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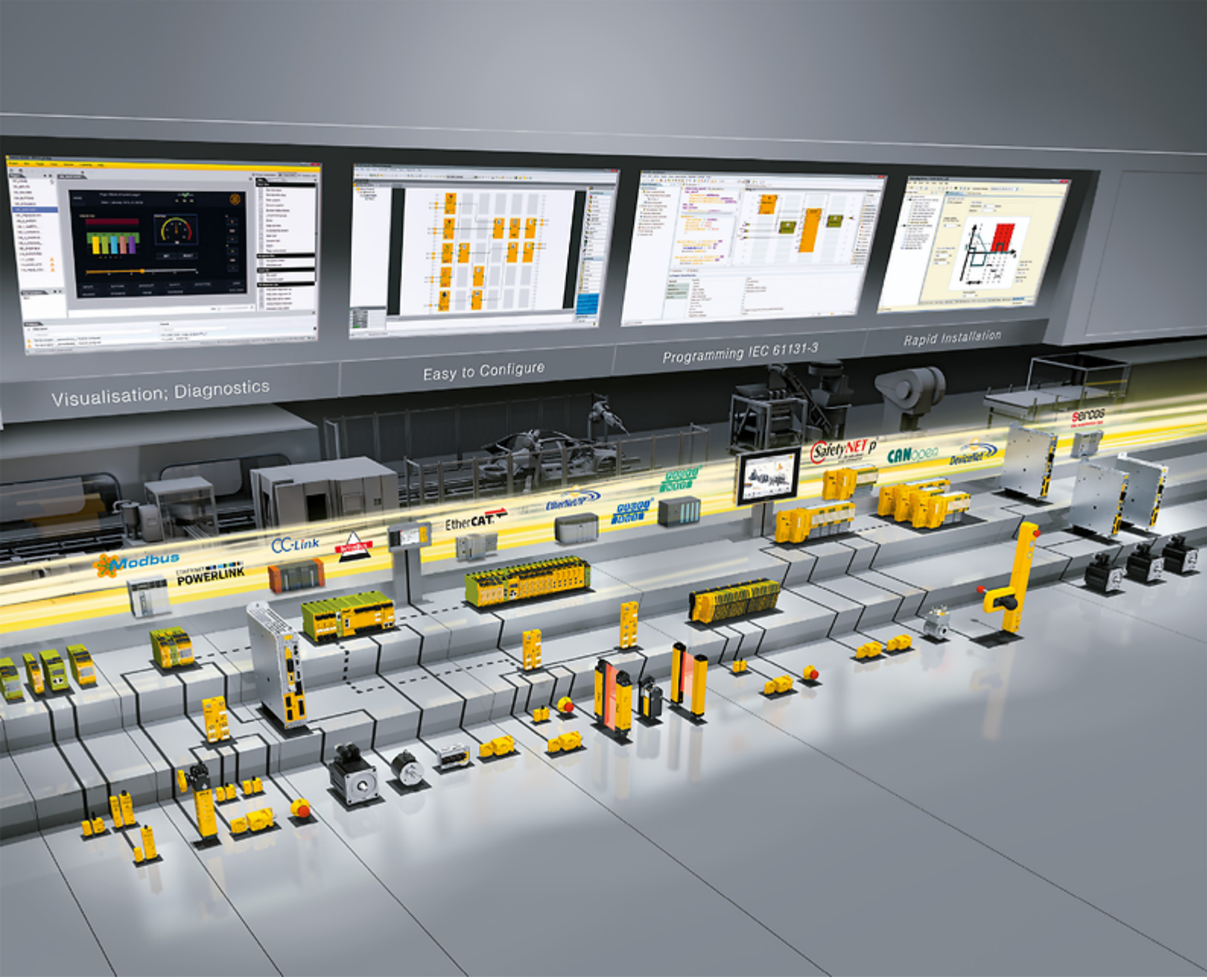
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PNOZ X7

PILZ
THE SPIRIT OF SAFETY

Safety relays

Operating Manual-19692-EN-08

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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 X7. 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 PNOZ X7 provides a safety-related interruption of a safety circuit.

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

- E-STOP pushbuttons
- Safety gates

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 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 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:

- 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:
  - 2 safety contacts (N/O), instantaneous
- Connection options for:
  - E-STOP pushbutton
  - Safety gate limit switch
  - Start button
- LED display for:
  - Supply voltage
  - Switch status of the safety contacts
- See order reference for unit types

