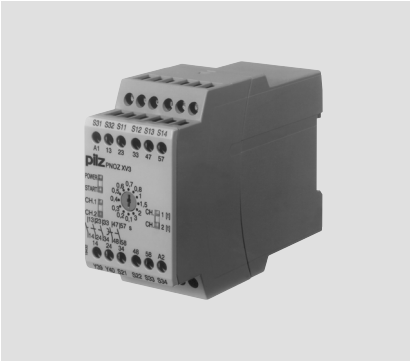
Up to Category 4, EN 954-1
PNOZ XV3



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

Approvals

	PNOZ XV3
BG-PRÜFZERT	◆
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
- See order reference for unit types

Unit description

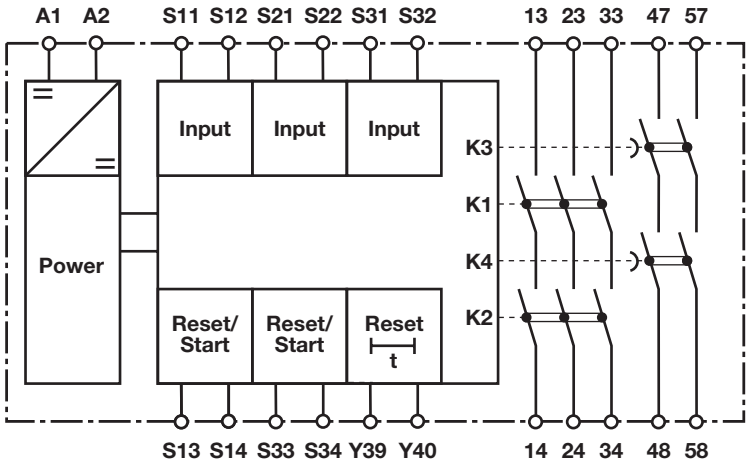
The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with
- E-STOP pushbuttons
- Safety gates

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 tranformer is short circuit-proof. An electronic fuse is used on a DC supply.

Block diagram



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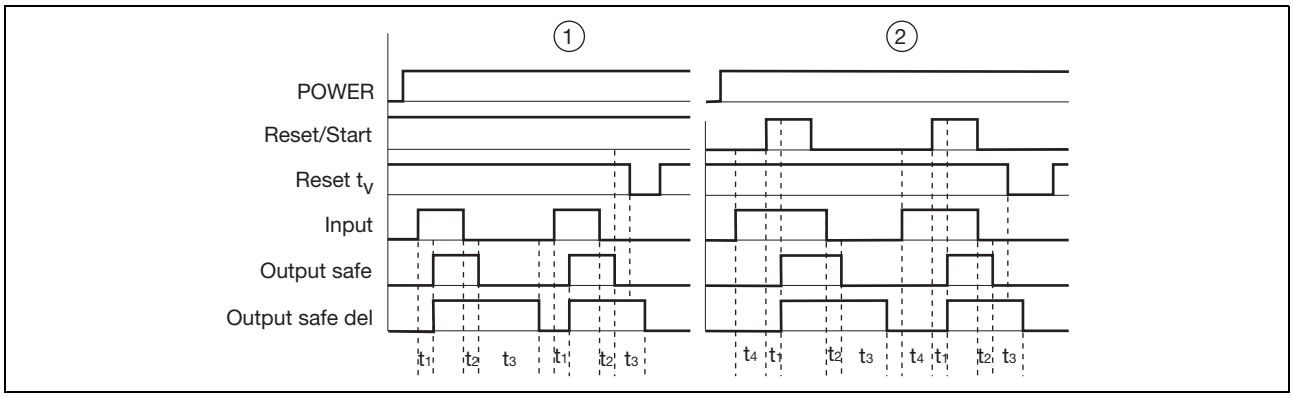
Function description

