PSR-...- 24UC/ESA4/3X1/1X2/B

Safety relay for emergency stop and safety door monitoring

Data sheet
100013_en_04

1 Description

Intended Use

The safety relay is used to monitor two-channel signal generators and to control actuators.

When the sensor circuit is interrupted, the safety relay initiates the safe state.

The safety relay interrupts circuits in a safety-related way.

Possible signal generators

- Emergency stop button
- Safety door monitoring

Contact type

- 3 undelayed enabling current paths
- 1 non-delayed signaling current path

The enabling current paths drop out without delay according to stop category 0 (EN 60204-1).

Control

- Two-channel
- Automatic start

Achievable safety integrity

- Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN 62061)

Additional features

- Cross circuiting detection
- Optional pluggable screw or Push-in terminal blocks
- 22.5 mm housing width

Approvals

WARNING: Risk of electric shock
Observe the safety regulations and installation notes in the corresponding section.

Make sure you always use the latest documentation.
It can be downloaded from the product at phoenixcontact.net/products.

This document is valid for the products listed in the “Ordering data”.
This document meets the same requirements as the original operating instructions with respect to the contents.

2 Table of contents

3 Ordering data

Description	Type	Item no.	Pcs./Pkt.
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e in accordance with EN ISO 13849, 2-channel operation, 3 enabling current paths, nominal input voltage: 24 V DC, plug-in screw terminal block	PSR-SCP- 24UC/ESA4/3X1/ 1X2/B	2963763	1
Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e in accordance with EN ISO 13849, 2-channel operation, 3 enabling current paths, nominal input voltage: 24 V AC/DC, plug-in Push-in terminal block	PSR-SPP- 24UC/ESA4/3X1/ 1X2/B	2963941	1

Accessories	Type	Item no.	Pcs./Pkt.
Coding profile, is inserted into the slot on the plug or inverted header, red insulating material	CP-MSTB	1734634	100
Coding section, inserted into the recess in the header or the inverted plug, red insulating material	CR-MSTB	1734401	100

4 Technical data

Hardware/firmware version	
HW/FW	≥ 13/-- (2963763) ≥ 10/-- (2963941)
The technical data and safety characteristics are valid as of the specified HW/FW version.	

Input data	
Rated control circuit supply voltage U_S	24 V DC -15 % / +10 %
Rated control supply current I_S	typ. 70 mA
Inrush current	< 3.5 A (Δt = 3 ms at U_S) < 100 mA (Δt = 500 ms, with U_s/I_x at S12) > -100 mA (Δt = 300 ms, with U_s/I_x at S22) < 6 mA (with U_s/I_x to S34)
Current consumption	typ. 38 mA (S12) typ. -38 mA (S22) typ. 1 mA (with U_s/I_x to S34)
Power consumption at U_S	typ. 1.68 W (DC)
Filter time	5 ms (at A1 in the event of voltage dips at U_s) No test pulses permitted
Input voltage range "0" signal	0 V ... 5 V (S12)
Input current range "0" signal	0 mA ... 2 mA
Voltage at input/start and feedback circuit	approx. 24 V DC
Max. permissible overall conductor resistance (Input and reset circuit at U_S)	approx. 50 Ω (Input and start circuits at U_S)
Typical response time at U_s	150 ms (automatic start)
Typical starting time with U_s	250 ms (with U_s when controlled via A1)
Typical release time with U_s	20 ms (on demand via the sensor circuit) 45 ms (on demand via A1)
Recovery time	1 s (following demand of the safety function)
Concurrence	∞
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
Limiting continuous current	6 A (N/O contact)
Maximum inrush current	6 A
Inrush current, minimum	10 mA

Output data	
Sq. Total current $I_{TH}^2 = I_1^2 + I_2^2 + ... + I_N^2$	72 A^2 (Enabling current paths) 36 A^2 (Signaling current path 31/32) (see derating curve)
Interrupting rating (ohmic load) max.	see load limit curve
Switching capacity min.	100 mW
Mechanical service life	approx. 10^7 cycles
Switching capacity according to IEC 60947-5-1	6 A (DC13, enabling current paths) 5 A (AC15, enabling current paths) 2 A (DC13, signaling current paths) 1.5 A (AC15, signaling current paths)
Output fuse	10 A gL/gG (Enabling current paths) 4 A gL/gG (Low-demand enabling current paths) 6 A gL/gG (Signaling current path)

General data	
Relay type	Electromechanical relay with force-guided contacts in accordance with IEC/EN 61810-3
Nominal operating mode	100% operating factor
Degree of protection	IP20
Min. degree of protection of inst. location	IP54
Mounting type	DIN rail mounting
Mounting position	vertical or horizontal
Assembly instructions	See derating curve
Weight	200.7 g
Type of housing	Polyamide yellow
Air clearances and creepage distances between the power circuits	according to DIN EN 60947-1
Rated insulation voltage	250 V
Rated surge voltage/insulation	See “Insulation coordination”
Degree of pollution	2
Overvoltage category	III
Maximum power dissipation for nominal condition	16.44 W (U_S = 26.4 V, I_L^2 = 72 A^2, $P_{Total\ max}$ = 2.04 W + 14.4 W)
Note on power dissipation	See “Calculating the power dissipation”

Dimensions	Screw connection	Push-in 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	Push-in connection
Conductor cross section solid	0.2 mm^2 ... 2.5 mm^2	0.2 mm^2 ... 1.5 mm^2
Conductor cross section flexible	0.2 mm^2 ... 2.5 mm^2	0.2 mm^2 ... 1.5 mm^2
Conductor cross-section AWG	24 ... 12	24 ... 16
Stripping length	7 mm	8 mm
Screw thread	M3	

