

Up to Category 3, EN 954-1 PNOZ X5



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

Approvals

	PNOZ X5
	◆
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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 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.
- ▶ The unit has an electronic fuse.

Unit description

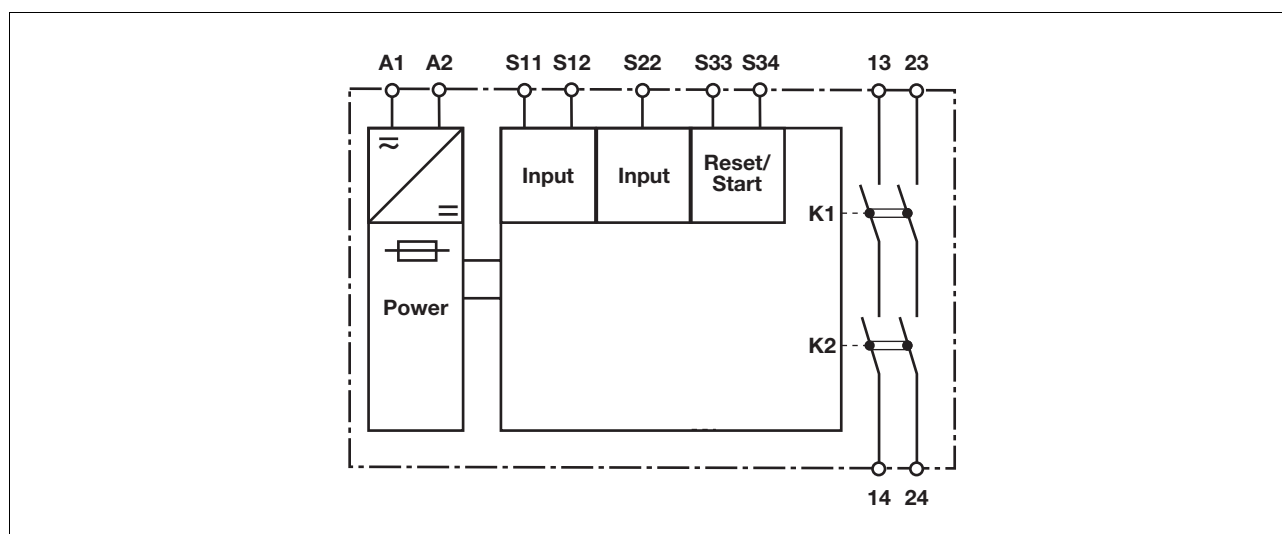
The safety relay meets the requirements of EN 60947-5-1, EN 60204-1 and VDE 0113-1 and may be used in applications with

- ▶ E-STOP pushbuttons
- ▶ Safety gates
- ▶ Light barriers

Safety features

The relay meets the following safety requirements:

Block diagram

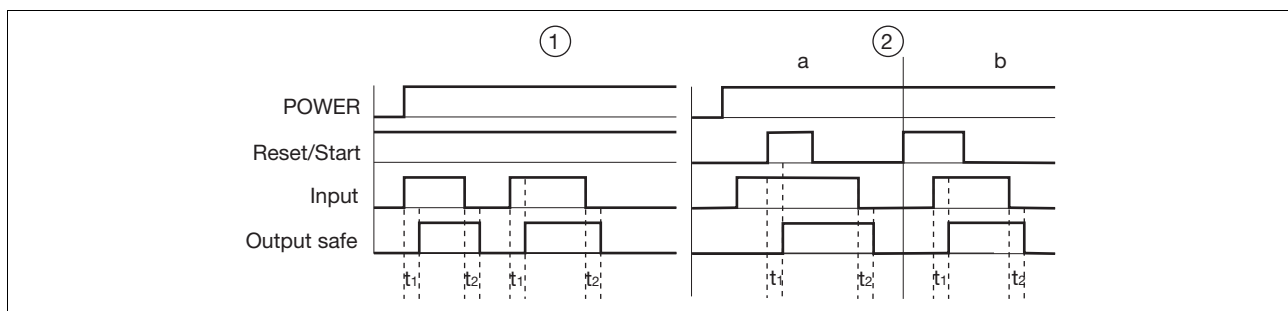


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Function description

- ▶ 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 expander 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

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:

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

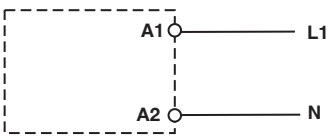
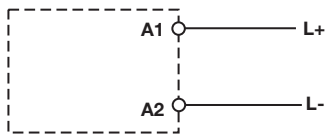
R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

- ▶ Use copper wire that can withstand 60/75 °C.
- ▶ Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

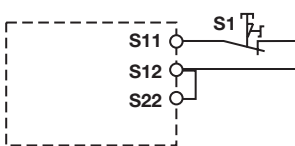
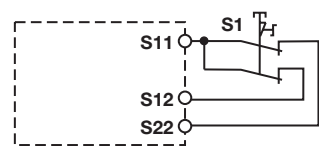
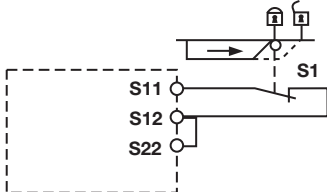
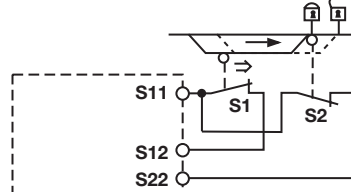
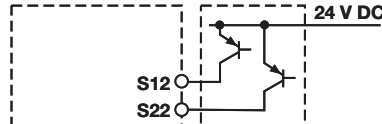
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Preparing for operation

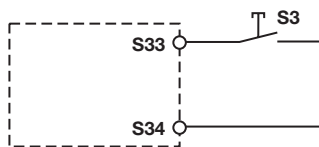
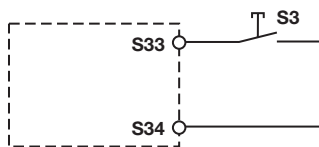
► Supply voltage

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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► Key

S1/S2 E-STOP/safety gate switch

S3 Reset button



Switch operated



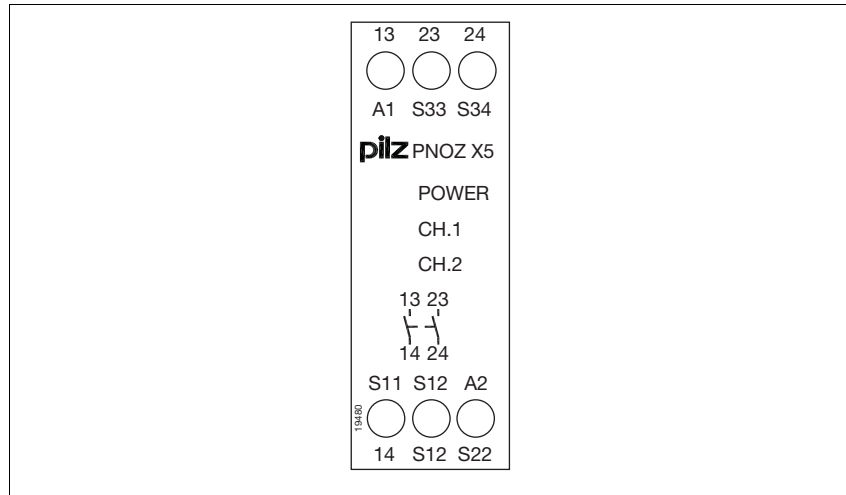
Gate open



Gate closed

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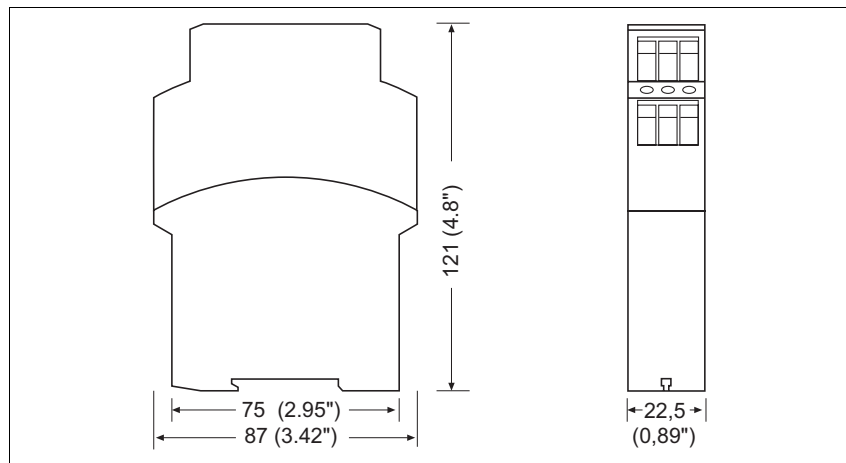
Terminal configuration