- 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.
- 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
- Reset t_v: Y39-Y40
- 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: Monitored reset
- 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 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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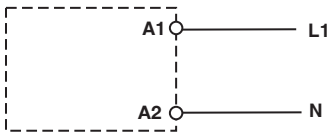
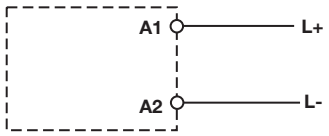
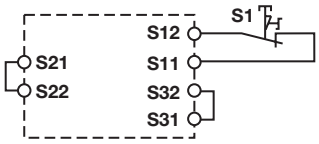
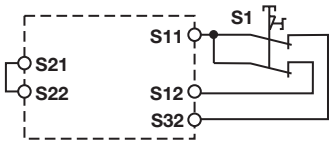
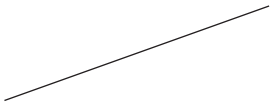
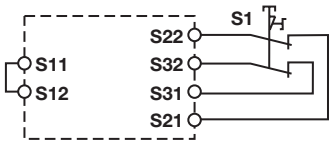
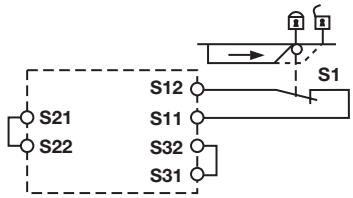
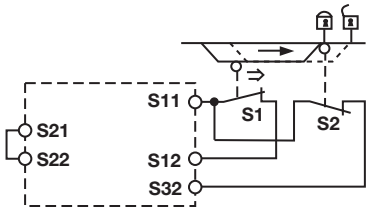
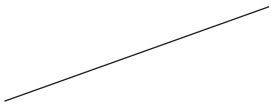
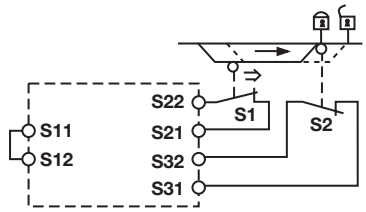
Preparing for operation

- 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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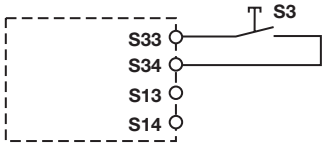
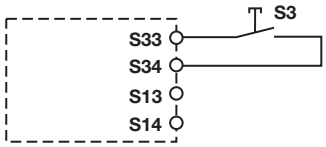
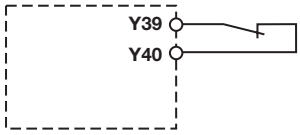
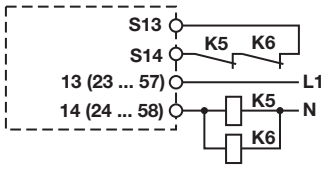
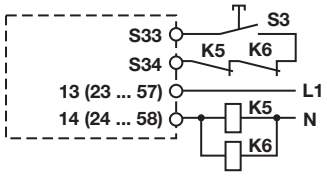
▸ Reset circuit

