

Up to Category 2, EN 954-1 PNOZ X1P



Safety relay for monitoring E-STOP pushbuttons.

Unit features




- ▶ Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), 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)

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.

Approvals

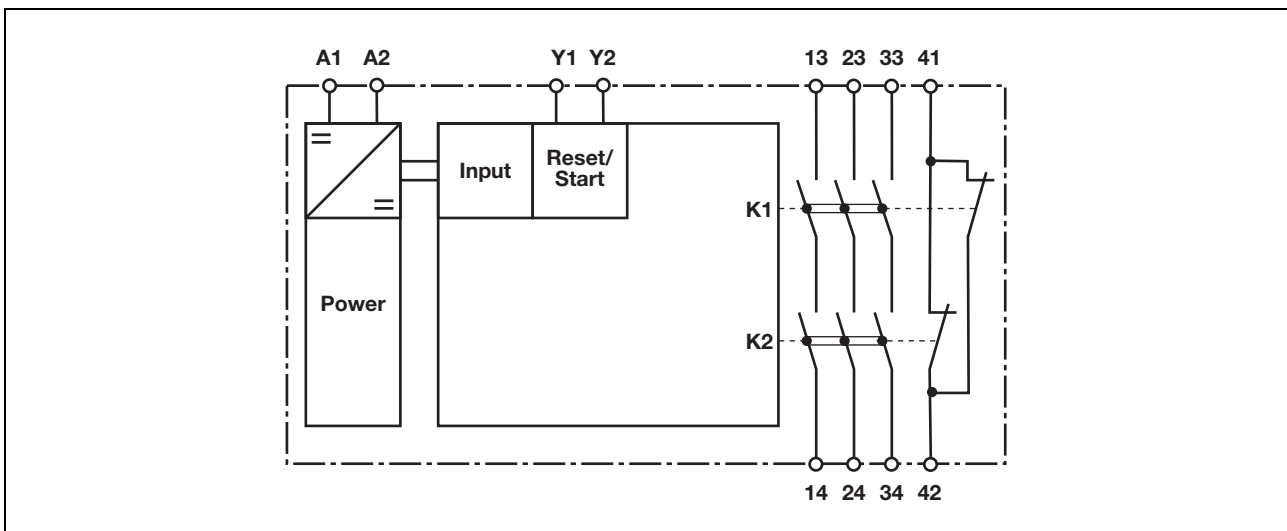
	PNOZ X1P
	◆
	◆
	◆

Unit description

The safety relay is not suitable for non-contact barriers because

- ▶ a dynamic start is not possible
- 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

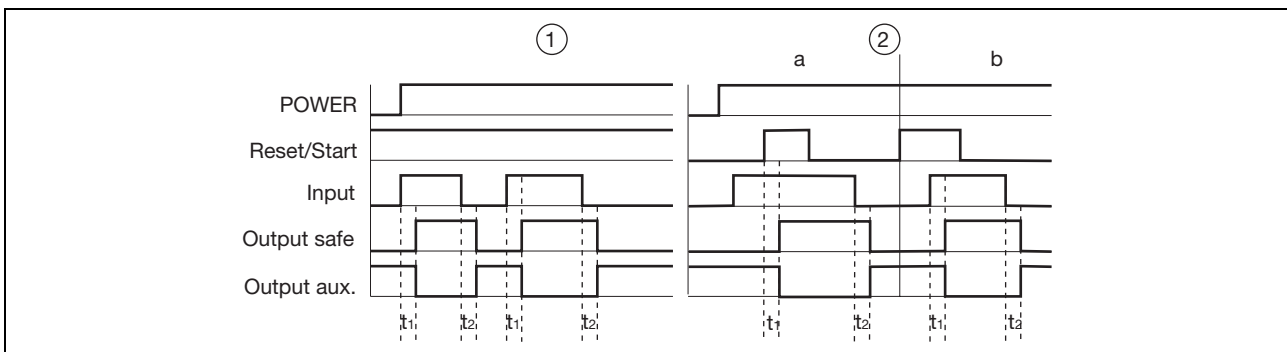


Up to Category 2, EN 954-1 PNOZ X1P

Function description

- ▶ Single-channel operation: no redundancy in the input circuit, earth faults in the reset 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, 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
- ▶ t₁: Switch-on delay
- ▶ t₂: 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, output 41-42 is an auxiliary contact (e.g. for display).
- ▶ 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:

$$I_{max} = \frac{R_{I_{max}}}{R_l / km}$$

$R_{I_{max}}$ = max. overall cable resistance (see technical details)


