

# PSR-...- 24UC/ESA4/3X1/1X2/B

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Safety relay for emergency stop and safety door monitoring



Data sheet  
100013\_en\_03

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## 1 Description

The safety relay can be used for emergency stop and safety door monitoring as well as in safety circuits according to EN 60204-1.

With this switching device, circuits are interrupted in a safety-oriented manner.

Control is via a single channel or two channels, either with automatic or manual monitored start circuit (PSR-ESM4 only).

Depending on the external wiring, up to category 4, PL e according to EN ISO 13849-1 or SILCL 3 according to EN 62061 can be achieved.

The safety relay is equipped with three enabling current paths and one signaling current path that drop out without delay according to stop category 0.

### Features

- Emergency stop and safety door monitoring
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)
- Single-channel or two-channel wiring with cross-circuit detection
- Automatic or manual start circuit
- Option of screw or spring-cage terminal blocks for plug-in



**WARNING: Risk of electric shock**

Observe the safety instructions in the corresponding section!



Make sure you always use the latest documentation.  
It can be downloaded from the product at [phoenixcontact.net/products](http://phoenixcontact.net/products).



This data sheet is valid for all products listed on the following pages.

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### 3 Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, single or two-channel operation, 3 enabling current paths, nominal input voltage of 24 V AC/DC, plug-in screw terminal blocks	PSR-SCP- 24UC/ESA4/3X1/1X2/B	2963763	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, single or two-channel operation, 3 enabling current paths, nominal input voltage of 24 V AC/DC, plug-in spring-cage terminal block	PSR-SPP- 24UC/ESA4/3X1/1X2/B	2963941	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, single or two-channel operation, 3 enabling current paths, nominal input voltage of 24 V AC/DC, plug-in screw terminal blocks	PSR-SCP- 24UC/ESM4/3X1/1X2/B	2963776	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, single or two-channel operation, 3 enabling current paths, nominal input voltage of 24 V AC/DC, plug-in spring-cage terminal block	PSR-SPP- 24UC/ESM4/3X1/1X2/B	2963925	1
Documentation	Type	Order No.	Pcs. / Pkt.
User manual, English, for applications for PSR safety relay	UM EN SAFETY RELAY APPLICATION	2888712	1

## 4 Technical data

Input data	
Nominal input voltage $U_N$	24 V AC/DC
Input voltage range (factor)	0.85 ... 1.1
Typical input current	140 mA AC 65 mA DC
Voltage at input/start and feedback circuit	approx. 24 V DC
Max. permissible overall conductor resistance (Input and reset circuit at $U_N$ )	approx. 50 $\Omega$ (Input and start circuits at $U_N$ )
Typical response time	100 ms (automatic start)
Typical release time	45 ms (single-channel) 10 ms (two-channel)
Recovery time	1 s
Operating voltage display	Green LED
Status display	Green LED
Protective circuit	Surge protection Suppressor diode
Output data	
Contact type	3 enabling current paths 1 signaling current path
Contact material	AgSnO <sub>2</sub> , + 0.2 $\mu$ m Au
Minimum switching voltage	15 V AC/DC
Maximum switching voltage	250 V AC/DC
Limiting continuous current	6 A (N/O contact)
Maximum inrush current	6 A
Inrush current, minimum	25 mA
Sq. Total current	72 A <sup>2</sup> ( $I_{TH}^2 = I_1^2 + I_2^2 + I_3^2$ ) (see derating curve)
Interrupting rating (ohmic load) max.	144 W (24 V DC, $\tau = 0$ ms) 288 W (48 V DC, $\tau = 0$ ms) 77 W (110 V DC, $\tau = 0$ ms) 88 W (220 V DC, $\tau = 0$ ms) 1500 VA (250 V AC, $\tau = 0$ ms)
Maximum interrupting rating (inductive load)	48 W (24 V DC, $\tau = 40$ ms) 40 W (48 V DC, $\tau = 40$ ms) 35 W (110 V DC, $\tau = 40$ ms) 33 W (220 V DC, $\tau = 40$ ms)
Switching capacity min.	0.4 W
Mechanical service life	Approx. 10 <sup>7</sup> cycles
Switching capacity (360/h cycles)	6 A (24 V DC) 5 A (230 V AC)
Switching capacity (3600/h cycles)	3 A (24 V (DC13)) 3 A (230 V (AC 15))
Output fuse	10 A gL/gG NEOZED (N/O contact) 6 A gL/gG NEOZED (N/C contact)
General data	
Relay type	Electromechanically forcibly guided, dust-proof relay.
Nominal operating mode	100% operating factor
Degree of protection	IP20
Min. degree of protection of inst. location	IP54
Mounting position	any
Mounting type	DIN rail mounting
Air and creepage distances between the power circuits	DIN EN 50178/VDE 0160

