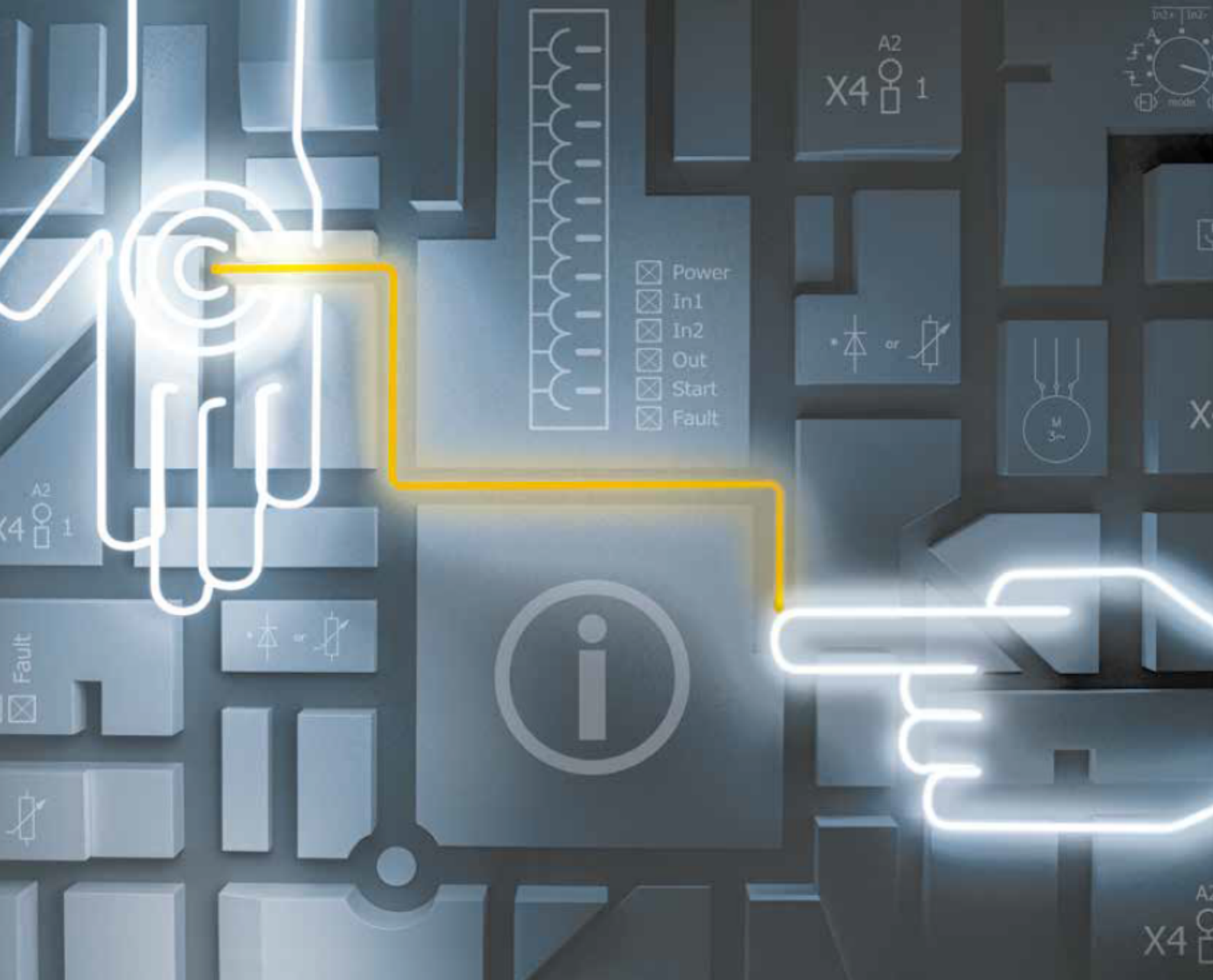




## ► PNOZ s10

**PILZ**  
THE SPIRIT OF SAFETY

Operating Manual-21402-EN-17  
- Safety relays



This document is the original document.

Where unavoidable, for reasons of readability, the masculine form has been selected when formulating this document. We do assure you that all persons are regarded without discrimination and on an equal basis.

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SD means Secure Digital

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## Introduction

### Validity of documentation

This documentation is valid for the product PNOZ s10. It is valid until new documentation is published.

This operating manual explains the function and operation, describes the installation and provides guidelines on how to connect the product.

### Using the documentation

This document is intended for instruction. Only install and commission the product if you have read and understood this document. The document should be retained for future reference.

### Definition of symbols

Information that is particularly important is identified as follows:



#### **DANGER!**

This warning must be heeded! It warns of a hazardous situation that poses an immediate threat of serious injury and death and indicates preventive measures that can be taken.



#### **WARNING!**

This warning must be heeded! It warns of a hazardous situation that could lead to serious injury and death and indicates preventive measures that can be taken.



#### **CAUTION!**

This refers to a hazard that can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.



#### **NOTICE**

This describes a situation in which the product or devices could be damaged and also provides information on preventive measures that can be taken. It also highlights areas within the text that are of particular importance.

**INFORMATION**

This gives advice on applications and provides information on special features.

**Safety****Intended use**

The unit meets the requirements of EN 60947-5-1 and EN 60204-1. The contact expansion module is used to increase the number of instantaneous safety contacts available on a base unit. Base units are all safety relays with feedback loop monitoring.

The max. achievable safety level depends on the base unit. The expansion module may not exceed this. The safety-related characteristic values stated under [safety-related characteristic data](#) [ 20] can only be achieved if the base unit also exhibits these safety characteristic values.

**Improper use**

The following is deemed improper use in particular:

- ▶ Any component, technical or electrical modification to the product,
- ▶ Use of the product outside the areas described in this operating manual,
- ▶ Use of the product outside the technical details (see chapter entitled [Technical Details](#) [ 16]).

**NOTICE****EMC-compliant electrical installation**

The product is designed for use in an industrial environment. The product may cause interference if installed in other environments. If installed in other environments, measures should be taken to comply with the applicable standards and directives for the respective installation site with regard to interference.

**Safety regulations****Safety assessment**

Before using a device, a safety assessment in accordance with the Machinery Directive is required.

The product as an individual component fulfils the functional safety requirements in accordance with EN ISO 13849 and EN IEC 62061. However, this does not guarantee the functional safety of the overall plant/machine. To achieve the relevant safety level of the overall plant/machine's required safety functions, each safety function needs to be considered separately.

**Use of qualified personnel**

The products may only be assembled, installed, programmed, commissioned, operated, de-commissioned and maintained by persons who are competent to do so.

A competent person is a qualified and knowledgeable person who, because of their training, experience and current professional activity, has the specialist knowledge required. In order to inspect, assess and handle products, devices, systems, plant and machinery, this person must be familiar with the state of the art and the applicable national, European and international laws, directives and standards.

