PSR-...-230UC/ESAM4/3X1/1X2/B

Safety relay for emergency stop and safety door monitoring



Data sheet
105318_en_02

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1 Description

The safety relay can be used in safety circuits according to EN 60240-1 and IEC 61508.

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 start circuit.

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 that drop out without delay corresponding to stop category 0 according to EN 60204-1.

Features

- Emergency stop and safety door monitoring
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)
- Optional plug-in screw or spring-cage terminal blocks
- Single-channel or two-channel wiring with cross-circuit detection
- 3 enable current paths
- 1 signaling current path

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.

2 Table of contents

1 Description 1
2 Table of contents 2
3 Ordering data 3
4 Technical data 3
5 Basic circuit diagram 5
6 Derating 5
7 Safety notes 6
8 Operating and indication elements 7
9 Diagnostics 7
10 Application examples 8
10.1 Two-channel emergency stop circuit with cross-circuit detection 8
10.2 Single-channel emergency stop circuit 8

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 230 V AC/DC, plug-in screw terminal blocks	PSR-SCP-230UC/ESAM4/3X1/1X2/B	2901428	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 230 V AC/DC, plug-in spring-cage terminal blocks	PSR-SPP-230UC/ESAM4/3X1/1X2/B	2901429	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	230 V AC/DC
Input voltage range (factor)	0.85 ... 1.1
Typical input current	22 mA
Voltage at input/start and feedback circuit	~ 24 V DC
Max. permissible overall conductor resistance (Input and reset circuit at U_N)	50 Ω
Typical response time	40 ms (man. start)
Typical release time	150 ms (when controlled via A1)
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	$AgSnO_2$, + 0.2 µm Au
Minimum switching voltage	10 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	10 mA
Sq. Total current	72 A^2 ($I_{TH}^2 = I_1^2 + I_2^2 + I_3^2$) (see derating curve)
Interrupting rating (ohmic load) max.	144 W (24 V DC, τ = 0 ms) 230 W (48 V DC, τ = 0 ms) 68 W (110 V DC, τ = 0 ms) 88 W (220 V DC, τ = 0 ms) 2000 VA (250 V AC, τ = 0 ms)
Maximum interrupting rating (inductive load)	48 W (24 V DC, τ = 40 ms) 40 W (48 V DC, τ = 40 ms) 35 W (110 V DC, τ = 40 ms) 33 W (220 V DC, τ = 40 ms)
Switching capacity min.	100 mW
Mechanical service life	Approx. 10^7 cycles

Output data	
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
Air and creepage distances between the power circuits	DIN EN 50178/VDE 0160
Rated surge voltage / insulation	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between A1-A2/logic/enabling and signaling current paths)

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 mm² ... 2.5 mm²	0.2 mm² ... 1.5 mm²
Conductor cross section, stranded	0.2 mm² ... 2.5 mm²	0.2 mm² ... 1.5 mm²
Conductor cross section AWG/kcmil	24 ... 12	24 ... 16

Ambient conditions	
Ambient temperature (operation)	-25 °C ... 55 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °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
Demand rate	< 12 Months
Proof test interval	240 Months

Safety parameters for IEC 61508 - Low demand	
SIL	3
Proof test interval	78 Months
Duration of use	240 Months

Safety characteristic data according to EN ISO 13849	
Category	4
Performance level	e

5 Basic circuit diagram

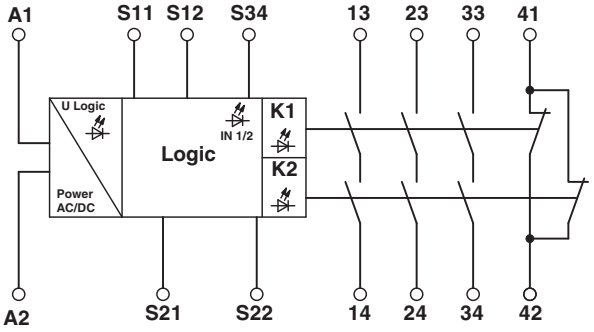


Figure 1 Block diagram

6 Derating

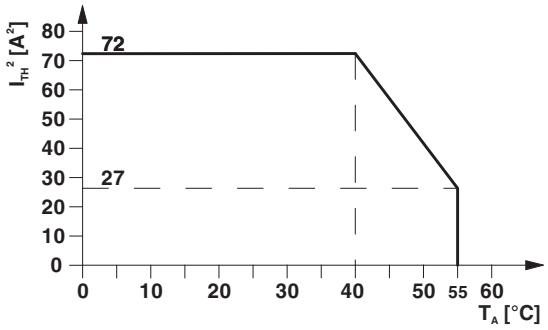


Figure 2 Derating curve

Key:

Designation	Explanation
A1/A2	Safety relay input voltage
S11/S12	Safety sensor/switch 1 input circuit
S21/S22	Safety sensor/switch 2 input circuit
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: Risk of automatic machine restart!

