

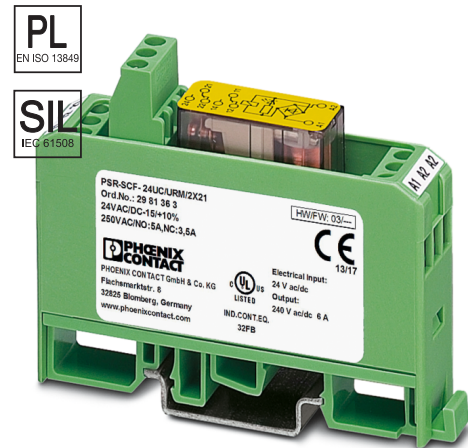
# PSR-SCF- 24UC/URM/2X21

## Safe coupling relay

Data sheet  
101762\_en\_06

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2025-05-16



## 1 Description

### Intended Use

The safe coupling relay is used for power adaptation and electrical isolation in high and low-demand applications. The device couples digital signals from failsafe controllers. Alternatively, when used in combination with a suitable basic device the device provides additional output contacts. The coupling relay safely interrupts circuits.

### Possible signal generators

- Failsafe controllers
- Safety relay

### Contact switching type

- 2 changeover contacts (IEC/EN 61810-3)

Can be used in safety-related applications as:

- 1 enabling current path without delay (N/O contact)
- 1 confirmation current path without delay (N/C contact)

According to IEC/EN 61810-3, only one N/O contact/N/C contact pair should be used as force-guided contacts.

The enabling current paths drop out without delay as per stop category 0 in accordance with EN 60204-1.

### Control

- 1- or 2-channel
- Automatic start

### Achievable safety integrity

- Suitable up to category 1, PL c (EN ISO 13849-1), SIL 1 (EN IEC 62061), SIL 1 (IEC 61508)

### Additional features

- Safe readback due to force-guided signal contact in accordance with IEC/EN 61810-3
- Easy proof test according to IEC 61508 due to forcibly guided signal contact
- Fixed screw connection
- 17.5 mm housing width

### 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](https://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.

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### 3 Ordering data

| Description                                                                                                                                                                                                                              | Type                   | Item no. | Pcs./Pkt. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------|-----------|
| Safe coupling relay with force-guided contacts, 2 changeover contacts, 1-channel, fixed screw terminal block, width: 17.5 mm                                                                                                             | PSR-SCF- 24UC/URM/2X21 | 2981363  | 10        |
| Accessories                                                                                                                                                                                                                              | Type                   | Item no. | Pcs./Pkt. |
| 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 mm <sup>2</sup> ... 6.0 mm <sup>2</sup> , lateral entry, trapezoidal crimp | CRIMPFOX 6             | 1212034  | 1         |

### 4 Technical data

| Hardware/firmware version                                                                  |                                                                                                                |
|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| HW/FW                                                                                      | ≥ 03/--                                                                                                        |
| The technical data and safety characteristics are valid as of the specified HW/FW version. |                                                                                                                |
| Supply: A1/A2                                                                              |                                                                                                                |
| Rated control circuit supply voltage $U_S$                                                 | 24 V AC/DC -15 % / +10 %                                                                                       |
| Rated control supply current $I_S$                                                         | typ. 30 mA                                                                                                     |
| Power consumption at $U_S$                                                                 | typ. 0.72 W                                                                                                    |
| Relay outputs: Relay outputs (11/12/14, 21/22/24)                                          |                                                                                                                |
| Number of outputs                                                                          | 2                                                                                                              |
| Output description                                                                         | safety-related                                                                                                 |
| Contact material                                                                           | AgNi                                                                                                           |
| Switching voltage range<br>(Observe the load curve)                                        | 5 V AC/DC ... 250 V AC/DC                                                                                      |
| Limiting continuous current                                                                | 5 A (N/O contact)<br>3.5 A (N/C contact)                                                                       |
| Inrush current, minimum                                                                    | min. 10 mA                                                                                                     |
| Inrush current                                                                             | max. 6 A                                                                                                       |
| Sq. Total current<br>$I_{TH}^2 = I_1^2 + I_2^2 + \dots + I_N^2$                            | 50 A <sup>2</sup>                                                                                              |
| Switching capacity                                                                         | min. 50 mW                                                                                                     |
| Switching frequency                                                                        | max. 0.5 Hz                                                                                                    |
| Interrupting rating (ohmic load) max.                                                      | See load limit curve                                                                                           |
| Service life electrical                                                                    | See section "Electrical service life"                                                                          |
| Mechanical service life                                                                    | 10 <sup>7</sup> cycles                                                                                         |
| Switching capacity                                                                         | 3 A (AC15, 250 V)<br>3 A (DC13, 24 V)                                                                          |
| Output fuse                                                                                | 6 A gL/gG NEOZED (N/O contact)<br>4 A gL/gG NEOZED (N/O contact, low demand)<br>4 A gL/gG NEOZED (N/C contact) |

