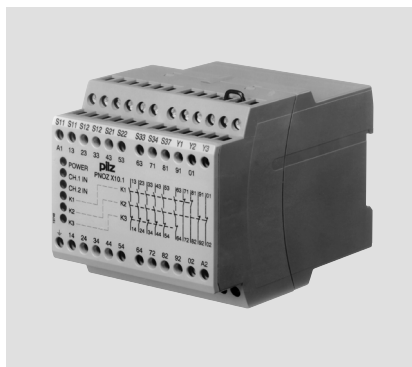


## Up to Category 4, EN 954-1 PNOZ X10.1



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

### Approvals

	PNOZ X10.1
	◆
	◆
	◆

### Unit features

- ▶ Positive-guided relay outputs:
  - 6 safety contacts (N/O), instantaneous
  - 4 auxiliary contacts (N/C), 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
  - Reset circuit
  - Input circuits
- ▶ 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 transformer is short circuit-proof. An electronic fuse is used on a DC supply.

### Unit description

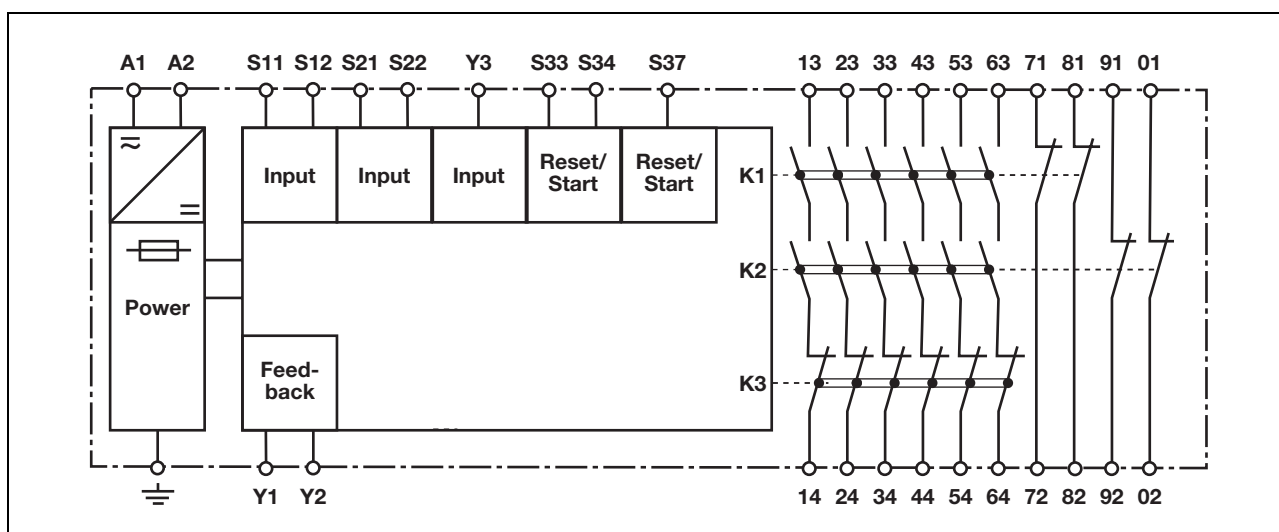
The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

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

### Safety features

The relay conforms to the following safety criteria:

### Block diagram

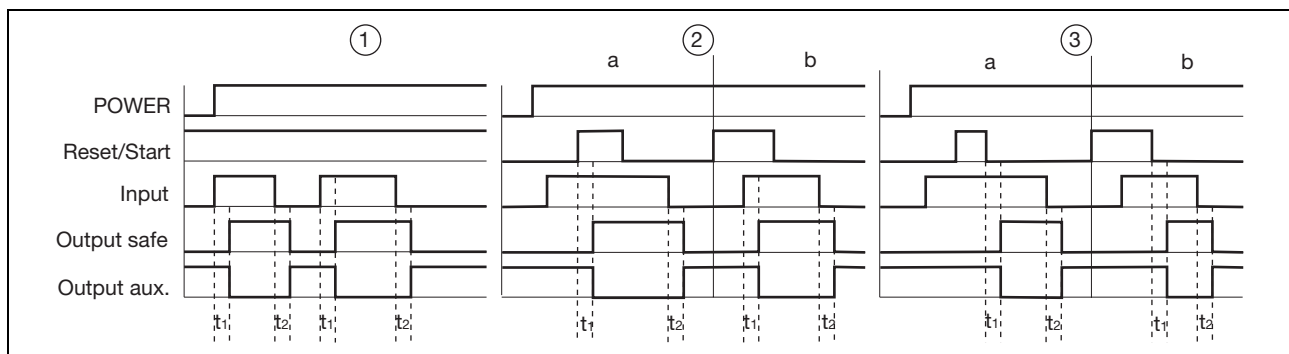


## Up to Category 4, EN 954-1 PNOZ X10.1

### 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.
- ▶ 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.
- ▶ Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- ▶ Monitored reset: Unit is active once
  - the input circuit is closed and then the reset circuit is closed and opened again.
  - the reset circuit is closed and then opened again once the input 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 S33(S12)-S34
- ▶ Input: Input circuits S12-Y3, S21-S22
- ▶ Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54, 63-64
- ▶ Output aux: Auxiliary contacts 71-72, 81-82, 91-92, 01-02
- ▶ ①: Automatic reset
- ▶ ②: Manual reset
- ▶ ③: Monitored 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, 43-44, 53-54, 63-64 are safety contacts, outputs 71-72, 81-82, 91-92, 01-02 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

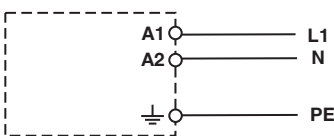
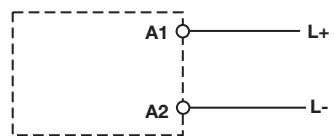
- ▶ Use copper wire that can withstand 60/75 °C.
- ▶ Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

# E-STOP relay, safety gate monitor

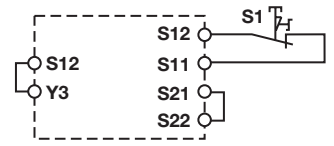
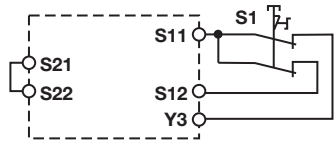
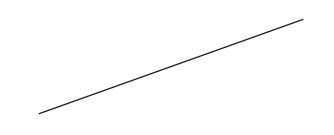
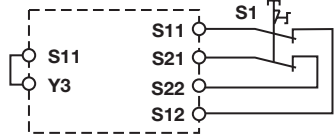
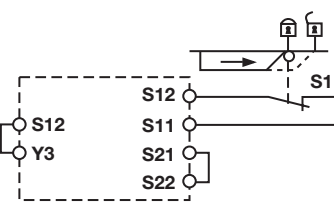
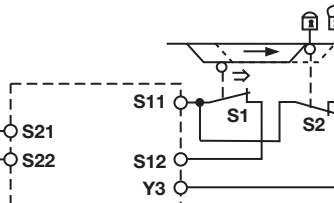
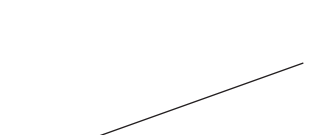
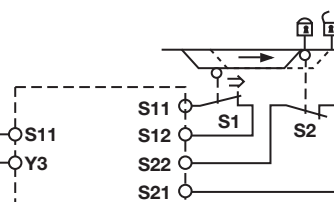
## Up to Category 4, EN 954-1 PNOZ X10.1

### Preparing for operation

#### ► Supply voltage

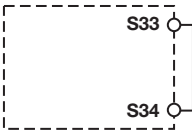
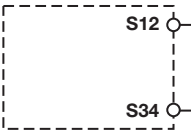
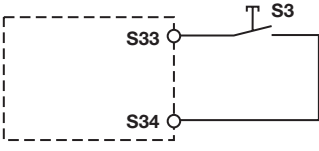
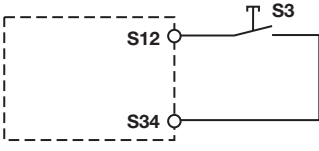
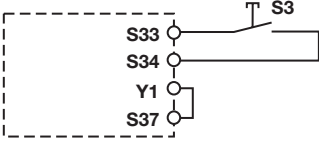
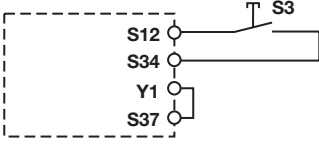
Supply voltage	AC	DC
		