Ambient conditions	
Ambient temperature (operation)	-20 °C ... 55 °C
Ambient temperature (storage/transport)	-40 °C ... 70 °C
Max. permissible relative humidity (operation)	75 % (on average, 85% infrequently, non-condensing)
Max. permissible humidity (storage/transport)	75 % (on average, 85% infrequently, non-condensing)
Maximum altitude	≤ 2000 m (Above sea level)
Information on operating height	See the “Using PSR devices at altitudes greater than 2000 m above sea level” section
Shock	15g
Vibration (operation)	10 Hz ... 150 Hz, 2g

Conformance/Approvals	
Approvals	

Safety data	
Stop category according to IEC 60204	0

Safety parameters in accordance with IEC 61508 - high demand	
IEC 61508 - High demand	
Equipment type	Type A
HFT	1
SIL	3
Demand rate	< 12 Months
Proof test interval	240 Months
Duration of use	240 Months

Safety technology parameters according to IEC 61508 - low demand	
IEC 61508 - Low demand	
Equipment type	Type A
HFT	1
SIL	3
PFD_{avg}	1.37×10^{-4}
Proof test interval	66 Months

Safety characteristic data according to EN ISO 13849-1	
Category	4
Performance level	e (5 A DC13; 5 A AC15; 8760 switching cycles/year)
Duration of use	240 Months
For applications in PL e, the required demand rate for the safety function is once per month.	

Safety technology parameters in accordance with EN 62061	
SIL	3

5 Notes regarding documentation

5.1 Identification of warning notes

This symbol indicates hazards that could lead to personal injury.

There are three signal words indicating the severity of a potential injury.

DANGER Indicates a hazard with a high risk level. If this hazardous situation is not avoided, it will result in death or serious injury.

WARNING Indicates a hazard with a medium risk level. If this hazardous situation is not avoided, it could result in death or serious injury.

CAUTION Indicates a hazard with a low risk level. If this hazardous situation is not avoided, it could result in minor or moderate injury.

This symbol together with the **NOTE** signal word warns the reader of actions that might cause property damage or a malfunction.

Here you will find additional information or detailed sources of information.

5.2 Validity

This data sheet is valid for the described product(s) from the hardware/firmware version specified in the technical data.

5.3 Target group

This data sheet is therefore aimed at:

– Qualified personnel who plan and design safety equipment for machines and systems and are familiar with regulations governing occupational safety and accident prevention.
– Qualified personnel who install and operate safety equipment in machines and systems.

Qualified personnel:

Qualified personnel are people who, because of their education, experience, and instruction and their knowledge of relevant standards, regulations, accident prevention, and service conditions, have been authorized by those responsible for the safety of the system to carry out any required operations and who are able to recognize and avoid any possible dangers.

Requirements:

Knowledge of the following topics is required:

– Handling safety components
– Valid EMC regulations
– Valid regulations governing occupational safety and accident prevention

6 Safety regulations and installation notes

WARNING: Death, serious personal injury or damage to equipment

Depending on the application, incorrect handling of the device may pose serious risks for the user or cause damage to equipment.

- Observe all the safety notes and warning instructions provided in this chapter and elsewhere in this document.

Direct/indirect contact

- Protection against direct and indirect contact according to VDE 0100 Part 410 must be ensured for all components connected to the system.

In the event of an error, parasitic voltages must not occur (single-fault tolerance).

Power supply units for 24 V supply

- Only use power supply units with safe isolation and SELV/PELV.
- Protect the 24 V area with a suitable external fuse.
- Make sure that the power supply unit is able to supply **four times** the nominal current of the external fuse, to ensure that it trips in the event of an error.
- Make sure that the output voltage of the voltage supply does not exceed 32 V even in the event of error.

Startup, mounting, and modifications

Startup, mounting, modifications, and upgrades may only be carried out by qualified personnel.

- Before working on the device, disconnect the power.
- Carry out wiring according to the application. Refer to the “Application examples” section for this.

Reliable operation is only ensured if the device is installed in housing protected from dust and humidity.

- Install the device in housing protected from dust and humidity (min. IP54).

Mismatching and polarity reversal of connections

- Take measures to prevent mismatching, polarity reversal, and manipulation of connections.

In operation

During operation, parts of electrical switching devices carry hazardous voltages.

- Protective covers must not be removed when operating electrical switching devices.

For emergency stop applications, automatic startup of the machine can pose serious risks for the user.

- The machine must be prevented from restarting automatically by a higher-level controller.

With the manual, monitored reset device, a machine start may not be triggered in accordance with EN ISO 13849-1.

Inductive loads can lead to welded relay contacts.

- Connect a suitable and effective protective circuit to inductive loads.
- Implement the protective circuit parallel to the load and not parallel to the switch contact.

Magnetic fields can influence the device. The magnetic field strength of the environment must not exceed 30 A/m.

- Do not use the device in the vicinity of strong magnetic fields (e.g., caused by transformers or magnetic iron).

Noise emission may occur when operating relay modules. Wireless reception may be disrupted in residential areas.

The device is a Class A product.

- Observe the requirements for noise emission for electrical and electronic equipment (EN 61000-6-4).
- Implement appropriate precautions against noise emission.