**Times**

|                                  |                                             |
|----------------------------------|---------------------------------------------|
| Typical starting time with $U_S$ | 10 ms (with $U_S$ / when controlled via A1) |
| Typical release time with $U_S$  | 10 ms (with $U_S$ / when controlled via A1) |
| Restart time                     | < 1 s (Boot time)                           |
| Recovery time                    | < 500 ms                                    |

**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                                                                                                                   |
| Dimensions (W/H/D)                              | 17.5 x 75 x 60.5 mm                                                                                                                      |
| Type of housing                                 | PC pale green (RAL 6021)                                                                                                                 |
| Operating voltage display                       | 1 x yellow LED                                                                                                                           |
| 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 | 5.87 W (at $U_B = 26.4$ V DC, $U_S = 24$ V, $I_S = 30$ mA, $n = 1$ , $I_L^2 = 50$ A <sup>2</sup> , $R_{\text{contact}} = 0.1$ $\Omega$ ) |
| Note on power dissipation                       | See "Calculating the power dissipation"                                                                                                  |

**Dimensions**

|           |                     |
|-----------|---------------------|
| W x H x D | 17.5 x 75 x 60.5 mm |
|-----------|---------------------|

**Connection data**

|                                  |                                             |
|----------------------------------|---------------------------------------------|
| Connection method                | Screw connection                            |
| Conductor cross section rigid    | 0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> |
| Conductor cross section flexible | 0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> |
| Conductor cross-section AWG      | 24 ... 12                                   |
| Stripping length                 | 7 mm                                        |
| Screw thread                     | M3                                          |
| Tightening torque                | 0.6 Nm                                      |

**Ambient conditions**

|                                                |                                                     |
|------------------------------------------------|-----------------------------------------------------|
| Ambient temperature (operation)                | -20 °C ... 50 °C                                    |
| Ambient temperature (storage/transport)        | -20 °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)                          |

**Ambient conditions**

|                                 |                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------|
| Information on operating height | See the “Using PSR devices at altitudes greater than 2000 m above sea level” section |
| Shock                           | N/O contact: 10g, N/C contact: 5g                                                    |
| Vibration (operation)           | 10 Hz ... 150 Hz, amplitude 0.35 mm, 2 g                                             |

**Conformance/Approvals**

|                                                                                                                                                          |                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| CE                                                                                                                                                       | CE-compliant                                                                      |
| The complete EU declaration of conformity is available on the Internet at <a href="http://phoenixcontact.com/products">phoenixcontact.com/products</a> . |                                                                                   |
| Approvals                                                                                                                                                |  |

**Safety data**

|                                      |   |
|--------------------------------------|---|
| Stop category according to IEC 60204 | 0 |
|--------------------------------------|---|

**Safety parameters in accordance to IEC 61508 - high demand**

|                     |                                                                                                                                                                                                                                                                 |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Equipment type      | Type A                                                                                                                                                                                                                                                          |
| HFT                 | 0                                                                                                                                                                                                                                                               |
| SIL                 | 1                                                                                                                                                                                                                                                               |
| PFH <sub>D</sub>    | $6.67 \times 10^{-7}$ (3 A AC15; 8760 switching cycles/year; 10 % of the total SIL)<br>$3.33 \times 10^{-7}$ (3 A DC13; 8760 switching cycles/year; 10% of the total SIL)<br>$2.00 \times 10^{-7}$ (6 A AC1, 8760 switching cycles/year, 10 % of the total SIL) |
| Demand rate         | < 12 Months                                                                                                                                                                                                                                                     |
| Proof test interval | 240 Months                                                                                                                                                                                                                                                      |
| Mission time        | 240 Months                                                                                                                                                                                                                                                      |

**Safety parameters according to IEC 61508 - low demand**

|                     |                       |
|---------------------|-----------------------|
| Equipment type      | Type A                |
| HFT                 | 0                     |
| SIL                 | 1                     |
| PFD <sub>avg</sub>  | $4.05 \times 10^{-3}$ |
| Proof test interval | 56 Months             |
| Mission time        | 240 Months            |

**Safety parameters according to EN ISO 13849-1**

|                   |            |
|-------------------|------------|
| Category          | 1          |
| Performance level | c          |
| Mission time      | 240 Months |

**Safety parameters according to EN IEC 62061**

|     |   |
|-----|---|
| SIL | 1 |
|-----|---|

## 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.
- 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).

### **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.

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.

