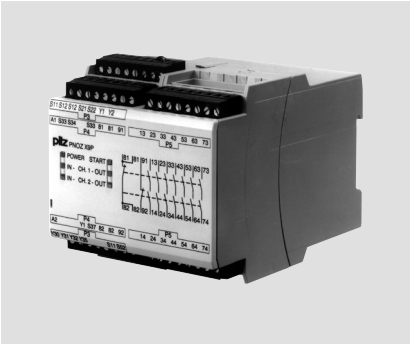
Up to Category 4, EN 954-1
PNOZ X9P



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

Approvals

	PNOZ X9P
BG-PRÜFZERT	◆
c UL us LISTED	◆
CCC	◆

Unit features

- Positive-guided relay outputs:
  - 7 safety contacts (N/O), instantaneous
  - 2 auxiliary contacts (N/C), instantaneous
- 2 semiconductor outputs
- Connection options for:
  - E-STOP pushbutton
  - Safety gate limit switch
  - Light barriers
  - Reset button
- LED indicator for:
  - Switch status channel 1/2
  - Input circuits
  - Supply voltage
  - Reset circuit
- 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

Unit description

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

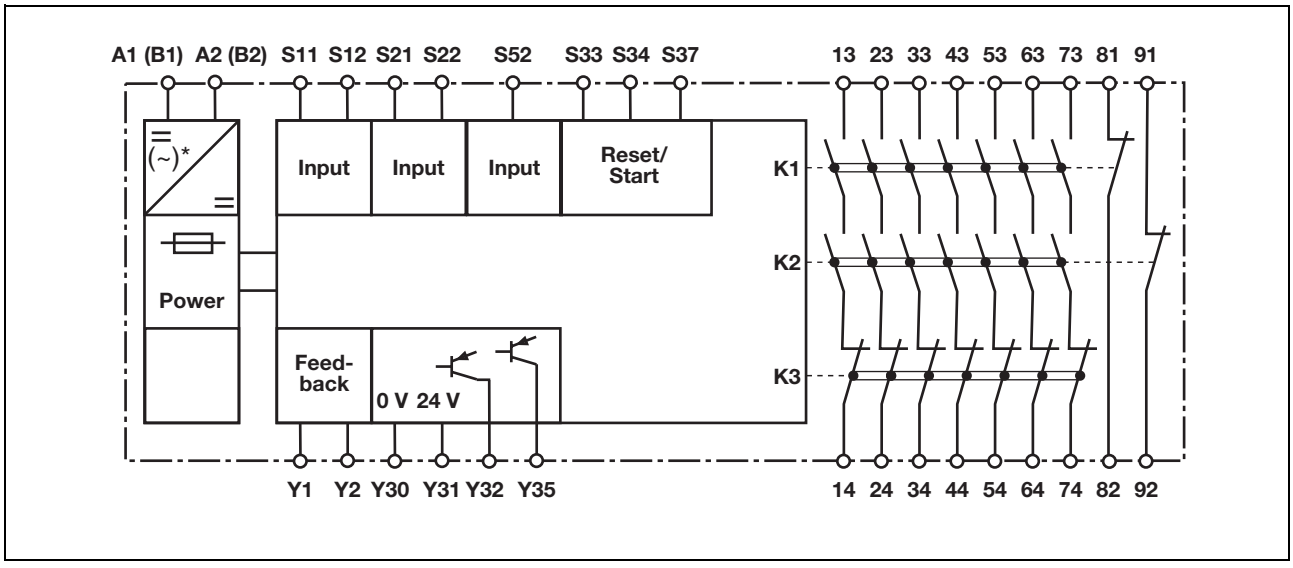
- E-STOP pushbuttons
- Safety gates
- Light barriers

Safety features

The relay conforms to the following safety criteria:

- 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.

