



Visualisation; Diagnostics

Easy to Configure

Programming IEC 61131-3

Rapid Installation

PNOZ X4

PILZ

THE SPIRIT OF SAFETY

► Safety relays

This document is a translation of the original document.

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

Source code from third-party manufacturers or open source software has been used for some components. The relevant licence information is available on the Internet on the Pilz homepage.

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	4
Validity of documentation	4
Using the documentation	4
Definition of symbols	4
Safety	5
Intended use	5
Safety regulations	5
Safety assessment	5
Use of qualified personnel	6
Warranty and liability	6
Disposal	6
For your safety	6
Unit features	7
Safety features	7
Block diagram/terminal configuration	7
Types: AC	7
Type: DC	8
Function Description	8
Operating modes	8
Timing diagram	9
Installation	9
Wiring	10
Preparing for operation	11
Operation	13
Status indicators	13
Faults – Interference	14
Dimensions in mm	14
Technical details	15
Safety characteristic data	30
Supplementary data	30
Service life graph	31
Order reference	31
EC declaration of conformity	32

Introduction

Validity of documentation

This documentation is valid for the product PNOZ X4. 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 X4 provides a safety-related interruption of a safety circuit.

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

- ▶ E-STOP pushbuttons
- ▶ Safety gates
- ▶ Light grids and safety switches with detection of shorts across contacts

The following is deemed improper use in particular:

- ▶ Any component, technical or electrical modification to the product
- ▶ Use of the product outside the areas described in this manual
- ▶ Use of the product outside the technical details (see [Technical details](#)  15).

**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 it is necessary to perform a safety assessment in accordance with the Machinery Directive.

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

Use of qualified personnel

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

A competent person is someone who, because of their training, experience and current professional activity, has the specialist knowledge required to test, assess and operate the work equipment, devices, systems, plant and machinery in accordance with the general standards and guidelines for safety technology.

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 this description under "Safety"
- ▶ 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 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:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- ▶ Connection options for:
 - E-STOP pushbuttons
 - Safety gate limit switches
 - Start button
 - Light guards and safety switches
- ▶ LED display for:
 - Supply voltage
 - Switch status of the safety contacts
- ▶ See order reference for unit types

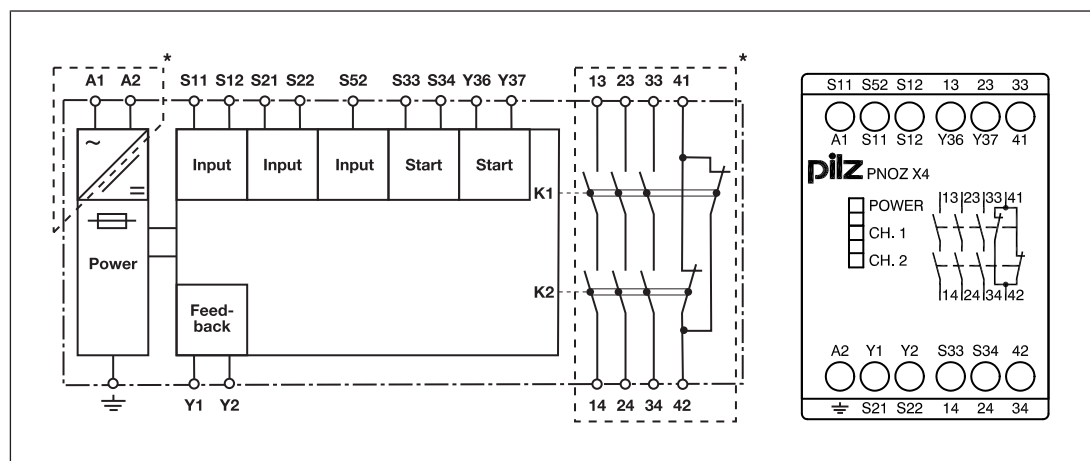
Safety features

The safety relay meets the following safety requirements:

- ▶ The circuit is 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.