### **Error removal within the process safety time**

When an error is detected by the higher-level controller, it is assumed that the safety function can no longer be performed.

The error must be removed within 72 hours or within the process safety time if required by the application.

## 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

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

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

### 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 Section “Ordering data”.

## 8 Function description

### 8.1 Type B changeover contacts

The device has two type B changeover contacts. One changeover contact can act as both the N/O contact and the N/C contact.

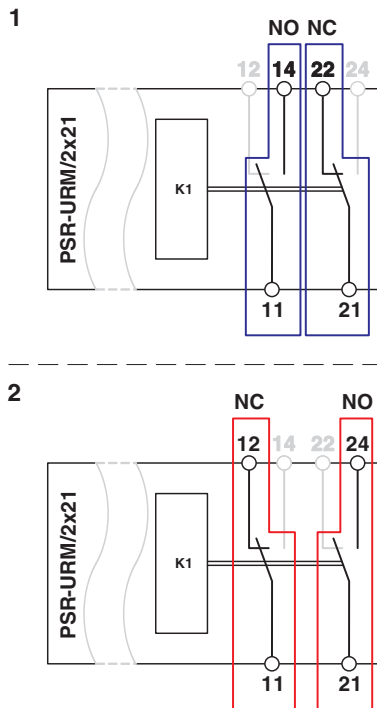
According to IEC/EN 61810-3, only one N/O contact/N/C contact pair should be used as force-guided contacts.

The two changeover contacts can therefore be used in safety-related applications as:

- 1 enabling current path without delay (N/O contact)
- 1 confirmation current path without delay (N/C contact)

The figure below shows the assignment of the possible N/O contact/N/C contact pairs. The respective other pair is not available in the safety-related application.

Figure 1 Changeover contacts as NC and NO



- 1 Pair 1:** N/O contact 11/14 as enabling current path, N/C contact 21/22 as confirmation current path
- 2 Pair 2:** N/O contact 21/24 as enabling current path, N/C contact 11/12 as confirmation current path

### 8.2 One or two-channel activation

The external enable signal of the failsafe controller or basic device is switched at A1.

The external enable signal can also be switched at A2 as an option.

### 8.3 Automatic start

The device starts automatically once it has received the external enable signal.

In the activated state, N/O contacts 11/14 and 21/24 of both changeover contacts are closed. N/C contacts 11/12 and 21/24 are therefore open.

### 8.4 Safe shutdown

Once the external enable signal has been deactivated, the enabling current paths open and the contacts enter the safe state.

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

The confirmation current paths close.

### 8.5 Diagnostics / proof test

The confirmation current path transmits safety-related status information.

Due to the forced guidance of the contacts, the confirmation current path closes when the enabling current paths open.

If required by the application, trace the confirmation current path back to the failsafe controller or the basic device.

The proof test required by standards can be carried out in two ways:

1. Continuity test for the confirmation current path
2. Evaluation of the failsafe controller via readback of the confirmation current path



See "Proof test".

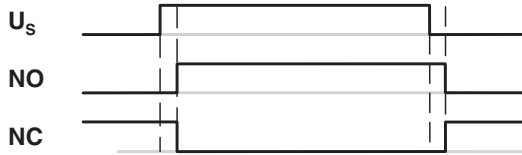
See section "Feedback circuit connection versions".

If several devices are used, the N/C contacts of the confirmation current paths can be connected in series.

