

PNOZ s6.1

PILZ
THE SPIRIT OF SAFETY

Safety relays

Operating Manual-21692-EN-10

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SD means Secure Digital

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Introduction

Validity of documentation

This documentation is valid for the product PNOZ s6.1. 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 safety relay can be used as a two-hand control relay or for simultaneity monitoring.

The safety relay meets the requirements of EN 60947-5-1, EN 60204-1 and VDE 0113-1 and may be used in applications with

- E-STOP pushbuttons
- Safety gates

The two-hand control relay meets the requirements of EN 574 Type IIIA. It forces the operator to keep his hands outside the danger zone area during the hazardous movement. It is designed for use in two-hand circuits.

CAUTION!

The two-hand control relay may **not be used on press controllers**. It is only suitable for use where the risk analysis has established a low level of risk (e.g. EN ISO 13849-1 Cat. 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 [📖 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 it is necessary to perform a safety assessment in accordance with the Machinery Directive.

Functional safety is guaranteed for the product as a single component. However, this does not guarantee the functional safety of the overall plant/machine. In order to achieve the required safety level for the overall plant/machine, define the safety requirements for the plant/machine and then define how these must be implemented from a technical and organisational standpoint.

Use of qualified personnel

The products may only be assembled, installed, programmed, commissioned, operated, maintained and decommissioned by competent persons.

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 supply voltage for the two-hand relay must only be connected after the shutdown device in accordance with § 9 VBG 7n5.1/2.
- 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)
  - Emergency stop pushbutton
  - Safety gate limit switches
- 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 safety relay meets the following safety requirements:

- The safety relay prevents the plant from being enabled in the following cases:
  - Power supply failure
  - Component failure
  - Short circuit on an input circuit
  - Coil defect
  - Open circuit
  - Earth fault
- In each on-off cycle, the output relays on the safety device are tested to ensure they open and close correctly

