



► PNOZ 16SP

PILZ
THE SPIRIT OF SAFETY

Operating Manual-19900-EN-09
- Safety relays



This document is the original document.

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

All rights to this documentation are reserved by Pilz GmbH & Co. KG. Copies may be made for the user's internal purposes. Suggestions and comments for improving this documentation will be gratefully received.

Pilz®, PIT®, PMI®, PNOZ®, Primo®, PSEN®, PSS®, PVIS®, SafetyBUS p®, SafetyEYE®, SafetyNET p®, the spirit of safety® are registered and protected trademarks of Pilz GmbH & Co. KG in some countries.



SD means Secure Digital

Introduction	5
Validity of documentation	5
Using the documentation	5
Definition of symbols	5
Safety	6
Intended use	6
Safety regulations	6
Safety assessment	6
Use of qualified personnel	7
Warranty and liability	7
Disposal	7
For your safety	7
Unit features	8
Safety features	8
Block diagram/terminal configuration	9
Function Description	9
Operating modes	10
Timing diagram	10
Installation	12
Wiring	12
Preparing for operation	13
Operation	15
Status indicators	16
Faults – Interference	16
Dimensions in mm	16
Technical details Order no. 777070	17
Technical details Order no. 777076	21
Safety characteristic data	25
Supplementary data	26
Service life graph	26

Remove plug-in terminals27

Order reference27

EC declaration of conformity28

UKCA-Declaration of Conformity28

Introduction

Validity of documentation

This documentation is valid for the product PNOZ 16SP. 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 16SP 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
- ▶ Pressure sensitive mats
- ▶ Pressure sensitive edges

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](#) [ 17]).

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

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

Safety regulations**Safety assessment**

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

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

Use of qualified personnel

The products may only be assembled, installed, programmed, commissioned, operated, 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

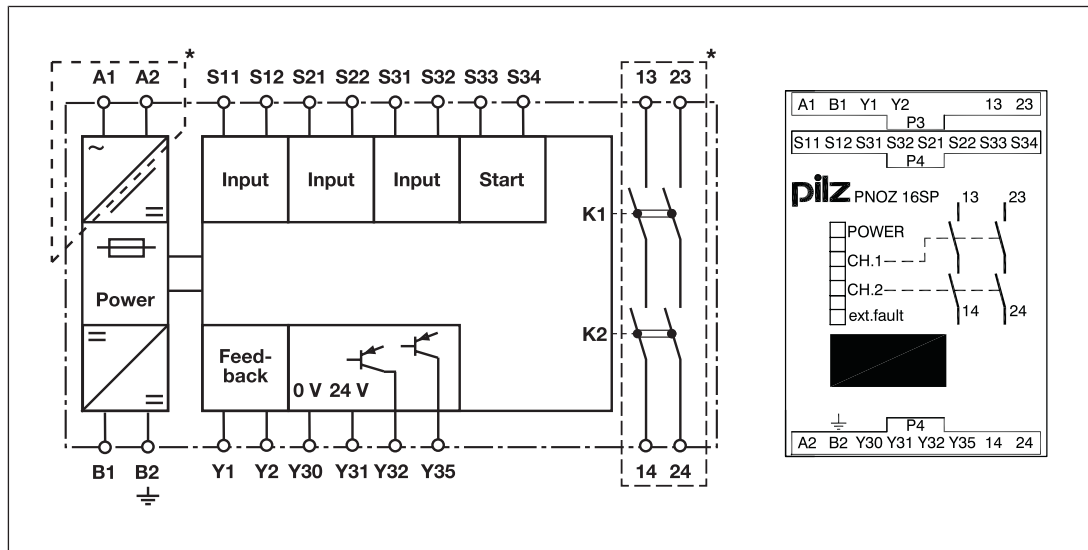
- ▶ Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
- ▶ 2 semiconductor outputs
- ▶ Connection options for:
 - E-STOP pushbuttons
 - Safety gate limit switches
 - Start button
 - Pressure sensitive edges
 - Pressure sensitive mats
- ▶ LED indicator for:
 - Supply voltage
 - Switch state of the safety contacts
 - Detection of shorts across contacts, pressure sensitive mat
- ▶ Semiconductor outputs signal:
 - Supply voltage is present, no short across contacts
 - Switch state of the safety contacts
- ▶ See order reference for unit types

Safety features

The safety relay meets the following safety requirements:

- ▶ The circuit is redundant with built-in self-monitoring.
- ▶ The safety function remains effective in the case of a component failure.
- ▶ The correct opening and closing of the safety function 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 (over-voltage category III), Protective separation (overvoltage category II)

Function Description

The safety relay PNOZ 16P provides a safety-oriented interruption of a safety circuit. When supply voltage is supplied the "POWER" LED is lit. The unit is ready for operation when the feedback loop Y1-Y2 and the start circuit S33-S34 are closed.