Safety features

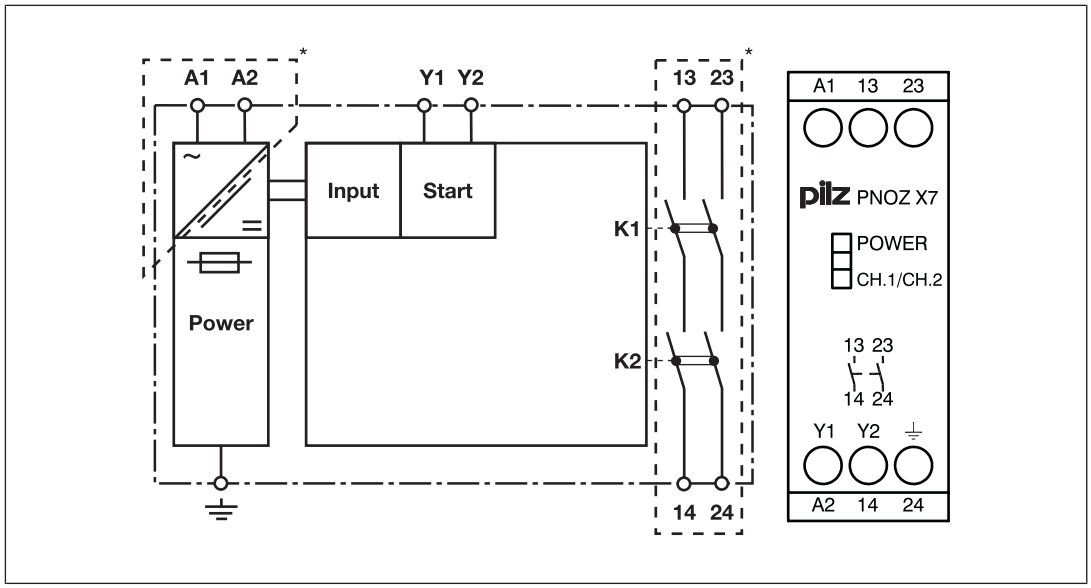
The safety relay meets the following safety requirements:

- The circuit is internally redundant with built-in self-monitoring.
- The safety device remains effective in the case of a component failure.
- The correct opening and closing of the safety device relays is tested automatically in each on-off cycle.

Block diagram/terminal configuration

Types: AC

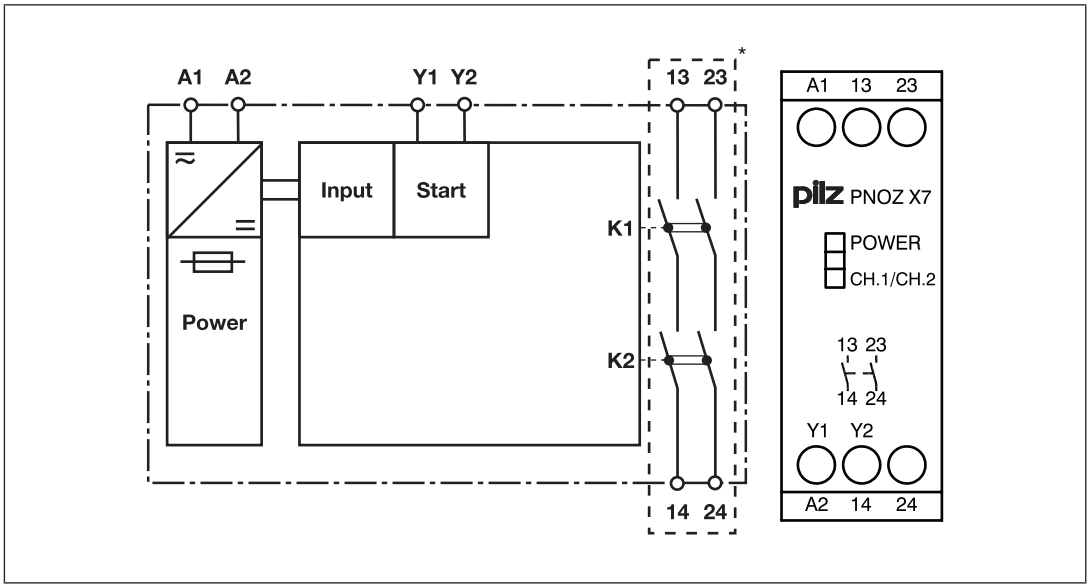
- U_B: 48 VAC; Order no. 774049
- U_B: 110 VAC; Order no. 774053
- U_B: 115 VAC; Order no. 774054
- U_B: 120 VAC; Order no. 774055
- U_B: 230 VAC; Order no. 774056
- U_B: 240 VAC; Order no. 774057



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

Type: AC/DC

- U_B: 24 VAC/DC; Order no. 774059



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

Function Description

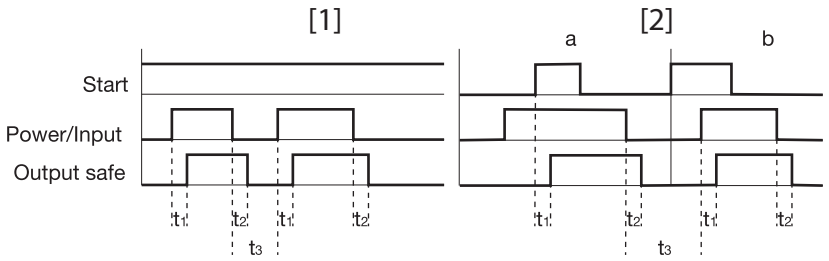
The safety relay PNOZ X7 provides a safety-oriented interruption of a safety circuit. When the supply voltage is applied via the E-STOP pushbutton, the “POWER” LED is lit. The unit is ready for operation when the start circuit and feedback loop Y1-Y2 is closed.

- Input circuit is closed (e.g. E-STOP pushbutton not operated):
  - The LED "CH.1/CH.2" will light.
  - Safety contacts 13-14 and 23-24 are closed. The unit is active.
- Input circuit is opened (e.g. E-STOP pushbutton operated):
  - The LEDs "CH.1" and "CH.2" goes out.
  - Safety contacts 13-14 and 23-24 are redundantly opened.

Operating modes

- Single-channel operation: No redundancy in the input circuit, earth faults in the start and input circuit are detected.
- Automatic start: Unit is active once the input circuit has been closed.
- Manual start: Unit is active once the input circuit and the start circuit are closed.
- Increase in the number of available contacts by connecting contact expandsion modules or external contactors/relays.