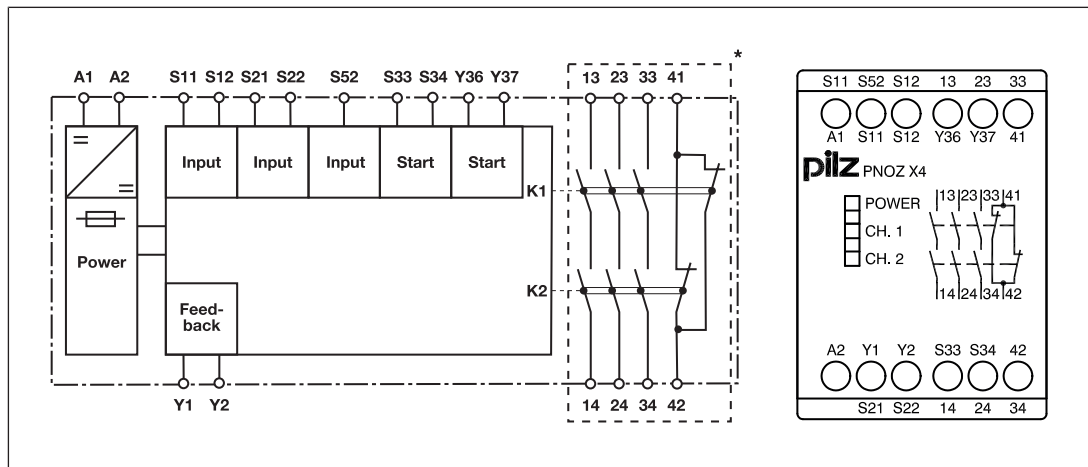
Block diagram/terminal configuration

Types: AC



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

Type: DC



*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 X4 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.

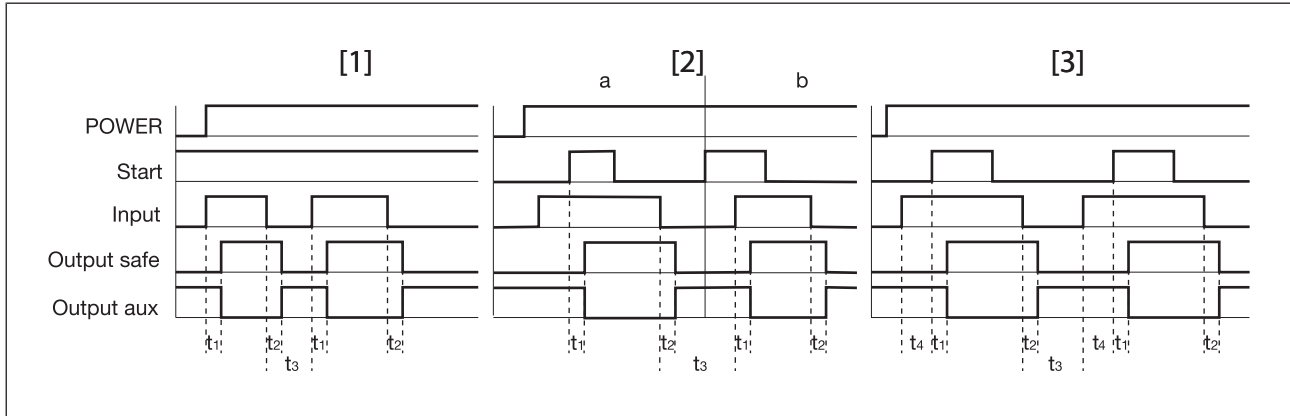
- ▶ Input circuit is closed (e.g. E-STOP pushbutton not operated):
 - LEDs "CH1" and "CH2" will light.
 - Safety contacts 13-14, 23-24 and 33-34 are closed, auxiliary contact 41-42 is open. The unit is active.
- ▶ Input circuit is opened (e.g. E-STOP pushbutton operated):
 - The LEDs "CH1" and "CH2" go out.
 - Safety contacts 13-14, 23-24 and 33-34 are opened redundantly, auxiliary contact 41-42 is closed.

Operating modes

- ▶ Single-channel operation: No redundancy in the input circuit, earth faults in the start and input circuit are detected.
- ▶ Dual-channel operation without detection of shorts across contacts: Redundant input circuit, detects PNOZ X4
 - earth faults in the start and input circuit,
 - short circuits in the input circuit.
- ▶ Dual-channel operation with detection of shorts across contacts: Redundant input circuit, PNOZ X4 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.

- ▶ Monitored start: Unit is active once the input circuit is closed and once the start circuit is closed after the waiting period has elapsed (see [Technical details \[15\]](#)).
- ▶ Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Legend

- ▶ Power: Supply voltage
- ▶ Start: Start circuit
- ▶ Input: Input circuit
- ▶ Output safe: Safety contacts
- ▶ Output aux: Auxiliary contact
- ▶ [1]: Automatic start
- ▶ [2]: Manual start
- ▶ [3]: Monitored 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
- ▶ t_4 : Waiting period with a monitored start

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.
- ▶ Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Wiring

Please note:

- ▶ Information given in the "[Technical details \[15\]](#)" must be followed.
- ▶ Outputs 13-14, 23-24, 33-34 are safety contacts; output 41-42 is an auxiliary contact (e.g. for display).
- ▶ Auxiliary contact 41-42 should **not** be used for safety circuits!
- ▶ Do not connect undesignated terminals.
- ▶ To prevent contact welding, a fuse should be connected before the output contacts (see [Technical details \[15\]](#)).

