PSR-...-24DC/URM4/5X1/2X2/B

Safety relay for contact extension

Data sheet
110753_en_02

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1 Description

Intended Use

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

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

Possible signal generators

– Safety relay

Contact switching type

– 5 undelayed enabling current paths
– 1 non-delayed signaling current path
– 1 undelayed confirmation current path

The enabling current paths, the confirmation current path, and the signaling current path drop out without delay as per stop category 0 in accordance with EN 60204-1.

Control

– 1- or 2-channel

Achievable safety integrity

– Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN IEC 62061) in conjunction with an appropriate evaluation device

Additional features

– Reinforced insulation
– Optional pluggable screw or Push-in terminal blocks

Approvals

Observe these notes

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.com/products.

This document is valid for the products listed in the “Ordering data” chapter.
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.
1-channel or 2-channel contact extension, 5 N/O contacts, 1 N/C contact, 1 confirmation current path, together with basic device up to Cat. 4 PL e in accordance with EN ISO 13849 safe isolation, width: 22.5 mm, pluggable screw terminal block	PSR-SCP- 24DC/URM4/5X1/2X2/B	1442344	1
1- or 2-channel contact extension, 5 N/O contacts, 1 N/C contact, 1 confirmation current path, together with basic device up to Cat. 4 PL e in accordance with EN ISO 13849 safe isolation, width: 22.5 mm, pluggable Push-in terminal block	PSR-SPP- 24DC/URM4/5X1/2X2/B	1442342	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
Crimping pliers, for ferrules without insulating collar according to DIN 46228 Part 1 and ferrules with insulating collar according to DIN 46228 Part 4, 0.25 mm² ... 6.0 mm², lateral entry, trapezoidal crimp	CRIMPFOX 6	1212034	1

4 Technical data

Hardware/firmware version	
HW/FW	≥ 00/--
The technical data and safety characteristics are valid as of the specified HW/FW version.	

Digital inputs: A1	
Number of inputs	1
Description of the input	safety-related
Input voltage range "1" signal	19.2 V ... 26.4 V
Current consumption	typ. 75 mA
Max. permissible overall conductor resistance	25 Ω
Protective circuit	Suppressor diode

Relay outputs: Enabling current paths (23/24 ... 63/64)	
Number of outputs	5
Output description	2 N/O contacts each in series, safety-related, floating
Contact material	$AgSnO_2$
Switching voltage (see section “Relay data”)	min. 10 V max. 250 V AC/DC
Limiting continuous current (see section “Relay data”)	6 A (observe derating)
Inrush current	min. 10 mA max. 20 A (≤ 100 ms)
Sq. Total current $I_{TH}^2 = I_1^2 + I_2^2 + ... + I_N^2$	72 A^2 (observe derating)
Switching capacity	min. 100 mW
Switching frequency	max. 1 Hz
Service life electrical	See section “Electrical service life”
Mechanical service life	10x 10^6 cycles
Switching capacity	3 A (AC15) 5 A (DC13)
Output fuse	10 A gL/gG 4 A gL/gG (for low-demand applications)

Relay outputs: Signaling current path (71/72)	
Number of outputs	1
Output description	2 N/C contacts parallel, non-safety-related, floating
Contact material	$AgSnO_2$
Switching voltage	min. 5 V AC/DC max. 250 V AC/DC
Limiting continuous current	6 A
Inrush current	min. 10 mA max. 6 A
Sq. Total current $I_{TH}^2 = I_1^2 + I_2^2 + ... + I_N^2$	36 A^2
Switching capacity	min. 50 mW
Switching frequency	max. 1 Hz
Service life electrical	See section “Electrical service life”
Mechanical service life	10x 10^6 cycles
Switching capacity	1.5 A (AC15) 5 A (DC13)
Output fuse	6 A (gL/gG)