It is the company's responsibility only to employ personnel who

- ▶ Are familiar with the basic regulations concerning health and safety / accident prevention,
- ▶ Have read and understood the information provided in the section entitled Safety
- ▶ Have a good knowledge of the generic and specialist standards applicable to the specific application.

**Warranty and liability**

All claims to warranty and liability will be rendered invalid if

- ▶ The product was used contrary to the purpose for which it is intended,
- ▶ Damage can be attributed to not having followed the guidelines in the manual,
- ▶ Operating personnel are not suitably qualified,
- ▶ Any type of modification has been made (e.g. exchanging components on the PCB boards, soldering work etc.).

**Disposal**

- ▶ In safety-related applications, please comply with the mission time  $T_M$  stated in the safety-related characteristic data.
- ▶ When decommissioning, please comply with local regulations regarding the disposal of electronic devices (e.g. Electrical and Electronic Equipment Act).

**For your safety**

The unit meets all the necessary conditions for safe operation. However, please note the following:

- ▶ Note for overvoltage category III: If voltages higher than low voltage (>50 VAC or >120 VDC) are present on the unit, connected control elements and sensors must have a rated insulation voltage of at least 250 V.

### Unit features

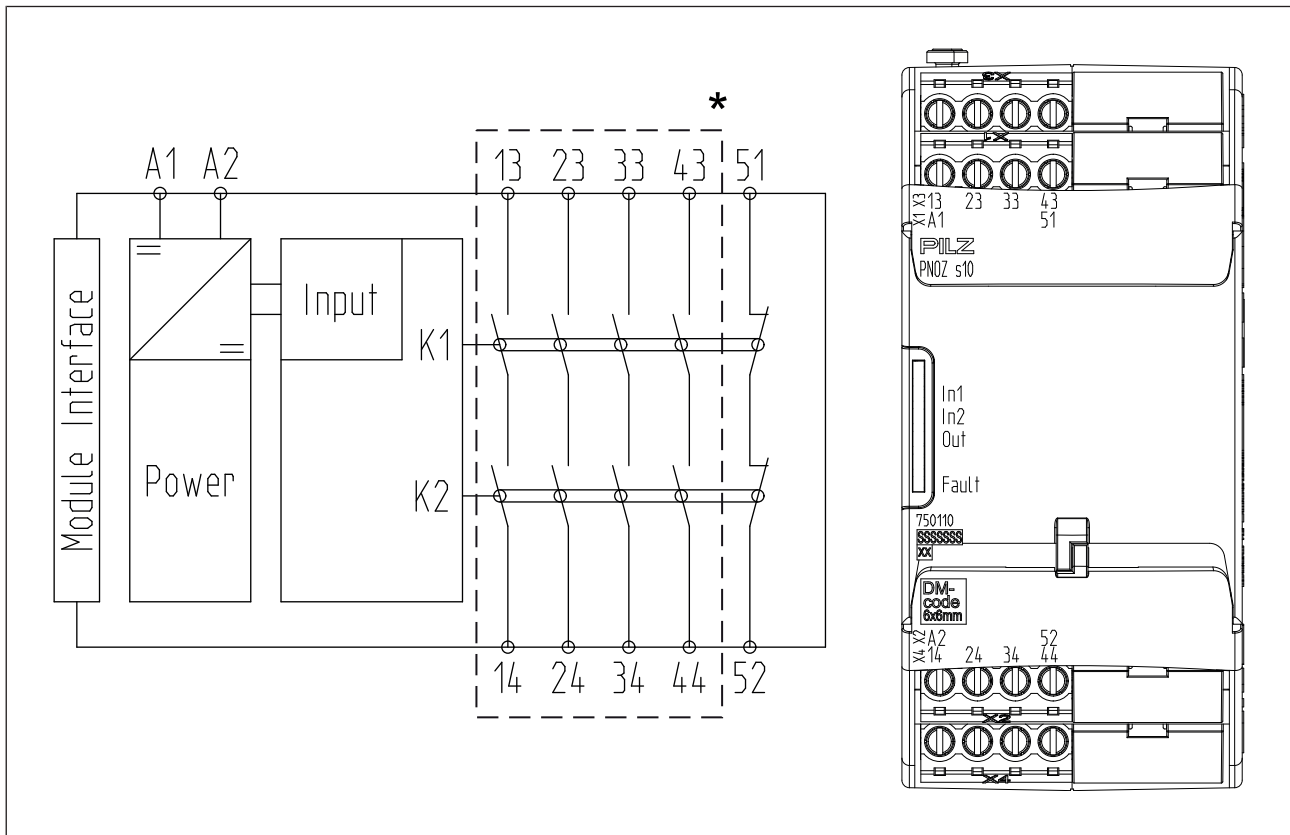
- ▶ Positive-guided relay outputs:
  - 4 safety contacts (N/O), instantaneous
  - 1 auxiliary contact (N/C), instantaneous
- ▶ LED for:
  - Input status, channel 1
  - Input status, channel 2
  - Switch status of the safety contacts
  - Fault
- ▶ Plug-in connection terminals (either spring-loaded terminal or screw terminal)
- ▶ See order reference for unit types

### Safety features

The unit meets the following safety requirements:

- ▶ The contact expansion module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expansion module.
- ▶ The safety function remains effective in the case of a component failure.
- ▶ Earth fault in the feedback loop:  
Detected, depending on the base unit that is used.
- ▶ Earth fault in the input circuit:  
The output relays de-energise and the safety contacts open.

## Block diagram/terminal configuration



\*Safe separation from non-marked area in accordance with EN 60947-1, 6 kV, basic insulation between all safety contacts.

## Function description

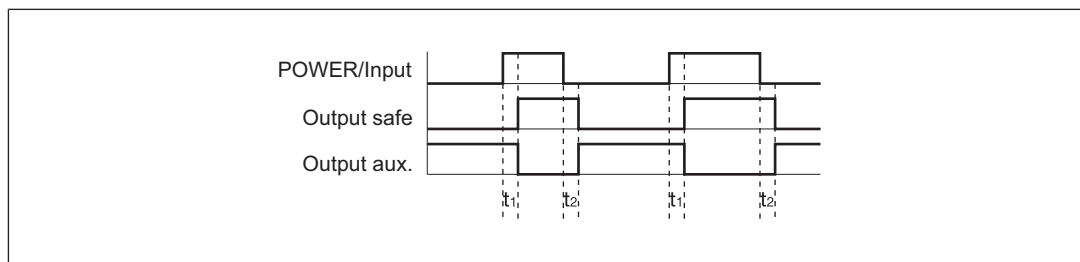
with PNOZsigma base unit:

- Dual-channel operation via PNOZsigma connector

without PNOZsigma base unit:

- Single-channel operation: one input circuit affects the output relays

### Timing diagram



### Legend

- ▶ POWER/Input: Supply voltage/input circuit
- ▶ Output safe: Safety contacts
- ▶ Output aux.: Auxiliary contacts
- ▶  $t_1$ : Switch-on delay
- ▶  $t_2$ : Delay-on de-energisation

### Installation

#### Install contact expansion module without base unit:

- ▶ Ensure that the plug terminator is inserted at the side of the unit.

