Requirement class IIIA, EN 574
PNOZ s6.1



Two-hand control device for safety circuits

Approvals

	PNOZ s6.1
cULus LISTED	◆
	◆
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Unit features

- Positive-guided relay outputs:
  - 3 safety contacts (N/O), instantaneous
  - 1 auxiliary contact (N/C), instantaneous
- 1 semiconductor output
- Connection options for:
  - 2 operator elements (buttons)
- A connector can be used to connect 1 PNOZsigma contact expander module
- LED indicator for:
  - Supply voltage
  - Input status, channel 1
  - Input status, channel 2
  - Switch status, safety contacts
  - Feedback loop
  - Fault
- Plug-in connection terminals (either cage clamp terminal or screw terminal)
- See order reference for unit types

Unit description

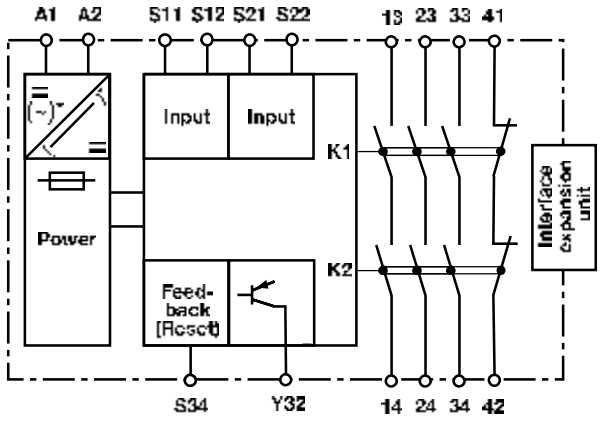
The two-hand control relay meets the requirements of EN 574 Type IIIA. It forces the operator to keep his hands outside the danger zone area during the hazardous movement. It is designed for use in two-hand circuits.
CAUTION!
The two-hand control relay may **not** be used on **press controllers**. It is only suitable for use where the risk analysis has established a low level of risk (e.g. EN 954-1 Cat. B or 1).

Safety features

The two-hand control relay meets the following safety requirements:

- The two-hand control relay prevents the plant from being enabled in the following cases:
  - Power supply failure
  - Component failure
  - Short circuit on an input circuit
  - Coil defect
  - Open circuit
  - Earth fault
- In each on-off cycle, the output relays on the safety device are tested to ensure they open and close correctly

Block diagram



*only with UB = 48 – 240 VAC/DC

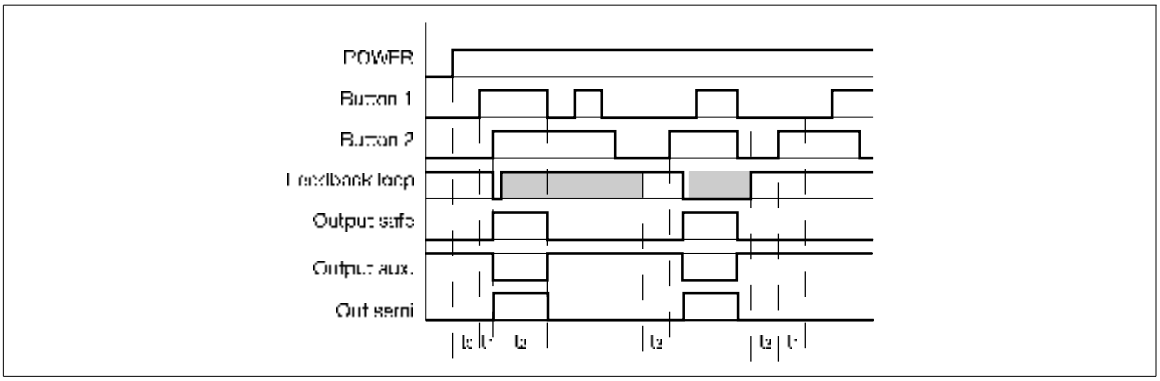
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Function description

- The two-hand control relay must be activated by simultaneously pressing two buttons within **0.5 s**. If one or both of the buttons are released, the unit interrupts the control command for the hazardous movement.
- Reactivation: The output relays will not re-energise until both operator elements have been released and then re-operated simultaneously.

Timing diagram



Key

- POWER: Supply voltage
- Button 1/Button 2: Input circuits S13-S14, S23-S24
- Feedback loop: Feedback loop S34
- Output safe: Safety outputs 13-14, 23-24, 33-34
- Output aux: Auxiliary contacts 41-42
- Out semi: Semiconductor output switch status Y32
- t_0: Recovery time after power on
- t_1: Simultaneity, channel 1 and 2
- t_2: Operating cycle ended through button 1 or 2
- t_3: S34-S12 must be closed before before the button is operated (recovery time)

Shaded area: Status irrelevant

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 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.