Relay outputs: Confirmation current path (11/12)	
Number of outputs	1
Output description	Diagnostic contact, 2 NC in series, floating
Contact material	$AgSnO_2$
Switching voltage	min. 10 V max. 250 V AC/DC
Limiting continuous current	6 A
Inrush current	min. 10 mA max. 6 A
Sq. Total current $I_{TH}^2 = I_1^2 + I_2^2 + ... + I_N^2$	36 A^2
Switching capacity	min. 100 mW
Switching frequency	max. 0.5 Hz
Service life electrical	See section “Electrical service life”
Mechanical service life	10x 10^6 cycles
Switching capacity	1.5 A (AC15) 3 A (DC13)
Output fuse	10 A (gL/gG)

Times	
Typical starting time with U_s	< 25 ms (with Us / when controlled via A1)
Typical release time with U_s	< 20 ms (with Us / when controlled via A1)
Recovery time	< 1 s

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 note	See derating curve
Type of housing	PA zinc yellow (RAL 1018)
Operating voltage display	1 x LED (green)
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	16.6 W (U_S = 26.4 V, I_L^2 = 72 A², $P_{Total\ max}$ = 2.2 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 rigid	0.2 mm² ... 2.5 mm²	0.2 mm² ... 1.5 mm²
Conductor cross section flexible	0.2 mm² ... 2.5 mm²	0.2 mm² ... 1.5 mm²
Conductor cross-section AWG	24 ... 12	24 ... 16
Conductor cross section flexible, with ferrule without plastic sleeve	-	0.25 mm² ... 1.5 mm² (only together with CRIMPFOX 6)
Conductor cross section flexible, with ferrule with plastic sleeve	-	0.25 mm² ... 1.5 mm² (only together with CRIMPFOX 6)
Stripping length	7 mm	8 mm
Screw thread	M3	-
Tightening torque	0.5 Nm ... 0.6 Nm	-

Ambient conditions	
Ambient temperature (operation)	-20 °C ... 55 °C (observe derating)
Ambient temperature (storage/transport)	-40 °C ... 70 °C
Max. permissible relative humidity (operation)	75 %
Max. permissible humidity (storage/transport)	75 %
Maximum altitude	max. 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, amplitude 0.15 mm, 2g

Conformance/Approvals	
CE	CE-compliant
The complete EU declaration of conformity is available on the Internet at phoenixcontact.com/products.	
Approvals	

Safety data	
Stop category according to IEC 60204	0

Safety parameters in accordance to IEC 61508 - high demand	
Equipment type	Type A
HFT	1
SIL	3 (In conjunction with suitable evaluating device)
PFH_D	1.00×10^{-9} (3 A DC13; 3 A AC15; 8760 switching cycles/ year)
Demand rate	< 12 Months
Proof test interval	240 Months
Mission time	240 Months
The information is only valid if the safety function is requested at least once a year and the confirmation current path is read back using a suitable evaluation device.	

Safety parameters according to IEC 61508 - low demand	
Equipment type	Type A
HFT	1
SIL	3 (In conjunction with suitable evaluating device)
PFD_{avg}	1.48×10^{-4}
Proof test interval	80 Months

Safety parameters according to EN ISO 13849-1	
Category	4 (In conjunction with suitable evaluating device)
Performance level	e (In conjunction with suitable evaluating device)
Mission time	240 Months
For applications in PL e, the required demand rate for the safety function is once per month.	

Safety parameters according to EN IEC 62061	
SIL	3 (In conjunction with suitable evaluating device)
For applications in SIL 3 the required demand rate for the safety function is once per month.	

5 Interface type (ZVEI classification)

Relay outputs : Enabling current paths 23/24 ... 63/64				
Source/destination	**Interface type**	**Additional measure**	**Source/destination**	**Suitable interface type**
Source	A	M	Destination	A
Source	C0	M	Destination	-

Interface type A - Source			
Parameter	**min.**	**typ.**	**max.**
Switching current I_i	10 mA	-	6 A
Switching voltage U_i	10 V	-	250 V AC/DC
Internal resistance R_i (in the switched state)	Load ≥ 10 mA ≤ 200 mΩ	-	Load ≥ 10 mA ≤ 133.4 Ω
Load capacitance C_L	-	-	see switching capacity
Inductive load L_L	-	-	see switching capacity
Electrical isolation	yes		
Additional measure M	- The outputs are not types in accordance with IEC 61131-2.		

