



## ► PSEN cs4.1n

**PILZ**

THE SPIRIT OF SAFETY

Operating Manual-22180-EN-08

- PSEN sensor technology



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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 PSEN cs4.1n from Version 3.0.

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 functions of the safety switch are:

- ▶ Safe shutdown of safety outputs when the actuator is removed beyond the assured release distance  $s_{ar}$  or when the actuator is not detected
- ▶ Remain shut down safely after the actuator has been removed

The safety switch meets the requirements in accordance with:

- ▶ EN 60947-5-3: PDDB with one of the approved actuators
- ▶ EN 62061: SIL CL 3
- ▶ EN ISO 13849-1: PL e (Cat. 4)
- ▶ EN ISO 14119: Coding level High, type 4

The safety switch may only be used with one of the approved actuators.

The safety level PL e (Cat. 4)/SIL CL 3 is achieved only when:

- ▶ the safety outputs use 2-channel processing.

## Improper use

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 chapter entitled [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.

Approved actuators:

- ▶ PSEN cs4.1
- ▶ PSEN cs2.1
- ▶ PSEN cs4.1 low profile glue
- ▶ PSEN cs4.1 low profile screw

## **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 IEC 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. In order to inspect, assess and handle products, devices, systems, plant and machinery, this person must be familiar with 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



### WARNING!

#### Loss of safety function due to manipulation of the interlocking device

Manipulation of the interlocking device may lead to serious injury and death.

- You should prevent any possibility of the interlocking device being manipulated through the use of a spare actuator.
- Keep the substitute actuator in a safe place and protect it from unauthorised access.
- If substitute actuators are used, these must be installed as described under [Installation \[15\]](#).
- If the original actuators are replaced with substitute actuators, the original actuators must be destroyed before disposal.

- ▶ Do not remove the connector's protective cap until you are just about to connect the unit. This will prevent potential contamination.

## Unit features

- ▶ Transponder technology for presence detection
- ▶ Pilz coding type: fully coded
- ▶ Dual-channel operation
- ▶ 2 safety outputs
- ▶ LED display for:
  - State of the actuator
  - Supply voltage/fault
- ▶ 1 direction of actuation
- ▶ 5-pin M12 male connector

## Function description

### Basic function

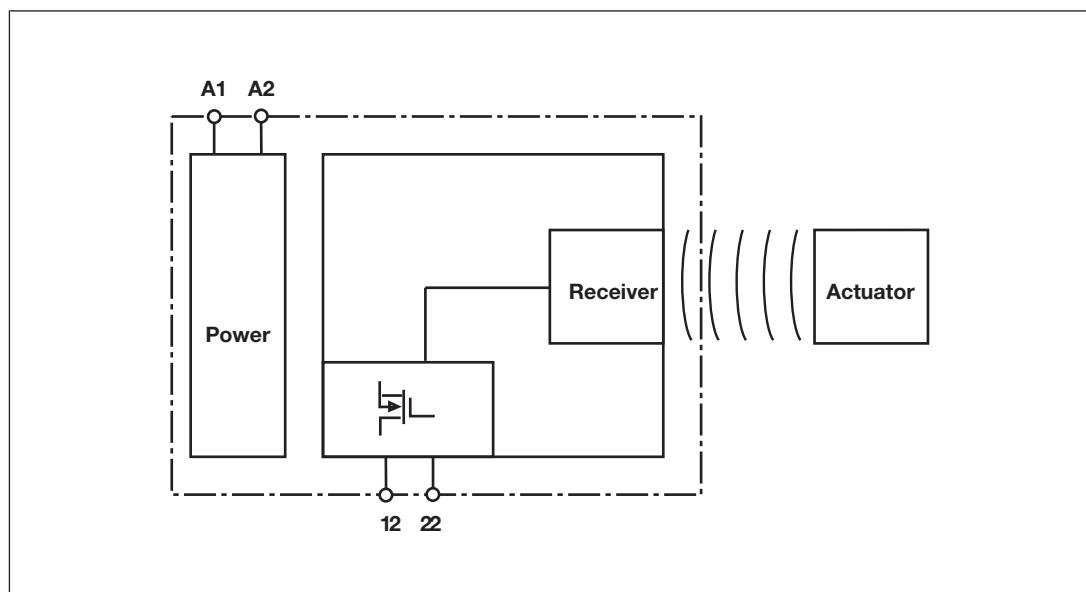
The safety outputs may have a high or low signal, depending on the position of the actuator.