Timing diagram



Legend

- Power: Supply voltage
- Start: Start circuit
- Input: Input circuit
- Output safe: Safety contacts
- [1]: Automatic start
- [2]: Manual start
- a: Input circuit closes before start circuit
- b: Start circuit closes before input circuit
- t_1: Switch-on delay
- t_2: Delay-on de-energisation
- t_3: Recovery time

Installation

- The unit 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).

Wiring

Please note:

- Information given in the "Technical details [16]" must be followed.
- Calculating the max. cable length I_{max} in the input circuit on PNOZ X7 24 VAC/DC:

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

R_{lmax} = max. overall cable resistance (see Technical details [16])
R_l / km = cable resistance/km

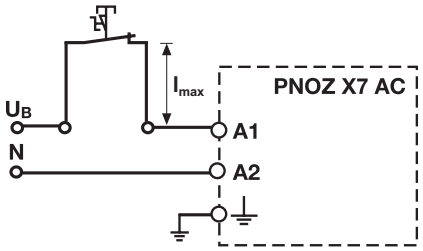
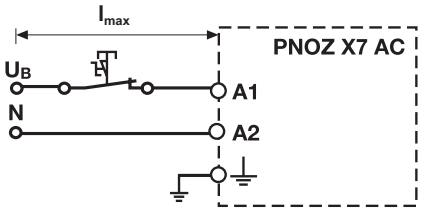
- Calculating the max. cable length I_{max} in the input circuit on PNOZ X7 AC units:

$$I_{max} = \frac{C_{lmax}}{C_l / km}$$

C_{lmax} = max. overall line capacitance (see Technical details [16])
C_l / km = line capacitance/km

Stub circuit: The max. permitted cable length I_{max} depends on the max. overall line capacitance C_{lmax} (see Technical details [16]).

Alternative: Loop circuit: Capacitance is negligible; 1 phase: Max. cable length I_{max}: 1 km

	Stub circuit	Loop circuit
Cable length		

WARNING!

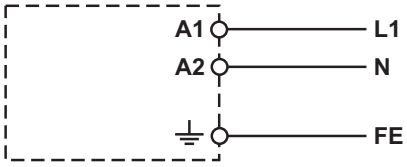
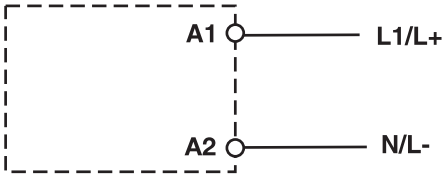
If the max. overall line capacitance is exceeded, the unit will no longer switch off safely and serious injuries and death may result.

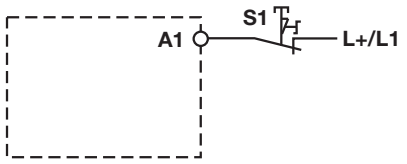
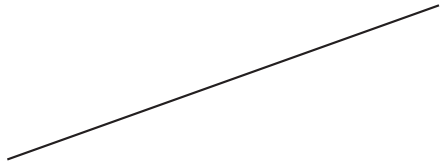
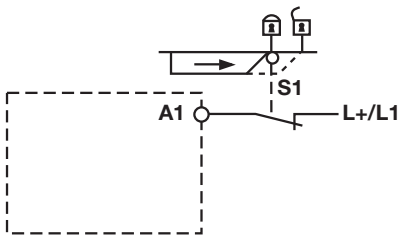
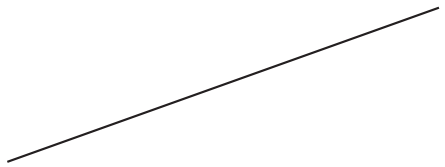
Always comply with the max. overall line capacitance.

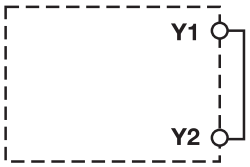
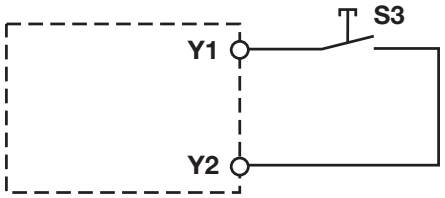
- The outputs 13-14, 23-24 are safety contacts.
- Do not connect undesignated terminals.
- To prevent contact welding, a fuse should be connected before the output contacts (see Technical details [16]).
- Use copper wiring with a temperature stability of 60/75 °C.
- To prevent EMC interferences (particularly 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.

- Do not switch low currents using contacts that have been used previously with high currents.
- On AC units: Connect operational earth terminal to functional earth.
- With 24 V AC/DC units:
  The power supply must meet the regulations for extra low voltages with protective electrical separation (SELV, PELV).

Preparing for operation

Supply voltage	AC	24 VAC/DC
		

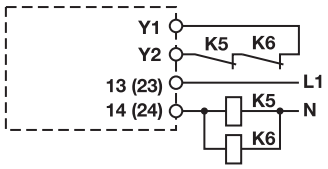
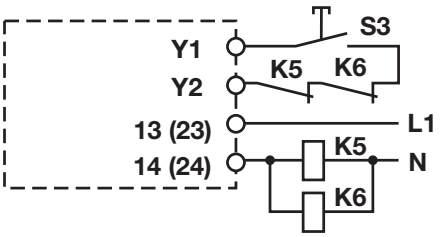
Input circuit	Single-channel	Dual-channel
E-STOP		
Safety gate		

Start circuit	Automatic start	Manual start
		

NOTICE

In the event of an automatic start or manual start with bridged start contact (fault):

The unit starts up automatically when the safeguard is reset, e.g. when the E-STOP pushbutton is released. Use external circuit measures to prevent an unexpected restart.