Block diagram/terminal configuration

Unit types with UB 24 VDC

- U_B: 24 VDC; Order no. 750126, 751126

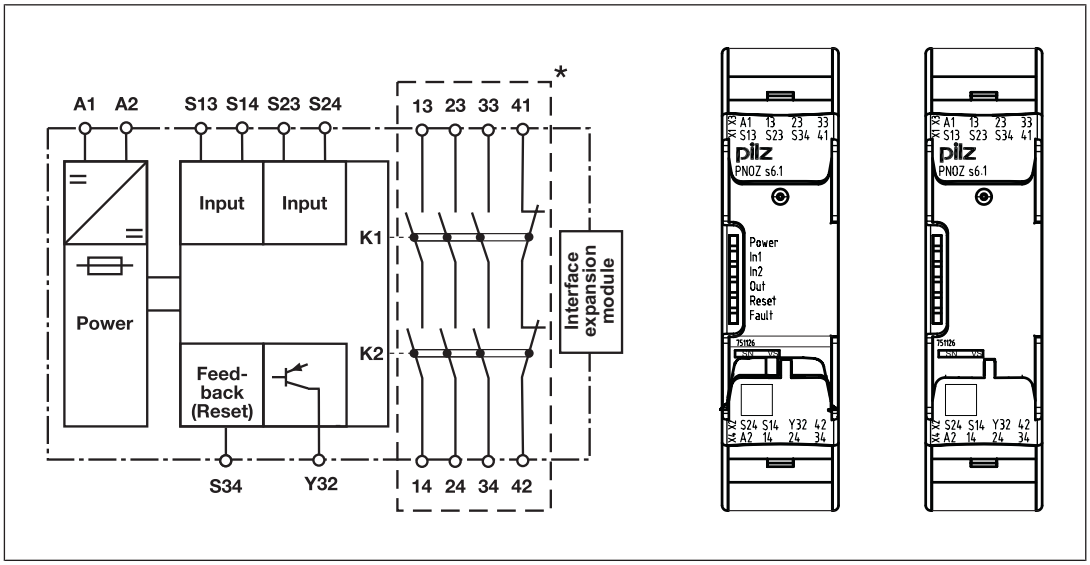


Fig.: Centre: Front view with cover, right: Front view without cover

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

Unit types with UB 48 - 240 VAC/DC

- U_B: 48 - 240 VAC/DC; Order no. 750156, 751156

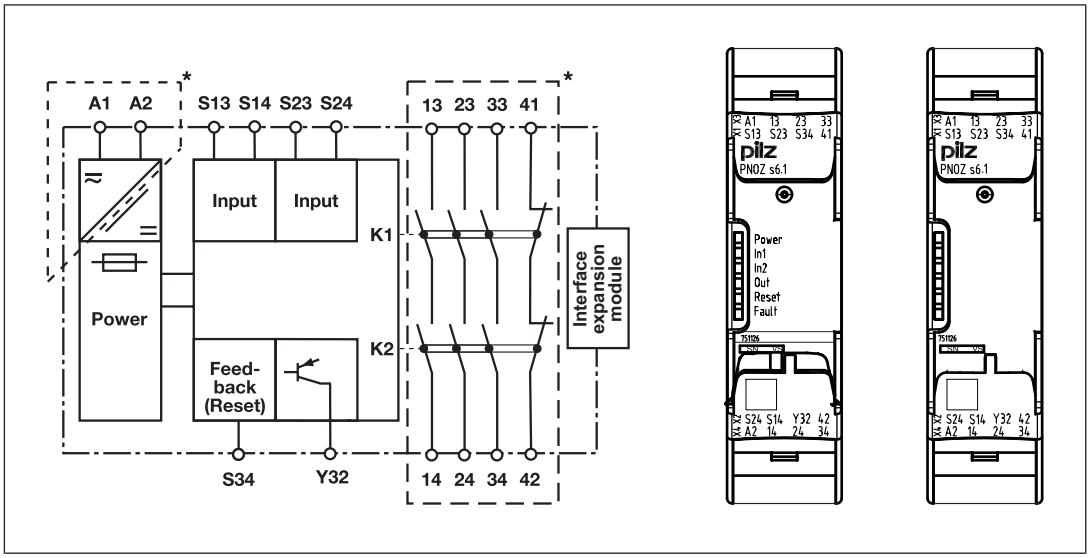


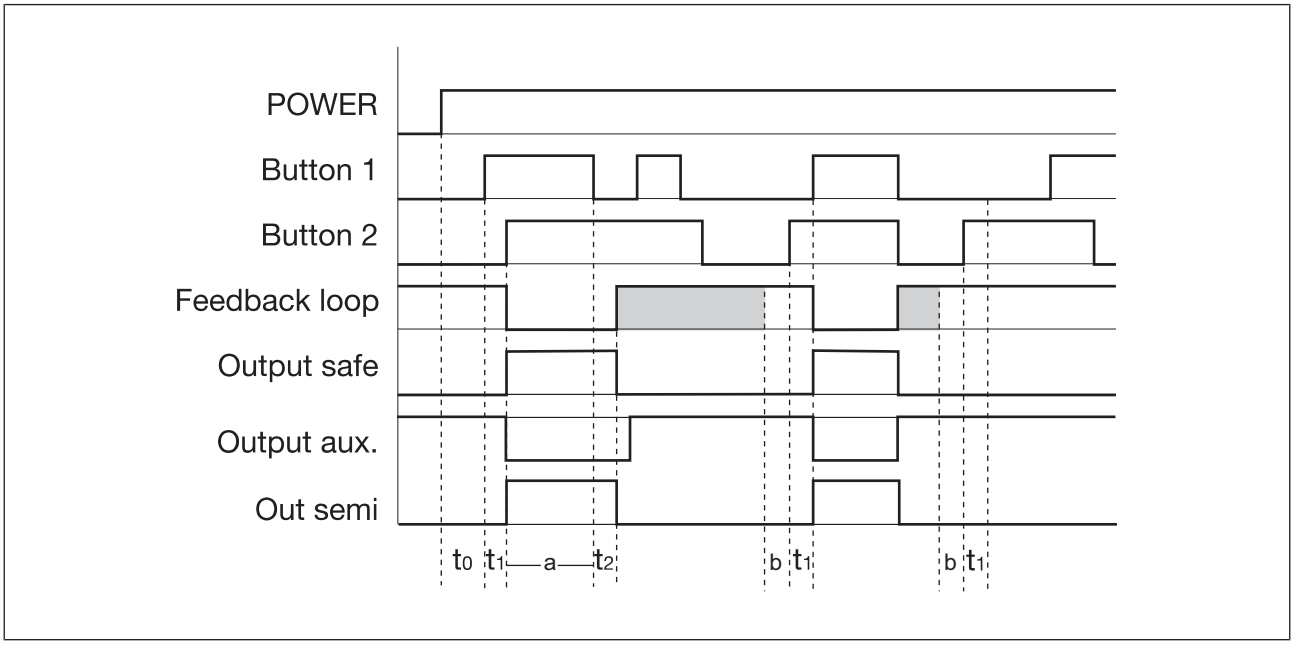
Fig.: Centre: Front view with cover, right: Front view without cover

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

Function description

- The safety relay must be activated by simultaneously pressing two control elements (pushbuttons) within 0,5 s . If one or both pushbuttons are released or the contacts open, the unit interrupts the control command for the hazardous movement.
- Reactivation: The output relays will not re-energise until both control elements have been released and re-operated simultaneously or the contacts have opened and then closed.

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

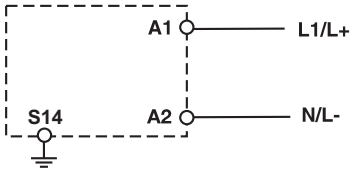
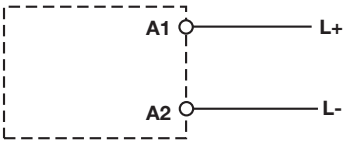
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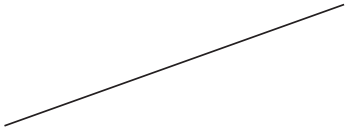
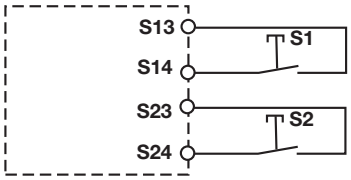
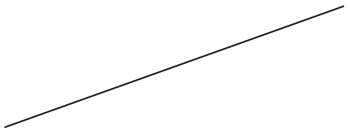
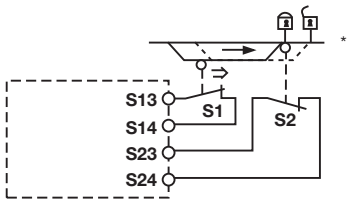
- Information given in the "Technical details [16]" must be followed.
- Outputs 13-14, 23-24, 33-34 are safety contacts; output 41-42 is an auxiliary contact (e.g. for display).
- Auxiliary contact 41-42 and semiconductor output Y32 should **not** be used for safety circuits!
- To prevent contact welding, a fuse should be connected before the output contacts (see Technical details [16]).
- Calculation of the max. cable length l_{max} in the input circuit:

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

  R_{lmax} = max. overall cable resistance (see Technical details [16])
  R_l / km = cable resistance/km
- Use copper wire that can withstand 60/75 °C.
- Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.
- With U_B 48 – 240 VAC/DC: Connect S14 to functional earth.
- Ensure the wiring and EMC requirements of EN 60204-1 are met.
- 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.

