

PNOZ X3

PLZ
THE SPIRIT OF SAFETY

> Safety relays

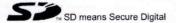
Operating Manual-20547-EN-12

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Introduction

Validity of documentation

This documentation is valid for the product PNOZ X3. It is valid until new documentation is

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 fea-

Safety

Intended use

The safety relay PNOZ X3 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

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,
- \triangleright Use of the product outside the technical details (see Technical details [\bigcirc 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 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

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

Unit features

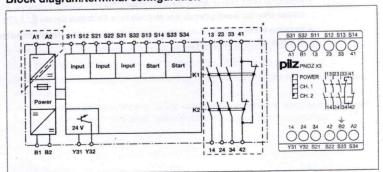
- Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- ▶ 1 semiconductor output
- Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Start button
- > LED display for:
 - Supply voltage
 - Switch status of the safety contacts
- > Semiconductor output signals:
 - 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 (over-voltage category II)

Function Description

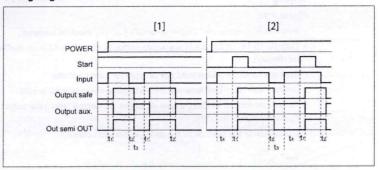
The safety relay PNOZ X3 provides a safety-oriented interruption of a safety circuit. When supply voltage is supplied the "POWER" LED is lit. The unit is ready for operation when the start circuit S13-S14 is closed.

- Input circuit is closed (e.g. E-STOP pushbutton not operated):
 - Safety contacts 13-14, 23-24 and 33-34 are closed, auxiliary contact 41-42 is open.
 The unit is active.
 - The LEDs "CH.1" and "CH.2" are lit.
 - A high signal is present at the semiconductor output switch state Y32.
- Input circuit is opened (e.g. E-STOP pushbutton operated):
 - Safety contacts 13-14, 23-24 and 33-34 are opened redundantly, auxiliary contact 41-42 is closed.
 - The LEDs "CH.1" and "CH.2" go out.
 - A low signal is present at the semiconductor output switch state Y32.

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 X3 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.
- 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 [117]).
- Increase in the number of available contacts by connecting contact expandsion modules or external contactors/relays.

Timing diagram



Legend

- Power: Supply voltage
- ▶ Start: Start circuit
- ▶ Input: Input circuit
- Dutput safe: Safety contacts
- Dutput aux: Auxiliary contact
- Dut semi OUT: Semiconductor output switch state
- [1]: Automatic start
- [2]: Monitored start
- t₁: Switch-on delay
- t₂: Delay-on de-energisation
- ▶ t₃: Recovery time
- ▶ t₄: 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 (35 mm).
- When installed vertically: Secure the unit by using a fixing element (e.g. retaining bracket or end angle).
- With AC supply voltage: When installing more than 2 units next to each other in the control cabinet, a distance of at least 6mm must be maintained between the units.

Wiring

Please note:

- Information given in the "Technical details [17]" 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!
- Delivery condition: Link between S11-S12 (dual-channel input circuit)
- To prevent contact welding, a fuse should be connected before the output contacts (see Technical details [2] 17]).
- Calculation of the max. cable length I_{max} in the input circuit:

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

 $R_{\rm imax}$ = max. overall cable resistance (see Technical details [17]) $R_{\rm i}$ / km = cable resistance/km

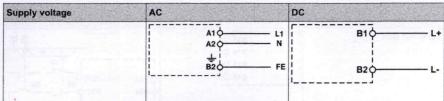
- ▶ Use copper wiring with a temperature stability of 60/75 °C.
- ▶ To prevent EMC interferences (particularly common-mode interferences) the measures described in EN 60204-1 must be executed. This includes the separate routing of cables of the control circuits (input, start and feedback loop) from other 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 must be provided on all output contacts with capacitive and inductive loads.
- When connecting magnetically operated, reed proximity switches, ensure that the max. peak inrush current (on the input circuit) does not overload the proximity switch.
- 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).
- When operated with AC voltage: Connect terminal B2 to the functional earth.

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.
- 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.
- Reset the fuse: Remove the short circuit and switch off the supply voltage for approx. 1
 minute

Preparing for operation



Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts	\$12 0 \$21 \$11 0 \$22 \$32 0 \$31 0	
E-STOP with detection of shorts across contacts		\$1 \begin{array}{cccccccccccccccccccccccccccccccccccc
Safety gate without detection of shorts across contacts	\$12 ¢ \$21 \$11 ¢ \$22 \$32 ¢ \$31 ¢	G G
Safety gate with detection of shorts across contacts		S31 0 S1 S11 S32 0 S1 S12 S21 0 S22



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 [33]).