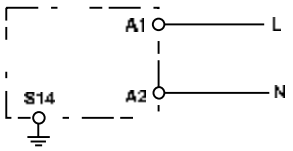
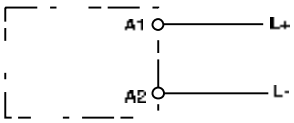
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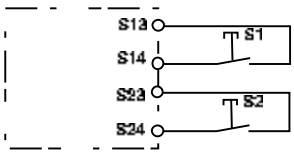
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Preparing for operation

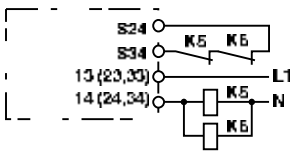
- Supply voltage

Supply voltage	AC	DC
		

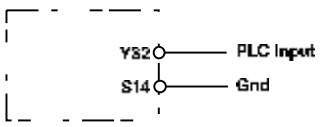
- Input circuit

Input circuit	Single-channel	Dual-channel
Two-hand button **with** detection of shorts across contacts		

- Feedback loop

	Feedback loop
Contacts from external contactors	

- Semiconductor output



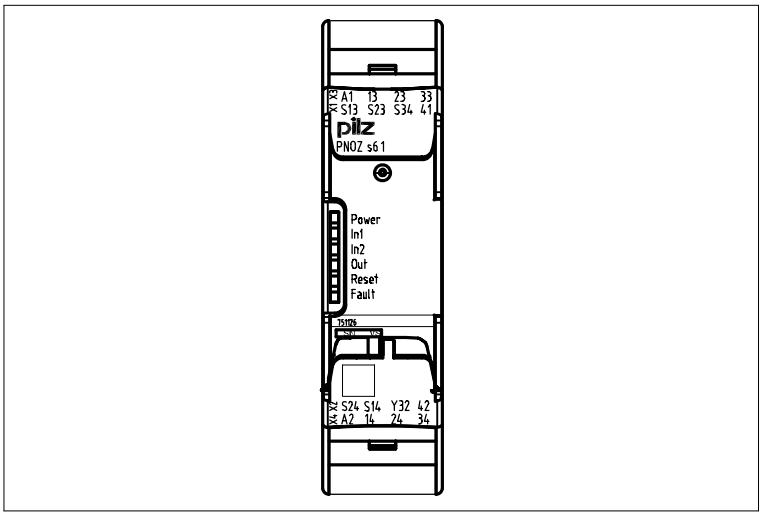
- Key

S1/S2	Two-hand button

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Terminal configuration



Installation

Install base unit without contact expander module:

- Ensure that the plug terminator is inserted at the side of the unit.

Connect base unit and PNOZsigma contact expander module:

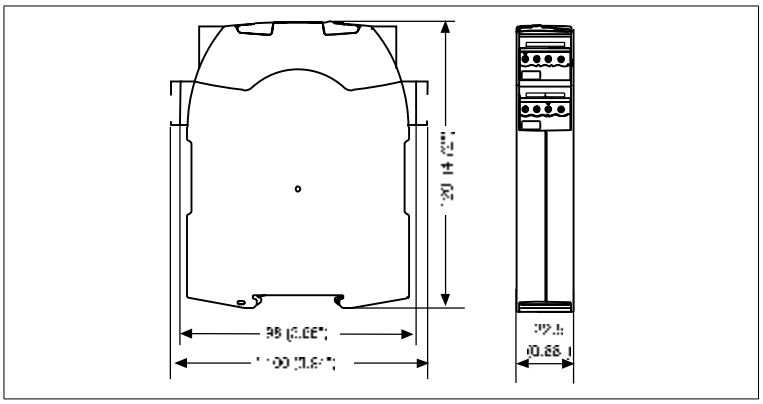
- Remove the plug terminator at the side of the base unit and at the contact expander module.
- Connect the base unit and the contact expander module to the supplied connector before mounting the units to the DIN rail.

Installation in control cabinet

- 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).
- Push the unit upwards or downwards before lifting it from the DIN rail.