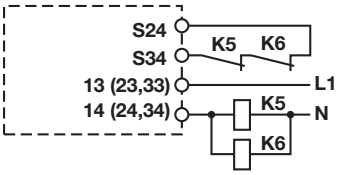
Preparing for operation

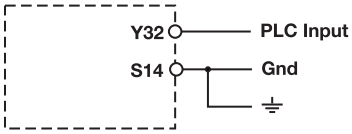
Supply voltage	Unit types with U_B 48-240 VAC/DC	Unit types with U_B 240 VDC
		

Input circuit	Single-channel	Dual-channel
Two-hand pushbuttons **with** detection of shorts across contacts		
Simultaneity monitoring in safety gate applications with automatic start after the safety gate is closed		

CAUTION!

*The unit starts automatically when the E-STOP / safety gate device is released. Use external circuit measures to prevent an unexpected restart.

Feedback loop	with feedback loop monitoring	without feedback loop monitoring
Link or contacts from external contactors		

Semiconductor output


Legend

- S1/S2: Two-hand pushbuttons

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 S13 is operated.



IN2
Pushbutton at S23 is operated.



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



RESET

24 VDC is present at S34.

Fault 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 S14 and S24 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 S13; input circuits not operated simultaneously

- Remedy: Open both input circuits, S14 and S24, simultaneously and then close again.

◐ **IN2** ☼ **FAULT**

Diagnostics: Simultaneity exceeded: Channel 2 too late or power-up blocked due to short-term interruption at S23; input circuits not operated simultaneously

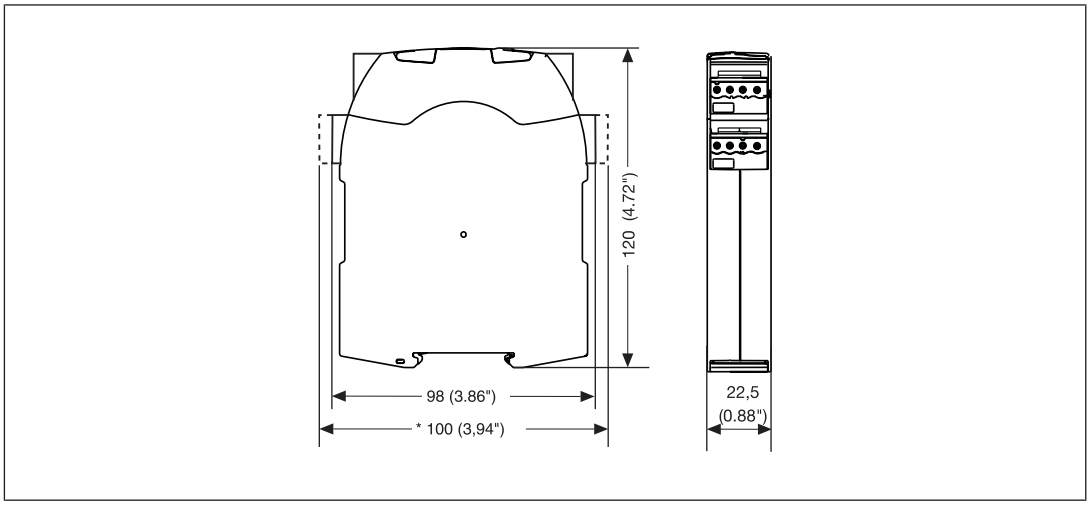
- Remedy: Open both input circuits, S14 and S24, simultaneously and then close again.

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. 750126, 750156

General	750126	750156
Approvals	CCC, CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed	CCC, CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed
Electrical data	**750126**	**750156**
Supply voltage		
Voltage	24 V	48 - 240 V
Kind	DC	AC/DC
Voltage tolerance	-15 %/+10 %	-15 %/+10 %
Output of external power supply (AC)	–	7 VA
Output of external power supply (DC)	3,5 W	3,5 W
Frequency range AC	–	50 - 60 Hz
Residual ripple DC	20 %	20 %
Duty cycle	100 %	100 %
Current at		
Normally open contact	20 mA	20 mA
Max. overall cable resistance Rl-max per input circuit	30 Ohm	30 Ohm
External unit fuse protection F1 min.	1 A	1 A
External unit fuse protection F1 max.	Max. conductor cross section	Max. conductor cross section

Electrical data	750126	750156
Two-hand control relay type		
In accordance with the standard	**EN 574**	**EN 574**
Type	**III A**	**III A**
Inputs	**750126**	**750156**
Number	**2**	**2**
Voltage at		
Input circuit DC	**24 V**	**24 V**
Feedback loop DC	**24 V**	**24 V**
Current at		
Feedback loop DC	**15 mA**	**15 mA**
Semiconductor outputs	**750126**	**750156**
Number	**1**	**1**
Voltage	**24 V**	**24 V**
Current	**20 mA**	**20 mA**
Relay outputs	**750126**	**750156**
Number of output contacts		
Safety contacts (N/O), instantaneous	**3**	**3**
Auxiliary contacts (N/C)	**1**	**1**
Max. short circuit current IK	**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	**6 A**	**6 A**
Max. power	**1500 VA**	**1500 VA**
DC1 at	**24 V**	**24 V**
Min. current	**0,01 A**	**0,01 A**
Max. current	**6 A**	**6 A**
Max. power	**150 W**	**150 W**
Utilisation category of auxiliary contacts		
AC1 at	**240 V**	**240 V**
Min. current	**0,01 A**	**0,01 A**
Max. current	**6 A**	**6 A**
Max. power	**1500 VA**	**1500 VA**
DC1 at	**24 V**	**24 V**
Min. current	**0,01 A**	**0,01 A**
Max. current	**6 A**	**6 A**
Max. power	**150 W**	**150 W**
Utilisation category		
In accordance with the standard	**EN 60947-5-1**	**EN 60947-5-1**

