

PSR-...- 24DC/ESP4/2X1/1X2

Safety relay for emergency stop and safety door monitoring



Data sheet
100516_en_05

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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 DIN EN 60204-1.

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

Control is via a single channel, either with automatic or manual start circuit.

A connected reset button is not monitored.

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

The safety relay is equipped with two 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
- Meets up to safety category 4, PL e (ISO 13849-1), SIL 3 (IEC 61508)
- Optional plug-in screw or spring-cage terminal blocks
- Automatic or manual start circuit
- Single-channel control
- Safe isolation between mains voltage and 24 V supply voltage in accordance with EN 50178
- Two undelayed enable contacts
- One undelayed signal contact



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.



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 SIL 3 high and low-demand applications, also approved according to EN 50156, Germanischer Lloyd, and EN ISO 13849, emergency stop and safety door monitoring, single-channel, 2 enabling current paths, 1 alarm contact, plug-in screw terminal blocks, width: 22.5 mm	PSR-SCP- 24DC/ESP4/2X1/1X2	2981020	1
Safety relay for SIL 3 high and low-demand applications, also approved according to EN 50156, Germanischer Lloyd, and EN ISO 13849, emergency stop and safety door monitoring, single-channel, 2 enabling current paths, 1 alarm contact, plug-in spring-cage terminal blocks, width: 22.5 mm	PSR-SPP- 24DC/ESP4/2X1/1X2	2981017	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 DC
Input voltage range (factor)	0.85 ... 1.1
Typical input current	50 mA DC
Typical inrush current	< 1 A
Voltage at input/start and feedback circuit	24 V DC
Typical response time	60 ms (Automatic/manual start)
Typical release time	20 ms
Recovery time	approx. 1 s
Operating voltage display	Green LED
Status display	Green LED
Protective circuit	Surge protection Suppressor diode, 33 V (A1 - A2, Y2 - A2)
Output data	
Contact type	2 enabling current paths 1 signaling current path (type B according to EN 50205)
Contact material	AgSnO ₂ , gold-flashed
Minimum switching voltage	10 V
Maximum switching voltage	250 V AC/DC
Limiting continuous current	6 A (N/O contact/N/C contact, high demand)
Maximum inrush current	6 A
Inrush current, minimum	10 mA
Interrupting rating (ohmic load) max.	144 W (24 V DC, $\tau = 0$ ms) 200 W (48 V DC, $\tau = 0$ ms) 77 W (110 V DC, $\tau = 0$ ms) 70 W (220 V DC, $\tau = 0$ ms) 1500 VA (250 V AC, $\tau = 0$ ms)
Maximum interrupting rating (inductive load)	42 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.	0.2 W
Mechanical service life	Approx. 10^7 cycles

Output data	
Switching capacity (360/h cycles)	5 A (24 V DC) 5 A (230 V AC)
Switching capacity (3600/h cycles)	5 A (24 V (DC13)) 5 A (230 V (AC 15))
Output fuse	6 A gL/gG NEOZED (High demand) 4 A gL/gG NEOZED (Low demand)

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	On horizontal and vertical DIN rail
Type of housing	Polyamide PA non-reinforced yellow
Air and creepage distances between the power circuits	DIN EN 50178/VDE 0160
Rated surge voltage / insulation	6 kV / Safe isolation, increased insulation

Dimensions	Screw connection	Spring-cage conn.
W x H x D	22.5 x 99 x 114.5 mm	22.5 x 112 x 114.5 mm

Connection data	Screw connection	Spring-cage conn.
Conductor cross section, solid	0.2 mm ² ... 2.5 mm ²	0.2 mm ² ... 1.5 mm ²
Conductor cross section, stranded	0.2 mm ² ... 2.5 mm ²	0.2 mm ² ... 1.5 mm ²
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	

Safety data	
Stop category according to IEC 60204	0

Safety parameters for IEC 61508 - High demand	
SIL	3
PFH _d	1,16 x 10 ⁻¹⁰
Demand rate	< 12 Months
Proof test interval	240 Months
Duration of use	240 Months
Demand rate	< 12 Months

The specifications apply assuming the following calculation basis	
d _{op}	365.25 Days
h _{op}	24 h
t _{Cycle}	3600 s

Safety parameters for IEC 61508 - Low demand

SIL	3
PFD _{avg}	1,24 x 10 ⁻⁴
Proof test interval	72 Months
Duration of use	240 Months