## 9 Function and time diagrams

### 9.1 Time diagram for automatic start

Figure 2 Time diagram for automatic start

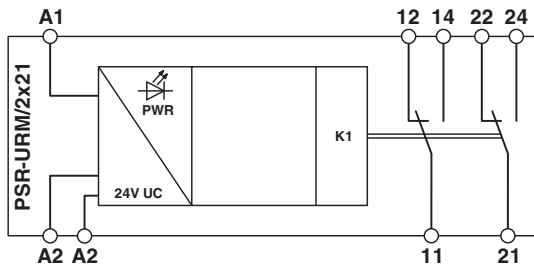


#### Key:

|       |                                      |                |
|-------|--------------------------------------|----------------|
| $U_s$ | Control/enable signal                | A1/A2          |
| NO    | Enabling current path, undelayed     | 11/14 or 21/24 |
| NC    | Confirmation current path, undelayed | 11/12 or 21/22 |

## 10 Block diagram

Figure 3 Block diagram



#### Key:

|           |                    |
|-----------|--------------------|
| <b>A1</b> | 24 V AC/DC control |
| <b>A2</b> | 0 V control        |

#### Enabling current paths, without delay:

|              |                                    |
|--------------|------------------------------------|
| <b>11/14</b> | N/O contact - changeover contact 1 |
| <b>21/24</b> | N/O contact - changeover contact 2 |

#### Confirmation current paths, without delay:

|              |                                    |
|--------------|------------------------------------|
| <b>11/12</b> | N/C contact - changeover contact 1 |
| <b>21/22</b> | N/C contact - changeover contact 2 |

### 10.1 Insulation coordination

|          | A1/A2 | 11/12-14 | 21/22-24 |
|----------|-------|----------|----------|
| A1/A2    | -     | 6 kV ST  | 6 kV ST  |
| 11/12-14 | -     | -        | 4 kV BI  |
| 21/22-24 | -     | -        | -        |

#### Key:

|           |                  |
|-----------|------------------|
| <b>BI</b> | Basic insulation |
| <b>ST</b> | Safe isolation   |



#### Basic insulation

(rated surge voltage of 4 kV)

A mixture of SELV and PELV is strictly prohibited. Only switch 230 V AC at one of the enable contacts if the adjacent contact carries the same potential.

#### Safe isolation/reinforced insulation

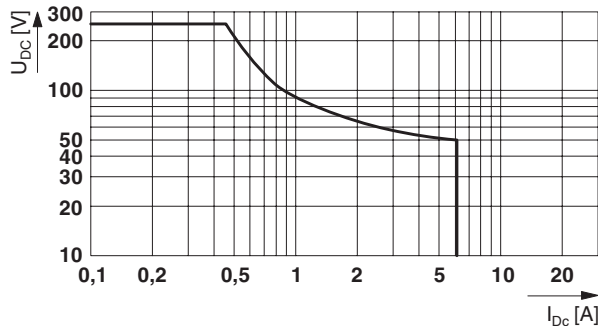
(rated surge voltage of 6 kV)

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.