#### Connect base unit and PNOZsigma contact expansion module:

- ▶ Remove the plug terminator at the side of the base unit and at the contact expander module
- ▶ Connect the base unit and the contact expansion module using the connector supplied, before mounting the units to the DIN rail.

#### Control cabinet installation

- ▶ The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- ▶ Use the notch on the rear of the unit to attach it to a DIN rail (35 mm).
- ▶ When installed vertically: Secure the unit by using a fixing element (e.g. retaining bracket or end angle).
- ▶ Push the unit upwards or downwards before lifting it from the DIN rail.

## Wiring

Please note:

- ▶ Information given in the "[Technical details \[16\]](#)" must be followed.
- ▶ Outputs 13-14, 23-24, 33-34, 43-44 are safety contacts; outputs 51 -52 are auxiliary contacts (e.g. for display).
- ▶ Auxiliary contact 51-52 should **not** be used for safety circuits!
- ▶ To prevent contact welding, a fuse should be connected before the output contacts (see [Technical details \[16\]](#)).
- ▶ Calculation of the max. cable length  $l_{\max}$  in the input circuit:

$$l_{\max} = \frac{R_{l_{\max}}}{R_l / \text{km}}$$

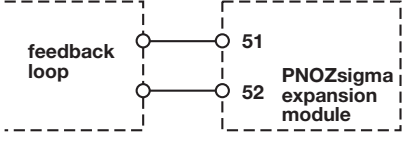
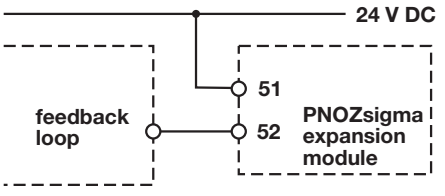
$R_{l_{\max}}$  = max. overall cable resistance (see [Technical details \[16\]](#))

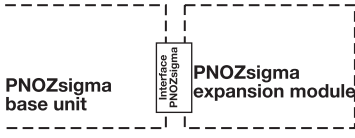
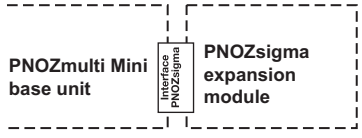
$R_l / \text{km}$  = cable resistance/km

- ▶ Use copper wiring with a temperature stability of 75 °C.
- ▶ To prevent EMC interferences (particularly common-mode interferences) the measures described in EN 60204-1 must be executed. This includes the separate routing of cables of the control circuits (input, start and feedback loop) from other cables for energy transmission or the shielding of cables, for example.
- ▶ Adequate protection circuit must be provided on all output contacts with capacitive and inductive loads.
- ▶ Do not connect undesignated terminals.
- ▶ The power supply must comply with the regulations for extra low voltages with protective electrical separation (SELV, PELV) in accordance with VDE 0100, Part 410.

## Preparing for operation

| Input circuit                                                                                                                        | Single-channel | Dual-channel |
|--------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|
| Base unit:<br>Safety relay PNOZ X                                                                                                    |                |              |
| Base unit:<br>Safety relay or programmable safety system, control via semiconductor outputs (24 V DC), e.g. PNOZelog, PNOZmulti, PSS |                |              |
| Base unit:<br>Programmable safety system, control via dual-pole semiconductor outputs (24 V DC/0 V DC), e.g. PNOZmulti, PSS          |                |              |

| Feedback loop                                                                           | Base unit: Safety relay PNOZ X                                                    | Base unit: Safety relay or programmable safety system with semiconductor input, e.g. PNOZelog, PNOZmulti, PSS |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| The inputs that evaluate the feedback loop will depend on the base unit and application |  |                             |

| Connection to PNOZsigma base unit/PNOZmulti Mini base unit     | Base unit: Safety relay PNOZ-sigma                                                | Base unit: Small control system PNOZmulti Mini                                      |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| The feedback loop is connected and evaluated via the connector |  |  |

**INFORMATION**

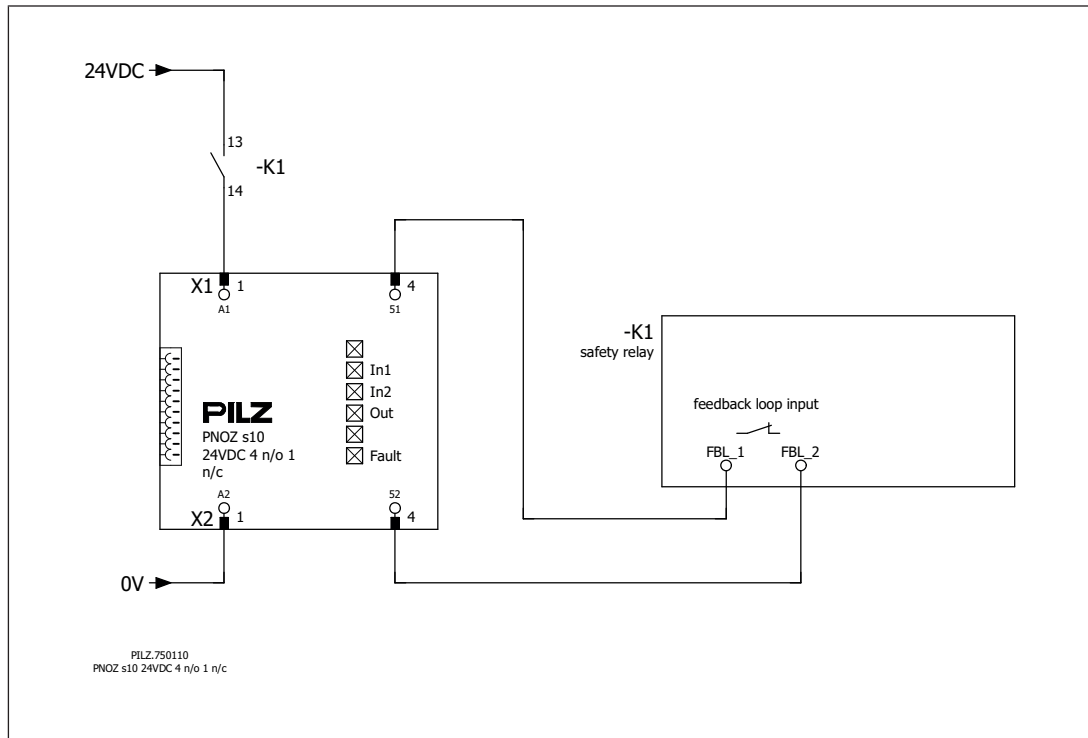
If a base unit and a contact expansion module are linked via the connector, no additional wiring is necessary.

