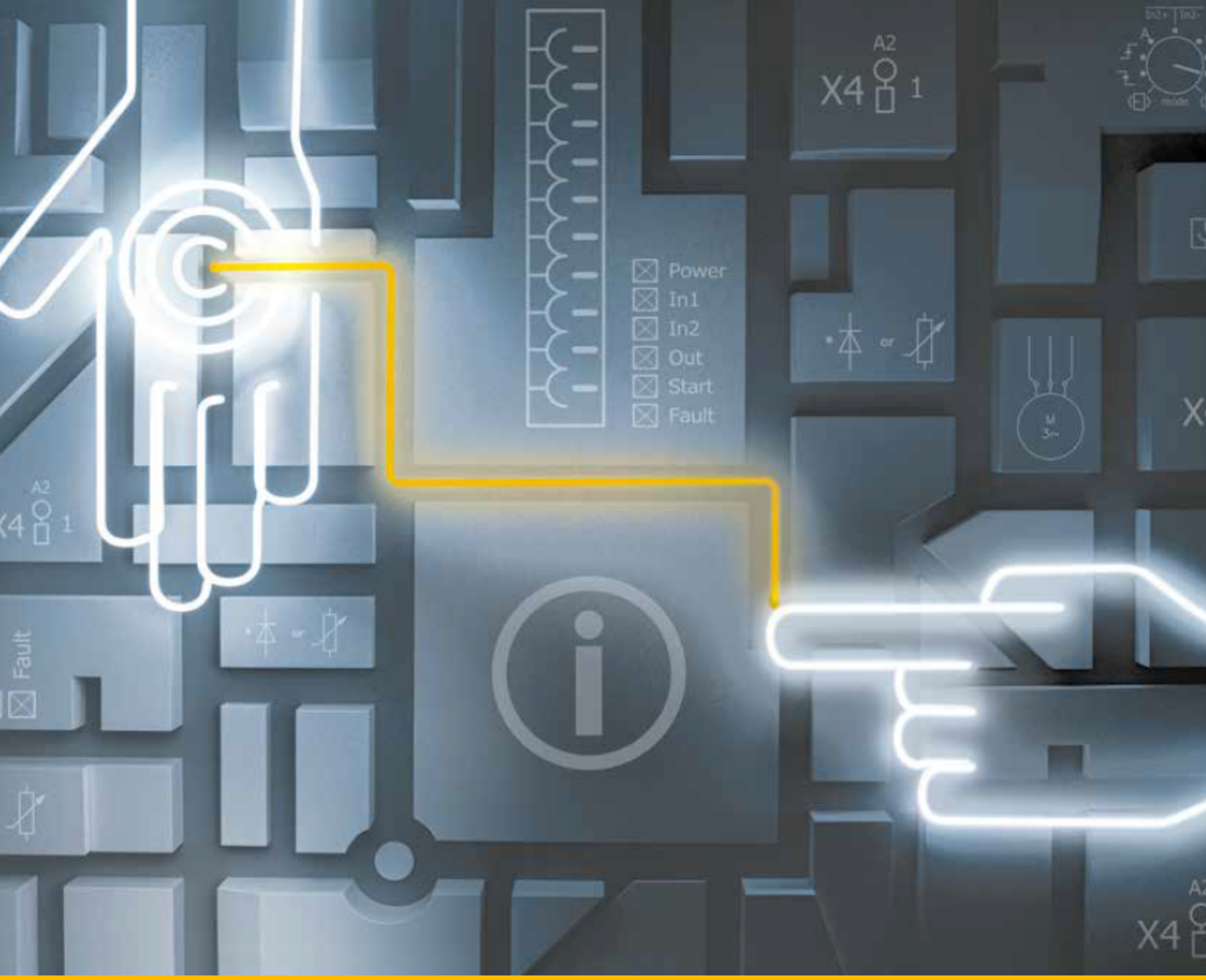


PZW

PILZ
THE SPIRIT OF SAFETY

Operating Manual-19157-EN-11
- Safe monitoring relays




This document is a translation of the original document.

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

Introduction

Validity of documentation

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

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

Using the documentation

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

Definition of symbols

Information that is particularly important is identified as follows:

DANGER!

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

WARNING!

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

CAUTION!