## 11 Relay data

### 11.1 Load limit curve at DC load

Figure 4 Relay load limit curve – resistive load



### 11.2 Electrical service life

Bild 5 Electrical service life AC15 250 V AC

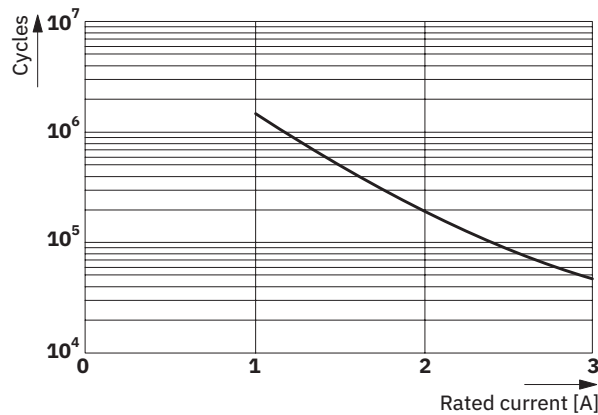


Figure 6 Electrical service life AC1 250 V AC

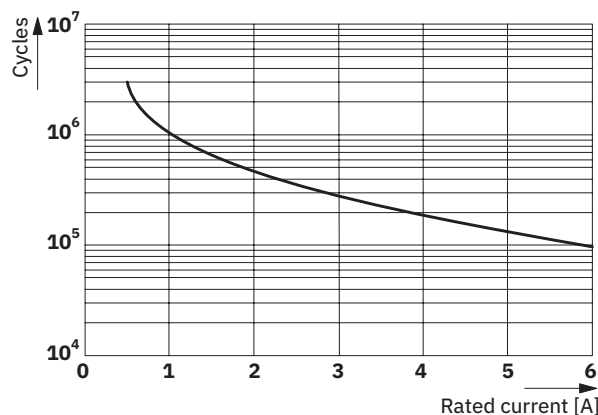
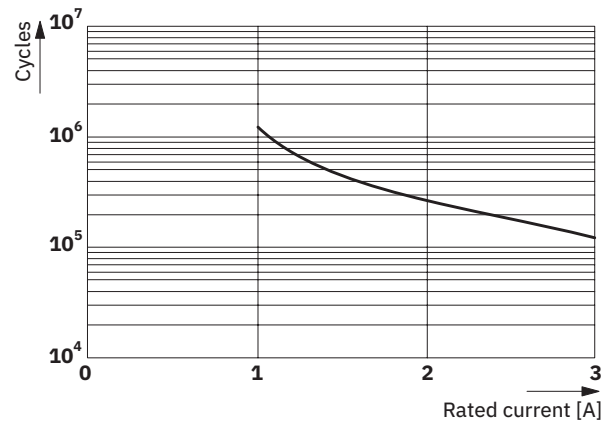


Figure 7 Electrical service life DC13 24 V DC



#### Behavior of the electrical service life

The service life curves indicate the number of switching cycles after which wear-related failures must be expected. They depend on the utilization category and the expected load current.

#### Example:

Let's assume:

- Inductive load = 2 A
- Utilization category = AC15

This results in a contact service life of about 200000 switching cycles.



#### WARNING: Loss of functional safety

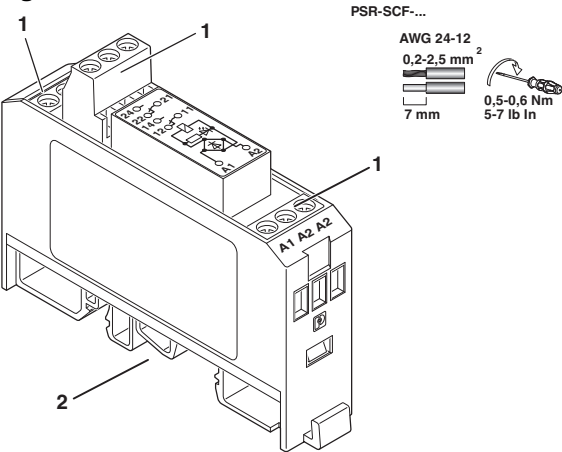
At the end of the electrical service life, there is an increased risk of loss of functional safety.

