



## PNOZ e7p

# PILZ

THE SPIRIT OF SAFETY

- ▶ Safety relays

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Where unavoidable, for reasons of readability, the masculine form has been selected when formulating this document. We do assure you that all persons are regarded without discrimination and on an equal basis.

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SD means Secure Digital

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## Introduction

### Validity of documentation

This documentation is valid for the product PNOZ e7p. It is valid until new documentation is published.

This operating manual explains the function and operation, describes the installation and provides guidelines on how to connect the product.

### Using the documentation

This document is intended for instruction. Only install and commission the product if you have read and understood this document. The document should be retained for future reference.

### Definition of symbols

Information that is particularly important is identified as follows:



#### **DANGER!**

This warning must be heeded! It warns of a hazardous situation that poses an immediate threat of serious injury and death and indicates preventive measures that can be taken.



#### **WARNING!**

This warning must be heeded! It warns of a hazardous situation that could lead to serious injury and death and indicates preventive measures that can be taken.



#### **CAUTION!**

This refers to a hazard that can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.



#### **NOTICE**

This describes a situation in which the product or devices could be damaged and also provides information on preventive measures that can be taken. It also highlights areas within the text that are of particular importance.

**INFORMATION**

This gives advice on applications and provides information on special features.


**Safety****Intended use**

The safety relay PNOZ e7p provides a safety-related interruption of two safety circuits.

The safety relay meets the requirements of EN 60947-5-1, EN 60204-1 and EN 61496-1 as a Type 4 ESPE and may be used

- ▶ As an evaluation device for the safety light beam devices PSEN op2S-1-1, PSEN op4S-1-1, PSEN op4S-1-2

The following is deemed improper use in particular

- ▶ Any component, technical or electrical modification to the product,
- ▶ Use of the product outside the areas described in this operating manual,
- ▶ Use of the product outside the technical details (see [Technical details](#)  25]).

**NOTICE****EMC-compliant electrical installation**

The product is designed for use in an industrial environment. The product may cause interference if installed in other environments. If installed in other environments, measures should be taken to comply with the applicable standards and directives for the respective installation site with regard to interference.

**Safety regulations****Safety assessment**

Before using a device, a safety assessment in accordance with the Machinery Directive is required.

The product as an individual component fulfils the functional safety requirements in accordance with EN ISO 13849 and EN 62061. However, this does not guarantee the functional safety of the overall plant/machine. To achieve the relevant safety level of the overall plant/machine's required safety functions, each safety function needs to be considered separately.

**Use of qualified personnel**

The products may only be assembled, installed, programmed, commissioned, operated, maintained and decommissioned by persons who are competent to do so.

A competent person is a qualified and knowledgeable person who, because of their training, experience and current professional activity, has the specialist knowledge required. To be able to inspect, assess and operate devices, systems and machines, the person has to be informed of the state of the art and the applicable national, European and international laws, directives and standards.

It is the company's responsibility only to employ personnel who

- ▶ Are familiar with the basic regulations concerning health and safety / accident prevention,
- ▶ Have read and understood the information provided in the section entitled Safety
- ▶ Have a good knowledge of the generic and specialist standards applicable to the specific application.

**Warranty and liability**

All claims to warranty and liability will be rendered invalid if

- ▶ The product was used contrary to the purpose for which it is intended,
- ▶ Damage can be attributed to not having followed the guidelines in the manual,
- ▶ Operating personnel are not suitably qualified,
- ▶ Any type of modification has been made (e.g. exchanging components on the PCB boards, soldering work etc.).

**Disposal**

- ▶ In safety-related applications, please comply with the mission time  $T_M$  in the safety-related characteristic data.
- ▶ When decommissioning, please comply with local regulations regarding the disposal of electronic devices (e.g. Electrical and Electronic Equipment Act).

**For your safety**

The unit meets all the necessary conditions for safe operation. However, please note the following:

- ▶ Please make sure you shut down the supply voltage or open the input circuit (e.g. interrupt the light beam device) when performing maintenance work (e.g. when replacing contactors), otherwise the unit may switch on unexpectedly in the case of a wiring error.

### Unit features

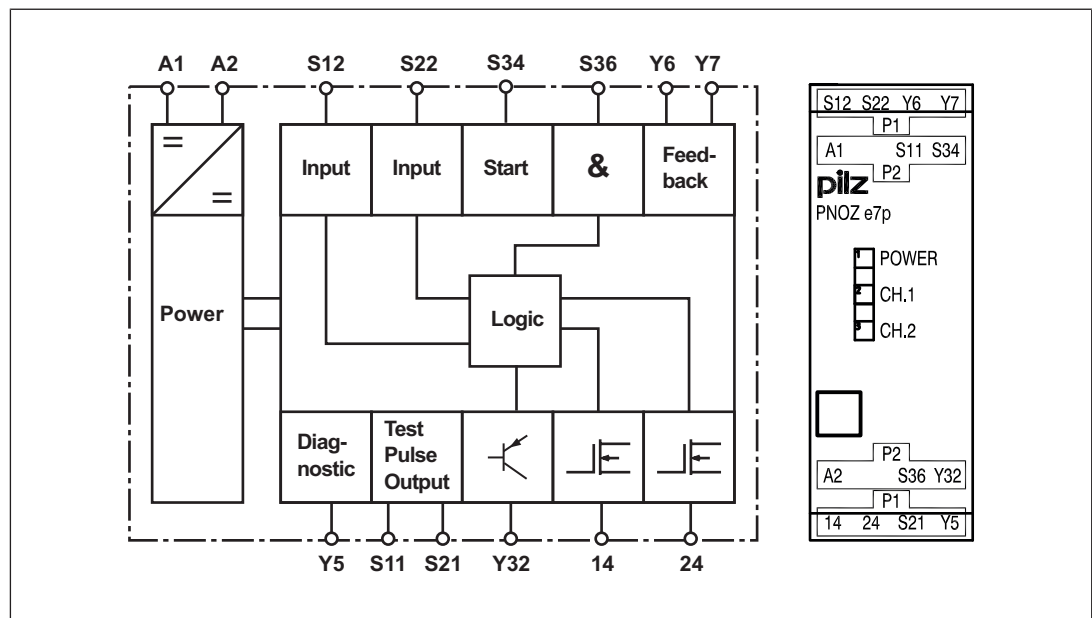
- ▶ Outputs using semiconductor technology:
  - 2 safety outputs
  - 1 auxiliary output
  - 2 test pulse outputs
- ▶ Connection options:
  - Safety light beam devices PSEN op2S-1-1, PSEN op4S-1-1, PSEN op4S-1-2
  - Start button
- ▶ 2 operating modes can be set
- ▶ LED display for:
  - Supply voltage
  - Switch state of safety outputs
- ▶ One logic input to AND-connect several units
- ▶ Feedback loops for monitoring external contactors

### Safety features

The relay meets the following safety requirements:

- ▶ The circuit is redundant with built-in self-monitoring.
- ▶ The safety device remains effective in the case of a component failure.
- ▶ The safety outputs are tested periodically using an off-test.

