



**PNOZ s5**

Safety relays

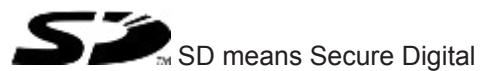


**pilz**

This document is the original document.

All rights to this documentation are reserved by Pilz GmbH & Co. KG. Copies may be made for internal purposes. Suggestions and comments for improving this documentation will be gratefully received.

Pilz®, PIT®, PMI®, PNOZ®, Primo®, PSEN®, PSS®, PVIS®, SafetyBUS p®, SafetyEYE®, SafetyNET p®, the spirit of safety® are registered and protected trademarks of Pilz GmbH & Co. KG in some countries.



## PNOZ s5 safety relay

The safety relay provides a safety-related interruption of a safety circuit.

The safety relay meets the requirements of EN 60947-5-1, EN 60204-1 and VDE 0113-1 and may be used in applications with

- ▶ E-STOP pushbuttons
- ▶ Safety gates
- ▶ Light beam devices

## For your safety

- ▶ Only install and commission the unit if you have read and understood these operating instructions and are familiar with the applicable regulations for health and safety at work and accident prevention.  
Ensure VDE and local regulations are met, especially those relating to safety.
- ▶ Any guarantee is rendered invalid if the housing is opened or unauthorised modifications are carried out.
- ▶ Note for overvoltage category III:  
If voltages higher than low voltage (>50 V AC or >120 V DC) are present on the unit, connected control elements and sensors must have a rated insulation voltage of at least 250 V

## Unit features

- ▶ Positive-guided relay outputs:
  - 2 safety contacts (N/O), instantaneous
  - 2 safety contacts (N/O), delay-on de-energisation
- ▶ 1 semiconductor output
- ▶ Connection options for:
  - E-STOP pushbutton
  - Safety gate limit switch
  - Start button
  - Light beam device
  - PSEN
- ▶ A connector can be used to connect 1 PNOZsigma contact expansion module
- ▶ Delay-on de-energisation selectable
- ▶ Operating modes and delay times can be selected via rotary switches
- ▶ LED indicator for:
  - Supply voltage
  - Input status, channel 1
  - Input status, channel 2
  - Switch status channel 1/2
  - Start circuit
  - Error

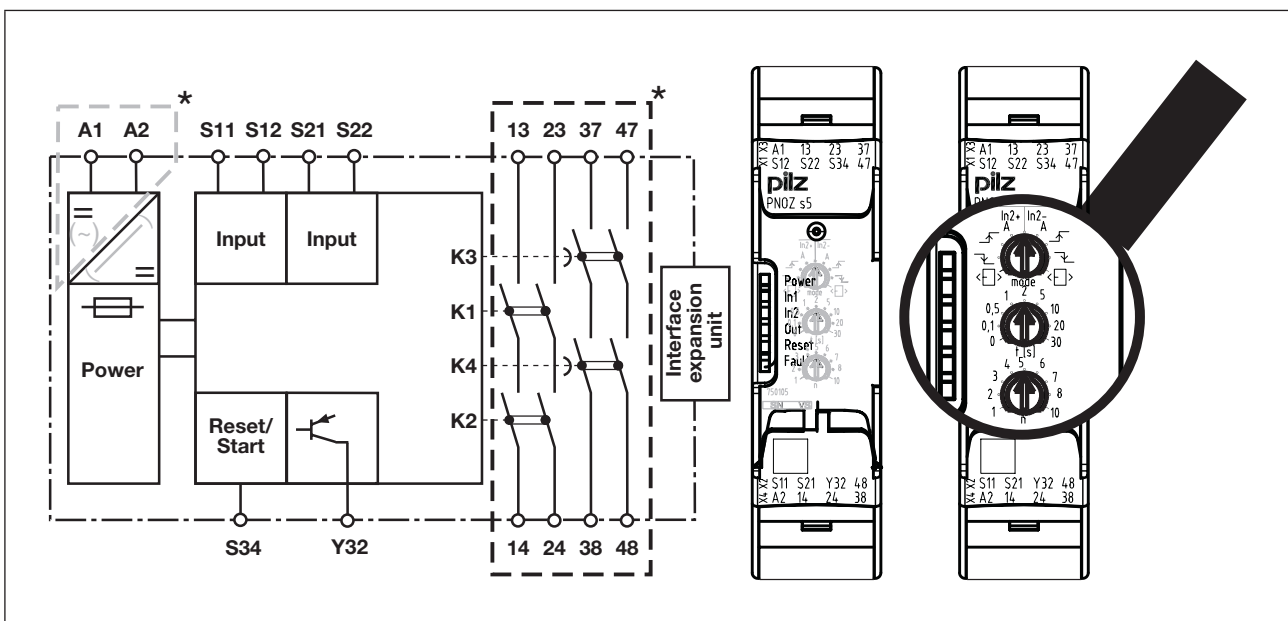
- ▶ Plug-in connection terminals (either spring-loaded terminal or screw terminal)

## Safety features

The relay meets the following safety requirements:

- ▶ 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/terminal configuration







Centre: Front view with cover, right: Front view without cover

Grey highlighted area: Applies only with  $U_B = 48 - 240$  V AC/DC

\*Insulation between the non-marked area and the relay contacts: Basic insulation (overvoltage category III), safe separation (overvoltage category II)

## Function description

- ▶ <sup>In2+</sup> Single-channel operation: no redundancy in the input circuit, earth faults in the start circuit and input circuit are detected.
- ▶ Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
  - earth faults in the start and input circuit,
  - short circuits in the input circuit and, with a monitored start, in the start circuit too.