Faulty devices

The devices may be damaged following an error. Correct operation can no longer be ensured.

- Replace any defective devices.

Only the manufacturer or their authorized representative may perform the following activities. Otherwise the warranty is invalidated.

– Repairs to the device
– Opening the housing

6.1 Safety of machines or systems

Draw up and implement a safety concept

The machine or system manufacturer and the operator are responsible for the safety of the machine or system and the application in which the machine or system is used. In order to use the device described in this document, you must have drawn up an appropriate safety concept for your machine or system. This includes a risk assessment in accordance with the directives and standards specified in the EC Declaration of Conformity, as well as other standards.

Risk assessment, validation and function test

- Before using the device, perform a risk assessment on the machine or system.
- Validate your entire safety system.
- Carry out a new validation every time you make a safety-related modification.
- Perform a function test on a regular basis.

Achievable safety integrity

The functional safety is ensured for the device as a single component. However, this does not guarantee functional safety for the entire machine or system. In order to be able to achieve the desired safety level for the entire machine or system, define the safety requirements for the machine or system as well as how to implement them from both a technological and an organizational perspective.

7 Transport, storage, and unpacking

7.1 Transport

The device is delivered in cardboard packaging.

- Observe the instructions on how to handle the package indicated on the packaging.

Suitable transport packaging

- Only transport the device in its original packaging or in packaging suitable for transport.

Technical data and environmental conditions

- For transport, observe the specifications regarding the temperature range, humidity, and air pressure.

See “Technical data” section.

7.2 Storage

Suitable storage location

The storage location must meet the following requirements:

– Dry
– Protected against unauthorized access
– Protected against harmful environmental influences such as UV light

Technical data and environmental conditions

- For storage, observe the specifications regarding the temperature range, humidity, and air pressure.

See “Technical data” section.

7.3 Unpacking

The device is delivered in packaging together with a packing slip that provides installation instructions.

Observing the packing slip

- Read the entire packing slip carefully.
- Retain the packing slip.

Checking the delivery

- Check the delivery for damage and completeness.
- Submit any claims for transport damage immediately.

Scope of supply

Refer to the ordering data for the standard scope of supply for the product.

See “Ordering data” section.

8 Function description

8.1 Two-channel sensor circuit

The connection of the two-channel sensor circuit is equivalent with cross-circuit detection.

i See “Signal generator connection versions” section.

8.2 Automatic start

The device starts automatically after the sensor circuit has been closed.

i See “Start and feedback circuit connection versions” section.

i See section “Function and time diagrams”.

8.3 Safe shutdown

When the sensor circuit opens, the enabling current paths open without delay.

When the enabling current paths are open, the device is in the safe state.

The signaling current path closes.

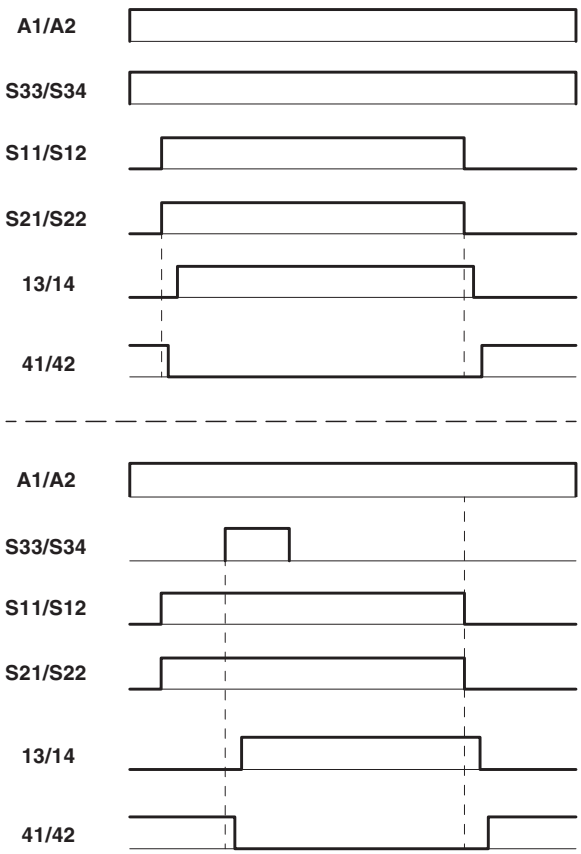
9 Function and time diagrams

Key:

A1/A2	Power supply
S33/S34	Automatic start
S11/S12	Sensor inputs
S21/S22	Sensor inputs
13/14	Enabling current path, delayed
41/42	Signaling current path

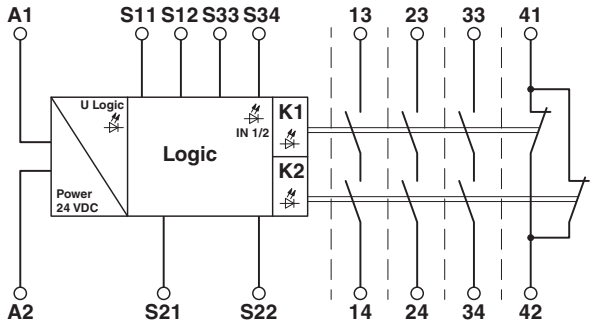
9.1 Time diagram for automatic start

Figure 1 Time diagram for automatic start



10 Block diagram

Figure 2 Block diagram



Key:

A1/A2	Safety relay input voltage
S11/S12	Input sensor circuit (channel 1)
S21/S22	Input sensor circuit (channel 2)
S33/S34	Automatic 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

