Up to Category 4, EN 954-1
PNOZ XV3.3P

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

Approvals

	PNOZ XV3.3P
c UL us LISTED	◆
CCC	◆

Unit features

- Positive-guided relay outputs:
  - 3 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
- Delay-on de-energisation, fixed or selectable
- Delay time can be cancelled via reset button
- LED indicator for:
  - Switch status channel 1/2
  - Supply voltage
  - Reset circuit
- Plug-in connection terminals (either cage clamp terminal or screw terminal)
- See order reference for unit types

Unit description

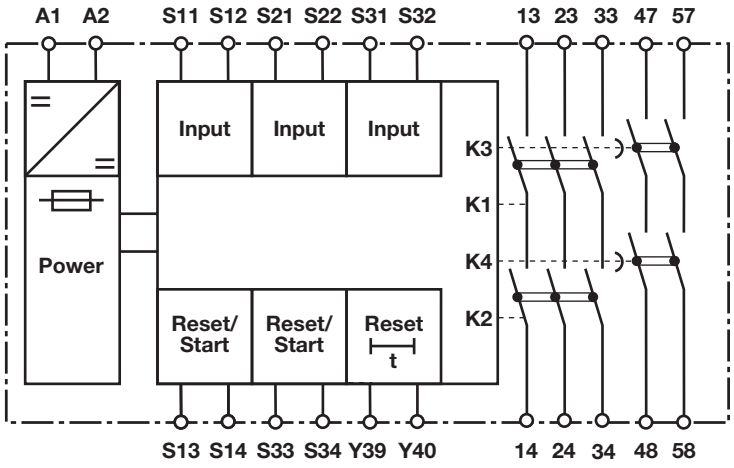
The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with
- E-STOP pushbuttons
- Safety gates

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.

Block diagram



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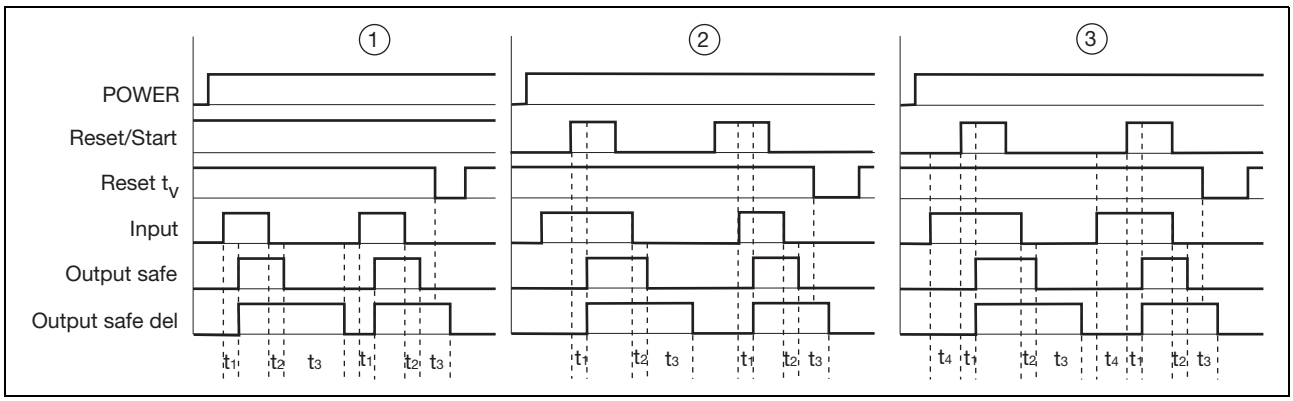
Function description

- 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 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
- Input: Input circuits S11-S12, S21-S22, S31-S32
- Output safe: Safety contacts, instantaneous 13-14, 23-24, 33-34
- Output safe del: Safety contacts, delayed 47-48, 57-58
- 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
- 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, 33-34 are instantaneous safety contacts, outputs 47-48, 57-58 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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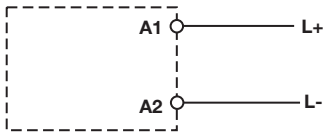
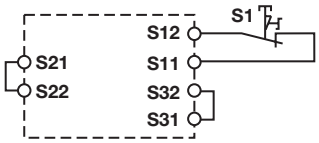
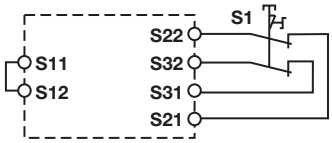
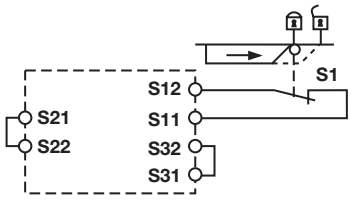
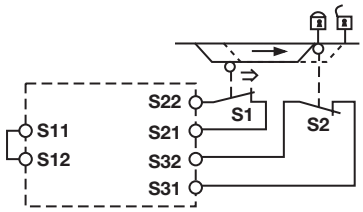
Preparing for operation

