

# PSR-SCP- 24DC/SSM/2X1 PSR-SPP- 24DC/SSM/2X1

## Safety Relay With Downtime Monitoring



### INTERFACE

Data Sheet

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### Description

The **PSR-...- 24DC/SSM/2X1** safety relay can be used in safety circuits according to DIN EN 60204-1/VDE 0113-1. Depending on the external wiring, up to safety category 4 according to EN 954-1 can be achieved. The relay meets the requirements of SIL 3 according to EN 61508. Control is implemented via two PNP or 2-wire proximity switches that switch with a 180° overlap (see "Connection Example" on page 6).

The requirements of the following standards are met once the safety equipment has been in use for the relevant period of time or a function test is carried out (experiment test).

Standard	Level	Period of Use
IEC 61508	SIL 3	48 months
EN 954-1	Cat. 4	12 months

The relay has two positively-driven N/O contacts that meet stop category 0 according to DIN EN 60204-1/VDE 0113-1.



Observe the safety instructions on page 3.



Make sure you always use the latest documentation.  
It can be downloaded at [www.download.phoenixcontact.com](http://www.download.phoenixcontact.com).  
A conversion table is available on the Internet at  
[www.download.phoenixcontact.com/general/7000\\_en\\_00.pdf](http://www.download.phoenixcontact.com/general/7000_en_00.pdf).



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

## Ordering Data

### Safety Relays

Description	Type	Order No.	Pcs./Pkt.
Safety relay with downtime monitoring, with screw connection	PSR-SCP- 24DC/SSM/2X1	2981567	1
Safety relay with downtime monitoring, with spring-cage connection	PSR-SPP- 24DC/SSM/2X1	2981570	1

### Documentation

Description	Type	Order No.	Pcs./Pkt.
Application manual for PSR safety relays	UM EN SAFETY RELAY APPLICATION	2888712	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 $U_N$ (without proximity switch)	60 mA
Voltage at +S1, +S2	24 V DC
Typical response time (K1, K2) at $U_N$	12 ms
Typical release time (K1, K2) at $U_N$	8 ms
Surge protection	Suppressor diode
Status indicators (K1, K2)	Green LED
Switching range	
Downtime at	< 2 Hz
Operation at	> 2.5 Hz
Cut-off frequency	2 kHz

### Output Data

Contact type	2 enable current paths, 2 signaling current paths		
Contact material	Silver nickel 15 (AgNi15), hard gold-plated (5 $\mu$ m Au)		
Maximum switching voltage	250 V AC/DC		
Minimum switching voltage	10 V AC/DC		
Limiting continuous current	5 A		
Total current	On request		
Maximum inrush current	5 A		
Minimum inrush current	10 mA		
Maximum shutdown power	Ohmic load $\tau = 0$ ms	Inductive load $\tau = 40$ ms	
	24 V DC	192 W	48 W
	48 V DC	144 W	24 W
	110 V DC	88 W	33 W
	220 V DC	66 W	22 W
	250 V AC	2000 VA	
Minimum switching power	0.25 W		
Mechanical service life	50 x 10 <sup>6</sup> cycles, approximately		
Switching capacity	<b>Cycles</b>	<b>DC13</b>	<b>AC15</b>
	<b>360/h:</b>	24 V:	2 A
		230 V:	–
			3 A
Short-circuit protection of the output circuits, external	6 A gL (automatic device C8)		

**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 circuits	According to EN 60664/VDE 0110
Basic insulation <sup>1</sup>	
Impulse voltage withstand level	4 kV <sup>1</sup>
Pollution degree	2
Surge voltage category	III
Dimensions (W x H x D):	
PSR-SCP- 24DC/SSM/2X1	22.5 mm x 99 mm x 114.5 mm
PSR-SPP- 24DC/SSM/2X1	22.5 mm x 112 mm x 114.5 mm
Conductor cross section	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Housing material	Polyamide PA, not reinforced

<sup>1</sup> Safe isolation, increased insulation, and 6 kV between input circuit and output contact current paths.

**Tests/Approvals**

TÜV (German Technical Inspectorate)



UL

applied for

**Safety Instructions**

- 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.



- 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.