### Block diagram/terminal configuration





## Function description

When supply voltage is applied and the set operating mode is detected (initialisation phase), the "POWER" LED is lit. The unit is ready for operation when the feedback loops are closed.

### **Operating mode 1: Input circuit S12 affects safety output 14, input circuit S22 affects safety output 24**

- ▶ Input circuit is closed (e.g. safety light beam device not interrupted):
  - The LED "CH.1" is lit.
  - There is a high signal at safety output 14, the unit is active.
- ▶ Input circuit S22 is closed (e.g. safety light beam device not interrupted):
  - The LED "CH.2" is lit.
  - There is a high signal at safety output 24, the unit is active.
- ▶ Input circuit S12 is open (e.g. safety light beam device interrupted):
  - The LED "CH.1" goes out.
  - There is a low signal at safety output 14.
- ▶ Input circuit S22 is open (e.g. safety light beam device interrupted):
  - LED "CH.2" goes out.
  - There is a low signal at safety output 24.

There will only be a high signal at auxiliary output Y32 if there is a high signal at both safety outputs 14 and 24.

### **Operating mode 2: Input circuits S12 and S22 are AND-linked and affect safety output 14 and 24**

- ▶ Input circuits S12 and S22 are closed (e.g. safety light beam devices are not interrupted):
  - The LEDs "CH.1" and "CH.2" are lit.
  - There are high signals at safety outputs 14 and 24, the unit is active.
  - There is a high signal at auxiliary output Y32.
- ▶ Input circuit S12 or S22 is open (e.g. safety light beam device interrupted):
  - The LEDs "CH.1" and "CH.2" go out.
  - There are low signals at safety outputs 14 and 24.
  - There is a low signal at auxiliary output Y32.

### Feedback loop

Before a safety output is switched on, a test is run to establish whether the contacts at feedback loop inputs Y6 and Y7 are closed. If a contact is open, an error is detected and LEDs CH.1 and CH.2 will flash alternately. It will not be possible to switch the unit back on until the feedback loops are closed and the safety function has been reset.

The feedback loop contacts are also checked when the signal at the output changes from high to low. After this signal change, the contacts at the feedback loop inputs must close within 150 ms. If a contact is still open after 150 ms has elapsed, an error is detected and is displayed as a flashing code 1,8 (see [Faults – Interference](#) [📖 20]). It will not be possible to switch the unit back on until the error has been rectified and the supply voltage has been switched off and then on again.

### Logic AND connection

The PNOZ e7p has a logic input S36 for logic connections between several units.

### Operating modes

- ▶ Single-channel operation: Input wiring in accordance with EN 60204, no redundancy in the input circuit; earth faults in the input circuit and start circuit are detected.
- ▶ Operating mode 1: Individual evaluation of input circuits S12 and S22, input circuit S12 affects safety output 14, input circuit 22 affects safety output 24.
- ▶ Operating mode 2: Input circuits S12 and S22 are AND-linked. The result of the logic operation affects safety outputs 14 and 24.
- ▶ Automatic start: Unit is active once the input circuit has been closed.
- ▶ Monitored start: Unit is not active until the start button has been operated and then released.
- ▶ Increase in the number of available contacts by connecting contact expansion modules or external contactors/relays.

### Installation



#### CAUTION!

**Electrostatic discharge can damage components on the safety system!**

Ensure against discharge before touching the safety system, e.g. by touching an earthed, conductive surface or by wearing an earthed armband.

- ▶ The unit 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).

**NOTICE**

If you are connecting several units logically, please note the guidelines in the section entitled [Logic connection between several units](#) [14].

**Wiring**

Please note:

- ▶ Information given in the "[Technical details](#) [25]" must be followed.
- ▶ Use copper wiring with a temperature stability of 60/75 °C.
- ▶ To prevent EMC interferences (particularly common-mode interferences) the measures described in EN 60204-1 must be executed. This includes the separate routing of cables of the control circuits (input, start and feedback loop) from other cables for energy transmission or the shielding of cables, for example.
- ▶ 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](#) [25])

$R_l / \text{km}$  = cable resistance/km

- ▶ Cables that have to be laid outside the control cabinet must be protected from mechanical damage, e.g. by installing them in a conduit.
- ▶ The unit and the input circuits must always be supplied by a single power supply.
- ▶ Do not connect undesignated terminals.
- ▶ Safety outputs 14 and 24 should exclusively be used for safe applications.
- ▶ The safety outputs must **not** be connected to control inputs.
- ▶ To suppress the pulse on switching off at safety outputs 14 and 24, use the terminal block with filter (see [Order reference](#) [31]).
- ▶ You must comply with the idling capacity at safety outputs 14 and 24 (see [Technical details](#) [25]).
- ▶ Output Y32 is an auxiliary output, e.g. for communication with a PLC or text display.
- ▶ Auxiliary output Y32 should **not** be used for safety circuits!
- ▶ Only contactors with positive-guided contacts should be used for safety functions.
- ▶ Use freewheel diodes to drive inductive loads (e.g. contactors or relays) with the safety/auxiliary outputs.
- ▶ The power supply must comply with the regulations for extra low voltages with protective electrical separation (SELV, PELV) in accordance with VDE 0100, Part 410.
- ▶ Terminal Y5 is provided for Pilz-internal diagnostic purposes.

## Preparing for operation

### Supply voltage

Supply voltage	AC	DC
	/	<p>The diagram shows a dashed box containing terminals A1 and A2. Terminal A1 is connected to L+ through a fuse labeled F1. Terminal A2 is connected to L-.</p>

### Input circuit

The table describes how the input circuits are wired when the unit is used as a single unit and without a feedback loop.



#### NOTICE

The logic input S36 must always be wired. If the unit is used as a single unit, terminal S36 must be connected to terminal S21.

Input circuit	1 safety light beam device	2 safety light beam devices
Operating mode 1	/	<p>The diagram shows a dashed box containing terminals S22, S21, S12, Y7, and S11. S22 and S12 are connected to a common line with a diode symbol. S21 and S11 are connected to another common line with a diode symbol. Y7 is connected to the junction between S21 and S11.</p>
Operating mode 2	<p>The diagram shows a dashed box containing terminals A1, Y7, S22, S21, S12, and S11. A1 and Y7 are connected to a common line. S22 and S21 are connected to a common line. S12 and S11 are connected to a common line with a diode symbol.</p>	<p>The diagram shows a dashed box containing terminals A1, Y7, S22, S21, S12, and S11. A1 and Y7 are connected to a common line. S22 and S12 are connected to a common line with a diode symbol. S21 and S11 are connected to another common line with a diode symbol.</p>

**Start circuit/feedback loop**

Terminals Y6 and Y7 are used to connect the feedback loops and also to define the start behaviour and operating mode.