Feedback loop	Automatic start	Manual start
Contacts from external contactors		

Legend

- S1: E-STOP/safety gate switch
- S3: Start button
- : Gate open
- : Gate closed

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.

Status indicators

LEDs indicate the status and errors during operation:

LED on

POWER

Supply voltage is present.

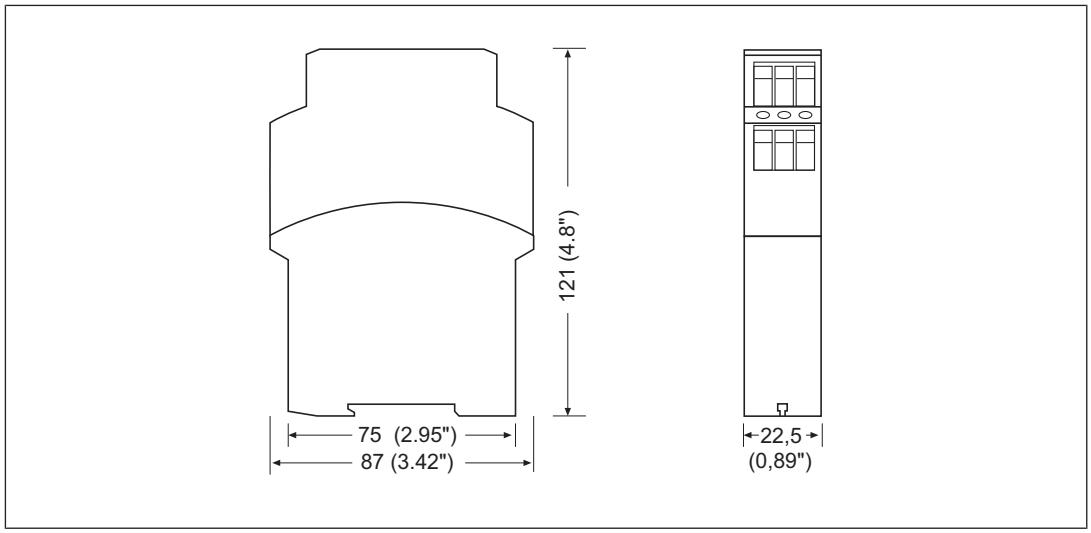
CH.1/CH.2

Safety contacts of channel 1 and 2 are closed.

Faults – Interference

- Earth fault: The supply voltage fails and the safety contacts open. Once the cause of the respective fault has been rectified and the supply voltage is switched off for approx. 1 minute, the unit is ready for operation again.
- Contact malfunctions: If the contacts have welded, reactivation will not be possible after the input circuit has opened.
- LED "POWER" does not light: Short circuit or no supply voltage.

Dimensions in mm



Technical details Order no. 774049, 774053, 774054

General	774049	774053	774054
Certifications	CCC, CE, EAC, KOSHA, TÜV, UKCA, cULus Listed	CCC, CE, EAC, KOSHA, TÜV, UKCA, cULus Listed	CCC, CE, EAC, KOSHA, TÜV, UKCA, cULus Listed
Electrical data	**774049**	**774053**	**774054**
Supply voltage			
Voltage	48 V	110 V	115 V
Kind	AC	AC	AC
Voltage tolerance	-15 %/+10 %	-15 %/+10 %	-15 %/+10 %
Output of external power supply (AC)	2 VA	2 VA	2 VA
Frequency range AC	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz
Duty cycle	100 %	100 %	100 %
Inputs	**774049**	**774053**	**774054**
Number	1	1	1
Voltage at			
Input circuit DC	48 V	110 V	115 V
Start circuit DC	24 V	24 V	24 V
Feedback loop DC	24 V	24 V	24 V
Current at			
Input circuit DC	45 mA	14 mA	17 mA
Start circuit DC	40 mA	40 mA	40 mA
Feedback loop DC	40 mA	40 mA	40 mA
Max. overall line capacitance Clmax	37 nF	37 nF	37 nF
Relay outputs	**774049**	**774053**	**774054**
Number of output contacts			
Safety contacts (N/O), instantaneous	2	2	2
Max. short circuit current IK	1 kA	1 kA	1 kA
Utilisation category			
In accordance with the standard	EN 60947-4-1	EN 60947-4-1	EN 60947-4-1
Utilisation category of safety contacts			
AC1 at	240 V	240 V	240 V
Min. current	0,01 A	0,01 A	0,01 A
Max. current	4 A	4 A	4 A
Max. power	1000 VA	1000 VA	1000 VA
DC1 at	24 V	24 V	24 V
Min. current	0,01 A	0,01 A	0,01 A
Max. current	4 A	4 A	4 A
Max. power	100 W	100 W	100 W