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

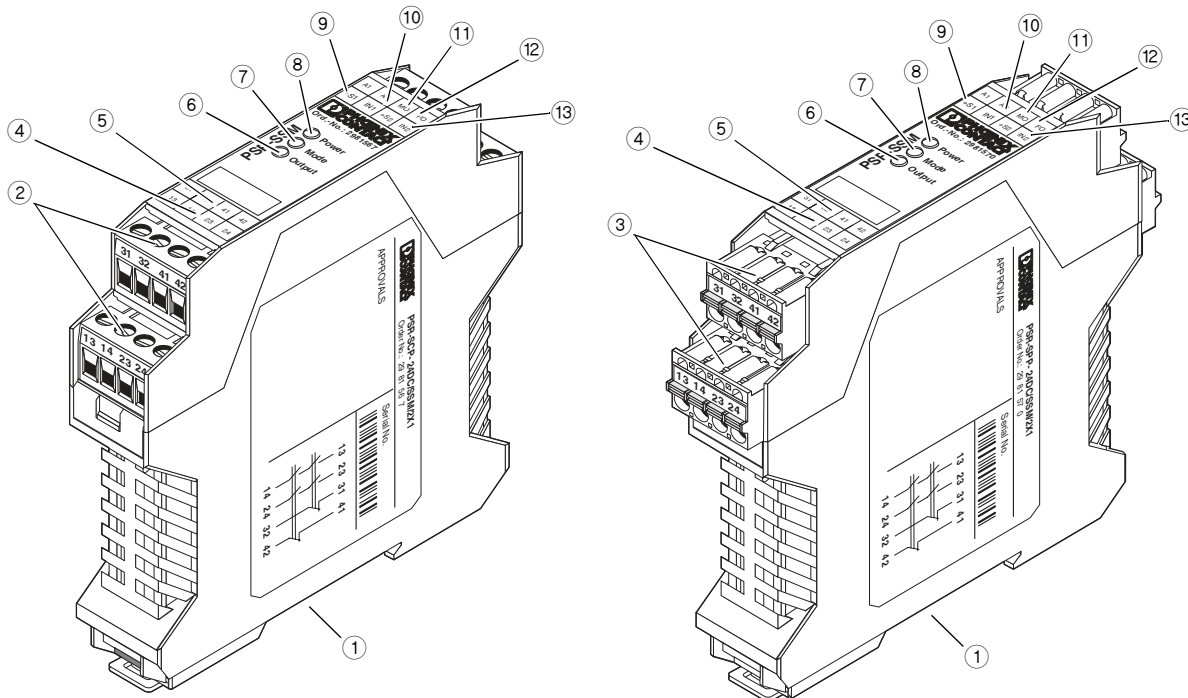


The device must be operated in a closed control cabinet (according to EN 61508-6:2001, Table 01).



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.

### Structure



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Figure 1 Structure

- 1 Metal lock for fixing on the DIN rail
- 2 COMBICON plug-in screw terminal blocks
- 3 COMBICON plug-in spring-cage terminal blocks
- 4 13-14, 23-24: N/O contact
- 5 31-32, 41-42: N/C contact
- 6 "Output" LED: Lights up in the event of a downtime, OFF in the event of movement, flashes in the event of a device error
- 7 "Mode" LED: Lights up when "Device OK", flashes in the event of a sensor error
- 8 "Power" LED: Lights up in the event of voltage at A1/A2
- 9 +S1, +S2: Supply voltage for proximity switches IN1, IN2
- 10 A1, A2: Supply voltage connection
- 11 MO: Downtime alarm output
- 12 FO: Error output (+24 V = device OK)
- 13 IN1, IN2: Proximity switch connection

### Block Diagram

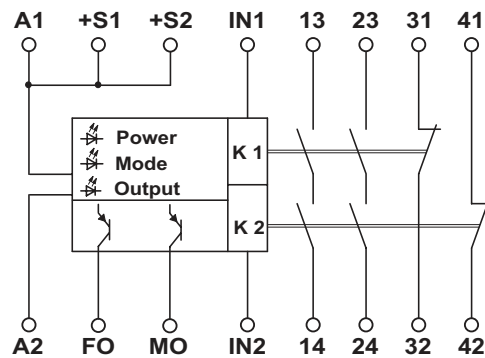


Figure 2 Block diagram

## Function

If the 24 V DC operating voltage is applied at terminal blocks A1 and A2, the electronics checks (in the stop state) whether at least one of the proximity switches provides a signal at input IN1 or IN2.

The FO diagnostic output indicates the ready state with +24 V. The "Power" and "Mode" LEDs light up. If this is the case (one or both proximity switches provide a signal), the internal output relays switch to the operated condition. N/O contacts 13-14 and 23-24 are closed, N/C contacts 31-32 and 41-42 are open, and the "Output" lights up. Alarm output MO indicates +24 V.

The outputs remain active in their switch position as long as no signal change is generated at inputs IN1 and IN2 by a movement.

N/O contacts 13-14 and 23-24 open and N/C contacts 31-32 and 41-42 close if a signal change with a frequency > 2.5 Hz is detected at inputs IN1 and IN2. Alarm output MO is a high-resistance output.

If the input circuit frequency is less than 2 Hz (stop state entered or movement not hazardous), relays K1 and K2 switch. N/O contacts 13-14 and 23-24 are closed and N/C contacts 31-32 and 41-42 are open. Alarm output MO indicates +24 V.