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

12 Operating and indication elements

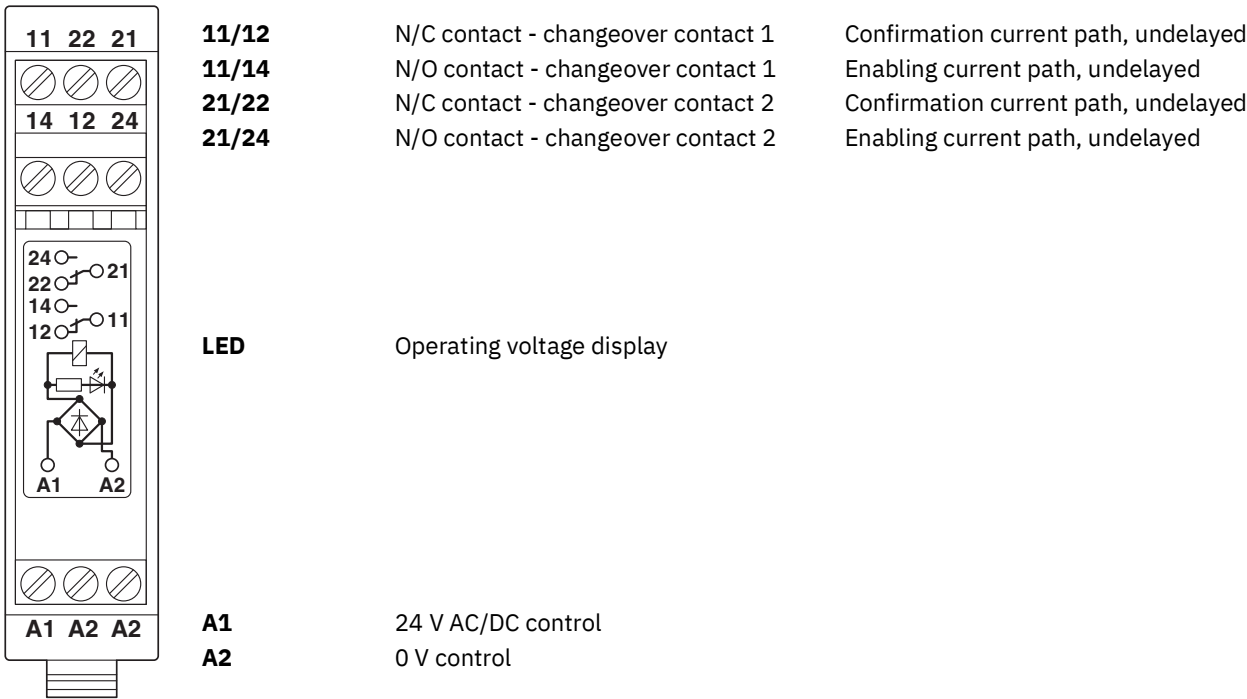
12.1 Connection versions

Figure 8 Connection versions



- 1 Fixed screw terminal block
- 2 Snap-on foot for DIN rail mounting

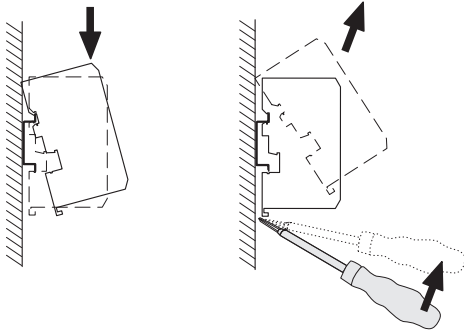
12.2 Connection assignment



## 13 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.

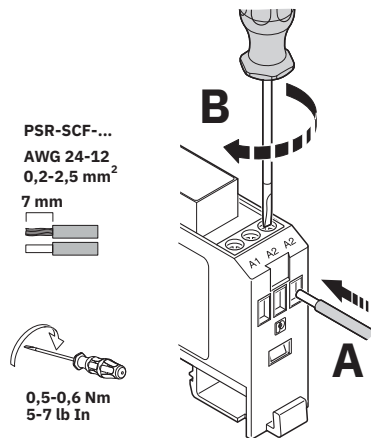
Figure 9 Mounting and removing



## 14 Wiring

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

Figure 10 Connecting cables



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.

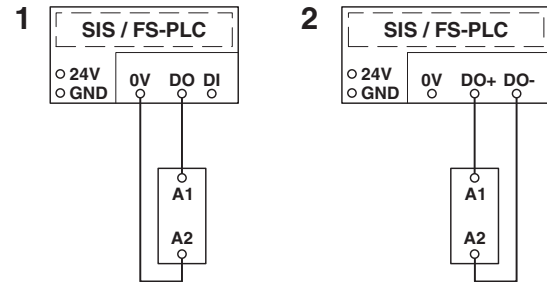


For compliance with UL approval, use copper wire that is approved for > 75°C.

### 14.1 Signal generator connection versions

- Connect suitable signal generators to A1/A2.

Figure 11 Signal generator connection versions



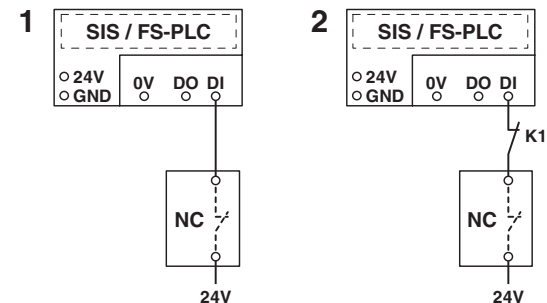
- 1-channel control via failsafe controller
- 2-channel control via failsafe controller

### 14.2 Feedback circuit connection versions

To carry out the diagnostic function via the confirmation current path, proceed as follows:

- Read the confirmation current path back to one of the digital inputs of the failsafe controller.
- Place the relevant N/C contacts in the confirmation current path to the digital input of the failsafe controller to monitor external contactors or extension devices with force-guided contacts.

Figure 12 Feedback circuit connection versions



- Confirmation current path without monitored contact extension
- Confirmation current path with monitored contact extension

**NC** Confirmation current path 11/12 or 21/22

## 15 Startup

- Provide the external enable signal (24 V AC/DC) of the failsafe controller or the basic device at terminal block A1.

The LED lights up.

Enabling current paths 11/14 and 21/24 close.

Confirmation current paths 11/12 and 21/22 open.