#### ► Input circuit

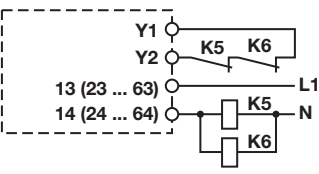
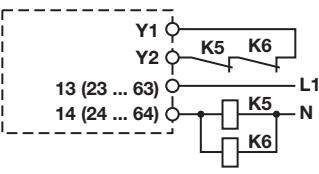
Input circuit	Single-channel	Dual-channel
E-STOP <b>without</b> detection of shorts across contacts		
E-STOP <b>with</b> detection of shorts across contacts		
Safety gate <b>without</b> detection of shorts across contacts		
Safety gate <b>with</b> detection of shorts across contacts		

## Up to Category 4, EN 954-1 PNOZ X10.1




### ▶ 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		
Monitored reset		

### ▶ Feedback loop

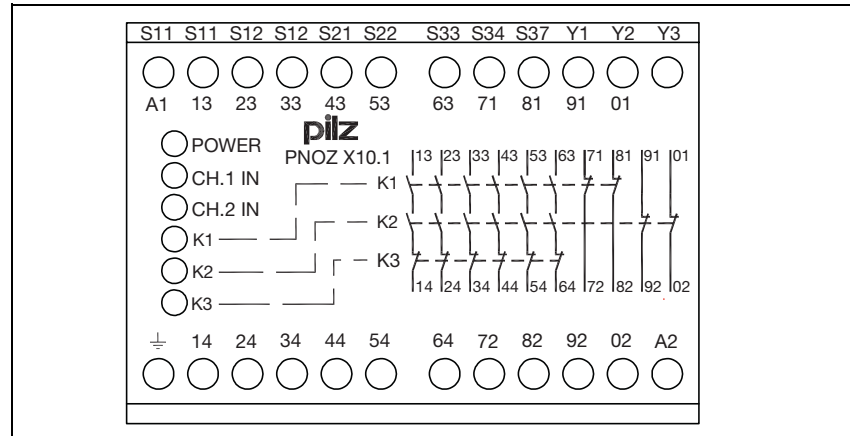
Feedback loop	Automatic reset	Monitored/manual reset
Contacts from external contactors		

