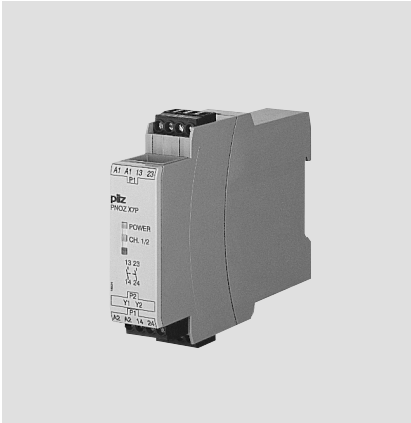
Up to Category 2, EN 954-1
PNOZ X7P



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

Approvals

	PNOZ X7P
c UL us LISTED	◆
	◆
	◆

Unit features

- Positive-guided relay outputs:
  - 2 safety contacts (N/O), instantaneous
- Connection options for:
  - E-STOP pushbutton
  - Reset button
- LED indicator for:
  - Switch status channel 1/2
  - Supply voltage
- Plug-in connection terminals (either cage clamp terminal or screw terminal)
- 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.

Unit description

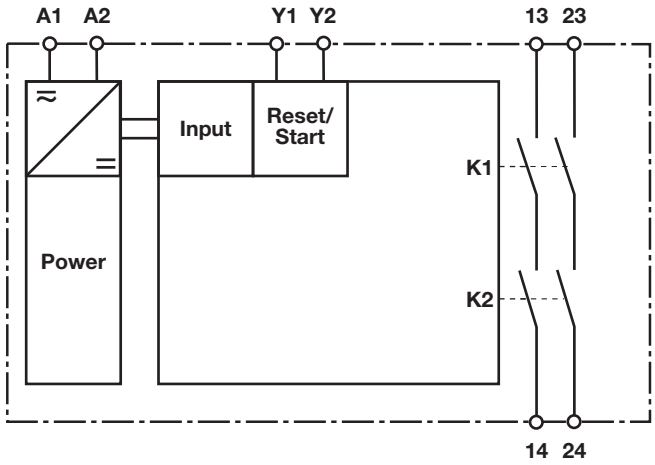
The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with
- E-STOP pushbuttons
- Safety gates

The safety relay is not suitable for non-contact barriers because
- a dynamic start is not possible
- the unit can be started during the delay-on de-energisation time.

Safety features

The relay conforms to the following safety criteria:

Block diagram



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Up to Category 2, EN 954-1
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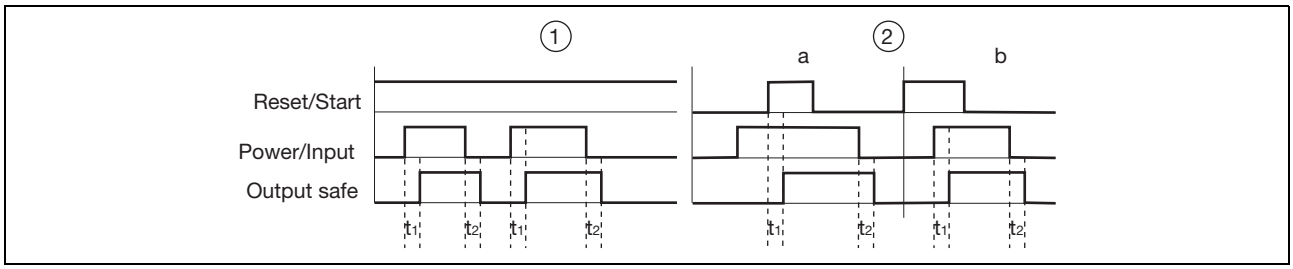
Function description

- Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- 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 circuit Y1-Y2
- Input: Input circuits A1
- 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
- t_1: Switch-on delay
- t_2: 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

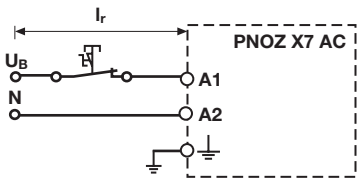
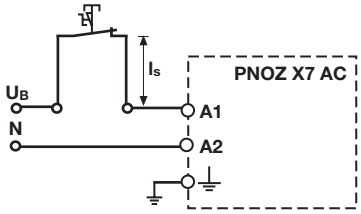
- Use copper wire that can withstand 60/75 °C.
- Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

PNOZ X7 AC: The cable runs depend on the cable capacitance.

