



Visualisation; Diagnostics

Easy to Configure

Programming IEC 61131-3

Rapid Installation

## PNOZ s6

# PILZ

THE SPIRIT OF SAFETY

► Safety relays

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SD means Secure Digital

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## Introduction

### Validity of documentation

This documentation is valid for the product PNOZ s6. 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 two-hand control relay PNOZ s6 meets the requirements of EN 574 Type IIIC. It forces the operator to keep his hands outside the danger zone area during the hazardous movement. The unit is suitable for use on controllers for metalworking presses as a component for simultaneous switching.

It can be used in applications with

- ▶ Mechanical presses (EN 692)
- ▶ Hydraulic presses (EN 693)
- ▶ Safety circuits in accordance with EN 60204-1

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 manual,
- ▶ Use of the product outside the technical details (see [Technical details](#) [ 17]).

**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 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, maintained and decommissioned 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. To be able to inspect, assess and operate devices, systems and machines, the person has to be informed of 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  $T_M$  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:

- ▶ The two-hand circuit and the connected parts of the press control must conform to the relevant safety standards EN 574, EN 692 and EN 693
- ▶ To avoid inductive and capacitance coupling, the cables between the two-hand relay and the pushbuttons must be run separately to any power cables.
- ▶ On account of the low currents you should use gold-plated pushbutton contacts.
- ▶ 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:
  - 3 safety contacts (N/O), instantaneous
  - 1 auxiliary contact (N/C), instantaneous
- ▶ 1 semiconductor output
- ▶ Connection options for:
  - 2 control elements (pushbuttons)
- ▶ A connector can be used to connect 1 PNOZsigma contact expansion module
- ▶ LED for:
  - Supply voltage
  - Input status, channel 1
  - Input status, channel 2
  - Switch status of the safety contacts
  - Feedback loop
  - Fault
- ▶ Plug-in connection terminals (either spring-loaded terminal or screw terminal)
- ▶ See order reference for unit types

### Safety features

The two-hand control relay meets the following safety requirements:

- ▶ The circuit is redundant with built-in self-monitoring.
- ▶ The safety function remains effective in the case of a component failure.
- ▶ The circuit prevents a further press stroke in the case of:
  - Relay failure
  - Contact welding
  - Coil defect on a relay
  - Open circuit
  - Short circuit



## Block diagram/terminal configuration

### Unit types with UB 24 VDC

► U<sub>B</sub>: 24 VDC; Order no. 750106, 751106

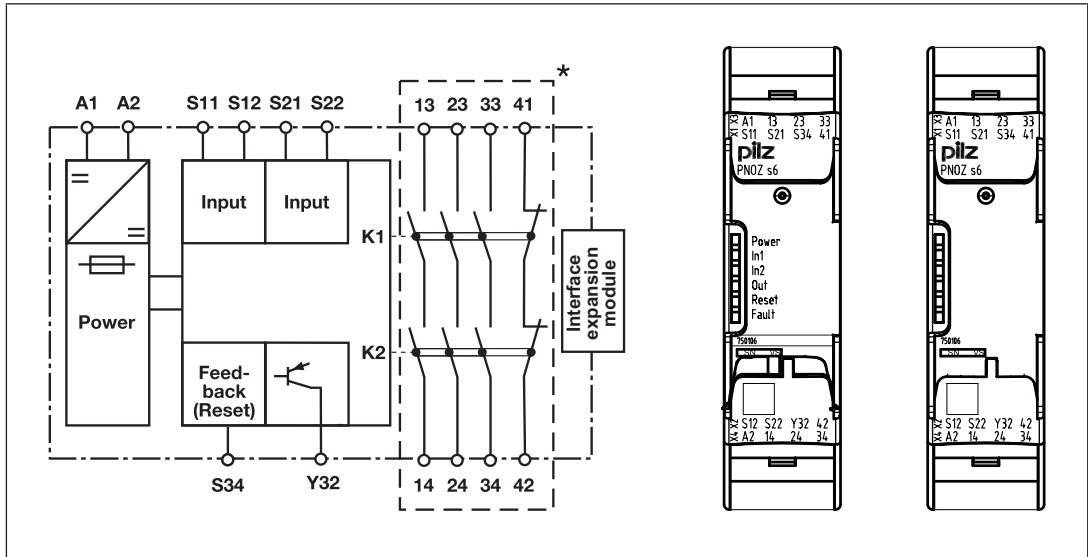


Fig.: Centre: Front view with cover, right: Front view without cover

\*Insulation between the non-marked area and the relay contacts: Basic insulation (over-voltage category III), Protective separation (overvoltage category II)