- ▶ The Y6 terminal is used to
  - Determine the start behaviour and to
  - Connect the feedback loop for safety output 14.
- ▶ The Y7 terminal is used to
  - Determine the operating mode and to
  - Connect the feedback loop for safety output 24.

Start behaviour and feedback loop for safety output 14:

Start behaviour/feedback loop safety output 14	Automatic start	Monitored start
Without feedback loop		
With feedback loop		

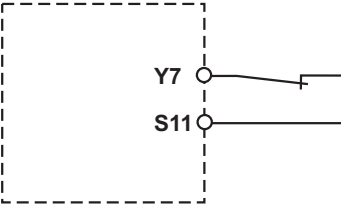
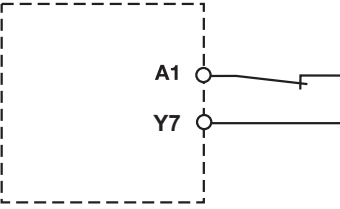


**NOTICE**

**With automatic start**

The unit starts up automatically when the safeguard is reset, e.g. when the E-STOP pushbutton is released. Use external circuit measures to prevent an unexpected restart.

Operating mode of input circuit and of feedback loop for safety output 24:




Operating mode/feedback loop safety output 24	Operating mode 1	Operating mode 2
With feedback loop for safety output 24		

Wiring without a feedback loop is described under "Input circuit".

### Logic connection between several units

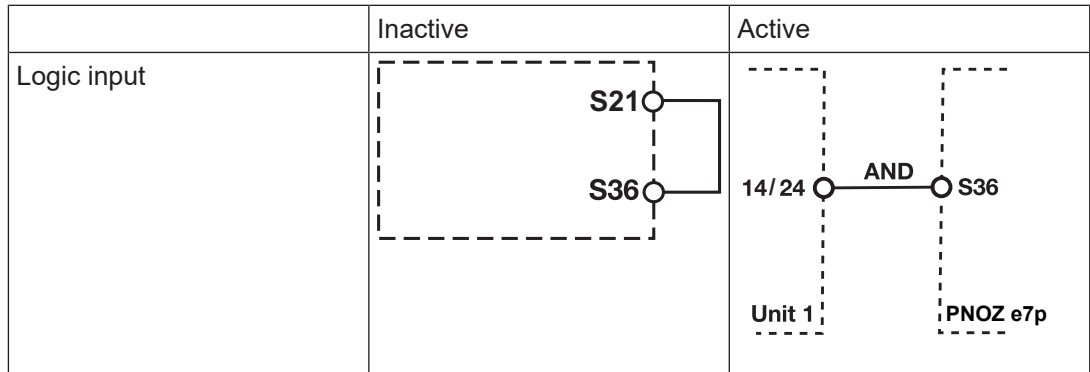
Units from the PNOZelog product range can be logically connected to each other and to units from the PNOZmulti product range. On the PNOZelog, input S35 is intended for the logic OR connection and input S36 for the logic AND connection. Safety outputs 14 and 24 on the PNOZelog are suitable for logic connections.

#### When linking several units logically, please note:

- ▶ When PNOZelog units are linked logically to each other, a safety output from a PNOZelog unit may be connected to logic inputs from one or more PNOZelog units.
- ▶ When linking PNOZelog units logically to PNOZmulti units
  - a cascading output from PNOZmulti units may be connected to logic inputs on PNOZelog units
  - or
  - a safety output from PNOZelog units may be connected to cascading inputs on PNOZmulti units.
- ▶ The unit with the lowest SIL/PL value determines the SIL/PL value of the entire circuit.
- ▶ PNOZ e1p, PNOZ e8.1p: These units do not have logic inputs. Their safety outputs can be used to logically link the units to the logic inputs of other PNOZelog units or to the cascading inputs from PNOZmulti units.
- ▶ Safety outputs from the PNOZ e1p are suitable for logic connections from unit version 3.0.
- ▶ Each safety output on a PNOZelog unit that is connected to the load may also be connected to the logic inputs of a maximum of four PNOZelog units ([Example 1](#)  16).
- ▶ Up to 50 logic inputs from PNOZelog units can be connected to safety outputs with no load.
- ▶ Logically linking the units leads to delays when switching on and off (see on-delay and response time in the [Technical details](#)  25]). These are added up with each unit that is logically linked ([Example 3](#)  18]).
- ▶ Install all the logically linked units in the same control cabinet or ensure that faults regarding the units' connection are excluded, e.g. via protected installation of the connection cables.
- ▶ All linked units must be connected to the same supply voltage.

**Logic input S36**

Logic input S36 from the PNOZ e7p enables additional PNOZelog or PNOZmulti units to be logically AND-linked.