10.1 Insulation coordination

	Housing	A1/A2, Logic	13/14	23/24	33/34	41/42
Housing	-	4 kV BI	4 kV BI	4 kV BI	4 kV BI	4 kV BI
A1/A2, Logic	-	-	6 kV ST	6 kV ST	6 kV ST	6 kV ST
13/14	-	-	-	4 kV BI	4 kV BI	4 kV BI
23/24	-	-	-	-	4 kV BI	4 kV BI
33/34	-	-	-	-	-	4 kV BI
41/42	-	-	-	-	-	-

Key:

BI	Basic insulation
ST	Safe isolation

Basic insulation

(rated surge voltage of 4 kV)

A mixture of SELV and PELV is strictly prohibited. Only switch 250 V AC at one of the enable contacts if the adjacent contact/enabling current path carries the same potential.

Safe isolation/reinforced insulation

(rated surge voltage of 6 kV)

Reinforced insulation (e.g., thanks to greater air clearances and creepage distances between conductive paths) is designed for one overvoltage category higher than basic insulation. This means that SELV circuits of U ≤ 25 V AC or U ≤ 60 V DC and circuits with higher voltages can be mixed.

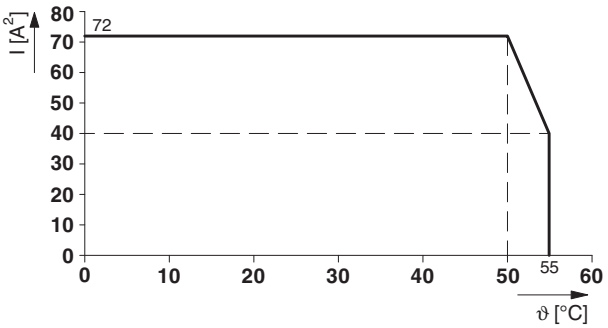
11 Derating

11.1 Horizontal mounting position

The derating curve applies for the following conditions:

– Devices mounted next to each other without spacing
– at U_S up to max. 26.4 V DC
– $I_{max}^2 = I_1^2 + I_2^2 + I_3^2$

Figure 3 Derating curve - horizontal mounting position, without spacing

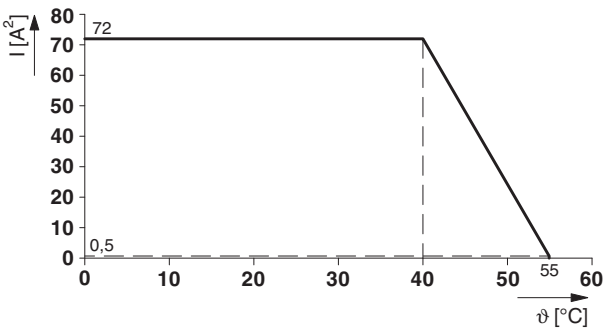


11.2 Vertical mounting position

The derating curve applies for the following conditions:

– Devices mounted next to each other without spacing
– at U_S up to max. 26.4 V DC
– $I_{max}^2 = I_1^2 + I_2^2 + I_3^2$

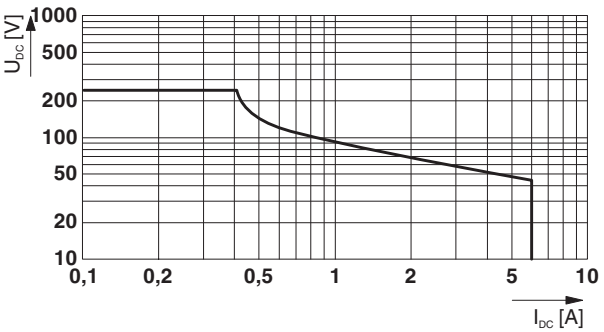
Figure 4 Derating curve - vertical mounting position, without spacing