### Unit types with UB 48 - 240 VAC/DC

► U<sub>B</sub>: 48 - 240 VAC/DC; Order no. 750136, 751136

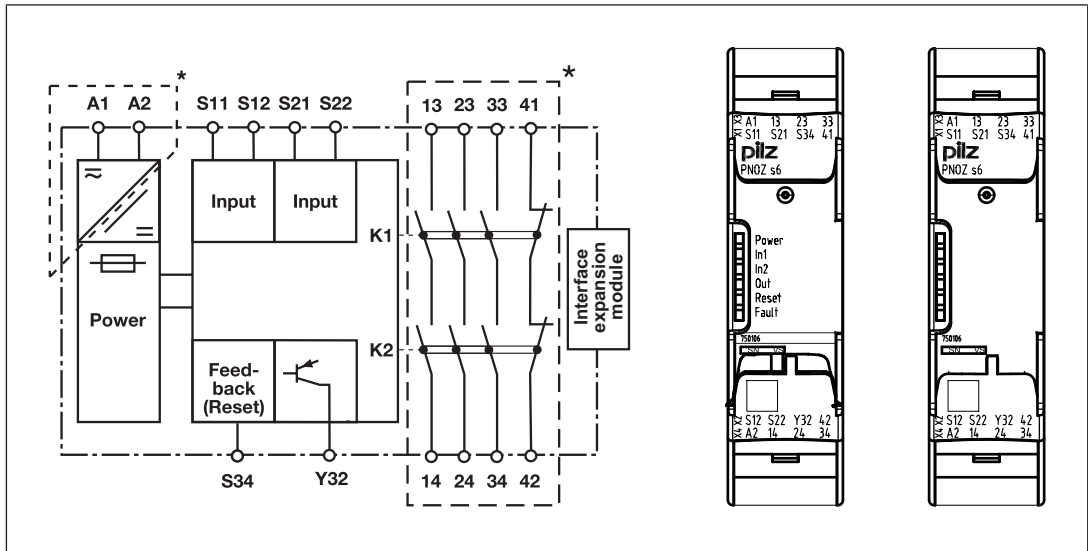


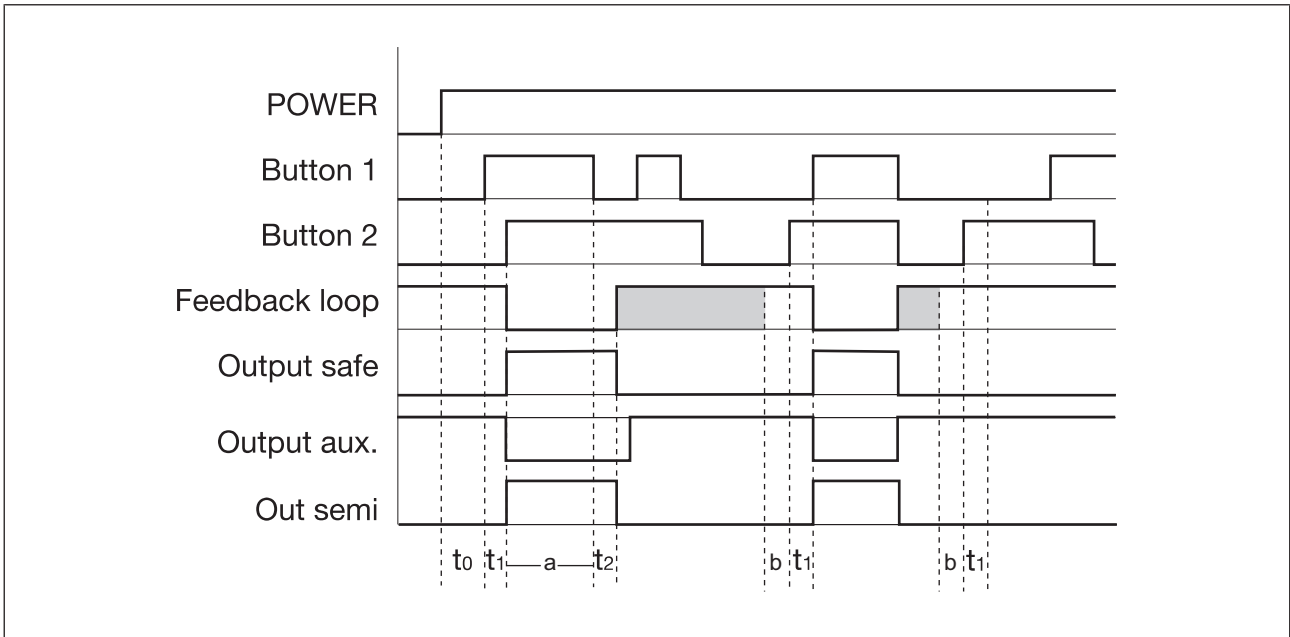
Fig.: Centre: Front view with cover, right: Front view without cover

\*Insulation between the non-marked area and the relay contacts: Basic insulation (over-voltage category III), Protective separation (overvoltage category II)

### Function description

- ▶ The two-hand control relay must be activated by simultaneously pressing two buttons within 0,5 s. If one or both of the buttons are released, the unit interrupts the control command for the hazardous movement.
- ▶ Reactivation: The output relays will not re-energise until both operator elements have been released and then re-operated simultaneously.

### Timing diagram



### Legend

- ▶ POWER: Supply voltage
- ▶ Button 1/Button 2: Input circuits
- ▶ Feedback loop: Feedback loop
- ▶ Output safe: Safety outputs
- ▶ Output aux: Auxiliary contacts
- ▶ Out semi: Semiconductor output switch status
- ▶  $t_0$ : Recovery time after power on
- ▶  $t_1$ : Simultaneity, channel 1 and 2
- ▶  $t_2$ : Delay-on de-energisation
- ▶ a: Operating cycle ended through button 1 or 2
- ▶ b: S34-S12 must be closed before before the button is operated

Shaded area: Status irrelevant

## Installation

### Install base unit without contact expansion module:

- ▶ 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 expansion module.
- ▶ Connect the base unit and the contact expansion module to the supplied connector before mounting the units to the DIN rail.

### Installation in control cabinet

- ▶ 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 device upwards or downwards before lifting it from the DIN rail.

## Wiring

Please note:

- ▶ Information given in the "[Technical details \[17\]](#)" must be followed.
- ▶ Outputs 13-14, 23-24, 33-34 are safety contacts; output 41-42 is an auxiliary contact (e.g. for display).
- ▶ Auxiliary contact 41-42 and semiconductor output Y32 should **not** be used for safety circuits!
- ▶ To prevent contact welding, a fuse should be connected before the output contacts (see [Technical details \[17\]](#)).
- ▶ Calculation of the max. cable length  $l_{\max}$  in the input circuit:

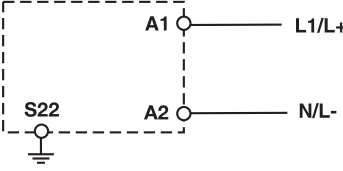
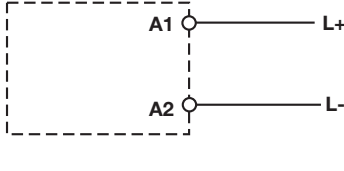
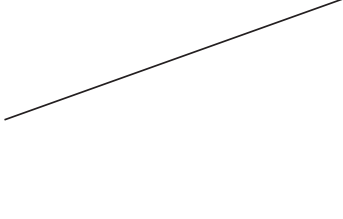
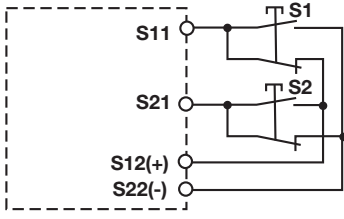
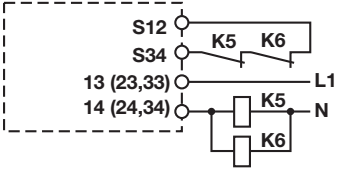
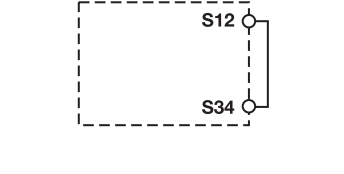
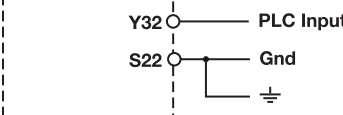
$$l_{\max} = \frac{R_{l_{\max}}}{R_l / \text{km}}$$

$R_{l_{\max}}$  = max. overall cable resistance (see [Technical details \[17\]](#))

$R_l / \text{km}$  = 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 must be provided on all output contacts with capacitive and inductive loads.
- ▶ With  $U_B$  48 – 240 VAC/DC: Connect S22 to functional earth.
- ▶ On 24 VDC devices:  
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

Supply voltage	Unit types with $U_B$ 48-240 VAC/DC	Unit types with $U_B$ 240 VDC
		
Input circuit	Single-channel	Dual-channel
Two-hand pushbuttons <b>with</b> detection of shorts across contacts		
Feedback loop	with feedback loop monitoring	without feedback loop monitoring
Link or contacts from external contactors		
Semiconductor output		
		

