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Up to Category 3, EN 954-1
PNOZ 1



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

Approvals

	PNOZ 1
c UL us LISTED	◆
TÜV SÜD	◆
CCC	◆

Unit features

- Positive-guided relay outputs:
  - 3 safety contacts (N/O), instantaneous
  - 1 auxiliary contact (N/C), 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 60947-5-1, EN 60204-1 and VDE 0113-1 and may be used in applications with

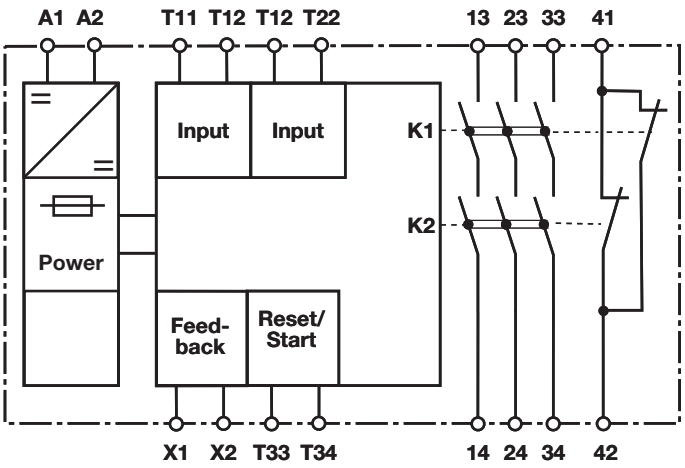
- E-STOP pushbuttons
- Safety gates

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.
- The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- The tranformer is short circuit-proof. An electronic fuse is used on a DC supply.

Block diagram

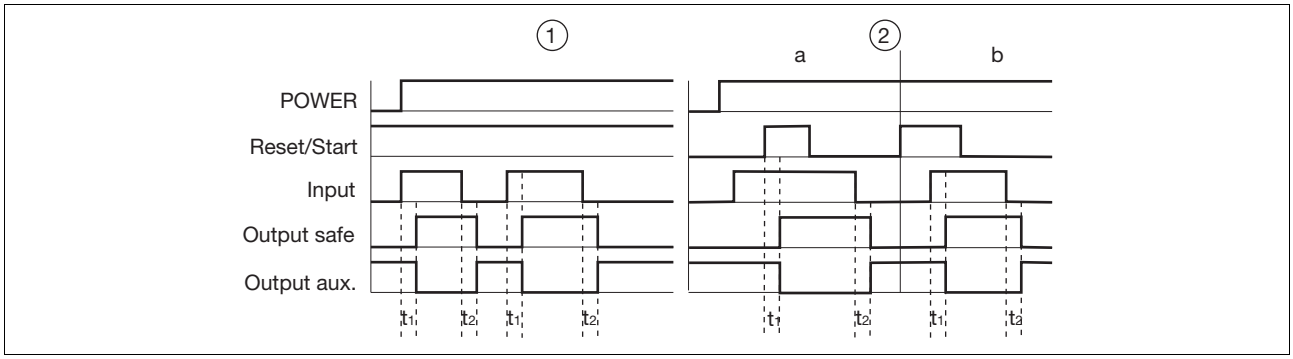


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Function description

- Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- 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 instantaneous safety contacts by connecting contact expansion modules or external contactors.

Timing diagram



Key

- Power: Supply voltage
- Reset/start: Reset circuit
- Input: Input circuits T12-T22, T11-T22
- Output safe: Safety contacts 13-14, 23-24, 33-34
- Output aux: Auxiliary contacts 41-42
- 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, 33-34 are safety contacts, outputs 41-42 are auxiliary contacts (e.g. for display).
- To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- Calculation of the max. cabling runs l_{max} in the input circuit:

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

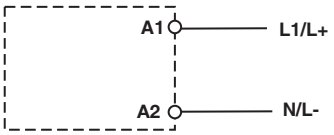
R_{lmax} = max. overall cable resistance (see technical details)
R_l /km = cable resistance/km