In the event of an error (sensor error), the "Mode" LED flashes and FO is a high-resistance output.

For a connection example, please refer to page 6.

## Assembly and Startup



**Before working on the device, disconnect the power.**

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:

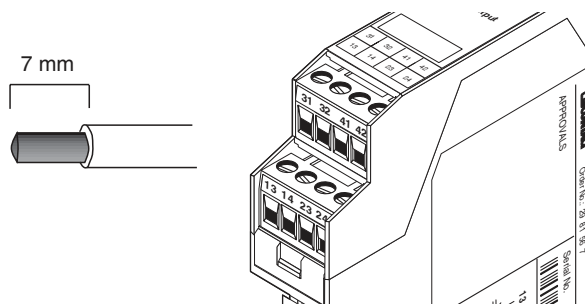


Figure 3 PSR-SCP- 24DC/SSM/2X1

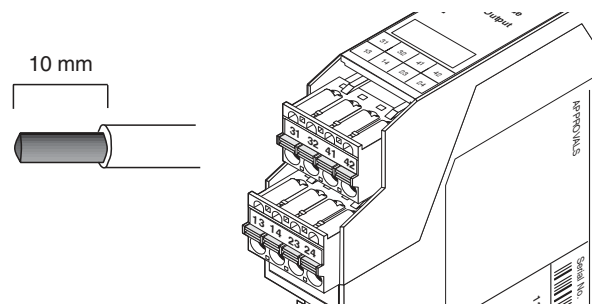


Figure 4 PSR-SPP- 24DC/SSM/2X1

### Mounting the Proximity Switches



**Prevent cross circuits between IN1 and IN2 by using a suitable cable installation.**

#### Requirements for a Gearwheel or Gear Rack:

The design of the gearwheel or gear rack is of particular importance for safe operation:

The surface of the gearwheel must always be greater than the gap between the teeth. This ensures that at least one proximity switch is actuated.

#### Arrangement of the Proximity Switches:

- Tooth > gap
- Tooth > switch diameter
- Depth of gap > switching interval of the switch
- $a \leq (\text{switching interval of the switch}/2)$

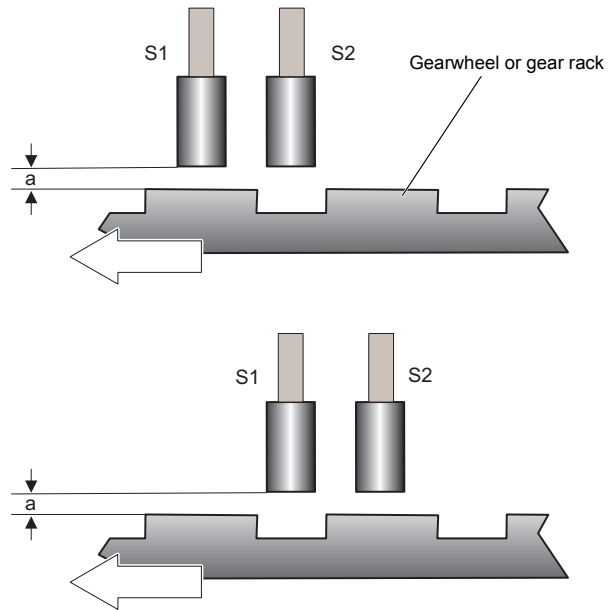


Figure 6 Mounting the proximity switches

### Connection Example

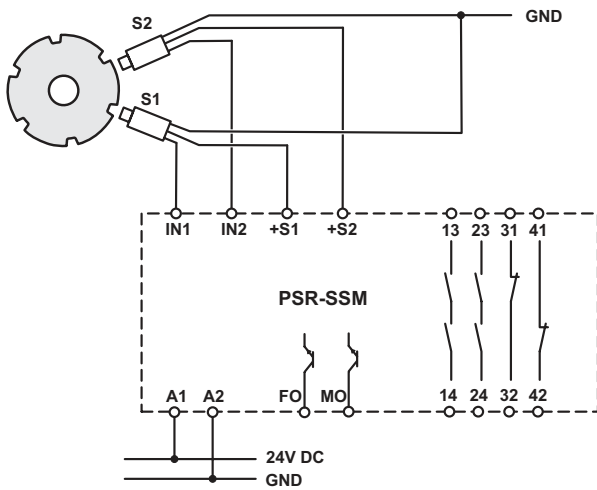


Figure 5 Two-channel downtime monitoring using two PNP or 2-wire proximity switches, suitable up to safety category 3\*, SIL 3

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\* Safety category 4 is possible if a test is performed within 24 hours of machine downtime to detect the internal sensor errors.