

Up to PL e of EN ISO 13849-1 PNOZ s6.1



Two-hand control device for safety circuits

Approvals

PNOZ s6.1	
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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 spring-loaded 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!

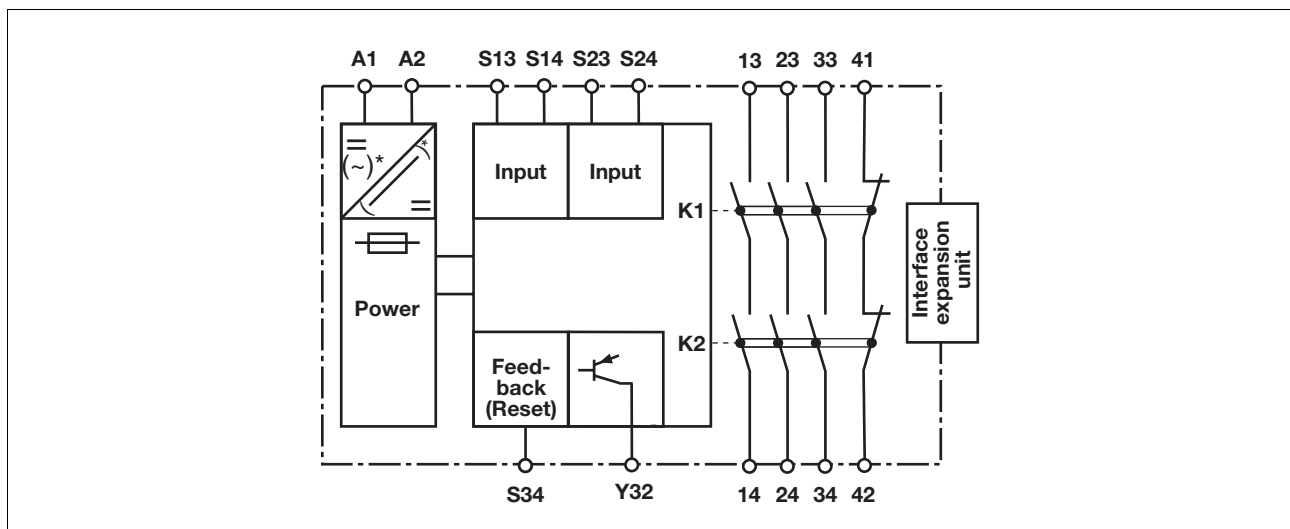
The two-hand control relay may **not** be used on **press controllers**. It is only suitable for use where the risk analysis has established a low level of risk (e.g. EN 954-1 Cat. 1).

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 re-lays on the safety device are tested to ensure they open and close correctly