Do not connect A1/A2 to the contact expansion module!

## Application examples

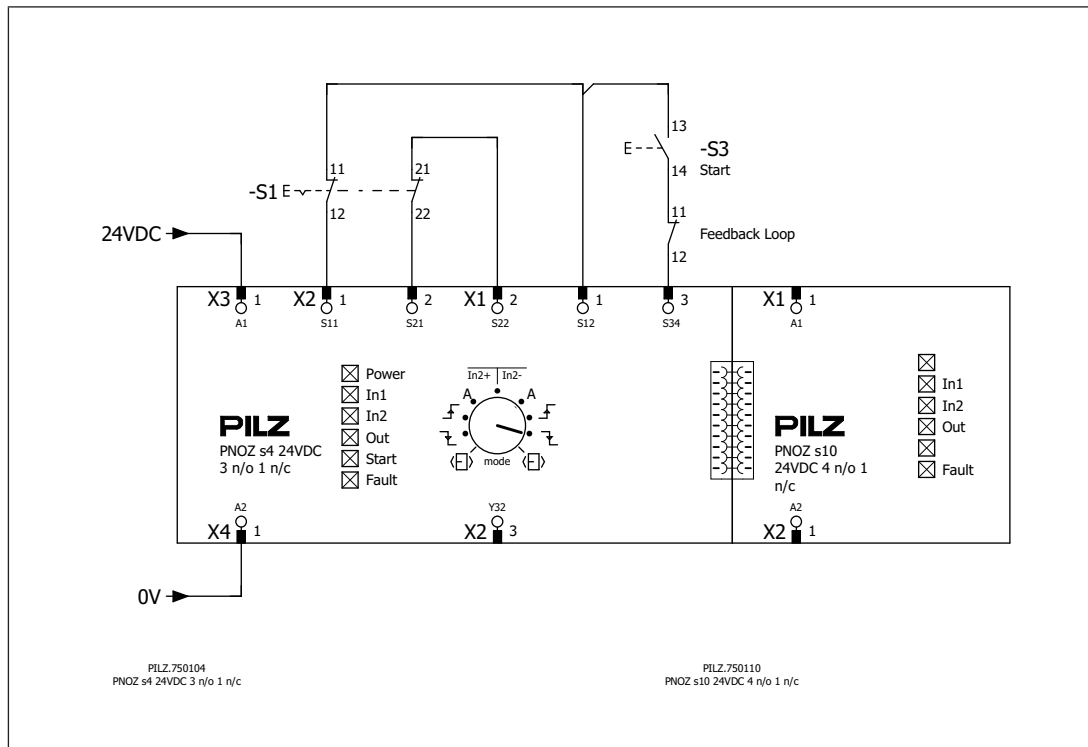
### Single device

- ▶ Single-channel
- ▶ Driven via safety relay with safety contacts



**Combined with PNOZ s4**

- ▶ Emergency stop
- ▶ Dual-channel
- ▶ with detection of shorts across contacts
- ▶ Monitored start
- ▶ falling edge with feedback loop monitoring

**Run**

When the relay outputs are switched on, the mechanical contact on the relay cannot be tested automatically. Depending on the operational environment, measures to detect the non-opening of switching elements may be required under some circumstances.

When the product is used in accordance with the European Machinery Directive, a check must be carried out to ensure that the safety contacts on the relay outputs open correctly. Open the safety contacts (switch off output) and start the device again, so that the internal diagnostics can check that the safety contacts open correctly

- ▶ for SIL 3/PL e at least 1x per month
- ▶ for SIL 2/PL d at least 1x per year

**NOTICE**

The safety functions should be checked after initial commissioning and each time the plant/machine is changed. The safety functions may only be checked by qualified personnel.

LEDs indicate the status and errors during operation:

 LED on

### Status indicators

 **IN1**  
Channel 1 actuated.

 **IN2**  
Channel 2 actuated.

 **IN1, IN2, OUT**  
Safety contacts are closed.

### Error indicators

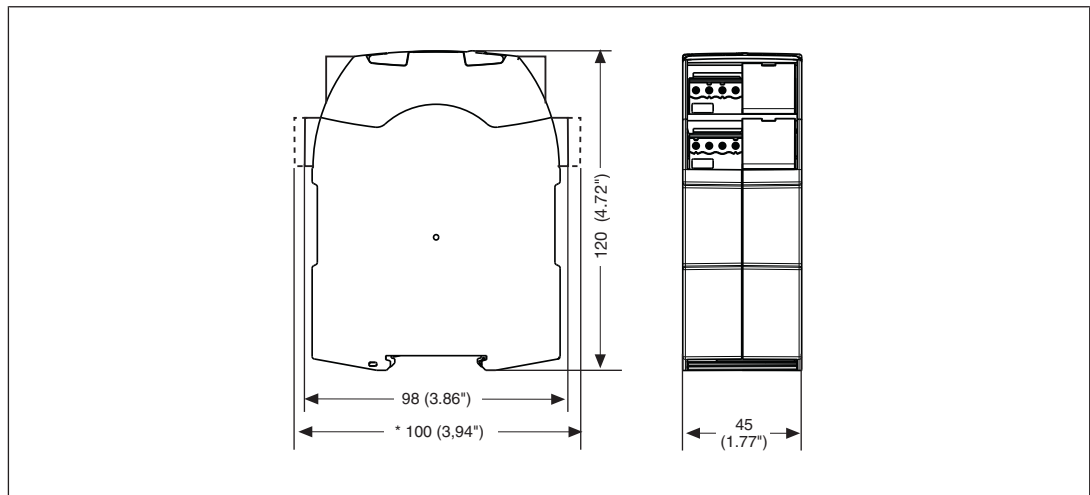
 **FAULT**  
Diagnostics: Plug terminator not connected  
► Remedy: Insert plug terminator, switch supply voltage off and then on again.

### Faults - malfunctions

- Contact malfunctions: If the contacts have welded, reactivation will not be possible after the input circuit has opened.