Relay outputs	774049	774053	774054
Utilisation category			
In accordance with the standard	**EN 60947-5-1**	**EN 60947-5-1**	**EN 60947-5-1**
Utilisation category of safety contacts			
AC15 at	**230 V**	**230 V**	**230 V**
Max. current	**4 A**	**4 A**	**4 A**
DC13 (6 cycles/min) at	**24 V**	**24 V**	**24 V**
Max. current	**4 A**	**4 A**	**4 A**
Utilisation category in accordance with UL			
Voltage	**240 V AC G. P.**	**240 V AC G. P.**	**240 V AC G. P.**
With current	**4 A**	**4 A**	**4 A**
Voltage	**24 V DC Resistive**	**24 V DC Resistive**	**24 V DC Resistive**
With current	**4 A**	**4 A**	**4 A**
Pilot Duty	**C300, R300**	**C300, R300**	**C300, R300**
External contact fuse protection, safety contacts			
In accordance with the standard	**EN 60947-5-1**	**EN 60947-5-1**	**EN 60947-5-1**
Max. melting integral	**240 A²s**	**240 A²s**	**240 A²s**
Blow-out fuse, quick	**4 A**	**4 A**	**4 A**
Blow-out fuse, slow	**4 A**	**4 A**	**4 A**
Blow-out fuse, gG	**4 A**	**4 A**	**4 A**
Circuit breaker 24V AC/DC, characteristic B/C	**4 A**	**4 A**	**4 A**
Contact material	**AgSnO2 + 0,2 µm Au**	**AgSnO2 + 0,2 µm Au**	**AgSnO2 + 0,2 µm Au**
Conventional thermal current while loading several contacts	**774049**	**774053**	**774054**
Ith per contact at UB AC; AC1: 240 V, DC1: 24 V			
Conv. therm. current with 1 contact	**4 A**	**4 A**	**4 A**
Conv. therm. current with 2 contacts	**3 A**	**3 A**	**3 A**

Times	774049	774053	774054
Switch-on delay			
With automatic start typ.	**230 ms**	**230 ms**	**230 ms**
With automatic start max.	**700 ms**	**700 ms**	**700 ms**
With automatic start after power on typ.	**230 ms**	**230 ms**	**230 ms**
With automatic start after power on max.	**700 ms**	**700 ms**	**700 ms**
With manual start typ.	**140 ms**	**140 ms**	**140 ms**
With manual start max.	**700 ms**	**700 ms**	**700 ms**
Delay-on de-energisation			
With E-STOP typ.	**70 ms**	**70 ms**	**70 ms**
With E-STOP max.	**100 ms**	**100 ms**	**100 ms**
With power failure typ.	**70 ms**	**70 ms**	**70 ms**
With power failure max.	**100 ms**	**100 ms**	**100 ms**
Recovery time at max. switching frequency 1/s			
After E-STOP	**120 ms**	**120 ms**	**120 ms**
After power failure	**120 ms**	**120 ms**	**120 ms**
Supply interruption before de-energisation	**20 ms**	**20 ms**	**20 ms**
Environmental data	**774049**	**774053**	**774054**
Climatic suitability	**EN 60068-2-78**	**EN 60068-2-78**	**EN 60068-2-78**
Ambient temperature			
Temperature range	**-10 - 55 °C**	**-10 - 55 °C**	**-10 - 55 °C**
Storage temperature			
Temperature range	**-40 - 85 °C**	**-40 - 85 °C**	**-40 - 85 °C**
Climatic suitability			
Humidity	**93 % r. h. at 40 °C**	**93 % r. h. at 40 °C**	**93 % r. h. at 40 °C**
Condensation during operation	**Not permitted**	**Not permitted**	**Not permitted**
EMC	**EN 60947-5-1, EN 61000-6-2, EN 61326-3-1**	**EN 60947-5-1, EN 61000-6-2, EN 61326-3-1**	**EN 60947-5-1, EN 61000-6-2, EN 61326-3-1**
Vibration			
In accordance with the standard	**EN 60068-2-6**	**EN 60068-2-6**	**EN 60068-2-6**
Frequency	**10 - 55 Hz**	**10 - 55 Hz**	**10 - 55 Hz**
Amplitude	**0,35 mm**	**0,35 mm**	**0,35 mm**
Airgap creepage			
In accordance with the standard	**EN 60947-1**	**EN 60947-1**	**EN 60947-1**
Overvoltage category	**III / II**	**III / II**	**III / II**
Pollution degree	**2**	**2**	**2**
Rated insulation voltage	**250 V**	**250 V**	**250 V**
Rated impulse withstand voltage	**4 kV**	**4 kV**	**4 kV**

Environmental data	774049	774053	774054
Protection type			
Housing	IP40	IP40	IP40
Terminals	IP20	IP20	IP20
Mounting area (e.g. control cabinet)	IP54	IP54	IP54
Mechanical data	**774049**	**774053**	**774054**
Mounting position	Any	Any	Any
Mechanical life	10,000,000 cycles	10,000,000 cycles	10,000,000 cycles
Material			
Bottom	PPO UL 94 V1	PPO UL 94 V1	PPO UL 94 V1
Front	ABS UL 94 V0	ABS UL 94 V0	ABS UL 94 V0
Top	PPO UL 94 V1	PPO UL 94 V1	PPO UL 94 V1
Connection type	Screw terminal	Screw terminal	Screw terminal
Mounting type	Fixed	Fixed	Fixed
Conductor cross section with screw terminals			
1 core flexible	0,2 - 4 mm², 24 - 10 AWG	0,2 - 4 mm², 24 - 10 AWG	0,2 - 4 mm², 24 - 10 AWG
2 core with the same cross section, flexible with crimp connectors, no plastic sleeve	0,2 - 2,5 mm², 24 - 14 AWG	0,2 - 2,5 mm², 24 - 14 AWG	0,2 - 2,5 mm², 24 - 14 AWG
2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors	0,2 - 2,5 mm², 24 - 14 AWG	0,2 - 2,5 mm², 24 - 14 AWG	0,2 - 2,5 mm², 24 - 14 AWG
Torque setting with screw terminals	0,6 Nm	0,6 Nm	0,6 Nm
Stripping length with screw terminals	8 mm	8 mm	8 mm
Dimensions			
Height	87 mm	87 mm	87 mm
Width	22,5 mm	22,5 mm	22,5 mm
Depth	121 mm	121 mm	121 mm
Weight	225 g	225 g	225 g