Block diagram



*only with UB = 48 – 240 VAC/DC

Up to PL e of EN ISO 13849-1 PNOZ s6.1

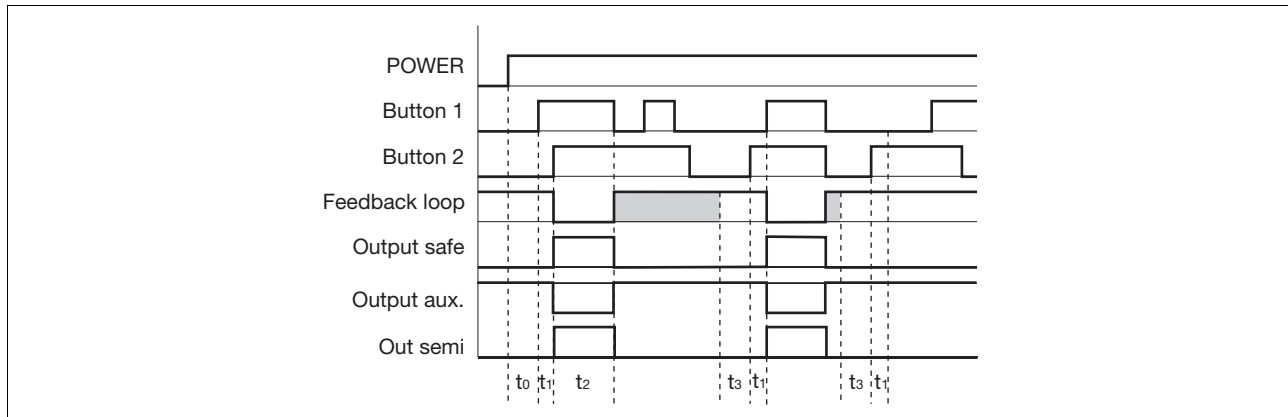
Function description

- ▶ The two-hand control relay must be activated by simultaneously press-

ing 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 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 I_{\max} in the input circuit:

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

$R_{l\max}$ = 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.

Up to PL e of EN ISO 13849-1 PNOZ s6.1

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

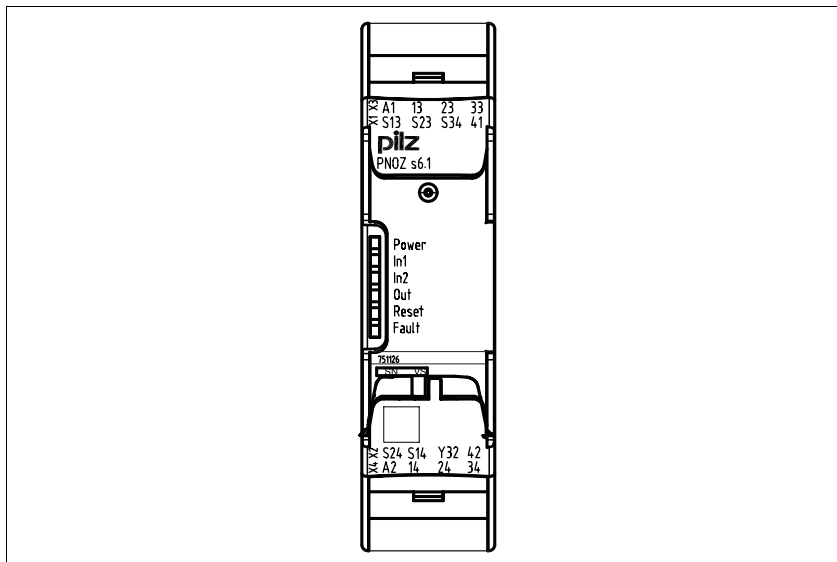
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▶ Key

S1/S2	Two-hand button
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Up to PL e of EN ISO 13849-1 PNOZ s6.1

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:

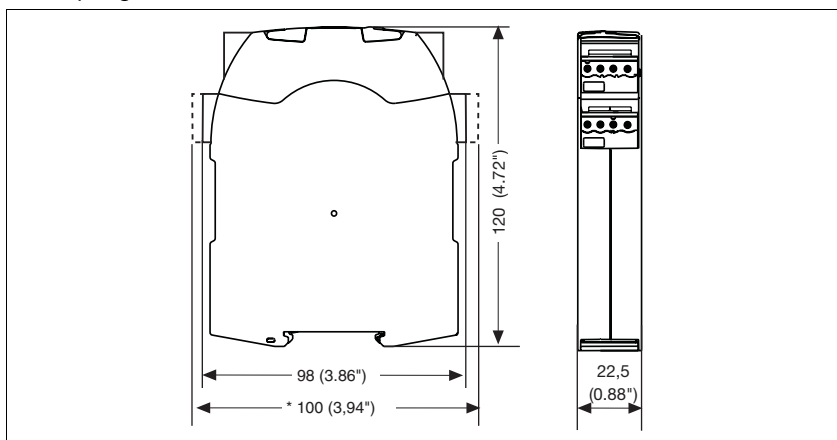
- ▶ Remove the plug terminator at the side of the base unit and at the contact expander module.
- ▶ Connect the base unit and the contact expander module to the supplied connector before mounting the units to the DIN rail.