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

NOTICE

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

INFORMATION

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

Safety

Intended use

The unit operates as a pulse relay

- in accordance with EN ISO 12100:2010 section 6.2.11.10, 6.3.2.4 and 3.28.9 (inching circuit for limited movement of hazardous machine components during installation, set up and positioning)
- In safety circuits in accordance with EN 60204-1

The unit is designed for use with

- Safety relays from the PNOZ series
- Two-hand control relays from the P2HZ series

The category that can be achieved in accordance with EN ISO 13849-1 depends on the category of the base unit. PZW may not exceed this.

Improper use

The following is deemed improper use in particular:

- Any component, technical or electrical modification to the product,
- Use of the product outside the areas described in this operating manual,
- Use of the product outside the technical details (see chapter entitled Technical Details [13]).

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 unit, a risk assessment is required in accordance with the Machinery Regulation.

Connecting additional units may result in further risks. Take the necessary measures to protect against corruption.

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

Use of qualified personnel

Product installation, assembly, programming, commissioning, operation, decommissioning and maintenance may only be carried out 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.

In order to inspect, assess and handle products, devices, systems, plant and machinery, this person must be familiar with the state of the art and the applicable national, European and international laws, regulations, 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 section on "Safety" in this description and
- Have a good knowledge of the generic and specialist standards applicable to the specific application.

Warranty and liability

All claims to warranty and liability will be rendered invalid if

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

Disposal

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

For your safety

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

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

Unit features

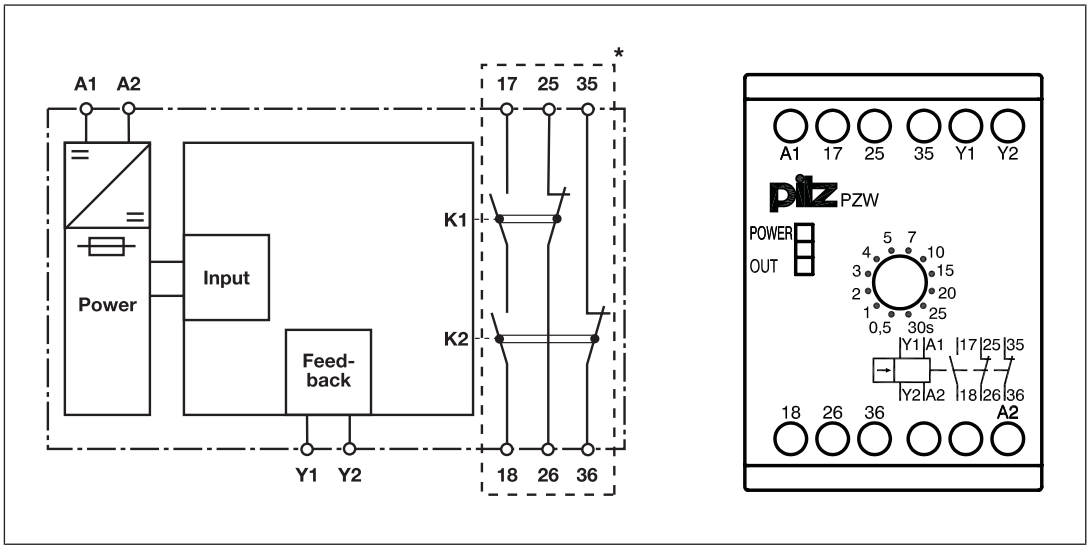
- Positive-guided relay outputs:
  - 1 safety contact (N/O), pulsing
  - 2 auxiliary contacts (N/C), pulsing
- LED display for:
  - Supply voltage
  - Switch state safety output
- 12 pulse times, set via rotary switch
- Feedback loop for monitoring external contactors
- See order reference for unit types

Safety features

The 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



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

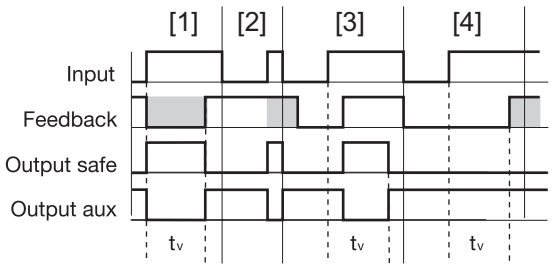
Function description

The unit is ready for operation when the feedback loop Y1-Y2 is closed.

