

PSR-...-24DC/URM4/4X1/2X2/B

Safety relay as contact extension for emergency stop relays and two-hand control devices



Data sheet
102856_en_03

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1 Description

The safety relay can be used as a contact extension for emergency stop relays and two-hand control devices.

The extension module is used in safety circuits according to EN 60204-1.

The extension module has four enable current paths, one signaling current path, and one confirmation current path

The contacts drop without delay according to stop category 0 (EN 60204-1).

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 in conjunction with a suitable evaluation device.

Features

- Contact extension with PSR-TBUS connection
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061) in conjunction with an appropriate evaluation device
- Approved according to EN 50516
- Stop category 0
- 4 enabling current paths
- 1 signaling current path
- 1 Check-back current path
- Optional plug-in screw or spring-cage terminal blocks



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.
Single-channel contact extension with TBUS interface, 4 N/O contacts, 1 N/C contact, 1 confirmation current path, undelayed, Cat. 4, PL e according to EN ISO 13849, pluggable screw terminal blocks, width: 22.5 mm	PSR-SCP- 24DC/URM4/4X1/2X2/B	2981677	1
Single-channel contact extension with TBUS interface, 4 N/O contacts, 1 N/C contact, 1 confirmation current path, undelayed, Cat. 4, PL e according to EN ISO 13849, pluggable spring-cage terminal blocks, width: 22.5 mm	PSR-SPP- 24DC/URM4/4X1/2X2/B	2981680	1
Documentation	Type	Order No.	Pcs. / Pkt.
User manual, English, for applications for PSR safety relay	UM EN SAFETY RELAY APPLICATION	2888712	1
Accessories	Type	Order No.	Pcs. / Pkt.
DIN rail connector for safety switching devices, for supplying/controlling/monitoring (depending on the module) Plug component	PSR-TBUS	2890425	50
Blind plug for the PSR-TBUS DIN rail connector used with the modular safety relay system (PSR-SDC4) Plug component	PSR-TBUS-TP	2981716	50

4 Technical data

Input data	
Nominal input voltage U_N	24 V DC
Input voltage range (factor)	0.9 ... 1.1
Typical input current	42 mA
Typical response time	10 ms
Typical release time	10 ms
Recovery time	1 s
Status display	Green LED
Protective circuit	Surge protection Suppressor diode
Output data	
Contact type	4 enabling current paths 1 signaling current path 1 confirmation current path
Contact material	AgSnO ₂
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 (N/O contact)
Inrush current, minimum	25 mA
Sq. Total current	72 A^2 ($I_{TH}^2 = I_1^2 + I_2^2 + I_3^2 + I_4^2$) (see derating curve)
Interrupting rating (ohmic load) max.	144 W (24 V DC, $\tau = 0$ ms, N/C contact 61/62: 72 W) 288 W (48 V DC, $\tau = 0$ ms, N/C contact 61/62: 144 W) 77 W (110 V DC, $\tau = 0$ ms) 88 W (220 V DC, $\tau = 0$ ms) 1500 VA (250 V AC, $\tau = 0$ ms, N/C contact 61/62: 750 VA)
Maximum interrupting rating (inductive load)	48 W (24 V DC, $\tau = 40$ ms) 40 MW (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. 10^7 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 (AC15))
Output fuse	10 A gL/gG NEOZED (N/O contact) 4 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
Rated insulation voltage	250 V
Rated surge voltage / insulation	4 kV / basic isolation (safe isolation, reinforced insulation and 6 kV between input circuit/N/C contacts and enabling current paths).
Pollution degree	2
Surge voltage category	III

Dimensions	Screw connection	Spring-cage connection
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 connection
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 (In conjunction with suitable evaluating device)
PFH _d	9.7×10^{-11} (In conjunction with suitable evaluating device)
Demand rate	< 12 Months
Proof test interval	240 Months
Duration of use	240 Months
The data only applies if the safety function is demanded at least once a year.	
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

Safety parameters for IEC 61508 - Low demand	
SIL	3 (In conjunction with suitable evaluating device)
MTTF _d	21024 Years
PFD _{avg}	$1,37 \times 10^{-4}$
Proof test interval	76 Months
Duration of use	240 Months

Safety characteristic data according to EN ISO 13849	
Category	4 (In conjunction with suitable evaluating device)
Performance level	e (In conjunction with suitable evaluating device)
CCF	Passed
Duration of use	240 Months
The data only applies if the safety function is demanded at least once a year.	
The specifications apply assuming the following calculation basis	
B _{10d}	300000 (At 5 A DC 13)

Safety characteristic data according to EN ISO 13849

d_{op}	365.25 Days
h_{op}	24 h
t_{Cycle}	3600 s

5 Basic circuit diagram

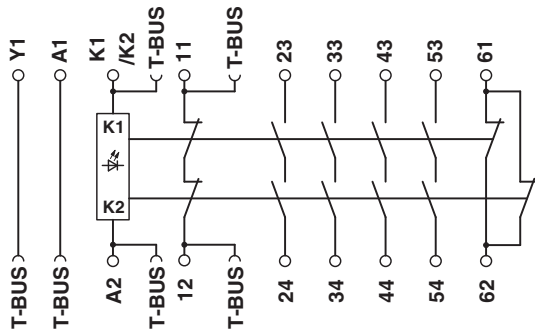


Figure 1 Block diagram

6 Derating

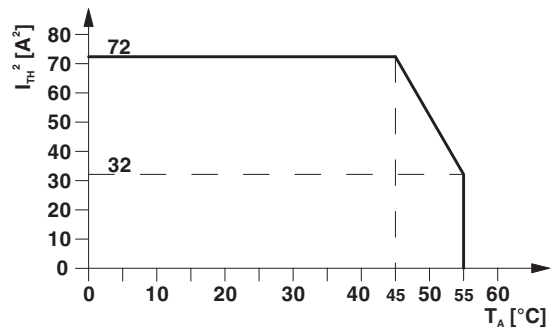


Figure 2 Derating curve

Key:

Designation	Explanation
K1/K2	Safety relay input voltage
Y1/A1	Connection to the DIN rail connector
A2	GND
11/12	Confirmation current path
23/24	Enabling current paths
33/34	
43/44	
53/54	
61/62	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

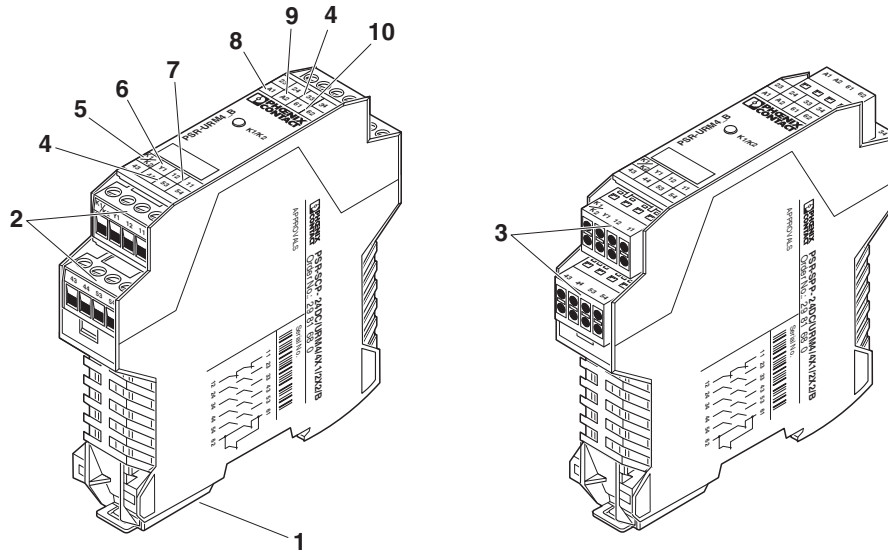


Figure 3 PSR-SCP-24DC/URM4/4X1/2X2/B and PSR-SPP-24DC/URM4/4X1/2X2/B

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	23/24, 33/34, 43/44, 53/54 - undelayed enabling current paths
5	K1/K2 - Safety relay input voltage
6 / 8	Y1/A1 - connection to the DIN rail connector
7	11/12 - confirmation current path
9	A2 - GND
10	61/62 - signaling current path

9 Diagnostics

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

10 Application examples

10.1 Two-channel emergency stop monitoring with contact extension

- Cross circuiting detection
- Ground fault detection (S11, S12 only)
- Manual activation with connection at Y1/S34
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061) in conjunction with an appropriate evaluation device

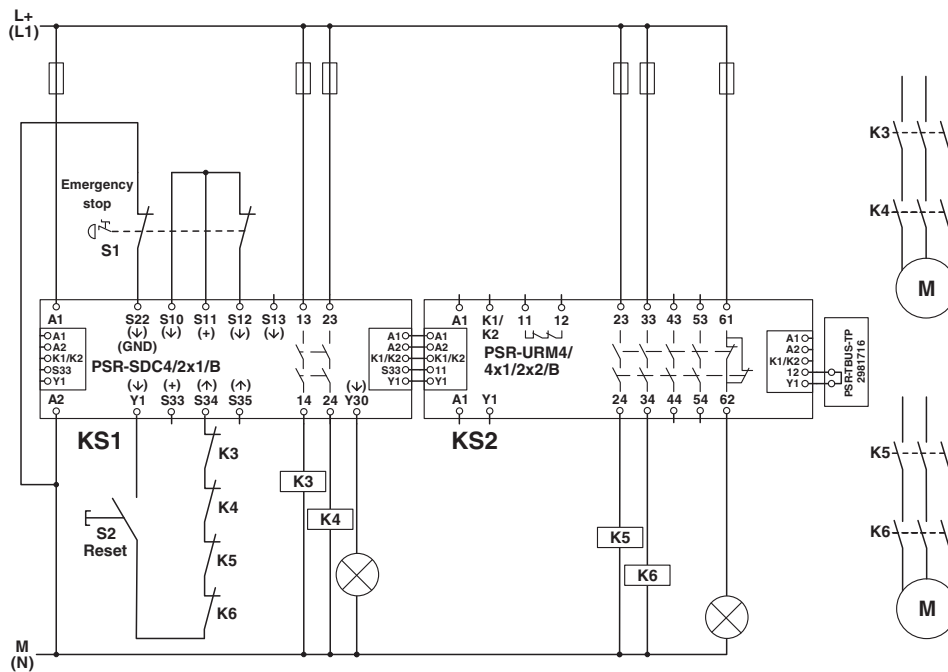


Figure 4 Two-channel emergency stop monitoring with contact extension and manual reset