Start circuit	E-STOP wiring Safety gate without start-up test	Safety gate with start-up test
Automatic start	S33 ¢ S34 ¢ S13 ¢ S14 ¢	\$33 \$33 \$514 \$14
Monitored start	S33 Q S34 Q S13 Q S14 Q	

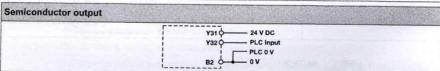


NOTICE

In the event of an automatic start:

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

Feedback loop	Automatic start	Monitored start
Contacts from external contactors	\$13 0 \$14 0 K5 K 13 (23, 33) 0 14 (24, 34) 0 K	S33 0 K5 K6 S34 0 K5 K6 S34 0 K5 K6 S34 0 K5 K6 S34 0 K5 K6 S34 0 K5 K6 K6 S34



Legend

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



INFORMATION

With automatic start, S33 and S34 must not be linked; with monitored start, S13 and S14 must not be linked.

Operation



NOTICE

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

When the relay outputs are switched on, the mechanical contact on the relay cannot be tested automatically. Depending on the operational environment, measures to detect the non-opening of switching elements may be required under some circumstances.

When the product is used in accordance with the European Machinery Directive, a check must be carried out to ensure that the safety contacts on the relay outputs open correctly. Open the safety contacts (switch off output) and start the device again, so that the internal diagnostics can check that the safety contacts open correctly

- ▶ for SIL CL 3/PL e at least 1x per month
- ▶ for SIL CL 2/PL d at least 1x per year

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.

*

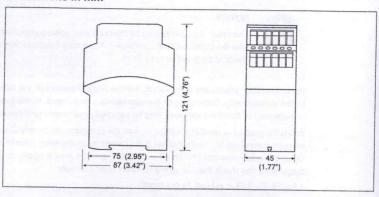
CH.2

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. 774310, 774311, 774312

General	774310	774311	774312
Certifications	CCC, CE, EAC (Euras- ian), KOSHA, TÜV, cU- Lus Listed	CCC, CE, EAC (Euras- ian), KOSHA, TÜV, cU- Lus Listed	CCC, CE, EAC (Eurasian), KOSHA, TÜV, cU Lus Listed
Electrical data	774310	774311	774312
Supply voltage			
Voltage	24 V	42 V	48 V
Kind	AC	AC	AC
Voltage tolerance Output of external	-15 %/+10 %	-15 %/+10 %	-15 %/+10 %
power supply (AC)	5 VA	5 VA	5 VA
Frequency range AC	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz
Supply voltage			
Voltage	24 V	24 V	24 V
Kind	DC	DC	DC
Voltage tolerance Output of external	-15 %/+10 %	-15 %/+10 %	-15 %/+10 %
power supply (DC)	2,5 W	2,5 W	2,5 W
Residual ripple DC	160 %	160 %	160 %
Duty cycle	100 %	100 %	100 %
Inputs	774310	774311	774312
Number	2	2	2
Voltage at			The Control of the Control
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	50 mA	50 mA	50 mA
Start circuit DC	35 mA	35 mA	35 mA
Feedback loop DC	20 mA	20 mA	20 mA
fin. input resistance at ower-on	130 Ohm	130 Ohm	130 Ohm
fax. overall cable resist- nce Rlmax		NAC.	
Single-channel at UB DC	150 Ohm	150 Ohm	150 Ohm
Single-channel at UB AC	180 Ohm	180 Ohm	180 Ohm
Dual-channel with de- tection of shorts across contacts at UB DC	15 Ohm	15 Ohm	15 Ohm
Dual-channel with de- tection of shorts across contacts at UB AC	30 Ohm	30 Ohm	Tracting and
emiconductor outputs			30 Ohm
umber		174311	774312

Semiconductor outputs	774310	774311	774312
Voltage	24 V	24 V	24 V
Current	20 mA	20 mA	20 mA
External supply voltage	24 V	24 V	24 V
Voltage tolerance	-20 %/+20 %	-20 %/+20 %	-20 %/+20 %
Residual current at "0"	La Francisco Pale		
signal	0,1 mA	0,1 mA	0,1 mA
Max. internal voltage drop	4 V	4 V	4V
Conditional rated short cir-	100 A	100 A	VIII 400 A
cuit current	0 mA	0 mA	100 A 0 mA
Lowest operating current	UMA	UMA	UMA
Utilisation category in ac- cordance with EN 60947-1	DC-12	DC-12	DC-12
Relay outputs	774310	774311	774312
Number of output contacts			
Safety contacts (N/O),			
instantaneous	3	3	3
Auxiliary contacts (N/C)	1	1	1
Max. short circuit current	1 kA	1 kA	1 kA
Utilisation category			WWW.
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
Utilisation category of auxiliary contacts			elica et el desa lleccomo y Locación la
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	of the second of the		SON LAND IN THE SERVICE
In accordance with the			
standard	EN 60947-5-1	EN 60947-5-1	EN 60947-5-1