12 Load limit curve

12.1 Ohmic load

Figure 5 Relay load limit curve – resistive load



13 Electrical service life

Figure 6 Number of switching cycles for AC-1

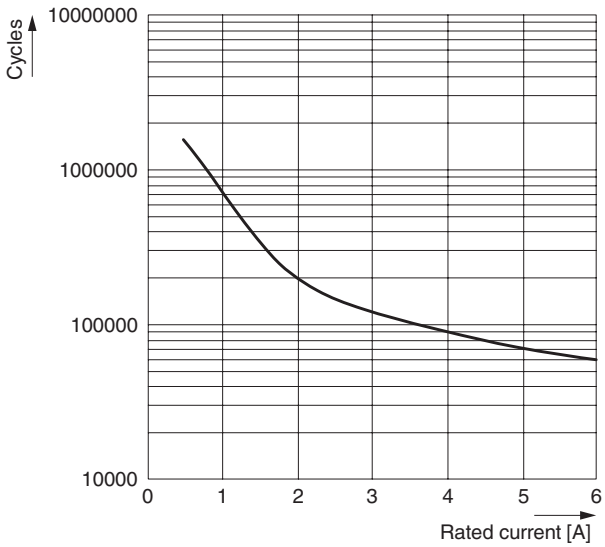


Figure 7 Number of switching cycles for AC-15

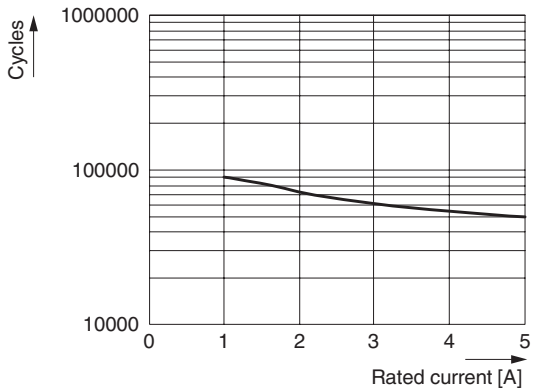


Figure 8 Number of switching cycles for DC-1

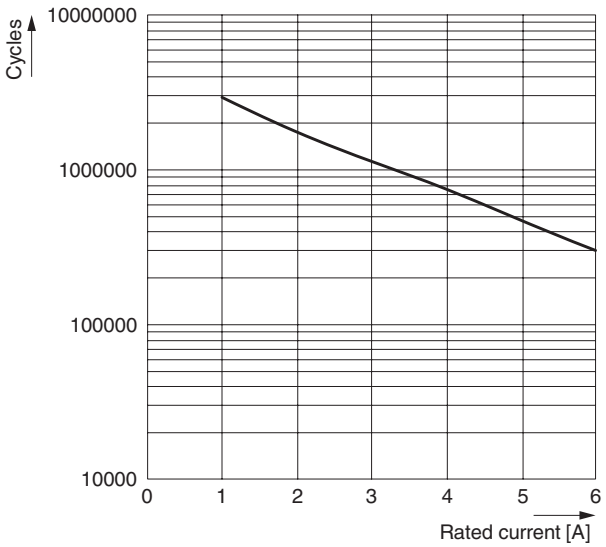
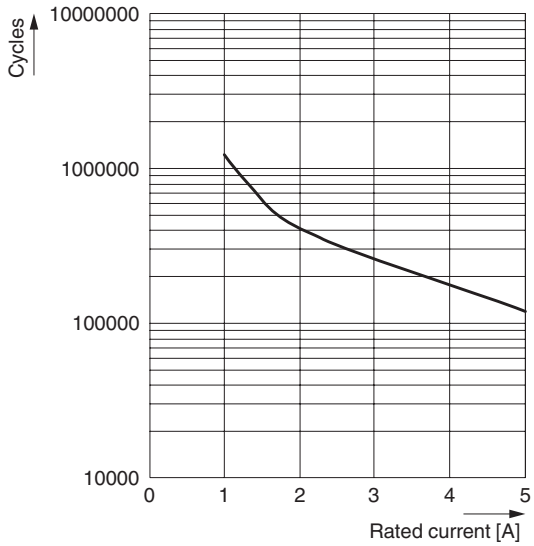


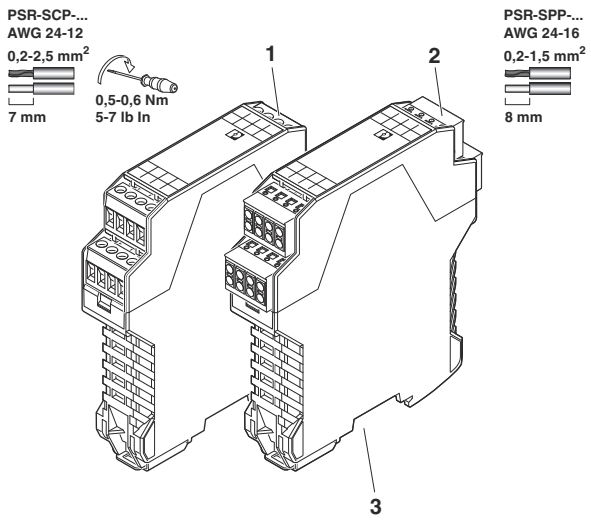
Figure 9 Number of switching cycles for DC-13



14 Operating and indication elements

14.1 Connection versions

Figure 10 Connection versions

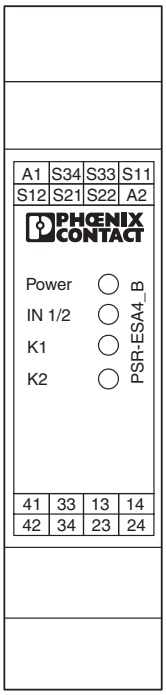


1 COMBICON plug-in screw terminal block
2 Pluggable COMBICON Push-in terminal block
3 Metal lock for fixing to DIN rail

See section "Optional terminal coding".

The year the device was constructed can be found underneath the CE designation on the housing.
XX/XX = Calendar week / year

14.2 Connection assignment



A1/A2	24 V DC power supply
S11/S12	Input sensor circuit (channel 1)
S21/S22	Input sensor circuit (channel 2)
S33/S34	Start circuit for autostart
Power	Power, LED (green)
IN 1/2	Status indicator for the inputs, LED (green)
K1	Status indicator safety circuit, LED (green)
K2	Status indicator safety circuit, LED (green)
13/14	
23/24	Enabling current path, undelayed
33/34	
41/42	Signaling current path

14.3 Optional terminal coding

The device connection terminal blocks are **not** coded as standard.

The optional coding accessories can provide you with increased safety against connection mismatching and reverse polarity.
See section “Ordering data”.

If you do not use the coding accessories, ensure that alternative validation measures are taken.

Coding system

The terminal blocks can be coded by using coding sections and coding profiles.

Coding sections are plugged onto the terminal block header in the device housing.