- ▶ Input circuit is closed (e.g. E-STOP pushbutton not operated):
 - The LEDs "CH.1" and "CH.2" are lit.
 - Safety contacts 13-14 and 23-24 are closed. The unit is active.
 - A high signal is present at the semiconductor output switch state Y32.
- ▶ Input circuit is opened (e.g. E-STOP pushbutton operated):
 - The LEDs "CH.1" and "CH.2" go out.
 - Safety contacts 13-14 and 23-24 are redundantly opened.
 - A low signal is present at the semiconductor output switch state Y32.

Semiconductor output short across contact Y35

- ▶ A high signal is present at semi-conductor output Y35 if the supply voltage is present and the internal fuse has not blown.

Operating modes

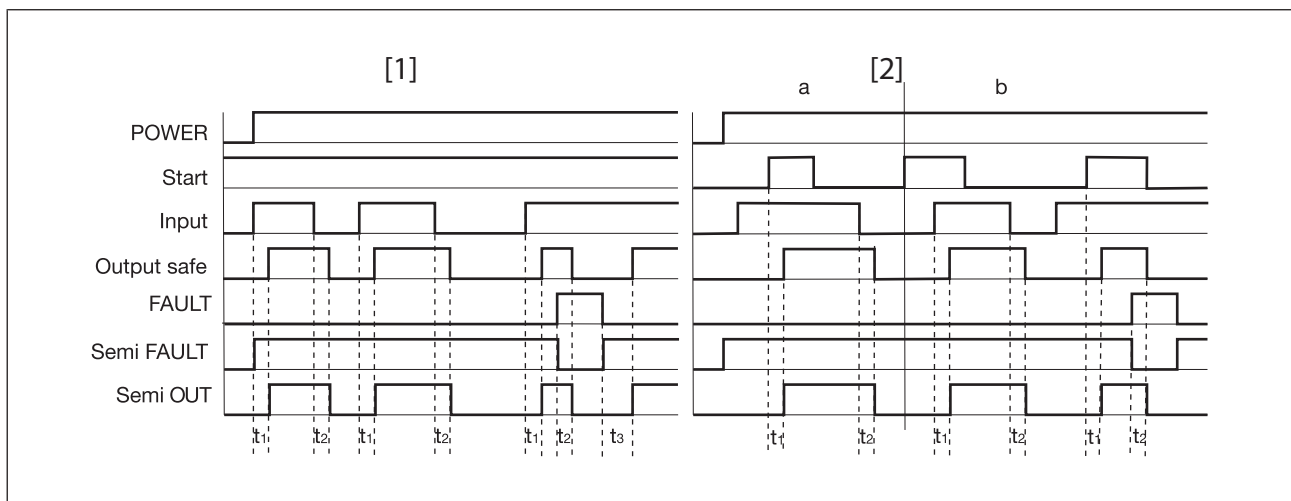
- ▶ Single-channel operation: No redundancy in the input circuit, earth faults in the start and input circuit are detected.
- ▶ Dual-channel operation with detection of shorts across contacts: Redundant input circuit, PNOZ 16SP detects
 - earth faults in the start and input circuit,
 - short circuits in the input circuit,
 - shorts across contacts in the input circuit.
- ▶ 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.
- ▶ Operating with pressure sensitive mat: When the pressure sensitive mat is actuated, a short is formed between the inputs and internal fault detection is energised. Safety contacts open and the "EXT.FAULT" LED is lit. If the pressure sensitive mat is cleared and supply voltage is maintained, the unit is ready for operation again once the recovery time has elapsed.
- ▶ Increase in the number of available contacts by connecting contact expansion modules or external contactors/relays.