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

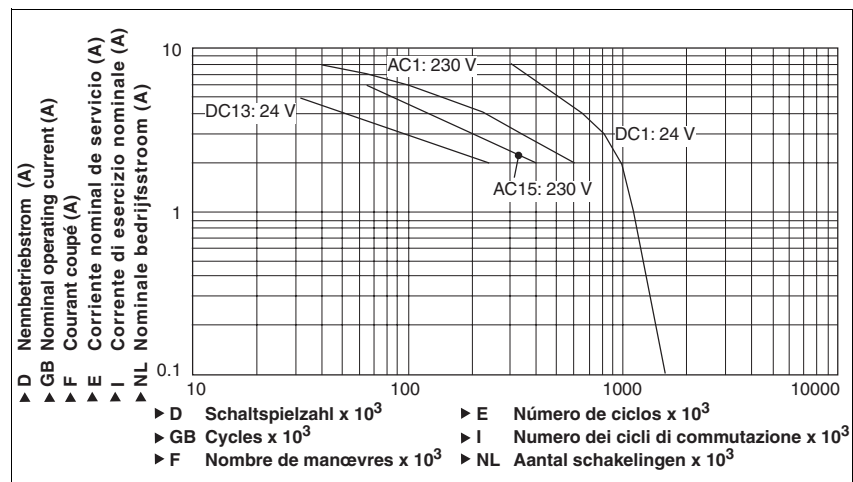


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Notice

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 U_B AC	24 V
Supply voltage U_B DC	12 V, 24 V
Voltage tolerance	-15% / +10% Order No.: 774325 -20% / +20% Order No.: 774326
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
Frequency range AC	10 - 55 Hz
Residual ripple DC	20 % Order no.: 774326 160 % Order no.: 774325
Voltage and current at input circuit: 24 VDC	55 mA Order no.: 774325 70 mA Order no.: 774326
reset circuit: 24 VDC	55 mA Order no.: 774325 90 mA Order no.: 774326
feedback loop: 24 VDC	55 mA Order no.: 774325 90 mA Order no.: 774326
Output contacts in accordance with EN 954-1, Category 3	Safety contacts (N/O): 2
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I_{min} : 0.01 A , I_{max} : 6 A P_{max} : 1500 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 4 A P_{max} : 100 W
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	I_{max} : 5 A
DC13 (6 cycles/min): 24 V	I_{max} : 4 A
Contact material	AgSnO₂ + 0.2 µm Au

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Electrical data	
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	4 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel at U_B DC	50 Ohm Order no.: 774325 20 Ohm Order no.: 774326
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
Dual-channel without detect. of shorts across contacts at U_B AC	250 Ohm Order no.: 774325
Times	
Switch-on delay	
with automatic reset typ.	115 ms Order no.: 774325 124 ms Order no.: 774326
with automatic reset max.	180 ms Order no.: 774325 230 ms Order no.: 774326
with automatic reset after power on typ.	120 ms Order no.: 774325 124 ms Order no.: 774326
with automatic reset after power on max.	190 ms Order no.: 774325 230 ms Order no.: 774326
with manual reset typ.	40 ms Order no.: 774325 80 ms Order no.: 774326
with manual reset max.	180 ms Order no.: 774325 230 ms Order no.: 774326
Delay-on de-energisation	
with E-STOP typ.	12 ms Order no.: 774325 18 ms Order no.: 774326
with E-STOP max.	20 ms Order no.: 774325 30 ms Order no.: 774326
with power failure typ.	110 ms Order no.: 774325 20 ms Order no.: 774326
with power failure max.	160 ms Order no.: 774325 30 ms Order no.: 774326
Recovery time at max. switching frequency 1/s after E-STOP	50 ms Order no.: 774325 40 ms Order no.: 774326
after power failure	200 ms Order no.: 774325 50 ms Order no.: 774326
Simultaneity, channel 1 and 2	∞
Supply interruption before de-energisation	20 ms Order no.: 774325 10 ms Order no.: 774326
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP 40
Terminals	IP 20

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Mechanical data

Housing material	PPO UL 94 V0
Housing	PPO UL 94 V0
Front	
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	
with screw terminals	87 mm x 22.5 mm x 121 mm
Weight	190 g

The standards current on **09/04** 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