Interface type C0 - Source			
Parameter	**min.**	**typ.**	**max.**
Test pulse duration t_i	-	-	-
Test pulse interval T	-	-	-
Nominal current I_N	-	-	6 A
Load capacitance C_L	-	-	see switching capacity
Inductive load L_L	-	-	see switching capacity
Additional measure M	- The outputs are not types in accordance with IEC 61131-2. - No test pulses are emitted at the output.		

Relay outputs : Signaling current path 71/72				
Source/destination	**Interface type**	**Additional measure**	**Source/destination**	**Suitable interface type**
Source	A	M	Destination	A
Source	C0	M	Destination	-

Interface type A - Source			
Parameter	**min.**	**typ.**	**max.**
Switching current I_i	10 mA	-	6 A
Switching voltage U_i	5 V	-	250 V AC
Internal resistance R_i (in the switched state)	Load ≥ 1 A ≤ 100 mΩ	-	-
Load capacitance C_L	-	-	see switching capacity
Inductive load L_L	-	-	see switching capacity
Electrical isolation	yes		
Additional measure M	- The outputs are not types in accordance with IEC 61131-2.		

Interface type C0 - Source			
Parameter	**min.**	**typ.**	**max.**
Test pulse duration t_i	-	-	-
Test pulse interval T	-	-	-
Nominal current I_N	-	-	6 A
Load capacitance C_L	-	-	see switching capacity
Inductive load L_L	-	-	see switching capacity
Additional measure M	- The outputs are not types in accordance with IEC 61131-2. - No test pulses are emitted at the output.		

Relay outputs : Confirmation current path 11/12				
Source/destination	**Interface type**	**Additional measure**	**Source/destination**	**Suitable interface type**
Source	A	M	Destination	A
Source	C0	M	Destination	-

Interface type A - Source			
Parameter	**min.**	**typ.**	**max.**
Switching current I_i	10 mA	-	6 A
Switching voltage U_i	10 V	-	250 V AC
Internal resistance R_i (in the switched state)	Load ≥ 1 A ≤ 100 mΩ	-	Load ≥ 10 mA ≤ 133.4 Ω
Load capacitance C_L	-	-	see switching capacity
Inductive load L_L	-	-	see switching capacity
Electrical isolation	yes		
Additional measure M	- The outputs are not types in accordance with IEC 61131-2.		

Interface type C0 - Source			
Parameter	**min.**	**typ.**	**max.**
Test pulse duration t_i	-	-	-
Test pulse interval T	-	-	-
Nominal current I_N	-	-	6 A
Load capacitance C_L	-	-	see switching capacity
Inductive load L_L	-	-	see switching capacity
Additional measure M	- The outputs are not types in accordance with IEC 61131-2. - No test pulses are emitted at the output.		

6 Notes regarding documentation

6.1 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.

6.2 Validity

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

6.3 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

7 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.
- Ensure that the device is disconnected from the power supply.
- 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).

EMC notes

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

Replacing the device

- Dispose of the device in the following circumstances:

– At the end of its mission time

See “Technical data” section.

– At the end of its electrical service life

See section “Electrical service life”.

– In the event of a fault

7.1 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.

8 Transport, storage, and unpacking

8.1 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 humidity and air pressure specifications, and the temperature range.
  See Section “Technical data”.

8.2 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 humidity and air pressure specifications, and the temperature range.
  See Section “Technical data”.

8.3 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 Section “Ordering data”.

9 Function description

9.1 Contact extension

The device provides additional output contacts for safe shutdown for a suitable basic device.