In a safe condition the safety outputs are in the OFF state.

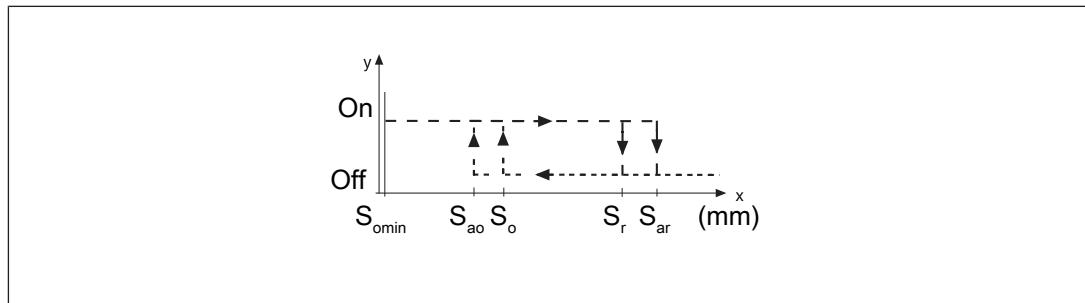
State of the outputs:

Actuator in the response range	Safety output 12	Safety output 22
Yes	High	High
No	Low	Low

### Block diagram



### Operating distances



#### Legend

$S_{ao}$  Assured operating distance

$S_{omin}$  Min. operating distance

$S_{ar}$  Assured release distance

The offset-independent values for the switching distances are included in the [Technical details](#) [25].

The switching distances of the actuators PSEN cs2.1 and PSEN cs4.1 low profile glue were determined under the following conditions:

- ▶ Assured operating distance  $S_{ao}$  and assured release distance  $S_{ar}$ 
  - Measurement over the entire temperature range
  - Installed on various base materials
  - Taking into account product tolerances
- ▶ Typical operating distance  $S_o$  and typical release distance  $S_r$ 
  - Measured at room temperature
  - Installed on plastic