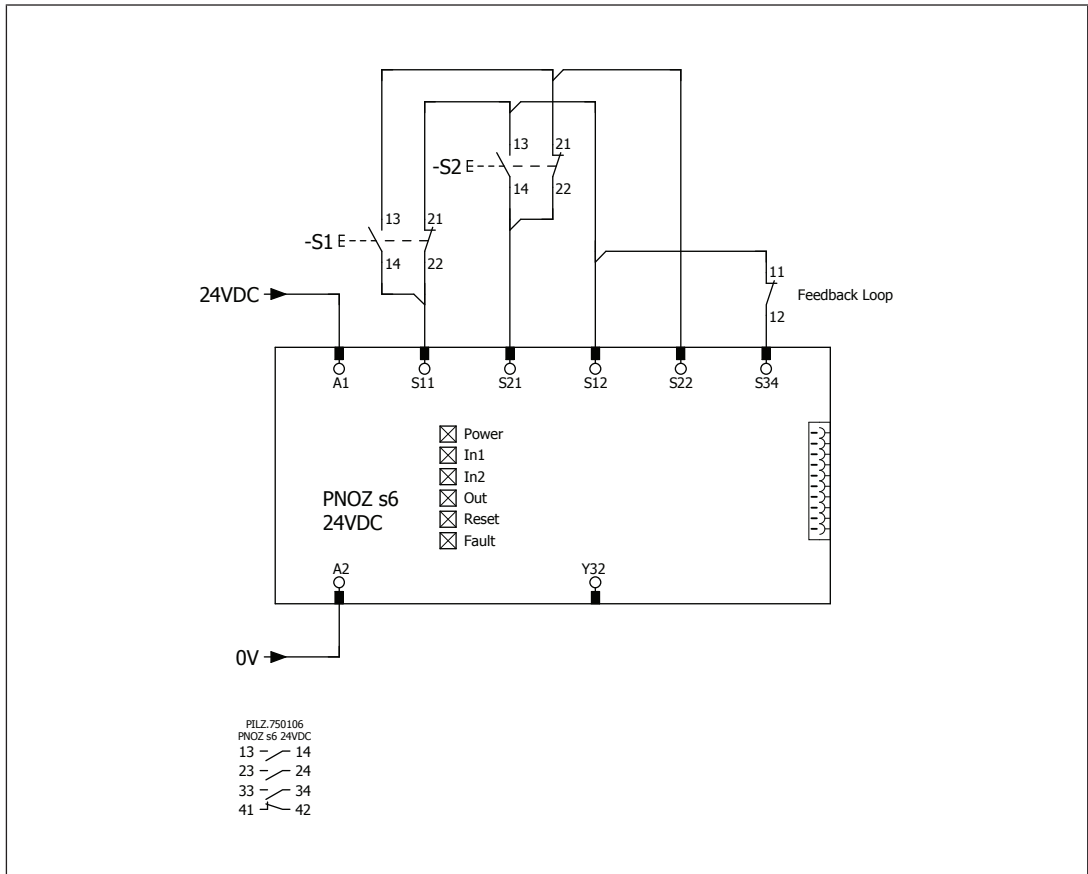
#### Legend

- ▶ S1/S2: Two-hand pushbuttons

## Application example

### Two-hand pushbuttons

- ▶ Dual-channel
- ▶ with detection of shorts across contacts
- ▶ with feedback loop monitoring
- ▶ EN 574, Type IIIC



## Operation

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



### NOTICE

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

The unit is ready for operation when the Power LED is permanently lit.

LEDs indicate the status and errors during operation:



LED on



LED flashes



### INFORMATION

Status indicators and error indicators may occur independently. In the case of an error display, the "Fault" LED will light or flash (exception: "Supply voltage too low"). An LED that is also flashing indicates the potential cause of the error. An LED that is lit and is static indicates a normal operating status. Several status indicators and error indicators may occur simultaneously.

### Status indicators



#### POWER

Supply voltage is present.



#### IN1

Pushbutton at S11 is operated.



#### IN2

Pushbutton at S21 is operated.



#### OUT

Safety contacts are closed and semiconductor output Y32 carries a high signal.



#### RESET

24 VDC is present at S34.

## Error indicators



### All LEDs off

Diagnostics: Short across contacts/earth fault; unit switched off

- ▶ Remedy: Rectify short across contacts/earth fault, switch off supply voltage for 1 min.



### FAULT

Diagnostics: Plug terminator not connected

- ▶ Remedy: Insert plug terminator, switch supply voltage off and then on again.



### FAULT

Diagnostics: Internal error, unit defective

- ▶ Remedy: Switch supply voltage off and then on again, change unit if necessary.



### POWER

Diagnostics: Supply voltage too low

- ▶ Remedy: Check supply voltage and increase if necessary.



### IN1, IN2 alternately



### FAULT

Diagnostics: Connection error (possibly: cable resistance in the input circuit is too high) or short between S12 and S22 detected or internal error

- ▶ Remedy: Rectify connection error or short across contacts, switch supply voltage off and then on again.



### IN1



### FAULT

Diagnostics: Simultaneity exceeded: Channel 1 too late or power-up blocked due to short-term interruption at S11; input circuits not operated simultaneously

- ▶ Remedy: Open both input circuits, S12 and S22, simultaneously and then close again.



### IN2



### FAULT

Diagnostics: Simultaneity exceeded: Channel 2 too late or power-up blocked due to short-term interruption at S21; input circuits not operated simultaneously

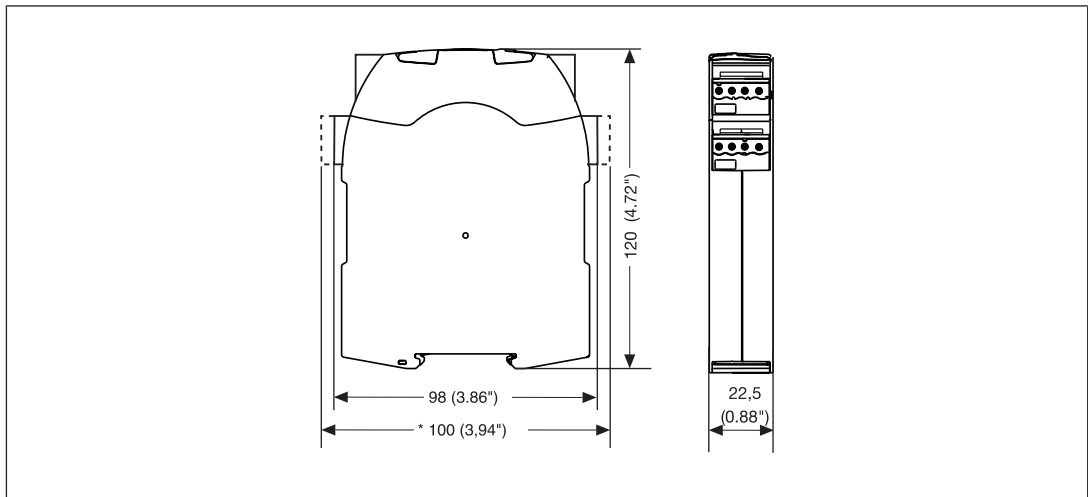
- ▶ Remedy: Open both input circuits, S12 and S22, simultaneously and then close again.