- ▶  Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
  - earth faults in the start and input circuit,
  - short circuits in the input circuit and, with a monitored start, in the start circuit too,
  - shorts between contacts in the input circuit.
- ▶ **A** Automatic start: Unit is active once the input circuit has been closed.
- ▶ Manual start: Unit is active once the input circuit is closed and then the start circuit is closed.
- ▶  Monitored start with falling edge: Unit is active once
  - the input circuit is closed and then the start circuit is closed and opened again.
  - the start circuit is closed and then opened again once the input circuit is closed.
- ▶  Monitored start with rising edge: Unit is active once the input circuit is closed and once the start circuit is closed after the waiting period has elapsed (see technical details).
- ▶  Start with start-up test: The unit checks whether safety gates that are closed are opened and then closed again when supply voltage is applied.
- ▶ Ability to increase the number of contacts available on the
  - instantaneous safety contacts by using connectors to link to a PNOZsigma contact expansion module
  - delayed/instantaneous safety contacts by connecting contact expansion modules or external contactors

## Installation

### Install base unit without contact expansion module:

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

### Connect base unit and PNOZsigma contact expansion module:

- ▶ Remove the plug terminator at the side of the base unit and at the contact expansion module.
- ▶ Connect the base unit and the contact expansion 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 (35 mm).
- ▶ When installed vertically: Secure the unit by using a fixing element (e.g. retaining bracket or end angle).
- ▶ Push the device upwards or downwards before lifting it from the DIN rail.

## Wiring

Please note:

- ▶ Information given in the "Technical details" must be followed.
- ▶ Outputs 13-14, 23-24 are instantaneous safety contacts, outputs 37-38, 47-48 are delay-on de-energisation safety contacts.
- ▶ Semiconductor output Y32 should **not** be used for safety circuits!
- ▶ To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- ▶ Calculation of the max. cable length  $l_{\max}$  in the input circuit:

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

$R_{l_{\max}}$  = max. overall cable resistance (see technical details)

$R_l / \text{km}$  = 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.
- ▶ With  $U_B$  48 – 240 VAC/DC: Connect S21 to the protective earth system
- ▶ When connecting magnetically operated, reed proximity switches, ensure that the max. peak inrush current (on the input circuit) does not overload the proximity switch.
- ▶ On 24 VDC devices:  
The power supply must comply with the regulations for extra low voltages with safe electrical separation (SELV, PELV) in accordance with VDE 0100, Part 410.

## Preparing for operation

### Operating modes and delay time

The operating mode and delay time are set via the rotary switches on the unit. You can do this by opening the cover on the front of the unit.



#### CAUTION!

Do not adjust the rotary switch during operation, otherwise an error message will appear, the safety contacts will open and the unit will not be ready for operation until the supply voltage has been switched off and then on again.

### Set operating modes

- ▶ Switch off supply voltage.
- ▶ Select operating mode via the operating mode selector switch "mode".
- ▶ If the operating mode selector switch "mode" is in its start position (vertical position), an error message will appear.

Operating mode selector switch "mode"	Automatic/manual start	Monitored start rising edge	Monitored start falling edge	Automatic start with start-up test
Without detection of shorts across contacts				
With detection of shorts across contacts				

### Set delay time

Time selector switch "t[s]"

Factor selector switch "n"

$n \times t[s] = \text{Delay time}$

Example:

$t = 4 \text{ s}, n = 5$

Delay time =  $5 \times 4 = 20 \text{ s}$

### Connection

- ▶ Supply voltage

Supply voltage	AC	DC

- ▶ Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP <b>without</b> detection of shorts across contacts		
E-STOP <b>with</b> detection of shorts across contacts		

<p>Safety gate <b>without</b> detection of shorts across contacts</p>		
<p>Safety gate <b>with</b> detection of shorts across contacts</p>		
<p>Light beam device or safety switch <b>with</b> detection of shorts across contacts via ESPE (only when <math>U_B = 24\text{ VDC}</math>)</p>		

▶ Start circuit/feedback loop

Start circuit/feedback loop	Start circuit	Feedback loop
<p>Automatic start</p>		
<p>Monitored, manual start/re-start</p>		



▶ Semiconductor output

U <sub>B</sub> 24 VDC	U <sub>B</sub> 48 – 240 VAC/DC
<p>*Connect together the 0V connections on all the external power supplies</p>	

### Legend

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

### Operation

The unit is ready for operation when the Power LED is permanently lit.

LEDs indicate the status and errors during operation:

- LED on
- LED flashes



#### Information

Status indicators and error indicators may occur independently. In the case of an error display, the "Fault" LED will light or flash (exception: "Supply voltage too low"). An LED that is also flashing indicates the potential cause of the error. An LED that is lit and is static indicates a normal operating status. Several status indicators and error indicators may occur simultaneously.

### Status indicators

- Power**  
Supply voltage is present.
- In1**  
Input circuit at S12 is closed.
- In2**  
Input circuit at S22 is closed.
- Out**  
Safety contacts are closed and semiconductor output Y32 carries a high signal.