Relay outputs	774310	774311	774312
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
Max. current	6 A	6 A	6 A
Utilisation category of auxiliary contacts	Torker to make a Age	TENER DESIGNA	7 07 14 SE-00-2 1 d'a
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	6 A	6 A	6 A
Utilisation category in ac- cordance with UL		A	A Common Section Control
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 pro- tection, safety contacts	eli competition de la competition della competit	5 2 200 G	
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
External contact fuse pro-			or any and the second
tection, auxiliary contacts	240 A2s	240 A2s	240 A²s
Max. melting integral	10 A	10 A	10 A
Blow-out fuse, quick	6 A	6 A	6 A
Blow-out fuse, slow	10 A	10 A	10 A
Blow-out fuse, gG Circuit breaker 24 V	10 A		
AC/DC, characteristic	6 A	6 A	6 A
Contact material	AgSnO2 + 0,2 µm Au	AgSnO2 + 0,2 µm Au	AgSnO2 + 0,2 µm Au

Conventional therm: current while loading several contacts		774311	774312
Ith per contact at UB AAC1: 240 V, DC1: 24	AC;		
Conv. therm. currer with 1 contact	8 A	8 A	8 A
Conv. therm. currer with 2 contacts Conv. therm. curren	7,5 A	7,5 A	7,5 A
with 3 contacts	6,5 A	6,5 A	
Ith per contact at UB D AC1: 240 V, DC1: 24 V		0,3 A	6,5 A
Conv. therm. current			
with 1 contact Conv. therm. current	8 A	8 A	8 A
with 2 contacts Conv. therm. current	8 A	8 A	8 A
with 3 contacts	7 A	7 A	7 A
Times	774310	774311	774312
Switch-on delay			774312
With automatic start typ. With automatic start	250 ms	250 ms	250 ms
max. With automatic start	500 ms	500 ms	500 ms
after power on typ. With automatic start	280 ms	280 ms	280 ms
after power on max. With monitored start	550 ms	550 ms	550 ms
typ. With monitored start	35 ms	35 ms	35 ms
max.	50 ms	50 ms	50 ms
Delay-on de-energisation			Joins
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	50 ms	50 ms
With power failure max	. 70 ms	70 ms	70 ms
Recovery time at max. witching frequency 1/s			* ***
After E-STOP	50 ms	50 ms	50 ms
After power failure	100 ms	100 ms	100 ms
Vaiting period with a nonitored start	300 ms	300 ms	300 ms
fin. start pulse duration rith a monitored start	30 ms	30 ms	
upply interruption before e-energisation	20 ms	20 ms	30 ms
imultaneity, channel 1 nd 2 max.	80	80 80	20 ms

Environmental data	774310	774311	774312
Climatic suitability	EN 60068-2-78	EN 60068-2-78	EN 60068-2-78
Ambient temperature			
Temperature range	-20 - 55 °C	-20 - 55 °C	-20 - 55 °C
Storage temperature		A Residence	in injuicita large follow to age is
Temperature range	-40 - 85 °C	-40 - 85 °C	-40 - 85 °C
Climatic suitability	A III HALL IN THE COMM	gebreel	A CALL THE SECOND STREET, LINE AND
Humidity	93 % r. h. at 40 °C	93 % r. h. at 40 °C	93 % r. h. at 40 °C
Condensation during op-			- Studies (12 Jan 1990)
eration	Not permitted	Not permitted	Not permitted
EMÇ	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	or the Market Committee of the		PRESIDE BY STREET
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	111/11	111/11	111 / 11
Pollution degree	3	3	3
Rated insulation voltage	250 V	250 V	250 V
Rated impulse withstand voltage	4 kV	4 kV	4 kV
Protection type	MAN THE SECOND STATES		7 ()
Housing	IP40	IP40	IP40
Terminals	IP20	IP20	IP20
Mounting area (e.g. control cabinet)	IP54	IP54	IP54
Mechanical data	774310	774311	774312
Mounting position	Any	Any	Any
Mechanical life	10,000,000 cycles	10,000,000 cycles	10,000,000 cycles
Material	Smile - Color of the		10,000,000 Cycles
Bottom	PPO UL 94 V0	PPO UL 94 VO	PPO UL 94 VO
Front			ABS UL 94 V0
Тор	PPO UL 94 V0		PPO UL 94 V0
Connection type	Screw terminal		Screw terminal
Mounting type	Fixed	Fixed	Fixed

Mechanical data	774310	774311	
Conductor cross section with screw terminals		7/4311	774312
1 core flexible 2 core with the same cross section, flexible	0,2 - 4 mm², 24 - 10 AV	VG 0,2 - 4 mm², 24 - 10 A\	NG 0,2 - 4 mm², 24 - 10 AWG
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
Connectors	0,2 - 2,5 mm², 24 - 14 AWG	0,2 - 2,5 mm², 24 - 14 AWG	0,2 - 2,5 mm², 24 - 14
Torque setting with screw terminals	0,6 Nm		AWG
Stripping length with screw terminals	8 mm	0,6 Nm	0,6 Nm
Dimensions	20172221	8 mm	8 mm
TAT: ALL	87 mm 45 mm	87 mm 45 mm	87 mm
Depth	121 mm	121 mm	45 mm
Veight	375 g	375 g	121 mm
14.0		<u> </u>	375 g