NOTICE

The device does not recognise short circuits or shorts across contacts in the start/feedback loop. Take suitable measures, such as fault exclusion through protected or separate installation.

Timing diagram



Legend

- ▶ Power: Supply voltage
- ▶ Start: Start circuit
- ▶ Input: Input circuit
- ▶ Output safe: Safety contacts
- ▶ Semi FAULT: Semiconductor output short across contact

- ▶ Semi OUT: Semiconductor output switch state
- ▶ FAULT: Short across contacts in the input circuit due to actuation of pressure sensitive mat
- ▶ [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 after short across contacts

Installation

- ▶ Install the safety relay 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](#) [ 17]" must be followed.
- ▶ 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](#) [ 17]).
- ▶ Calculation of the max. cable length $l_{\max}$ in the input circuit:

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

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

R_l / 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.
- ▶ Do not switch low currents using contacts that have been used previously with high currents.
- ▶ Adequate protection circuit must be provided on all output contacts with capacitive and inductive loads.
- ▶ With a 24 VDC supply voltage via terminals B1, B2, the power supply must comply with the regulations for extra low voltages with safe electrical separation (SELV, PELV).
- ▶ Semiconductor output supply voltage: Connect surge protection elements between the Y30 and Y31 connections and any DC distribution network (not SELV/PELV) fed from outside of the electrical installation area.

Important for detection of shorts across contacts:

As this function for detecting shorts across contacts is not failsafe, it is tested by Pilz during the final control check. If there is a danger of exceeding the cable length, we recommend the following test once the unit is installed:

1. Unit ready for operation (output contacts closed)
2. Short circuit the test terminals S22, S32 for detecting shorts across the inputs.
3. The unit's fuse must be triggered and the output contacts must open. Cable lengths in the scale of the maximum length can delay the fuse triggering for up to 2 minutes.
4. Reset the fuse: Remove the short circuit and switch off the supply voltage for approx. 1 minute.

Preparing for operation

Supply voltage	AC	DC
Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		
Short circuit-forming pressure sensitive mat/edge		



NOTICE

With single-channel wiring the safety level of your machine/plant may be lower than the safety level of the unit (see [Safety characteristic data](#) [25]).



NOTICE

The overall system PNOZ 16SP and the short circuit-forming pressure sensitive mat or edge has to be assessed in accordance with the product standard EN ISO 13856-1 and/or EN ISO 13856-2.

Start circuit	Automatic start	Manual start



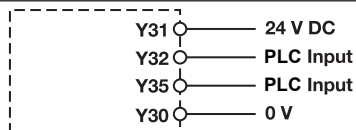
NOTICE

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

Semiconductor output



Legend

- ▶ S1/S2: E-STOP/safety gate switch
- ▶ S3: Reset button
- ▶ : Switch operated
- ▶ : 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 3/PL e at least 1x per month
- ▶ for SIL 2/PL d at least 1x per year



NOTICE

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

Status indicators

LEDs indicate the status and errors during operation:



LED on



POWER

Supply voltage is present.



CH.1

Safety contacts of channel 1 are closed.



CH.2

Safety contacts of channel 2 are closed.



EXT. FAULT

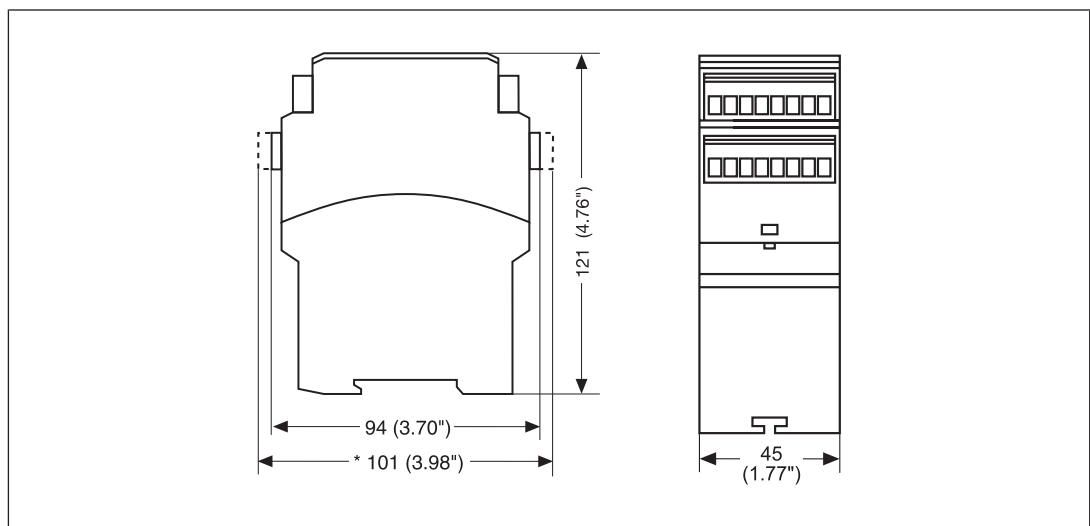
Short across contacts when operating with pressure sensitive mat.