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

▸ Reset

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

▸ Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

▸ Key

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

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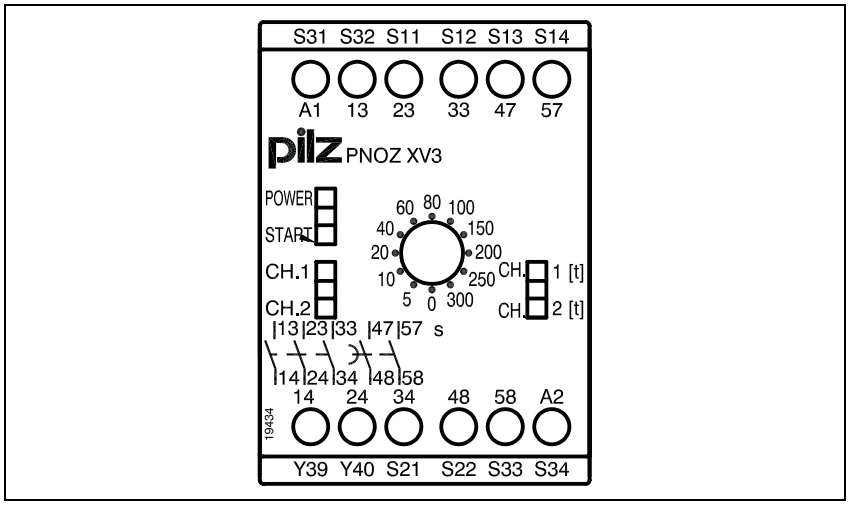
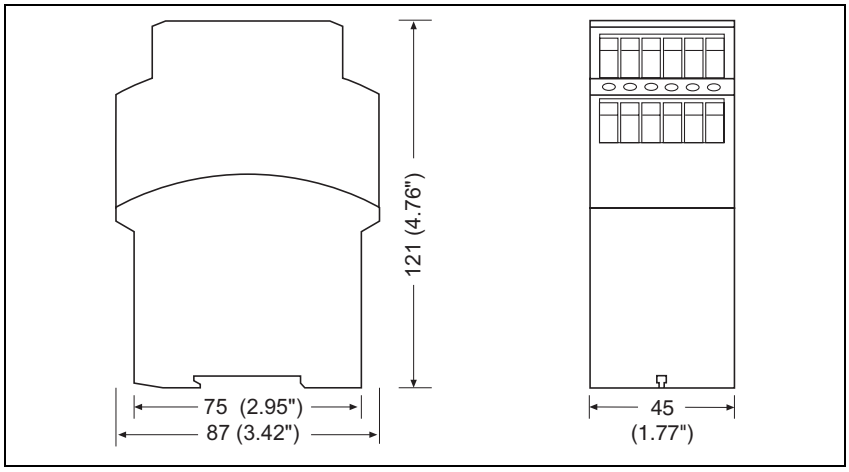
Terminal configuration



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



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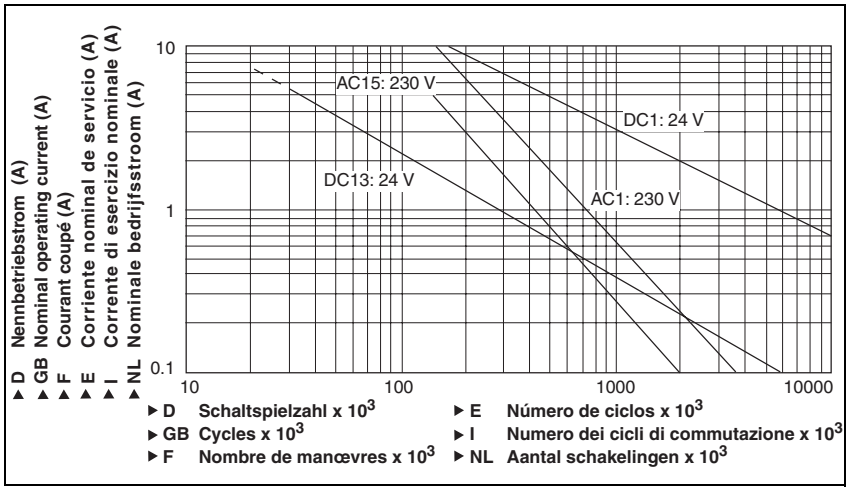
Notice

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 AC	**24 V**
Supply voltage U_B DC	**24 V**
Voltage tolerance	**-15 % / 10 %**
Power consumption at U_B AC	**7.0 VA** Order no.: 774541
Power consumption at U_B DC	**4.5 W** Order no.: 774540, 774542, 774544, 774545, 774547, 774548
Frequency range AC	**50 – 60 Hz** Order no.: 774541
Residual ripple DC	**160 %** Order no.: 774540, 774542, 774544, 774545, 774547, 774548
Voltage and current at	
input circuit: **24 V**DC	**35 mA**
reset circuit: **24 V**DC	**50.0 mA**
feedback loop: **24 V**DC	**5.0 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** Order no. 774540, 774541, 774548	When delay time >30 s
Category **3**	When delay time <30 s
Utilisation category in accordance with **EN 60947-4-1**	
AC1: **240 V**	I_{min}: **0.01 A**, I_{max}: **8 A** P_{max}: **2,000 VA**
DC1: **24 V**	I_{min}: **0.01 A**, I_{max}: **8 A** P_{max}: **200 W**
Utilisation category in accordance with **EN 60947-5-1**	
AC15: **230 V**	I_{max}: **5 A**
DC13 (6 cycles/min): **24 V**	I_{max}: **7 A**
Contact material	**$AgSnO_2$ + 0.2 µm Au**