9.2 Single-channel or two-channel wiring

The external enable signal of the basic device is connected to A1.

The external enable signal of the basic device can also be optionally connected to A2.

9.3 Automatic start

The module is started automatically via digital input A1 with the application of 24 V (-20%/+10%).

The enabling current paths close.

Confirmation current path 11/12 and signaling current path 71/72 open.

9.4 Safe shutdown

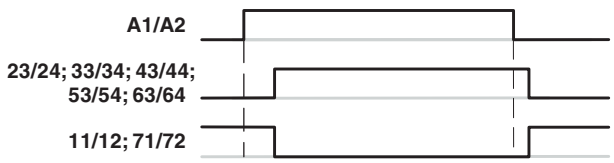
The safe state has been reached, if at least one of the relays K1 or K2 has switched off.

The enabling current paths open.

The confirmation current path and signaling current path close.

10 Function and time diagrams

Figure 1 Time diagram

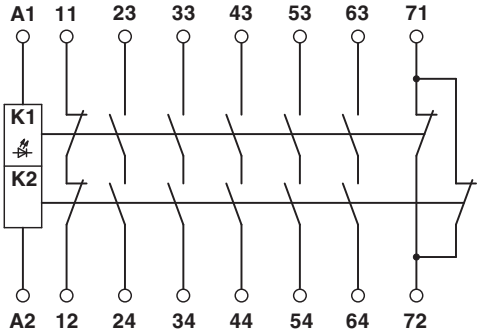


Key:

A1/A2	Control
23/24, 33/34, 43/44, 53/54, 63/64	Enabling current paths
11/12	Confirmation current path
71/72	Signaling current path

11 Block diagram

Figure 2 Block diagram



Key:

A1	24 V DC control
A2	0 V control
11/12	Confirmation current path, undelayed
23/24 ... 63/64	Undelayed enabling current paths
71/72	Signaling current path, undelayed

11.1 Insulation coordination

	A1/A2	11/12	23/24	33/34	43/44	53/54	63/64	71/72	Housing
A1/A2	-	4 kV BI	4 kV BI	6 kV ST	6 kV ST	6 kV ST	6 kV ST	4 kV BI	4 kV BI
11/12	-	-	4 kV BI	6 kV ST	6 kV ST	6 kV ST	6 kV ST	4 kV BI	4 kV BI
23/24	-	-	-	6 kV ST	6 kV ST	6 kV ST	6 kV ST	4 kV BI	4 kV BI
33/34	-	-	-	-	4 kV BI	4 kV BI	4 kV BI	6 kV ST	4 kV BI
43/44	-	-	-	-	-	4 kV BI	4 kV BI	6 kV ST	4 kV BI
53/54	-	-	-	-	-	-	4 kV BI	6 kV ST	4 kV BI
63/64	-	-	-	-	-	-	-	6 kV ST	4 kV BI
71/72	-	-	-	-	-	-	-	-	4 kV BI
Housing	-	-	-	-	-	-	-	-	-

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 $U \leq 25$ V AC or $U \leq 60$ V DC and circuits with higher voltages can be mixed.

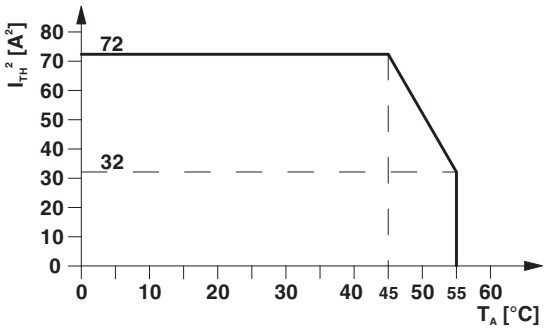
12 Derating

12.1 Vertical or horizontal mounting position

The derating curve applies for the following conditions:

– Mounting on a vertical or horizontal DIN rail
– Devices mounted next to each other without spacing
– at U_S up to max. 26.4 V DC
– $I_{max}^2 = I_1^2 + I_2^2 + I_3^2 + ...$