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

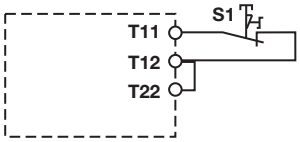
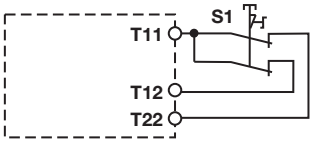
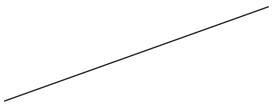
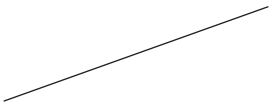
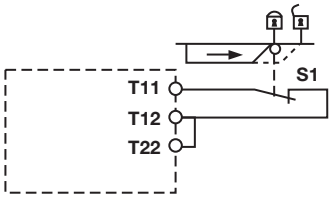
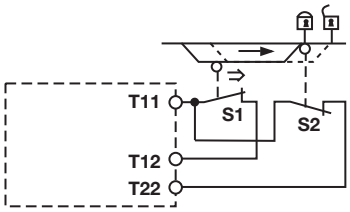
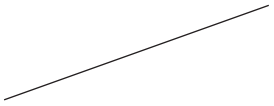
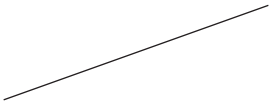
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Preparing for operation

- Supply voltage

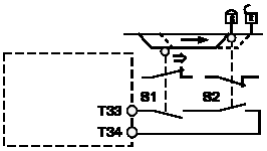
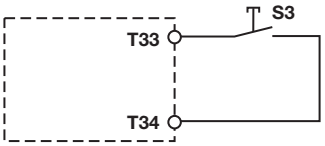
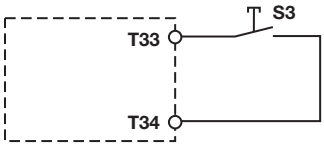
Supply voltage	AC/DC
	

- Input circuit

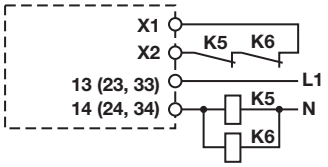
Input circuit	Single-channel	Dual-channel
E-STOP **without** detection of shorts across contacts		
E-STOP **with** detection of shorts across contacts		
Safety gate **without** detection of shorts across contacts		
Safety gate **with** detection of shorts across contacts		

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▸ Reset circuit

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

▸ Feedback loop

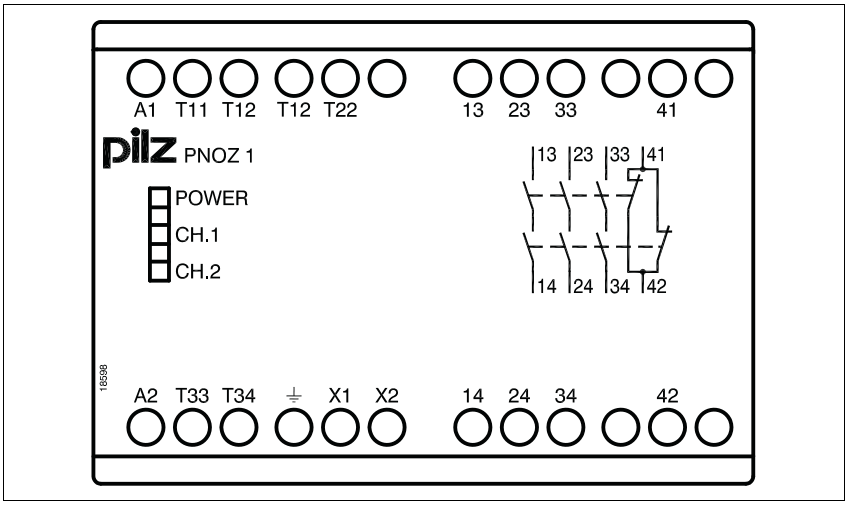
Feedback loop	Without feedback loop	With feedback loop
Link or contacts from external contactors		

