




Up to Category 4, EN 954-1 PNOZ XV2



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

Approvals

| | PNOZ XV2 |
|---|----------|
|  | ◆ |
|  | ◆ |
|  | ◆ |

Unit features

- ▶ Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
 - 2 safety contacts (N/O), delay-on de-energisation
- ▶ Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- ▶ LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
- ▶ Delay-on de-energisation, fixed or selectable
- ▶ Delay time can be cancelled via reset button
- ▶ See order reference for unit types

The max. category the safety contacts can achieve in accordance with EN 954-1 is stated in the technical details.

Safety features

The relay conforms to the following safety criteria:

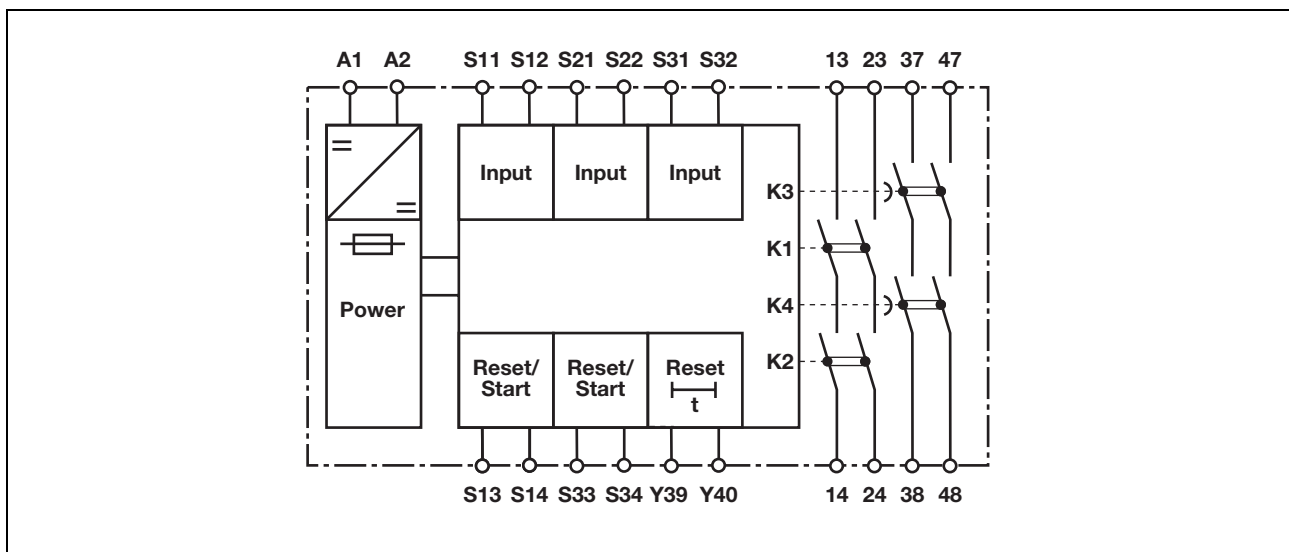
- ▶ The circuit is redundant with built-in self-monitoring.
- ▶ The safety function remains effective in the case of a component failure.
- ▶ The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- ▶ The unit has an electronic fuse.