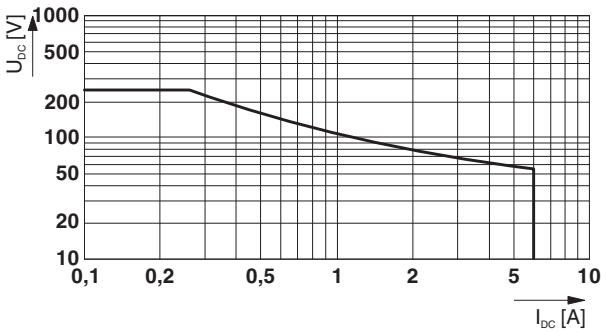
Figure 3 Derating curve - vertical or horizontal mounting position, without spacing



13 Relay data

13.1 Load limit curve at DC load

Figure 4 Relay load limit curve – resistive load



13.2 Electrical service life

Contact	AC-15	AC-1	DC-13
NO	3 A / 128000	6 A / 130000	3 A / 190000

Behavior of the electrical service life

The service life table indicates the number of switching cycles after which wear-related failures must be expected.

They depend on the utilization category and the expected load current.

WARNING: Loss of functional safety

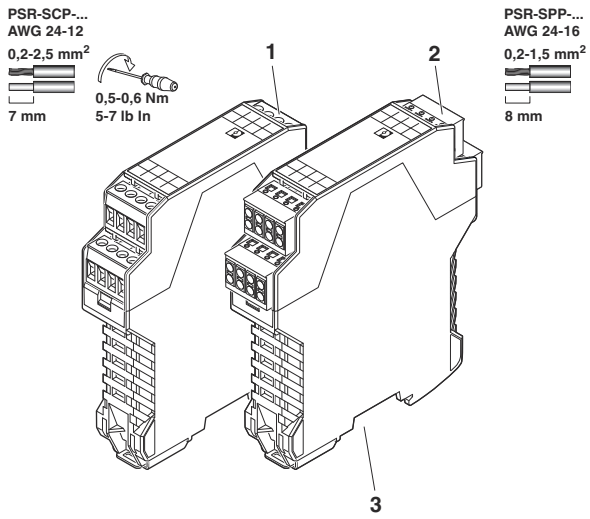
At the end of the electrical service life, there is an increased risk of loss of functional safety.

- Replace the device in good time before the end of the electrical service life.

14 Operating and indication elements

14.1 Connection versions

Figure 5 Connection versions



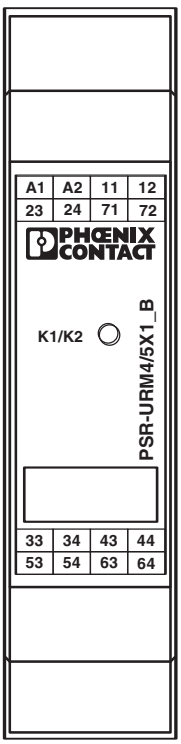
1 COMBICON plug-in screw terminal block
2 Pluggable COMBICON Push-in terminal block
3 Metal lock for fixing to DIN rail

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	24 V DC control
A2	0 V control
11/12	Confirmation current path, undelayed
23/24	Enabling current path, undelayed
71/72	Signaling current path, undelayed
K1/K2	Status indicator safety circuit, LED (green)
33/34	Undelayed enabling current paths
43/44	
53/54	
63/64	

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.