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



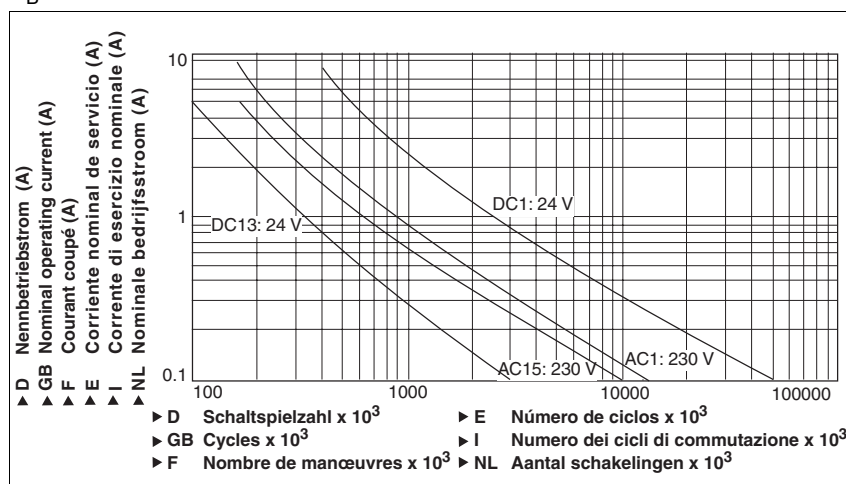
Up to PL e of EN ISO 13849-1 PNOZ s6.1

NOTICE

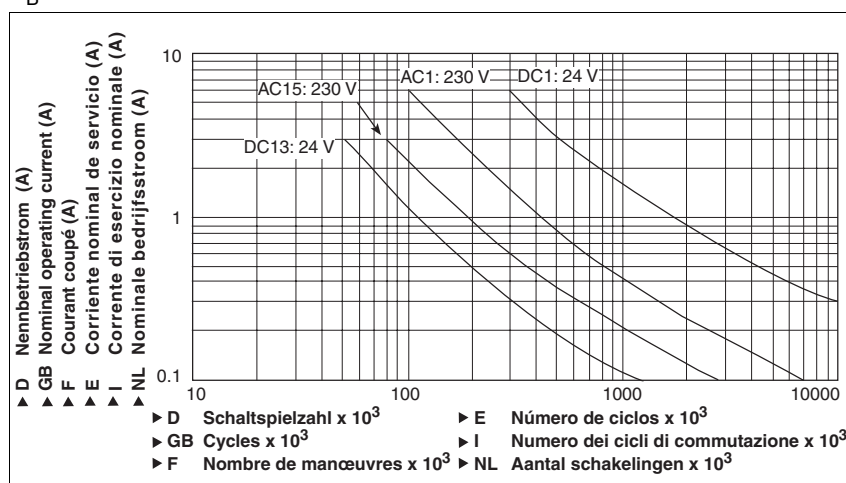
This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

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

Up to PL e of EN ISO 13849-1 PNOZ s6.1

Electrical data	
Type in accordance with EN 574	III A
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	
Performance Level (PL)* of EN ISO 13849-1	
Safety contacts, instantaneous	e
SIL claim limit (SIL CL) in accordance with EN IEC 62061	
Safety contacts, instantaneous	3
Probability of dangerous failure per hour (PFH_D) in accordance with EN IEC 62061	
Safety contacts, instantaneous	2.44E-09 1/h
Mission time/Proof test interval in years	20

Up to PL e of EN ISO 13849-1 PNOZ s6.1

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
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
Cross section of external conductors with spring-loaded terminals: Flexible with/without crimp connectors	
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

*not within BG's scope of inspection

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

Up to PL e of EN ISO 13849-1 PNOZ s6.1

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	6.00 A Order no.: 750156, 751156
	8.00 A Order no.: 750126, 751126	
2	6.00 A Order no.: 750156, 751156	6.00 A Order no.: 750156, 751156
	8.00 A Order no.: 750126, 751126	
3	4.50 A Order no.: 750156, 751156	4.50 A Order no.: 750156, 751156
	6.00 A Order no.: 750126, 751126	

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