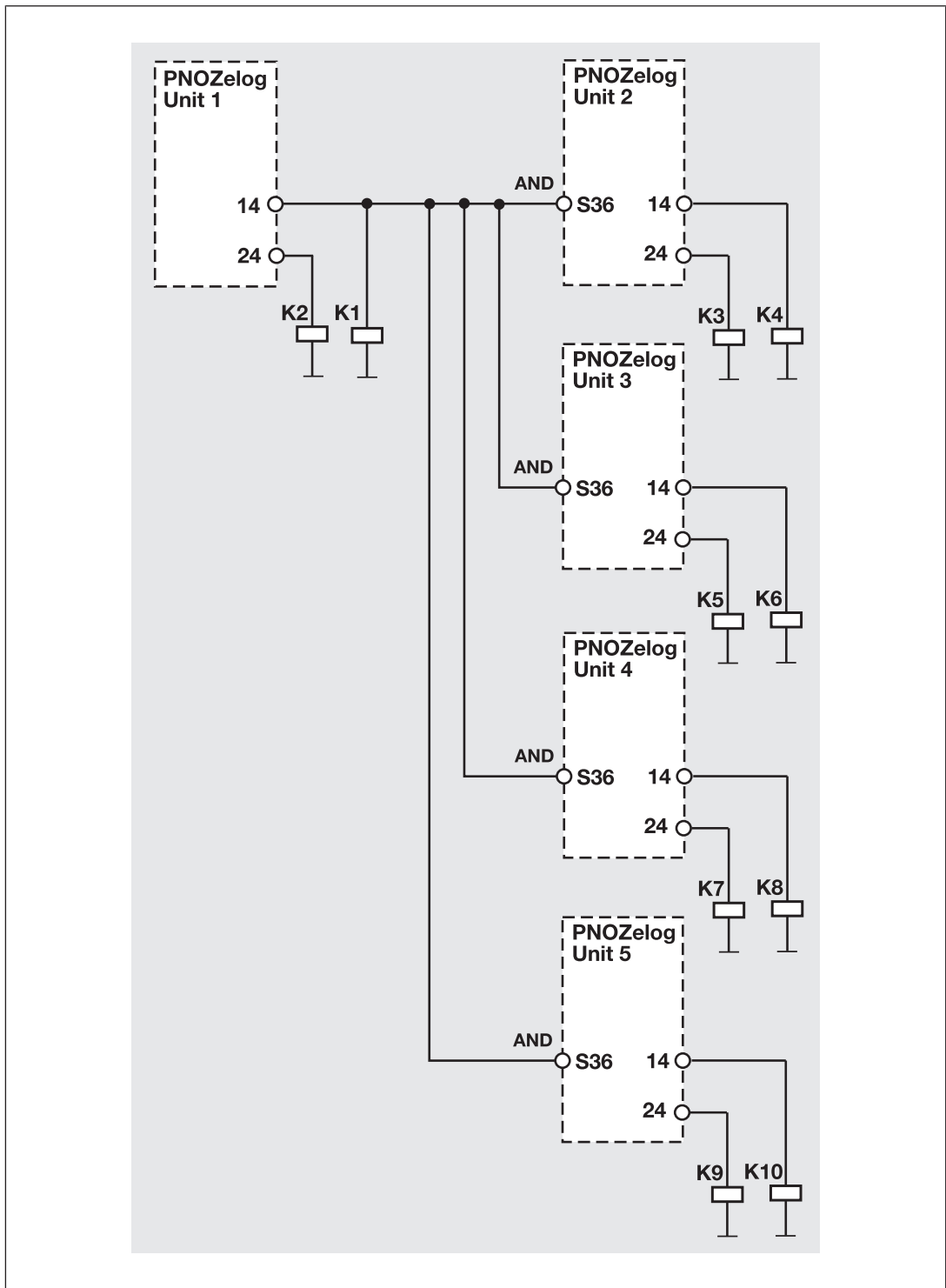


**Examples**

The following examples represent various ways in which PNOZelog units can be logically connected. In all the application examples, 2 loads may also be connected to the safety outputs.

► Example 1:

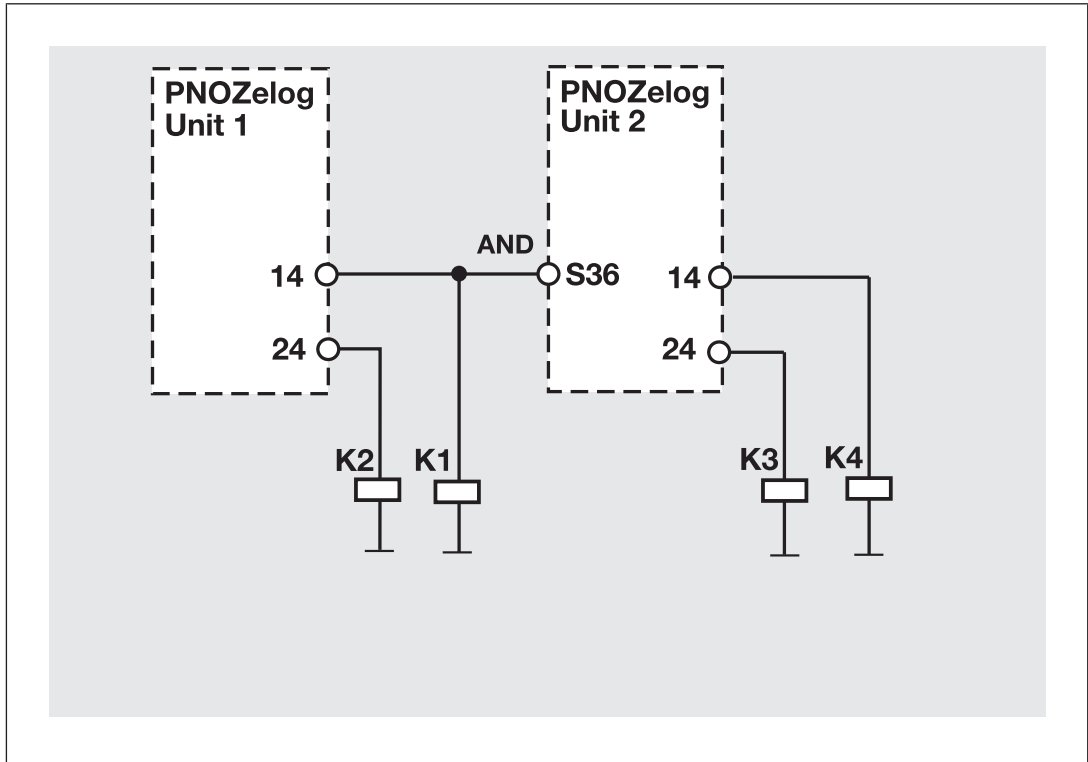
Loads are connected to the safety outputs of Unit 1. In addition, a safety output is AND-linked to 4 other PNOZelog units via the logic input S36.





► Example 2:

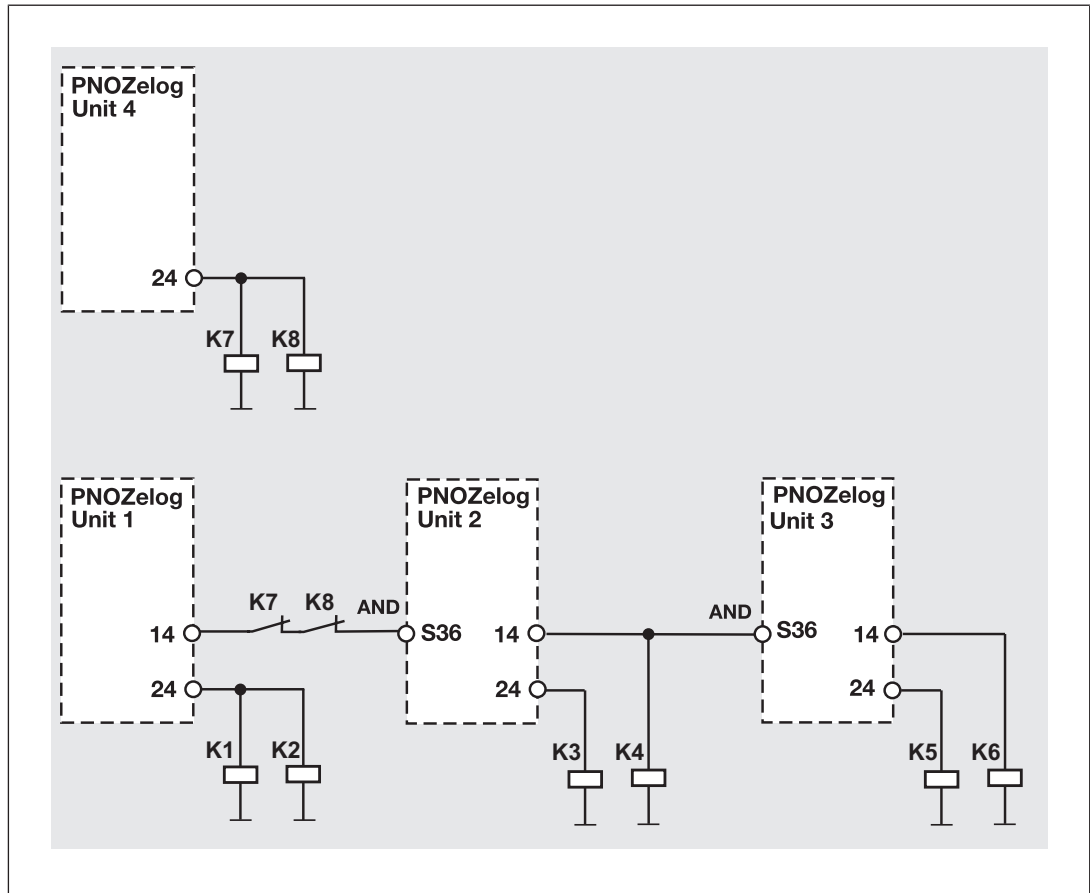
Loads are connected to the safety outputs of Unit 1. In addition, a safety output is AND-linked to another PNOZelog unit via the logic input S36.



► Example 3

The logic connection line between Unit 1 and Unit 2 contains contacts from the external contactors on Unit 4. This means that Unit 4 and Unit 1 can set the outputs on Unit 2 and Unit 3 to low.

A short circuit between +24 VDC and a safety output must be excluded!



## Operation



### NOTICE

The safety function should be checked after initial commissioning and each time the plant/machine is changed. The safety functions may only be checked by qualified personnel.



### INFORMATION

The safety outputs are constantly checked via test pulses. This may generate a humming noise on the connected contactors, which does not affect the function. The test pulses also mean that, when measured with a multi-meter, the voltage at the safety outputs is displayed to be less than it actually is.

The unit detects the set operating mode once supply voltage is applied. During this time (initialisation phase) the "POWER" LED will flash. The unit is ready for operation when the "POWER" LED is lit continuously.

LEDs indicate the status and errors during operation:



LED on



LED flashes

### Status indicators



#### POWER

Supply voltage is present, operating mode is detected.



#### POWER

Initialisation phase



#### CH.1

There is a high signal at safety output 14.



#### CH.2

There is a high signal at safety output 24.

## Faults – Interference



### INFORMATION

Supply interruptions lasting longer than 20 ms are detected as an error. The LEDs indicate an error and the safety outputs carry a low signal. The plant or machinery driven via the safety outputs will be shut down. The unit can only be restarted when the supply voltage is switched off for at least 1 s and then switched on again.

### Fault

Fault conditions are indicated by flashing the LEDs. There are faults that are displayed via periodic flashing (see table "Display of fault conditions") and faults where an error code can be determined via the number of flashes (see table "Relationship between the number of flashes and the decimal error code"). These faults are always indicated by three short flashes at LED CH.1 or CH.2. After a longer pause, the LED will then flash at one second intervals. The number of LED flashes corresponds to a digit in the error code. The error code can consist of up to 4 digits. The digits are separated by a longer period without flashing. The entire sequence is constantly repeated.



### INFORMATION

Error code 0: 16 flashes

**Display of fault conditions**

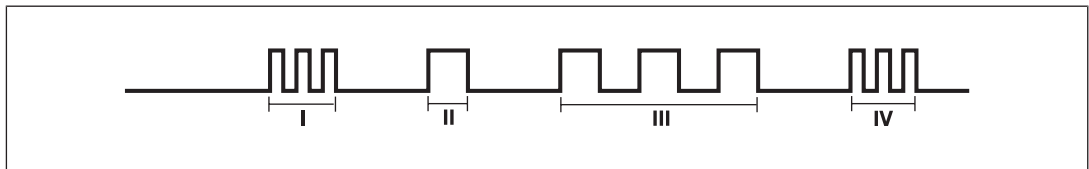
LED	Fault	Remedy
LEDs unlit	Supply voltage is missing, too low, wrongly connected	Connect supply voltage: A1 - +24 VDC and A2 - 0 VDC Permitted voltage range: 19.2 ... 30 VDC
POWER flashes	Unknown operating mode, initialisation phase, start not executed	Depending on operating mode: Press start button or perform start-up test
CH.1 or CH.2 flash a code	Error coding, see table "Error code [📖 23]"	See table "Error code [📖 23]"
CH.1 and CH.2 flash alternately	1.) Feedback loop open on start-up 2.) Only one channel of the input circuit is open or is partially operated	1.) Close feedback loop, open input circuit, start unit again 2.) Open both input circuit channels or activate and then clear the safety mat

**Examples**

Error code 1, 3:

LED CH.1 or CH.2 flashes

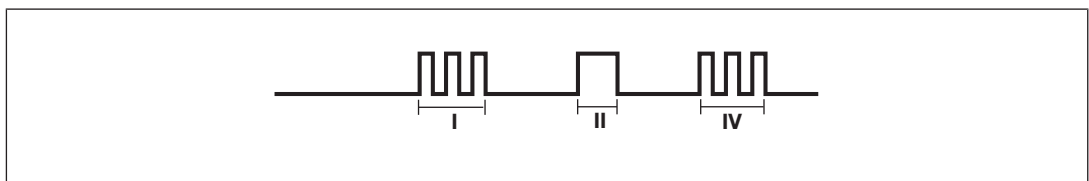
- ▶ 3 times, short
- ▶ Pause
- ▶ Once for one second
- ▶ Pause
- ▶ 3 times, for one second each



Error code 1:

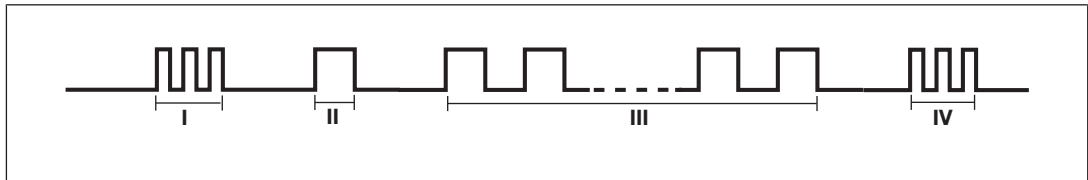
LED CH.1 or CH.2 flashes

- ▶ 3 times, short
- ▶ Pause
- ▶ Once for one second



Error code 1, 0:  
LED CH.1 or CH.2 flashes

- ▶ 3 times, short
- ▶ Pause
- ▶ Once for one second
- ▶ Pause
- ▶ 16 times, for one second each



- I Code for error message
- II Code for 1st digit
- III Code for 2nd digit
- IV Code for error message repeated

The table below shows the relationship between the number of flashes and the error code. The key to the error codes is described in the Error coding table.