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

Block diagram

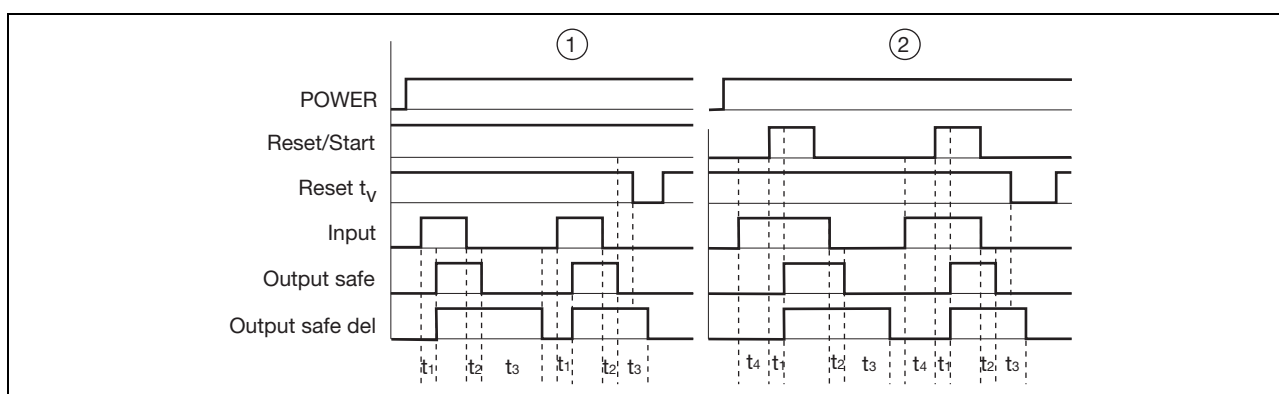


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Function description

- ▶ Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- ▶ Dual-channel operation 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.
- ▶ Automatic start: Unit is active once the input circuit has been closed.
- ▶ 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 S13-S14, S33-S34
- ▶ Reset t_v : Y39-Y40
- ▶ Input: Input circuits S11-S12, S21-S22, S31-S32
- ▶ Output safe: Safety contacts, instantaneous 13-14, 23-24
- ▶ Output safe del: Safety contacts, delayed 37-38, 47-48
- ▶ ①: Automatic reset
- ▶ ②: Monitored reset
- ▶ t_1 : Switch-on delay
- ▶ t_2 : Delay-on de-energisation
- ▶ t_3 : Delay time
- ▶ t_4 : Waiting period

Wiring

Please note:

- ▶ Information given in the “Technical details” must be followed.
- ▶ Outputs 13-14, 23-24 are instantaneous safety contacts, outputs 37-38, 47-48 are delay-on de-energisation 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


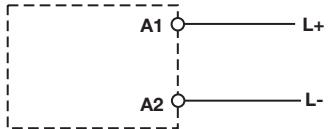
- ▶ Use copper wire that can withstand 60/75 °C.

- ▶ Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

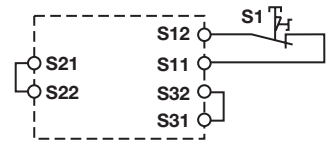
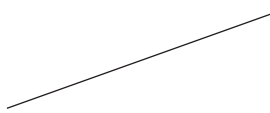
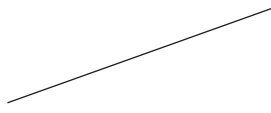
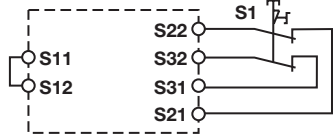
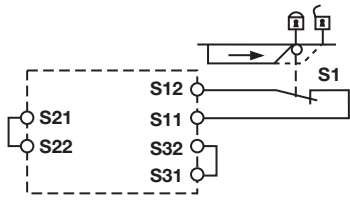
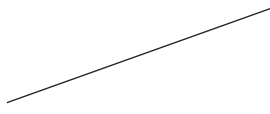
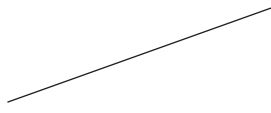
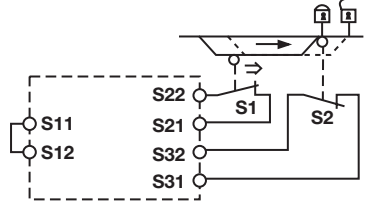
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Preparing for operation

► 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) Safety gate (single-channel) | E-STOP wiring (dual-channel) Safety gate (dual-channel) |
|-----------------|--|--|
| Automatic reset | | |
| Monitored reset | | |




▶ Reset

| Reset | Link | N/C contact for resetting the delay time |
|---------------------|------|--|
| Link or N/C contact | | |