- 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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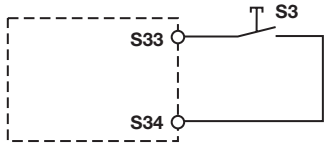
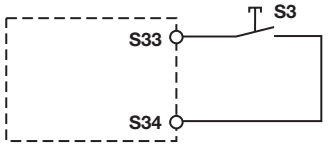
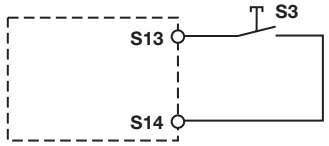
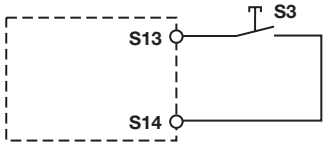
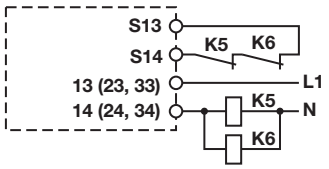
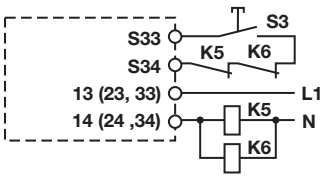
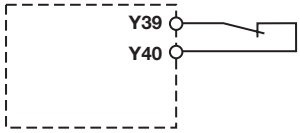
▸ Reset circuit

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

▸ Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

▸ Reset

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

▸ Key

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

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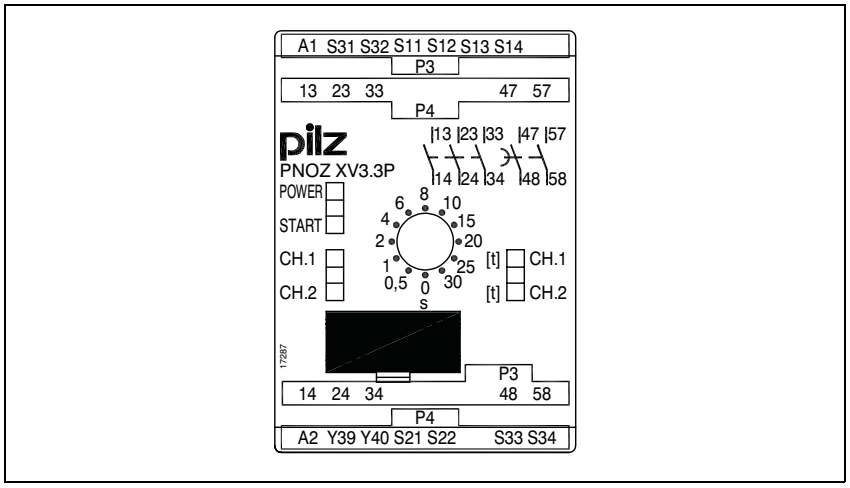
Klemmenbelegung