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

Technical details Order no. 774314, 774315, 774316

CCC, CE, EAC (Euras-	774315	
ian), KOSHA, TÜV, cU- Lus Listed	CCC, CE, EAC (Euras- ian), KOSHA, TÜV, cU-	ian), KOSHA, TÜV, cU-
774314	CONTROL SALES CO	Lus Listed
	774313	774316
110 V	115 V	120 V
-15 %/+10 %	AC -15 %/+10 %	AC -15 %/+10 %
5 VA	5 VA	5 VA
30 - 00 HZ	50 - 60 Hz	50 - 60 Hz
24 V	24 V	24 V
-15 %/+10 %	DC -15 %/+10 %	DC -15 %/+10 %
400 0/		2,5 W
400.0/		160 %
771244	70/18/9/99/99/99/99	100 %
	3	774316 2
3	Lus Listed 774314 110 V AC -15 %/+10 % 5 VA 50 - 60 Hz 24 V DC -15 %/+10 % 2,5 W 160 % 100 % 774314	Lus Listed 774314 774315 110 V AC AC -15 %/+10 % 5 VA 50 - 60 Hz 24 V DC DC -15 %/+10 % 2,5 W 160 % 100 % 100 % 774314 24 U Lus Listed Lus Listed Lus Listed Lus Listed 15 V, Color AC AC -15 %/+10 % 5 VA 5 VA 5 VA 5 VA 5 VA 5 VA 50 - 60 Hz 24 V DC DC -15 %/+10 % 160 % 160 % 174314

Inputs	774314	774315	774316
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		E LA PLANTE	A BUSINESS STREET, PROJECT BOOK
Input circuit DC	50 mA	50 mA	50 mA
Start circuit DC	35 mA	35 mA	35 mA
Feedback loop DC	20 mA	20 mA	20 mA
Min. input resistance at power-on	130 Ohm	130 Ohm	130 Ohm
Max. overall cable resistance Rlmax			10 Signates content Statement Producti
Single-channel at UB DC	150 Ohm	150 Ohm	150 Ohm
Single-channel at UB AC	180 Ohm	180 Ohm	180 Ohm
Dual-channel with de- tection of shorts across contacts at UB DC	15 Ohm	15 Ohm	15 Ohm
Dual-channel with de- tection of shorts across contacts at UB AC		30 Ohm	
Semiconductor outputs	774314	774315	30 Ohm
Number	1		774316
Voltage	24 V	1	STORY CONTRACTOR
Current	20 mA	24 V 20 mA	24 V
External supply voltage	24 V	20 MA 24 V	20 mA
Voltage tolerance	-20 %/+20 %		24 V
Residual current at "0"	-20 %/+20 %	-20 %/+20 %	-20 %/+20 %
signal	0,1 mA	0,1 mA	0,1 mA
Max. internal voltage drop	4 V	4 V	4 V
Conditional rated short cir-			
cuit current	100 A	100 A	100 A
owest operating current	0 mA	0 mA	0 mA
Utilisation category in accordance with EN		46	A 3 mereor partit
50947-1	DC-12	DC-12	DC-12
Relay outputs Number of output con-	774314	. 774315	774316
Safety contacts (N/O),	- evidence of	G V 12 avitylans	
	3	3	A 3 Jaktus Hrys
Auxiliary contacts (N/C)	09.53	(4888 1 = 2 = 1083	Light Self Level
	1 kA	1 kA	1 kA
Itilisation category In accordance with the standard	EN 60947-4-1	EN 60947-4-1	EN 60947-4-1