- ▶ Calculation of the max. cable runs I_{\max} in the input circuit:

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

$R_{I_{\max}}$ = max. overall cable resistance (see [Technical details \[15\]](#))

R_l / km = cable resistance/km

- ▶ Use copper wire that can withstand 60/75 °C.
- ▶ Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.
- ▶ Do not switch low currents using contacts that have been used previously with high currents.
- ▶ When connecting magnetically operated, reed proximity switches, ensure that the max. peak inrush current (on the input circuit) does not overload the proximity switch.
- ▶ 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.
- ▶ Ensure the wiring and EMC requirements of IEC 60204-1 are met.

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 runs, we recommend the following test after the installation of the device:

1. Unit ready for operation (output contacts closed)
2. Short circuit the test terminals S12, S22 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		
Light guard or safety switch, detection of shorts across contacts via ESPE (only when $U_B = 24$ VDC)		



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 \[30\]](#)).



NOTICE

Operation with a light guard or safety switch

It must not be possible to switch off the supply voltage for the PNOZ X4 separately from the supply voltage for the light guard or safety switch.

Start circuit	E-STOP wiring, safety gate (single-channel)	E-STOP wiring, safety gate (dual-channel)
Automatic start		
Manual start		
Monitored 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	with feedback loop monitoring	without feedback loop monitoring
Link or contacts from external contactors		

Legend

- ▶ S1/S2: E-STOP/safety gate switch
- ▶ S3: Reset button
- ▶ ↑↑: Switch operated
- ▶ : Gate open
- ▶ : Gate closed

Operation



NOTICE

Check each safety function

- after initial commissioning and after each change of the machine/ plant
- for SIL CL 3/PL e at least 1x per month, for SIL CL 2/PL d at least 1x per year

Follow the instructions below:

- Activate the safety function and check whether all the used safety contacts open.
- Prepare for operation again and start the unit. All the used safety contacts must be closed again.

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.



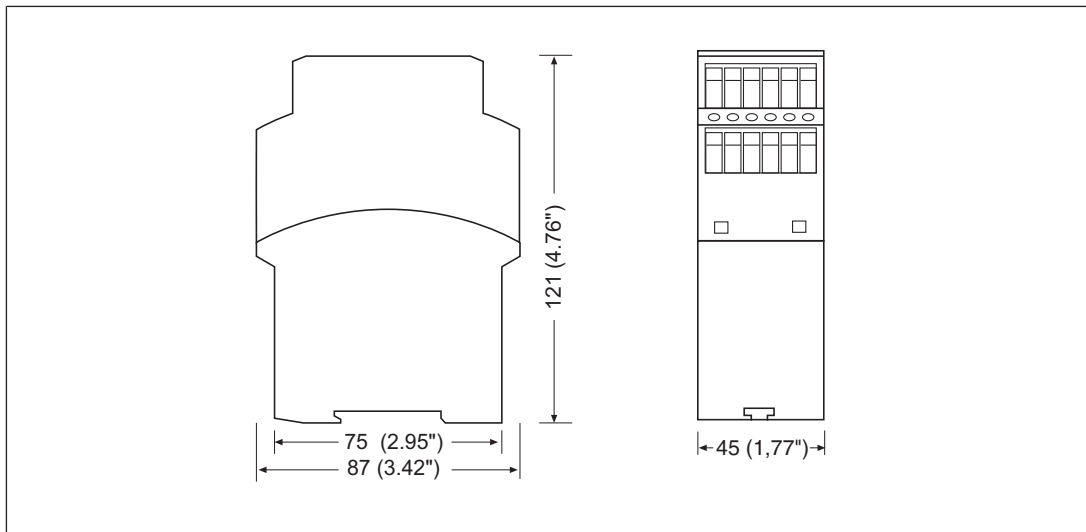
CH.2

Safety contacts of channel 2 are closed.