**Reset**  
24 V DC is present at S34.



**Out**  
Set delay time is running.

### Error indicators

#### All LEDs off

Diagnostics: Short across contacts/earth fault; unit switched off

- ▶ Remedy: Rectify short across contacts/earth fault, switch off supply voltage for 1 min.



**Fault**  
Diagnostics: Plug terminator not connected

- ▶ Remedy: Insert plug terminator, switch supply voltage off and then on again.



**Fault**  
Diagnostics: Internal error, unit defective

- ▶ Remedy: Switch supply voltage off and then on again, change unit if necessary.



**Power**  
Diagnostics: Supply voltage too low

- ▶ Remedy: Check the supply voltage.



**In1, In2 alternately**



**Fault**  
Diagnostics: Short detected between S12 and S22

- ▶ Remedy: Rectify short across contacts, switch supply voltage off and then on again.



**In1**



**Fault**  
Diagnostics: Power-up blocked due to short-term interruption at S12; input circuits not operated simultaneously

- ▶ Remedy: Open both input circuits, S12 and S22, simultaneously and then close again.

**In2****Fault**

Diagnostics: Power-up blocked due to short-term interruption at S22; input circuits not operated simultaneously

- ▶ Remedy: Open both input circuits, S12 and S22, simultaneously and then close again.

**Reset****Fault**

Diagnostics: Position of rotary switch is not permitted or rotary switch was adjusted during operation.

- ▶ Remedy: Switch supply voltage off and then on again.

**Power, In1, In2, Out, Reset, Fault**

Diagnostics: The operating mode selector switch "mode" is in its start position (vertical position)

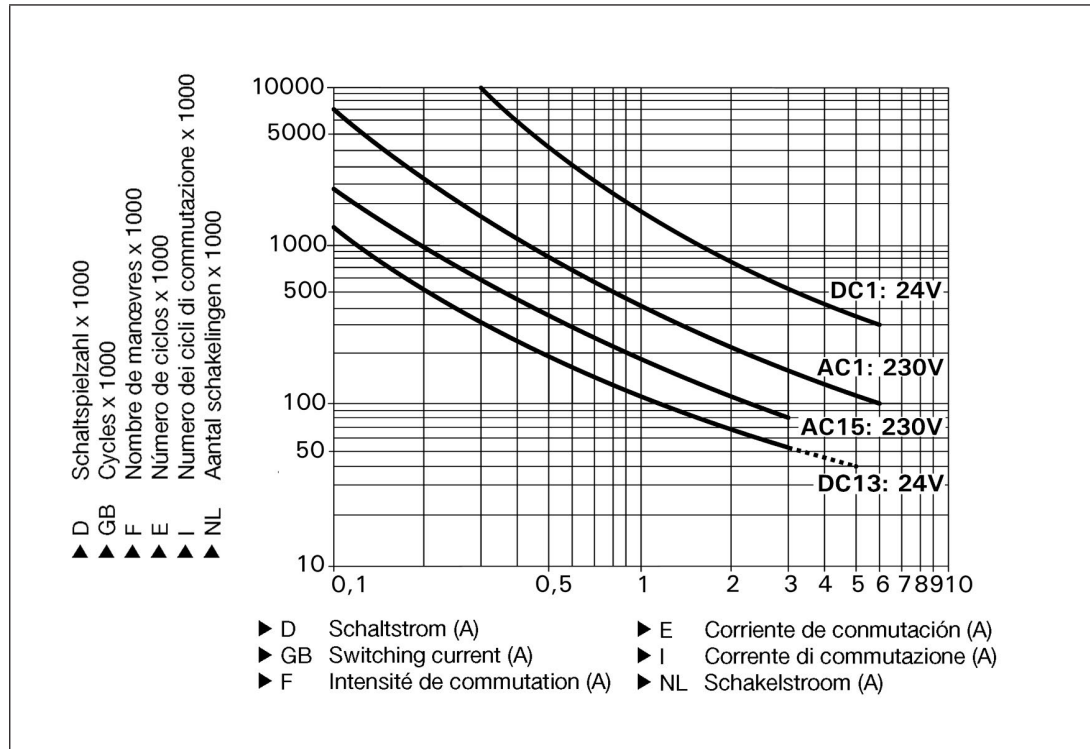
- ▶ Remedy: Switch off the supply voltage and set the required operating mode on operating mode selector switch "mode".

**Faults - malfunctions**

- ▶ Contact malfunctions: If the contacts have welded, reactivation will not be possible after the input circuit has opened.

## Service life graph

The service life graphs indicate the number of cycles from which failures due to wear must be expected. The wear is mainly caused by the electrical load; the mechanical load is negligible.



### Example

- ▶ Inductive load: 0,2 A
- ▶ Utilisation category: AC15
- ▶ Contact service life: 1,000,000 cycles

Provided the application requires fewer than 1,000,000 cycles, the PFH value (see technical details) can be used in the calculation.

To increase the service life, sufficient spark suppression must be provided on all output contacts. With capacitive loads, any power surges that occur must be noted. With contactors, use freewheel diodes for spark suppression.