### General data

Rated insulation voltage	250 V
Rated surge voltage/insulation	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between A1-A2/logic/enabling and signaling current paths)
Pollution degree	2
Surge voltage category	III

Dimensions	Screw connection	Spring-cage connection
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W x H x D	22.5 x 99 x 114.5 mm	22.5 x 112 x 114.5 mm
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Connection data	Screw connection	Spring-cage connection
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Conductor cross section, solid	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>	0.2 mm <sup>2</sup> ... 1.5 mm <sup>2</sup>
Conductor cross section, stranded	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>	0.2 mm <sup>2</sup> ... 1.5 mm <sup>2</sup>
Conductor cross section AWG/kcmil	24 ... 12	24 ... 16
Stripping length	7 mm	8 mm

### Ambient conditions

Ambient temperature (operation)	-20 °C ... 55 °C
Ambient temperature (storage/transport)	-40 °C ... 70 °C
Max. permissible relative humidity (operation)	75 %
Max. permissible humidity (storage/transport)	75 %

### Certification / Approvals

Approvals	
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### Safety data

Stop category according to IEC 60204	0
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### Safety parameters for IEC 61508 - High demand

SIL	3
PFH <sub>d</sub>	5.05 x 10 <sup>-10</sup>
Demand rate	< 12 Months
Proof test interval	240 Months
Duration of use	240 Months

Data only applies if the safety function is demanded at least once a year and the signal contact is read back.

The specifications apply assuming the following calculation basis

B <sub>10d</sub>	300000 (At 5 A DC 13)
d <sub>op</sub>	365.25 Days
h <sub>op</sub>	24 h
t <sub>cycle</sub>	3600 s

### Safety parameters for IEC 61508 - Low demand

SIL	3
MTTF <sub>d</sub>	19629 Years
PFD <sub>avg</sub>	1,37 x 10 <sup>-4</sup>
Proof test interval	66 Months
Duration of use	240 Months

### Safety characteristic data according to EN ISO 13849

Category	4
Performance level	e
CCF	Passed

**Safety characteristic data according to EN ISO 13849**

Duration of use	240 Months
Data only applies if the safety function is demanded at least once a year and the signal contact is read back.	
The specifications apply assuming the following calculation basis	
$B_{10d}$	300000 (At 5 A DC 13)
$d_{op}$	365.25 Days
$h_{op}$	24 h
$t_{Cycle}$	3600 s