▸ Key

S1	E-STOP pushbutton
	Switch operated
	Gate open
	Gate closed

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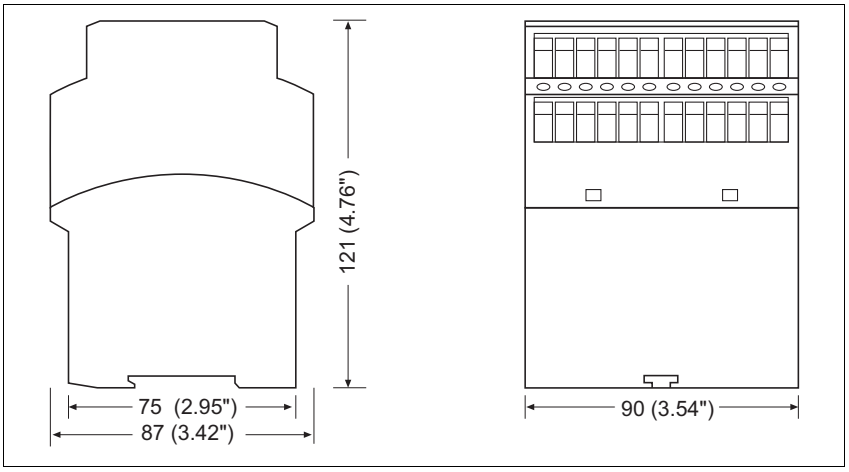
Terminal configuration



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



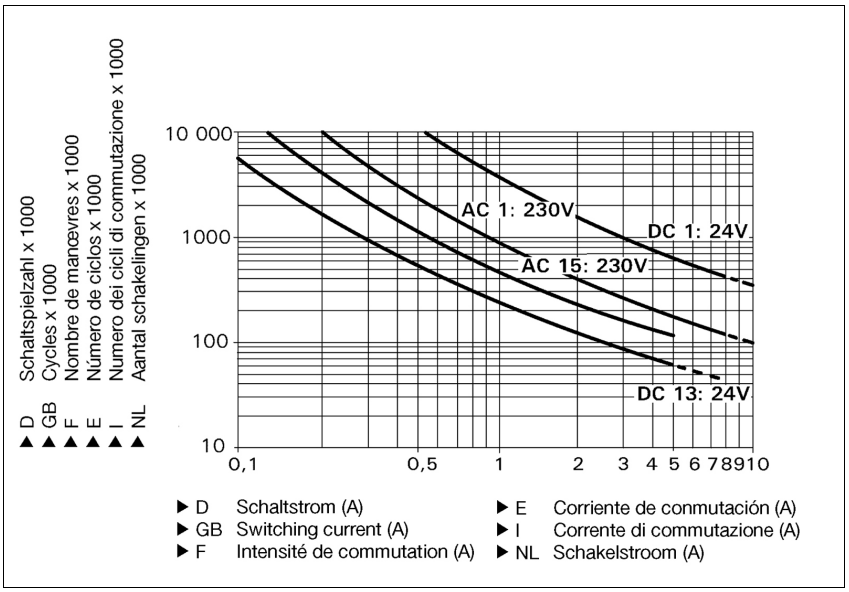
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Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

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.



Example
- Inductive load: 0,2 A
- Utilisation category: AC15
- Contact service life: 4,000,000 cycles

Provided the application 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 contactors, use freewheel diodes for spark suppression.

Technical details

Electrical data	
Supply voltage	
Supply voltage U_B AC	**24 V**, **48 V**, **110 - 120 V**, **230 - 240 V**
Supply voltage U_B DC	**24 V**
Voltage tolerance	**-15 %/+10 %**
Power consumption at U_B AC	**5.5 VA** No. 775600, 775620, 775630, 775650
Power consumption at U_B DC	**2.5 W** No. 775695
Frequency range AC	**50 - 60 Hz**
Residual ripple DC	**160 %**
Voltage and current at	
Input circuit DC: **24.0 V**	**30.0 mA** No. 775600, 775620, 775630, 775650 **40.0 mA** No. 775695
Reset circuit DC: **24.0 V**	**50.0 mA**
Feedback loop DC: **24.0 V**	**50.0 mA**