Dimensions

*with spring-loaded terminals



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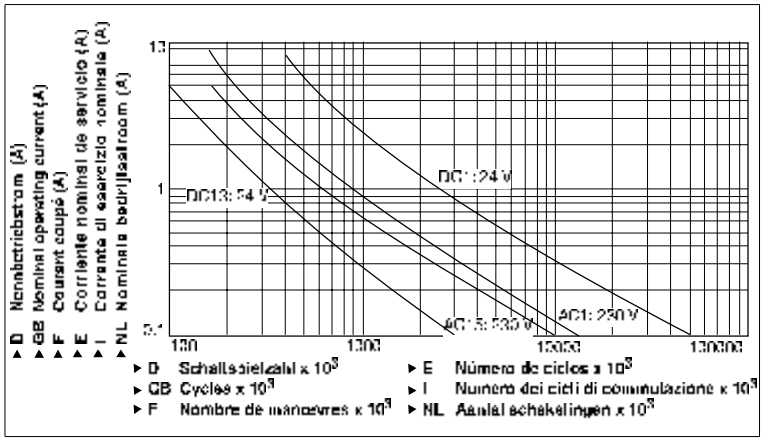
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NOTICE

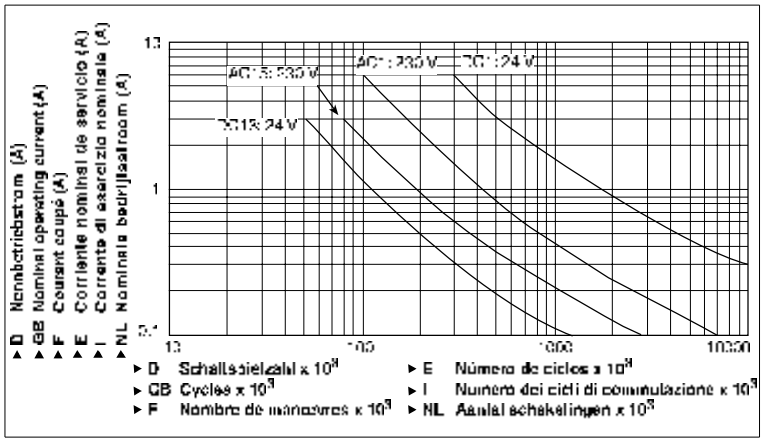
This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph

U_B 24 VDC



U_B 48-240 VAC/DC



Technical details

Electrical data	
Supply voltage	
Supply voltage U_B DC	**24 V**
Supply voltage U_B AC/DC	**48 - 240 V**
Voltage tolerance	**-15 %/+10 %**
Power consumption at U_B AC	**7.0 VA** Order no.: 750156, 751156
Power consumption at U_B DC	**3.5 W**
Frequency range AC	**50 - 60 Hz**
Residual ripple DC	**20 %**
Voltage and current at	
Input circuit DC: **24.0 V**	
N/O contact	**20 mA**
Feedback loop DC: **24.0 V**	**15.0 mA**
Number of output contacts	
Safety contacts (S) instantaneous:	**3**
Auxiliary contacts (N/C):	**1**

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Electrical data	
Category of output contacts in accordance with **EN 954-1**	
Safety contacts (S) instantaneous:	**1**
Utilisation category in accordance with **EN 60947-4-1**	
Safety contacts: AC1 at **240 V**	I_{min}: **0.01 A** , I_{max}: **6.0 A** Order no.: 750156, 751156 **8.0 A** Order no.: 750126, 751126 P_{max}: **1500 VA** Order no.: 750156, 751156 **2000 VA** Order no.: 750126, 751126
Safety contacts: DC1 at **24 V**	I_{min}: **0.01 A** , I_{max}: **6.0 A** Order no.: 750156, 751156 **8.0 A** Order no.: 750126, 751126 P_{max}: **150 W** Order no.: 750156, 751156 **200 W** Order no.: 750126, 751126
Auxiliary contacts: AC1 at **240 V**	I_{min}: **0.01 A** , I_{max}: **6.0 A** Order no.: 750156, 751156 **8.0 A** Order no.: 750126, 751126 P_{max}: **1500 VA** Order no.: 750156, 751156 **2000 VA** Order no.: 750126, 751126
Auxiliary contacts: DC1 at **24 V**	I_{min}: **0.01 A** , I_{max}: **6.0 A** Order no.: 750156, 751156 **8.0 A** Order no.: 750126, 751126 P_{max}: **150 W** Order no.: 750156, 751156 **200 W** Order no.: 750126, 751126
Utilisation category in accordance with **EN 60947-5-1**	
Safety contacts: AC15 at **230 V**	I_{max}: **3.0 A** Order no.: 750156, 751156 **6.0 A** Order no.: 750126, 751126
Safety contacts: DC13 at **24 V** (6 cycles/min)	I_{max}: **4.0 A** Order no.: 750156, 751156 **5.0 A** Order no.: 750126, 751126
Auxiliary contacts: AC15 at **230 V**	I_{max}: **3.0 A** Order no.: 750156, 751156 **6.0 A** Order no.: 750126, 751126
Auxiliary contacts: DC13 at **24 V** (6 cycles/min)	I_{max}: **4.0 A** Order no.: 750156, 751156 **5.0 A** Order no.: 750126, 751126
Contact material	**AgCuNi + 0.2 µm Au**
External contact fuse protection (I_K = 1 kA) to **EN 60947-5-1**	
Blow-out fuse, quick	
Safety contacts:	**10 A** Order no.: 750126, 751126 **6 A** Order no.: 750156, 751156
Auxiliary contacts:	**10 A** Order no.: 750126, 751126 **6 A** Order no.: 750156, 751156
Blow-out fuse, slow	
Safety contacts:	**4 A** Order no.: 750156, 751156 **6 A** Order no.: 750126, 751126
Auxiliary contacts:	**4 A** Order no.: 750156, 751156 **6 A** Order no.: 750126, 751126
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	**4 A** Order no.: 750156, 751156 **6 A** Order no.: 750126, 751126
Auxiliary contacts:	**4 A** Order no.: 750156, 751156 **6 A** Order no.: 750126, 751126
Semiconductor outputs (short circuit proof)	**24.0 V** DC,**20 mA**
Max. overall cable resistance R_{lmax} per input circuit	**30 Ohm**
Safety-related characteristic data	
Probability of dangerous failure per hour (PFH_D)	
Safety contacts, instantaneous	**2.44E-09 1/h**
SIL claim limit (SIL CL)	
Safety contacts, instantaneous	**3**
Performance level (PL)	
Safety contacts, instantaneous	**e**
Proof test interval in years	**20**

