Up to Category 4, EN 954-1
PNOZ X2



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

Approvals

	PNOZ X2
CCC	◆
BG-PRÜFZERT	◆
c UL us LISTED	◆

Unit features

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

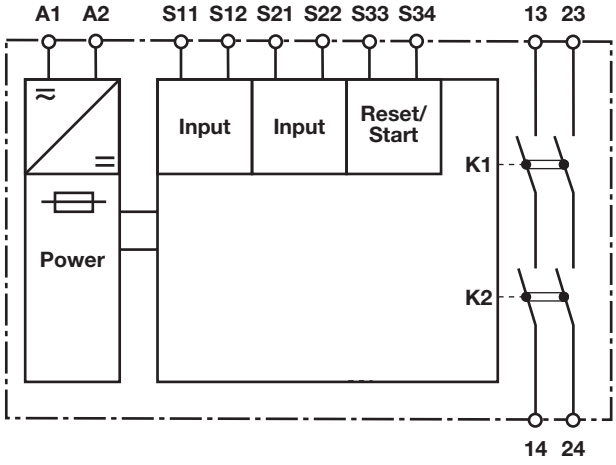
Unit description

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

Safety features

The relay conforms to the following safety criteria:
- 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.

Block diagram



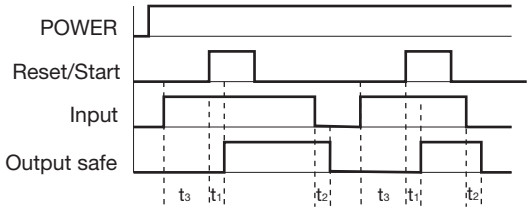
Pilz GmbH & Co. KG, Sichere Automation, Felix-Wankel-Straße 2, 73760 Ostfildern, Germany
Telephone: +49 711 3409-0, Telefax: +49 711 3409-133, E-Mail: pilz.gmbh@pilz.de

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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 with 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,
  - shorts between contacts in the input circuit.
- Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- 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 S33-S34
- Input: Input circuits S11-S12, S21-S22
- Output safe: Safety contacts 13-14, 23-24
- t_1: Switch-on delay
- t_2: Delay-on de-energisation
- t_3: Waiting period

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 l_{max} in the input circuit:

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

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

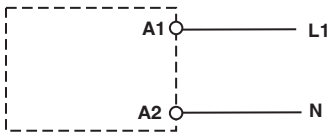
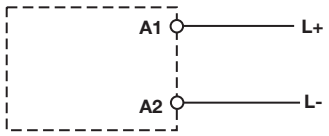
- Use copper wire that can withstand 60/75 °C.
- Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

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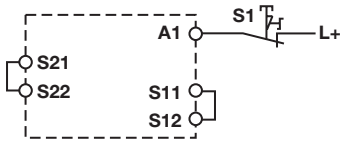
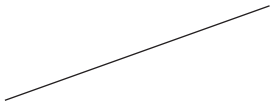
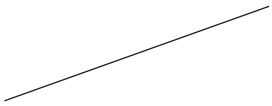
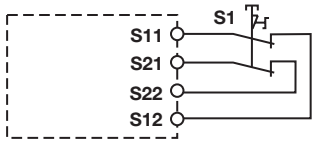
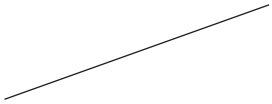
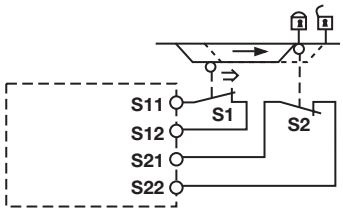
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Preparing for operation

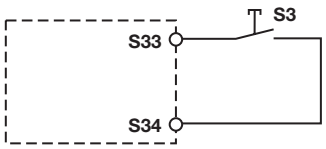
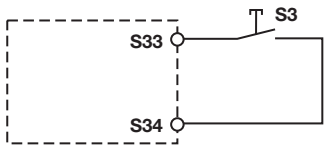
▸ Supply voltage

Supply voltage	AC	DC
		

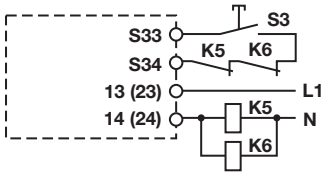
▸ Input circuit

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

▸ Reset circuit

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

▸ Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

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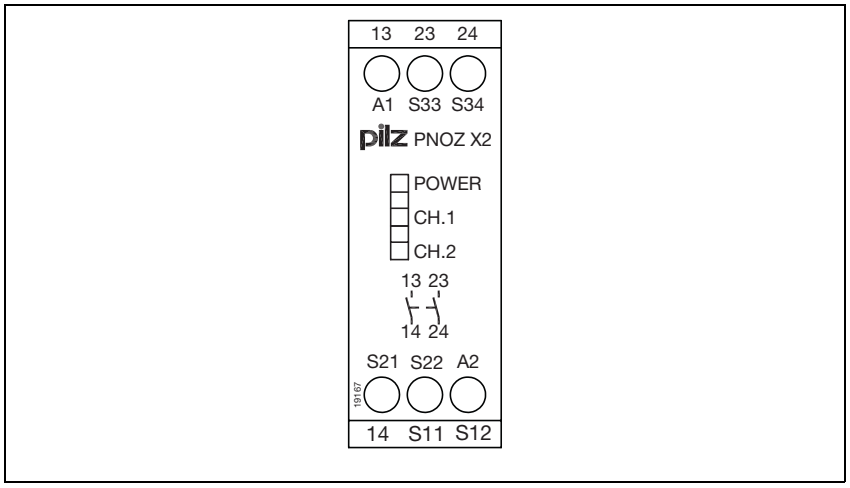
- Key