- Input circuit closed (supply voltage is present)
  "POWER" LED is illuminated. The safety contact 17-18 will be closed immediately and the auxiliary contacts 25-26, 35-36 will open, time sequence starts. The "OUT" LED is lit. The safety contact 17-18 is opened redundantly and the auxiliary contacts 25-26, 35-36 will close once the set pulse time has elapsed. The "OUT" LED is goes out.

The input circuit must be closed for at least as long as the set delay time t_v (pulse time). When the input or feedback loop is interrupted prematurely, the time sequence is cancelled. The safety contact 17-18 will open and the auxiliary contacts 25-26, 35-36 will close. The LEDs "POWER" and "OUT" go out.

The delay time t_v (pulse time) can be set in 12 stages.



Legend

- Input: Input circuit
- Feedback: Feedback loop
- Output safe: Safety contact
- Output aux: Auxiliary contacts
- t_v: Delay time (pulse time)

[1]: Normal operating cycle

[2]: Fault: Input circuit opened too early

[3]: Fault: Feedback loop closed too late within t_v

[4]: Fault: Feedback loop closed too late after t_v elapsed

NOTICE

In the case of a fault, the delay-on de-energisation safety contacts open after the set delay time + 50 ms + 15% of the set value, at the latest. An earlier shutdown is possible. For this reason, safety functions that require a minimum delay time must not be implemented.

Installation

NOTICE

Protection against manipulation

Protect the product from unauthorised access.

- 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 [13]" must be followed.
- The output 17-18 is a safety contact, outputs 25-26, 35-36 are auxiliary contacts (e.g. for display).
- Do **not** use auxiliary contacts 25-26, 35-36 for safety circuits!
- To prevent contact welding, a fuse should be connected before the output contacts (see Technical details [13]).
- Do not connect undesignated terminals.
- Calculation of the max. cable length l_{max} in the input circuit:

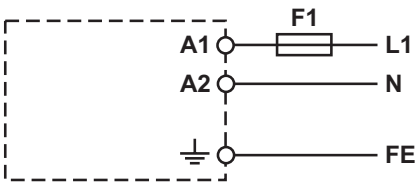
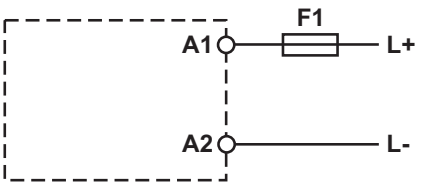
$$l_{max} = \frac{R_{lmax}}{R_l / km}$$

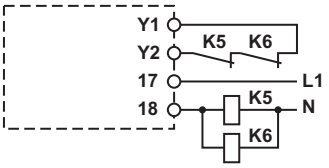
R_{lmax} = max. overall cable resistance (see Technical details [13])
R_l / km = cable resistance/km

- 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 circuit 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 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.
- In devices for 24 V DC shorts between the input circuit and feedback loop or earth faults in the feedback loop can damage the unit. We recommend the use of a short circuit-proof supply voltage with current limitation.

Preparing for Operation

Connection

Supply voltage	AC	DC
Input circuit is driven by connecting U_B		

Feedback loop	Without feedback loop monitoring	With feedback loop monitoring
Link or contacts from external contactors		