## Technical details

General	750105	750135	751105	751135	751185
Approvals	CCC, CE, GOST, KOSHA, TÜV, cULus Listed	CCC, CE, GOST, KOSHA, TÜV, cULus Listed	CCC, CE, GOST, KOSHA, TÜV, cULus Listed	CCC, CE, GOST, KOSHA, TÜV, cULus Listed	CCC, CE, GOST, KOSHA, TÜV, cULus Listed
Electrical data	750105	750135	751105	751135	751185
Supply voltage					
Voltage	24 V	48 - 240 V	24 V	48 - 240 V	24 V
Type	DC	AC/DC	DC	AC/DC	DC
Voltage tolerance	-15 %/+10 %	-15 %/+10 %	-15 %/+10 %	-15 %/+10 %	-15 %/+10 %
Output of external power supply (AC)	–	8,0 VA	–	8,0 VA	–
Output of external power supply (DC)	4,0 W	4,0 W	4,0 W	4,0 W	4,0 W
Frequency range AC	–	50 - 60 Hz	–	50 - 60 Hz	–
Residual ripple DC	20 %	160 %	20 %	160 %	20 %
Continuous duty	100 %	100 %	100 %	100 %	100 %
Max. inrush current impulse					
Reset circuit	0,20 A	0,20 A	0,20 A	0,20 A	0,20 A
Feedback loop	0,20 A	0,20 A	0,20 A	0,20 A	0,20 A
Max. overall cable resistance R <sub>I-max</sub>					
Single-channel at UB DC	30 Ohm	30 Ohm	30 Ohm	30 Ohm	30 Ohm
Single-channel at UB AC	–	30 Ohm	–	30 Ohm	–
Dual-channel without detection of shorts across contacts at UB DC	30 Ohm	30 Ohm	30 Ohm	30 Ohm	30 Ohm
Dual-channel without detection of shorts across contacts at UB AC	–	30 Ohm	–	30 Ohm	–
Dual-channel with detection of shorts across contacts at UB DC	30 Ohm	30 Ohm	30 Ohm	30 Ohm	30 Ohm

<b>Electrical data</b>	<b>750105</b>	<b>750135</b>	<b>751105</b>	<b>751135</b>	<b>751185</b>
Dual-channel with detection of shorts across contacts at UB AC	–	30 Ohm	–	30 Ohm	–
Min. input resistance at power-on	110 Ohm	110 Ohm	110 Ohm	110 Ohm	110 Ohm
Voltage at					
Input circuit DC	24,0 V	24,0 V	24,0 V	24,0 V	24,0 V
Reset circuit DC	24,0 V	24,0 V	24,0 V	24,0 V	24,0 V
Feedback loop DC	24,0 V	24,0 V	24,0 V	24,0 V	24,0 V
Current at					
Input circuit DC	40,0 mA	40,0 mA	40,0 mA	40,0 mA	40,0 mA
Reset circuit DC	40,0 mA	40,0 mA	40,0 mA	40,0 mA	40,0 mA
Feedback loop	40,0 mA	40,0 mA	40,0 mA	40,0 mA	40,0 mA
Number of output contacts					
Instantaneous safety contacts (N/O)	2	2	2	2	2
Safety contacts (N/O), delayed	2	2	2	2	2
<b>Inputs</b>	<b>750105</b>	<b>750135</b>	<b>751105</b>	<b>751135</b>	<b>751185</b>
Number	2	2	2	2	2
<b>Semiconductor outputs</b>	<b>750105</b>	<b>750135</b>	<b>751105</b>	<b>751135</b>	<b>751185</b>
Number	1	1	1	1	1
Voltage	24,0 V	24,0 V	24,0 V	24,0 V	24,0 V
Current	20 mA	20 mA	20 mA	20 mA	20 mA
<b>Relay outputs</b>	<b>750105</b>	<b>750135</b>	<b>751105</b>	<b>751135</b>	<b>751185</b>
Max. short circuit current I <sub>K</sub>	1 kA	1 kA	1 kA	1 kA	1 kA
Utilisation category					
In accordance with the standard	EN 60947-4-1	EN 60947-4-1	EN 60947-4-1	EN 60947-4-1	EN 60947-4-1
Safety contacts, delayed: AC1 at	240 V	240 V	240 V	240 V	240 V
Min. current	0,01 A	0,01 A	0,01 A	0,01 A	0,01 A
Max. current	6,0 A	6,0 A	6,0 A	6,0 A	6,0 A
Max. power	1500 VA	1500 VA	1500 VA	1500 VA	1500 VA