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

Technical details Order no. 774055, 774056, 774057

General	774055	774056	774057
Certifications	CCC, CE, EAC, KOSHA, TÜV, UKCA, cULus Listed	CCC, CE, EAC, KOSHA, TÜV, UKCA, cULus Listed	CCC, CE, EAC, KOSHA, TÜV, UKCA, cULus Listed
Electrical data	**774055**	**774056**	**774057**
Supply voltage			
Voltage	120 V	230 V	240 V
Kind	AC	AC	AC
Voltage tolerance	-15 %/+10 %	-15 %/+10 %	-15 %/+10 %
Output of external power supply (AC)	2 VA	2 VA	2 VA
Frequency range AC	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz
Duty cycle	100 %	100 %	100 %
Inputs	**774055**	**774056**	**774057**
Number	1	1	1
Voltage at			
Input circuit DC	120 V	230 V	240 V
Start circuit DC	24 V	24 V	24 V
Feedback loop DC	24 V	24 V	24 V
Current at			
Input circuit DC	18 mA	8 mA	7 mA
Start circuit DC	40 mA	40 mA	40 mA
Feedback loop DC	40 mA	40 mA	40 mA
Max. overall line capacitance Clmax	37 nF	7 nF	7 nF
Relay outputs	**774055**	**774056**	**774057**
Number of output contacts			
Safety contacts (N/O), instantaneous	2	2	2
Max. short circuit current IK	1 kA	1 kA	1 kA
Utilisation category			
In accordance with the standard	EN 60947-4-1	EN 60947-4-1	EN 60947-4-1
Utilisation category of safety contacts			
AC1 at	240 V	240 V	240 V
Min. current	0,01 A	0,01 A	0,01 A
Max. current	4 A	4 A	4 A
Max. power	1000 VA	1000 VA	1000 VA
DC1 at	24 V	24 V	24 V
Min. current	0,01 A	0,01 A	0,01 A
Max. current	4 A	4 A	4 A
Max. power	100 W	100 W	100 W

Relay outputs	774055	774056	774057
Utilisation category			
In accordance with the standard	**EN 60947-5-1**	**EN 60947-5-1**	**EN 60947-5-1**
Utilisation category of safety contacts			
AC15 at	**230 V**	**230 V**	**230 V**
Max. current	**4 A**	**4 A**	**4 A**
DC13 (6 cycles/min) at	**24 V**	**24 V**	**24 V**
Max. current	**4 A**	**4 A**	**4 A**
Utilisation category in accordance with UL			
Voltage	**240 V AC G. P.**	**240 V AC G. P.**	**240 V AC G. P.**
With current	**4 A**	**4 A**	**4 A**
Voltage	**24 V DC Resistive**	**24 V DC Resistive**	**24 V DC Resistive**
With current	**4 A**	**4 A**	**4 A**
Pilot Duty	**C300, R300**	**C300, R300**	**C300, R300**
External contact fuse protection, safety contacts			
In accordance with the standard	**EN 60947-5-1**	**EN 60947-5-1**	**EN 60947-5-1**
Max. melting integral	**240 A²s**	**240 A²s**	**240 A²s**
Blow-out fuse, quick	**4 A**	**4 A**	**4 A**
Blow-out fuse, slow	**4 A**	**4 A**	**4 A**
Blow-out fuse, gG	**4 A**	**4 A**	**4 A**
Circuit breaker 24V AC/DC, characteristic B/C	**4 A**	**4 A**	**4 A**
Contact material	**AgSnO2 + 0,2 µm Au**	**AgSnO2 + 0,2 µm Au**	**AgSnO2 + 0,2 µm Au**
Conventional thermal current while loading several contacts	**774055**	**774056**	**774057**
Ith per contact at UB AC; AC1: 240 V, DC1: 24 V			
Conv. therm. current with 1 contact	**4 A**	**4 A**	**4 A**
Conv. therm. current with 2 contacts	**3 A**	**3 A**	**3 A**