### ▶ Key

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

## Up to Category 4, EN 954-1 PNOZ X10.1

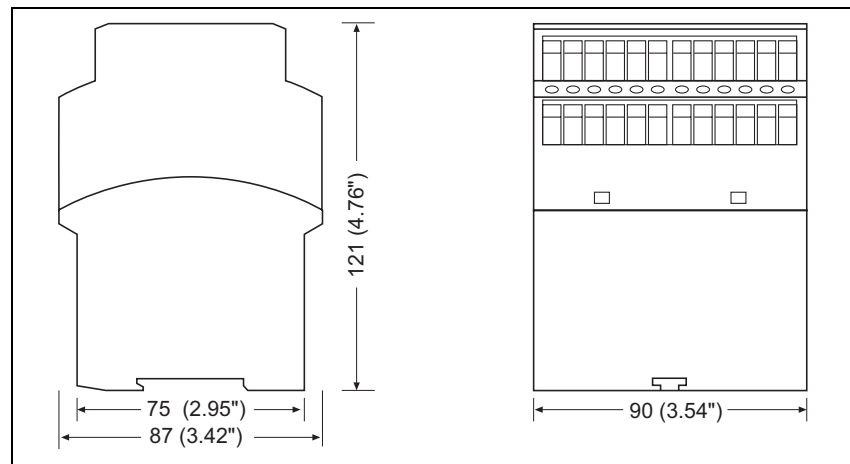
### Terminal configuration



### 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

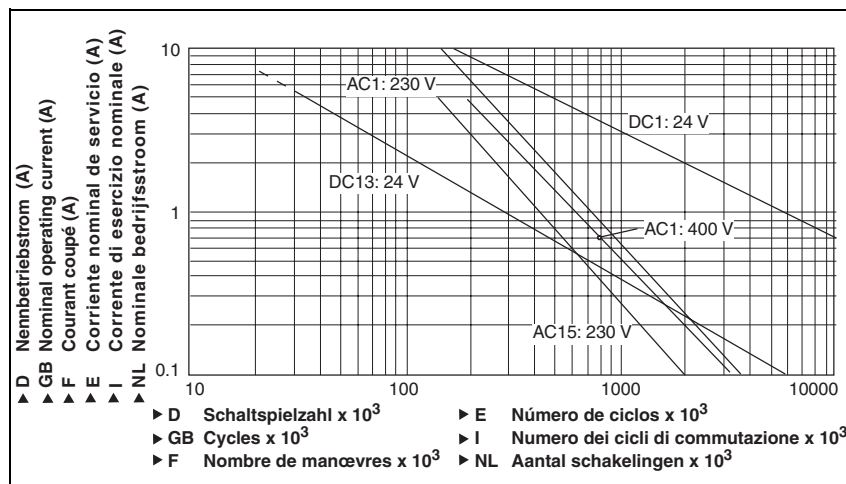


## Up to Category 4, EN 954-1 PNOZ X10.1

### 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	<b>24 V, 42 V, 110 - 120 V, 230 - 240 V</b>
Supply voltage $U_B$ DC	<b>24 V</b>
Voltage tolerance	<b>-15 % / 10 %</b>
Power consumption at $U_B$ AC	<b>10.0 VA</b> Order no.: 774740, 774741, 774745, 774746
Power consumption at $U_B$ DC	<b>5.5 W</b> Order no.: 774749
Frequency range AC	<b>50 - 60 Hz</b> Order no.: 774740, 774741, 774745, 774746
Residual ripple DC	<b>160 %</b> Order no.: 774749
Voltage and current at input circuit: <b>24.0 VDC</b>	<b>50 mA</b>
reset circuit: <b>24.0 VDC</b>	<b>100.0 mA</b>
feedback loop: <b>24.0 VDC</b>	<b>100.0 mA</b>
Output contacts in accordance with <b>EN 954-1</b> , Category 4	Safety contacts (N/O): <b>6</b> Auxiliary contacts (N/C): <b>4</b>
Utilisation category in accordance with <b>EN 60947-4-1</b>	
AC1: <b>240 V</b>	$I_{min}$ : <b>0.01 A</b> , $I_{max}$ : <b>8.0 A</b> $P_{max}$ : <b>2,000 VA</b>
AC1: <b>400 V</b>	$I_{min}$ : <b>0.01 A</b> , $I_{max}$ : <b>5.0 A</b> $P_{max}$ : <b>2,000 VA</b>
DC1: <b>24 V</b>	$I_{min}$ : <b>0.01 A</b> , $I_{max}$ : <b>8.0 A</b> $P_{max}$ : <b>200 W</b>
Utilisation category in accordance with <b>EN 60947-5-1</b>	
AC15: <b>230 V</b>	$I_{max}$ : <b>5.0 A</b>
DC13 (6 cycles/min): <b>24 V</b>	$I_{max}$ : <b>7.0 A</b>
Contact material	<b>AgSnO<sub>2</sub> + 0.2 µm Au</b>
External contact fuse protection ( <b>EN 60947-5-1</b> )	
Blow-out fuse, quick	<b>10 A</b>
Blow-out fuse, slow	<b>6 A</b>
Circuit breaker	<b>6 A</b> , 24 VAC/DC, characteristic B/C
Max. overall cable resistance $R_{lmax}$ input circuits, reset circuits	
single-channel at $U_B$ DC	<b>45 Ohm</b> Order no.: 774749
single-channel at $U_B$ AC	<b>45 Ohm</b> Order no.: 774740, 774741, 774745, 774746
dual-channel without detect. of shorts across contacts at $U_B$ DC	<b>90 Ohm</b> Order no.: 774749
dual-channel without detect. of shorts across contacts at $U_B$ AC	<b>90 Ohm</b> Order no.: 774740, 774741, 774745, 774746
dual-channel with detect. of shorts across contacts at $U_B$ DC	<b>15 Ohm</b> Order no.: 774749
dual-channel with detect. of shorts across contacts at $U_B$ AC	<b>15 Ohm</b> Order no.: 774740, 774741, 774745, 774746