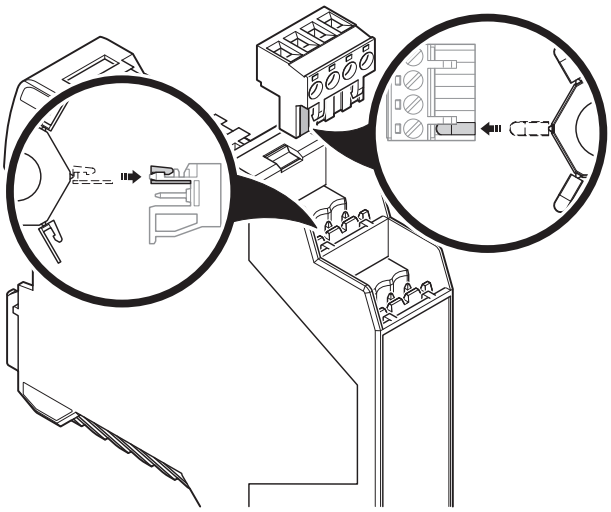
Coding profiles are plugged into the groove of the pluggable terminal block.

Various combinations can be used to create a coding system for the device terminal blocks.

Attaching coding elements

1. Push a coding section onto the terminal block header in the device housing.
   Remove the coding section from the coding star.
2. Push a coding profile into the groove of the terminal block.
   Remove the coding profile from the coding star.

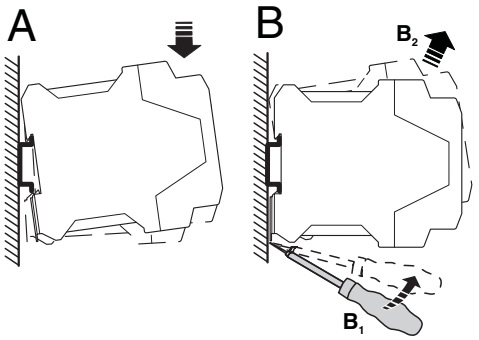
Figure 11 Attach coding elements



15 Mounting and removing

- Mount the device on a 35 mm DIN rail according to EN 60715.
- To remove the device, use a screwdriver to release the snap-on foot.

Figure 12 Mounting and removing



16 Wiring

- Connect the cables to the connection terminal blocks using a screwdriver.

Figure 13 Connection of the cables

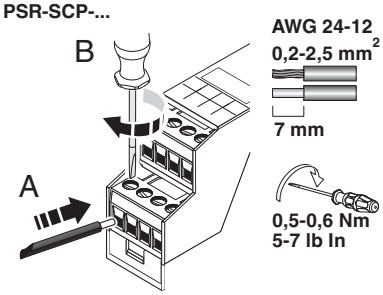
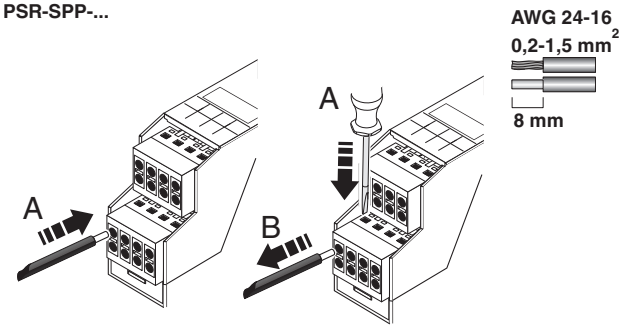


Figure 14 Connecting the cables for PSR-SPP-... (Spring-cage terminal block)



It is recommended that ferrules are used to connect stranded cables.

For compliance with UL approval, use copper wire that is approved up to 60°C/75°C.

16.1 Signal generator connection versions

- Connect suitable signal generators to S12/S22.

Figure 15 Two-channel connection with cross-circuit detection

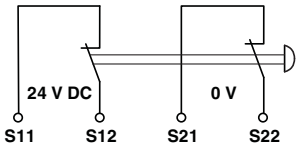
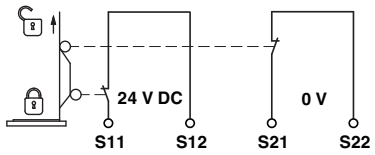


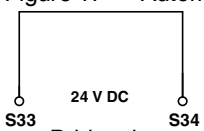
Figure 16 Two-channel safety door circuit. Two N/C contacts.



16.2 Start and feedback circuit connection variants

Automatic start

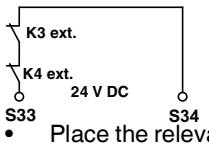
Figure 17 Automatic activation



- Bridge the contacts S33/S34.

Start and feedback circuit

Figure 18 Automatic activation with monitored contact extension



- Place the relevant N/C contact in path S33/S34 to monitor external contactors or extension devices with force-guided contacts.

K3/K4 Force-guided contactors

17 Startup

- Apply the rated control circuit supply voltage (24 V DC) at terminal blocks A1/A2.

The Power LED lights up.

- Close contacts S11/S12 and S21/S22.

⇒ The IN 1/2 LED lights up.

See “Signal generator connection versions” section.

Automatic start

The enabling current paths 13/14, 23/24 and 33/34 close.

Signaling current path 41/42 opens.

The K1 and K2 LEDs light up.

18 Calculating the power dissipation

The total power dissipation of the safety relay is based on the input power dissipation and the contact power dissipation for the same and for different load currents.