Number of flashes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Decimal error code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0

## Error coding

**INFORMATION**

Each time a fault is rectified, switch the supply voltage off for at least 1 s and then switch it back on.

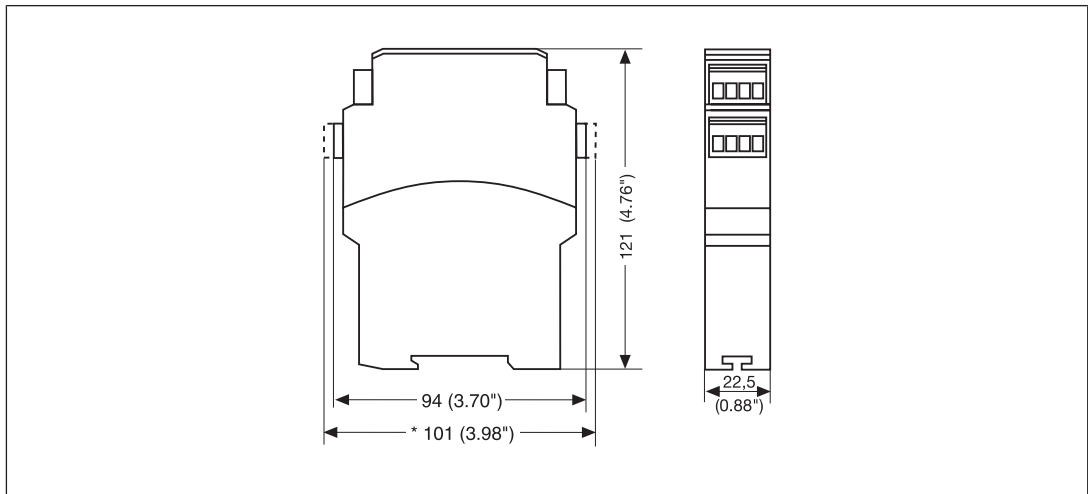
Decimal error code	Number of flashes	Description	Remedy
1	3x short – 1x long – 3x short	Faulty wiring, short circuit	Wiring error at start input, input circuits, feedback loop or programming input
2	3x short – 2x long – 3x short		
3	3x short – 3x long – 3x short		
4	3x short – 4x long – 3x short	In the initialisation phase, short circuit between the safety outputs and +24 VDC	Rectify wiring error at terminals 14, 24
...	...		
9	3x short – 9x long – 3x short		
10	3x short – 10x long – 3x short	During operation, short circuit between the safety outputs and +24 VDC	Rectify wiring error at terminals 14, 24
...	...		
1, 0	3x short – 1x long – 16x long – 3x short		
1, 1	3x short – 1x long – 1x long – 3x short		
1, 9	3x short – 1x long – 9x long – 3x short		
10.1	3x short – 10x long – 1x long – 3x short		
14.5	3x short – 14x long – 5x long – 3x short		
1, 2	3x short – 1x long – 2x long – 3x short	During operation, short circuit between the safety outputs and 0 VDC or $U_B < 19.2$ VDC	Rectify wiring error at terminals 14, 24; Keep within the supply voltage range of 19.2 ... 30 VDC
1, 3	3x short – 1x long – 3x long – 3x short		
1, 12	3x short – 1x long – 12x long – 3x short		
1, 13	3x short – 1x long – 13x long – 3x short		
1, 4	3x short – 1x long – 4x long – 3x short	Operating mode changed during operation	Check wiring for the operating mode and rectify fault

Decimal error code	Number of flashes	Description	Remedy
1, 5	3x short – 1x long – 5x long – 3x short	Unexpected status at S36	Check wiring at terminal S36
1, 6 1, 7	3x short – 1x long – 6x long – 3x short 3x short – 1x long – 7x long – 3x short	Wiring of operating mode “with detection of shorts across contacts” faulty	Rectify wiring error at input circuits
1, 8 1, 11	3x short – 1x long – 8x long – 3x short 3x short – 1x long – 11x long – 3x short	1. Maximum time of feedback loop monitoring exceeded 2. PNOZ e6.1p, PNOZ e6vp: External feedback loop closed, but internal feedback loop faulty	1. Check contactor for contact welding 2. No user remedy possible. Change the unit.
1, 10	3x short – 1x long – 10x long – 3x short	Open circuit	Check safety mat wiring
5, 10	3x short – 5x long – 10x long – 3x short	$U_B < 19.2$ VDC	Keep within the supply voltage range of 19.2 ... 30 VDC
8, 1	3x short – 8x long – 1x long – 3x short	Invalid operating mode	Check wiring for the operating mode and rectify fault
8, 2 8, 3 14, 13	3x short – 8x long – 2x long – 3x short 3x short – 8x long – 3x long – 3x short 3x short – 14x long – 13x long – 3x short	Supply interrupted, possibly caused by a short to earth	Rectify wiring error at terminal A1 or check supply voltage
2, 0, 0 2, 0, 1	3x short – 2x long – 16x long – 16x long – 3x short 3x short – 2x long – 16x long – 1x long – 3x short	$U_B < 19.2$ VDC	Keep within the supply voltage range of 19.2 ... 30 VDC
2, 0, 2	3x short – 2x long – 16x long – 2x long – 3x short	In the initialisation phase, short circuit between the safety outputs and +24 VDC	Rectify wiring error at terminals 14, 24
2, 0, 3	3x short – 2x long – 16x long – 3x long – 3x short	$U_B < 19.2$ VDC	Keep within the supply voltage range of 19.2 ... 30 VDC