Relay outputs	750126	750156
Utilisation category of safety contacts		
AC15 at	**230 V**	**230 V**
Max. current	**5 A**	**3 A**
DC13 (6 cycles/min) at	**24 V**	**24 V**
Max. current	**5 A**	**4 A**
Utilisation category of auxiliary contacts		
AC15 at	**230 V**	**230 V**
Max. current	**5 A**	**3 A**
DC13 (6 cycles/min) at	**24 V**	**24 V**
Max. current	**5 A**	**4 A**
Utilisation category in accordance with UL		
Voltage	**240 V AC G.U. (same polarity)**	**240 V AC G.U. (same polarity)**
With current	**6 A**	**6 A**
Voltage	**24 V DC G. U.**	**24 V DC G. U.**
With current	**6 A**	**6 A**
External contact fuse protection, safety contacts		
In accordance with the standard	**EN 60947-5-1**	**EN 60947-5-1**
Max. melting integral	**260 A²s**	**66 A²s**
Blow-out fuse, quick	**10 A**	**6 A**
Blow-out fuse, slow	**6 A**	**4 A**
Blow-out fuse, gG	**10 A**	**6 A**
Circuit breaker 24V AC/DC, characteristic B/C	**6 A**	**4 A**
External contact fuse protection, auxiliary contacts		
Max. melting integral	**160 A²s**	**66 A²s**
Blow-out fuse, quick	**10 A**	**6 A**
Blow-out fuse, slow	**6 A**	**4 A**
Blow-out fuse, gG	**6 A**	**6 A**
Circuit breaker 24 V AC/DC, characteristic B/C	**6 A**	**4 A**
Contact material	**AgCuNi + 0,2 µm Au**	**AgCuNi + 0,2 µm Au**
Conventional thermal current while loading several contacts	**750126**	**750156**
Ith per contact at UB AC; AC1: 240 V, DC1: 24 V		
Conv. therm. current with 1 contact	–	**6 A**
Conv. therm. current with 2 contacts	–	**6 A**
Conv. therm. current with 3 contacts	–	**4,5 A**

Conventional thermal current while loading several contacts	**750126**	**750156**
Ith per contact at UB DC; AC1: 240 V, DC1: 24 V		
Conv. therm. current with 1 contact	**6 A**	**6 A**
Conv. therm. current with 2 contacts	**6 A**	**6 A**
Conv. therm. current with 3 contacts	**6 A**	**4,5 A**
Times	**750126**	**750156**
Delay-on de-energisation (response time in accordance with EN 574)		
Normally open contact	**40 ms**	**40 ms**
N/C	**50 ms**	**50 ms**
Recovery time	**250 ms**	**250 ms**
Supply interruption before de-energisation	**20 ms**	**20 ms**
Simultaneity, channel 1 and 2 max.	**0,5 s**	**0,5 s**
Environmental data	**750126**	**750156**
Climatic suitability	**EN 60068-2-78**	**EN 60068-2-78**
Ambient temperature		
Temperature range	**-10 - 55 °C**	**-10 - 55 °C**
Storage temperature		
Temperature range	**-40 - 85 °C**	**-40 - 85 °C**
Climatic suitability		
Humidity	**93 % r. h. at 40 °C**	**93 % r. h. at 40 °C**
Condensation during operation	**Not permitted**	**Not permitted**
EMC	**EN 60947-5-1, EN 61000-6-2, EN 61000-6-4, EN 61326-3-1**	**EN 60947-5-1, EN 61000-6-2, EN 61000-6-4, EN 61326-3-1**
Vibration		
In accordance with the standard	**EN 60068-2-6**	**EN 60068-2-6**
Frequency	**10 - 55 Hz**	**10 - 55 Hz**
Amplitude	**0,35 mm**	**0,35 mm**
Airgap creepage		
In accordance with the standard	**EN 60947-1**	**EN 60947-1**
Overvoltage category	**III / II**	**III / II**
Pollution degree	**2**	**2**
Rated insulation voltage	**250 V**	**250 V**
Rated impulse withstand voltage	**4 kV**	**4 kV**
Protection type		
Housing	**IP40**	**IP40**
Terminals	**IP20**	**IP20**
Mounting area (e.g. control cabinet)	**IP54**	**IP54**

Mechanical data	750126	750156
Mounting position	**Any**	**Any**
Mechanical life	**10,000,000 cycles**	**10,000,000 cycles**
Material		
Bottom	**PC**	**PC**
Front	**PC**	**PC**
Top	**PC**	**PC**
Connection type	**Screw terminal**	**Screw terminal**
Mounting type	**plug-in**	**plug-in**
Conductor cross section with screw terminals		
1 core flexible	**0,25 - 2,5 mm², 24 - 12 AWG**	**0,25 - 2,5 mm², 24 - 12 AWG**
2 core with the same cross section, flexible with crimp connectors, no plastic sleeve	**0,25 - 1 mm², 24 - 16 AWG**	**0,25 - 1 mm², 24 - 16 AWG**
2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors	**0,2 - 1,5 mm², 24 - 16 AWG**	**0,2 - 1,5 mm², 24 - 16 AWG**
Torque setting with screw terminals	**0,5 Nm**	**0,5 Nm**
Dimensions		
Height	**98 mm**	**98 mm**
Width	**22,5 mm**	**22,5 mm**
Depth	**120 mm**	**120 mm**
Weight	**185 g**	**205 g**

Where standards are undated, the 2017-01 latest editions shall apply.

