PSR-...- 24DC/ESD/5X1/1X2/ T...

Safety relay for emergency stop and safety door monitoring with fixed delay time



Data sheet
102100_en_01

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1 Description

The **PSR-...-24DC/ESD/5X1/1X2/...T...** safety relay can be used for emergency stop and safety door monitoring in safety circuits according to DIN EN 60204-1/VDE 0113-1.

With this switching device, circuits are interrupted in a safety-oriented manner. Single-channel or two-channel control is available, either with an automatic or a manual start circuit. A connected reset button (connected to S33/S34) is monitored.

Depending on the external wiring, up to category 4, PL e according to EN ISO 13849-1 or SIL 3 according to IEC 61508 (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. Two other enabling current paths drop out with delay corresponding to stop category 1.

Features

- Emergency stop and safety door monitoring
- suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (IEC 61508)
- Single-channel or two-channel wiring with cross-circuit detection
- Three undelayed and two delayed enable contacts
- Fixed delay time of 0.5 to 30 s
- Automatic or manual start circuit
- Choice of 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 page:

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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, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 10 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/ T10	2981088	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 0.5 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/0T 5	2981101	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 2 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/ T 2	2981125	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 0.5 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/0T 5	2981130	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 1.0 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/ T 1	2981143	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 1.0 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/ T 1	2981156	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 1.5 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/1T 5	2981169	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 1.5 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/1T 5	2981172	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 2 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/ T 2	2981198	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 2.5 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/2T 5	2981208	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 2.5 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/2T 5	2981211	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 3.0 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/ T 3	2981224	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 3.0 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/ T 3	2981237	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 4.0 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/ T 4	2981240	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 4.0 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/ T 4	2981253	1

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, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 5.0 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/ T 5	2981266	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 5.0 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/ T 5	2981279	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 6.0 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/ T 6	2981282	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 6.0 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/ T 6	2981295	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 15.0 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/ T15	2981305	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 15.0 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/ T15	2981318	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 20.0 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/ T20	2981321	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 20.0 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/ T20	2981334	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 30.0 s dropout delay, plug-in screw connection terminal blocks	PSR-SCP- 24DC/ESD/5X1/1X2/ T30	2981347	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 30.0 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/ T30	2981350	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 10.0 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/T10S	2981509	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, automatic or manual activation, 3 N/O contacts, 1 N/C contact, 2 N/O contacts with fixed 10 s dropout delay, plug-in spring-cage connection terminal blocks	PSR-SPP- 24DC/ESD/5X1/1X2/ T10	2981091	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	150 mA DC
Voltage at input/start and feedback circuit	approx. 23 V DC

Input data

Max. permissible overall conductor resistance (Input and reset circuit at U_N)	11 Ω (Input and start circuits at U_N)
Typical response time	70 ms (manual start) 600 ms (automatic start)
Typical release time	20 ms (undelayed contacts)
Recovery time	1 s

Output data

Contact type	3 enabling current paths undelayed 2 enabling current paths delayed 1 signaling current path undelayed
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
Inrush current, minimum	25 mA
Interrupting rating (ohmic load) max.	144 W (24 V DC, τ = 0 ms) 288 W (48 V DC, τ = 0 ms) 110 W (110 V DC, τ = 0 ms) 88 W (220 V DC, τ = 0 ms) 1500 VA (250 V AC, τ = 0 ms)
Maximum interrupting rating (inductive load)	42 W (24 V DC, τ = 40 ms) 42 W (48 V DC, τ = 40 ms) 42 W (110 V DC, τ = 40 ms) 42 W (220 V DC, τ = 40 ms)
Switching capacity min.	0.4 W
Mechanical service life	Approx. 10^7 cycles
Switching capacity (360/h cycles)	4 A (24 V DC) 4 A (230 V AC)
Switching capacity (3600/h cycles)	2.5 A (24 V (DC13)) 3 A (230 V (AC 15))
Output fuse	6 A fast blow (undelayed) C6 (24 V AC/DC) automatic device (undelayed) 10 A gL/gG NEOZED (delayed)

General data

Relay type	Electromechanically forcibly guided 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 isolation, (safe isolation, reinforced insulation and 6 kV between the enabling current paths **(13/14, 23/24, 33/34)** and the remaining current paths and between **13/14, 23/24, 33/34** between each other.)