Safety characteristic data according to EN ISO 13849

Category	4
Performance level	e
DC _{avg}	99 %
MTTF _d	269 Years
Duration of use	240 Months

5 Basic circuit diagram

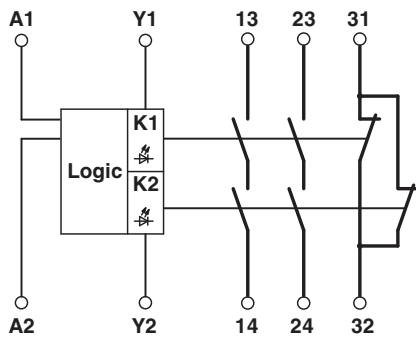


Figure 1 Block diagram

Designation	Explanation
A1/A2	Safety relay input voltage
Y1/Y2	Feedback circuit
13/14	Load current path
23/24	Load current path
31/32	Confirmation path

6 Derating

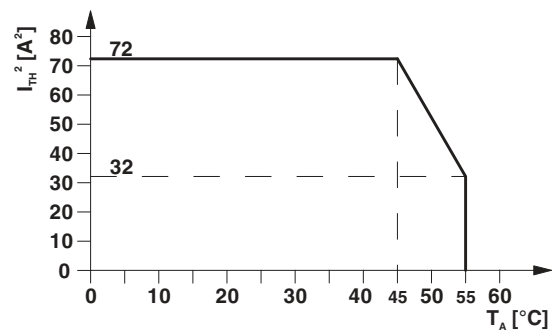
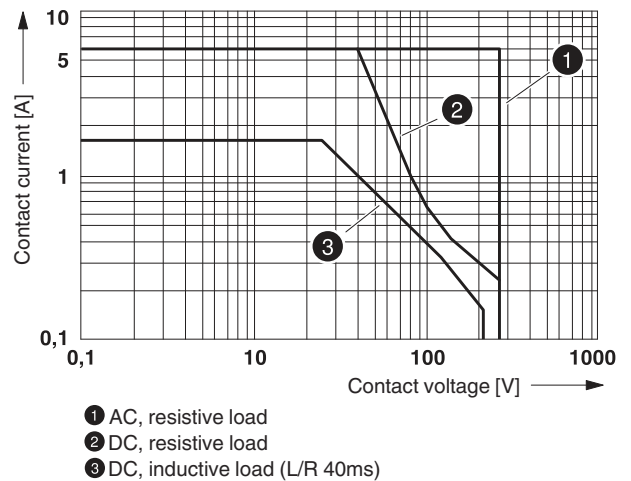


Figure 2 Derating curve

7 Load curve - inductive load



- ① AC, resistive load
- ② DC, resistive load
- ③ DC, inductive load (L/R 40ms)

8 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.