**5 Basic circuit diagram**

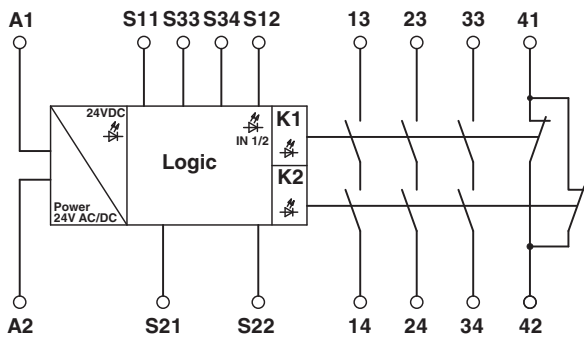


Figure 1 Block diagram

**6 Derating**

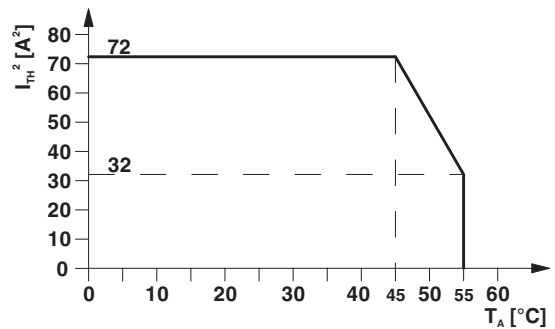


Figure 2 Derating curve

**Key:**

Designation	Explanation
A1/A2	Safety relay input voltage
S11/S12	Input circuit 1
S21/S22	Input circuit 2
S33/S34	Start circuit
13/14	Undelayed enabling current path 1
23/24	Undelayed enabling current path 2
33/34	Undelayed enabling current path 3
41/42	Signaling current path

## 7 Safety notes



### **WARNING: Risk of electric shock**

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

Before working on the switching 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, mounting, modifications, and upgrades should 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.



### **NOTE: 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. Refer to the "Application examples" section for this.



### **NOTE: Risk of damage to equipment due to noise emissions**

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.

## 8 Operating and indication elements

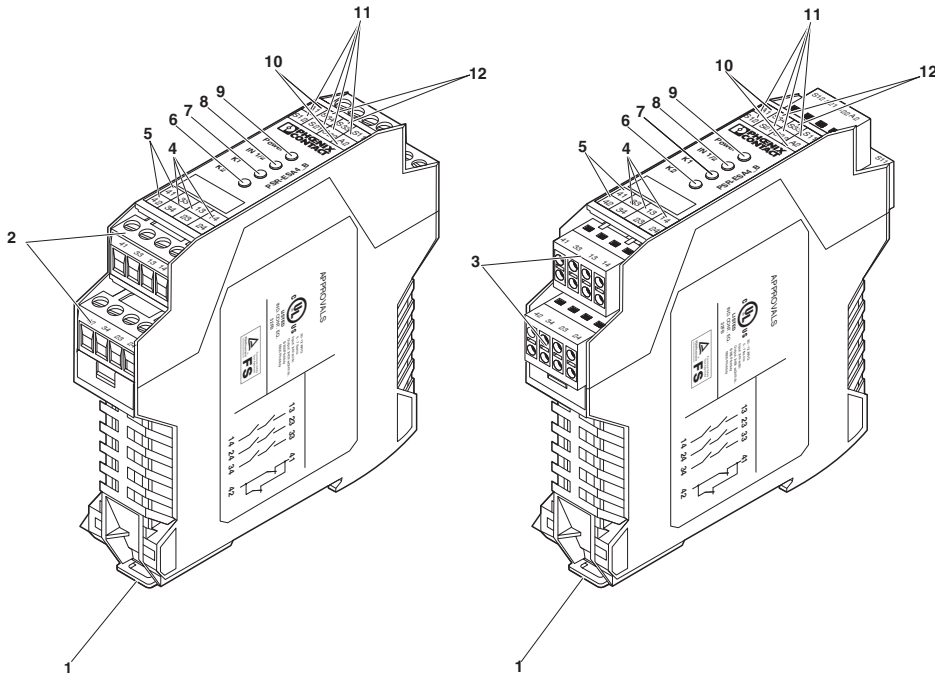


Figure 3 PSR-SCP-24UC/ES...4/3X1/1X2/B and PSR-SPP-24UC/ES...4/3X1/1X2/B

### Key:

Designation	Explanation
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 - undelayed enabling current paths
5	41/42 - Signaling current path
6	LED status indicator, green - K2
7	LED status indicator, green - K1
8	LED status indicator, green - IN 1/2
9	LED status indicator, green - Power
10	A1, A2 - supply voltage connection
11	S11, S12, S21, S22 - input circuits
12	S33, S34 - start circuit (activating circuit)

## 9 Diagnostics

The diagnostic descriptions can be found in Section 7 of the application manual for PSR safety relays.