### 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 Order no. 750106, 750136s

<b>General</b>	<b>750106</b>	<b>750136</b>
Certifications	CCC, CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed	CCC, CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed
<b>Electrical data</b>	<b>750106</b>	<b>750136</b>
Supply voltage		
Voltage	<b>24 V</b>	<b>48 - 240 V</b>
Kind	<b>DC</b>	<b>AC/DC</b>
Voltage tolerance	<b>-15 %/+10 %</b>	<b>-15 %/+10 %</b>
Output of external power supply (AC)	–	<b>7 VA</b>
Output of external power supply (DC)	<b>3,5 W</b>	<b>3,5 W</b>
Frequency range AC	–	<b>50 - 60 Hz</b>
Residual ripple DC	<b>20 %</b>	<b>20 %</b>
Duty cycle	<b>100 %</b>	<b>100 %</b>
Current at		
Normally open contact	<b>20 mA</b>	<b>20 mA</b>
N/C	<b>10 mA</b>	<b>10 mA</b>
Max. overall cable resistance R <sub>I</sub> -max per input circuit	<b>30 Ohm</b>	<b>30 Ohm</b>
External unit fuse protection F1 min.	<b>1 A</b>	<b>1 A</b>
External unit fuse protection F1 max.	<b>Max. conductor cross section</b>	<b>Max. conductor cross section</b>
Two-hand control relay type		
In accordance with the standard	<b>EN 574</b>	<b>EN 574</b>
Type	<b>III C</b>	<b>III C</b>
<b>Inputs</b>	<b>750106</b>	<b>750136</b>
Number	<b>2</b>	<b>2</b>
Voltage at		
Input circuit DC	<b>24 V</b>	<b>24 V</b>
Feedback loop DC	<b>24 V</b>	<b>24 V</b>
Current at		
Feedback loop DC	<b>15 mA</b>	<b>15 mA</b>
<b>Semiconductor outputs</b>	<b>750106</b>	<b>750136</b>
Number	<b>1</b>	<b>1</b>
Voltage	<b>24 V</b>	<b>24 V</b>
Current	<b>20 mA</b>	<b>20 mA</b>
Residual current at "0" signal	<b>0,1 mA</b>	<b>0,1 mA</b>
Max. internal voltage drop	<b>5 V</b>	–
Conditional rated short circuit current	<b>100 A</b>	<b>100 A</b>
Lowest operating current	<b>0 mA</b>	<b>0 mA</b>
Utilisation category in accordance with EN 60947-1	<b>DC-12</b>	<b>DC-12</b>

<b>Relay outputs</b>	<b>750106</b>	<b>750136</b>
Number of output contacts		
Safety contacts (N/O), instantaneous	<b>3</b>	<b>3</b>
Auxiliary contacts (N/C)	<b>1</b>	<b>1</b>
Max. short circuit current IK	<b>1 kA</b>	<b>1 kA</b>
Utilisation category		
In accordance with the standard	<b>EN 60947-4-1</b>	<b>EN 60947-4-1</b>
Utilisation category of safety contacts		
AC1 at	<b>240 V</b>	<b>240 V</b>
Min. current	<b>0,003 A</b>	<b>0,003 A</b>
Max. current	<b>6 A</b>	<b>6 A</b>
Min. output	<b>0,04 VA</b>	<b>0,04 VA</b>
Max. power	<b>1500 VA</b>	<b>1500 VA</b>
DC1 at	<b>24 V</b>	<b>24 V</b>
Min. current	<b>0,003 A</b>	<b>0,003 A</b>
Max. current	<b>6 A</b>	<b>6 A</b>
Min. output	<b>0,04 W</b>	<b>0,04 W</b>
Max. power	<b>150 W</b>	<b>150 W</b>
Utilisation category of auxiliary contacts		
AC1 at	<b>240 V</b>	<b>240 V</b>
Min. current	<b>0,003 A</b>	<b>0,003 A</b>
Max. current	<b>6 A</b>	<b>6 A</b>
Min. output	<b>0,04 VA</b>	<b>0,04 VA</b>
Max. power	<b>1500 VA</b>	<b>1500 VA</b>
DC1 at	<b>24 V</b>	<b>24 V</b>
Min. current	<b>0,003 A</b>	<b>0,003 A</b>
Max. current	<b>6 A</b>	<b>6 A</b>
Min. output	<b>0,04 W</b>	<b>0,04 W</b>
Max. power	<b>150 W</b>	<b>150 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>5 A</b>	<b>3 A</b>
DC13 (6 cycles/min) at	<b>24 V</b>	<b>24 V</b>
Max. current	<b>5 A</b>	<b>4 A</b>
Utilisation category of auxiliary contacts		
AC15 at	<b>230 V</b>	<b>230 V</b>
Max. current	<b>5 A</b>	<b>3 A</b>
DC13 (6 cycles/min) at	<b>24 V</b>	<b>24 V</b>
Max. current	<b>5 A</b>	<b>4 A</b>

<b>Relay outputs</b>	<b>750106</b>	<b>750136</b>
Utilisation category in accordance with UL		
Voltage	<b>240 V AC G.U. (same polarity)</b>	<b>240 V AC G.U. (same polarity)</b>
With current	<b>6 A</b>	<b>6 A</b>
Voltage	<b>24 V DC G. U.</b>	<b>24 V DC G. U.</b>
With current	<b>6 A</b>	<b>6 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>260 A<sup>2</sup>s</b>	<b>66 A<sup>2</sup>s</b>
Blow-out fuse, quick	<b>10 A</b>	<b>6 A</b>
Blow-out fuse, slow	<b>6 A</b>	<b>4 A</b>
Blow-out fuse, gG	<b>10 A</b>	<b>6 A</b>
Circuit breaker 24V AC/DC, characteristic B/C	<b>6 A</b>	<b>4 A</b>
External contact fuse protection, auxiliary contacts		
Max. melting integral	<b>160 A<sup>2</sup>s</b>	<b>66 A<sup>2</sup>s</b>
Blow-out fuse, quick	<b>10 A</b>	<b>6 A</b>
Blow-out fuse, slow	<b>6 A</b>	<b>4 A</b>
Blow-out fuse, gG	<b>6 A</b>	<b>6 A</b>
Circuit breaker 24 V AC/DC, characteristic B/C	<b>6 A</b>	<b>4 A</b>
Contact material	<b>AgCuNi + 0,2 µm Au</b>	<b>AgCuNi + 0,2 µm Au</b>
<b>Conventional thermal current while loading several contacts</b>	<b>750106</b>	<b>750136</b>
I <sub>th</sub> per contact at UB AC; AC1: 240 V, DC1: 24 V		
Conv. therm. current with 1 contact	–	<b>6 A</b>
Conv. therm. current with 2 contacts	–	<b>6 A</b>
Conv. therm. current with 3 contacts	–	<b>4,5 A</b>
I <sub>th</sub> per contact at UB DC; AC1: 240 V, DC1: 24 V		
Conv. therm. current with 1 contact	<b>6 A</b>	<b>6 A</b>
Conv. therm. current with 2 contacts	<b>6 A</b>	<b>6 A</b>
Conv. therm. current with 3 contacts	<b>6 A</b>	<b>4,5 A</b>
<b>Times</b>	<b>750106</b>	<b>750136</b>
Delay-on de-energisation (response time in accordance with EN 574)		
Normally open contact	<b>30 ms</b>	<b>30 ms</b>
N/C	<b>40 ms</b>	<b>40 ms</b>