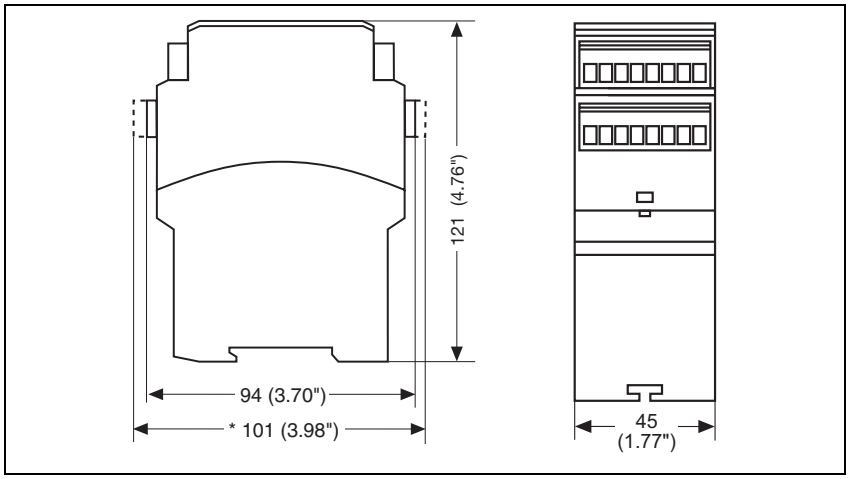


Installation

- 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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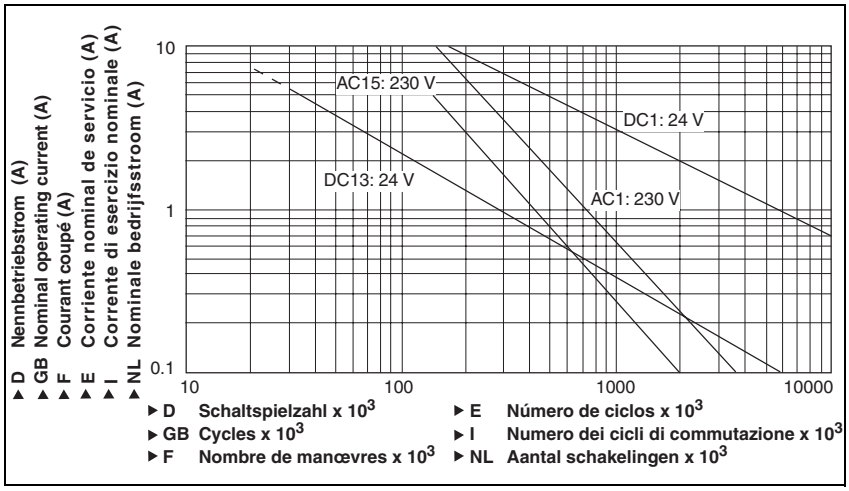
Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Breaking capacity of the safety contacts



Technical details

Electrical data	
Supply voltage U_B DC	**24 V**
Voltage tolerance	**-15 % / +10 %**
Power consumption at U_B DC	**4.5 W**
Residual ripple DC	**160 %**
Voltage and current at	
input circuit: **24 V**DC	**45 mA**
reset circuit: **24 V**DC	**50 mA**
feedback loop: **24 V**DC	**1 mA**
Output contacts in accordance with **EN 954-1**, Category **4**	Safety contacts (N/O): **3 ST**
Output contacts in accordance with **EN 954-1**	Safety contacts (N/O), delayed: **2 ST**
Category **1**	If delay time >30 s
Category **3**	If delay time <30 s
Utilisation category in accordance with **EN 60947-4-1**	
AC1: **240 V**	I_{min}: **0.01 A**, I_{max}: **8.00 A** P_{max}: **2000 VA**
DC1: **24 V**	I_{min}: **0.01 A**, I_{max}: **8.00 A** P_{max}: **200 W**
Utilisation category in accordance with **EN 60947-5-1**	
AC15: **230 V**	I_{max}: **5.00 A**
DC13 (6 cycles/min): **24 V**	I_{max}: **7.00 A**
Contact material	**$AgSnO_2$ + 0.2 µm Au**
External contact fuse protection (**EN 60947-5-1**)	
Blow-out fuse, quick	**10 A**
Blow-out fuse, slow	**6 A**
Circuit breaker	**6 A**, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel at U_B DC	**100 Ohm**
Dual-channel with detect. of shorts across contacts at U_B DC	**10 Ohm**

more than automation
safe automation

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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.	**35 ms**
with monitored reset max.	**70 ms**
with manual reset typ.	**220 ms**
with manual reset max.	**650 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	**50 ms + t_v**
after power failure	**250 ms**
Delay time t_v	
selectable	**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**
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	**0.25 - 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	**0.2 - 1.5 mm^2**
Cage clamp terminals	
Terminal points per connection	**2**
Stripping length	**8 mm**
Dimensions (H x W x D)	
with screw terminals	**94 mm** x **45 mm** x **121 mm**
with cage clamp terminals	**101 mm** x **45 mm** x **121 mm**
Weight	**365 Grams** Order No. 777511 **360 Grams** Order No. 787511

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The standards current on **07/02** apply.

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**
5	**4.30 A**

Order reference

Type	Features			Terminals	Order no.
PNOZ XV3.3P C		24 VDC	30 s selectable	Cage clamp terminals	787 511
PNOZ XV3.3P		24 VDC	30 s selectable	Screw terminals	777 511

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