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Electrical data	
Number of output contacts	
Safety contacts (S) instantaneous:	**3**
Auxiliary contacts (N/C):	**1**
Utilisation category in accordance with **EN 60947-4-1**	
Safety contacts: AC1 at **240 V**	I_{min}: **0.01 A** , I_{max}: **8.0 A** P_{max}: **2000 VA**
Safety contacts: AC1 at **400 V**	I_{min}: **0.01 A** , I_{max}: **5.00 A** P_{max}: **2000 VA**
Safety contacts: DC1 at **24 V**	I_{min}: **0.01 A** , I_{max}: **8.0 A** P_{max}: **200 W**
Auxiliary contacts: AC1 at **240 V**	I_{min}: **0.01 A** , I_{max}: **8.0 A** P_{max}: **2000 VA**
Auxiliary contacts: DC1 at **24 V**	I_{min}: **0.01 A** , I_{max}: **8.0 A** P_{max}: **200 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}: **7.0 A**
Auxiliary contacts: AC15 at **230 V**	I_{max}: **5.0 A**
Auxiliary contacts: DC13 at **24 V** (6 cycles/min)	I_{max}: **7.0 A**
Conventional thermal current	**8.0 A**
Contact material	**AgSnO2 + 0.2 µm Au**
External contact fuse protection (I_K = 1 kA) to **EN 60947-5-1**	
Blow-out fuse, quick	
Safety contacts:	**10 A**
Auxiliary contacts:	**10 A**
Blow-out fuse, slow	
Safety contacts:	**6 A**
Auxiliary contacts:	**6 A**
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	**6 A**
Auxiliary contacts:	**6 A**
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
single-channel at U_B DC	**150 Ohm** No. 775695
single-channel at U_B AC	**200 Ohm** No. 775600, 775620, 775630, 775650
dual-channel without detect. of shorts across contacts at U_B DC	**250 Ohm** No. 775695
dual-channel without detect. of shorts across contacts at U_B AC	**350 Ohm** No. 775600, 775620, 775630, 775650
Times	
Switch-on delay	
with automatic reset typ.	**190 ms**
with automatic reset max.	**250 ms** No. 775695 **270 ms** No. 775600, 775620, 775630, 775650
with automatic reset after power on typ.	**190 ms** No. 775695 **215 ms** No. 775600, 775620, 775630, 775650
with automatic reset after power on max.	**250 ms** No. 775695 **320 ms** No. 775600, 775620, 775630, 775650
with manual reset typ.	**190 ms**
with manual reset max.	**250 ms** No. 775695 **270 ms** No. 775600, 775620, 775630, 775650
Delay-on de-energisation	
with E-STOP typ.	**15 ms**
with E-STOP max.	**30 ms**
with power failure max.	**80 ms**
Recovery time at max. switching frequency 1/s	
after E-STOP	**300 ms**
after power failure	**350 ms**

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Times	
Simultaneity, channel 1 and 2	**140 ms**
Supply interruption before de-energisation	**35 ms**
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**
Overvoltage category	**III**
Rated insulation voltage	**400 V**
Rated impulse withstand voltage	**4.00 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 mm² , 24 - 10 AWG**
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	**0.20 - 2.50 mm² , 24 - 14 AWG**
without crimp connectors or with TWIN crimp connectors	**0.20 - 2.50 mm² , 24 - 14 AWG**
Torque setting with screw terminals	**0.60 Nm**
Dimensions	
Height	**87.0 mm**
Width	**90.0 mm**
Depth	**121.0 mm**
Weight	**400 g** No. 775695 **500 g** No. 775600, 775620, 775630, 775650

No. stands for order number.

The standards current on **2005-10** apply.

Order reference

Type	Features	Terminals	Order no.
PNOZ 1	24 VAC	With screw terminals	775 600
PNOZ 1	48 VAC	With screw terminals	775 620
PNOZ 1	110 – 120 VAC	With screw terminals	775 630
PNOZ 1	230 – 240 VAC	With screw terminals	775 650
PNOZ 1	24 VDC	With screw terminals	775 695

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