

Up to PL e of EN ISO 13849-1 PNOZ X5



Unit features

- ▶ Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
- ▶ Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Light barriers
- ▶ LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- ▶ See order reference for unit types

- ▶ The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- ▶ The unit has an electronic fuse.

Unit description

Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

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 barriers

Approvals

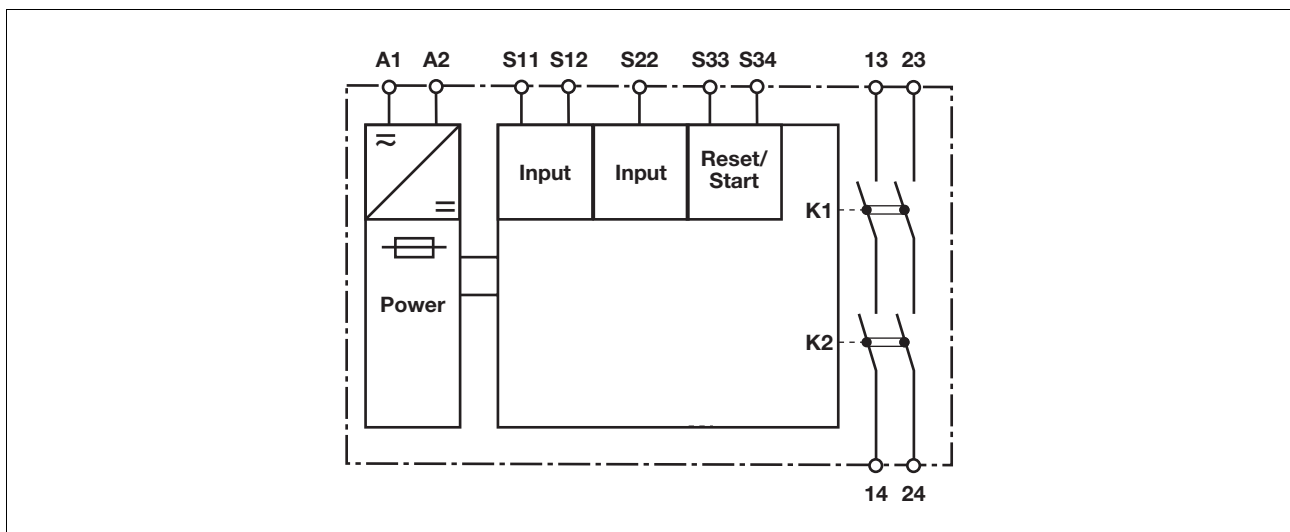
	PNOZ X5
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Safety features

The 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.

Block diagram

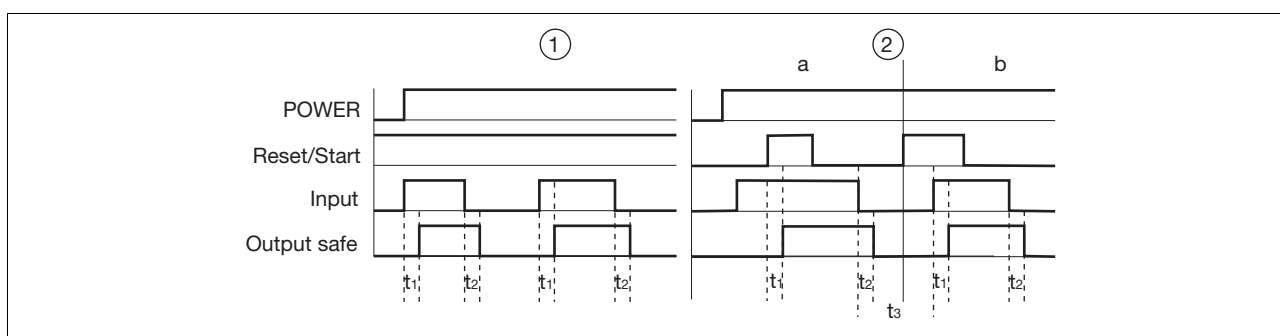


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Function description

- ▶ Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- ▶ Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too.
- ▶ Automatic start: Unit is active once the input circuit has been closed.
- ▶ Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- ▶ Increase in the number of available contacts by connecting contact expansion modules or external contactors/relays.

Timing diagram



Key

- ▶ Power: Supply voltage
- ▶ Reset/start: Reset S33-S34
- ▶ Input: Input circuits S11, S12, S22
- ▶ Output safe: Safety contacts 13-14, 23-24
- ▶ ①: Automatic reset
- ▶ ②: Manual reset
- ▶ a: Input circuit closes before reset circuit
- ▶ b: Reset circuit closes before input circuit
- ▶ t₁: Switch-on delay
- ▶ t₂: Delay-on de-energisation
- ▶ t₃: Recovery time

Wiring

Please note:

- ▶ Information given in the “Technical details” must be followed.
- ▶ Outputs 13-14, 23-24 are safety contacts.
- ▶ To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- ▶ Calculation of the max. cable runs I_{max} in the input circuit:

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

R_{lmax} = max. overall cable resistance (see technical details)

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.