Relay outputs	774314		
Utilisation categ	Orv of	774315	774316
safety contacts			174310
AC1 at	240 V		
Min. current	0.01 A	240 V	240 V
Max. current	8 A	0,01 A	0,01 A
Max. power	2000 VA	8 A	0,01 A 8 A
DC1 at	24 V	2000 VA	
Min. current	The state of the s	24 V	2000 VA
Max. current	0,01 A	0,01 A	24 V
Max. power	8 A	8 A	0,01 A
Utilisation categor	200 W	200 W	8 A
auxiliary contacts	y of		200 W
AC1 at	240.14		
Min. current	240 V	240 V	
Max. current	0,01 A	0,01 A	240 V
Max. power	8 A	8 A	0,01 A
DC1 at	2000 VA	2000 VA	8 A
Min. current	24 V	24 V	2000 VA
Max. current	0,01 A	0.01 A	24 V
Max. power	8 A	8 A	0,01 A
Itilisation	200 W	200 W	8 A
Utilisation category	642 战	200 VV	200 W
In accordance wit			CENTRAL DIRECTOR
Itilisation category o	EN 60947-5-1	EN 60947-5-1	
afety contacts	V and the second	16 1-0-1	EN 60947-5-1
AC15 at	电影		Y 68
Max. current	230 V	230 V	
	5 A	5 A	230 V
DC13 (6 cycles/mir Max. current		24 V	5 A
ilisation t	6 A	6 A	24 V
tilisation category of exiliary contacts			6 A
AC15 at	2221		
Max. current	230 V	230 V	
	5 A	5 A	230 V
DC13 (6 cycles/min) Max. current		24 V	5 A
isation	6 A	6 A	24 V
sation category in a dance with UL	C-	1-061	6 A
oltage			10612 - 1886
Vith current	240 V AC G. P.	240 V AC G. P.	
oltage	8 A	8 A	240 V AC G. P.
ith current	24 V DC Resistive	24 V DC Resistive	8 A
lot Duty	5 A	5 A	24 V DC Resistive
or Duty	B300, R300	B300, R300	5 A
		5500, K300	B300, R300

Relay outputs	774314	774315	774316
External contact fuse pro- tection, safety contacts			dista pitome de el
In accordance with the		ids.	
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 Circuit breaker 24V AC/DC, characteristic	10 A	10 A	10 A
B/C	6 A	6 A	6 A
External contact fuse pro- tection, 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	774314	774315	774316
current while loading		//40/0	114310
several contacts			
Ith per contact at UB AC; AC1: 240 V, DC1: 24 V	5 00		EE july not be
Conv. therm. current with 1 contact	8 A	8 A	8 A
Conv. therm. current with 2 contacts	7,5 A	7,5 A	7,5 A
Conv. therm. current with 3 contacts	6,5 A	6,5 A	6,5 A
Ith per contact at UB DC; AC1: 240 V, DC1: 24 V	or a street the better	12/17/2017	entaregion in a
Conv. therm. current with 1 contact	8 A	8 A	8 A
Conv. therm. current		8 A	8 A
with 2 contacts	8 A	0 A	0 A

774314		
/	/74315	774316
tic start		. 7010
250 ms		
	250 ms	250 ms
500 ms	500	- Too mis
	300 ms	500 ms
0.04-1	280 mg	
	200 ms	280 ms
stort 550 ms	550 ms	TO THE HOLD
25	100 1118	550 ms
35 ms	35 ms	
**		35 ms
isation	50 ms	
n 4=	A 140 S T T T	50 ms
	15 me	FA 458
		15 ms
e typ. 50 ms		30 ms
e max. 70 ms		50 ms
	70 ms	70 ms
50 ms	50	
100 ms	CONTRACTOR OF THE PARTY OF THE	50 ms
100 ms	100 ms	100 ms
300 ms	200	100 IIIS
	300 ms	300 ms
30 ms	20	Too ms
	30 ms	30 ms
20 ms	20	
	20 ms	20 ms
80	on.	
774314		∞
EN 60068-2-79		774316
2-76	EN 60068-2-78	
-20 - 55 00	194	EN 60068-2-78
20-35 C	-20 - 55 °C	
40		-20 - 55 °C
-40 - 85 °C	-40 - 85 °C	TO THE REAL PROPERTY.
	- 00 0	-40 - 85 °C
93 % r. h. at 40 °C	03 0/	S. E. S. L. S. D. W. L. Storm, London
The state of the s	33 % r. h. at 40 °C	93 % r. h. at 40 °C
Not permitted	Not now !!	at 40 °C
EN 60947-5-1 EN	Not permitted	Not permitted
	EN 60947-5-1, EN	EN 60947-5-1, EN
61000-6-2, EN 61326-3-4		0034/-5-1 EM
61000-6-2, EN 61326-3-1	61000-6-2, EN 61326-3-1	61000-6-2 EN CAR
61000-6-2, EN 61326-3-1	61000-6-2, EN 61326-3-1	61000-6-2, EN 61326-3-1
EN 60068-2-6	61000-6-2, EN 61326-3-1	61000-6-2, EN 61326-3-1
EN 60068-2-6	EN 60068-2-6	61000-6-2, EN 61326-3-1
EN 60068-2-6 10 - 55 Hz	EN 60068 2 c	61000-6-2, EN 61326-3-1 EN 60068-2-6 10 - 55 Hz
	tic start 250 ms ic start 500 ms c start 10 typ. 280 ms c start 35 ms start 50 ms isation p. 15 ms ax. 30 ms re typ. 50 ms e max. 70 ms ax. 1/s 50 ms ax. 1/s 50 ms ax. 20 ms ax. 1/s 50 ms ax. 1/s ax. 1/s 50 ms ax. 1/s ax. 1/s 50 ms ax. 1/s ax. ax. 1/s ax. ax. ax. ax. ax. ax. ax. ax	tic start 250 ms 250 ms 500 ms 550 ms 50 ms 50 ms 50 ms 6 start 50 ms 50 ms 70 ms