When using the manual reset function with monitored start, the “cross-circuit between S21/S22 and the cable from the reset button to S34” error must be prevented by design-related measures, especially for safety functions with increased risk potential (see EN ISO 13849-2).

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

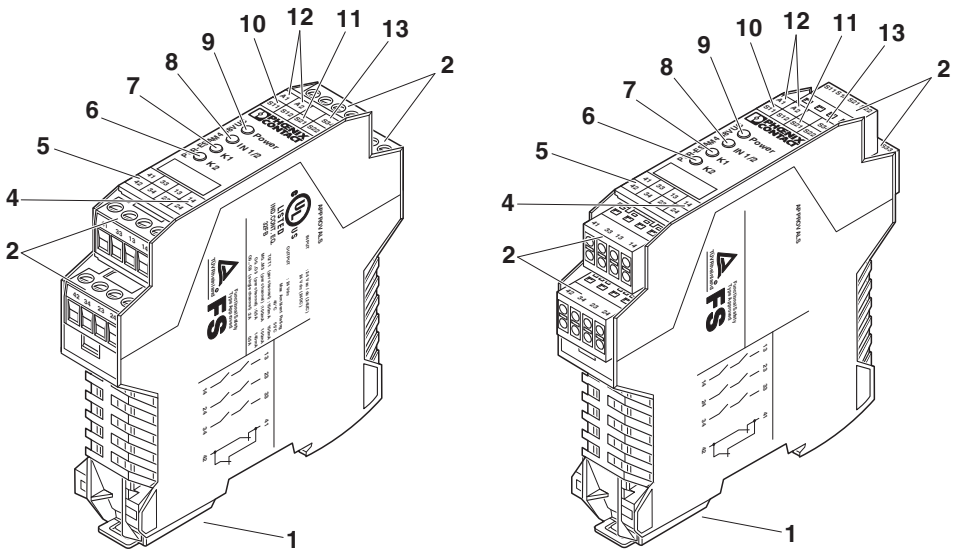


Figure 3 PSR-SCP-230UC/ESAM4/3X1/1X2/B and PSR-SPP-230UC/ESAM4/3X1/1X2/B

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 - enabling current paths
5	41/42 signaling current path
6	LED status indicator, green - K1
7	LED status indicator, green - K2
8	LED status indicator, green - IN 1/2
9	LED status indicator, green - Power
10	S11/S12 - input circuit
11	S21/S22 - input circuit
12	Power supply
13	S34 - start 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 Two-channel emergency stop circuit with cross-circuit detection

– Manual activation with connection at S12-S34
– Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)

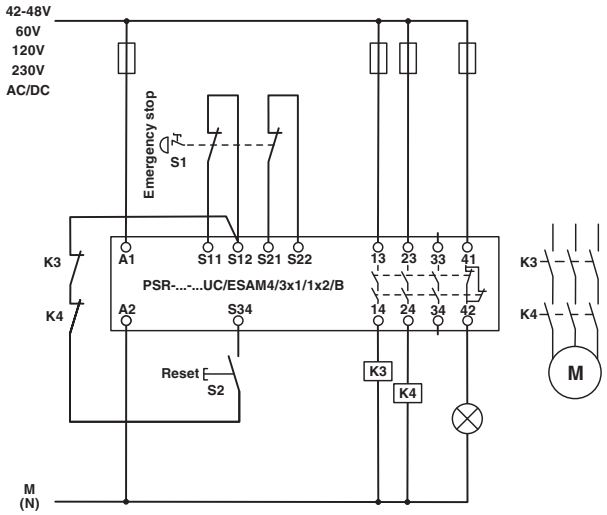


Figure 4 Emergency stop with cross-circuit detection and manually monitored reset

10.2 Single-channel emergency stop circuit

– Automatic activation with connection at S22-S34
– Suitable up to category 1, PL c (EN ISO 13849-1), SILCL 1 (EN 62061)

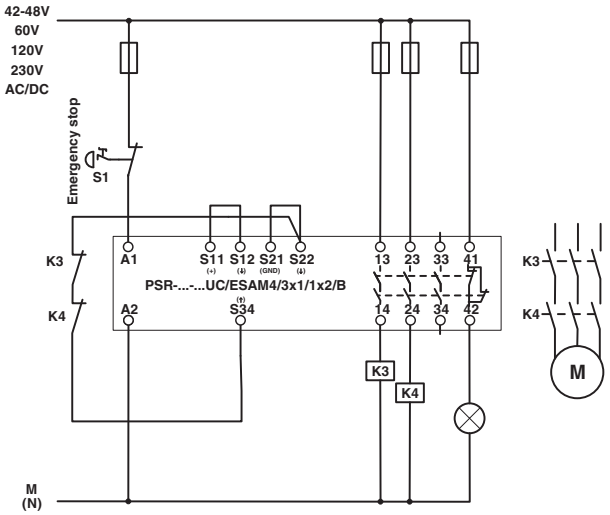


Figure 5 Emergency stop with automatic start