Input power dissipation

$P_{Input} = U_B^2 / (U_S/I_S)$

Contact power dissipation

$P_{Contact} = (I_{L1}^2 + I_{L2}^2 + ... + I_{Ln}^2) \bullet 200\ m\Omega$

Total power dissipation

$P_{Total} = P_{Input} + P_{Contact}$

$P_{Total} = U_B^2 / (U_S/I_S) + (I_{L1}^2 + I_{L2}^2 + ... + I_{Ln}^2) \bullet 200\ m\Omega$

Key:

P	Power dissipation in mW
U_B	Applied operating voltage
U_S	Rated control circuit supply voltage
I_S	Rated control supply current
I_L	Contact load current

19 Function test/proof test

To verify the device function, proceed as follows:

- Demand the safety function by actuating the corresponding safety equipment.
- Check whether the safety function was executed correctly by switching the device on again.

If the device does not switch on again, the proof test failed.

WARNING: Loss of functional safety due to malfunction.

If the proof test contains errors, the device no longer functions correctly.

- Replace the device.

20 Diagnostics

Plausibility errors are deleted when the supply voltage is switched off (power down reset).

In the event of an error or fault that is not listed, please contact Phoenix Contact.

20.1 General states

Key:

○ LED OFF
● LED ON

LED				State	Notes
Power	IN 1/2	K1	K2		
●	○	○	○	No relays are activated. The sensor circuit is inactive.	-
				Only channel 1 or channel 2 of the sensor circuit is active.	-
●	●	○	○	The sensor circuit is active. Relays K1 and K2 are ready to start and await reset/start command (S34).	Possible error see error messages
●	●	●	●	The sensor circuit is active. All relays are picked up.	-

20.2 Error messages

Key:

○ LED OFF
● LED ON

LED				State	Possible cause	Corrective
Power	IN 1/2	K1	K2			
○	○	○	○	The sensor circuit is actively controlled, but no input LEDs are lit up.	Possible cross-circuit in sensor circuit S11/S12 and S21/S22.	Switch off the operating voltage and rectify the cross-circuit. Then perform a function test.
				The sensor circuits are active.	No supply voltage or undervoltage at A1/A2.	Check the supply voltage.
●	●	○	○	The sensor circuit is active. The reset/start circuit (S34) is/was activated. The safety circuit (K1 and K2) is not picking up.	External error: the readback contact (external actuator) is open in the reset circuit. Internal error: 1. The diagnostic contact is not working correctly. 2. An N/O contact is welded.	External error: check the actuator. Internal error: perform a power down reset with subsequent function test. **If the error occurs again after the function test, replace the device.**
●	●	○	●	The sensor circuit is active. The reset/start circuit (S34) is/was activated. The safety circuit (K1 and K2) is not picking up.	Possible short circuit in the sensor circuit between S21 and S22.	Switch off the operating voltage and remove the short circuit. Then perform a function test.
				The sensor circuit is active. The reset/start circuit (S34) is/was activated. The safety circuit (K1) is not picking up.	External error: both channels of the sensor circuit were not opened or requested. Internal error: diagnostics active.	External error: check whether the second channel opens when the sensor is requested. Internal error: perform a power down reset with subsequent function test. **If the error occurs again after the function test, replace the device.**
●	●	●	○	The sensor circuit is active. The reset/start circuit (S34) is/was activated. The safety circuit (K1 and K2) is not picking up.	Possible short circuit in the sensor circuit between S11 and S12.	Switch off the operating voltage and remove the short circuit. Then perform a function test.
				The sensor circuit is active. The reset/start circuit (S34) is/was activated. The safety circuit (K2) is not picking up.	External error: both channels of the sensor circuit were not opened or requested. Internal error: diagnostics active.	External error: check whether the second channel opens when the sensor is requested. Internal error: perform a power down reset with subsequent function test. **If the error occurs again after the function test, replace the device.**

21 Application examples

21.1 Two-channel emergency stop monitoring

Application description:

- Automatic start
- Cross circuiting detection
- Monitoring of external, force-guided contactors

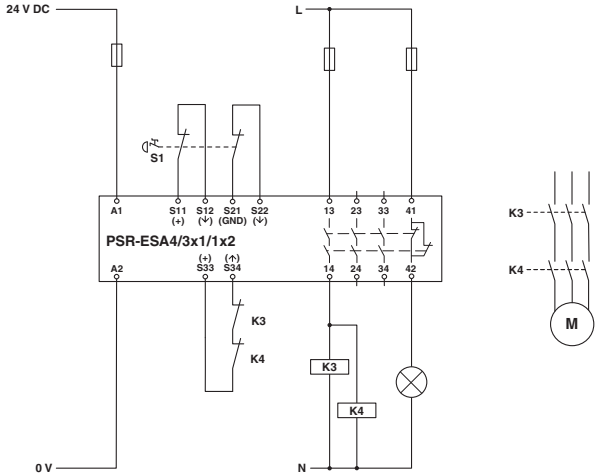
Notes:

Cross-circuits in the cable installation can be ruled out in the same electrical installation space or through mechanically protected cable installation.