▶ Feedback loop

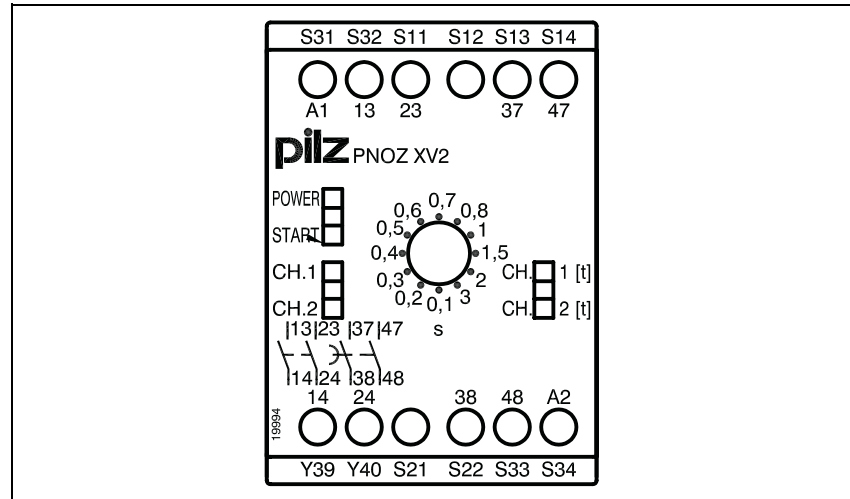
| Feedback loop | Automatic reset | Monitored reset |
|-----------------------------------|-----------------|-----------------|
| Contacts from external contactors | | |

▶ Key

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

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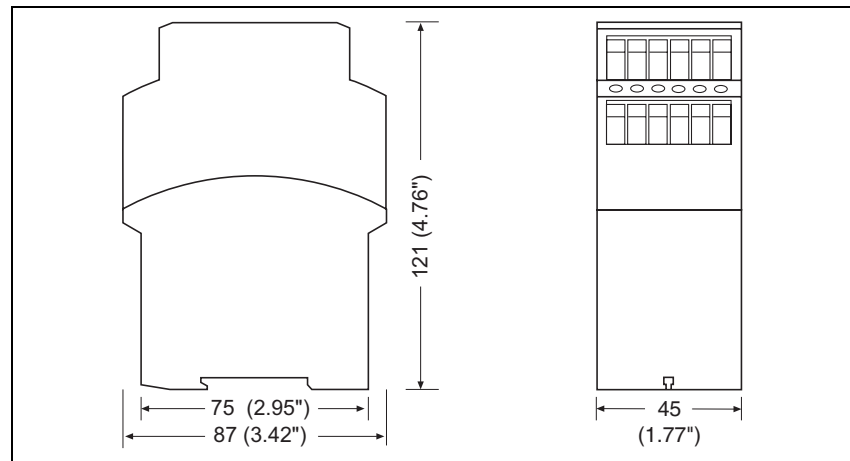
Terminal configuration