Environmental data	774314	774315	774316
Airgap creepage			,,,,,,,,,
In accordance with th	ie		
standard	EN 60947-1	EN 60947-1	EN 60947-1
Overvoltage category	111/11	111 / 11	10/10
Pollution degree	3	3	3
Rated insulation voltage		250 V	250 V
Rated impulse withstand		THE RESERVE WILLIAM	
voltage	4 kV	4 kV	4 kV
Protection type		Minimus 25	Carried Company
Housing	IP40	IP40	IP40
Terminals	IP20	IP20	IP20
Mounting area (e.g. control cabinet)	IP54	IP54	IP54
Mechanical data	774314	774315	774316
Mounting position	Any	Any	
Mechanical life	10,000,000 cycles	10,000,000 cycles	Any
Material	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	10,000,000 cycles	10,000,000 cycles
Bottom	PPO UL 94 VO	PPO UL 94 VO	
Front	ABS UL 94 V0		PPO UL 94 V0
Top	PPO UL 94 V0	ABS UL 94 V0 PPO UL 94 V0	ABS UL 94 V0
Connection type	Screw terminal	Screw terminal	PPO UL 94 VO
Mounting type	Fixed	Fixed	Screw terminal
Conductor cross section		rixed	Fixed
vith screw terminals			
1 core flexible	0,2 - 4 mm ² , 24 - 10 AV	VG 0 2 - 4 mm ² 24 - 10 AM	VG 0,2 - 4 mm², 24 - 10 AW
2 core with the same		10 0,2 - 4 mm , 24 - 10 AV	VG 0,2 - 4 mm², 24 - 10 AW
cross section, flexible			
with crimp connectors, no plastic sleeve	0,2 - 2,5 mm ² , 24 - 14 AWG	0,2 - 2,5 mm ² , 24 - 14	0,2 - 2,5 mm ² , 24 - 14
2 core with the same	Am 25	AWG	AWG
cross section, flexible			
without crimp connect-			
ors or with TWIN crimp	0,2 - 2,5 mm ² , 24 - 14	0,2 - 2,5 mm ² , 24 - 14	0,2 - 2,5 mm², 24 - 14
connectors	AWG	AWG	AWG
orque setting with screw	0.01	Sirie 621	DO SED characteriste
ripping length with	0,6 Nm	0,6 Nm	0,6 Nm
	8 mm		Portferior discrete estado o
mensions		8 mm	8 mm
	87 mm		or keeten riter temeris-kuud
	67 mm 45 mm	87 mm	87 mm
	40 IIIIII C#	45 mm	45 mm
	104		45 mm
Depth	121 mm 375 g	121 mm 375 g	121 mm

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

Technical details Order no. 774318, 774319

General	774318	774319
Certifications	CCC, CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed	CCC, CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed
Electrical data	774318	774319
Supply voltage		77-019
Voltage	230 V	240.14
Kind	AC	240 V
Voltage tolerance	-15 %/+10 %	AC 45 00 to 40 to
Output of external power s	supply	-15 %/+10 %
(AC)	5 VA	5 VA
Frequency range AC	50 - 60 Hz	50 - 60 Hz
Supply voltage		30 - 80 HZ
Voltage	24 V	24.14
Kind	DC	24 V
Voltage tolerance	-15 %/+10 %	DC
Output of external power si (DC)	upply 2,5 W	-15 %/+10 %
Residual ripple DC	160 %	2,5 W
Duty cycle	100 %	160 %
Inputs		100 %
Number	774318	774319
Voltage at	2	2
Input circuit DC	24 V	24 V
Start circuit DC	24 V	24 V
Feedback loop DC	24 V	24 V
Current at		94025 - 124
Input circuit DC	50 mA	50 mA
Start circuit DC	35 mA	35 mA
Feedback loop DC	20 mA	20 mA
lin. input resistance at power-o	on 130 Ohm	130 Ohm
lax. overall cable resistance R ax	- 41 - 12	130 Onm
Single-channel at UB DC	150 Ohm	150.01
Single-channel at UB AC	180 Ohm	150 Ohm
Dual-channel with detection of	of	180 Ohm
shorts across contacts at UB	DC 15 Ohm	15 Ohm
Dual-channel with detection of shorts across contacts at UB	of	30 Ohm
emiconductor outputs	774318	
ımber	1	774319
ltage	24 V	1 Harrist Company
rrent	20 mA	24 V
ternal supply voltage		20 mA
Itage tolerance	24 V	24 V
ago tolerance	-20 %/+20 %	-20 %/+20 %