Technical details Order no. 751126, 751156

General	751126	751156
Approvals	**CCC, CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed**	**CCC, CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed**
Electrical data	**751126**	**751156**
Supply voltage		
Voltage	**24 V**	**48 - 240 V**
Kind	**DC**	**AC/DC**
Voltage tolerance	**-15 %/+10 %**	**-15 %/+10 %**
Output of external power supply (AC)	–	**7 VA**
Output of external power supply (DC)	**3,5 W**	**3,5 W**
Frequency range AC	–	**50 - 60 Hz**
Residual ripple DC	**20 %**	**20 %**
Duty cycle	**100 %**	**100 %**
Current at		
Normally open contact	**20 mA**	**20 mA**

Electrical data	751126	751156
Max. overall cable resistance Rl-max per input circuit	**30 Ohm**	**30 Ohm**
External unit fuse protection F1 min.	**1 A**	**1 A**
External unit fuse protection F1 max.	**Max. conductor cross section**	**Max. conductor cross section**
Two-hand control relay type		
In accordance with the standard	**EN 574**	**EN 574**
Type	**III A**	**III A**
Inputs	**751126**	**751156**
Number	**2**	**2**
Voltage at		
Input circuit DC	**24 V**	**24 V**
Feedback loop DC	**24 V**	**24 V**
Current at		
Feedback loop DC	**15 mA**	**15 mA**
Semiconductor outputs	**751126**	**751156**
Number	**1**	**1**
Voltage	**24 V**	**24 V**
Current	**20 mA**	**20 mA**
Relay outputs	**751126**	**751156**
Number of output contacts		
Safety contacts (N/O), instantaneous	**3**	**3**
Auxiliary contacts (N/C)	**1**	**1**
Max. short circuit current IK	**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	**6 A**	**6 A**
Max. power	**1500 VA**	**1500 VA**
DC1 at	**24 V**	**24 V**
Min. current	**0,01 A**	**0,01 A**
Max. current	**6 A**	**6 A**
Max. power	**150 W**	**150 W**

Relay outputs	751126	751156
Utilisation category of auxiliary contacts		
AC1 at	**240 V**	**240 V**
Min. current	**0,01 A**	**0,01 A**
Max. current	**6 A**	**6 A**
Max. power	**1500 VA**	**1500 VA**
DC1 at	**24 V**	**24 V**
Min. current	**0,01 A**	**0,01 A**
Max. current	**6 A**	**6 A**
Max. power	**150 W**	**150 W**
Utilisation category		
In accordance with the standard	**EN 60947-5-1**	**EN 60947-5-1**
Utilisation category of safety contacts		
AC15 at	**230 V**	**230 V**
Max. current	**5 A**	**3 A**
DC13 (6 cycles/min) at	**24 V**	**24 V**
Max. current	**5 A**	**4 A**
Utilisation category of auxiliary contacts		
AC15 at	**230 V**	**230 V**
Max. current	**5 A**	**3 A**
DC13 (6 cycles/min) at	**24 V**	**24 V**
Max. current	**5 A**	**4 A**
Utilisation category in accordance with UL		
Voltage	**240 V AC G.U. (same polarity)**	**240 V AC G.U. (same polarity)**
With current	**6 A**	**6 A**
Voltage	**24 V DC G. U.**	**24 V DC G. U.**
With current	**6 A**	**6 A**
External contact fuse protection, safety contacts		
In accordance with the standard	**EN 60947-5-1**	**EN 60947-5-1**
Max. melting integral	**260 A²s**	**66 A²s**
Blow-out fuse, quick	**10 A**	**6 A**
Blow-out fuse, slow	**6 A**	**4 A**
Blow-out fuse, gG	**10 A**	**6 A**
Circuit breaker 24V AC/DC, characteristic B/C	**6 A**	**4 A**
External contact fuse protection, auxiliary contacts		
Max. melting integral	**160 A²s**	**66 A²s**
Blow-out fuse, quick	**10 A**	**6 A**
Blow-out fuse, slow	**6 A**	**4 A**
Blow-out fuse, gG	**6 A**	**6 A**
Circuit breaker 24 V AC/DC, characteristic B/C	**6 A**	**4 A**

Relay outputs	**751126**	**751156**
Contact material	**AgCuNi + 0,2 µm Au**	**AgCuNi + 0,2 µm Au**
Conventional thermal current while loading several contacts	**751126**	**751156**
Ith per contact at UB AC; AC1: 240 V, DC1: 24 V		
Conv. therm. current with 1 contact	–	**6 A**
Conv. therm. current with 2 contacts	–	**6 A**
Conv. therm. current with 3 contacts	–	**4,5 A**
Ith per contact at UB DC; AC1: 240 V, DC1: 24 V		
Conv. therm. current with 1 contact	**6 A**	**6 A**
Conv. therm. current with 2 contacts	**6 A**	**6 A**
Conv. therm. current with 3 contacts	**6 A**	**4,5 A**
Times	**751126**	**751156**
Delay-on de-energisation (response time in accordance with EN 574)		
Normally open contact	**40 ms**	**40 ms**
N/C	**50 ms**	**50 ms**
Recovery time	**250 ms**	**250 ms**
Supply interruption before de-energisation	**20 ms**	**20 ms**
Simultaneity, channel 1 and 2 max.	**0,5 s**	**0,5 s**
Environmental data	**751126**	**751156**
Climatic suitability	**EN 60068-2-78**	**EN 60068-2-78**
Ambient temperature		
Temperature range	**-10 - 55 °C**	**-10 - 55 °C**
Storage temperature		
Temperature range	**-40 - 85 °C**	**-40 - 85 °C**
Climatic suitability		
Humidity	**93 % r. h. at 40 °C**	**93 % r. h. at 40 °C**
Condensation during operation	**Not permitted**	**Not permitted**
EMC	**EN 60947-5-1, EN 61000-6-2, EN 61000-6-4, EN 61326-3-1**	**EN 60947-5-1, EN 61000-6-2, EN 61000-6-4, EN 61326-3-1**
Vibration		
In accordance with the standard	**EN 60068-2-6**	**EN 60068-2-6**
Frequency	**10 - 55 Hz**	**10 - 55 Hz**
Amplitude	**0,35 mm**	**0,35 mm**