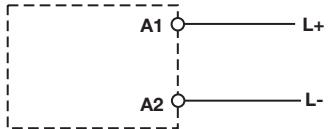
R_l / km = cable resistance/km

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

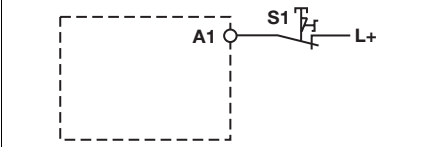
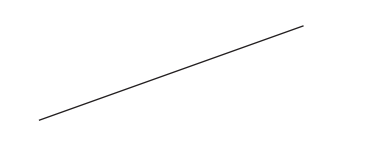
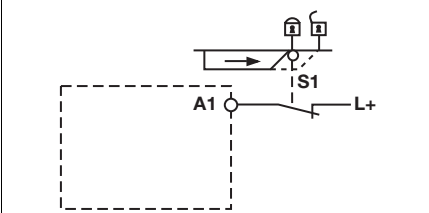
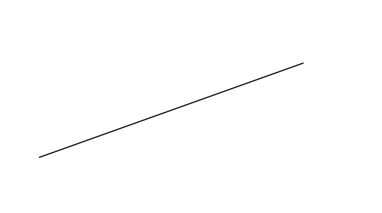
Up to Category 2, EN 954-1 PNOZ X1P

Preparing for operation

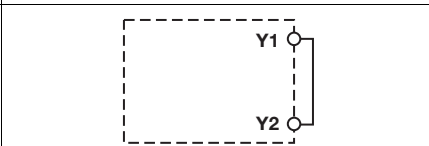
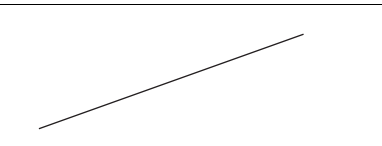
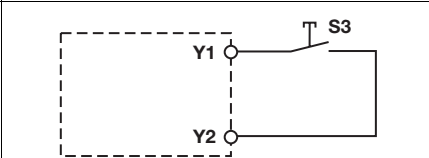
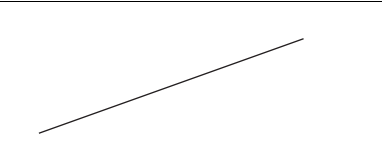
► Supply voltage

Supply voltage	AC	DC
		

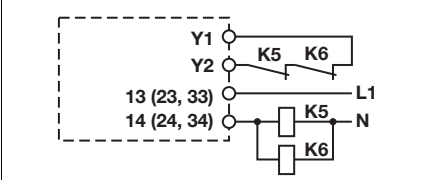
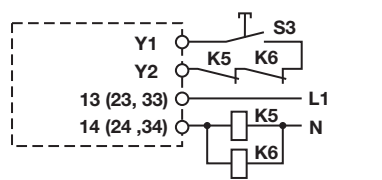
► Input circuit

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

► Feedback loop

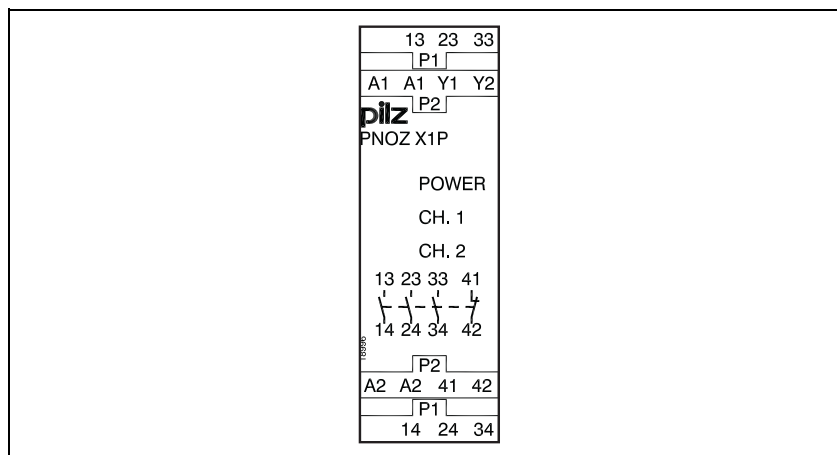
Feedback loop	Automatic reset	Manual reset
Contacts from external contactors		