Achievable safety integrity:

- Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN 62061)

Figure 19 Two-channel emergency stop monitoring



Key:

S1	Emergency stop button
K3/K4	Force-guided contactors

21.2 Two-channel safety door monitoring

Application description:

- Automatic start
- Cross circuiting detection
- Monitoring of external, force-guided contactors

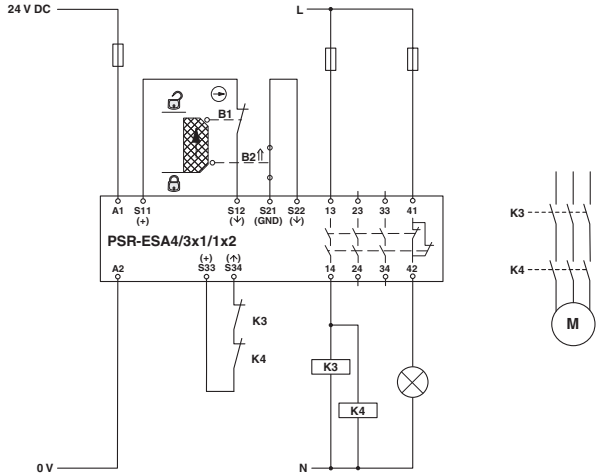
Notes:

Cross-circuits in the cable installation can be ruled out in the same electrical installation space or through mechanically protected cable installation.

Achievable safety integrity:

- Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN 62061)

Figure 20 Two-channel safety door monitoring



Key:

B1/B2	Mechanical safety door switches
K3/K4	Force-guided contactors

22 Device replacement, device defect, and repair

22.1 Device replacement

The device can be replaced, if necessary.

If you need to replace the device, proceed as described in the following section:

– Mounting and removal
– Wiring

Observe the device type and version

The new device must meet the following requirements:

– Same device type
– Same or later version

22.2 Device defect and repair

Do not open the housing

Repairs may only be carried out by Phoenix Contact. Do not open the housing. If the housing is opened, the function of the device can no longer be ensured.

Faulty devices

- Please contact Phoenix Contact.

23 Maintenance, decommissioning, and disposal

23.1 Maintenance

The device requires no maintenance during the permissible duration of use. Refer to the technical data for the duration of use of the device.

If necessary, carry out proof tests within the specified proof test interval.

See “Technical data” section.

Depending on the application and connected I/O devices, you should test the function of the I/O devices and the safety chain regularly.

Observe the relevant manufacturer specifications for carrying out maintenance on connected I/O devices.

23.2 Decommissioning and disposal

Carry out decommissioning according to the requirements of the machine or system manufacturer.

When decommissioning the system or parts of the system, ensure the following for the devices used.

The device continues to be used only as intended:

- Observe the storage and transport requirements.

See “Transport, storage, and unpacking” section.

The device is not used any more:

The device contains valuable recyclable materials, which should be utilized.

Device disposal

- Do not dispose of the device with household waste; it should instead be disposed of in accordance with the currently applicable national regulations.

Packaging disposal

- Dispose of packaging materials that are no longer needed (cardboard packaging, paper, bubble wrap sheets, pillow bags, etc.) with household waste in accordance with the currently applicable national regulations.

24 Attachment

24.1 Using PSR devices at altitudes greater than 2000 m above sea level

The following section describes the special conditions for using PSR devices at altitudes greater than 2000 m above sea level. Observe the relevant device-specific data (technical data, derating, etc.) according to the product documentation for the individual device.

Using the device at altitudes **greater than 2000 m above sea level up to max. 4500 m above sea level** is possible under the following conditions:

1. Limit the rated control circuit supply voltage (U_S) in accordance with the table below. Observe the technical data for the device.

U_S according to the technical data for the device	U_S when used at altitudes greater than 2000 m above sea level
< 150 V AC/DC	U_S according to the technical data for the device still valid
> 150 V AC/DC	Limited to max. 150 V AC/DC

2. Limit the maximum switching voltage in accordance with the table below. Observe the technical data for the device.

Max. switching voltage according to the technical data for the device	Max. switching voltage when used at altitudes greater than 2000 m above sea level
< 150 V AC/DC	Max. switching voltage according to the technical data for the device still valid
> 150 V AC/DC	Limited to max. 150 V AC/DC

3. Reduce the maximum ambient temperature for operation by the corresponding factor in accordance with the table below.
4. If derating is specified, offset all the points of the derating curve by the corresponding factor in accordance with the table below.

Altitude above sea level	Temperature derating factor
2000 m	1
2500 m	0.953
3000 m	0.906
3500 m	0.859
4000 m	0.813
4500 m	0.766

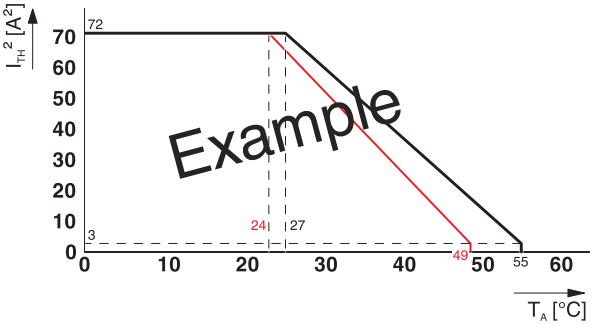
Example calculation for 3000 m

The following calculation and the illustrated derating curve are provided as examples. Perform the actual calculation and offset the derating curve for the device used according to the technical data and the “Derating” section.

27 °C • 0.906 ≈ 24 °C

55 °C • 0.906 ≈ 49 °C

Figure 21 Example of a suspended derating curve (red)



24.2 Revision history

Version	Date	Contents
04	2022-05-02	Safety regulations and installation notes section revised. Technical data adapted, AC content removed; Derating curve changed; Diagnostics section revised. Applications section revised. New sections added: Notes on documentation, Electrical service life, Transport, storage, and unpacking, Terminal block coding, Function test / proof test, Device replacement, device defects, and repairs, Maintenance, decommissioning, and disposal.