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

* with spring-loaded terminals



Technical details Order no. 777070

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

General	
Certifications	CCC, CE, EAC, TÜV, UKCA, cULus Listed
Electrical data	
Supply voltage	
Voltage	24 V
Kind	AC
Voltage tolerance	-15 %/+10 %
Output of external power supply (AC)	3,5 VA
Frequency range AC	50 - 60 Hz
Supply voltage	
Voltage	24 V
Kind	DC
Voltage tolerance	-15 %/+10 %
Output of external power supply (DC)	2 W
Residual ripple DC	20 %
Duty cycle	100 %
Inputs	
Quantity	2
Voltage at	
Input circuit DC	24 V
Start circuit DC	24 V
Feedback loop DC	24 V
Current at	
Input circuit DC	25 mA
Start circuit DC	25 mA
Feedback loop DC	25 mA
Max. overall cable resistance R _{lmax}	
Single-channel at UB DC	40 Ohm
Single-channel at UB AC	40 Ohm
Dual-channel with detection of shorts across con- tacts at UB DC	80 Ohm
Dual-channel with detection of shorts across con- tacts at UB AC	80 Ohm
Max. resistance of pressure sensitive mat	80 Ohm
Semiconductor outputs	
Quantity	2
Voltage	24 V
Current	20 mA
External supply voltage	24 V
Voltage tolerance	-15 %/+10 %
Residual current at "0" signal	0,1 mA

Semiconductor outputs

Max. internal voltage drop	4 V
Conditional rated short circuit current	100 A
Lowest operating current	0 mA
Utilisation category in accordance with EN 60947-1	DC-12

Relay outputs

Number of output contacts	
Safety contacts (N/O), instantaneous	2
Max. short circuit current I _K	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	8 A
Max. power	2.000 VA
DC1 at	24 V
Min. current	0,01 A
Max. current	8 A
Max. power	200 W

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	8 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	10 A
Blow-out fuse, slow	6 A
Blow-out fuse, gG	10 A
Circuit breaker 24V AC/DC, characteristic B/C	6 A

Contact material	AgSnO₂ + 0,2 µm Au
------------------	--------------------------------------

Conventional thermal current while loading several contactsI_{th} per contact at UB AC; AC1: 240 V, DC1: 24 V

Conv. therm. current with 1 contact	8 A
Conv. therm. current with 2 contacts	6 A

Conventional thermal current while loading several contacts

1th per contact at UB DC; AC1: 240 V, DC1: 24 V

Conv. therm. current with 1 contact	8 A
Conv. therm. current with 2 contacts	6 A

Times

Switch-on delay

with automatic start typ.	230 ms
with automatic start max.	350 ms
with automatic start after power on typ.	310 ms
with automatic start after power on max.	450 ms
with manual start typ.	230 ms
with manual start max.	350 ms

Delay-on de-energisation

with E-STOP typ.	18 ms
with E-STOP max.	30 ms
with power failure typ.	50 ms
with power failure max.	100 ms

Recovery time at max. switching frequency 1/s

after E-STOP	50 ms
after power failure	100 ms

Supply interruption before de-energisation

20 ms

Simultaneity, channel 1 and 2 max.