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Preparing for operation

▶ Supply voltage

Supply voltage	AC	DC

▶ Input circuit

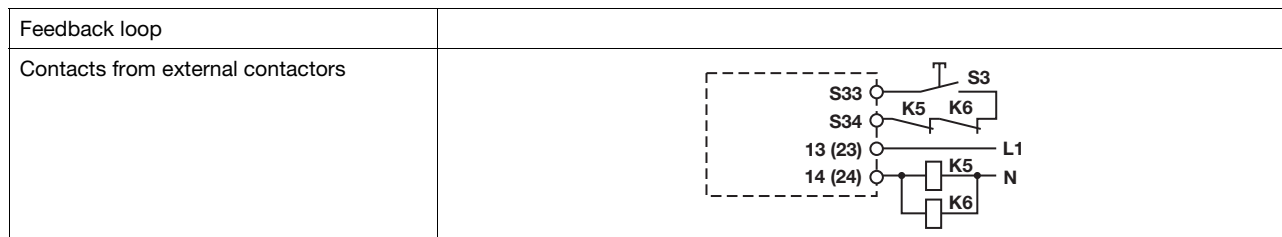
Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Light barrier with detection of shorts across contacts via ESPE		

▶ Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		

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► Feedback loop

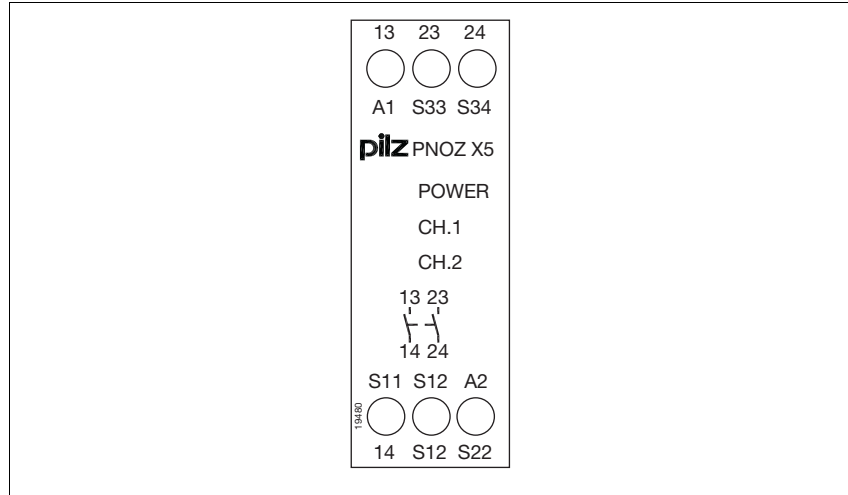


► Key

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

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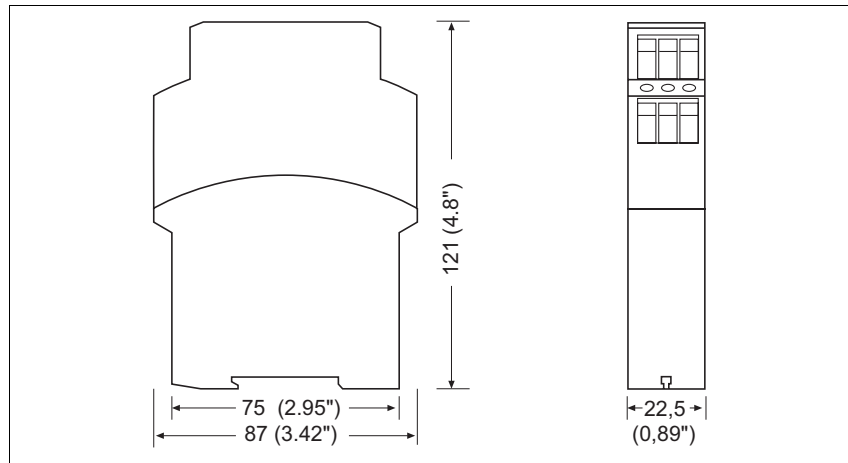
Terminal configuration



Installation

- ▶ The safety relay 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).