<b>Times</b>	<b>750106</b>	<b>750136</b>
Recovery time	<b>250 ms</b>	<b>250 ms</b>
Supply interruption before de-energisation	<b>20 ms</b>	<b>20 ms</b>
Simultaneity, channel 1 and 2 max.	<b>0,5 s</b>	<b>0,5 s</b>
<b>Environmental data</b>	<b>750106</b>	<b>750136</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>
Airgap creepage		
In accordance with the standard	<b>EN 60947-1</b>	<b>EN 60947-1</b>
Overvoltage category	<b>III / II</b>	<b>III / II</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>4 kV</b>	<b>4 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>750106</b>	<b>750136</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>Screw terminal</b>
Mounting type	<b>plug-in</b>	<b>plug-in</b>

<b>Mechanical data</b>	<b>750106</b>	<b>750136</b>
Conductor cross section with screw terminals		
1 core flexible	<b>0,25 - 2,5 mm<sup>2</sup>, 24 - 12 AWG</b>	<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>	<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>	<b>0,2 - 1,5 mm<sup>2</sup>, 24 - 16 AWG</b>
Torque setting with screw terminals	<b>0,5 Nm</b>	<b>0,5 Nm</b>
Stripping length with screw terminals	<b>8 mm</b>	<b>8 mm</b>
Dimensions		
Height	<b>98 mm</b>	<b>98 mm</b>
Width	<b>22,5 mm</b>	<b>22,5 mm</b>
Depth	<b>120 mm</b>	<b>120 mm</b>
Weight	<b>185 g</b>	<b>205 g</b>

Where standards are undated, the 2020-07 latest editions shall apply.

### Technical details Order no. 751106, 751136

<b>General</b>	<b>751106</b>	<b>751136</b>
Certifications	CCC, CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed	CCC, CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed
<b>Electrical data</b>	<b>751106</b>	<b>751136</b>
Supply voltage		
Voltage	<b>24 V</b>	<b>48 - 240 V</b>
Kind	<b>DC</b>	<b>AC/DC</b>
Voltage tolerance	<b>-15 %/+10 %</b>	<b>-15 %/+10 %</b>
Output of external power supply (AC)	–	<b>7 VA</b>
Output of external power supply (DC)	<b>3,5 W</b>	<b>3,5 W</b>
Frequency range AC	–	<b>50 - 60 Hz</b>
Residual ripple DC	<b>20 %</b>	<b>20 %</b>
Duty cycle	<b>100 %</b>	<b>100 %</b>
Current at		
Normally open contact	<b>20 mA</b>	<b>20 mA</b>
N/C	<b>10 mA</b>	<b>10 mA</b>
Max. overall cable resistance RI-max per input circuit	<b>30 Ohm</b>	<b>30 Ohm</b>
External unit fuse protection F1 min.	<b>1 A</b>	<b>1 A</b>
External unit fuse protection F1 max.	<b>Max. conductor cross section</b>	<b>Max. conductor cross section</b>
Two-hand control relay type		
In accordance with the standard	<b>EN 574</b>	<b>EN 574</b>
Type	<b>III C</b>	<b>III C</b>
<b>Inputs</b>	<b>751106</b>	<b>751136</b>
Number	<b>2</b>	<b>2</b>
Voltage at		
Input circuit DC	<b>24 V</b>	<b>24 V</b>
Feedback loop DC	<b>24 V</b>	<b>24 V</b>
Current at		
Feedback loop DC	<b>15 mA</b>	<b>15 mA</b>
<b>Semiconductor outputs</b>	<b>751106</b>	<b>751136</b>
Number	<b>1</b>	<b>1</b>
Voltage	<b>24 V</b>	<b>24 V</b>
Current	<b>20 mA</b>	<b>20 mA</b>
Residual current at "0" signal	<b>0,1 mA</b>	<b>0,1 mA</b>
Max. internal voltage drop	<b>5 V</b>	–
Conditional rated short circuit current	<b>100 A</b>	<b>100 A</b>
Lowest operating current	<b>0 mA</b>	<b>0 mA</b>
Utilisation category in accordance with EN 60947-1	<b>DC-12</b>	<b>DC-12</b>

<b>Relay outputs</b>	<b>751106</b>	<b>751136</b>
Number of output contacts		
Safety contacts (N/O), instantaneous	<b>3</b>	<b>3</b>
Auxiliary contacts (N/C)	<b>1</b>	<b>1</b>
Max. short circuit current IK	<b>1 kA</b>	<b>1 kA</b>
Utilisation category		
In accordance with the standard	<b>EN 60947-4-1</b>	<b>EN 60947-4-1</b>
Utilisation category of safety contacts		
AC1 at	<b>240 V</b>	<b>240 V</b>
Min. current	<b>0,003 A</b>	<b>0,003 A</b>
Max. current	<b>6 A</b>	<b>6 A</b>
Min. output	<b>0,04 VA</b>	<b>0,04 VA</b>
Max. power	<b>1500 VA</b>	<b>1500 VA</b>
DC1 at	<b>24 V</b>	<b>24 V</b>
Min. current	<b>0,003 A</b>	<b>0,003 A</b>
Max. current	<b>6 A</b>	<b>6 A</b>
Min. output	<b>0,04 W</b>	<b>0,04 W</b>
Max. power	<b>150 W</b>	<b>150 W</b>
Utilisation category of auxiliary contacts		
AC1 at	<b>240 V</b>	<b>240 V</b>
Min. current	<b>0,003 A</b>	<b>0,003 A</b>
Max. current	<b>6 A</b>	<b>6 A</b>
Min. output	<b>0,04 VA</b>	<b>0,04 VA</b>
Max. power	<b>1500 VA</b>	<b>1500 VA</b>
DC1 at	<b>24 V</b>	<b>24 V</b>
Min. current	<b>0,003 A</b>	<b>0,003 A</b>
Max. current	<b>6 A</b>	<b>6 A</b>
Min. output	<b>0,04 W</b>	<b>0,04 W</b>
Max. power	<b>150 W</b>	<b>150 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>5 A</b>	<b>3 A</b>
DC13 (6 cycles/min) at	<b>24 V</b>	<b>24 V</b>
Max. current	<b>5 A</b>	<b>4 A</b>
Utilisation category of auxiliary contacts		
AC15 at	<b>230 V</b>	<b>230 V</b>
Max. current	<b>5 A</b>	<b>3 A</b>
DC13 (6 cycles/min) at	<b>24 V</b>	<b>24 V</b>
Max. current	<b>5 A</b>	<b>4 A</b>