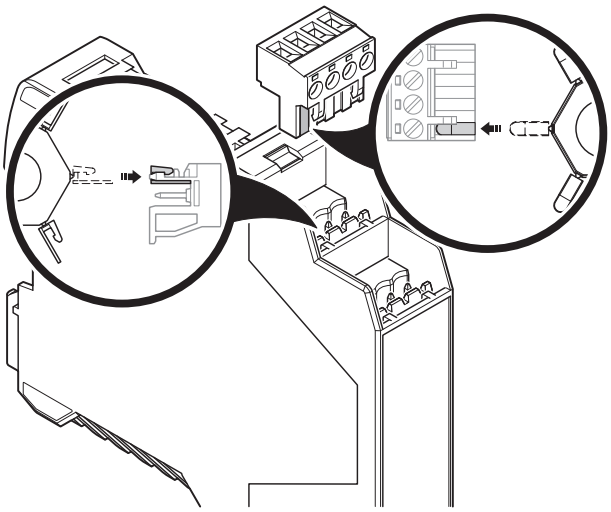
Coding profiles are plugged into the groove of the pluggable terminal block.

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.

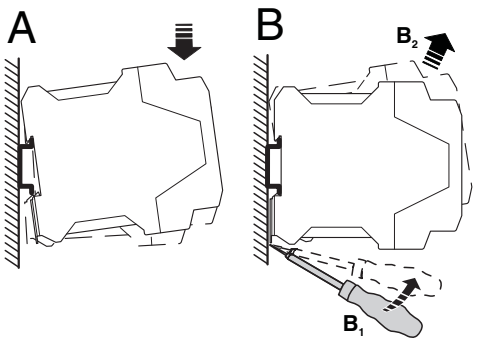
Figure 6 Attach coding elements



15 Mounting and removing

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

Figure 7 Mounting and removing



16 Wiring

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

Figure 8 Connecting the cables for PSR-SCP-... (Screw terminal block)

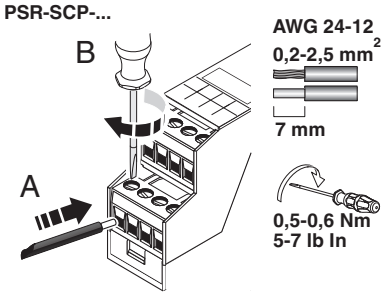
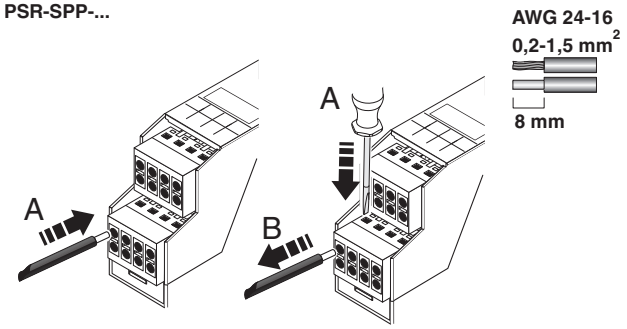


Figure 9 Connecting the cables for PSR-SPP-... (Push-in terminal block)



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

Use the CRIMPFOX 6 crimping tool from Phoenix Contact.

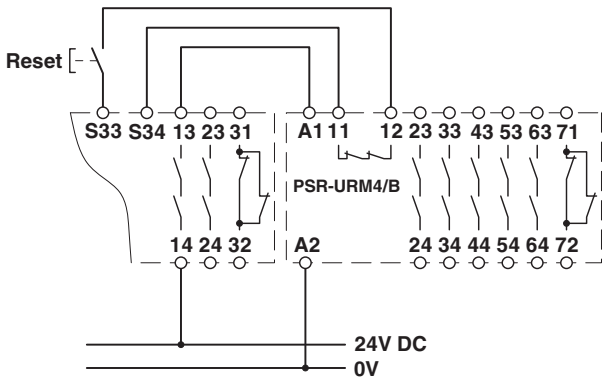
The tool enables the reliable processing of ferrules and easy removal of conductors with ferrules from the connection terminal blocks.

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

16.1 Basic device connection

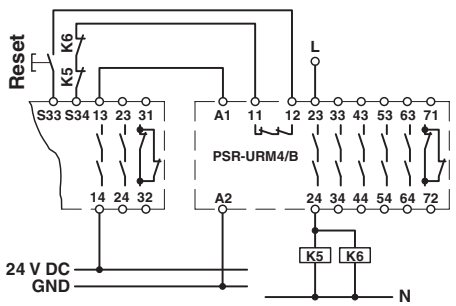
- Connect the basic device in accordance with the figure.
- Install confirmation current path 11/12 in the feedback circuit of the basic device.