Dimensions

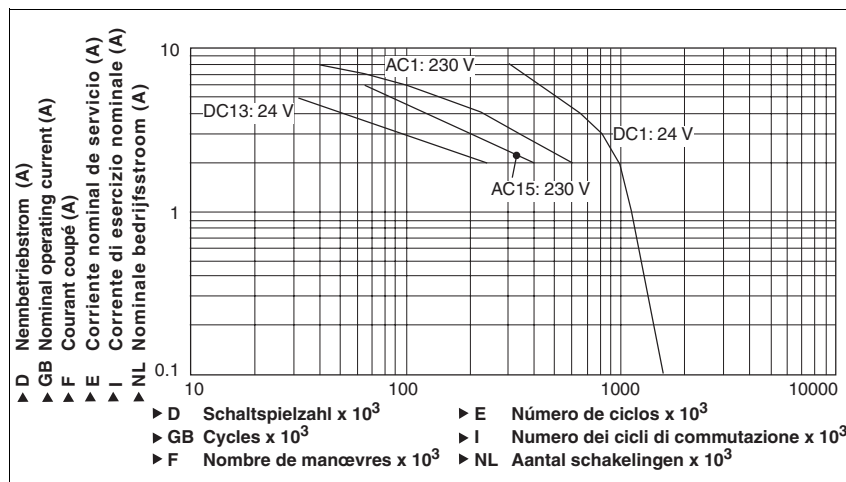


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Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U _B DC	12 V
Supply voltage U _B AC/DC	24 V
Voltage tolerance	-15 %/+10 % Order no.: 774325 -20 %/+20 % Order no.: 774326, 774327
Power consumption at U _B AC	4.0 VA Order no.: 774325
Power consumption at U _B DC	2.0 W Order no.: 774325 2.5 W Order no.: 774326, 774327
Frequency range AC	50 - 60 Hz
Residual ripple DC	20 %, 160 %
Voltage and current at	
Input circuit DC: 24.0 V	55.0 mA Order no.: 774325 70.0 mA Order no.: 774326, 774327
Reset circuit DC: 24.0 V	55.0 mA Order no.: 774325 90.0 mA Order no.: 774326, 774327
Feedback loop DC: 24.0 V	55.0 mA Order no.: 774325 90.0 mA Order no.: 774326, 774327
Number of output contacts	
Safety contacts (S) instantaneous:	2
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I _{min} : 0.01 A , I _{max} : 6.0 A P _{max} : 1500 VA
Safety contacts: DC1 at 24 V	I _{min} : 0.01 A , I _{max} : 4.0 A P _{max} : 100 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I _{max} : 5.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 4.0 A
Conventional thermal current	6.0 A
Contact material	AgSnO2 + 0.2μ Au

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Electrical data	
External contact fuse protection ($I_K = 1 \text{ kA}$) to EN 60947-5-1	
Blow-out fuse, quick	
Safety contacts:	6 A
Blow-out fuse, slow	
Safety contacts:	4 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	4 A
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
single-channel at U_B DC	20 Ohm Order no.: 774326, 774327 50 Ohm Order no.: 774325
single-channel at U_B AC	150 Ohm Order no.: 774325
dual-channel without detect. of shorts across contacts at U_B DC	100 Ohm Order no.: 774325 35 Ohm Order no.: 774326, 774327
dual-channel without detect. of shorts across contacts at U_B AC	250 Ohm Order no.: 774325
Safety-related characteristic data	
PL in accordance with EN ISO 13849-1	PL e (Cat. 4)
Category in accordance with EN 954-1	Cat. 4
SIL CL in accordance with EN IEC 62061	SIL CL 3
PFH in accordance with EN IEC 62061	2.31E-09
SIL in accordance with IEC 61511	SIL 3
PFH in accordance with IEC 61511	2.03E-06
t_M in years	20
Times	
Switch-on delay	
with automatic reset typ.	115 ms Order no.: 774325 124 ms Order no.: 774326, 774327
with automatic reset max.	180 ms Order no.: 774325 230 ms Order no.: 774326, 774327
with automatic reset after power on typ.	120 ms Order no.: 774325 124 ms Order no.: 774326, 774327
with automatic reset after power on max.	190 ms Order no.: 774325 230 ms Order no.: 774326, 774327
with manual reset typ.	40 ms Order no.: 774325 80 ms Order no.: 774326, 774327
with manual reset max.	180 ms Order no.: 774325 230 ms Order no.: 774326, 774327
Delay-on de-energisation	
with E-STOP typ.	12 ms Order no.: 774326, 774327 18 ms Order no.: 774325
with E-STOP max.	20 ms Order no.: 774326, 774327 30 ms Order no.: 774325
with power failure typ.	110 ms Order no.: 774325 20 ms Order no.: 774326, 774327
with power failure max.	160 ms Order no.: 774325 30 ms Order no.: 774326, 774327
Recovery time at max. switching frequency 1/s after E-STOP	
	40 ms Order no.: 774326, 774327 50 ms Order no.: 774325
after power failure	200 ms Order no.: 774325 50 ms Order no.: 774326, 774327
Simultaneity, channel 1 and 2	∞
Supply interruption before de-energisation	10 ms Order no.: 774326, 774327 20 ms Order no.: 774325

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Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration to EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage in accordance with EN 60947-1	
Pollution degree	2
Rated insulation voltage	250 V
Rated impulse withstand voltage	4.0 kV
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ² , 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ² , 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ² , 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm
Dimensions	
Height	87.0 mm
Width	22.5 mm
Depth	121.0 mm
Weight	190 g

The standards current on **09/03** apply.

Order reference			
Type	Features	Terminals	Order no.
PNOZ X5	24 VAC/DC	Screw terminals	774 325
PNOZ X5	12 VDC	Screw terminals	774 326