Up to Category 2, EN 954-1 PNOZ X1P

▶ Key

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

Terminal configuration

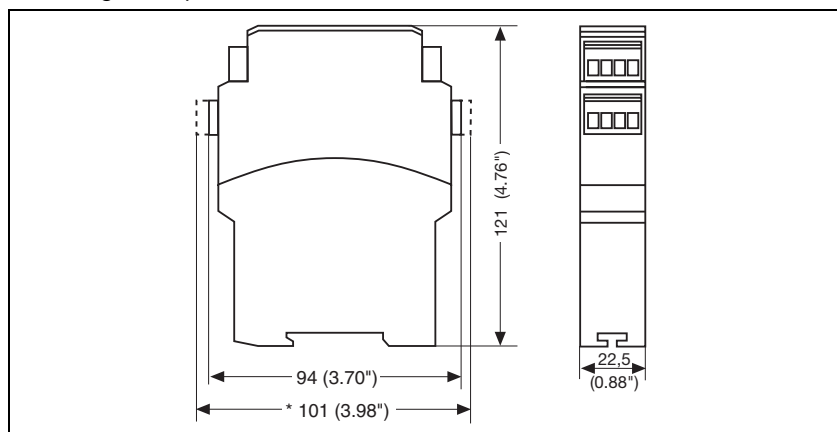


Installation

- ▶ 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

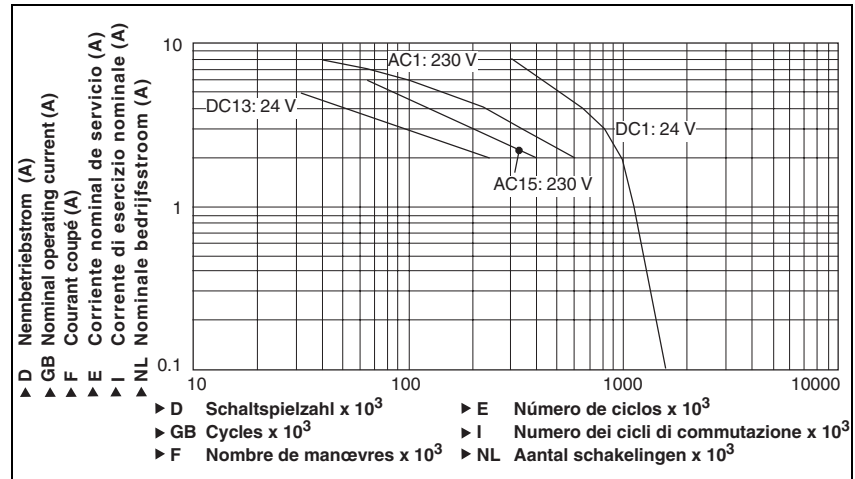


Up to Category 2, EN 954-1 PNOZ X1P

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 at U_B DC	1.5 W
Residual ripple DC	160 %
Voltage and current at Input circuit: 24 VDC Reset circuit: 24 VDC Feedback loop: 24 VDC	45 mA 45 mA 45 mA
Output contacts in accordance with EN 954-1, Category 2	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	I_{min} : 0.01 A , I_{max} : 6.0 A P_{max} : 1500 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 6.0 A P_{max} : 150 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} : 4.0 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	6 A 4 A 4 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits Single-channel at U_B DC	30 Ohm
Times	
Switch-on delay with automatic reset typ. with automatic reset max. with manual reset typ. with manual reset max.	60 ms 120 ms 50 ms 120 ms
Delay-on de-energisation with E-STOP typ. with E-STOP max. with power failure typ. with power failure max.	55 ms 90 ms 55 ms 90 ms

Up to Category 2, EN 954-1 PNOZ X1P

Times	
Recovery time at max. switching frequency 1/s after E-STOP	150 ms
after power failure	150 ms
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	0.25 – 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 – 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 – 1.50 mm ²
Torque setting with screw terminals	0.50 Nm
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	205 g

The standards current on **05/03** apply.

Max. continuous current	
Number of contacts	I_{max} (A) at U_B DC
1	6.00 A
2	6.00
3	4.50

Order reference			
Type	Features	Terminals	Order no.
PNOZ X1P C	24 VDC	Cage clamp terminals	787 100
PNOZ X1P	24 VDC	Screw terminals	777 100