<b>Relay outputs</b>	<b>750105</b>	<b>750135</b>	<b>751105</b>	<b>751135</b>	<b>751185</b>
Safety con- tacts, delayed: DC1 at	<b>24 V</b>	<b>24 V</b>	<b>24 V</b>	<b>24 V</b>	<b>24 V</b>
Min. current	<b>0,01 A</b>	<b>0,01 A</b>	<b>0,01 A</b>	<b>0,01 A</b>	<b>0,01 A</b>
Max. current	<b>6,0 A</b>	<b>6,0 A</b>	<b>6,0 A</b>	<b>6,0 A</b>	<b>6,0 A</b>
Max. power	<b>150 W</b>	<b>150 W</b>	<b>150 W</b>	<b>150 W</b>	<b>150 W</b>
Safety con- tacts, AC1 at	<b>240 V</b>	<b>240 V</b>	<b>240 V</b>	<b>240 V</b>	<b>240 V</b>
Max. current	<b>6,0 A</b>	<b>6,0 A</b>	<b>6,0 A</b>	<b>6,0 A</b>	<b>6,0 A</b>
Min. current	<b>0,01 A</b>	<b>0,01 A</b>	<b>0,01 A</b>	<b>0,01 A</b>	<b>0,01 A</b>
Max. power	<b>1500 VA</b>	<b>1500 VA</b>	<b>1500 VA</b>	<b>1500 VA</b>	<b>1500 VA</b>
Safety con- tacts, DC1 at	<b>24 V</b>	<b>24 V</b>	<b>24 V</b>	<b>24 V</b>	<b>24 V</b>
Max. current	<b>6,0 A</b>	<b>6,0 A</b>	<b>6,0 A</b>	<b>6,0 A</b>	<b>6,0 A</b>
Min. current	<b>0,01 A</b>	<b>0,01 A</b>	<b>0,01 A</b>	<b>0,01 A</b>	<b>0,01 A</b>
Max. power	<b>150 W</b>	<b>150 W</b>	<b>150 W</b>	<b>150 W</b>	<b>150 W</b>
Utilisation cate- gory					
In accordance with the standard	<b>EN 60947-5-1</b>	<b>EN 60947-5-1</b>	<b>EN 60947-5-1</b>	<b>EN 60947-5-1</b>	<b>EN 60947-5-1</b>
Safety con- tacts, delayed: AC15 at	<b>230 V</b>	<b>230 V</b>	<b>230 V</b>	<b>230 V</b>	<b>230 V</b>
Max. current	<b>3,0 A</b>	<b>3,0 A</b>	<b>3,0 A</b>	<b>3,0 A</b>	<b>3,0 A</b>
Safety con- tacts, delayed: DC13 (6 cy- cles/min) at	<b>24 V</b>	<b>24 V</b>	<b>24 V</b>	<b>24 V</b>	<b>24 V</b>
Max. current	<b>4,0 A</b>	<b>4,0 A</b>	<b>4,0 A</b>	<b>4,0 A</b>	<b>4,0 A</b>
Safety con- tacts, AC15 at	<b>230 V</b>	<b>230 V</b>	<b>230 V</b>	<b>230 V</b>	<b>230 V</b>
Max. current	<b>3,0 A</b>	<b>3,0 A</b>	<b>3,0 A</b>	<b>3,0 A</b>	<b>3,0 A</b>
Safety con- tacts, DC13 (6 cycles/min) at	<b>24 V</b>	<b>24 V</b>	<b>24 V</b>	<b>24 V</b>	<b>24 V</b>
Max. current	<b>4,0 A</b>	<b>4,0 A</b>	<b>4,0 A</b>	<b>4,0 A</b>	<b>4,0 A</b>
Contact fuse pro- tection, external safety contacts					
In accordance with the standard	<b>EN 60947-5-1</b>	<b>EN 60947-5-1</b>	<b>EN 60947-5-1</b>	<b>EN 60947-5-1</b>	<b>EN 60947-5-1</b>
Blow-out fuse, quick	<b>6 A</b>	<b>6 A</b>	<b>6 A</b>	<b>6 A</b>	<b>6 A</b>
Blow-out fuse, slow	<b>4 A</b>	<b>4 A</b>	<b>4 A</b>	<b>4 A</b>	<b>4 A</b>
Circuit break- er, 24V AC/ DC, charac- teristic B/C	<b>4 A</b>	<b>4 A</b>	<b>4 A</b>	<b>4 A</b>	<b>4 A</b>

<b>Relay outputs</b>	<b>750105</b>	<b>750135</b>	<b>751105</b>	<b>751135</b>	<b>751185</b>
Contact fuse protection, external delayed safety contacts					
Blow-out fuse, 6 A quick	<b>6 A</b>	<b>6 A</b>	<b>6 A</b>	<b>6 A</b>	<b>6 A</b>
Blow-out fuse, 4 A slow	<b>4 A</b>	<b>4 A</b>	<b>4 A</b>	<b>4 A</b>	<b>4 A</b>
Circuit breaker, 24 V AC/DC, characteristic B/C	<b>4 A</b>	<b>4 A</b>	<b>4 A</b>	<b>4 A</b>	<b>4 A</b>
Contact material	<b>AgCuNi + 0,2 µm Au</b>	<b>AgCuNi + 0,2 µm Au</b>	<b>AgCuNi + 0,2 µm Au</b>	<b>AgCuNi + 0,2 µm Au</b>	<b>AgCuNi + 0,2 µm Au</b>
<b>Conventional thermal current while loading several contacts</b>	<b>750105</b>	<b>750135</b>	<b>751105</b>	<b>751135</b>	<b>751185</b>
Ith per contact at UB AC					
Conv. therm. current with 1 contact	–	<b>6,00 A</b>	–	<b>6,00 A</b>	–
Conv. therm. current with 2 contacts	–	<b>6,00 A</b>	–	<b>6,00 A</b>	–
Conv. therm. current with 3 contacts	–	<b>6,00 A</b>	–	<b>6,00 A</b>	–
Conv. therm. current with 4 contacts	–	<b>6,00 A</b>	–	<b>6,00 A</b>	–
Ith per contact at UB DC					
Conv. therm. current with 1 contact	<b>6,00 A</b>	<b>6,00 A</b>	<b>6,00 A</b>	<b>6,00 A</b>	<b>6,00 A</b>
Conv. therm. current with 2 contacts	<b>6,00 A</b>	<b>6,00 A</b>	<b>6,00 A</b>	<b>6,00 A</b>	<b>6,00 A</b>
Conv. therm. current with 3 contacts	<b>6,00 A</b>	<b>6,00 A</b>	<b>6,00 A</b>	<b>6,00 A</b>	<b>6,00 A</b>
Conv. therm. current with 4 contacts	<b>6,00 A</b>	<b>6,00 A</b>	<b>6,00 A</b>	<b>6,00 A</b>	<b>6,00 A</b>