Dimensions	Screw connection	Spring-cage conn.
W x H x D	45 x 99 x 114.5 mm	45 x 112 x 114.5 mm

Connection data	Screw connection	Spring-cage conn.
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
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 , 1

Safety parameters for IEC 61508 - High demand

SIL	3
PFH_d	1.67×10^{-9}
Diagnostic coverage (DC)	96.76 %
$MTTF_d$	68276 Years
Proof test interval	240 Months

Safety characteristic data according to EN ISO 13849

Category	4 (Undelayed contacts) 3 (delayed contacts)
Performance level	e (Undelayed contacts) d (delayed contacts)
DC_{avg}	96.76 %
CCF	Passed
B_{10d}	400000 (At 3 A AC15)
d_{op}	365.25 Days
h_{op}	24 h
t_{Cycle}	3600 s

5 Basic circuit diagram

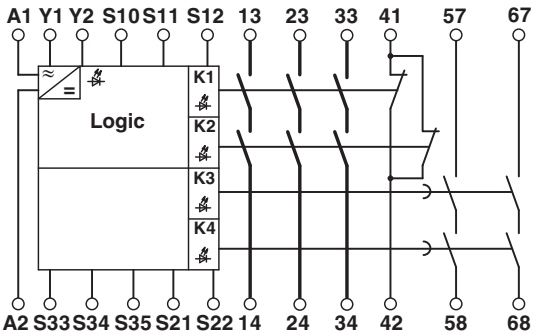


Figure 1 Block diagram

6 Derating

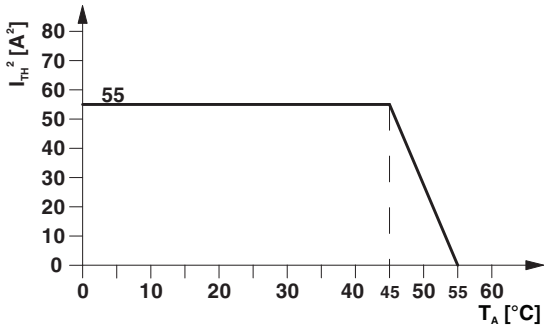


Figure 2 Derating curve

Key:

Designation	Explanation
A1/A2	Safety relay input voltage
Y1/Y2	Feedback circuit
S10, S11, S12	Safety sensor/switch 1 input circuit
S10, S21, S22	Safety sensor/switch 2 input circuit
13/14, 23/24, 33/34	Undelayed enabling current paths
41/42	Signaling current path
57/58, 67/68	Delayed enabling current paths
S33/S34	Manual start
S33/S35	Automatic start

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. Use the Application Examples section for this purpose.



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 display unit

Key:

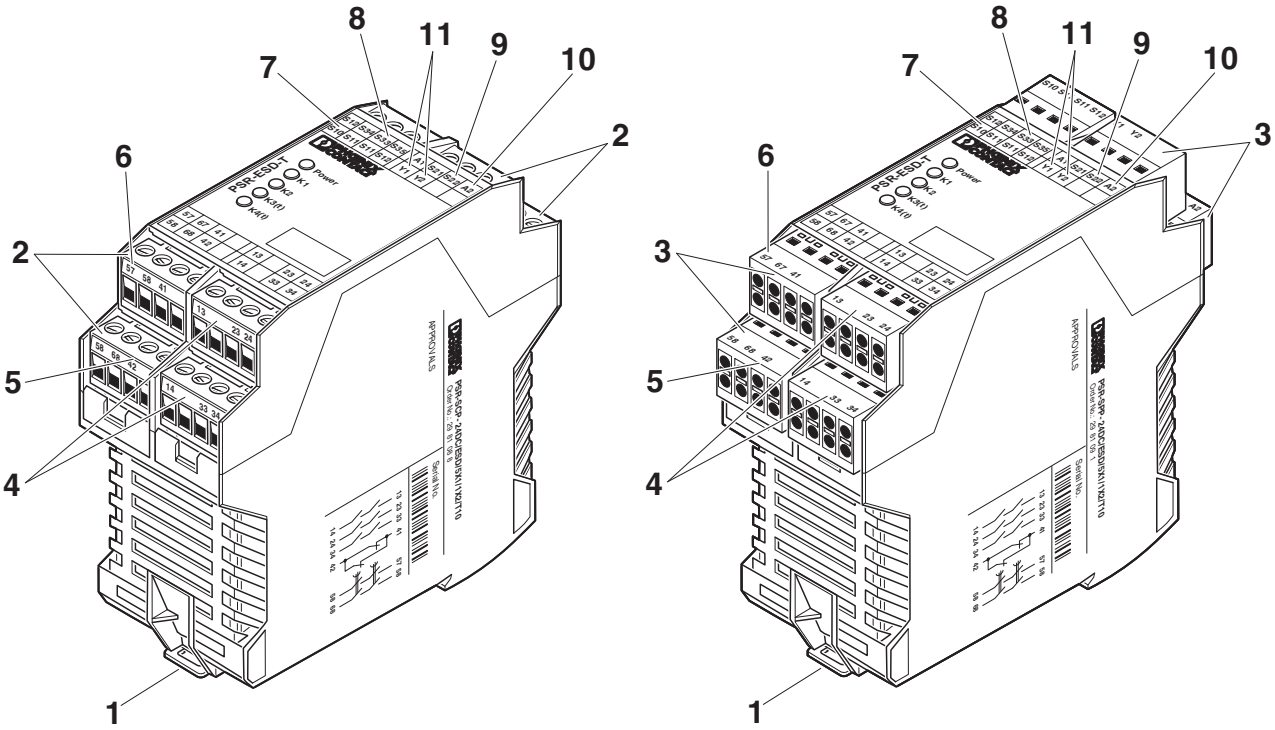


Figure 3 PSR-SCP-24DC/ESD/5X1/1X2/...T... and PSR-SPP-24DC/ESD/5X1/1X2/...T...

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 - alarm contact
6	57/58, 67/68 - delayed enabling current paths
7	S10, S11, S12 - input circuits
8	S33, S34, S35 - start circuit (activating circuit)
9	S21, S22 - input circuits
10	A1, A2 - supply voltage connection
11	Y1/Y2 - feedback circuit

9 Diagnostics

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

10 Application example

10.1 Two-channel emergency stop circuit with cross-circuit detection

- Manual activation via monitored reset button at S33/ S34
- Automatic activation with jumper at S33-S35
- suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (IEC 61508)

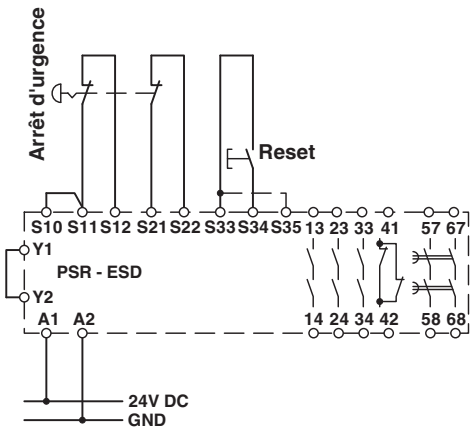


Figure 4 Two-channel emergency stop circuit with cross-circuit detection

10.2 Single-channel emergency stop circuit

- Manual activation via monitored reset button at S33/ S34
- Automatic activation with jumper at S33-S35
- Suitable up to category 1, PL c (EN ISO 13849-1), SIL 1 (IEC 61508)

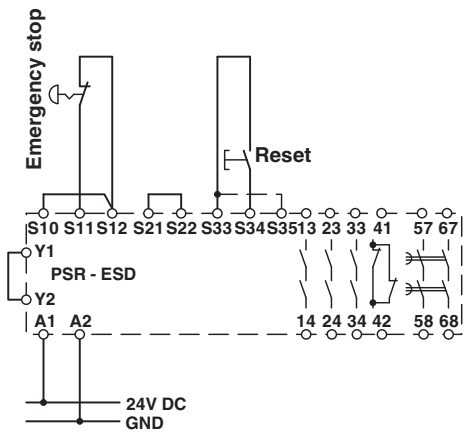


Figure 5 Single-channel emergency stop circuit

10.3 Two-channel monitoring with semiconductor output

- Manual activation via monitored reset button at S33/ S34
- Automatic activation with jumper at S33-S35
- suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (IEC 61508)

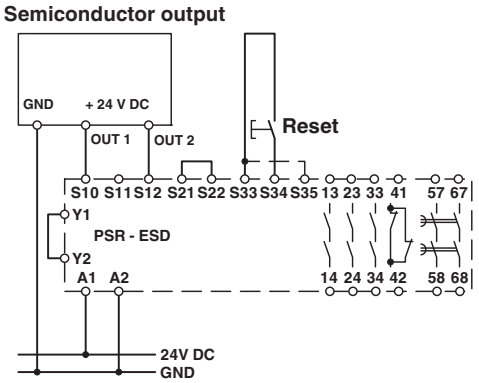


Figure 6 Two-channel monitoring

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