Figure 10 Single-channel connection with integration of the confirmation current path



- Place the relevant N/C contact in the path from 11/12 to the basic device to monitor external contactors or extension devices with force-guided contacts.

Figure 11 Single-channel connection with integration of the confirmation current path and externally monitored contacts



For two-channel operation, also connect the basic device to A2 of the contact extension.

17 Startup

- Install confirmation current path 11/12 in the feedback circuit of the basic device.
- Provide the external enable signal (24 V DC) at terminal block A1.

The K1/K2 LED lights up.

The enabling current paths 23/24, 33/34, 43/44, 53/54, and 63/64 close.

Confirmation current path 11/12 and signaling current path 71/72 open.

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

With the same load currents:

$P_{Contact} = n \bullet I_L^2 \bullet 200\ m\Omega$

With different load currents:

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

Total power dissipation

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

therefore

$P_{Total} = U_B^2 / (U_S/I_S) + n \bullet I_L^2 \bullet 200\ m\Omega$

or

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

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
n	Number of enabling current paths used

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 basic device and therefore also the contact extension 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

The device performs no self-diagnostics.

Diagnostics can be implemented by integrating the confirmation current path at a connected basic device.

Key:

○ LED OFF
● LED ON

20.1 General states

LED K1/K2	State	Notes
●	All relays are picked up.	-

20.2 Error messages

LED K1/K2	Possible cause	Corrective
○	No voltage or undervoltage at A1/A2.	Check the input voltage.
	Short circuit between A1 and A2.	Switch off the input voltage and remove the short circuit. Then perform a function test.
	Checkback contacts 11 and 12 are faulty.	Perform a power down reset with subsequent function test. **If the error occurs again after the function test, replace the device.**
	Enable contact(s) of relay K1 and K2 faulty	