Times	774055	774056	774057
Switch-on delay			
With automatic start typ.	**230 ms**	**230 ms**	**230 ms**
With automatic start max.	**700 ms**	**700 ms**	**700 ms**
With automatic start after power on typ.	**230 ms**	**230 ms**	**230 ms**
With automatic start after power on max.	**700 ms**	**700 ms**	**700 ms**
With manual start typ.	**140 ms**	**140 ms**	**140 ms**
With manual start max.	**700 ms**	**700 ms**	**700 ms**
Delay-on de-energisation			
With E-STOP typ.	**70 ms**	**70 ms**	**70 ms**
With E-STOP max.	**100 ms**	**100 ms**	**100 ms**
With power failure typ.	**70 ms**	**70 ms**	**70 ms**
With power failure max.	**100 ms**	**100 ms**	**100 ms**
Recovery time at max. switching frequency 1/s			
After E-STOP	**120 ms**	**120 ms**	**120 ms**
After power failure	**120 ms**	**120 ms**	**120 ms**
Supply interruption before de-energisation	**20 ms**	**20 ms**	**20 ms**
Environmental data	**774055**	**774056**	**774057**
Climatic suitability	**EN 60068-2-78**	**EN 60068-2-78**	**EN 60068-2-78**
Ambient temperature			
Temperature range	**-10 - 55 °C**	**-10 - 55 °C**	**-10 - 55 °C**
Storage temperature			
Temperature range	**-40 - 85 °C**	**-40 - 85 °C**	**-40 - 85 °C**
Climatic suitability			
Humidity	**93 % r. h. at 40 °C**	**93 % r. h. at 40 °C**	**93 % r. h. at 40 °C**
Condensation during operation	**Not permitted**	**Not permitted**	**Not permitted**
EMC	**EN 60947-5-1, EN 61000-6-2, EN 61326-3-1**	**EN 60947-5-1, EN 61000-6-2, EN 61326-3-1**	**EN 60947-5-1, EN 61000-6-2, EN 61326-3-1**
Vibration			
In accordance with the standard	**EN 60068-2-6**	**EN 60068-2-6**	**EN 60068-2-6**
Frequency	**10 - 55 Hz**	**10 - 55 Hz**	**10 - 55 Hz**
Amplitude	**0,35 mm**	**0,35 mm**	**0,35 mm**
Airgap creepage			
In accordance with the standard	**EN 60947-1**	**EN 60947-1**	**EN 60947-1**
Overvoltage category	**III / II**	**III / II**	**III / II**
Pollution degree	**2**	**2**	**2**
Rated insulation voltage	**250 V**	**250 V**	**250 V**
Rated impulse withstand voltage	**4 kV**	**4 kV**	**4 kV**

Environmental data	774055	774056	774057
Protection type			
Housing	IP40	IP40	IP40
Terminals	IP20	IP20	IP20
Mounting area (e.g. control cabinet)	IP54	IP54	IP54
Mechanical data	**774055**	**774056**	**774057**
Mounting position	Any	Any	Any
Mechanical life	10,000,000 cycles	10,000,000 cycles	10,000,000 cycles
Material			
Bottom	PPO UL 94 V1	PPO UL 94 V1	PPO UL 94 V1
Front	ABS UL 94 V0	ABS UL 94 V0	ABS UL 94 V0
Top	PPO UL 94 V1	PPO UL 94 V1	PPO UL 94 V1
Connection type	Screw terminal	Screw terminal	Screw terminal
Mounting type	Fixed	Fixed	Fixed
Conductor cross section with screw terminals			
1 core flexible	0,2 - 4 mm², 24 - 10 AWG	0,2 - 4 mm², 24 - 10 AWG	0,2 - 4 mm², 24 - 10 AWG
2 core with the same cross section, flexible with crimp connectors, no plastic sleeve	0,2 - 2,5 mm², 24 - 14 AWG	0,2 - 2,5 mm², 24 - 14 AWG	0,2 - 2,5 mm², 24 - 14 AWG
2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors	0,2 - 2,5 mm², 24 - 14 AWG	0,2 - 2,5 mm², 24 - 14 AWG	0,2 - 2,5 mm², 24 - 14 AWG
Torque setting with screw terminals	0,6 Nm	0,6 Nm	0,6 Nm
Stripping length with screw terminals	8 mm	8 mm	8 mm
Dimensions			
Height	87 mm	87 mm	87 mm
Width	22,5 mm	22,5 mm	22,5 mm
Depth	121 mm	121 mm	121 mm
Weight	225 g	225 g	225 g

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

Technical details Order no. 774059

General	
Certifications	**CCC, CE, EAC, KOSHA, TÜV, UKCA, cULus Listed**
Electrical data	
Supply voltage	
Voltage	**24 V**
Kind	**AC/DC**
Voltage tolerance	**-15 %/+10 %**
Output of external power supply (AC)	**3 VA**
Output of external power supply (DC)	**1,5 W**
Frequency range AC	**50 - 60 Hz**
Residual ripple DC	**160 %**
Duty cycle	**100 %**
Max. inrush current impulse	
Current pulse, A1	**1,7 A**
Pulse duration, A1	**8 ms**
Inputs	
Number	**1**
Voltage at	
Input circuit DC	**24 V**
Start circuit DC	**24 V**
Feedback loop DC	**24 V**
Current at	
Input circuit DC	**50 mA**
Start circuit DC	**210 mA**
Feedback loop DC	**210 mA**
Max. overall cable resistance Rlmax	
Single-channel at UB DC	**15 Ohm**
Single-channel at UB AC	**15 Ohm**
Relay outputs	
Number of output contacts	
Safety contacts (N/O), instantaneous	**2**
Max. short circuit current IK	**1 kA**
Utilisation category	
In accordance with the standard	**EN 60947-4-1**
Utilisation category of safety contacts	
AC1 at	**240 V**
Min. current	**0,01 A**
Max. current	**6 A**
Max. power	**1500 VA**
DC1 at	**24 V**
Min. current	**0,01 A**
Max. current	**6 A**
Max. power	**150 W**

