

- Automatic activation with jumper at S33-S35
- Suitable up to safety category 4 (safety category 4 can only be achieved if automatic disconnecting switches are used and the cables are installed in separate cable sheaths)



Single-channel safety door circuit with monitored reset button

- Automatic activation with jumper at S33-S35
- Suitable up to safety category 4*