Environmental data	751126	751156
Airgap creepage		
In accordance with the standard	**EN 60947-1**	**EN 60947-1**
Overvoltage category	**III / II**	**III / II**
Pollution degree	**2**	**2**
Rated insulation voltage	**250 V**	**250 V**
Rated impulse withstand voltage	**4 kV**	**4 kV**
Protection type		
Housing	**IP40**	**IP40**
Terminals	**IP20**	**IP20**
Mounting area (e.g. control cabinet)	**IP54**	**IP54**
Mechanical data	**751126**	**751156**
Mounting position	**Any**	**Any**
Mechanical life	**10,000,000 cycles**	**10,000,000 cycles**
Material		
Bottom	**PC**	**PC**
Front	**PC**	**PC**
Top	**PC**	**PC**
Connection type	**Spring-loaded terminal**	**Spring-loaded terminal**
Mounting type	**plug-in**	**plug-in**
Conductor cross section with spring-loaded terminals: Flexible with/without crimp connector	**0,2 - 2,5 mm², 24 - 12 AWG**	**0,2 - 2,5 mm², 24 - 12 AWG**
Spring-loaded terminals: Terminal points per connection	**2**	**2**
Stripping length with spring-loaded terminals	**9 mm**	**9 mm**
Dimensions		
Height	**100 mm**	**100 mm**
Width	**22,5 mm**	**22,5 mm**
Depth	**120 mm**	**120 mm**
Weight	**185 g**	**205 g**

Where standards are undated, the 2017-01 latest editions shall apply.

Safety characteristic data



NOTICE

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

Operating Mode	EN ISO 13849-1: 2015 PL	EN ISO 13849-1: 2015 Category	EN 62061 SIL CL	EN 62061 PFH_D [1/h]	IEC 61511 SIL	IEC 61511 PFD	EN ISO 13849-1: 2015 T_M [year]
E-STOP/ safety gate function	**PL e**	**Cat. 4**	**SIL CL 3**	**2,62E-09**	**SIL 3**	**3,32E-05**	**20**
Two-hand function	**PL c**	**Cat. 1**	**SIL CL 1**	**5,99E-08**	**SIL 1**	**5,10E-03**	**20**

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 switching frequency and the load on the relay output.
If the service life graphs are not accessible, the stated PFH value can be used irrespective of the switching 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. 750126, 751126