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. 774730 – 774734

See below for more order numbers

General	774730	774731	774734
Approvals	CCC, CE, EAC (Eurasian), TÜV, cULus Listed	CCC, CE, EAC (Eurasian), TÜV, cULus Listed	CCC, CE, EAC (Eurasian), TÜV, cULus Listed
Electrical data	774730	774731	774734
Supply voltage			
Voltage	24 V	24 V	110 V
Kind	DC	AC	AC
Voltage tolerance	-15 %/+10 %	-15 %/+10 %	-15 %/+10 %
Output of external power supply (AC)	–	5 VA	5 VA
Output of external power supply (DC)	2,5 W	–	–
Frequency range AC	–	50 - 60 Hz	50 - 60 Hz
Residual ripple DC	160 %	–	–
Duty cycle	100 %	100 %	100 %
Max. inrush current impulse			
Current pulse, A1	1,7 A	–	–
Pulse duration, A1	1,5 ms	–	–
Inputs	774730	774731	774734
Number	2	2	2
Voltage at			
Input circuit DC	24 V	24 V	24 V
Start circuit DC	24 V	24 V	24 V
Feedback loop DC	24 V	24 V	24 V
Current at			
Input circuit DC	40 mA	40 mA	40 mA
Start circuit DC	70 mA	90 mA	90 mA
Feedback loop DC	70 mA	90 mA	90 mA
Min. input resistance at power-on	165 Ohm	165 Ohm	165 Ohm

Inputs	774730	774731	774734
Max. overall cable resistance R _{lmax}			
Single-channel at UB DC	20 Ohm	–	–
Single-channel at UB AC	–	150 Ohm	150 Ohm
Dual-channel without detection of shorts across contacts at UB DC	20 Ohm	–	–
Dual-channel without detection of shorts across contacts at UB AC	–	150 Ohm	150 Ohm
Dual-channel with detection of shorts across contacts at UB DC	15 Ohm	–	–
Dual-channel with detection of shorts across contacts at UB AC	–	100 Ohm	100 Ohm
Relay outputs	774730	774731	774734
Number of output contacts			
Safety contacts (N/O), instantaneous	3	3	3
Auxiliary contacts (N/C)	1	1	1
Max. short circuit current I _K	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	8 A	8 A	8 A
Max. power	2000 VA	2000 VA	2000 VA
DC1 at	24 V	24 V	24 V
Min. current	0,01 A	0,01 A	0,01 A
Max. current	8 A	8 A	8 A
Max. power	200 W	200 W	200 W

Relay outputs	774730	774731	774734
Utilisation category of auxiliary contacts			
AC1 at	240 V	240 V	240 V
Min. current	0,01 A	0,01 A	0,01 A
Max. current	8 A	8 A	8 A
Max. power	2000 VA	2000 VA	2000 VA
DC1 at	24 V	24 V	24 V
Min. current	0,01 A	0,01 A	0,01 A
Max. current	8 A	8 A	8 A
Max. power	200 W	200 W	200 W
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	5 A	5 A	5 A
DC13 (6 cycles/min) at	24 V	24 V	24 V
Max. current	7 A	7 A	7 A
Utilisation category of auxiliary contacts			
AC15 at	230 V	230 V	230 V
Max. current	5 A	5 A	5 A
DC13 (6 cycles/min) at	24 V	24 V	24 V
Max. current	7 A	7 A	7 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	8 A	8 A	8 A
Voltage	24 V DC Resistive	24 V DC Resistive	24 V DC Resistive
With current	5 A	5 A	5 A
Pilot Duty	B300, R300	B300, R300	B300, 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	10 A	10 A	10 A
Blow-out fuse, slow	6 A	6 A	6 A
Blow-out fuse, gG	10 A	10 A	10 A
Circuit breaker 24V AC/DC, characteristic B/C	6 A	6 A	6 A

Relay outputs	774730	774731	774734
External contact fuse protection, auxiliary contacts			
Max. melting integral	240 A²s	240 A²s	240 A²s
Blow-out fuse, quick	10 A	10 A	10 A
Blow-out fuse, slow	6 A	6 A	6 A
Blow-out fuse, gG	10 A	10 A	10 A
Circuit breaker 24 V AC/DC, characteristic B/C	6 A	6 A	6 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	774730	774731	774734
I _{th} per contact at UB AC; AC1: 240 V, DC1: 24 V			
Conv. therm. current with 1 contact	–	8 A	8 A
Conv. therm. current with 2 contacts	–	7,5 A	7,5 A
Conv. therm. current with 3 contacts	–	6,5 A	6,5 A
I _{th} 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	8 A	–	–
Conv. therm. current with 3 contacts	7 A	–	–
Times	774730	774731	774734
Switch-on delay			
With automatic start typ.	270 ms	210 ms	210 ms
With automatic start max.	600 ms	350 ms	350 ms
With automatic start after power on typ.	270 ms	240 ms	240 ms
With automatic start after power on max.	600 ms	390 ms	390 ms
With manual start typ.	70 ms	55 ms	55 ms
With manual start max.	600 ms	350 ms	350 ms
With monitored start typ.	40 ms	30 ms	30 ms
With monitored start max.	70 ms	50 ms	50 ms