Block diagram



*Only applies when U_B = 100 - 240 VAC

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Up to Category 4, EN 954-1
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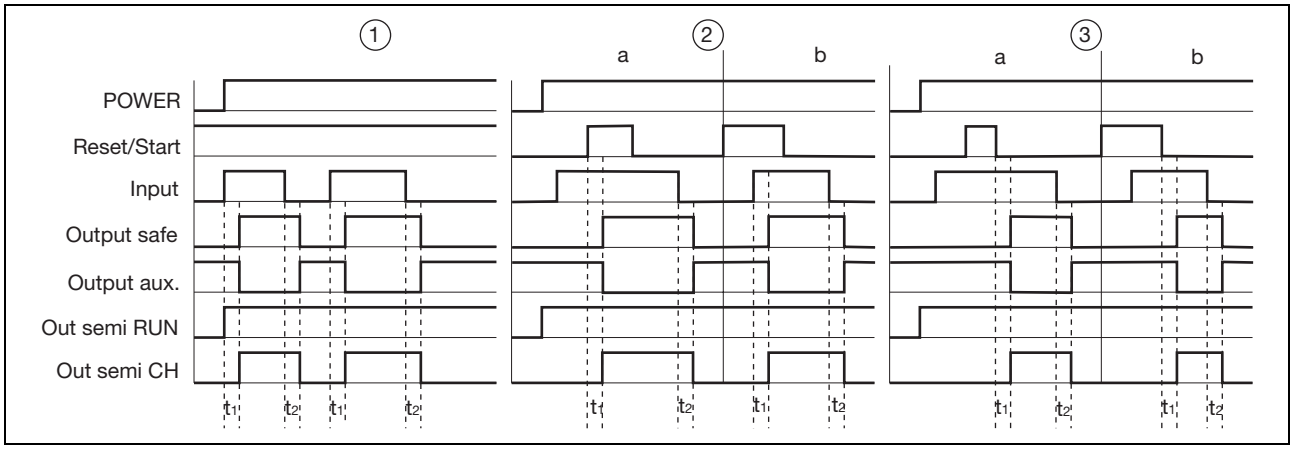
Function description

- 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.
- 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
- Input: Input circuits S11-S12, S21-S22, S52
- Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74
- Output aux: Auxiliary contacts 81-82, 91-92
- 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, outputs 81-82, 91-92 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 I_{max} in the input circuit:

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

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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Up to Category 4, EN 954-1
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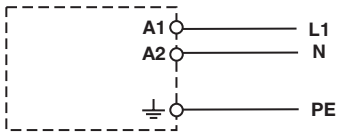
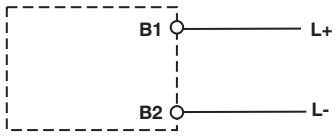
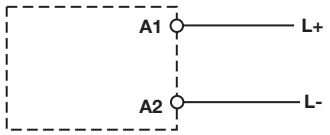
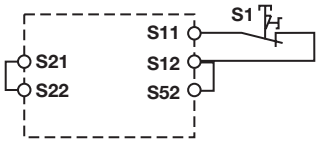
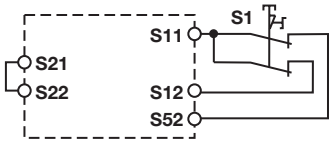
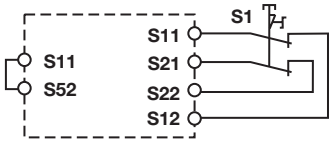
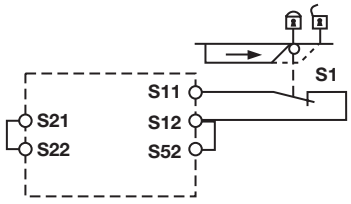
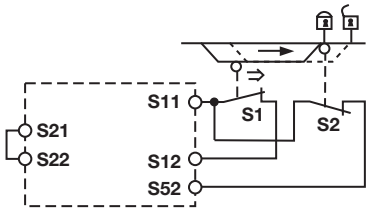
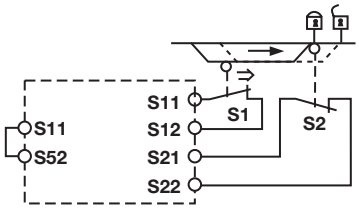
Preparing for operation

- Supply voltage

Supply voltage	AC	DC
U_B = 24 VDC/100 – 240 VAC		
U_B = 24 VDC		

- 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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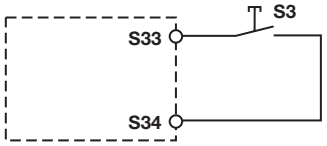
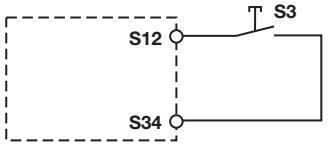
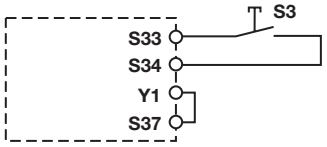
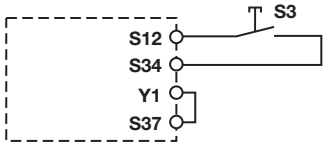
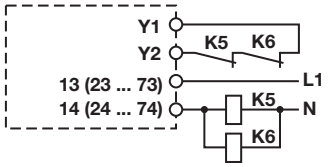
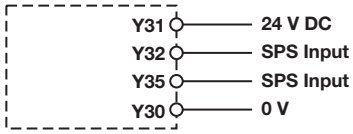
▸ Reset circuit