Delay time

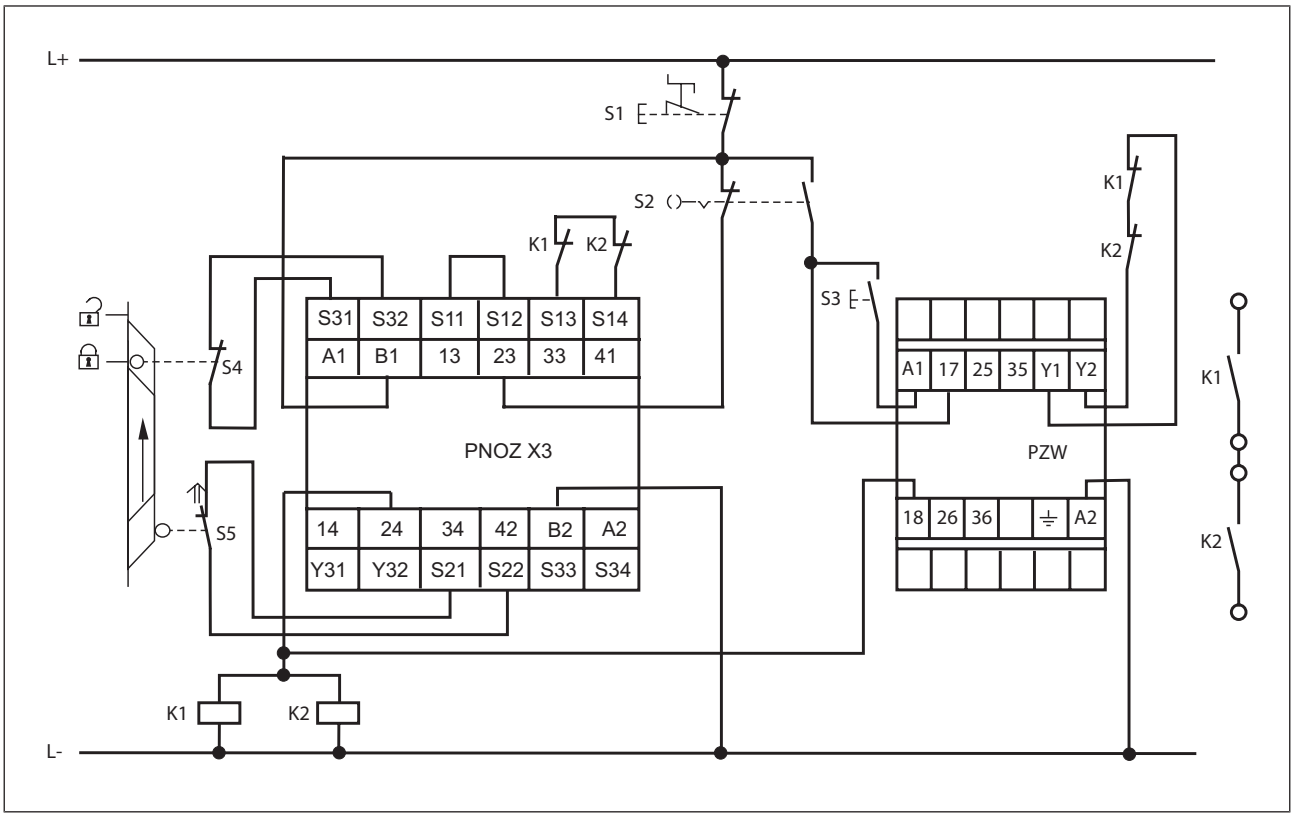
When you bring the rotary switch to the desired position, make sure that the rotary switch locks in position (click feel).

Protection against manipulation

Attach the rotary switch using an adhesive seal (see order reference [18]).

If the adhesive seal is broken, check the setting.

Application example



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 Regulation, 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 d at least 1x per month
- for SIL CL 1/PL c at least 1x per year

NOTICE

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

Status indicators

LEDs indicate the status and errors during operation:

LED on

POWER

Supply voltage is present.