21 Application examples

21.1 Two-channel emergency stop monitoring with contact extension

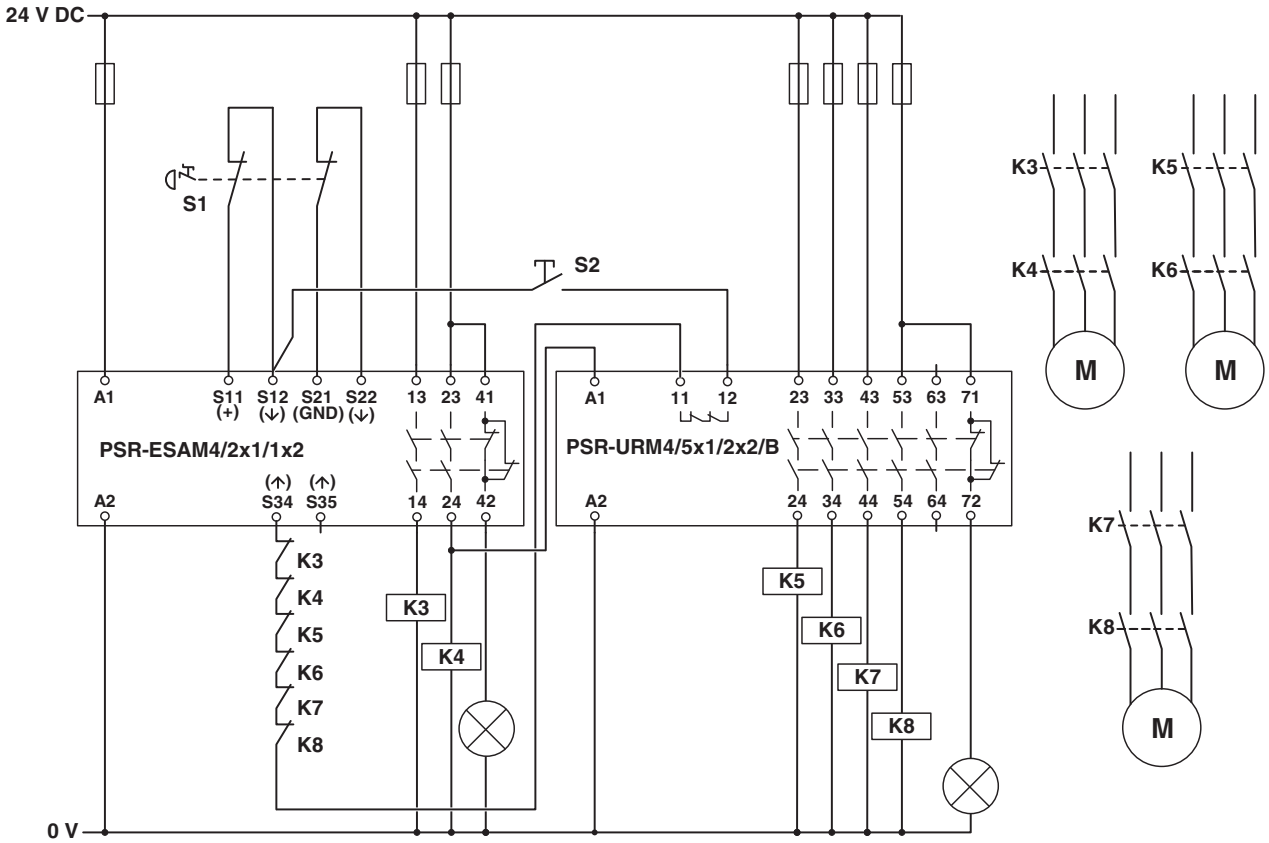
Application description:

- 2-channel emergency stop monitoring
- Manual, monitored start
- Monitoring of external, force-guided contactors

Achievable safety integrity:

- Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN IEC 62061), if cross-circuits can be ruled out in the control for contact extension

Figure 12 Two-channel emergency stop monitoring with contact extension



Key:

S1	Emergency stop button
S2	Manual reset device
K3 ... K8	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 mission time. Refer to the technical data for the mission time 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 symbol with the crossed-out trash can indicates that this item must be collected and disposed of separately from other waste.
Phoenix Contact or public collection sites will take the item back for free disposal. For information on the available disposal options, visit www.phoenixcontact.com.

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 **> 2000 m amsl up to max. 4500 m amsl** 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

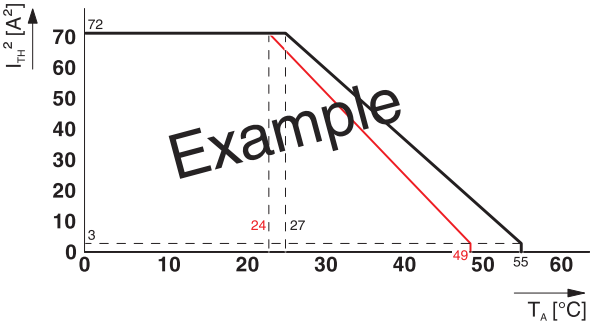
Example calculation for 3000 m

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 13 Example of a suspended derating curve (red)



24.2 Revision history

Version	Date	Contents
00	2023-03-01	First publication
01	2023-04-17	Technical data: Typical pickup time corrected to 25 ms.
02	2025-04-24	Designation of standard EN IEC 62061 updated; EAC logo removed; housing width corrected in legend text; accessories added in ordering data; Technical data section: electrical service life added; air clearances and creepage distances removed; minimum inrush current for confirmation current path 11/12 added; mechanical service life added for confirmation current path 11/12; note added for Push-in connection data; note added for safety characteristics according to EN IEC 62061; Notes added in “Safety regulations and installation notes” section; heading added in Relay data section; section on electrical service life added; note added in Wiring section