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Electrical data	
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** Order no.: 774540, 774542, 774544, 774545, 774547, 774548
Single-channel at U_B AC	**100 Ohm** Order no.: 774541
Dual-channel with detect. of shorts across contacts at U_B DC	**10 Ohm** Order no.: 774540, 774542, 774544, 774545, 774547, 774548
Dual-channel with detect. of shorts across contacts at U_B AC	**10 Ohm** Order no.: 774541
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.	**60 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	**0.10 s, 0.20 s, 0.30 s, 0.40 s, 0.50 s, 0.60 s, 0.70 s, 0.80 s, 1.00 s, 1.50 s, 2.00 s, 3.00 s** Order no.: 774542 **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** Order no.: 774540 **0.00 s, 5.00 s, 10.00 s, 20.00 s, 40.00 s, 60.00 s, 80.00 s, 100.00 s, 150.00 s, 200.00 s, 250.00 s, 300.00 s** Order no.: 774541, 774548
Fixed	**0.5 s** Order no.: 774544, **3.0 s** Order no.: 77454, **10.0 s** Order no.: 774547
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**

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Mechanical data	
Housing material	
Housing	**PPO UL94 VO**
Front	**ABS UL94 VO**
Max. cross section of external conductors with screw terminals	
1 core flexible	**0.20 - 4.00 mm**^{2}
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	**0.20 - 2.50 mm**^{2}
without crimp connectors or with TWIN crimp connectors	**0.20 - 2.50 mm**^{2}
Torque setting with screw terminals	**0.60 Nm**
Dimensions (H x W x D)	**87.0 mm** x **45.0mm** x **121.0 mm**
Weight	**360 g** Order no.: 774544, 774545, 774547 **370 g** Order no.: 774540, 774541, 774542, 774548

The standards current on **11/03** apply.

Max. continuous current

Number of contacts	I_{max} (A) at U_B DC	I_{max} (A) at U_B AC
1	**8.0 A** Order no.: 774 540, 774 542, 774 544, 774 545, 774 547, 774 548	**7.0 A** Order no.: 774 541
2	**6.8 A** Order no.: 774 540, 774 542, 774 544, 774 545, 774 547, 774 548	**5.0 A** Order no.: 774 541
3	**5.5 A** Order no.: 774 540, 774 542, 774 544, 774 545, 774 547, 774 548	**4.0 A** Order no.: 774 541
4	**4.8 A** Order no.: 774 540, 774 542, 774 544, 774 545, 774 547, 774 548	**3.5 A** Order no.: 774 541
5	**4.3 A** Order no.: 774 540, 774 542, 774 544, 774 545, 774 547, 774 548	**3.0 A** Order no.: 774 541

Order reference

Type	Features			Terminals	Order no.
PNOZ XV3		24 VDC	0.5 s fixed	Screw terminals	774 544
PNOZ XV3		24 VDC	3 s fixed	Screw terminals	774 545
PNOZ XV3		24 VDC	10 s fixed	Screw terminals	774 547
PNOZ XV3		24 VDC	3 s selectable	Screw terminals	774 542
PNOZ XV3		24 VDC	30 s selectable	Screw terminals	774 540
PNOZ XV3		24 VDC	300 s selectable	Screw terminals	774 548
PNOZ XV3	24 VAC		300 s selectable	Screw terminals	774 541

Please note: Order no. 774 541 is without UL approval.