∞

Environmental data

Climatic suitability **EN 60068-2-78**

Ambient temperature

Temperature range **-10 - 55 °C**

Storage temperature

Temperature range **-40 - 85 °C**

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

Environmental data

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 **plug-in**

Conductor cross section with screw terminals

1 core flexible **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**2 core with the same cross section, flexible without
crimp connectors or with TWIN crimp connectors **0,2 - 1,5 mm², 24 - 16 AWG**Torque setting with screw terminals **0,5 Nm**Stripping length with screw terminals **7 mm**

Dimensions

Height **94 mm**Width **45 mm**Depth **121 mm**Weight **335 g**

Technical details Order no. 777076

General	
Certifications	CCC, CE, EAC, TÜV, UKCA, cULus Listed
Electrical data	
Supply voltage	
Voltage	230 V
Kind	AC
Voltage tolerance	-15 %/+10 %
Output of external power supply (AC)	3,5 VA
Frequency range AC	50 - 60 Hz
Supply voltage	
Voltage	24 V
Kind	DC
Voltage tolerance	-15 %/+10 %
Output of external power supply (DC)	2 W
Residual ripple DC	20 %
Duty cycle	100 %
Inputs	
Quantity	2
Voltage at	
Input circuit DC	24 V
Start circuit DC	24 V
Feedback loop DC	24 V
Current at	
Input circuit DC	25 mA
Start circuit DC	25 mA
Feedback loop DC	25 mA
Max. overall cable resistance R _{lmax}	
Single-channel at UB DC	40 Ohm
Single-channel at UB AC	40 Ohm
Dual-channel with detection of shorts across contacts at UB DC	80 Ohm
Dual-channel with detection of shorts across contacts at UB AC	80 Ohm
Max. resistance of pressure sensitive mat	80 Ohm
Semiconductor outputs	
Quantity	2
Voltage	24 V
Current	20 mA
External supply voltage	24 V
Voltage tolerance	-15 %/+10 %
Residual current at "0" signal	0,1 mA
Max. internal voltage drop	4 V
Conditional rated short circuit current	100 A
Lowest operating current	0 mA

Semiconductor outputsUtilisation category in accordance with EN 60947-1 **DC-12****Relay outputs**

Number of output contacts

Safety contacts (N/O), instantaneous **2**Max. short circuit current I_K **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 **8 A**Max. power **2.000 VA**DC1 at **24 V**Min. current **0,01 A**Max. current **8 A**Max. power **200 W**

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 **8 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 **10 A**Blow-out fuse, slow **6 A**Blow-out fuse, gG **10 A**Circuit breaker 24V AC/DC, characteristic B/C **6 A**

Contact material

AgSnO₂ + 0,2 µm Au**Conventional thermal current while loading several contacts**I_{th} per contact at UB AC; AC1: 240 V, DC1: 24 VConv. therm. current with 1 contact **8 A**Conv. therm. current with 2 contacts **6 A**I_{th} per contact at UB DC; AC1: 240 V, DC1: 24 VConv. therm. current with 1 contact **8 A**Conv. therm. current with 2 contacts **6 A**

Times

Switch-on delay

with automatic start typ.	230 ms
with automatic start max.	350 ms
with automatic start after power on typ.	310 ms
with automatic start after power on max.	450 ms
with manual start typ.	230 ms
with manual start max.	350 ms

Delay-on de-energisation

with E-STOP typ.	18 ms
with E-STOP max.	30 ms
with power failure typ.	50 ms
with power failure max.	100 ms

Recovery time at max. switching frequency 1/s

after E-STOP	50 ms
after power failure	100 ms

Supply interruption before de-energisation

20 ms

Simultaneity, channel 1 and 2 max.

∞**Environmental data**Climatic suitability **EN 60068-2-78**

Ambient temperature

Temperature range **-10 - 55 °C**

Storage temperature

Temperature range **-40 - 85 °C**

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

Mechanical data

Material	
Bottom	PPO UL 94 V1
Front	ABS UL 94 V0
Top	PPO UL 94 V1
Connection type	Screw terminal
Mounting type	plug-in
Conductor cross section with screw terminals	
1 core flexible	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
2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors	0,2 - 1,5 mm², 24 - 16 AWG
Torque setting with screw terminals	0,5 Nm
Stripping length with screw terminals	7 mm
Dimensions	
Height	94 mm
Width	45 mm
Depth	121 mm
Weight	335 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: 2015	EN ISO 13849-1: 2015	EN IEC 62061 SIL CL/max. SIL	EN IEC 62061 61508 PFH [1/h]	EN/IEC 61511 61508 SIL	EN/IEC 61511 61508 PFD	EN ISO 13849-1: 2015 T _M [year]
	PL	Category					

