

Up to Category 4, EN 954-1 PNOZ X11P



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

Approvals

	PNOZ X11P
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Unit features

- ▶ Positive-guided relay outputs:
 - 7 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- ▶ 2 semiconductor outputs
- ▶ Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- ▶ LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
 - Input circuits
- ▶ Semiconductor outputs signal:
 - Switch status channel 1/2
 - Supply voltage is present
- ▶ Plug-in connection terminals (either cage clamp terminal or screw terminal)
- ▶ See order reference for unit types

- ▶ E-STOP pushbuttons
- ▶ Safety gates

Safety features

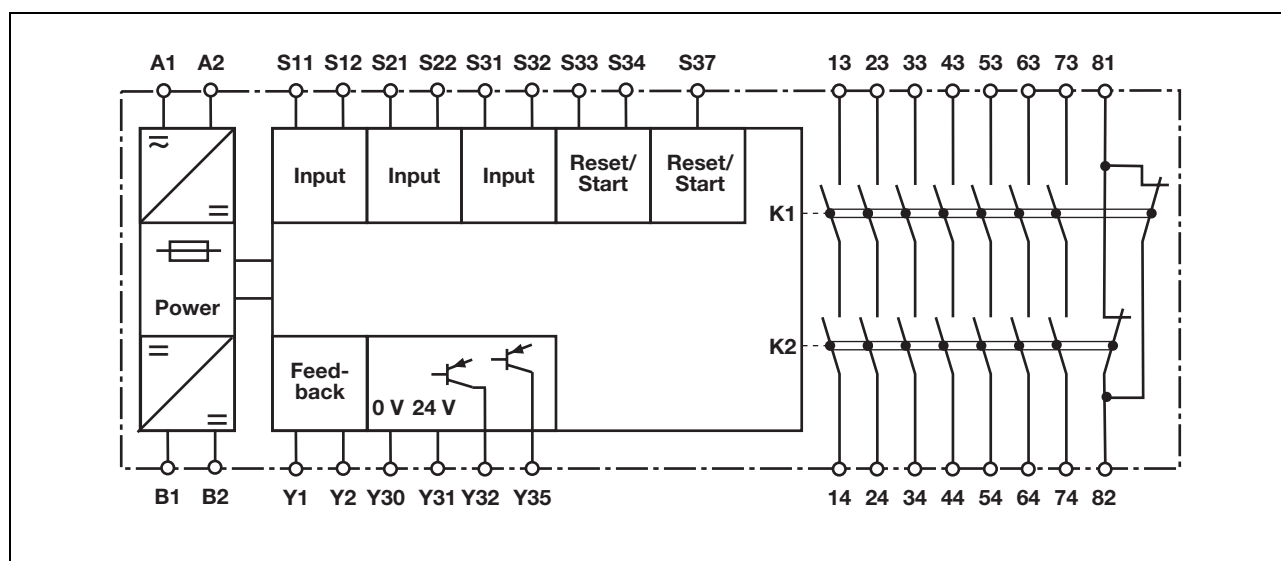
The relay conforms to the following safety criteria:

- ▶ 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 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