## Up to Category 4, EN 954-1 PNOZ X10.1

Times	
Switch-on delay with automatic reset typ.	<b>180 ms</b> Order no.: 774740, 774741, 774745, 774746 <b>190 ms</b> Order no.: 774749
with automatic reset max.	<b>250 ms</b>
with automatic reset after power on typ.	<b>230 ms</b> Order no.: 774740, 774741, 774745, 774746 <b>200 ms</b> Order no.: 774749
with automatic reset after power on max.	<b>320 ms</b> Order no.: 774740, 774741, 774745, 774746 <b>300 ms</b> Order no.: 774749
with manual reset typ.	<b>200 ms</b>
with manual reset max.	<b>250 ms</b>
with monitored reset typ.	<b>150 ms</b> Order no.: 774740, 774741, 774745, 774746 <b>165 ms</b> Order no.: 774749
with monitored reset max.	<b>200 ms</b> Order no.: 774740, 774741, 774745, 774746 <b>220 ms</b> Order no.: 774749
Delay-on de-energisation with E-STOP typ.	<b>20 ms</b>
with E-STOP max.	<b>30 ms</b>
with power failure typ.	<b>300 ms</b>
with power failure max.	<b>400 ms</b>
Recovery time at max. switching frequency 1/s after E-STOP	<b>50 ms</b>
after power failure	<b>450 ms</b>
Min. start pulse duration with a monitored reset	<b>50 ms</b>
Simultaneity, channel 1 and 2	<b>150 ms</b>
Supply interruption before de-energisation	<b>150 ms</b>
Environmental data	
EMC	<b>EN 60947-5-1, EN 61000-6-2</b>
Vibration in accordance with <b>EN 60068-2-6</b>	
Frequency	<b>10 - 55 Hz</b>
Amplitude	<b>0.35 mm</b>
Climatic suitability	<b>EN 600068-2-78</b>
Airgap creepage	<b>EN 60947-1</b>
Ambient temperature	<b>-10 - 55 °C</b>
Storage temperature	<b>-40 - 85 °C</b>
Protection type	
Mounting (e.g. cabinet)	<b>IP54</b>
Housing	<b>IP40</b>
Terminals	<b>IP20</b>
Mechanical data	
Housing material	
Housing	<b>PPO UL 94 V0</b>
Front	<b>ABS UL 94 V0</b>
Max. cross section of external conductors with screw terminals	
1 core flexible	<b>0.20 - 4.00 mm<sup>2</sup></b>
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	<b>0.20 - 2.50 mm<sup>2</sup></b>
without crimp connectors or with TWIN crimp connectors	<b>0.20 - 2.50 mm<sup>2</sup></b>
Torque setting with screw terminals	<b>0.60 Nm</b>
Dimensions (H x W x D)	
with screw terminals	<b>87 mm x 90 mm x 121 mm</b>
Weight	<b>550 g</b> Order no.: 774749 <b>730 g</b> Order no.: 774740, 774741, 774745, 774746

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

Max. continuous current		
Number of contacts	$I_{max}$ (A) at $U_B$ DC	$I_{max}$ (A) at $U_B$ AC
1	<b>8.00 A</b> Order no.: 774749	<b>8.00 A</b> Order no.: 774740, 774741, 774745, 774746

## Up to Category 4, EN 954-1 PNOZ X10.1

### Max. continuous current

2	<b>8.00 A</b> Order no.: 774749	<b>7.00 A</b> Order no.: 774740, 774741, 774745, 774746
3	<b>7.00 A</b> Order no.: 774749	<b>5.60 A</b> Order no.: 774740, 774741, 774745, 774746
4	<b>6.10 A</b> Order no.: 774749	<b>4.90 A</b> Order no.: 774740, 774741, 774745, 774746
5	<b>5.40 A</b> Order no.: 774749	<b>4.40 A</b> Order no.: 774740, 774741, 774745, 774746
6	<b>5.00 A</b> Order no.: 774749	<b>4.00 A</b> Order no.: 774740, 774741, 774745, 774746

### Order reference

Type	Features	Terminals	Order no.
PNOZ X10.1	24 VAC	Screw terminals	774 740
PNOZ X10.1	42 VAC	Screw terminals	774 741
PNOZ X10.1	110 - 120 VAC	Screw terminals	774 745
PNOZ X10.1	230 - 240 VAC	Screw terminals	774 746
PNOZ X10.1	24 VDC	Screw terminals	774 749