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

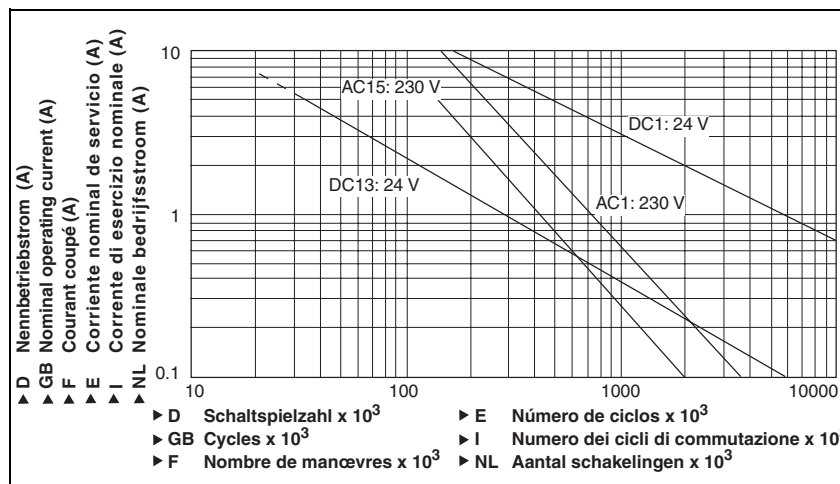


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Notice

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 U_B DC | 24 V |
| Voltage tolerance | -15% / +10% |
| Power consumption | 4.5 W |
| Residual ripple DC | 160 % |
| Voltage and current at input circuit: 24.0 VDC reset circuit: 24.0 VDC feedback loop: 24.0 VDC | 35.0 mA 40.0 mA 5.0 mA |
| Output contacts in accordance with EN 954-1 , Category 4 | Safety contacts (N/O): 2 ST |
| Output contacts in accordance with EN 954-1 Category 1 Order no. 774500, 774508 | Safety contacts (N/O), delayed: 2 ST When delay time >30 s |
| Category 3 | When delay time <30 s |
| Utilisation category in accordance with EN 60947-4-1 AC1: 240 V | I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 2,000 VA |
| DC1: 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 AC15: 230 V DC13 (6 cycles/min): 24 V | I_{max} : 5.0 A I_{max} : 7.0 A |
| Contact material | AgSnO₂ + 0.2 µm Au |
| External contact fuse protection (EN 60947-5-1) Blow-out fuse, quick Blow-out fuse, slow Circuit breaker | 10 A 6 A 6 A , 24 VAC/DC, characteristic B/C |
| Max. overall cable resistance R_{lmax} input circuits, reset circuits Single-channel Dual-channel with detection of shorts across contacts | 100 Ohm 10 Ohm |

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| Times | |
|--|---|
| Switch-on delay | |
| with automatic reset typ. | 350 ms |
| with automatic reset max. | 650 ms |
| with automatic reset after power on typ. | 385 ms |
| with automatic reset after power on max. | 700 ms |
| with monitored reset typ. | 45 ms |
| with monitored reset max. | 70 ms |
| Delay-on de-energisation | |
| with E-STOP typ. | 15 ms |
| with E-STOP max. | 30 ms |
| with power failure typ. | 85 ms |
| with power failure max. | 200 ms |
| Recovery time at max. switching frequency 1/s after E-STOP after power failure | 50 ms + t _v 250 ms |
| Delay time t _v selectable | 0.10 s, 0.20 s, 0.30 s, 0.40 s, 0.50 s, 0.60 s, 0.70 s, 0.80 s, 1.00 s, 1.50 s, 2.00 s, 3.00 s Order no.: 774502 |
| | 0.00 s, 0.50 s, 1.00 s, 2.00 s, 4.00 s, 6.00 s, 8.00 s, 10.00 s, 15.00 s, 20.00 s, 25.00 s, 30.00 s Order no.: 774500 |
| | 0.00 s, 5.00 s, 10.00 s, 20.00 s, 40.00 s, 60.00 s, 80.00 s, 100.00 s, 150.00 s, 200.00 s, 250.00 s, 300.00 s Order no.: 774508 |
| fixed | 0.5 s Order no.: 774504, 3.0 s Order no.: 774505, 10 s Order no.: 774506 |
| Repetition accuracy | 2 % |
| Time accuracy | -15% / +15% +50 ms |
| Waiting period with a monitored reset | 300 ms |
| Min. start pulse duration with a monitored reset | 30 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 | VDE 0110-1 |
| 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 mm x 45 mm x 121 mm |
| Weight | 350 g Order no.: 774502, 774500, 774508 340 g Order no.: 774504, 774505, 774506 |

The standards current on 11/03 apply.

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Max. continuous current

| Number of contacts | I_{\max} (A) at U_B DC |
|--------------------|----------------------------|
| 1 | 8.00 A |
| 2 | 6.80 A |
| 3 | 5.50 A |
| 4 | 4.80 A |

Order reference

| Type | Features | Terminals | Order no. |
|----------|----------|------------------|-------------------------|
| PNOZ XV2 | 24 VDC | 0.5 s fixed | Screw terminals 774 504 |
| PNOZ XV2 | 24 VDC | 3.0 s fixed | Screw terminals 774 505 |
| PNOZ XV2 | 24 VDC | 10.0 s fixed | Screw terminals 774 506 |
| PNOZ XV2 | 24 VDC | 3 s selectable | Screw terminals 774 502 |
| PNOZ XV2 | 24 VDC | 30 s selectable | Screw terminals 774 500 |
| PNOZ XV2 | 24 VDC | 300 s selectable | Screw terminals 774 508 |