### Dimensions in mm

\*with spring-loaded terminals



## Technical details

| General                                          | 750110                                       | 751110                                       |
|--------------------------------------------------|----------------------------------------------|----------------------------------------------|
| Certifications                                   | CCC, CE, EAC, KOSHA, TÜV, UKCA, cULus Listed | CCC, CE, EAC, KOSHA, TÜV, UKCA, cULus Listed |
| Electrical data                                  | 750110                                       | 751110                                       |
| Supply voltage                                   |                                              |                                              |
| Voltage                                          | 24 V                                         | 24 V                                         |
| Kind                                             | DC                                           | DC                                           |
| Voltage tolerance                                | -20 %/+20 %                                  | -20 %/+20 %                                  |
| Output of external power supply (DC)             | 3 W                                          | 3 W                                          |
| Residual ripple DC                               | 20 %                                         | 20 %                                         |
| Duty cycle                                       | 100 %                                        | 100 %                                        |
| Inputs                                           | 750110                                       | 751110                                       |
| Quantity                                         | 1                                            | 1                                            |
| Voltage at                                       |                                              |                                              |
| Input circuit DC                                 | 24 V                                         | 24 V                                         |
| Current at                                       |                                              |                                              |
| Input circuit DC                                 | 95 mA                                        | 95 mA                                        |
| Max. inrush current impulse                      |                                              |                                              |
| Current pulse, input circuit                     | 2 A                                          | 2 A                                          |
| Pulse duration, input circuit                    | 0,1 ms                                       | 0,1 ms                                       |
| Max. overall cable resistance R <sub>I-max</sub> |                                              |                                              |
| Single-channel at UB DC                          | 30 Ohm                                       | 30 Ohm                                       |
| Relay outputs                                    | 750110                                       | 751110                                       |
| Number of output contacts                        |                                              |                                              |
| Safety contacts (N/O), instantaneous             | 4                                            | 4                                            |
| Auxiliary contacts (N/C)                         | 1                                            | 1                                            |
| Max. short circuit current I <sub>K</sub>        | 1 kA                                         | 1 kA                                         |
| Utilisation category                             |                                              |                                              |
| in accordance with the standard                  | EN 60947-4-1                                 | EN 60947-4-1                                 |
| Utilisation category of safety contacts          |                                              |                                              |
| AC1 at                                           | 240 V                                        | 240 V                                        |
| Min. current                                     | 0,01 A                                       | 0,01 A                                       |
| Max. current                                     | 12 A                                         | 12 A                                         |
| Max. power                                       | 3000 VA                                      | 3000 VA                                      |
| DC1 at                                           | 24 V                                         | 24 V                                         |
| Min. current                                     | 0,01 A                                       | 0,01 A                                       |
| Max. current                                     | 12 A                                         | 12 A                                         |
| Max. power                                       | 300 W                                        | 300 W                                        |

| <b>Relay outputs</b>                              | <b>750110</b>             | <b>751110</b>             |
|---------------------------------------------------|---------------------------|---------------------------|
| Utilisation category of auxiliary contacts        |                           |                           |
| AC1 at                                            | <b>240 V</b>              | <b>240 V</b>              |
| Min. current                                      | <b>0,01 A</b>             | <b>0,01 A</b>             |
| Max. current                                      | <b>2 A</b>                | <b>2 A</b>                |
| Max. power                                        | <b>500 VA</b>             | <b>500 VA</b>             |
| DC1 at                                            | <b>24 V</b>               | <b>24 V</b>               |
| Min. current                                      | <b>0,01 A</b>             | <b>0,01 A</b>             |
| Max. current                                      | <b>2 A</b>                | <b>2 A</b>                |
| Max. power                                        | <b>50 W</b>               | <b>50 W</b>               |
| Utilisation category                              |                           |                           |
| in accordance with the standard                   | <b>EN 60947-5-1</b>       | <b>EN 60947-5-1</b>       |
| Utilisation category of safety contacts           |                           |                           |
| AC15 at                                           | <b>230 V</b>              | <b>230 V</b>              |
| Max. current                                      | <b>6 A</b>                | <b>6 A</b>                |
| DC13 (6 cycles/min) at                            | <b>24 V</b>               | <b>24 V</b>               |
| Max. current                                      | <b>7,5 A</b>              | <b>7,5 A</b>              |
| Utilisation category of auxiliary contacts        |                           |                           |
| AC15 at                                           | <b>230 V</b>              | <b>230 V</b>              |
| Max. current                                      | <b>2 A</b>                | <b>2 A</b>                |
| DC13 (6 cycles/min) at                            | <b>24 V</b>               | <b>24 V</b>               |
| Max. current                                      | <b>2 A</b>                | <b>2 A</b>                |
| Utilisation category in accordance with UL        |                           |                           |
| Voltage                                           | <b>240 V AC G. U.</b>     | <b>240 V AC G. U.</b>     |
| with current                                      | <b>10 A</b>               | <b>10 A</b>               |
| Voltage                                           | <b>150 V AC G. U.</b>     | <b>150 V AC G. U.</b>     |
| with current                                      | <b>12 A</b>               | <b>12 A</b>               |
| Voltage                                           | <b>24 V DC Resistive</b>  | <b>24 V DC Resistive</b>  |
| with current                                      | <b>12 A</b>               | <b>12 A</b>               |
| External contact fuse protection, safety contacts |                           |                           |
| in accordance with the standard                   | <b>EN 60947-5-1</b>       | <b>EN 60947-5-1</b>       |
| Max. melting integral                             | <b>640 A<sup>2</sup>s</b> | <b>640 A<sup>2</sup>s</b> |
| Blow-out fuse, quick                              | <b>16 A</b>               | <b>16 A</b>               |
| Blow-out fuse, slow                               | <b>10 A</b>               | <b>10 A</b>               |
| Blow-out fuse, gG                                 | <b>16 A</b>               | <b>16 A</b>               |
| Circuit breaker 24V AC/DC, characteristic B/C     | <b>10 A</b>               | <b>10 A</b>               |