### Lateral and vertical offset

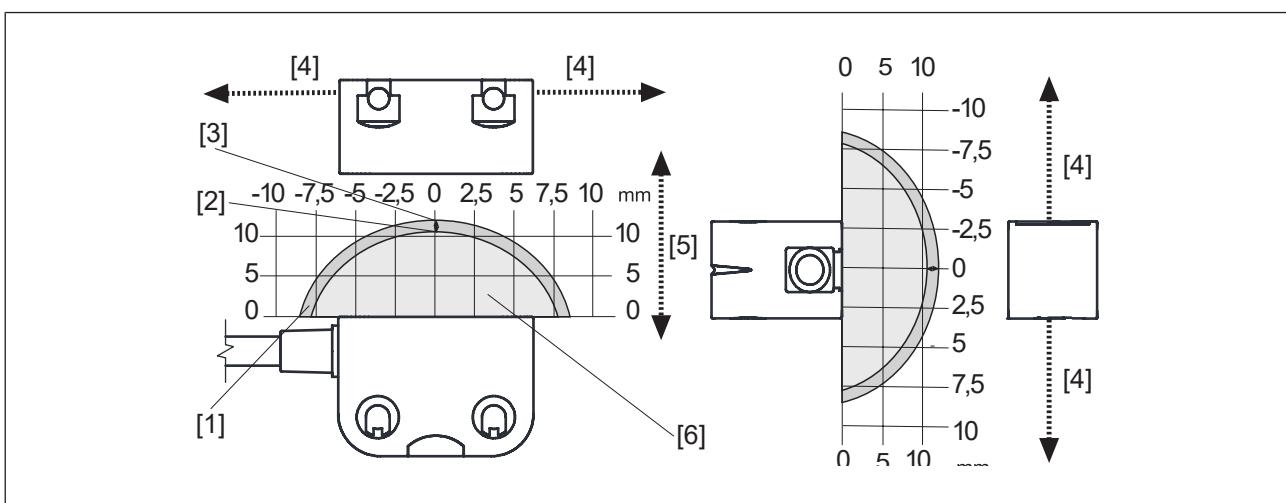


Fig.: Safety switches PSEN cs4.1n with actuator PSEN cs4.1

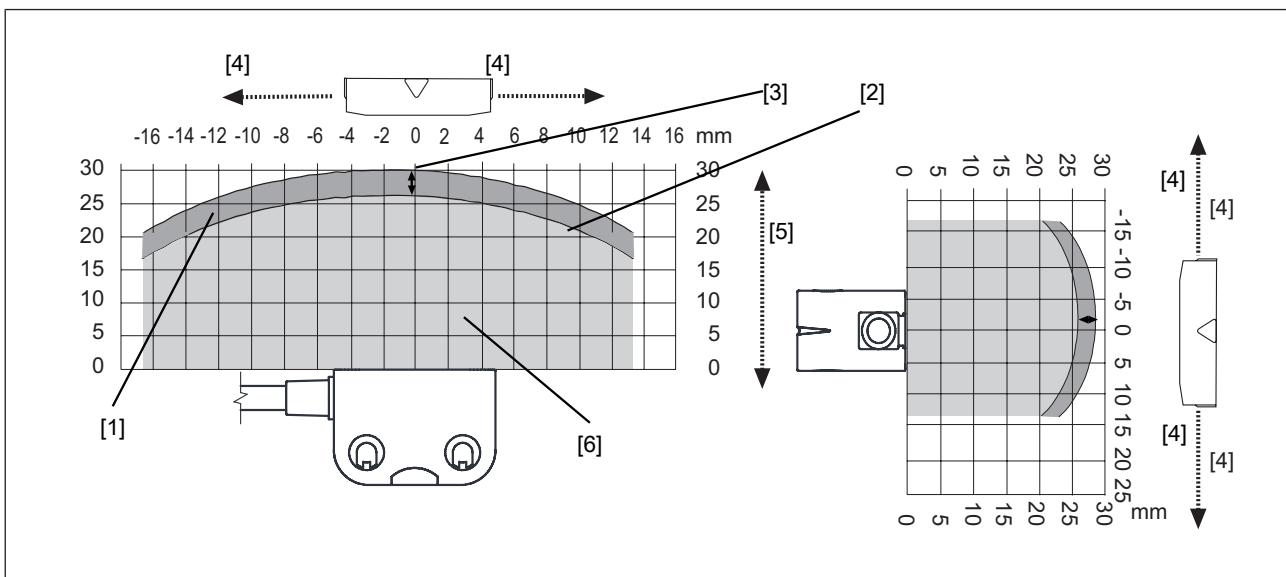


Fig.: Safety switches PSEN cs4.1n with actuator PSEN cs2.1

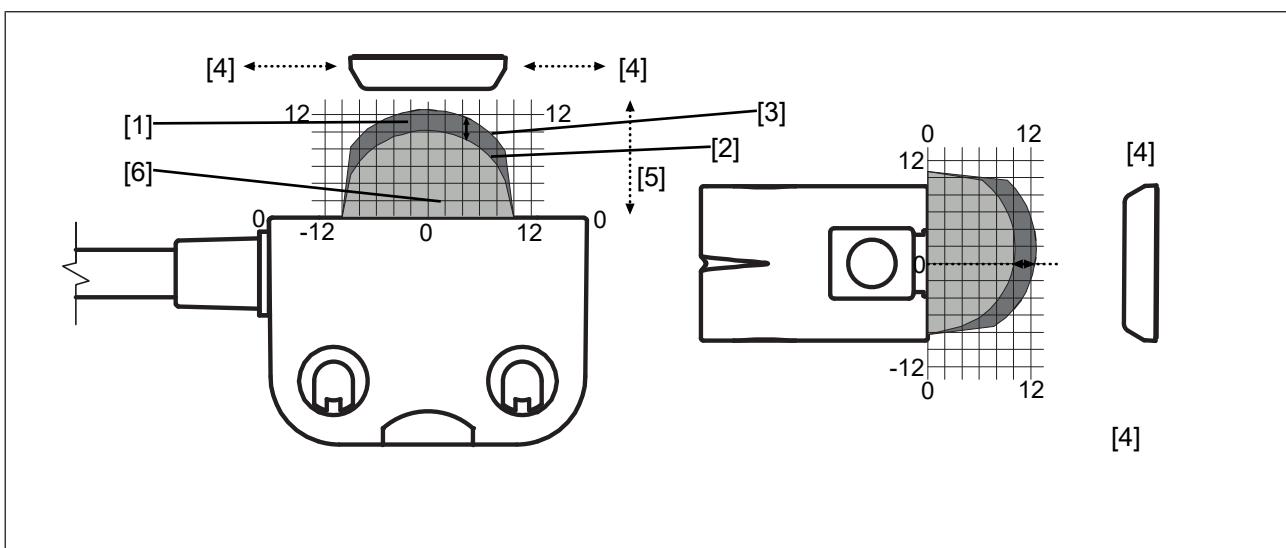


Fig.: Safety switches PSEN cs4.1n with actuator PSEN cs4.1 low profile glue or PSEN cs4.1 low profile screw