Block diagram

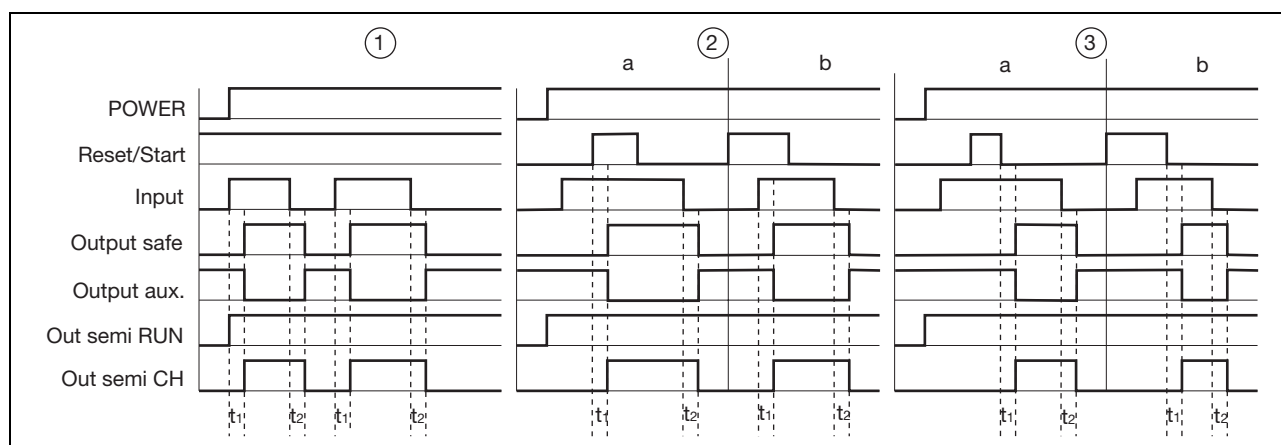


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Function description

- ▶ Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- ▶ Dual-channel operation 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-S34, S37
- ▶ Input: Input circuits S11-S12, S21-S22, S31-S32
- ▶ Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74
- ▶ Output aux: Auxiliary contacts 81-82
- ▶ Out semi RUN: Semiconductor output supply voltage Y35
- ▶ Out semi CH: Semiconductor output switch status Y32
- ▶ 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, 73-74 are safety contacts, output 81-82 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 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		
Manual reset		
Monitored reset		

Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

Semiconductor output

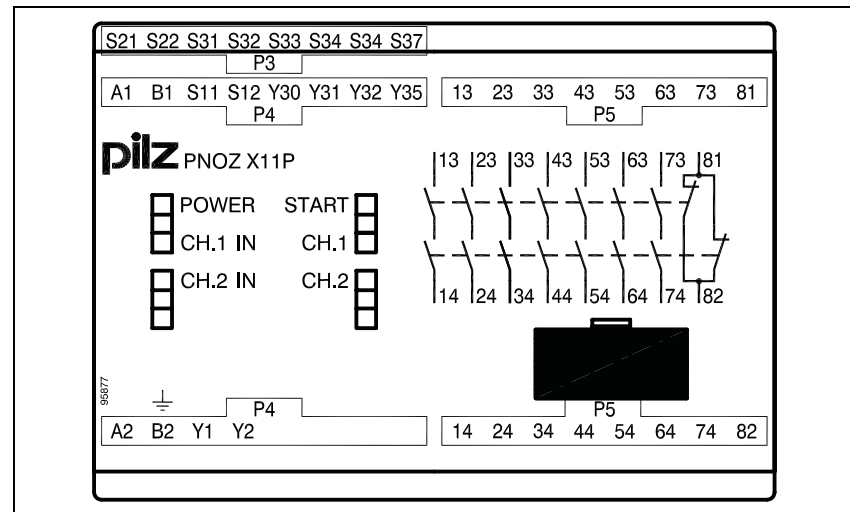
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Key