Times	750105	750135	751105	751135	751185
Switch-on delay					
With automatic reset typ.	180 ms	180 ms	180 ms	180 ms	180 ms
With automatic reset max.	330 ms	330 ms	330 ms	330 ms	330 ms
With automatic reset after power on typ.	1.430 ms	1.430 ms	1.430 ms	1.430 ms	1.430 ms
With automatic reset after power on max.	1.900 ms	1.900 ms	1.900 ms	1.900 ms	1.900 ms
With manual reset typ.	45 ms	45 ms	45 ms	45 ms	45 ms
With manual reset max.	85 ms	85 ms	85 ms	85 ms	85 ms
With monitored reset with rising edge typ.	45 ms	45 ms	45 ms	45 ms	45 ms
With monitored reset with rising edge max.	70 ms	70 ms	70 ms	70 ms	70 ms
With monitored reset with falling edge typ.	60 ms	60 ms	60 ms	60 ms	60 ms
With monitored reset with falling edge max.	80 ms	80 ms	80 ms	80 ms	80 ms
Delay-on de-energisation					
With E-STOP typ.	15 ms	15 ms	15 ms	15 ms	15 ms
With E-STOP max.	20 ms	20 ms	20 ms	20 ms	20 ms
With power failure typ.	75 ms	75 ms	75 ms	75 ms	75 ms
With power failure max.	110 ms	110 ms	110 ms	110 ms	110 ms
Recovery time at max. switching frequency 1/s					
After E-STOP	150 ms +tv	150 ms +tv	150 ms +tv	150 ms +tv	150 ms +tv
After power failure	200 ms	200 ms	200 ms	200 ms	200 ms

Times	750105	750135	751105	751135	751185
Delay time tv	0,00 s, 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, 10,00 s, 100,00 s, 12,00 s, 120,00 s, 14,00 s, 140,00 s, 15,00 s, 150,00 s, 16,00 s, 160,00 s, 180,00 s, 2,00 s, 2,50 s, 20,00 s, 200,00 s, 210,00 s, 240,00 s, 25,00 s, 3,00 s, 3,50 s, 30,00 s, 300,00 s, 35,00 s, 4,00 s, 40,00 s, 5,00 s, 50,00 s, 6,00 s, 60,00 s, 7,00 s, 70,00 s, 8,00 s, 80,00 s, 90,00 s	0,00 s, 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, 10,00 s, 100,00 s, 12,00 s, 120,00 s, 14,00 s, 140,00 s, 15,00 s, 150,00 s, 16,00 s, 160,00 s, 180,00 s, 2,00 s, 2,50 s, 20,00 s, 200,00 s, 210,00 s, 240,00 s, 25,00 s, 3,00 s, 3,50 s, 30,00 s, 300,00 s, 35,00 s, 4,00 s, 40,00 s, 5,00 s, 50,00 s, 6,00 s, 60,00 s, 7,00 s, 70,00 s, 8,00 s, 80,00 s, 90,00 s	0,00 s, 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, 10,00 s, 100,00 s, 12,00 s, 120,00 s, 14,00 s, 140,00 s, 15,00 s, 150,00 s, 16,00 s, 160,00 s, 180,00 s, 2,00 s, 2,50 s, 20,00 s, 200,00 s, 210,00 s, 240,00 s, 25,00 s, 3,00 s, 3,50 s, 30,00 s, 300,00 s, 35,00 s, 4,00 s, 40,00 s, 5,00 s, 50,00 s, 6,00 s, 60,00 s, 7,00 s, 70,00 s, 8,00 s, 80,00 s, 90,00 s	0,00 s, 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, 10,00 s, 100,00 s, 12,00 s, 120,00 s, 14,00 s, 140,00 s, 15,00 s, 150,00 s, 16,00 s, 160,00 s, 180,00 s, 2,00 s, 2,50 s, 20,00 s, 200,00 s, 210,00 s, 240,00 s, 25,00 s, 3,00 s, 3,50 s, 30,00 s, 300,00 s, 35,00 s, 4,00 s, 40,00 s, 5,00 s, 50,00 s, 6,00 s, 60,00 s, 7,00 s, 70,00 s, 8,00 s, 80,00 s, 90,00 s	0,00 s, 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, 10,00 s, 100,00 s, 12,00 s, 120,00 s, 14,00 s, 140,00 s, 15,00 s, 150,00 s, 16,00 s, 160,00 s, 180,00 s, 2,00 s, 2,50 s, 20,00 s, 200,00 s, 210,00 s, 240,00 s, 25,00 s, 3,00 s, 3,50 s, 30,00 s, 300,00 s, 35,00 s, 4,00 s, 40,00 s, 5,00 s, 50,00 s, 6,00 s, 60,00 s, 7,00 s, 70,00 s, 8,00 s, 80,00 s, 90,00 s
Repetition accuracy	+/-1 % + +/-20 ms	+/-1 % + +/-20 ms	+/-1 % + +/-20 ms	+/-1 % + +/-20 ms	+/-1 % + +/-20 ms
Repetition accuracy in the event of an error	+/-15 % + +/-20 ms	+/-15 % + +/-20 ms	+/-15 % + +/-20 ms	+/-15 % + +/-20 ms	+/-15 % + +/-20 ms
Time accuracy	+/-1 % + +/-20 ms	+/-1 % + +/-20 ms	+/-1 % + +/-20 ms	+/-1 % + +/-20 ms	+/-1 % + +/-20 ms
Waiting period with a monitored reset					
With rising edge	150 ms	150 ms	150 ms	150 ms	150 ms
With falling edge	240 ms	240 ms	240 ms	240 ms	240 ms
Min. start pulse duration with a monitored reset					
With rising edge	30 ms	30 ms	30 ms	30 ms	30 ms
With falling edge	70 ms	70 ms	70 ms	70 ms	70 ms
Supply interruption before de-energisation	20 ms	20 ms	20 ms	20 ms	20 ms
Simultaneity, channel 1 and 2	∞	∞	∞	∞	∞