<b>Relay outputs</b>	<b>751106</b>	<b>751136</b>
Utilisation category in accordance with UL		
Voltage	<b>240 V AC G.U. (same polarity)</b>	<b>240 V AC G.U. (same polarity)</b>
With current	<b>6 A</b>	<b>6 A</b>
Voltage	<b>24 V DC G. U.</b>	<b>24 V DC G. U.</b>
With current	<b>6 A</b>	<b>6 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>260 A<sup>2</sup>s</b>	<b>66 A<sup>2</sup>s</b>
Blow-out fuse, quick	<b>10 A</b>	<b>6 A</b>
Blow-out fuse, slow	<b>6 A</b>	<b>4 A</b>
Blow-out fuse, gG	<b>10 A</b>	<b>6 A</b>
Circuit breaker 24V AC/DC, characteristic B/C	<b>6 A</b>	<b>4 A</b>
External contact fuse protection, auxiliary contacts		
Max. melting integral	<b>160 A<sup>2</sup>s</b>	<b>66 A<sup>2</sup>s</b>
Blow-out fuse, quick	<b>10 A</b>	<b>6 A</b>
Blow-out fuse, slow	<b>6 A</b>	<b>4 A</b>
Blow-out fuse, gG	<b>6 A</b>	<b>6 A</b>
Circuit breaker 24 V AC/DC, characteristic B/C	<b>6 A</b>	<b>4 A</b>
Contact material	<b>AgCuNi + 0,2 µm Au</b>	<b>AgCuNi + 0,2 µm Au</b>
<b>Conventional thermal current while loading several contacts</b>	<b>751106</b>	<b>751136</b>
I <sub>th</sub> per contact at UB AC; AC1: 240 V, DC1: 24 V		
Conv. therm. current with 1 contact	–	<b>6 A</b>
Conv. therm. current with 2 contacts	–	<b>6 A</b>
Conv. therm. current with 3 contacts	–	<b>4,5 A</b>
I <sub>th</sub> per contact at UB DC; AC1: 240 V, DC1: 24 V		
Conv. therm. current with 1 contact	<b>6 A</b>	<b>6 A</b>
Conv. therm. current with 2 contacts	<b>6 A</b>	<b>6 A</b>
Conv. therm. current with 3 contacts	<b>6 A</b>	<b>4,5 A</b>
<b>Times</b>	<b>751106</b>	<b>751136</b>
Delay-on de-energisation (response time in accordance with EN 574)		
Normally open contact	<b>30 ms</b>	<b>30 ms</b>
N/C	<b>40 ms</b>	<b>40 ms</b>



<b>Times</b>	<b>751106</b>	<b>751136</b>
Recovery time	<b>250 ms</b>	<b>250 ms</b>
Supply interruption before de-energisation	<b>20 ms</b>	<b>20 ms</b>
Simultaneity, channel 1 and 2 max.	<b>0,5 s</b>	<b>0,5 s</b>
<b>Environmental data</b>	<b>751106</b>	<b>751136</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>
Airgap creepage		
In accordance with the standard	<b>EN 60947-1</b>	<b>EN 60947-1</b>
Overvoltage category	<b>III / II</b>	<b>III / II</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>4 kV</b>	<b>4 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>751106</b>	<b>751136</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>Spring-loaded terminal</b>	<b>Spring-loaded terminal</b>
Mounting type	<b>plug-in</b>	<b>plug-in</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>	<b>0,2 - 2,5 mm<sup>2</sup>, 24 - 12 AWG</b>
Spring-loaded terminals: Terminal points per connection	<b>2</b>	<b>2</b>
Stripping length with spring-loaded terminals	<b>9 mm</b>	<b>9 mm</b>

<b>Mechanical data</b>	<b>751106</b>	<b>751136</b>
Dimensions		
Height	<b>100 mm</b>	<b>100 mm</b>
Width	<b>22,5 mm</b>	<b>22,5 mm</b>
Depth	<b>120 mm</b>	<b>120 mm</b>
Weight	<b>185 g</b>	<b>205 g</b>

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Where standards are undated, the 2020-07 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 62061 SIL CL	EN 62061 PFH <sub>D</sub> [1/h]	IEC 61511 SIL	IEC 61511 PFD	EN ISO 13849-1: 2015 T <sub>M</sub> [year]
	PL	Category					
Two-hand function	PL e	Cat. 4	SIL CL 3	2,62E-09	SIL 3	3,32E-05	20

Explanatory notes for the safety-related characteristic data:

- ▶ The SIL CL value in accordance with EN 62061 corresponds to the SIL value in accordance with EN 61508.
- ▶ 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 61508-6 and IEC 61511 and as the proof test interval and mission time in accordance with EN 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 be different. We recommend that you use the PAScal software tool to calculate the safety function's SIL/PL values.