	774318	774319
Semiconductor outputs	0,1 mA	0,1 mA
Residual current at "0" signal	4 V	4 V
Max. internal voltage drop		- 1 Oct.
Conditional rated short circuit cur	100 A	100 A
rent	0 mA	0 mA
Lowest operating current	Α	20.40
Utilisation category in accordanc with EN 60947-1	DC-12	DC-12
Relay outputs	774318	774319
Number of output contacts		
Safety contacts (N/O), instant	Audi and an analysis of	100 4763
aneous	3	A 3.4
Auxiliary contacts (N/C)	A = 1	1 kA
Max. short circuit current IK	1 kA	The west post to be a leader
Litilization category		EN 60947-4-1
In accordance with the stand	ard EN 60947-4-1	Litouri
Utilisation category of safety co	n-	
tacts	240 V	240 V
AC1 at		0,01 A
Min. current	0,01 A	8 A
Max. current	8 A 2000 VA	2000 VA
Max. power	4-A-2	24 V
DC1 at	24 V	0,01 A
Min. current	0,01 A	8 A
Max. current	8 A	200 W
Max. power	200 W	
Utilisation category of auxiliary	con-	
tacts	240 V	240 V
AC1 at	0,01 A	0,01 A
Min. current	8 A	8 A
Max. current	2000 VA	2000 VA
Max. power	24 V	24 V
DC1 at	0,01 A	0,01 A
Min. current	8 A	8 A
Max. current	200 W	200 W
Max. power	200 11	
Utilisation category In accordance with the sta	ndard EN 60947-5-1	EN 60947-5-1
In accordance with the sta	con-	AGA CONTRACTOR
Utilisation category of safety		And it is a second to the last that the last the
tacts AC15 at	230 V	230 V
	5 A	5 A
Max. current DC13 (6 cycles/min) at	24 V	24 V
Max. current	6 A	6 A

Relay outputs	774318	77/1246
Utilisation category of auxiliar tacts	y con-	774319
AC15 at	230 V	
Max. current	5 A	230 V
DC13 (6 cycles/min) at	24 V	5 A
Max. current	6 A	24 V
Utilisation category in accorda with UL	nce	6 A
Voltage	240 V AC G. P.	
With current	8 A	240 V AC G. P.
Voltage		8 A
With current	24 V DC Resistive	24 V DC Resistive
Pilot Duty		5 A
External contact fuse protection	B300, R300	B300, R300
safety contacts	,	The residence
In accordance with the stand	lard EN 60947-5-1	
Max. melting integral	240 A2s	EN 60947-5-1
Blow-out fuse, quick	10 A	240 A ² s
Blow-out fuse, slow	6 A	10 A
Blow-out fuse, gG	10 A	6 A
Circuit breaker 24V AC/DC,	10 A	10 A
characteristic B/C	6 A	
external contact fuse protection, uxiliary contacts		6 A
Max. melting integral	240 A2s	
Blow-out fuse, quick	10 A	240 A2s
Blow-out fuse, slow	6 A	10 A
Blow-out fuse, gG	10 A	6 A
Circuit breaker 24 V AC/DC,	10 A	10 A
characteristic B/C	6 A	A ten a Control of the control of th
ontact material	AgSnO2 + 0,2 µm Au	6 A
onventional thermal current	774318	AgSnO2 + 0,2 µm Au
nile loading several contacts	114316	774319
per contact at UB AC; C1: 240 V, DC1: 24 V		
Conv. therm. current with 1 contact		
	8 A	8 A
Conv. therm. current with 2 contacts		DIS-14 Controller on the residence of the second
Conv. therm. current with 3 con-	7,5 A	7,5 A
tacts		
- X &	6,5 A	6,5 A

Conventional thermal current	774318	74319
while loading several contacts		
Ith per contact at UB DC;		
AC1: 240 V, DC1: 24 V		
Conv. therm. current with 1 contact	8 A	3 A
Conv. therm. current with 2 contacts	8 A	3 A
Conv. therm. current with 3 con-	7 A	7 A
tacts *		774319
Times	7,4319	9000000
Switch-on delay		250 ms
With automatic start typ.	250 ms	500 ms
With automatic start max.	500 ms	
With automatic start after power on typ.	280 ms	280 ms
With automatic start after power	550 ms	550 ms
on max.	35 ms	35 ms
With monitored start typ.	50 ms	50 ms
With monitored start max.	30 1113	The second second
Delay-on de-energisation	15 ms	15 ms
With E-STOP typ.		30 ms
With E-STOP max.	30 ms	50 ms
With power failure typ.	50 ms	70 ms
With power failure max.	70 ms	The first sparse in the second
Recovery time at max. switching frequency 1/s		50 ms
After E-STOP	50 ms	100 ms
After power failure	100 ms	100 ms
Waiting period with a monitored start	300 ms	300 ms
Min. start pulse duration with a monitored start	30 ms	30 ms
Supply interruption before de-ene	20 ms	20 ms
Simultaneity, channel 1 and 2 ma	X. ∞	774319
Environmental data	774318	EN 60068-2-78
Climatic suitability	EN 60068-2-78	EN 00000-2-70
Ambient temperature		20 EE °C
Temperature range	-20 - 55 °C	-20 - 55 °C
Storage temperature		-40 - 85 °C
Temperature range	-40 - 85 °C	-40 - 65 C
Climatic suitability	942	93 % r. h. at 40 °C
Humidity	93 % r. h. at 40 °C	
Condensation during operation	Not permitted	Not permitted V EN 60947-5-1, EN 61000-6-2, EN
EMC	EN 60947-5-1, EN 61000-6-2, EN 61326-3-1	61326-3-1