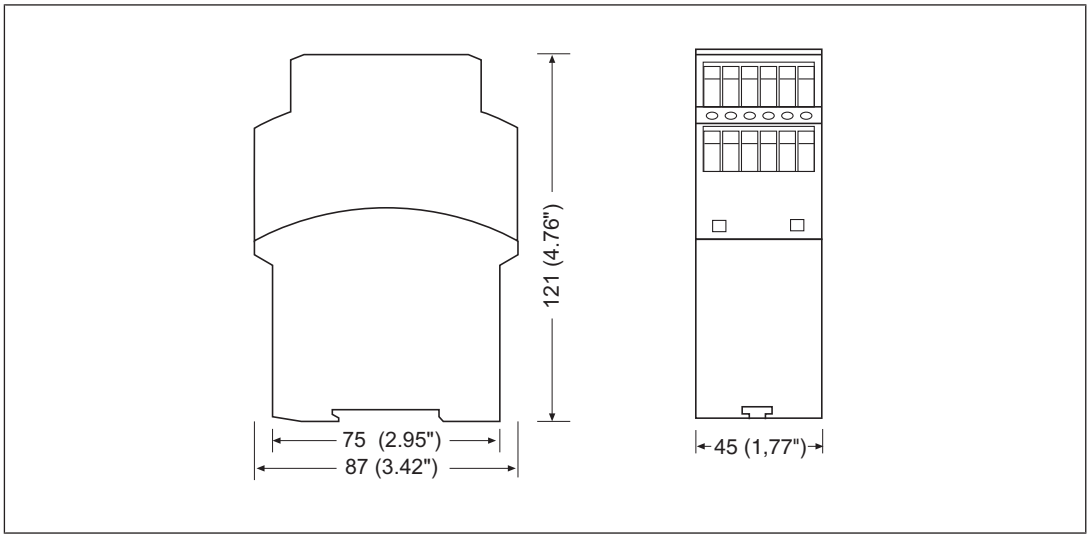
OUT

Safety contact is closed.

Faults – Interference

- LED "POWER" does not light: Short circuit or no supply voltage.
- Contact malfunctions: If the contacts have welded, reactivation will not be possible after the input circuit has opened.

Dimensions in mm



Technical details

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

General	774019	774042
Certifications	CE, EAC, TÜV, UKCA, cULus Listed	CE, EAC, TÜV, UKCA, cULus Listed
Electrical data	**774019**	**774042**
Supply voltage		
Voltage	24 V	24 V
Kind	DC	DC
Voltage tolerance	-15 %/+10 %	-15 %/+10 %
Output of external power supply (DC)	3 W	3 W
Residual ripple DC	10 %	10 %
Duty cycle	100 %	100 %
External unit fuse protection F1 min.	1 A	1 A
External unit fuse protection F1 max.	Max. conductor cross section	Max. conductor cross section
Inputs	**774019**	**774042**
Voltage at		
Feedback loop DC	24 V	24 V
Current at		
Feedback loop DC	50 mA	50 mA
Relay outputs	**774019**	**774042**
Number of output contacts		
Safety contacts (N/O), delayed	1	1
Auxiliary contacts (N/C), delayed	2	2
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	774019	774042
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	**4 A**	**4 A**
DC13 (6 cycles/min) at	**24 V**	**24 V**
Max. current	**3 A**	**3 A**
Utilisation category of auxiliary contacts		
AC15 at	**230 V**	**230 V**
Max. current	**4 A**	**4 A**
DC13 (6 cycles/min) at	**24 V**	**24 V**
Max. current	**3 A**	**3 A**
Utilisation category in accordance with UL		
Voltage	**240 V AC G. P.**	**240 V AC G. P.**
with current	**6 A**	**6 A**
Voltage	**24 V DC Resistive**	**24 V DC Resistive**
with current	**5 A**	**5 A**
Pilot Duty	**B300, R300**	**B300, R300**
External contact fuse protection, safety contacts		
in accordance with the standard	**EN 60947-5-1**	**EN 60947-5-1**
Max. melting integral	**240 A²s**	**240 A²s**
Blow-out fuse, quick	**6 A**	**6 A**
Blow-out fuse, slow	**4 A**	**4 A**
Blow-out fuse, gG	**6 A**	**6 A**
Circuit breaker 24V AC/DC, characteristic B/C	**4 A**	**4 A**