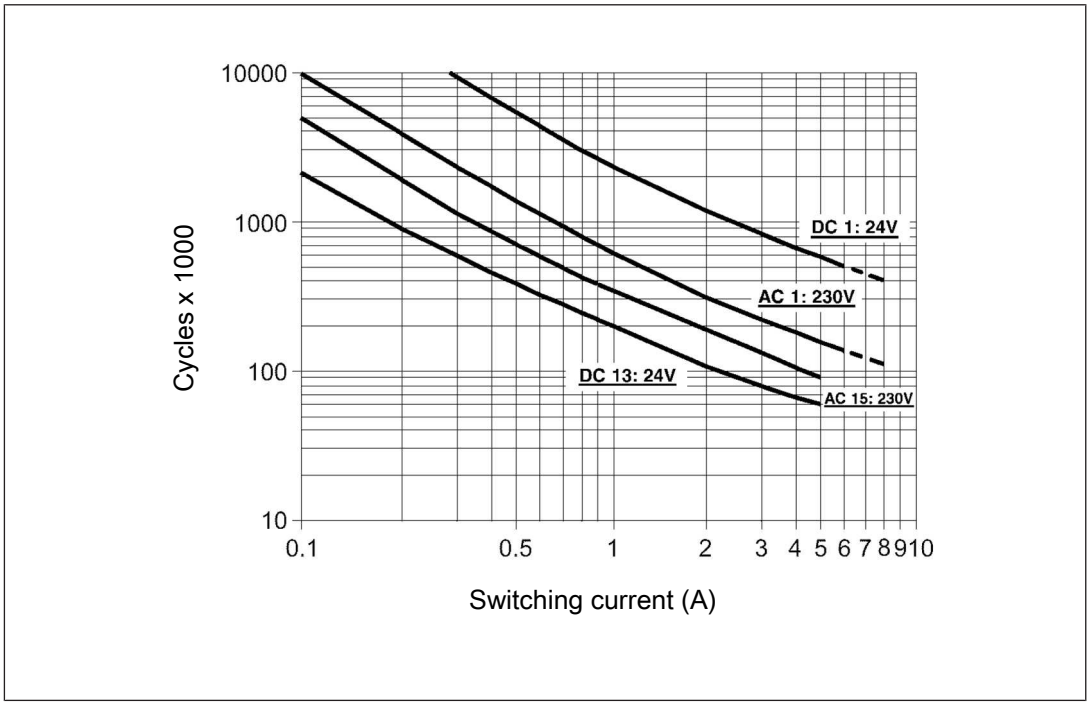


Fig.: Service life graphs at 24 VDC and 230 VAC

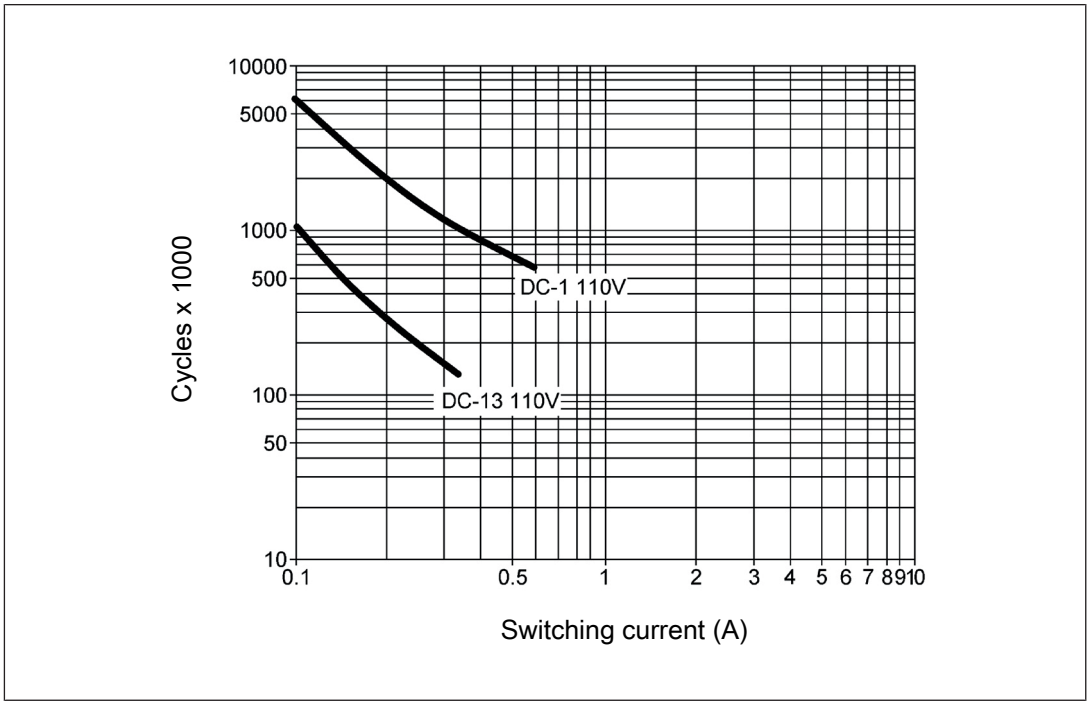


Fig.: Service life graphs at 110 VDC

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 [16]) 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. 750156, 751156