## Dimensions in mm

\* With spring-loaded terminals



## Technical details

General	774197	784197
Certifications	CE, EAC, TÜV, UKCA, cULus Listed	CE, EAC, TÜV, UKCA, cULus Listed
Electrical data	774197	784197
Supply voltage		
Voltage	24 V	24 V
Kind	DC	DC
Voltage tolerance	-20 %/+25 %	-20 %/+25 %
Output of external power supply (DC) at no load	2 W	2 W
Residual ripple DC	20 %	20 %
Duty cycle	100 %	100 %
External unit fuse protection F1 max.	6 A slow/10 A quick	6 A slow/10 A quick
Inputs	774197	784197
Voltage at		
Input circuit DC	24 V	24 V
Start circuit DC	24 V	24 V
Feedback loop DC	24 V	24 V
Logic input	24 V	24 V
Current at		
Input circuit DC	5 mA	5 mA
Start circuit DC	5 mA	5 mA
Feedback loop DC	5 mA	5 mA
Logic input	5 mA	5 mA

<b>Inputs</b>	<b>774197</b>	<b>784197</b>
Max. overall cable resistance R <sub>I</sub> - max		
Start circuit and feedback loop	<b>2.000 Ohm</b>	<b>2.000 Ohm</b>
Input circuit, single-channel	<b>2.000 Ohm</b>	<b>2.000 Ohm</b>
Max. line capacitance	<b>450 nF</b>	<b>450 nF</b>
<b>Semiconductor outputs</b>	<b>774197</b>	<b>784197</b>
Overall performance ext. loading, semiconductor	<b>100 W</b>	<b>100 W</b>
Number of safety outputs		
Instantaneous	<b>2</b>	<b>2</b>
Number of auxiliary outputs	<b>1</b>	<b>1</b>
Number of test pulse outputs	<b>2</b>	<b>2</b>
Residual current at "0" signal	<b>4 mA</b>	<b>4 mA</b>
Max. internal voltage drop	<b>1 V</b>	<b>1 V</b>
Switching capability, 2 safety out- puts under load		
Current at UB ≤ 26.5 V	<b>1,5 A</b>	<b>1,5 A</b>
Current at UB > 26,5 V	<b>1 A</b>	<b>1 A</b>
Power at UB ≤ 26.5 V	<b>40 W</b>	<b>40 W</b>
Power at UB > 26,5 V	<b>30 W</b>	<b>30 W</b>
Switching capability, 1 safety out- put under load		
Current at UB ≤ 26.5 V	<b>2 A</b>	<b>2 A</b>
Current at UB > 26,5 V	<b>1,5 A</b>	<b>1,5 A</b>
Power at UB ≤ 26.5 V	<b>50 W</b>	<b>50 W</b>
Power at UB > 26,5 V	<b>45 W</b>	<b>45 W</b>
Conditional rated short circuit cur- rent	<b>100 A</b>	<b>100 A</b>
Lowest operating current	<b>3 mA</b>	<b>3 mA</b>
Utilisation category in accordance with EN 60947-1	<b>DC-12</b>	<b>DC-12</b>
Max. line capacitance at the out- puts without load	<b>2 nF</b>	<b>2 nF</b>
Voltage auxiliary and test pulse outputs	<b>24 V</b>	<b>24 V</b>
Current auxiliary and test pulse outputs	<b>0,5 A</b>	<b>0,5 A</b>
<b>Times</b>	<b>774197</b>	<b>784197</b>
Switch-on delay		
After power on	<b>3 s</b>	<b>3 s</b>
With automatic start typ.	<b>60 ms</b>	<b>60 ms</b>
With automatic start max.	<b>210 ms</b>	<b>210 ms</b>
With monitored start typ.	<b>120 ms</b>	<b>120 ms</b>
With monitored start max.	<b>260 ms</b>	<b>260 ms</b>
Logic inputs typ.	<b>60 ms</b>	<b>60 ms</b>
Logic inputs max.	<b>200 ms</b>	<b>200 ms</b>

<b>Times</b>	<b>774197</b>	<b>784197</b>
Response time $t_r$ semiconductor outputs		
max.	<b>35 ms</b>	<b>35 ms</b>
Maximum time of feedback loop monitoring	<b>150 ms</b>	<b>150 ms</b>
Supply interruption before de-energisation	<b>20 ms</b>	<b>20 ms</b>
<b>Environmental data</b>	<b>774197</b>	<b>784197</b>
Climatic suitability	<b>EN 60068-2-78</b>	<b>EN 60068-2-78</b>
Ambient temperature		
Temperature range	<b>-10 - 55 °C</b>	<b>-10 - 55 °C</b>
Storage temperature		
Temperature range	<b>-25 - 70 °C</b>	<b>-25 - 70 °C</b>
Climatic suitability		
Humidity	<b>93 % r. h. at 40 °C</b>	<b>93 % r. h. at 40 °C</b>
Condensation during operation	<b>Not permitted</b>	<b>Not permitted</b>
EMC	<b>EN 60947-5-1, EN 61000-6-2, EN 61000-6-4, EN 61326-3-1, EN 61496-1</b>	<b>EN 60947-5-1, EN 61000-6-2, EN 61000-6-4, EN 61326-3-1, EN 61496-1</b>
Vibration		
In accordance with the standard	<b>EN 60068-2-6</b>	<b>EN 60068-2-6</b>
Frequency	<b>10 - 55 Hz</b>	<b>10 - 55 Hz</b>
Amplitude	<b>0,35 mm</b>	<b>0,35 mm</b>
Airgap creepage		
In accordance with the standard	<b>EN 60947-1</b>	<b>EN 60947-1</b>
Overvoltage category	<b>III</b>	<b>III</b>
Pollution degree	<b>2</b>	<b>2</b>
Rated insulation voltage	<b>30 V</b>	<b>30 V</b>
Rated impulse withstand voltage	<b>0,8 kV</b>	<b>0,8 kV</b>
Protection type		
Housing	<b>IP40</b>	<b>IP40</b>
Terminals	<b>IP20</b>	<b>IP20</b>
Mounting area (e.g. control cabinet)	<b>IP54</b>	<b>IP54</b>
<b>Mechanical data</b>	<b>774197</b>	<b>784197</b>
Mounting position	<b>Any</b>	<b>Any</b>
Material		
Bottom	<b>PPO UL 94 V0</b>	<b>PPO UL 94 V0</b>
Front	<b>ABS UL 94 V0</b>	<b>ABS UL 94 V0</b>
Top	<b>PPO UL 94 V0</b>	<b>PPO UL 94 V0</b>
Connection type	<b>Screw terminal</b>	<b>Spring-loaded terminal</b>
Mounting type	<b>plug-in</b>	<b>plug-in</b>

<b>Mechanical data</b>	<b>774197</b>	<b>784197</b>
Conductor cross section with screw terminals		
1 core flexible	<b>0,25 - 2,5 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 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>0,2 - 1,5 mm<sup>2</sup>, 24 - 16 AWG</b>	–
Torque setting with screw terminals	<b>0,5 Nm</b>	–
Stripping length with screw terminals	<b>8 mm</b>	–
Conductor cross section with spring-loaded terminals: Flexible with/without crimp connector	–	<b>0,2 - 1,5 mm<sup>2</sup>, 24 - 16 AWG</b>
Spring-loaded terminals: Terminal points per connection	–	<b>2</b>
Stripping length with spring-loaded terminals	–	<b>8 mm</b>
Dimensions		
Height	<b>94 mm</b>	<b>101 mm</b>
Width	<b>22,5 mm</b>	<b>22,5 mm</b>
Depth	<b>121 mm</b>	<b>121 mm</b>
Weight	<b>130 g</b>	<b>125 g</b>

Where standards are undated, the 2020-07 latest editions shall apply.