9 Operating and indication elements

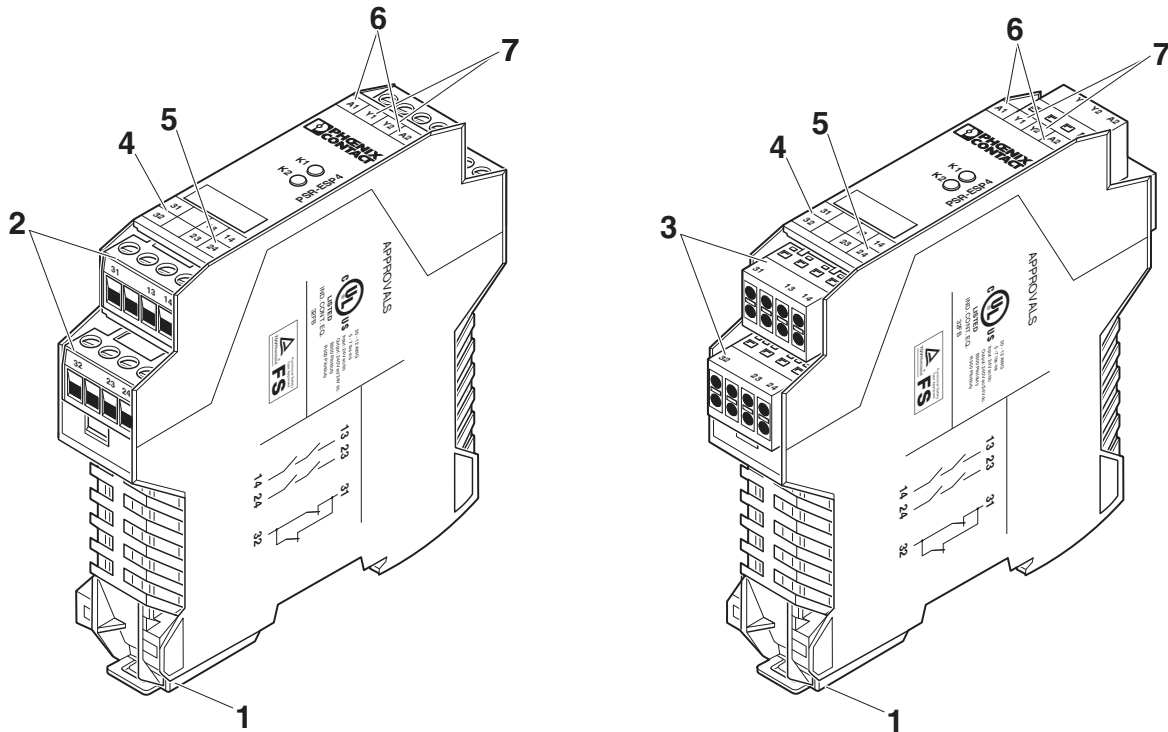


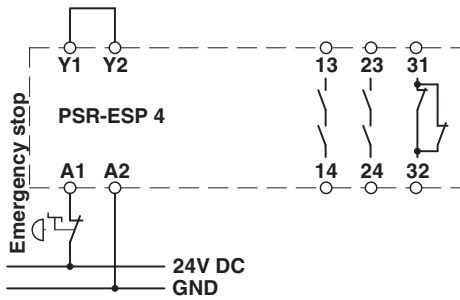
Figure 3 PSR-SCP-24DC/ESP4/2X1/1X2 and PSR-SPP-24DC/ESP4/2X1/1X2

Key:

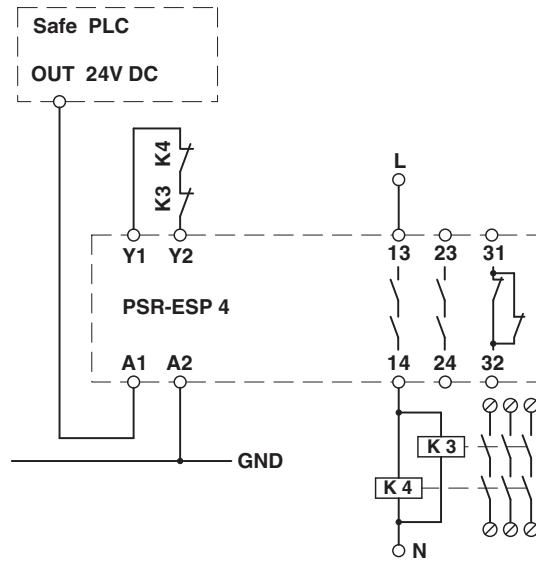
Designation	Explanation
1	Metal lock for mounting on the DIN rail
2	COMBICON plug-in screw terminal block
3	COMBICON plug-in spring-cage terminal blocks
4	31/32 - signaling current path
5	13/14, 23/24 - undelayed enabling current paths
6	A1/A2 - supply voltage connection
7	Y1/Y2 - feedback circuit

10 Application examples

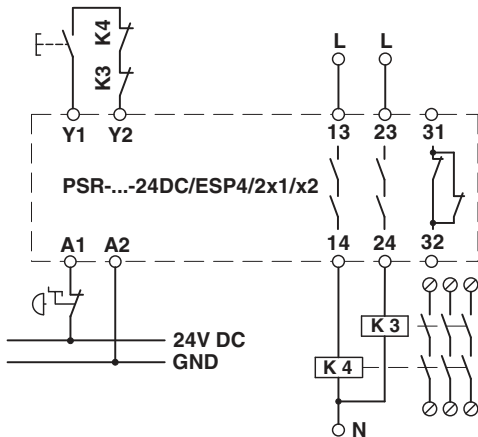
10.1 Single-channel emergency stop circuit with automatic activation



10.3 Single-channel evaluation of a safety controller with automatic activation, suitable for up to SIL 3



10.2 Single-channel emergency stop circuit with manual activation and monitored contact extension



11 Proof test

The PSR-...-24DC/ESP4/2X1/1X2 can be tested by turning off and restart the module. If the module does not start both relays (status LEDs K1 and K2), it must be replaced.