### 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.

Unit types with  $U_B$  240 VDC

►  $U_B$ : 24 VDC; Order no. 750106, 751106

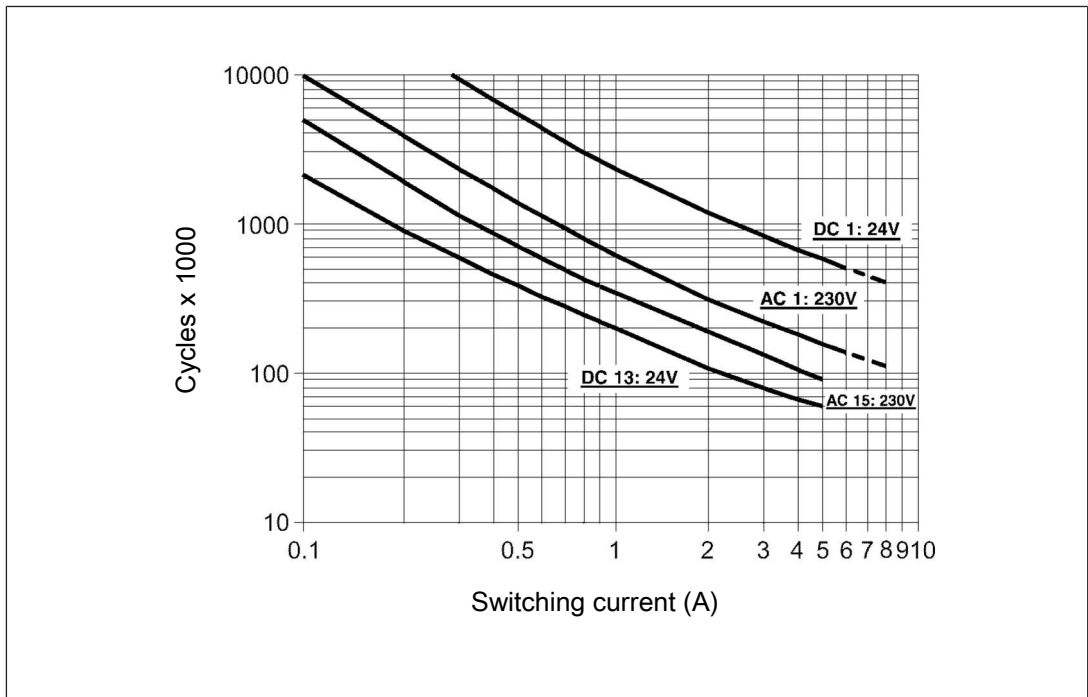


Fig.: Service life graphs at 24 VDC and 230 VAC

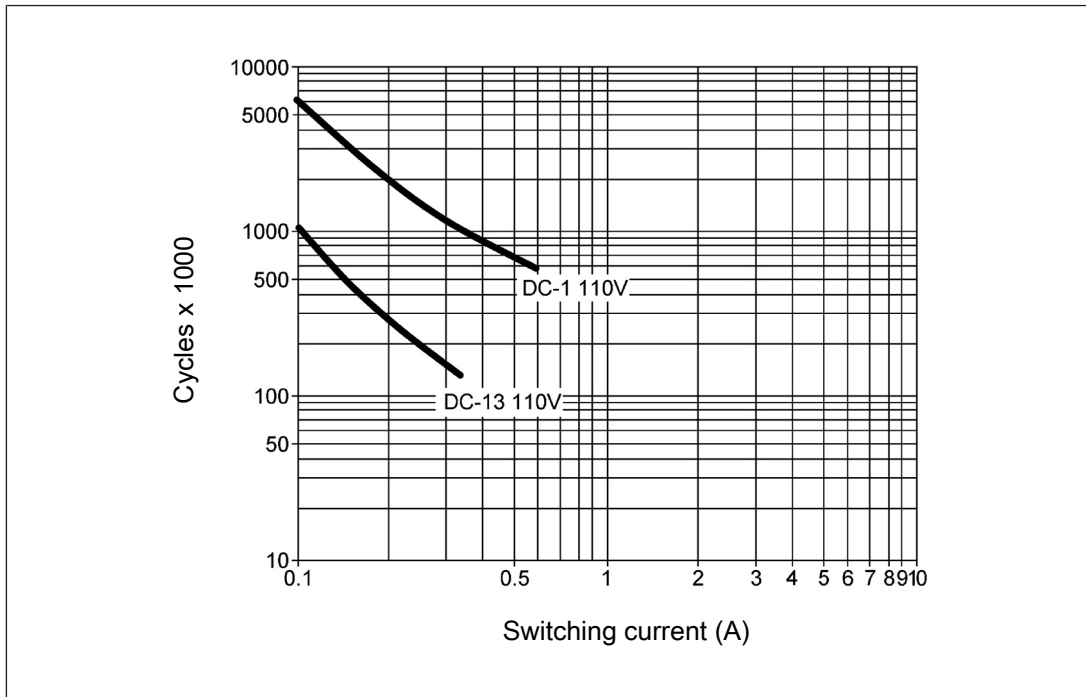


Fig.: Service life graphs at 110 VDC

### Example

- ▶ Inductive load: 0.2 A
- ▶ Utilisation category: AC15
- ▶ Contact service life: 2 000 000 cycles

Provided the application to be implemented requires fewer than 2 000 000 cycles, the PFH value (see [Technical details \[17\]](#)) 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.