Times	774730	774731	774734
Delay-on de-energisation			
With E-STOP typ.	15 ms	15 ms	15 ms
With E-STOP max.	30 ms	30 ms	30 ms
With power failure typ.	50 ms	55 ms	55 ms
With power failure max.	70 ms	80 ms	80 ms
Recovery time at max. switching frequency 1/s			
After E-STOP	50 ms	50 ms	50 ms
After power failure	100 ms	100 ms	100 ms
Waiting period with a monitored start			
	250 ms	150 ms	150 ms
Min. start pulse duration with a monitored start			
	30 ms	30 ms	30 ms
Supply interruption before de-energisation			
	20 ms	20 ms	20 ms
Simultaneity, channel 1 and 2 max.			
	∞	∞	∞
Environmental data	774730	774731	774734
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
Protection type			
Mounting area (e.g. control cabinet)	IP54	IP54	IP54
Housing	IP40	IP40	IP40
Terminals	IP20	IP20	IP20

Mechanical data	774730	774731	774734
Mounting position	Any	Any	Any
Mechanical life	10,000,000 cycles	10,000,000 cycles	10,000,000 cycles
Material			
Bottom	PPO UL 94 V0	PPO UL 94 V0	PPO UL 94 V0
Front	ABS UL 94 V0	ABS UL 94 V0	ABS UL 94 V0
Top	PPO UL 94 V0	PPO UL 94 V0	PPO UL 94 V0
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
Dimensions			
Height	87 mm	87 mm	87 mm
Width	45 mm	45 mm	45 mm
Depth	121 mm	121 mm	121 mm
Weight	270 g	370 g	370 g

Where standards are undated, the 2014-07 latest editions shall apply.

Order no. 774735 – 774736

See below for more order numbers

General	774735	774736
Approvals	CCC, CE, EAC (Eurasian), TÜV, cULus Listed	CCC, CE, EAC (Eurasian), TÜV, cULus Listed
Electrical data	774735	774736
Supply voltage		
Voltage	115 V	120 V
Kind	AC	AC
Voltage tolerance	-15 %/+10 %	-15 %/+10 %
Output of external power supply (AC)	5 VA	5 VA
Frequency range AC	50 - 60 Hz	50 - 60 Hz
Duty cycle	100 %	100 %
Inputs	774735	774736
Number	2	2
Voltage at		
Input circuit DC	24 V	24 V
Start circuit DC	24 V	24 V
Feedback loop DC	24 V	24 V
Current at		
Input circuit DC	40 mA	40 mA
Start circuit DC	90 mA	90 mA
Feedback loop DC	90 mA	90 mA
Min. input resistance at power-on	165 Ohm	165 Ohm
Max. overall cable resistance R _{I-max}		
Single-channel at UB AC	150 Ohm	150 Ohm
Dual-channel without detection of shorts across contacts at UB AC	150 Ohm	150 Ohm
Dual-channel with detection of shorts across contacts at UB AC	100 Ohm	100 Ohm
Relay outputs	774735	774736
Number of output contacts		
Safety contacts (N/O), instantaneous	3	3
Auxiliary contacts (N/C)	1	1
Max. short circuit current I _K	1 kA	1 kA
Utilisation category		
In accordance with the standard	EN 60947-4-1	EN 60947-4-1

Relay outputs	774735	774736
Utilisation category of safety contacts		
AC1 at	240 V	240 V
Min. current	0,01 A	0,01 A
Max. current	8 A	8 A
Max. power	2000 VA	2000 VA
DC1 at	24 V	24 V
Min. current	0,01 A	0,01 A
Max. current	8 A	8 A
Max. power	200 W	200 W
Utilisation category of auxiliary contacts		
AC1 at	240 V	240 V
Min. current	0,01 A	0,01 A
Max. current	8 A	8 A
Max. power	2000 VA	2000 VA
DC1 at	24 V	24 V
Min. current	0,01 A	0,01 A
Max. current	8 A	8 A
Max. power	200 W	200 W
Utilisation category		
In accordance with the standard	EN 60947-5-1	EN 60947-5-1
Utilisation category of safety contacts		
AC15 at	230 V	230 V
Max. current	5 A	5 A
DC13 (6 cycles/min) at	24 V	24 V
Max. current	7 A	7 A
Utilisation category of auxiliary contacts		
AC15 at	230 V	230 V
Max. current	5 A	5 A
DC13 (6 cycles/min) at	24 V	24 V
Max. current	7 A	7 A
Utilisation category in accordance with UL		
Voltage	240 V AC G. P.	240 V AC G. P.
With current	8 A	8 A
Voltage	24 V DC Resistive	24 V DC Resistive
With current	5 A	5 A
Pilot Duty	B300, R300	B300, R300