Reset circuit	E-STOP/safety gate wiring (single and dual-channel, without shorts across contacts)	E-STOP/safety gate wiring (dual-channel with shorts across contacts)
Automatic reset		
Manual reset		
Monitored reset		

▸ Feedback loop

Feedback loop	
Contacts from external contactors	

▸ Semiconductor output



▸ Key

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

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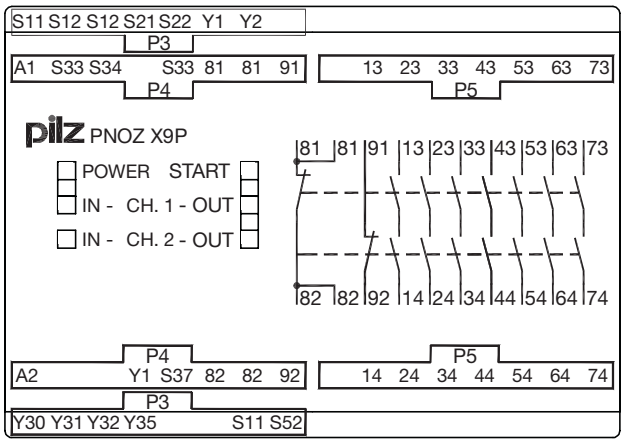
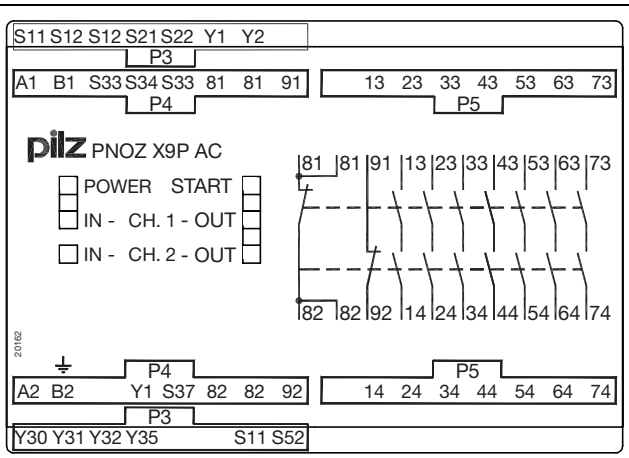
Up to Category 4, EN 954-1
PNOZ X9P

Terminal configuration

U_B = 24 VDC



U_B = 24 VDC/100 -240 VAC

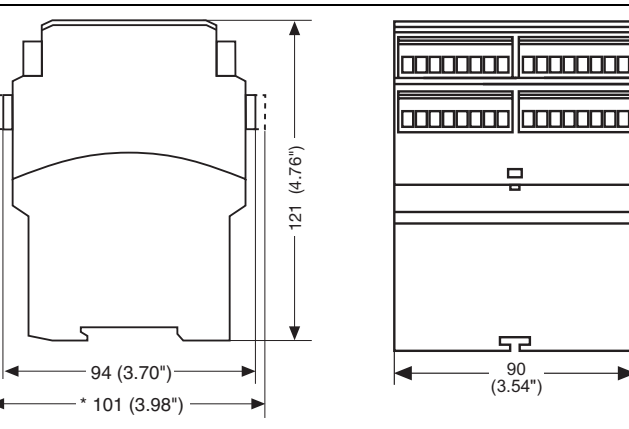


Installation

- 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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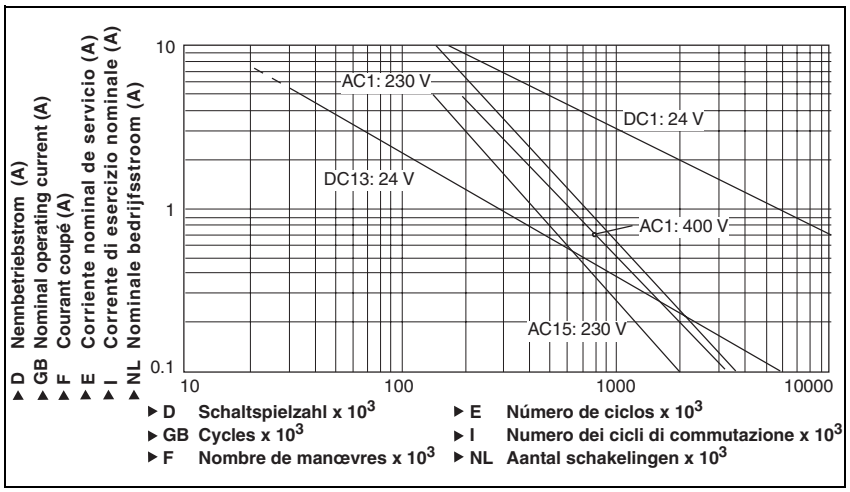
Up to Category 4, EN 954-1
PNOZ X9P