Short circuit-forming safety mats

PL c	Cat. 1	SIL 1	4,77E-08	SIL 1	3,79E-03	20
------	--------	-------	----------	-------	----------	----

Sensor, 2-channel

PL e	Cat. 4	SIL 3	2,31E-09	SIL 3	2,03E-06	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



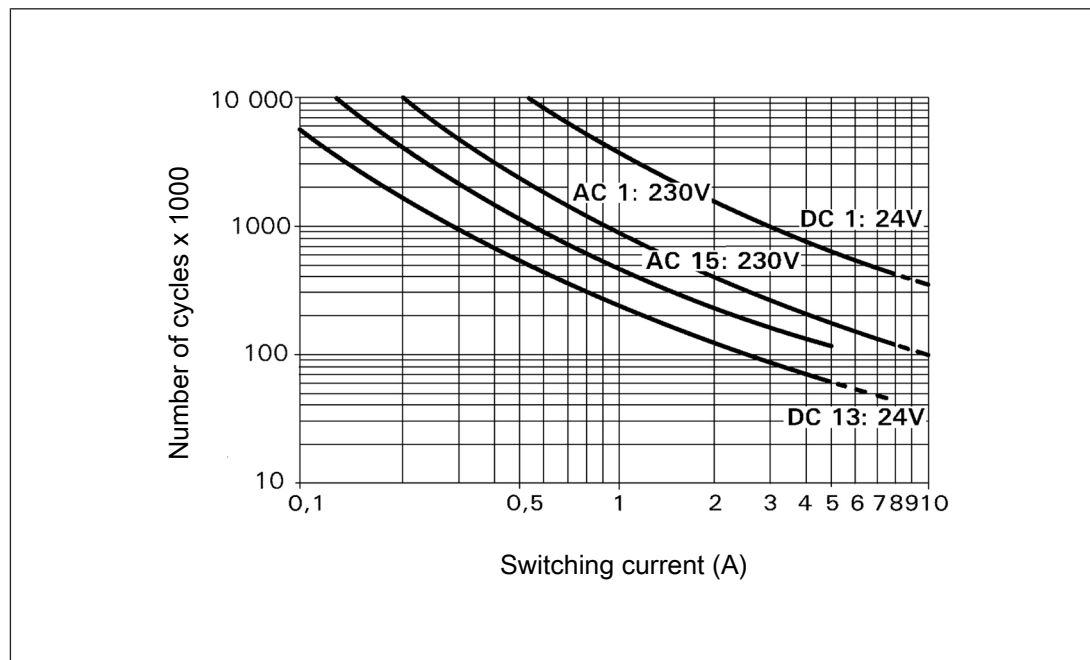
CAUTION!

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

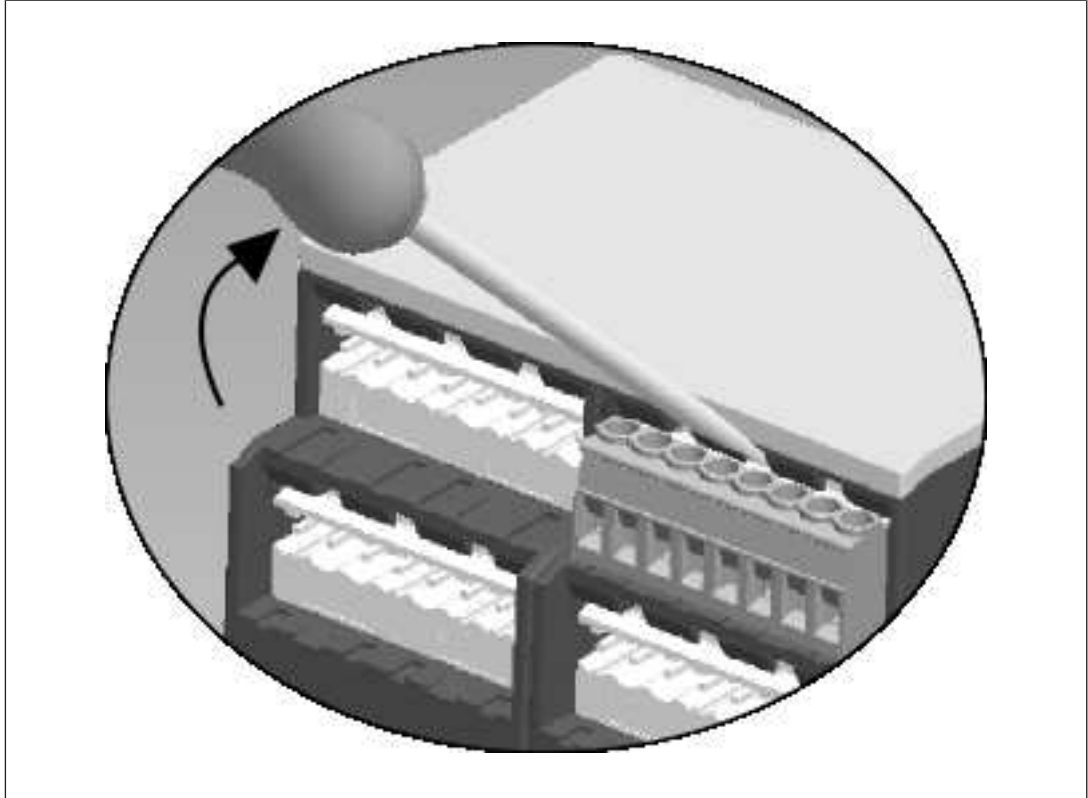
Provided the application to be implemented requires fewer than 4 000 000 cycles, the PFH value (see Technical details) can be used in the calculation.