Relay outputs	774735	774736
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	10 A	10 A
Blow-out fuse, slow	6 A	6 A
Blow-out fuse, gG	10 A	10 A
Circuit breaker 24V AC/DC, characteristic B/C	6 A	6 A
External contact fuse protection, auxiliary contacts		
Max. melting integral	240 A²s	240 A²s
Blow-out fuse, quick	10 A	10 A
Blow-out fuse, slow	6 A	6 A
Blow-out fuse, gG	10 A	10 A
Circuit breaker 24 V AC/DC, characteristic B/C	6 A	6 A
Contact material	AgSnO₂ + 0,2 µm Au	AgSnO₂ + 0,2 µm Au
Conventional thermal current while loading several contacts	774735	774736
I _{th} per contact at UB AC; AC1: 240 V, DC1: 24 V		
Conv. therm. current with 1 contact	8 A	8 A
Conv. therm. current with 2 contacts	7,5 A	7,5 A
Conv. therm. current with 3 contacts	6,5 A	6,5 A
Times	774735	774736
Switch-on delay		
With automatic start typ.	210 ms	210 ms
With automatic start max.	350 ms	350 ms
With automatic start after power on typ.	240 ms	240 ms
With automatic start after power on max.	390 ms	390 ms
With manual start typ.	55 ms	55 ms
With manual start max.	350 ms	350 ms
With monitored start typ.	30 ms	30 ms
With monitored start max.	50 ms	50 ms
Delay-on de-energisation		
With E-STOP typ.	15 ms	15 ms
With E-STOP max.	30 ms	30 ms
With power failure typ.	55 ms	55 ms
With power failure max.	80 ms	80 ms

Times	774735	774736
Recovery time at max. switching frequency 1/s		
After E-STOP	50 ms	50 ms
After power failure	100 ms	100 ms
Waiting period with a monitored start	150 ms	150 ms
Min. start pulse duration with a monitored start	30 ms	30 ms
Supply interruption before de-energisation	20 ms	20 ms
Simultaneity, channel 1 and 2 max.	∞	∞
Environmental data	774735	774736
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		
Mounting area (e.g. control cabinet)	IP54	IP54
Housing	IP40	IP40
Terminals	IP20	IP20
Mechanical data	774735	774736
Mounting position	Any	Any
Mechanical life	10,000,000 cycles	10,000,000 cycles
Material		
Bottom	PPO UL 94 V0	PPO UL 94 V0
Front	ABS UL 94 V0	ABS UL 94 V0
Top	PPO UL 94 V0	PPO UL 94 V0
Connection type	Screw terminal	Screw terminal
Mounting type	Fixed	Fixed

Mechanical data	774735	774736
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	0,6 Nm	0,6 Nm
Dimensions		
Height	87 mm	87 mm
Width	45 mm	45 mm
Depth	121 mm	121 mm
Weight	370 g	370 g

Where standards are undated, the 2014-07 latest editions shall apply.

Order no. 774738 – 774739

General	774738	774739
Approvals	CCC, CE, EAC (Eurasian), TÜV, cULus Listed	CCC, CE, EAC (Eurasian), TÜV, cULus Listed
Electrical data	774738	774739
Supply voltage		
Voltage	230 V	240 V
Kind	AC	AC
Voltage tolerance	-15 %/+10 %	-15 %/+10 %
Output of external power supply (AC)	5 VA	5 VA
Frequency range AC	50 - 60 Hz	50 - 60 Hz
Duty cycle	100 %	100 %
Inputs	774738	774739
Number	2	2
Voltage at		
Input circuit DC	24 V	24 V
Start circuit DC	24 V	24 V
Feedback loop DC	24 V	24 V
Current at		
Input circuit DC	40 mA	40 mA
Start circuit DC	90 mA	90 mA
Feedback loop DC	90 mA	90 mA
Min. input resistance at power-on	165 Ohm	165 Ohm

Inputs	774738	774739
Max. overall cable resistance RI-max		
Single-channel at UB AC	150 Ohm	150 Ohm
Dual-channel without detection of shorts across contacts at UB AC	150 Ohm	150 Ohm
Dual-channel with detection of shorts across contacts at UB AC	100 Ohm	100 Ohm
Relay outputs	774738	774739
Number of output contacts		
Safety contacts (N/O), instantaneous	3	3
Auxiliary contacts (N/C)	1	1
Max. short circuit current IK	1 kA	1 kA
Utilisation category		
In accordance with the standard	EN 60947-4-1	EN 60947-4-1
Utilisation category of safety contacts		
AC1 at	240 V	240 V
Min. current	0,01 A	0,01 A
Max. current	8 A	8 A
Max. power	2000 VA	2000 VA
DC1 at	24 V	24 V
Min. current	0,01 A	0,01 A
Max. current	8 A	8 A
Max. power	200 W	200 W
Utilisation category of auxiliary contacts		
AC1 at	240 V	240 V
Min. current	0,01 A	0,01 A
Max. current	8 A	8 A
Max. power	2000 VA	2000 VA
DC1 at	24 V	24 V
Min. current	0,01 A	0,01 A
Max. current	8 A	8 A
Max. power	200 W	200 W
Utilisation category		
In accordance with the standard	EN 60947-5-1	EN 60947-5-1
Utilisation category of safety contacts		
AC15 at	230 V	230 V
Max. current	5 A	5 A
DC13 (6 cycles/min) at	24 V	24 V
Max. current	7 A	7 A