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

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Terminal configuration

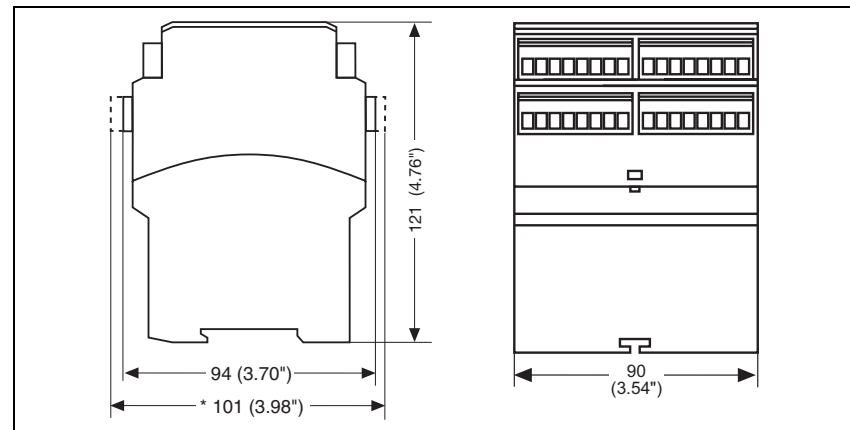


Installation

- ▶ 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

* with cage clamp terminals

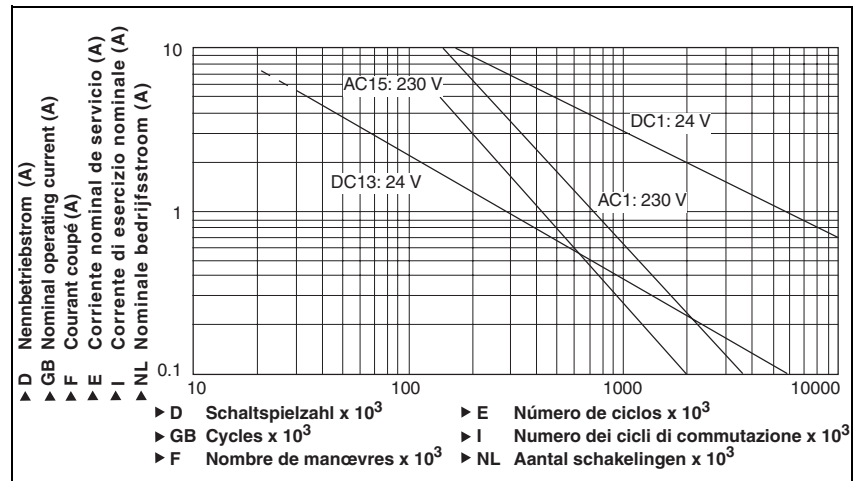


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Notice

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, 110 - 120 V, 230 - 240 V
Supply voltage U _B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U _B AC	9.0 VA
Power consumption at U _B DC	3.5 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at	
Input circuit DC: 24.0 V	50.0 mA
Reset circuit DC: 24.0 V	70.0 mA
Feedback loop DC: 24.0 V	70.0 mA
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 7 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: 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
Contact material	AgSnO2 + 0.2 µm Au

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Electrical data	
External contact fuse protection 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
Semiconductor outputs (short circuit proof)	24.0 V DC, 20 mA
External supply voltage	24.0 V DC
Voltage tolerance	-20 %/+20 %
Max. overall cable resistance R_{lmax}	
input circuits, reset circuits	
single-channel at U_B DC	50 Ohm
single-channel at U_B AC	100 Ohm
dual-channel with detect. of shorts across contacts at U_B DC	15 Ohm
dual-channel with detect. of shorts across contacts at U_B AC	20 Ohm
Times	
Switch-on delay	
with automatic reset typ.	450 ms
with automatic reset max.	680 ms
with automatic reset after power on typ.	450 ms
with automatic reset after power on max.	630 ms
with manual reset typ.	450 ms
with manual reset max.	680 ms
with monitored reset typ.	390 ms
with monitored reset max.	550 ms
Delay-on de-energisation	
with E-STOP typ.	17 ms
with E-STOP max.	30 ms
with power failure typ.	40 ms
with power failure max.	60 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	100 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 to 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

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Mechanical data

Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm² , 24 - 12 AWG Order no.: 777080, 777083, 777086
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm² , 24 - 16 AWG Order no.: 777080, 777083, 777086
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm² , 24 - 16 AWG Order no.: 777080, 777083, 777086
Torque setting with screw terminals	0.50 Nm Order no.: 777080, 777083, 777086
Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	0.20 - 1.50 mm² , 24 - 16 AWG Order no.: 787080, 787083, 787086
Cage clamp terminals: Terminal points per connection	2 Order no.: 787080, 787083, 787086
Stripping length	8 mm Order no.: 787080, 787083, 787086
Dimensions	
Height	101.0 mm Order no.: 787080, 787083, 787086 94.0 mm Order no.: 777080, 777083, 777086
Width	90.0 mm
Depth	121.0 mm
Weight	630 g Order no.: 787080, 787083, 787086 640 g Order no.: 777080, 777083, 777086

The standards current on **03/04** apply.

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC	$I_{\max}$ (A) at U_B AC
1	8.00 A	8.00 A
2	8.00 A	8.00 A
3	8.00 A	6.80 A
4	7.20 A	5.90 A
5	6.50 A	5.30 A
6	5.90 A	4.80 A
7	5.50 A	4.50 A

Order reference

Type	Features	Terminals	Order no.
PNOZ X11P C	24 VAC/DC	Cage clamp terminals	787 080
PNOZ X11P	24 VAC/DC	Screw terminals	777 080
PNOZ X11P C	110 - 120 VAC 24 VDC	Cage clamp terminals	787 083
PNOZ X11P	110 - 120 VAC 24 VDC	Screw terminals	777 083
PNOZ X11P C	230 - 240 VAC 24 VDC	Cage clamp terminals	787 086
PNOZ X11P	230 - 240 VAC 24 VDC	Screw terminals	777 086