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.

Remove plug-in terminals

Procedure

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



Order reference

Product type	Features	Connection type	Order no.
PNOZ 16SP	24 VAC, 24 VDC	Screw terminals	777070
PNOZ 16SP	230 VAC, 24 VDC	Screw terminals	777076

EC declaration of conformity

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

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

UKCA-Declaration of Conformity

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

The complete UKCA Declaration of Conformity is available on the Internet at www.pilz.com/downloads.

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

Support

Technical support is available from Pilz round the clock.

Americas

Brazil

+55 11 97569-2804

Canada

+1 888 315 7459

Mexico

+52 55 5572 1300

USA (toll-free)

+1 877-PILZUSA (745-9872)

Asia

China

+86 400-088-3566

Japan

+81 45 471-2281

South Korea

+82 31 778 3300

Australia and Oceania

Australia

+61 3 95600621

New Zealand

+64 9 6345350

Europe

Austria

+43 1 7986263-444

Belgium, Luxembourg

+32 9 3217570

France

+33 3 88104003

Germany

+49 711 3409-444

Ireland

+353 21 4804983

Italy, Malta

+39 0362 1826711

Scandinavia

+45 74436332

Spain

+34 938497433

Switzerland

+41 62 88979-32

The Netherlands

+31 347 320477

Türkiye

+90 216 5775552

United Kingdom

+44 1536 462203

**You can reach our
international hotline on:**

+49 711 3409-222

support@pilz.com

Pilz develops environmentally-friendly products using ecological materials and energy-saving technologies. Offices and production facilities are ecologically designed, environmentally-aware and energy-saving. So Pilz offers sustainability, plus the security of using energy-efficient products and environmentally-friendly solutions.



CECE®, CHRE®, CMSE®, INDUSTRIAL P®, Leansafe®, Myzel®, PAS4000®, PAScal®, PASconfig®, Pilz®, PIT®, PMCaprino®, PMCaproto®, PMCapendo®, PMD®, PM®, PNOZ®, Primo®, PSEN®, PSS®, PSS®, PVIS®, SafetyBUS p®, SafetyNET p®, THE SPIRIT OF SAFETY® are registered and protected trademarks of Pilz GmbH & Co. KG in some countries. We would point out that product features may vary from the details stated in this document, depending on the status at the time of publication and the scope of the equipment. We accept no responsibility for the validity, accuracy and entirety of the text and graphics presented in this information. Please contact our Technical Support if you have any questions.

We are represented internationally. Please refer to our homepage www.pilz.com for further details or contact our headquarters.

Headquarters: Pilz GmbH & Co. KG, Felix-Wankel-Straße 2, 73760 Ostfildern, Germany
Telephone: +49 711 3409-0, E-Mail: info@pilz.com, Internet: www.pilz.com

PILZ
THE SPIRIT OF SAFETY