<b>Environmental data</b>	<b>750105</b>	<b>750135</b>	<b>751105</b>	<b>751135</b>	<b>751185</b>
Climatic suitability	EN 60068-2-78	EN 60068-2-78	EN 60068-2-78	EN 60068-2-78	EN 60068-2-78
Ambient temperature					
Temperature range	-10 - 55 °C	-10 - 55 °C	-10 - 55 °C	-10 - 55 °C	-10 - 55 °C
Storage temperature					
Temperature range	-40 - 85 °C	-40 - 85 °C	-40 - 85 °C	-40 - 85 °C	-40 - 85 °C
EMC	EN 60947-5-1, EN 61000-6-2, EN 61000-6-4	EN 60947-5-1, EN 61000-6-2, EN 61000-6-4	EN 60947-5-1, EN 61000-6-2, EN 61000-6-4	EN 60947-5-1, EN 61000-6-2, EN 61000-6-4	EN 60947-5-1, EN 61000-6-2, EN 61000-6-4
Vibration					
In accordance with the standard	EN 60068-2-6	EN 60068-2-6	EN 60068-2-6	EN 60068-2-6	EN 60068-2-6
Frequency	10,0 - 55,0 Hz	10,0 - 55,0 Hz	10,0 - 55,0 Hz	10,0 - 55,0 Hz	10,0 - 55,0 Hz
Max. amplitude	0,35 mm	0,35 mm	0,35 mm	0,35 mm	0,35 mm
Airgap creepage					
In accordance with the standard	EN 60947-1	EN 60947-1	EN 60947-1	EN 60947-1	EN 60947-1
Overvoltage category	III / II	III / II	III / II	III / II	III / II
Pollution degree	2	2	2	2	2
Rated insulation voltage	250 V	250 V	250 V	250 V	250 V
Rated impulse withstand voltage	4,00 kV	4,00 kV	4,00 kV	4,00 kV	4,00 kV
Protection type					
Mounting (e.g. cabinet)	IP54	IP54	IP54	IP54	IP54
Housing	IP40	IP40	IP40	IP40	IP40
Terminals	IP20	IP20	IP20	IP20	IP20
<b>Mechanical data</b>	<b>750105</b>	<b>750135</b>	<b>751105</b>	<b>751135</b>	<b>751185</b>
Mounting position	Any	Any	Any	Any	Any
Mechanical life	10,000,000 cycles	10,000,000 cycles	10,000,000 cycles	10,000,000 cycles	10,000,000 cycles
Material					
Bottom	PC	PC	PC	PC	PC
Front	PC	PC	PC	PC	PC
Top	PC	PC	PC	PC	PC