Relay outputs	
Utilisation category	
In accordance with the standard	**EN 60947-5-1**
Utilisation category of safety contacts	
AC15 at	**230 V**
Max. current	**5 A**
DC13 (6 cycles/min) at	**24 V**
Max. current	**6 A**
Utilisation category in accordance with UL	
Voltage	**240 V AC G. P.**
With current	**6 A**
Voltage	**24 V DC Resistive**
With current	**6 A**
Pilot Duty	**C300, R300**
External contact fuse protection, safety contacts	
In accordance with the standard	**EN 60947-5-1**
Max. melting integral	**240 A²s**
Blow-out fuse, quick	**6 A**
Blow-out fuse, slow	**4 A**
Blow-out fuse, gG	**6 A**
Circuit breaker 24V AC/DC, characteristic B/C	**4 A**
Conventional thermal current	**6 A**
Contact material	**AgSnO2 + 0,2 µm Au**
Times	
Switch-on delay	
With automatic start typ.	**50 ms**
With automatic start max.	**150 ms**
With automatic start after power on typ.	**50 ms**
With automatic start after power on max.	**150 ms**
With manual start typ.	**35 ms**
With manual start max.	**150 ms**
Delay-on de-energisation	
With E-STOP typ.	**45 ms**
With E-STOP max.	**70 ms**
With power failure typ.	**45 ms**
With power failure max.	**70 ms**
Recovery time at max. switching frequency 1/s	
After E-STOP	**50 ms**
After power failure	**150 ms**
Supply interruption before de-energisation	**20 ms**
Environmental data	
Climatic suitability	**EN 60068-2-78**
Ambient temperature	
Temperature range	**-10 - 55 °C**
Storage temperature	
Temperature range	**-40 - 85 °C**

Environmental data	
Climatic suitability	
Humidity	**93 % r. h. at 40 °C**
Condensation during operation	**Not permitted**
EMC	**EN 60947-5-1, EN 61000-6-2, EN 61326-3-1**
Vibration	
In accordance with the standard	**EN 60068-2-6**
Frequency	**10 - 55 Hz**
Amplitude	**0,35 mm**
Airgap creepage	
In accordance with the standard	**EN 60947-1**
Overvoltage category	**III / II**
Pollution degree	**2**
Rated insulation voltage	**250 V**
Rated impulse withstand voltage	**4 kV**
Protection type	
Housing	**IP40**
Terminals	**IP20**
Mounting area (e.g. control cabinet)	**IP54**
Mechanical data	
Mounting position	**Any**
Mechanical life	**10,000,000 cycles**
Material	
Bottom	**PPO UL 94 V1**
Front	**ABS UL 94 V0**
Top	**PPO UL 94 V1**
Connection type	**Screw terminal**
Mounting type	**Fixed**
Conductor cross section with screw terminals	
1 core flexible	**0,2 - 4 mm², 24 - 10 AWG**
2 core with the same cross section, flexible with crimp connectors, no plastic sleeve	**0,2 - 2,5 mm², 24 - 14 AWG**
2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors	**0,2 - 2,5 mm², 24 - 14 AWG**
Torque setting with screw terminals	**0,6 Nm**
Stripping length with screw terminals	**8 mm**
Dimensions	
Height	**87 mm**
Width	**22,5 mm**
Depth	**121 mm**
Weight	**185 g**

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 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]
–	PL e	Cat. 4	SIL CL 3	2,31E-09	SIL 3	2,03E-06	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_M 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



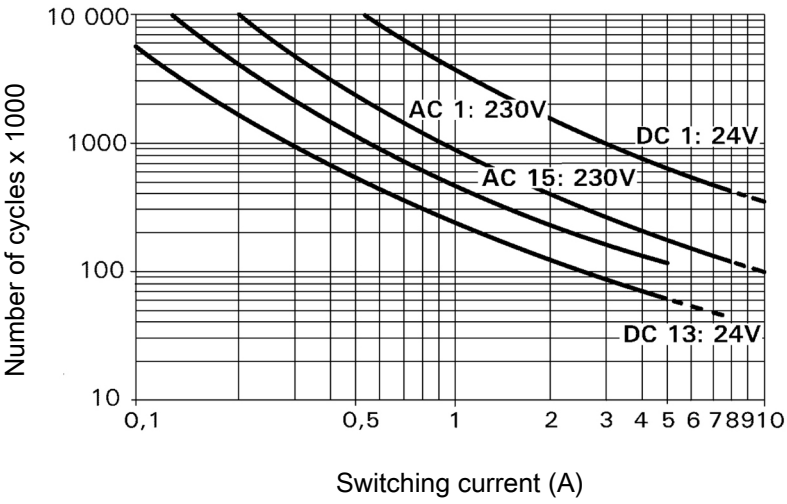
CAUTION!

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.



Example

- Inductive load: 0.2 A
- Utilisation category: AC15
- Contact service life: 4 000 000 cycles

Provided the application to be implemented requires fewer than 4 000 000 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.

Order reference

Product type	Features	Connection type	Order no.
PNOZ X7	48 V AC	Screw terminals	774049
PNOZ X7	110 VAC	Screw terminals	774053
PNOZ X7	115 VAC	Screw terminals	774054
PNOZ X7	120 VAC	Screw terminals	774055
PNOZ X7	230 VAC	Screw terminals	774056
PNOZ X7	240 VAC	Screw terminals	774057
PNOZ X7	24 VAC/DC	Screw terminals	774059

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.
Authorised representative: Norbert Fröhlich, 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/support/downloads.

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

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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
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Europe
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+31 347 320477
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You can reach our international hotline on:
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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, Internet: www.pilz.com

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