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	**100 - 240 V**
Supply voltage U_B DC	**24 V**
Voltage tolerance	**-15 %/+10 %**
Power consumption at U_B AC	**8.5 VA** Order no.: 777606, 787606
Power consumption at U_B DC	**5.5 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**	**100.0 mA**
feedback loop DC: **24.0 V**	**100.0 mA**
Output contacts in accordance with **EN 954-1** Category **4**	Safety contacts (N/O): **7** Auxiliary contacts (N/C): **2**
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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PNOZ X9P

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	**45 Ohm**
single-channel at U_B AC	**45 Ohm** Order no.: 777606, 787606
dual-channel without detect. of shorts across contacts at U_B DC	**90 Ohm**
dual-channel without detect. of shorts across contacts at U_B AC	**90 Ohm** Order no.: 777606, 787606
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	**15 Ohm** Order no.: 777606, 787606
Times	
Switch-on delay	
with automatic reset typ.	**200 ms**
with automatic reset max.	**250 ms**
with automatic reset after power on typ.	**220 ms**
with automatic reset after power on max.	**300 ms**
with manual reset typ.	**200 ms**
with manual reset max.	**250 ms**
with monitored reset typ.	**150 ms**
with monitored reset max.	**220 ms**
Delay-on de-energisation	
with E-STOP typ.	**20 ms**
with E-STOP max.	**30 ms**
with power failure typ.	**170 ms**
with power failure max.	**250 ms**
with power failure typ. U_B = **100 V AC** Order no.: 777606, 787606	**165 ms** Order no.: 777606, 787606
with power failure max. U_B = **100 V AC** Order no.: 777606, 787606	**200 ms** Order no.: 777606, 787606
with power failure typ. U_B = **240 V AC**	**320 ms** Order no.: 777606, 787606
with power failure max. U_B = **240 V AC**	**450 ms** Order no.: 777606, 787606
Recovery time at max. switching frequency 1/s	
after E-STOP	**50 ms**
after power failure	**300 ms**
after power failure on universal power supply	**500 ms** Order no.: 777606, 787606
Min. start pulse duration with a monitored reset	**50 ms**
Simultaneity, channel 1 and 2	**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**

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Environmental data	
Protection type	
Mounting (e.g. control 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 mm² , 24 - 12 AWG** Order no.: 777606, 777609
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	**0.25 - 1.00 mm² , 24 - 16 AWG** Order no.: 777606, 777609
without crimp connectors or with TWIN crimp connectors	**0.20 - 1.50 mm² , 24 - 16 AWG** Order no.: 777606, 777609
Torque setting with screw terminals	**0.50 Nm** Order no.: 777606, 777609
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	**0.20 - 1.50 mm² , 24 - 16 AWG** Order no.: 787606, 787609
Cage clamp terminals: terminal points per connection	**2** Order no.: 787606, 787609
Stripping length	**8 mm** Order no.: 787606, 787609
Dimensions	
Height	**101.0 mm** Order no.: 787606, 787609 **94.0 mm** Order no.: 777606, 777609
Width	**90.0 mm**
Depth	**121.0 mm**
Weight	**550 g** Order no.: 787609 **560 g** Order no.: 777609 **575 g** Order no.: 787606 **585 g** Order no.: 777606

The standards current on **02/01** 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** Order no.: 777609, 787609	**8.00 A** Order no.: 777606, 787606
2	**8.00 A** Order no.: 777609, 787609	**8.00 A** Order no.: 777606, 787606
3	**8.00 A** Order no.: 777609, 787609	**8.00 A** Order no.: 777606, 787606
4	**7.00 A** Order no.: 777609, 787609	**7.00 A** Order no.: 777606, 787606
5	**6.00 A** Order no.: 777609, 787609	**6.00 A** Order no.: 777606, 787606
6	**5.50 A** Order no.: 777609, 787609	**5.50 A** Order no.: 777606, 787606
7	**5.00 A** Order no.: 777609, 787609	**5.00 A** Order no.: 777606, 787606

Order reference

Type	Features		Terminals	Order no.
PNOZ X9P C	110 - 240 VAC	24 VDC	Cage clamp terminals	787 606
PNOZ X9P	110 - 240 VAC	24 VDC	Screw terminals	777 606
PNOZ X9P C		24 VDC	Cage clamp terminals	787 609
PNOZ X9P		24 VDC	Screw terminals	777 609

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