Unit types with  $U_B$  48 – 240 VAC/DC

- ▶  $U_B$ : 48 – 240 VAC/DC; Order no. 750136, 751136

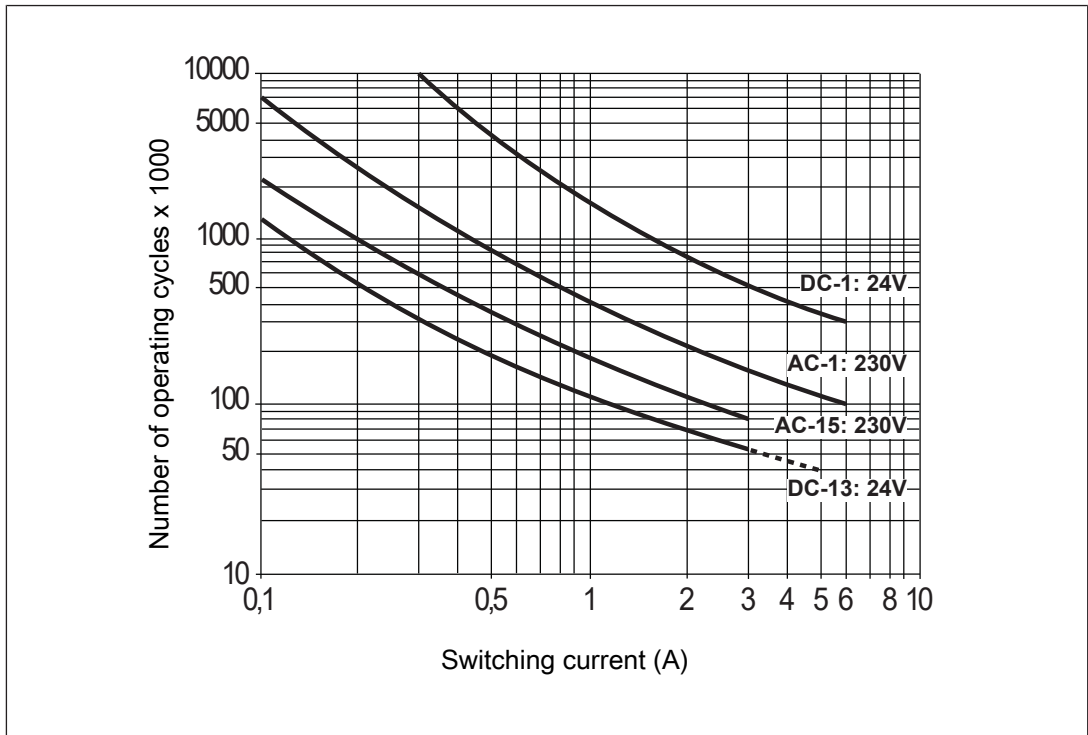


Fig.: Service life graphs at 24 VDC and 230 VAC

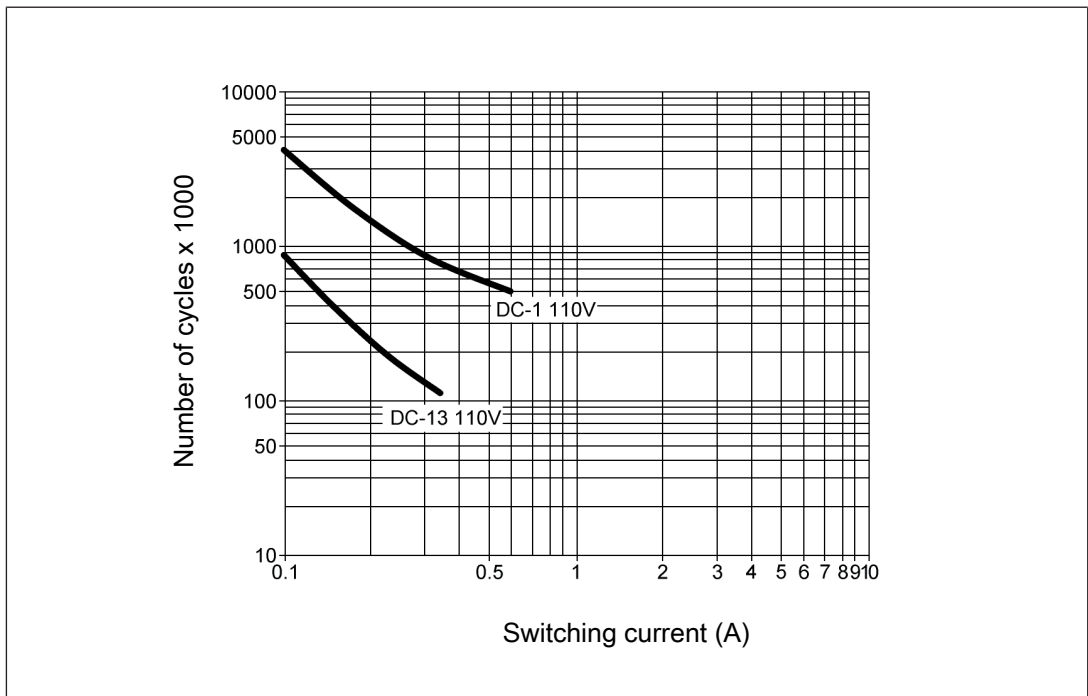


Fig.: Service life graphs at 110 VDC

**Example**

- ▶ Inductive load: 0.2 A
- ▶ Utilisation category: AC15
- ▶ Contact service life: 1 000 000 cycles

Provided the application to be implemented requires fewer than 1 000 000 cycles, the PFH value (see [Technical details \[📖 17\]](#)) can be used in the calculation.

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

### Permitted operating height

The values stated in the technical details apply to the use of the device 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
- ▶ Only device versions with UB 24 V DC are permitted (order no. 750106, 751106)
- ▶ 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	100 V	II	1.5 kV
	24 V	III	0.8 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	150 V	II	1.5 kV
	100 V	III	1.5 kV

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

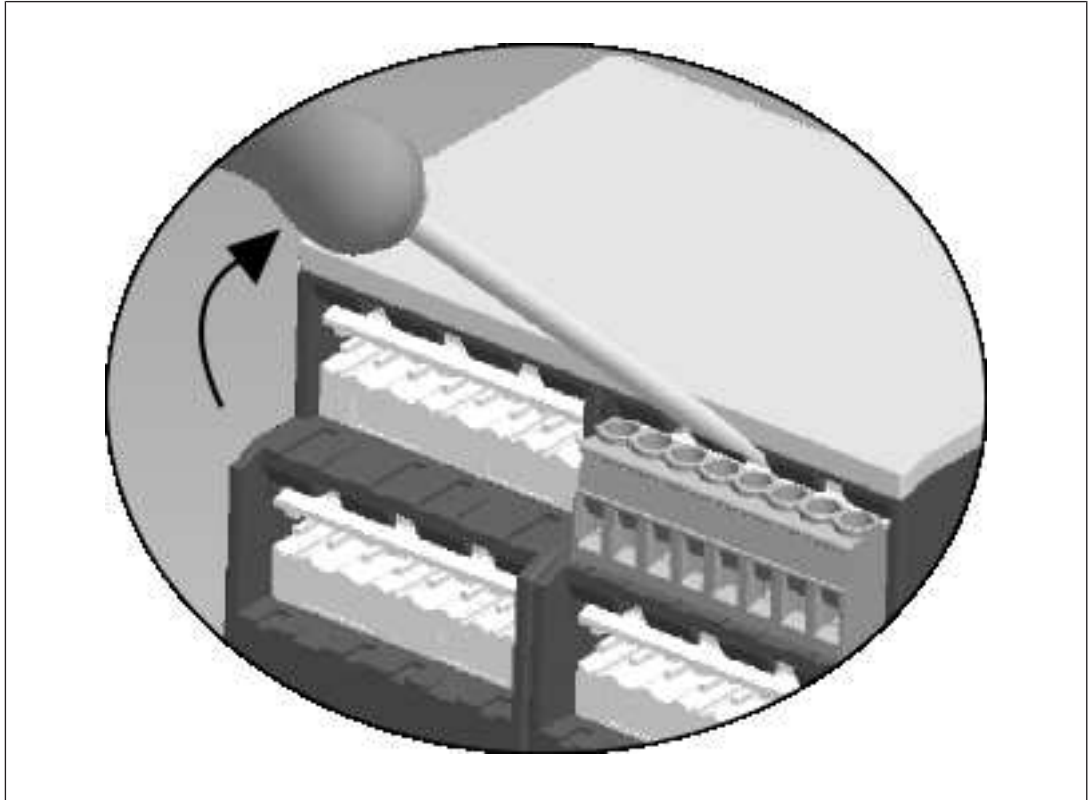
Operating height	Permitted ambient temperature
3000 m	50 °C
4000 m	45 °C
5000 m	40 °C



## Remove plug-in terminals

Procedure: Insert the screwdriver into the housing recess behind the terminal and lever the terminal out.

Do **not** remove the terminals by pulling the cables!



## Order reference

Product type	Features	Connection type	Order no.
PNOZ s6	24 V DC	Screw terminals	750106
PNOZ s6 C	24 V DC	Spring-loaded terminals	751106
PNOZ s6	48 - 240 VAC/DC	Screw terminals	750136
PNOZ s6 C	48 - 240 VAC/DC	Spring-loaded terminals	751136

## EC declaration of conformity

This product/these products meet the requirements of the directive 2006/42/EC for 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).

Authorised representative: Norbert Fröhlich, Pilz GmbH & Co. KG, Felix-Wankel-Str. 2, 73760 Ostfildern, Germany

# ► Support

Technical support is available from Pilz round the clock.

## Americas

**Brazil**  
+55 11 97569-2804

**Canada**  
+1 888 315 7459

**Mexico**  
+52 55 5572 1300

**USA (toll-free)**  
+1 877-PILZUSA (745-9872)

## Asia

**China**  
+86 21 60880878-216

**Japan**  
+81 45 471-2281

**South Korea**  
+82 31 778 3300

## Australia

+61 3 95600621

## Europe

**Austria**  
+43 1 7986263-0

**Belgium, Luxembourg**  
+32 9 3217570

**France**  
+33 3 88104003

**Germany**  
+49 711 3409-444

**Ireland**  
+353 21 4804983

**Italy, Malta**  
+39 0362 1826711

## Scandinavia

+45 74436332

## Spain

+34 938497433

## Switzerland

+41 62 88979-32

## The Netherlands

+31 347 320477

## Turkey

+90 216 5775552

## United Kingdom

+44 1536 462203

## You can reach our international hotline on:

+49 711 3409-444  
support@pilz.com

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Headquarters: Pilz GmbH & Co. KG, Felix-Wankel-Straße 2, 73760 Ostfildern, Germany  
Telephone: +49 711 3409-0, Telefax: +49 711 3409-133, E-Mail: [info@pilz.com](mailto:info@pilz.com), Internet: [www.pilz.com](http://www.pilz.com)

**PILZ**  
THE SPIRIT OF SAFETY

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