- Loop circuit, 1 phase: max. l_r = 1 km
- Stub circuit: Cable capacitance C_L and therefore the cable runs l_s are dependent on the supply voltage U_B

Cable capacitance C_L depends on the supply voltage U_B

U_B [V]	24	110	120	230	240
C_L [nF]	37.5	37.5	37.5	7.5	7.5

Cable runs	Loop circuit	Stub circuit
		

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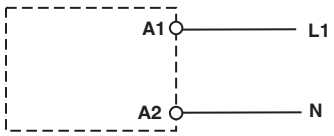
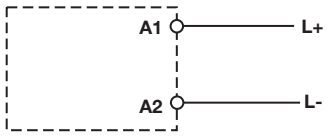
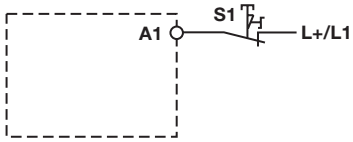
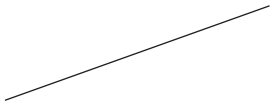
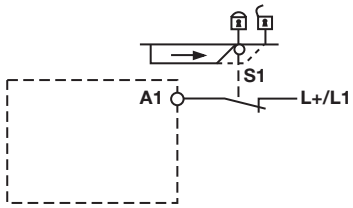
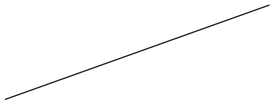
Preparing for operation

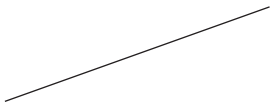
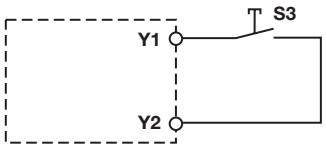
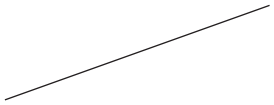
▸ Supply voltage

Supply voltage	AC	DC
		

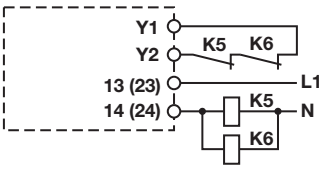
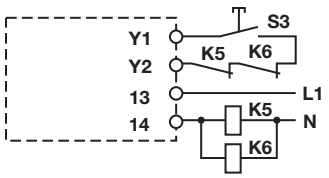
▸ Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP **without** detection of shorts across contacts		
Safety gate **without** detection of shorts across contacts		

▸ Reset circuit

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

▸ Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

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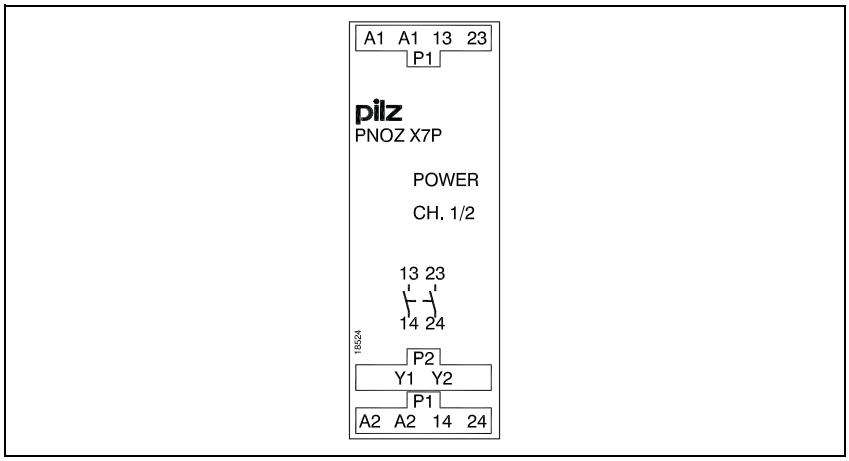
Up to Category 2, EN 954-1
PNOZ X7P

- Key

S1	E-STOP pushbutton
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Terminal configuration