| <b>Relay outputs</b>                                               | <b>750110</b>                                                 | <b>751110</b>                                                 |
|--------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| External contact fuse protection, auxiliary contacts               |                                                               |                                                               |
| Max. melting integral                                              | <b>240 A<sup>2</sup>s</b>                                     | <b>240 A<sup>2</sup>s</b>                                     |
| Blow-out fuse, quick                                               | <b>4 A</b>                                                    | <b>4 A</b>                                                    |
| Blow-out fuse, slow                                                | <b>2 A</b>                                                    | <b>2 A</b>                                                    |
| Blow-out fuse, gG                                                  | <b>4 A</b>                                                    | <b>4 A</b>                                                    |
| Circuit breaker, 24 V AC/DC, characteristic B/C                    | <b>2 A</b>                                                    | <b>2 A</b>                                                    |
| Contact material                                                   | <b>AgSnO<sub>2</sub> + 0,2 µm Au</b>                          | <b>AgSnO<sub>2</sub> + 0,2 µm Au</b>                          |
| <b>Conventional thermal current while loading several contacts</b> | <b>750110</b>                                                 | <b>751110</b>                                                 |
| I <sub>th</sub> per contact at UB DC;<br>AC1: 240 V, DC1: 24 V     |                                                               |                                                               |
| Conv. therm. current with 1 contact                                | <b>12 A</b>                                                   | <b>12 A</b>                                                   |
| Conv. therm. current with 2 contacts                               | <b>11 A</b>                                                   | <b>11 A</b>                                                   |
| Conv. therm. current with 3 contacts                               | <b>9 A</b>                                                    | <b>9 A</b>                                                    |
| Conv. therm. current with 4 contacts                               | <b>8 A</b>                                                    | <b>8 A</b>                                                    |
| <b>Times</b>                                                       | <b>750110</b>                                                 | <b>751110</b>                                                 |
| Switch-on delay                                                    |                                                               |                                                               |
| with automatic start after power on typ.                           | <b>30 ms</b>                                                  | <b>30 ms</b>                                                  |
| with automatic start after power on max.                           | <b>50 ms</b>                                                  | <b>50 ms</b>                                                  |
| Delay-on de-energisation                                           |                                                               |                                                               |
| with E-STOP typ.                                                   | <b>20 ms</b>                                                  | <b>20 ms</b>                                                  |
| with E-STOP max.                                                   | <b>30 ms</b>                                                  | <b>30 ms</b>                                                  |
| with power failure typ.                                            | <b>20 ms</b>                                                  | <b>20 ms</b>                                                  |
| with power failure max.                                            | <b>30 ms</b>                                                  | <b>30 ms</b>                                                  |
| <b>Environmental data</b>                                          | <b>750110</b>                                                 | <b>751110</b>                                                 |
| Climatic suitability                                               | <b>EN 60068-2-78</b>                                          | <b>EN 60068-2-78</b>                                          |
| Ambient temperature                                                |                                                               |                                                               |
| Temperature range                                                  | <b>-10 - 55 °C</b>                                            | <b>-10 - 55 °C</b>                                            |
| Storage temperature                                                |                                                               |                                                               |
| Temperature range                                                  | <b>-40 - 85 °C</b>                                            | <b>-40 - 85 °C</b>                                            |
| Climatic suitability                                               |                                                               |                                                               |
| Humidity                                                           | <b>93 % r. h. at 40 °C</b>                                    | <b>93 % r. h. at 40 °C</b>                                    |
| Condensation during operation                                      | <b>Not permitted</b>                                          | <b>Not permitted</b>                                          |
| EMC                                                                | <b>EN 60947-5-1, EN 61000-6-2, EN 61000-6-4, EN 61326-3-1</b> | <b>EN 60947-5-1, EN 61000-6-2, EN 61000-6-4, EN 61326-3-1</b> |
| Vibration                                                          |                                                               |                                                               |
| in accordance with the standard                                    | <b>EN 60068-2-6</b>                                           | <b>EN 60068-2-6</b>                                           |
| Frequency                                                          | <b>10 - 55 Hz</b>                                             | <b>10 - 55 Hz</b>                                             |
| Amplitude                                                          | <b>0,35 mm</b>                                                | <b>0,35 mm</b>                                                |

| <b>Environmental data</b>                                                                           | <b>750110</b>                                 | <b>751110</b>                                |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------|
| Airgap creepage                                                                                     |                                               |                                              |
| in accordance with the standard                                                                     | <b>EN 60947-1</b>                             | <b>EN 60947-1</b>                            |
| Overvoltage category                                                                                | <b>III</b>                                    | <b>III</b>                                   |
| Pollution degree                                                                                    | <b>2</b>                                      | <b>2</b>                                     |
| Rated insulation voltage                                                                            | <b>250 V</b>                                  | <b>250 V</b>                                 |
| Rated impulse withstand voltage                                                                     | <b>6 kV</b>                                   | <b>6 kV</b>                                  |
| Protection type                                                                                     |                                               |                                              |
| Housing                                                                                             | <b>IP40</b>                                   | <b>IP40</b>                                  |
| Terminals                                                                                           | <b>IP20</b>                                   | <b>IP20</b>                                  |
| Mounting area (e.g. control cabinet)                                                                | <b>IP54</b>                                   | <b>IP54</b>                                  |
| <b>Mechanical data</b>                                                                              | <b>750110</b>                                 | <b>751110</b>                                |
| Mounting position                                                                                   | <b>Any</b>                                    | <b>Any</b>                                   |
| Mechanical life                                                                                     | <b>10,000,000 cycles</b>                      | <b>10,000,000 cycles</b>                     |
| Material                                                                                            |                                               |                                              |
| Bottom                                                                                              | <b>PC</b>                                     | <b>PC</b>                                    |
| Front                                                                                               | <b>PC</b>                                     | <b>PC</b>                                    |
| Top                                                                                                 | <b>PC</b>                                     | <b>PC</b>                                    |
| Connection type                                                                                     | <b>Screw terminal</b>                         | <b>Spring-loaded terminal</b>                |
| Mounting type                                                                                       | <b>plug-in</b>                                | <b>plug-in</b>                               |
| Conductor cross section with screw terminals                                                        |                                               |                                              |
| 1 core flexible                                                                                     | <b>0,25 - 2,5 mm<sup>2</sup>, 24 - 12 AWG</b> | –                                            |
| 2 core with the same cross section, flexible with crimp connectors, no plastic sleeve               | <b>0,25 - 1 mm<sup>2</sup>, 24 - 16 AWG</b>   | –                                            |
| 2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors | <b>0,2 - 1,5 mm<sup>2</sup>, 24 - 16 AWG</b>  | –                                            |
| Torque setting with screw terminals                                                                 | <b>0,5 Nm</b>                                 | –                                            |
| Stripping length with screw terminals                                                               | <b>8 mm</b>                                   | –                                            |
| Conductor cross section with spring-loaded terminals: Flexible with/without crimp connector         | –                                             | <b>0,2 - 2,5 mm<sup>2</sup>, 24 - 12 AWG</b> |
| Spring-loaded terminals: Terminal points per connection                                             | –                                             | <b>2</b>                                     |
| Stripping length with spring-loaded terminals                                                       | –                                             | <b>9 mm</b>                                  |
| Dimensions                                                                                          |                                               |                                              |
| Height                                                                                              | <b>98 mm</b>                                  | <b>100 mm</b>                                |
| Width                                                                                               | <b>45 mm</b>                                  | <b>45 mm</b>                                 |
| Depth                                                                                               | <b>120 mm</b>                                 | <b>120 mm</b>                                |
| Weight                                                                                              | <b>295 g</b>                                  | <b>295 g</b>                                 |

Where standards are undated, the 2022-09 latest editions shall apply.

## Safety characteristic data

**NOTICE**

You must comply with the safety characteristic data in order to achieve the required safety level for your plant/machine.

| Operating mode | EN ISO 13849-1: 2015 | EN ISO 13849-1: 2015 | EN IEC 62061 SIL CL/max. SIL | EN IEC 62061 61508 PFH [1/h] | EN/IEC 61511 61508 SIL | EN/IEC 61511 61508 PFD | EN ISO 13849-1: 2015 T <sub>M</sub> [year] |
|----------------|----------------------|----------------------|------------------------------|------------------------------|------------------------|------------------------|--------------------------------------------|
| PL e           |                      | Cat. 4               | SIL 3                        | 2,31E-09                     | SIL 3                  | 2,03E-06               | 20                                         |

Safety con-  
tacts, in-  
stantaneous

Explanatory notes for the safety-related characteristic data:

- T<sub>M</sub> is the maximum mission time in accordance with EN ISO 13849-1. The value also applies as the retest interval in accordance with EN/IEC 61508-6 and EN/IEC 61511 and as the proof test interval and mission time in accordance with EN IEC 62061

All the units used within a safety function must be considered when calculating the safety characteristic data.