Relay outputs	774019	774042
External contact fuse protection, auxiliary contacts		
Max. melting integral	**240 A²s**	**240 A²s**
Blow-out fuse, quick	**6 A**	**6 A**
Blow-out fuse, slow	**4 A**	**4 A**
Blow-out fuse, gG	**6 A**	**6 A**
Circuit breaker, 24 V AC/DC, characteristic B/C	**4 A**	**4 A**
Conventional thermal current	**6 A**	**6 A**
Contact material	**AgSnO2 + 0,2 µm Au**	**AgSnO2 + 0,2 µm Au**
Times	**774019**	**774042**
Recovery time at max. switching frequency 1/s		
after power failure	**80 ms**	**80 ms**
Delay time tv	**0,5 s, 1 s, 2 s, 3 s, 4 s, 5 s, 7 s, 10 s, 15 s, 20 s, 25 s, 30 s**	**0,05 s, 0,1 s, 0,2 s, 0,3 s, 0,4 s, 0,5 s, 0,7 s, 1 s, 1,5 s, 2 s, 2,5 s, 3 s**
Time accuracy	**-15% / +15% +50 ms**	**-15% / +15% +50 ms**
Repetition accuracy	**2 %**	**2 %**
Max. delay time	**tv + 15 % + 50 ms**	**tv + 15 % + 50 ms**
Environmental data	**774019**	**774042**
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 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**
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	774019	774042
Mounting position	**Any**	**Any**
Mechanical life	**10,000,000 cycles**	**10,000,000 cycles**
Material		
Bottom	**PPO UL 94 V1**	**PPO UL 94 V1**
Front	**ABS UL 94 V0**	**ABS UL 94 V0**
Top	**PPO UL 94 V1**	**PPO UL 94 V1**
Connection type	**Screw terminal**	**Screw terminal**
Mounting type	**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**
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**
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**
Torque setting with screw terminals	**0,5 Nm**	**0,5 Nm**
Stripping length with screw terminals	**6 mm**	**6 mm**
Dimensions		
Height	**87 mm**	**87 mm**
Width	**45 mm**	**45 mm**
Depth	**121 mm**	**121 mm**
Weight	**255 g**	**255 g**

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: 2023 PL	EN ISO 13849-1: 2023 Category	EN IEC 62061 SIL CL/max. SIL	EN IEC 62061 61508 PFH [1/h]	EN/IEC 61511 61508 SIL	EN/IEC 61511 61508 PFD	EN ISO 13849-1: 2023 T_M [year]
Safety contacts, delayed <30 s	**PL d**	**Cat. 3**	**SIL 3**	**2,64E-09**	**SIL 3**	**1,26E-05**	**20**
Safety contacts, delayed ≥30 s	**PL c**	**Cat. 1**	**SIL 1**	**2,87E-09**	**SIL 2**	**4,64E-05**	**20**

Explanatory notes for the safety-related characteristic data:

- 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 IEC 61508-6 and EN IEC 61511 and as the proof test interval and mission time in accordance with EN IEC 62061.

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

INFORMATION

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

Supplementary data

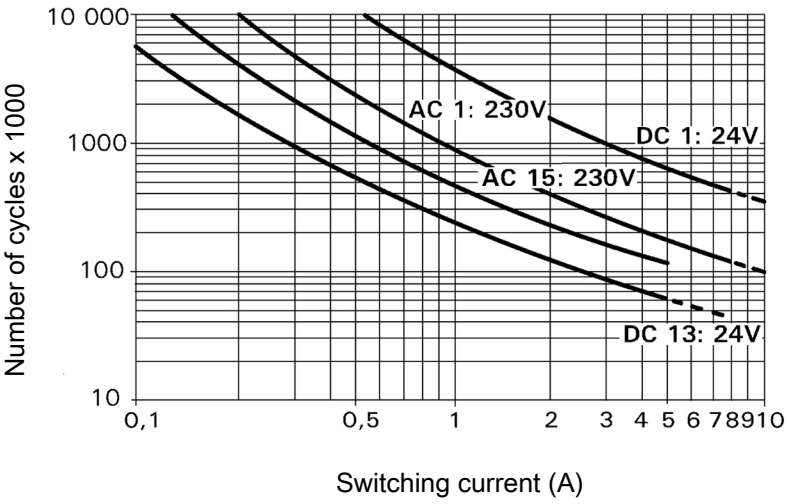
CAUTION!

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

Product type	Features	Connection type	Product ID
PZW	230 V AC, 30 s selectable	Screw terminals	774017
PZW	110 - 120 VAC, 3 s selectable	Screw terminals	774044

Accessories

Product type	Features	Product ID
Adhesive seal for myPNOZ (20 pieces)	Adhesive seal for myPNOZ to protect rotary switch settings from manipulation	2A000200

EU/EC declaration of conformity

These products meet the requirements of the directive 2006/42/EC on machinery up to and including 19 January 2027, and the EU regulation 2023/1230 of the European Parliament and of the Council from 20 January 2027. The full EU and EC declaration of conformity is available to download at www.pilz.com/manuals.

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

UKCA-Declaration of Conformity

These products comply 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/manuals.

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

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