Relay outputs	774738	774739
Utilisation category of auxiliary contacts		
AC15 at	230 V	230 V
Max. current	5 A	5 A
DC13 (6 cycles/min) at	24 V	24 V
Max. current	7 A	7 A
Utilisation category in accordance with UL		
Voltage	240 V AC G. P.	240 V AC G. P.
With current	8 A	8 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	10 A	10 A
Blow-out fuse, slow	6 A	6 A
Blow-out fuse, gG	10 A	10 A
Circuit breaker 24V AC/DC, characteristic B/C	6 A	6 A
External contact fuse protection, auxiliary contacts		
Max. melting integral	240 A²s	240 A²s
Blow-out fuse, quick	10 A	10 A
Blow-out fuse, slow	6 A	6 A
Blow-out fuse, gG	10 A	10 A
Circuit breaker 24 V AC/DC, characteristic B/C	6 A	6 A
Contact material	AgSnO₂ + 0,2 µm Au	AgSnO₂ + 0,2 µm Au
Conventional thermal current while loading several contacts	774738	774739
I _{th} per contact at UB AC; AC1: 240 V, DC1: 24 V		
Conv. therm. current with 1 contact	8 A	8 A
Conv. therm. current with 2 contacts	7,5 A	7,5 A
Conv. therm. current with 3 contacts	6,5 A	6,5 A

Times	774738	774739
Switch-on delay		
With automatic start typ.	210 ms	210 ms
With automatic start max.	350 ms	350 ms
With automatic start after power on typ.	240 ms	240 ms
With automatic start after power on max.	390 ms	390 ms
With manual start typ.	55 ms	55 ms
With manual start max.	350 ms	350 ms
With monitored start typ.	30 ms	30 ms
With monitored start max.	50 ms	50 ms
Delay-on de-energisation		
With E-STOP typ.	15 ms	15 ms
With E-STOP max.	30 ms	30 ms
With power failure typ.	55 ms	55 ms
With power failure max.	80 ms	80 ms
Recovery time at max. switching frequency 1/s		
After E-STOP	50 ms	50 ms
After power failure	100 ms	100 ms
Waiting period with a monitored start		
	150 ms	150 ms
Min. start pulse duration with a monitored start		
	30 ms	30 ms
Supply interruption before de-energisation		
	20 ms	20 ms
Simultaneity, channel 1 and 2 max.		
	∞	∞
Environmental data		
774738		
774739		
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

Environmental data	774738	774739
Rated insulation voltage	250 V	250 V
Rated impulse withstand voltage	4 kV	4 kV
Protection type		
Mounting area (e.g. control cabinet)	IP54	IP54
Housing	IP40	IP40
Terminals	IP20	IP20
Mechanical data	774738	774739
Mounting position	Any	Any
Mechanical life	10,000,000 cycles	10,000,000 cycles
Material		
Bottom	PPO UL 94 V0	PPO UL 94 V0
Front	ABS UL 94 V0	ABS UL 94 V0
Top	PPO UL 94 V0	PPO UL 94 V0
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	0,6 Nm	0,6 Nm
Dimensions		
Height	87 mm	87 mm
Width	45 mm	45 mm
Depth	121 mm	121 mm
Weight	370 g	370 g

Where standards are undated, the 2014-07 latest editions shall apply.


Safety characteristic data



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


Operating mode	EN ISO 13849-1: 2008 PL	EN ISO 13849-1: 2008 Category	EN 62061 SIL CL	EN 62061 PFH _D [1/h]	IEC 61511 SIL	IEC 61511 PFD	EN ISO 13849-1: 2008 T _M [year]
–	PL e	Cat. 4	SIL CL 3	2,31E-09	SIL 3	2,03E-06	20

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



INFORMATION
 A safety function's SIL/PL values are **not** identical to the SIL/PL values of the units that are used and may be different. We recommend that you use the PAScal software tool to calculate the safety function's SIL/PL values.