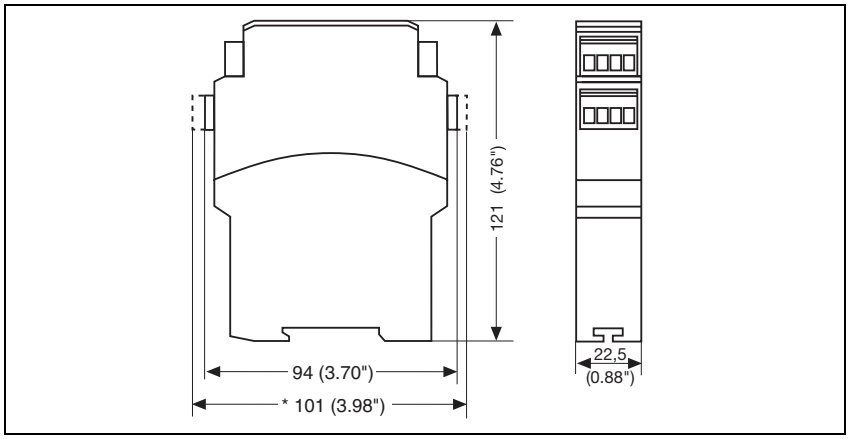


Installation

- 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

* with cage clamp terminals



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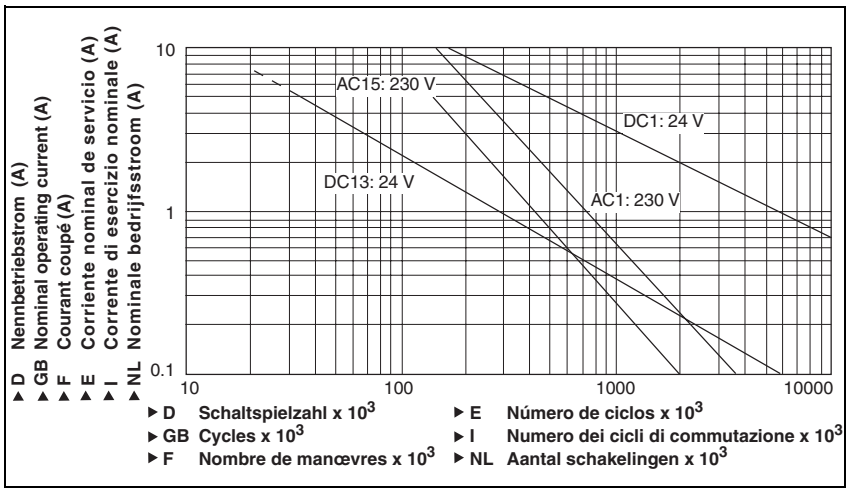
Up to Category 2, EN 954-1
PNOZ X7P

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	**110 - 120 V, 230 - 240 V**
Supply voltage U_B AC/DC	**24 V**
Voltage tolerance	**-15 % / 10 %**
Power consumption at U_B AC	**2.0 VA** Order no.: 777053, 777056, 787053, 787056 **3.0 VA** Order no.: 777059, 787059
Power consumption at U_B DC	**1.5 W** Order no.: 777059, 787059
Frequency range AC	**50 - 60 Hz**
Residual ripple DC	**160 %**
Voltage and current at input circuit:	
110.0 - 120.0 V Order no.: 777053, 787053	**17 mA** Order no.: 777053, 787053
230.0 - 240.0 V Order no.: 777056, 787056	**8 mA** Order no.: 777056, 787056
24.0 V Order no.: 777059, 787059	**50 mA** Order no.: 777059, 787059
reset circuit: **24 V**DC	**210.0 mA** Order no.: 777059, 787059 **40.0 mA** Order no.: 777053, 777056, 787053, 787056
feedback loop: **24 V**DC	**210.0 mA** Order no.: 777059, 787059 **40.0 mA** Order no.: 777053, 777056, 787053, 787056
Output contacts in accordance with **EN 954-1**, Category **2**	Safety contacts (N/O): **2**
Utilisation category in accordance with **EN 60947-4-1**	
AC1: **240 V**	I_{min}: **0.01 A**, I_{max}: **4.00 A** Order no.: 777053, 777056, 787053, 787056 **6.00 A** Order no.: 777059, 787059 P_{max}: **1,000 VA** Order no.: 777053, 777056, 787053, 787056 **1,500 VA** Order no.: 777059, 787059
DC1: **24 V**	I_{min}: **0.01 A**, I_{max}: **4.0 A** Order no.: 777053, 777056, 787053, 787056 **6.0 A** Order no.: 777059, 787059 P_{max}: **100 W** Order no.: 777053, 777056, 787053, 787056 **150 W** Order no.: 777059, 787059
Utilisation category in accordance with **EN 60947-5-1**	
AC15: **230 V**	I_{max}: **4.0 A** Order no.: 777053, 777056, 787053, 787056 **5.0 A** Order no.: 777059, 787059
DC13 (6 cycles/min): **24 V**	I_{max}: **4.0 A** Order no.: 777053, 777056, 787053, 787056 **6.0 A** Order no.: 777059, 787059
Contact material	**$AgSnO_2$ + 0.2 µm Au**