## 10 Application examples

### 10.1 Single-channel emergency stop monitoring

- Manual, monitored start
- Suitable up to category 1, PL c (EN ISO 13849-1), SILCL 1 (EN 62061)

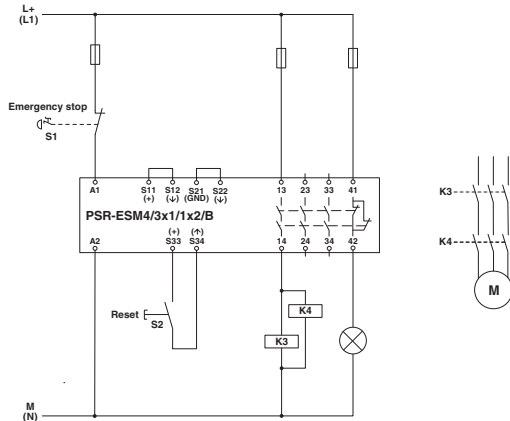


Figure 4 Single-channel emergency stop monitoring

### 10.2 Two-channel emergency stop monitoring

- Manual, monitored start
- Cross circuiting detection
- Monitoring of external contactors
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)

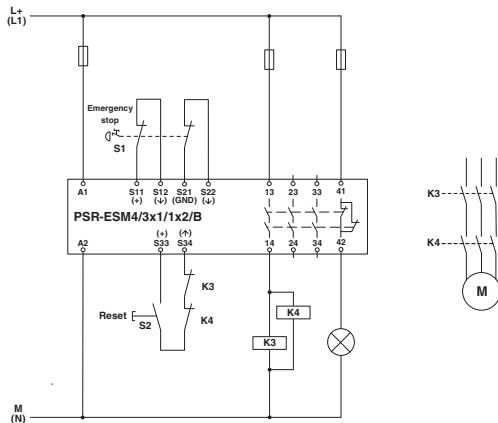


Figure 5 Two-channel emergency stop monitoring

### 10.3 Single-channel safety door monitoring

- Automatic start
- Suitable up to category 1, PL c (EN ISO 13849-1), SILCL 1 (EN 62061)

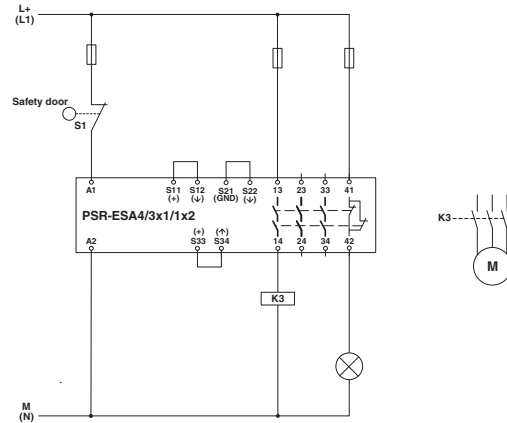


Figure 6 Single-channel safety door monitoring

### 10.4 Two-channel safety door monitoring

- Automatic start
- Cross circuiting detection
- Monitoring of external contactors
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)

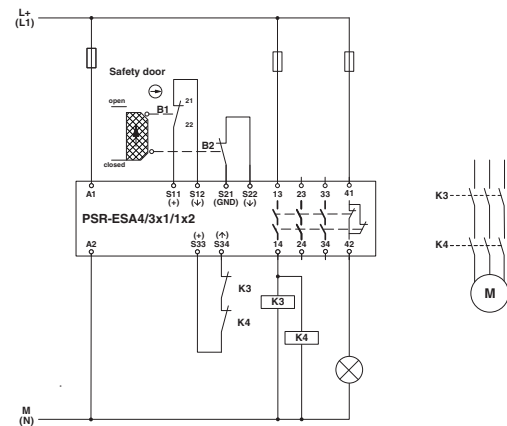


Figure 7 Two-channel safety door monitoring