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

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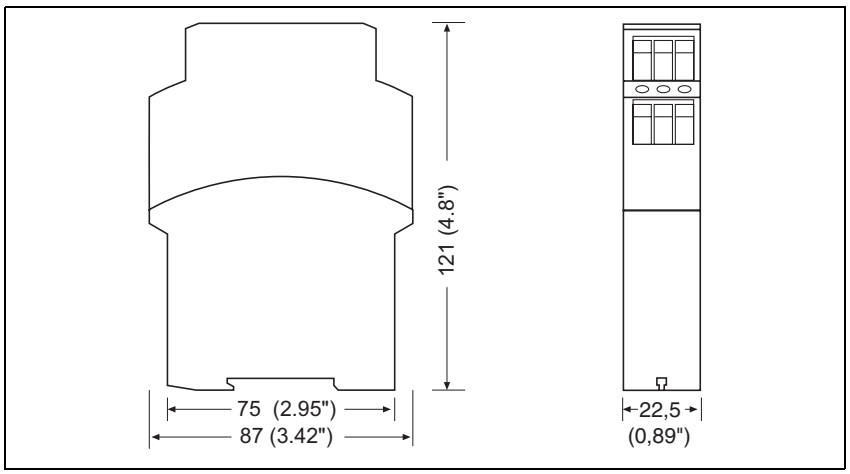
Terminal configuration



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



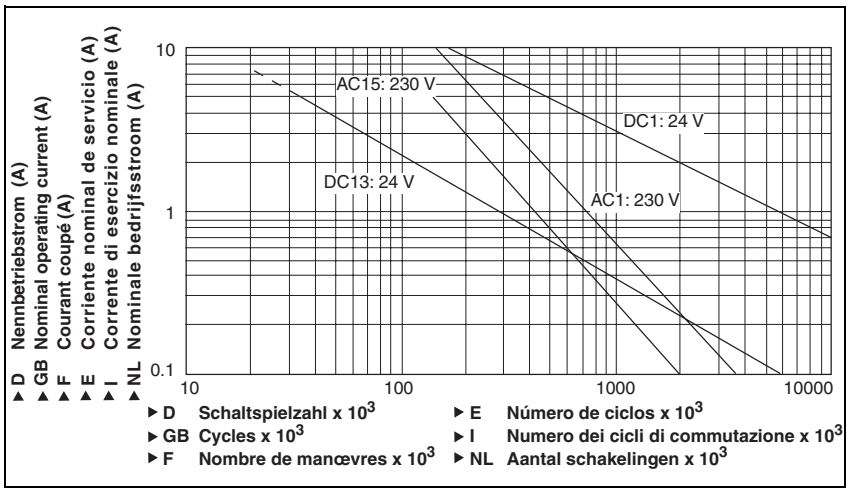
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Notice

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 AC	**24 V**
Supply voltage U_B DC	**24 V**
Voltage tolerance	**-15% / +10%**
Power consumption at U_B AC	**4.5 VA**
Power consumption at U_B DC	**2.0 W**
Frequency range AC	**50 - 60 Hz**
Residual ripple DC	**160 %**
Voltage and current at	
input circuit DC: **24.0 V**	**25 mA**
reset circuit DC: **24.0 V**	**50 mA**
feedback loop DC: **24.0 V**	**50 mA**
Output contacts in accordance with **EN 954-1**, Category 4	Safety contacts (N/O): **2**
Utilisation category in accordance with **EN 60947-4-1**	
AC1: **240 V**	I_{min}: **0.01 A**, I_{max}: **6.0 A** P: **1500 VA**
DC1: **24 V**	I_{min}: **0.01 A**, I_{max}: **6.0 A** P: **150 W**
Utilisation category in accordance with **EN 60947-5-1**	
AC15: **230 V**	I_{max}: **5.0 A**
DC13: **24 V** (DC13: 6 cycles/min)	I_{max}: **4.0 A**
Contact material	**AgSnO2 + 0.2 µm Au**
External contact fuse protection in accordance with **EN 60947-5-1**	
Blow-out fuse, quick	**6 A**
Blow-out fuse, slow	**4 A**
Circuit breaker	24 VAC/DC, **4 A**, characteristic B/C
Max. overall cable resistance Rlmax input circuits, reset circuits	
Single-channel at U_B AC	**150 Ohm**
Single-channel at U_B DC	**150 Ohm**
Dual-channel with detect. of shorts across contacts at U_B AC	**30 Ohm**
Dual-channel with detect. of shorts across contacts at U_B DC	**15 Ohm**

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Times	
Switch-on delay	
with monitored reset typ.	**38 ms**
with monitored reset max.	**50 ms**
Delay-on de-energisation	
with E-STOP typ.	**17 ms**
with E-STOP max.	**30 ms**
after power failure typ.	**70 ms**
after power failure max.	**110 ms**
Recovery time at max. switching frequency 1/s	
after E-STOP	**50 ms**
after power failure	**150 ms**
Waiting period with a monitored reset	**180 ms**
Simultaneity, channel 1 and 2	∞
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	**0.20 - 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)	**87.0 x 22.5 x 121.0 mm**
Weight	**200 g**

The standards current on **06/04** apply.

Order reference

Type	Features		Terminals	Order no.
PNOZ X2	24 VAC	24 VDC	Screw terminals	774 303

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