**Safety characteristic data**



**NOTICE**

You must comply with the safety characteristic data in order to achieve the required safety level for your plant/machine.

Operating mode	EN ISO 13849-1: 2015 PL	EN ISO 13849-1: 2015 Category	EN 62061 SIL CL	EN 62061 PFH <sub>D</sub> [1/h]	IEC 61511 SIL	IEC 61511 PFD	EN ISO 13849-1: 2015 T <sub>M</sub> [year]
1-ch., pulsed light barrier	PL e	Cat. 4	SIL CL 3	3,43E-09	SIL 3	5,31E-05	20
SC output via logic input	PL e	Cat. 4	SIL CL 3	3,61E-09	SIL 3	5,82E-05	20

Explanatory notes for the safety-related characteristic data:

- ▶ The SIL CL value in accordance with EN 62061 corresponds to the SIL value in accordance with EN 61508.
- ▶ T<sub>M</sub> is the maximum mission time in accordance with EN ISO 13849-1. The value also applies as the retest interval in accordance with EN 61508-6 and IEC 61511 and as the proof test interval and mission time in accordance with EN 62061.

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



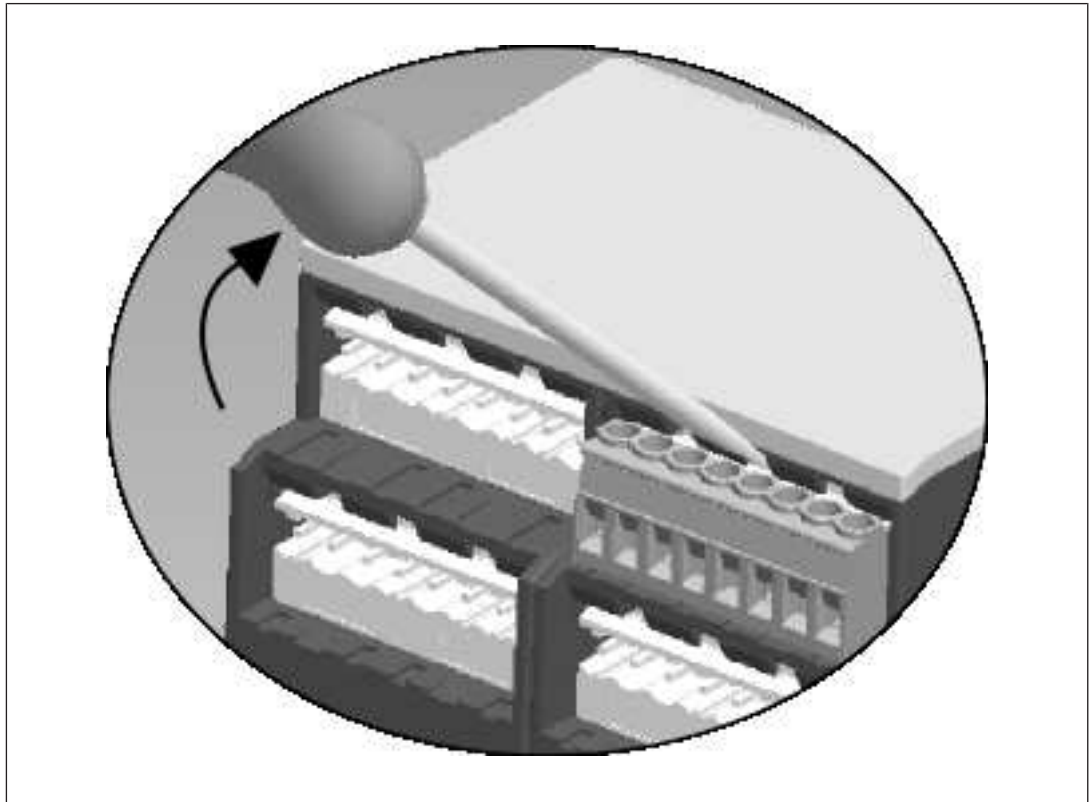
**INFORMATION**

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.

### Remove plug-in terminals

Procedure: Insert the screwdriver into the housing recess behind the terminal and lever the terminal out.

Do **not** remove the terminals by pulling the cables!



## Order reference

### Product

Product type	Features	Connection type	Order no.
PNOZ e7p	24 V DC	Screw terminals	774197
PNOZ e7p C	24 V DC	Spring-loaded terminals	784197

### Safety light beam devices

Product type	Features	Order no.
PSEN op2S-1-1	Safety light beam device, Type 2, infrared sensor	630380
PSEN op4S-1-1	Safety light beam device, Type 4, infrared sensor	630381
PSEN op4S-1-2	Safety light beam device Type 4, laser sensor	630382

### Accessories

Product type	Features	Order no.
Terminal block filter 1	Terminal block with filter for 3-10 kOhm load range	774195
Terminal block filter 2	Terminal block with filter for 10-30 kOhm load range	774196

## 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).

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

## UKCA-Declaration of Conformity

This product(s) complies with following UK legislation: Supply of Machinery (Safety) Regulation 2008.

The complete UKCA Declaration of Conformity is available on the Internet at [www.pilz.com/support/downloads](http://www.pilz.com/support/downloads).

Representative: Pilz Automation Technology, Pilz House, Little Colliers Field, Corby, Northamptonshire, NN18 8TJ United Kingdom, eMail: [mail@pilz.co.uk](mailto:mail@pilz.co.uk)

# ► Support

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Pilz develops environmentally-friendly products using ecological materials and energy-saving technologies. Offices and production facilities are ecologically designed, environmentally-aware and energy-saving. So Pilz offers sustainability, plus the security of using energy-efficient products and environmentally-friendly solutions.



We are represented internationally. Please refer to our homepage [www.pilz.com](http://www.pilz.com) for further details or contact our headquarters.

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