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Electrical data	
External contact fuse protection (**EN 60947-5-1**)	
Blow-out fuse, quick	**4 A** Order no.: 777053, 777056, 787053, 787056
	6 A Order no.: 777059, 787059
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	**15 Ohm** Order no.: 777059, 787059
Single-channel at U_B AC	**15 Ohm** Order no.: 777059, 787059
Times	
Switch-on delay	
with automatic reset typ.	**230 ms** Order no.: 777053, 777056, 787053, 787056
	50 ms Order no.: 777059, 787059
with automatic reset max.	**700 ms** Order no.: 777053, 777056, 787053, 787056
	150 ms Order no.: 777059, 787059
with automatic reset after power on typ.	**230 ms** Order no.: 777053, 777056, 787053, 787056
	50 ms Order no.: 777059, 787059
with automatic reset after power on max.	**700 ms** Order no.: 777053, 777056, 787053, 787056
	150 ms Order no.: 777059, 787059
with manual reset typ.	**140 ms** Order no.: 777053, 777056, 787053, 787056
	35 ms Order no.: 777059, 787059
with manual reset max.	**700 ms** Order no.: 777053, 777056, 787053, 787056
	150 ms Order no.: 777059, 787059
Delay-on de-energisation	
with E-STOP typ.	**70 ms** Order no.: 777053, 777056, 787053, 787056
	45 ms Order no.: 777059, 787059
with E-STOP max.	**100 ms** Order no.: 777053, 777056, 787053, 787056
	70 ms Order no.: 777059, 787059
with power failure typ.	**70 ms** Order no.: 777053, 777056, 787053, 787056
	45 ms Order no.: 777059, 787059
with power failure max.	**100 ms** Order no.: 777053, 777056, 787053, 787056
	70 ms Order no.: 777059, 787059
Recovery time at max. switching frequency 1/s	
after E-STOP	**120 ms** Order no.: 777053, 777056, 787053, 787056
	50 ms Order no.: 777059, 787059
after power failure	**120 ms** Order no.: 777053, 777056, 787053, 787056
	150 ms Order no.: 777059, 787059
Supply interruption before de-energisation	**20 ms**
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	**EN 60947-1**
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**
Max. cross section of external conductors with screw terminals	
1 core flexible	**0.25 - 2.50 mm²**
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	**0.25 - 1.00 mm²**
without crimp connectors or with TWIN crimp connectors	**0.20 - 1.50 mm²**
Torque setting with screw terminals	**0.50 Nm**

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more than automation
safe automation

Up to Category 2, EN 954-1
PNOZ X7P

Mechanical data	
Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	**0.20 - 1.50 mm**^{2}
Cage clamp terminals	
Terminal points per connection	**2**
Stripping length	**8 mm**
Dimensions (H x W x D)	
with screw terminals	**94.0 mm** x **22.5 mm** x **121.0 mm**
with cage clamp terminals	**101.0 mm** x **22.5 mm** x **121.0 mm**
Weight	**190 g**

The standards current on **09/04** apply.

Max. continuous current

Number of contacts	I_{max} (A) at U_B AC/DC	I_{max} (A) at U_B AC
1	**4 A** Order no.: 777059, 787059	**4 A** Order no.: 777053, 777056, 787053, 787056
2	**4 A** Order no.: 777059, 787059	**3 A** Order no.: 777053, 777056, 787053, 787056

Order reference

Type	Features	Terminals	Order no.
PNOZ X7P C	24 VAC/DC	Cage clamp terminals	787 059
PNOZ X7P	24 VAC/DC	Screw terminals	777 059
PNOZ X7P C	110 - 120 VAC	Cage clamp terminals	787 053
PNOZ X7P	110 - 120 VAC	Screw terminals	777 053
PNOZ X7P C	230 - 240 VAC	Cage clamp terminals	787 056
PNOZ X7P	230 - 240 VAC	Screw terminals	777 056

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