**INFORMATION**

A safety function's SIL/PL values are **not** identical to the SIL/PL values of the units that are used and may differ from these.

**Classification according to ZVEI, CB24I**

The following tables describe the classes and specific values of the product interface and the classes of interfaces compatible with it. The classification is described in the ZVEI position paper "Classification of Binary 24 V Interfaces - Functional Safety aspects covered by dynamic testing".

**Input****Interfaces**

Drain

Interface

**Module**

Class

**C0**

Source

Interface

**Sensor**

Class

**C1, C2, C3****Drain parameters**

Max. test pulse duration

**5 ms**

Min. input resistance

**0,2 kOhm**

Max. capacitive load

**10 nF****Relay outputs****Interfaces**

Source

Interface

**Module**

Class

**A**

Drain

Interface

**Actuator**

Class

**A****Source parameters**

Min. switching voltage

**24 V**

Max. switching voltage

**250 V**

Min. switching current

**0,01 A**

Max. switching current

**12 A**

Potential isolation

**Yes**

## Supplementary data



### CAUTION!

It is essential to consider the relay's service life graphs. The relay outputs' safety-related characteristic data is only valid if the values in the service life graphs are met.

The PFH value depends on the switch frequency and the load of the relay output.

If the service life graphs are not accessible, the stated PFH value can be used irrespective of the switch frequency and the load, as the PFH value already considers the relay's B10d value as well as the failure rates of the other components.

### Service life graph

The service life graphs indicate the number of cycles from which failures due to wear must be expected. The wear is mainly caused by the electrical load; the mechanical load is negligible.

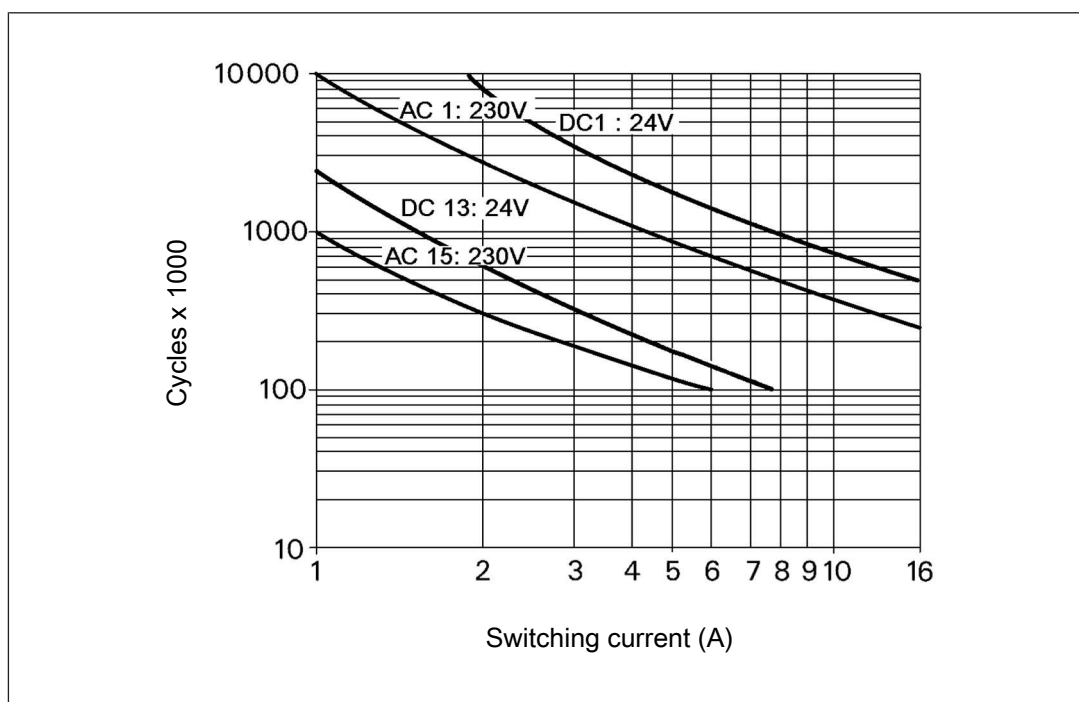


Fig.: Service life graphs at 24 V DC and 230 V AC

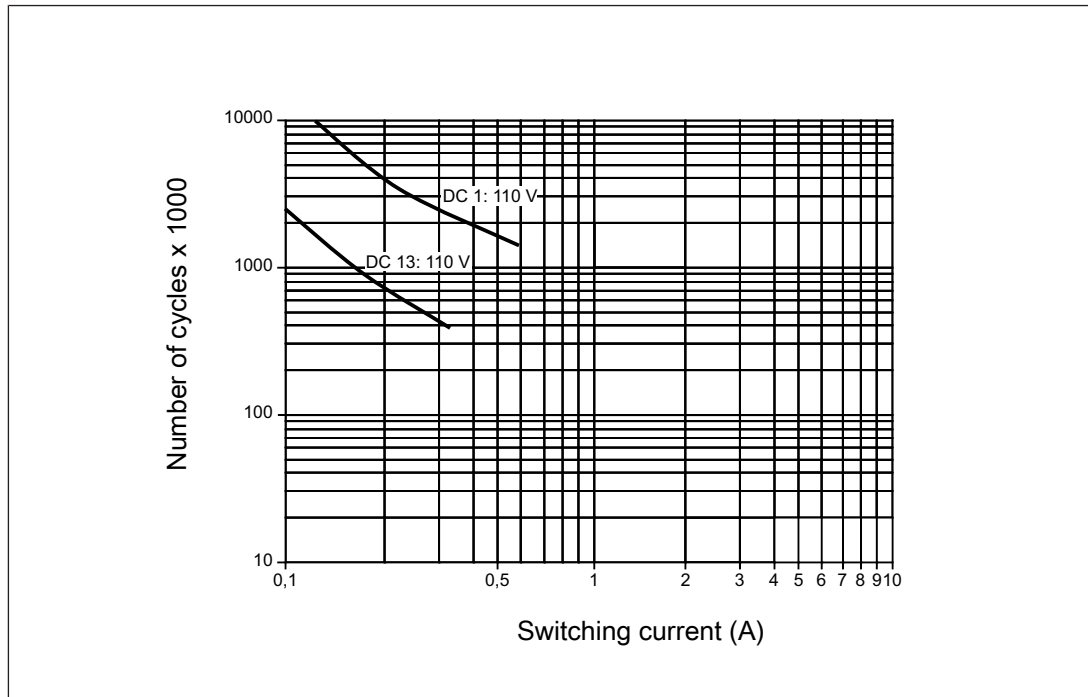


Fig.: Service life graphs at 110 V DC

### Example

- ▶ Inductive load: 2 A
- ▶ Utilisation category: AC15
- ▶ Contact service life: 300 000 cycles

Provided the application to be implemented requires fewer than 300 000 cycles, the PFH value (see Technical details) can be used in the calculation.