Environmental data	774318	774319
Vibration		774319
In accordance with the stand	ard EN 60068-2-6	
Frequency	10 - 55 Hz	EN 60068-2-6
Amplitude	0,35 mm	10 - 55 Hz
Airgap creepage	A SECTION AND A SECTION AND ASSESSMENT OF THE PARTY OF TH	0,35 mm
In accordance with the standa	ard EN 60947-1	Edit of State States and Control
Overvoltage category	111/11	EN 60947-1
Pollution degree	3	III / II
Rated insulation voltage	250 V	3
Rated impulse withstand voltage	4 kV	250 V
Protection type		4 kV
Housing	IP40	Table College College College
Terminals	IP20	IP40
Mounting area (e.g. control cat)-	IP20
inet)	IP54	IP54
Mechanical data	774318	
Mounting position	Any	774319
Mechanical life	10,000,000 cycles	Any
Material	70,000,000 Cycles	10,000,000 cycles
Bottom	PPO UL 94 VO	Authoritina Par
Front	ABS UL 94 V0	PPO UL 94 VO
Тор	PPO UL 94 V0	ABS UL 94 VO
Connection type		PPO UL 94 VO
Mounting type	Screw terminal Fixed	Screw terminal
Conductor cross section with screw	rixed	Fixed
terminals		20 (15)
1 core flexible 2 core with the same cross sec- tion, flexible with crimp connect-	0,2 - 4 mm², 24 - 10 AWG	0,2 - 4 mm², 24 - 10 AWG
2 core with the same cross section, flexible without crimp con-	0,2 - 2,5 mm², 24 - 14 AWG	0,2 - 2,5 mm², 24 - 14 AWG
nectors or with TWIN crimp con- nectors	00.00	
orque setting with screw terminals	0,2 - 2,5 mm², 24 - 14 AWG	0,2 - 2,5 mm ² , 24 - 14 AWG
Stripping length with screw terminals	U,6 Nm	0,6 Nm
	8 mm	
Dimensions	v mml	8 mm
Height	87 mm	V New page of the second
Midth	45 mm	87 mm
Donth	io mm I21 mm	45 mm
		121 mm

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

Safety characteristic data



NOTICE

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

	PLe	Cat. 4	SIL CL 3	2,01L-00			The second secon
	PL	Category		2.31E-09	SIL 3	2,03E-06	20
mode	13849-1: 2015	13849-1: 2015	SIL CL	PFH _D [1/h]	SIL	PFD	2015 T _m [year]
Operating	EN ISO	EN ISO	EN 62061	EN 62061	IEC 61511	IEC 61511	EN ISO 13849-1:

Explanatory notes for the safety-related characteristic data:

- The SIL CL value in accordance with EN 62061 corresponds to the SIL value in accord-
- \blacktriangleright T $_{\!\scriptscriptstyle M}$ is the maximum mission time in accordance with EN ISO 13849-1. The value also applies as the retest interval in accordance with EN 61508-6 and IEC 61511 and as the proof test interval and mission time in accordance with EN 62061.

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



INFORMATION

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

Supplementary data



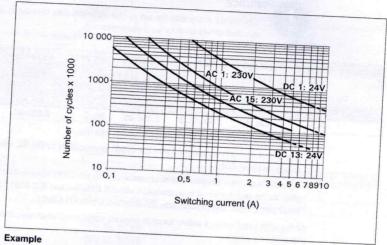
CAUTION

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

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

Service life graph

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



- 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	Connections	
PNOZ X3	24 VAC; 24 VDC	Connection type	Order no
PNOZ X3		Screw terminals	774310
PNOZ X3	42 VAC; 24 VDC	Screw terminals	774311
The state of the s	48 VAC; 24 VDC	Screw terminals	
PNOZ X3	110 VAC; 24 VDC	Screw terminals	774312
PNOZ X3	115 VAC; 24 VDC		774314
PNOZ X3	120 VAC; 24 VDC	Screw terminals	774315
PNOZ X3		Screw terminals	774316
	230 VAC; 24 VDC	Screw terminals	774318
PNOZ X3	240 VAC; 24 VDC	Screw terminals	774319

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

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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.











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