## 16 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

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

### Contact power dissipation

With the same load currents:

$$P_{\text{Contact}} = n \cdot I_L^2 \cdot R_{\text{Contact}}$$

With different load currents:

$$P_{\text{Contact}} = (I_{L1}^2 + I_{L2}^2 + \dots + I_{Ln}^2) \cdot R_{\text{Contact}}$$

### Total power dissipation

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

therefore

$$P_{\text{Total}} = U_B^2 / (U_S / I_S) + n \cdot I_L^2 \cdot R_{\text{Contact}}$$

or

$$P_{\text{Total}} = U_B^2 / (U_S / I_S) + (I_{L1}^2 + I_{L2}^2 + \dots + I_{Ln}^2) \cdot R_{\text{Contact}}$$

### Key:

|                            |                                                 |
|----------------------------|-------------------------------------------------|
| <b>P</b>                   | Power dissipation in mW                         |
| <b>U<sub>B</sub></b>       | Applied operating voltage                       |
| <b>U<sub>S</sub></b>       | Rated control circuit supply voltage            |
| <b>I<sub>S</sub></b>       | Rated control supply current                    |
| <b>n</b>                   | Number of enabling current paths used           |
| <b>I<sub>L</sub></b>       | Contact load current                            |
| <b>R<sub>Contact</sub></b> | Contact resistance of the relay contacts        |
|                            | General: 100 mΩ                                 |
|                            | With minimum approved load 5 V / 10 mA:<br>20 Ω |

## 17 Proof test

To verify the device function, proceed according to one of the following diagnostic options.



### WARNING: Loss of functional safety due to malfunction

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

- Replace the device.

### 17.1 Continuity test on confirmation current path

1. Deactivate A1.
2. Perform a continuity test for the confirmation current path.

**Expectation:** Continuity can be measured.

### 17.2 Evaluation of the failsafe controller via readback of the confirmation current path

1. Deactivate A1.
2. Read the confirmation current path back into one of the digital inputs of the failsafe controller.

**Expectation:** The failsafe controller receives a 24 V signal via the confirmation current path.

## 18 Application examples

### 18.1 High-demand application with failsafe controller

- 1-channel control
- Integration of the confirmation current path in the safe controller
- It is assumed that errors in the cable installation have been eliminated
- Suitable up to category 1, PL c (EN ISO 13849-1), SIL 1 (EN IEC 62061), SIL 1 (IEC 61508)



**WARNING: Loss of functional safety**

The switch-on pulses sent by the controller (light test) can lead to brief, unwanted activation of the safety relay.

- Deactivate the light pulses/light tests.



**WARNING: Loss of functional safety due to infiltration of process safety time**

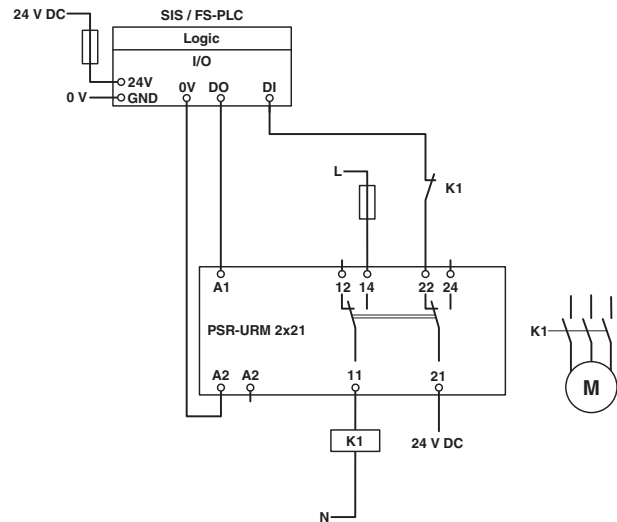
If the evaluation of the confirmation current path is not performed in high-demand applications within the process safety time, this may lead to a loss of functional safety.

- Ensure that the evaluation of the confirmation current path is performed in high-demand applications within the process safety time.



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

Figure 13 High-demand application with failsafe controller



**Key:**

|                     |                                                  |
|---------------------|--------------------------------------------------|
| <b>SIS / FS-PLC</b> | Safety Instrumented System / failsafe controller |
| <b>DI</b>           | Digital input                                    |
| <b>DO</b>           | Digital output                                   |
| <b>K1</b>           | Force-guided contactor                           |

## 18.2 Low-demand application with failsafe controller

- 1-channel control
- It is assumed that errors in the cable installation have been eliminated
- Suitable up to category 1, PL c (EN ISO 13849-1), SIL 1 (EN IEC 62061), SIL 1 (IEC 61508)



### WARNING: Loss of functional safety

The switch-on pulses sent by the controller (light test) can lead to brief, unwanted activation of the safety relay.