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Times	
Delay-on de-energisation (reaction time in accordance with EN 574)	
N/O contact	**40 ms**
N/C contact	**50 ms**
Recovery time	**250 ms**
Simultaneity, channel 1 and 2	**0.5 s**
Supply interruption before de-energisation	**20 ms**
Environmental data	
EMC	**EN 60947-5-1**, **EN 61000-6-2**, **EN 61000-6-4**
Vibration to **EN 60068-2-6**	
Frequency	**10 - 55 Hz**
Amplitude	**0.35 mm**
Climatic suitability	**EN 60068-2-78**
Airgap creepage in accordance with **EN 60947-1**	
Pollution degree	**2**
Rated insulation voltage	**250 V**
Rated impulse withstand voltage	**4.0 kV**
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	**PC**
Front	**PC**
Max. cross section of external conductors with screw terminals	
1 core flexible	**0.25 - 2.50 mm² , 24 - 12 AWG** Order no.: 750126, 750156
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	**0.25 - 1.00 mm² , 24 - 16 AWG** Order no.: 750126, 750156
without crimp connectors or with TWIN crimp connectors	**0.20 - 1.50 mm² , 24 - 16 AWG** Order no.: 750126, 750156
Torque setting with screw terminals	**0.50 Nm** Order no.: 750126, 750156
Max. cross section of external conductors with cage clamp terminals/spring-loaded terminals: Flexible without crimp connectors	**0.20 - 2.50 mm² , 24 - 12 AWG** Order no.: 751126, 751156
Cage clamp terminals/spring-loaded terminals: Terminal points per connection	**2** Order no.: 751126, 751156
Stripping length	**9 mm** Order no.: 751126, 751156
Dimensions	
Height	**100.0 mm** Order no.: 751126, 751156 **98.0 mm** Order no.: 750126, 750156
Width	**22.5 mm**
Depth	**120.0 mm**
Weight	**190 g** Order no.: 750126, 751126 **210 g** Order no.: 750156, 751156

The standards current on **2006-07** apply.

Conventional thermal current

Number of contacts	I_{th} (A) at U_B DC	I_{th} (A) at U_B AC
1	**6.00 A** Order no.: 750156, 751156 **8.00 A** Order no.: 750126, 751126	**6.00 A** Order no.: 750156, 751156
2	**6.00 A** Order no.: 750156, 751156 **8.00 A** Order no.: 750126, 751126	**6.00 A** Order no.: 750156, 751156
3	**4.50 A** Order no.: 750156, 751156 **6.00 A** Order no.: 750126, 751126	**4.50 A** Order no.: 750156, 751156

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Order reference

Type	Features		Terminals	Order no.
PNOZ s6.1		24 VDC	With screw terminals	750 126
PNOZ s6.1 C		24 VDC	With spring-loaded terminals	751 126
PNOZ s6.1	48 – 240 VAC/DC		With screw terminals	750 156
PNOZ s6.1 C	48 – 240 VAC/DC		With spring-loaded terminals	751 156

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