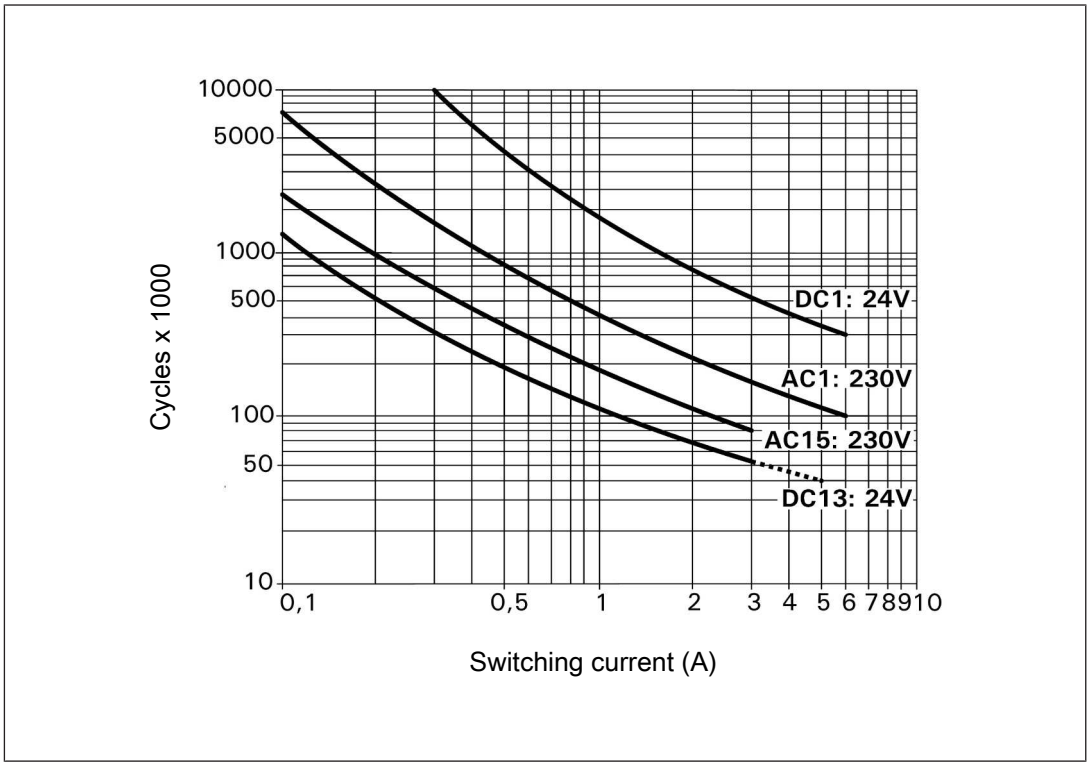


Fig.: Service life graphs at 24 VDC and 230 VAC

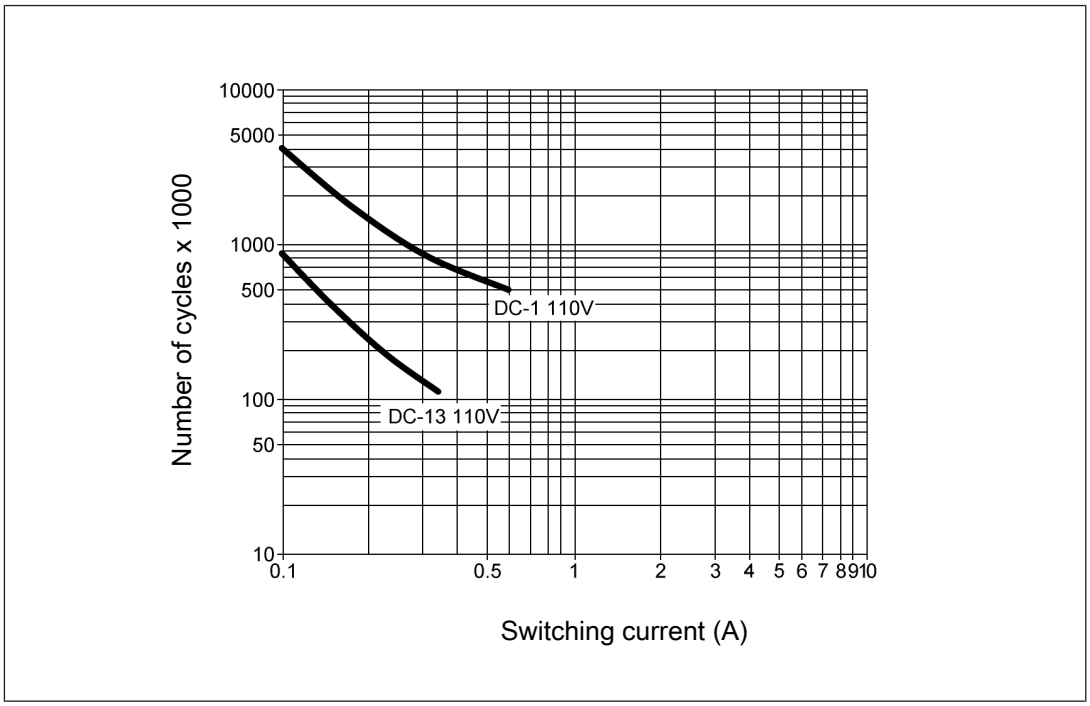


Fig.: Service life graphs at 110 VDC

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 [16]) 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. 750126, 751126)
- 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

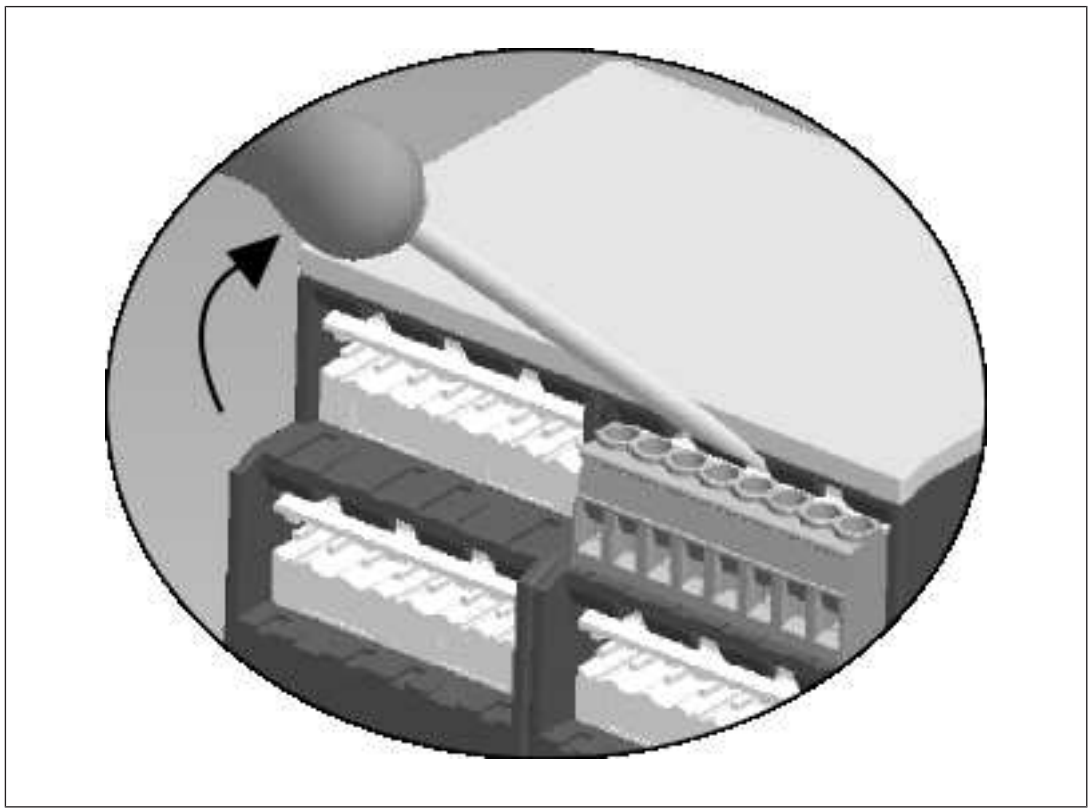
- From an operating height of 2000 m the max. permitted ambient temperature is reduced by 0.5 °C/100 m

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 s6.1	24 VDC	Screw terminals	750 126
PNOZ s6.1 C	24 VDC	Spring-loaded terminals	751 126
PNOZ s6.1	48 - 240 VAC/DC	Screw terminals	750 156
PNOZ s6.1 C	48 - 240 VAC/DC	Spring-loaded terminals	751 156

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.
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