Supplementary data

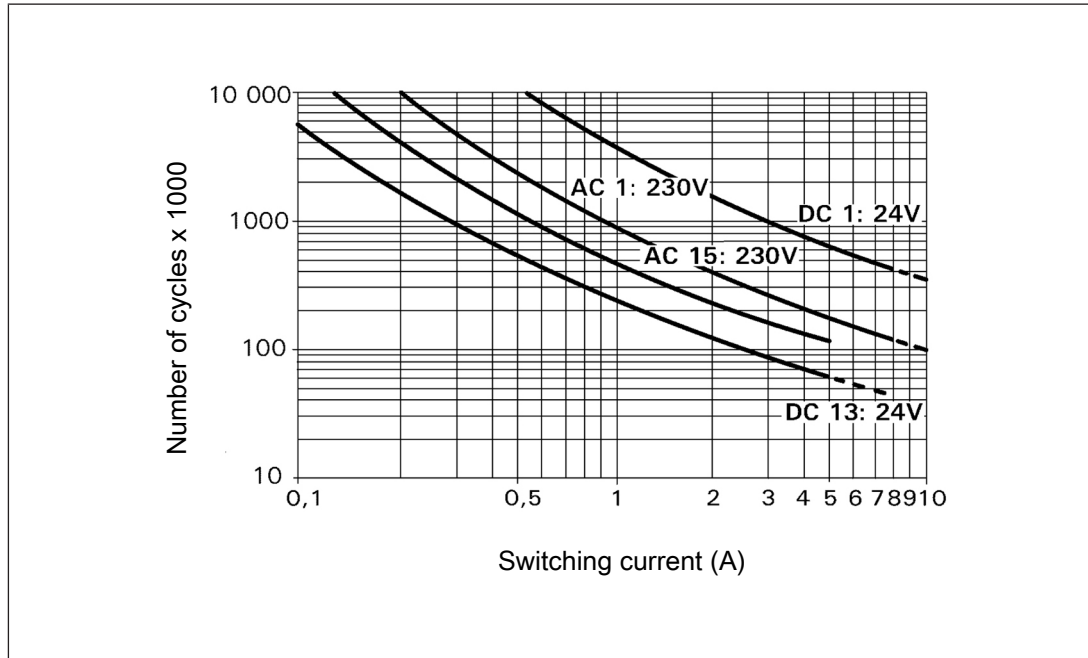


CAUTION!
 It is essential to consider the relay's service life graphs. The relay outputs' safety-related characteristic data is only valid if the values in the service life graphs are met.

The PFH value depends on the switching frequency and the load on the relay output. If the service life graphs are not accessible, the stated PFH value can be used irrespective of the switching frequency and the load, as the PFH value already considers the relay's B10d value as well as the failure rates of the other components.

Service life graph

The service life graphs indicate the number of cycles from which failures due to wear must be expected. The wear is mainly caused by the electrical load; the mechanical load is negligible.



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 X4	24 VDC	Screw terminals	774 730
PNOZ X4	24 V AC	Screw terminals	774 731
PNOZ X4	110 V AC	Screw terminals	774 734
PNOZ X4	115 V AC	Screw terminals	774 735
PNOZ X4	120 V AC	Screw terminals	774 736
PNOZ X4	230 V AC	Screw terminals	774 738
PNOZ X4	240 V AC	Screw terminals	774 739

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/support/downloads.

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

► Support

Technical support is available from Pilz round the clock.

Americas

Brazil

+55 11 97569-2804

Canada

+1 888-315-PILZ (315-7459)

Mexico

+52 55 5572 1300

USA (toll-free)

+1 877-PILZUSA (745-9872)

Asia

China

+86 21 60880878-216

Japan

+81 45 471-2281

South Korea

+82 31 450 0680

Australia

+61 3 95446300

Europe

Austria

+43 1 7986263-0

Belgium, Luxembourg

+32 9 3217575

France

+33 3 88104000

Germany

+49 711 3409-444

Ireland

+353 21 4804983

Italy

+39 0362 1826711

Scandinavia

+45 74436332

Spain

+34 938497433

Switzerland

+41 62 88979-30

The Netherlands

+31 347 320477

Turkey

+90 216 5775552

United Kingdom

+44 1536 462203

You can reach our international hotline on:

+49 711 3409-444

support@pilz.com

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.

Energy saving by Pilz



Pilz GmbH & Co. KG
Felix-Wankel-Straße 2
73760 Ostfildern, Germany
Tel.: +49 711 3409-0
Fax: +49 711 3409-133
info@pilz.com
www.pilz.com

PILZ
THE SPIRIT OF SAFETY