To increase the service life, sufficient spark suppression must be provided on all output contacts. With capacitive loads, any power surges that occur must be noted. With DC contactors, use flywheel diodes for spark suppression.

**Operating height in accordance with EN 60664-1**

The values stated in the technical details apply to the use of the product in operating heights up to max. 2000 m above sea level. When used in greater heights, constraints have to be taken into account:

- ▶ Permitted maximum operating height 5000 m
- ▶ Reduction of rated insulation voltage and rated impulse withstand voltage for applications with safe separation:

| Maximum operation height | Rated insulation voltage | Overvoltage category | Max. rated impulse withstand voltage |
|--------------------------|--------------------------|----------------------|--------------------------------------|
| 3000 m                   | 150 V                    | II                   | 2.5 kV                               |
|                          | 100 V                    | III                  | 2.5 kV                               |
| 4000 m                   | 150 V                    | II                   | 2.5 kV                               |
|                          | 100 V                    | III                  | 2.5 kV                               |
| 5000 m                   | 150 V                    | II                   | 2.5 kV                               |
|                          | 100 V                    | III                  | 2.5 kV                               |

- ▶ Reduction of rated insulation voltage and rated impulse withstand voltage for applications with basic insulation:

| Maximum operation height | Rated insulation voltage | Overvoltage category | Max. rated impulse withstand voltage |
|--------------------------|--------------------------|----------------------|--------------------------------------|
| 3000 m                   | 250 V                    | II                   | 2.5 kV                               |
|                          | 150 V                    | III                  | 2.5 kV                               |
| 4000 m                   | 250 V                    | II                   | 2.5 kV                               |
|                          | 150 V                    | III                  | 2.5 kV                               |
| 5000 m                   | 250 V                    | II                   | 2.5 kV                               |
|                          | 150 V                    | III                  | 2.5 kV                               |

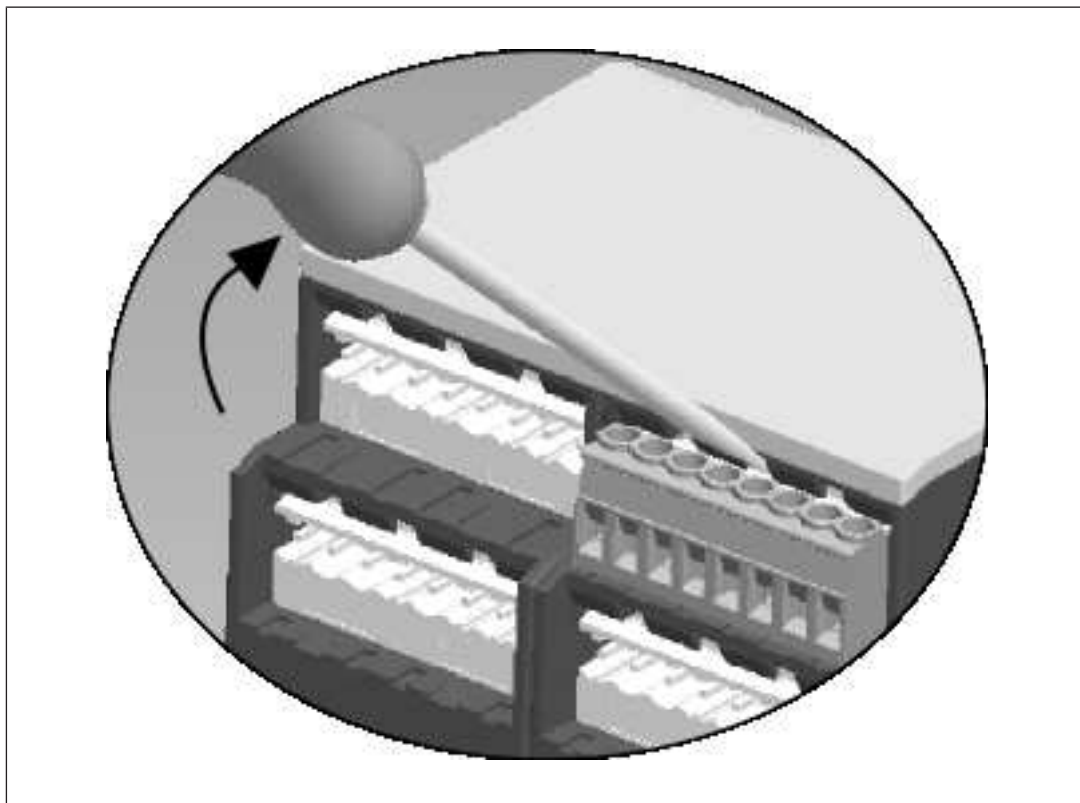
- ▶ From an operating height of 2000 m the max. permitted ambient temperature is reduced by 0.5 °C/100 m

| Operating height | Permitted ambient temperature |
|------------------|-------------------------------|
| 3000 m           | 50 °C                         |
| 4000 m           | 45 °C                         |
| 5000 m           | 40 °C                         |

## Remove plug-in terminals

### Procedure

- ▶ Insert a suitable screwdriver into the housing recess behind the terminal.
- Do **not** remove the terminals by pulling the cables!
- ▶ Lever the terminal out.



### Order reference

| Product type | Features | Connection type         | Order no. |
|--------------|----------|-------------------------|-----------|
| PNOZ s10     | 24 V DC  | Screw terminals         | 750110    |
| PNOZ s10 C   | 24 V DC  | Spring-loaded terminals | 751110    |

### EC declaration of conformity

This product/these products meet the requirements of the directive 2006/42/EC on machinery of the European Parliament and of the Council. The complete EC Declaration of Conformity is available on the Internet at [www.pilz.com/downloads](http://www.pilz.com/downloads).

Representative: Pilz GmbH & Co. KG, Felix-Wankel-Str. 2, 73760 Ostfildern, Germany

### **UKCA-Declaration of Conformity**

This product(s) complies with following UK legislation: Supply of Machinery (Safety) Regulation 2008.

The complete UKCA Declaration of Conformity is available on the Internet at [www.pilz.com/downloads](http://www.pilz.com/downloads).

Representative: Pilz Automation Technology, Pilz House, Little Colliers Field, Corby, Northamptonshire, NN18 8TJ United Kingdom, eMail: [mail@pilz.co.uk](mailto:mail@pilz.co.uk)

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