<b>Mechanical data</b>	<b>750105</b>	<b>750135</b>	<b>751105</b>	<b>751135</b>	<b>751185</b>
Cross section of external conductors with screw terminals					
1 core flexible	<b>0,25 - 2,50 mm<sup>2</sup>, 24 - 12 AWG</b>	<b>0,25 - 2,50 mm<sup>2</sup>, 24 - 12 AWG</b>	–	–	–
2 core with the same cross section, flexible with crimp connectors, no plastic sleeve	<b>0,25 - 1,00 mm<sup>2</sup>, 24 - 16 AWG</b>	<b>0,25 - 1,00 mm<sup>2</sup>, 24 - 16 AWG</b>	–	–	–
2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors	<b>0,20 - 1,50 mm<sup>2</sup>, 24 - 16 AWG</b>	<b>0,20 - 1,50 mm<sup>2</sup>, 24 - 16 AWG</b>	–	–	–
Torque setting with screw terminals	<b>0,50 Nm</b>	<b>0,50 Nm</b>	–	–	–
Connection type	<b>Screw terminal</b>	<b>Screw terminal</b>	<b>Spring-loaded terminal</b>	<b>Spring-loaded terminal</b>	<b>Spring-loaded terminal</b>
Mounting type	<b>plug in</b>	<b>plug in</b>	<b>plug in</b>	<b>plug in</b>	<b>plug in</b>
Cross section of external conductors with spring-loaded terminals: flexible with/without crimp connector	–	–	<b>0,20 - 2,50 mm<sup>2</sup>, 24 - 12 AWG</b>	<b>0,20 - 2,50 mm<sup>2</sup>, 24 - 12 AWG</b>	<b>0,20 - 2,50 mm<sup>2</sup>, 24 - 12 AWG</b>
Spring-loaded terminals: Terminal points per connection	–	–	<b>2</b>	<b>2</b>	<b>2</b>
Stripping length	–	–	<b>9 mm</b>	<b>9 mm</b>	<b>9 mm</b>
Dimensions					
Height	<b>98,0 mm</b>	<b>98,0 mm</b>	<b>100,0 mm</b>	<b>100,0 mm</b>	<b>100,0 mm</b>
Width	<b>22,5 mm</b>	<b>22,5 mm</b>	<b>22,5 mm</b>	<b>22,5 mm</b>	<b>22,5 mm</b>
Depth	<b>120,0 mm</b>	<b>120,0 mm</b>	<b>120,0 mm</b>	<b>120,0 mm</b>	<b>120,0 mm</b>
Weight	<b>235 g</b>	<b>255 g</b>	<b>235 g</b>	<b>255 g</b>	<b>235 g</b>

The standards current on 2009-12 apply.

### Safety characteristic data

Operating mode	EN ISO 13849-1: 2006 PL	EN ISO 13849-1: 2006 Category	EN IEC 62061 SIL CL	EN IEC 62061 PFH <sub>D</sub> [1/h]	IEC 61511 SIL	IEC 61511 PFD	EN ISO 13849-1: 2006 T <sub>M</sub> [year]
Safety contacts, instantaneous	PL e	Cat. 4	SIL CL 3	2,31E-09	SIL 3	2,03E-06	20
Safety contacts, delayed	PL e	Cat. 4	SIL CL 3	2,34E-09	SIL 3	2,75E-05	20

All the units used within a safety function must be considered when calculating the safety characteristic data.



#### Information

A safety function's SIL/PL values are **not** identical to the SIL/PL values of the units that are used and may be different. We recommend that you use the PAScal software tool to calculate the safety function's SIL/PL values.



#### ATTENTION!

It is essential to consider the relay's service life graphs. The relay outputs' safety-related characteristic data is only valid if the values in the service life graphs are met.

The PFH value depends on the switching frequency and the load on the relay output. If the service life graphs are not accessible, the stated PFH value can be used irrespective of the switching frequency and the load, as the PFH value already considers the relay's B10d value as well as the failure rates of the other components.

### Order reference

Order reference					
Product type	Features			Terminals	Order no.
PNOZ s5		24 VDC		Screw terminals	750 105
PNOZ s5 C		24 VDC		Spring-loaded terminals	751 105
PNOZ s5 C (coated version)		24 VDC		Spring-loaded terminals	751 185
PNOZ s5	48 - 240 VAC/DC			Screw terminals	750 135
PNOZ s5 C	48 - 240 VAC/DC			Spring-loaded terminals	751 135

### **EC declaration of conformity**

This product/these products meet the requirements of the directive 2006/42/EC for machinery of the European Parliament and of the Council. The complete EC Declaration of Conformity is available on the Internet at [www.pilz.com/downloads](http://www.pilz.com/downloads).

Representative: Norbert Fröhlich, Pilz GmbH & Co. KG, Felix-Wankel-Str. 2, 73760 Ostfildern, Germany



Pilz GmbH & Co. KG  
Felix-Wankel-Straße 2  
73760 Ostfildern, Germany  
Telephone: +49 711 3409-0  
Telefax: +49 711 3409-133  
E-Mail: [pilz.gmbh@pilz.de](mailto:pilz.gmbh@pilz.de)  
Internet: [www.pilz.com](http://www.pilz.com)

► ...  
In many countries we are represented by our subsidiaries and sales partners.

Please refer to our homepage for further details or contact our headquarters.

## ► Technical support

+49 711 3409-444  
[support@pilz.com](mailto:support@pilz.com)

# pilz

InduraneT p<sup>®</sup>, Pilz<sup>®</sup>, PIT<sup>®</sup>, PMCprotego<sup>®</sup>, PMI<sup>®</sup>, PNOZ<sup>®</sup>, Primo<sup>®</sup>, PSEN<sup>®</sup>, PSS<sup>®</sup>, PVIS<sup>®</sup>, SafetyBUS p<sup>®</sup>, SafetyEYE<sup>®</sup>, SafetyNET p<sup>®</sup>, the spirit of safety<sup>®</sup>, are registered and protected trademarks of Pilz GmbH & Co. KG in some countries. We would point out that product features may vary from the details stated in this document, depending on the status at the time of publication and the scope of the equipment. We accept no responsibility for the validity, accuracy and entirety of the text and graphics presented in this information. Please contact our Technical Support if you have any questions.

21397-EN-09, 2013-05 Printed in Germany  
© Pilz GmbH & Co. KG, 2011