- Deactivate the light pulses/light tests.

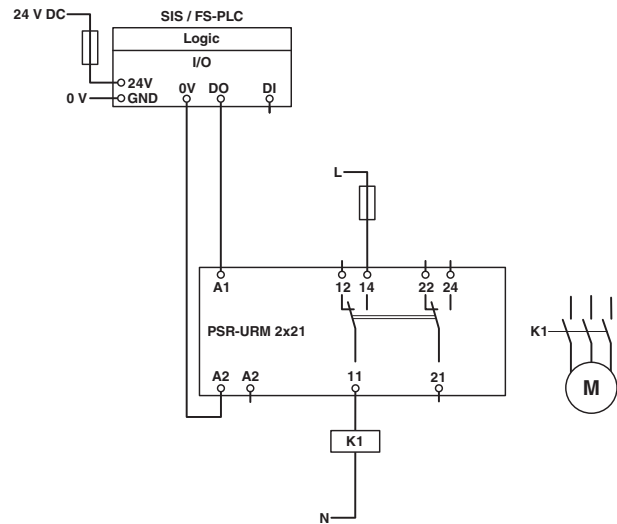


Cross-circuits in the cable installation can be ruled out in the same electrical installation space or through mechanically protected cable installation.



The confirmation current path is not absolutely necessary for low-demand applications. However, readback is recommended so a potential error in the switching operation can be read into the controller. In any case, verify proper function with regular proof tests.

Figure 14 Low-demand application with failsafe controller



### Key:

|                     |                                                  |
|---------------------|--------------------------------------------------|
| <b>SIS / FS-PLC</b> | Safety Instrumented System / failsafe controller |
| <b>DI</b>           | Digital input                                    |
| <b>DO</b>           | Digital output                                   |
| <b>K1</b>           | Force-guided contactor                           |

## 19 Device replacement, device defect, and repair

### 19.1 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

### 19.2 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.

## 20 Maintenance, decommissioning, and disposal

### 20.1 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.

### 20.2 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](http://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.

## 21 Attachment

### 21.1 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



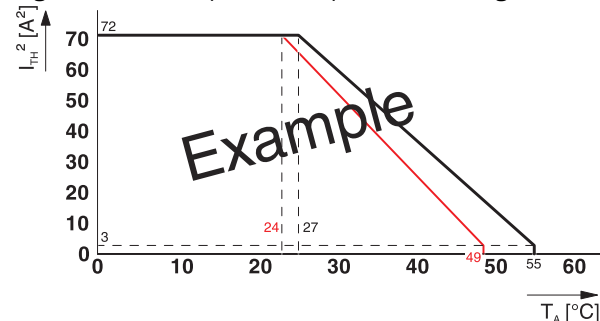
The following calculation and the illustrated derating curve are provided as examples.

Perform the actual calculation and offset the derating curve for the device used according to the technical data and the “Derating” section.

$$27\text{ °C} \cdot 0.906 \approx 24\text{ °C}$$

$$55\text{ °C} \cdot 0.906 \approx 49\text{ °C}$$

Figure 15 Example of a suspended derating curve (red)



## 21.2 Revision history

| Version | Date       | Contents                                                                                                                                                                                                                                                                                                            |
|---------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 02      | 2017-06-15 | New edition of the data sheet                                                                                                                                                                                                                                                                                       |
| 03      | 2018-03-21 | Chap. 4 Technical data: Safety parameters for IEC 61508 High demand and low demand changed, Chap. 5 added, Safety note on direct/indirect contact added to Chap. 6, Chap. 6.1 added                                                                                                                                 |
| 04      | 2020-10-23 | TÜV logo updated; Section Description: Relay type standard changed; Section Technical data: Inrush current and filter time removed, Restart time added, Relay type standard changed, max. power dissipation changed, information on shock and vibrations removed; Section Calculating the power dissipation revised |
| 05      | 2024-02-28 | Technical data: new structure, housing design, material changed to polycarbonate. New sections added: Transport, storage, and unpacking; Device replacement, device defects, and repairs; Maintenance, decommissioning, and disposal                                                                                |
| 06      | 2025-05-16 | EAC logo removed, TÜV Nord logo updated; accessories added to ordering data; "Safety regulations and installation notes" section updated; heading added to "Relay data" section; "Electrical service life" section added; note added to "Wiring" section                                                            |