### Legend

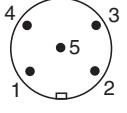
- [1] Hysteresis
- [2] Typical operating distance  $S_o$
- [3] Typical release distance  $S_r$
- [4] Offset in mm
- [5] Operating distance in mm
- [6] Response range

## Wiring

Please note:

- ▶ Information given in the "Technical details" must be followed.
- ▶ Switch off the supply voltage before disconnecting the plug-in connection.
- ▶ Make sure that when connecting or separating the connector the pollution degree 1 or 2 is maintained.
- ▶ The supply voltage to the safety switch must be protected with a 2 A to 4 A quick-acting fuse.
- ▶ Ensure the wiring and EMC requirements of EN 60204-1 are met.
- ▶ The power supply must meet the regulations for extra low voltages with protective electrical separation (SELV, PELV).
- ▶ The power supply must have an overvoltage protection of  $\leq 35$  V DC.

### Pin assignment, connector and cable

	5-pin M12 male connector		
Pin assignment table:			
PIN	Pin designation	Function	Wire colour
1	A1	+24 UB	Brown
2	12	Output, channel1	White
3	A2	0 V UB	Blue
4	22	Output, channel2	Black
5	-	Do not connect	Grey

The wire colour also applies for the cable available from Pilz as an accessory.

## Connection to evaluation devices

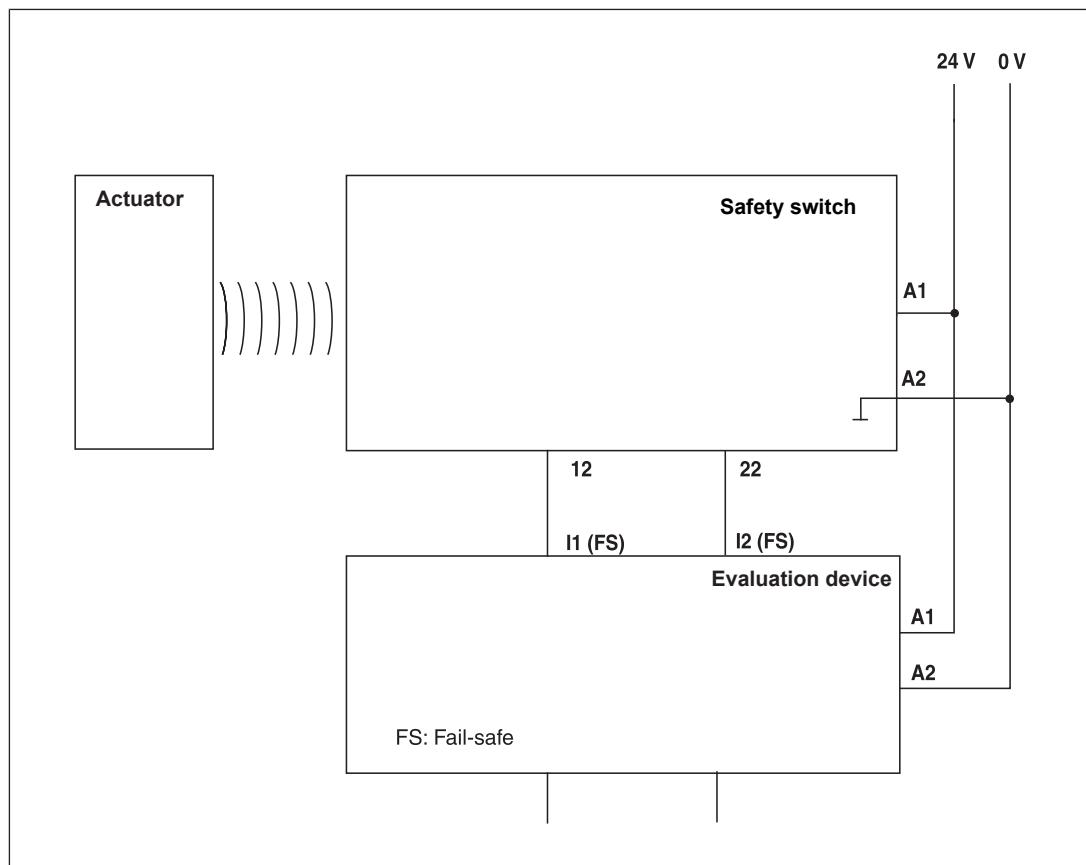
Make sure that the selected evaluation device has the following property:

- ▶ OSSD signals are evaluated through 2 channels with plausibility monitoring

Note:

- ▶ Information given in the [Technical details](#) [25] must be followed.

### Connection diagram, single connection



Suitable Pilz evaluation devices are, for example:

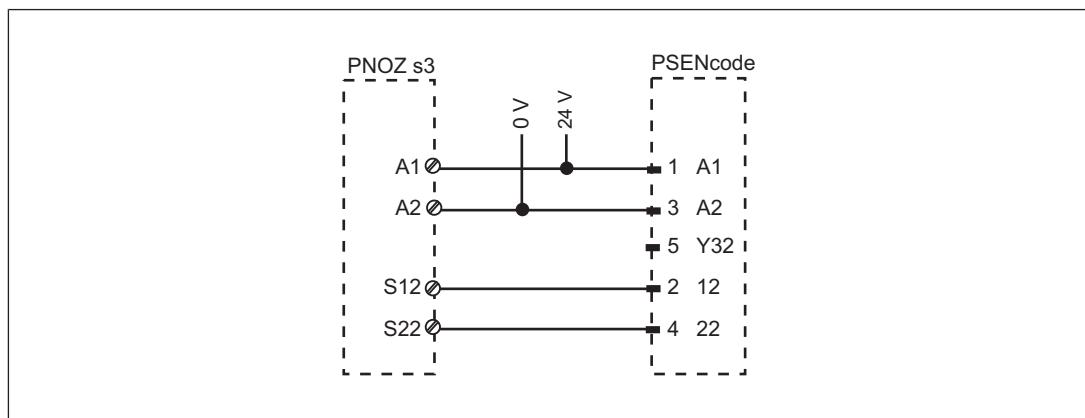
- ▶ PNOZelog for safety gate monitoring
- ▶ PNOZpower for safety gate monitoring
- ▶ PNOZsigma for safety gate monitoring
- ▶ PNOZ X for safety gate monitoring
- ▶ PNOZmulti for safety gate monitoring
- Configure the switch in the PNOZmulti Configurator with switch type 3.
- ▶ PSS for safety gate monitoring with standard function block SB064, SB066 or FS\_Safety Gate
- ▶ PSSuniversal PLC for safety gate monitoring with function block FS\_SafetyGate

The correct connection to the respective evaluation device is described in the operating manual for the evaluation device. Make sure that the connection is made in accordance with the specifications in the operating manual for the selected evaluation device.

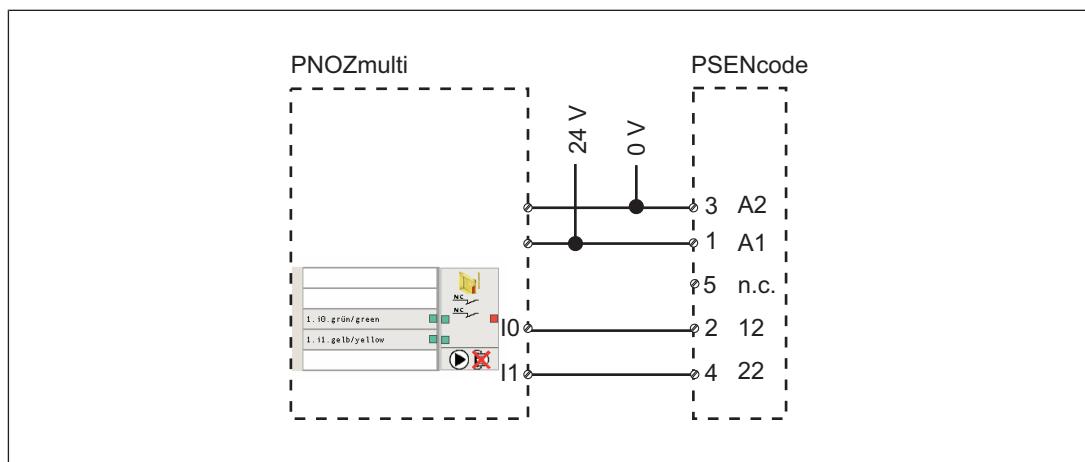
The connections to two evaluation devices are shown on the following pages, by way of example:

- ▶ PNOZ s3 and
- ▶ PNOZmulti

### PNOZ s3



### PNOZmulti



## Teaching in the actuator

### Teaching in the actuator for the first time:

The first actuator to be detected by the safety switch (see [Intended use \[book 6\]](#)) is taught in automatically as soon as it is brought into the response range.

### To teach in a new actuator:

A maximum of 8 learning procedures are possible.

1. The actuator that is to be taught in must be brought into the safety switch's response range as the only transponder. As soon as the actuator is detected, the "Safety Gate" LED will flash yellow.
2. After 20 s has elapsed, the "Safety Gate" LED turns to quick yellow flashes. Trigger a system reset in the next 120 s by interrupting the power supply.
3. When the supply voltage is switched back on, the learning procedure is complete and the number of permitted additional learning procedures is reduced by 1.

#### NOTICE



- The actuator must not be removed during the learning procedure.
- It is no longer possible to reteach this actuator on the same safety switch.

## Installation

### General



#### CAUTION!

#### Potential loss of safety function due to changed device properties

The unit's properties may be affected if installed in an environment containing electrically or magnetically conductive material.

- Please check the operating distances and the assured release distance.

- ▶ The safety switch and actuator should be installed opposite each other in parallel.
- ▶ Torque setting: Please note the information provided under [Technical details \[book 25\]](#).
- ▶ The distance between two safety switches must be maintained (see [Technical details \[book 25\]](#)).
- ▶ Make sure that the safety switch and actuator cannot be used as an end stop.
- ▶ Please note the installation measures in accordance with EN ISO 14119 for a safety switch design 4 and with level of coding High.
- ▶ Please note the permitted bending radii for the cable (see [Technical details \[book 25\]](#)), to avoid excessive force on the individual strands.

- ▶ Make sure that the bend protection is not damaged. Such damage can cause the whole product to fail.
- ▶ For simpler installation, the mounting brackets (see [Order reference for Accessories](#) [33]) can be used.

### Safety switch

- ▶ Safety switches should only be secured using M4 screws with a flat head (e.g. M4 cheese-head or pan head screws).

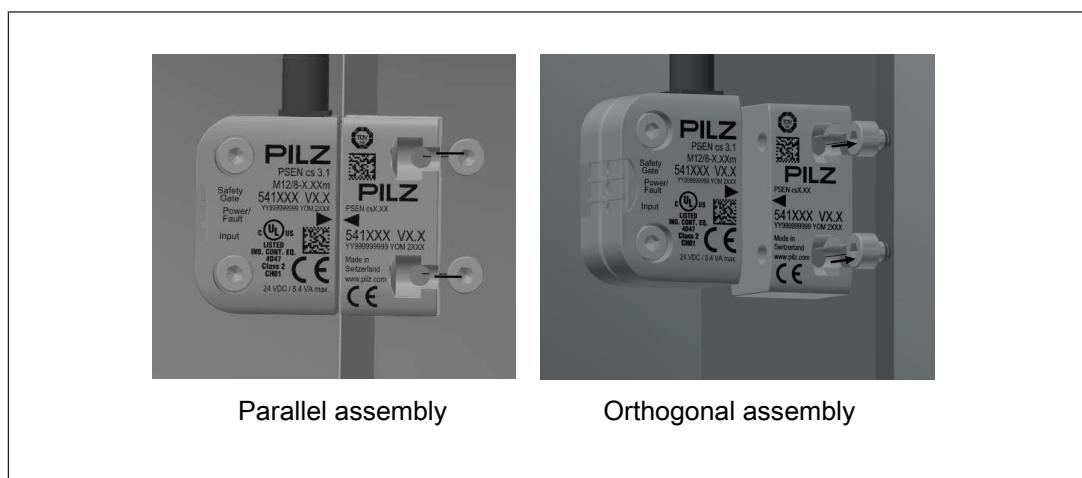
#### Procedure:

1. Provide the mounting surface with two drill holes for fastening the safety switch (see [Dimensions](#) [22]).
2. Use two screws to fix the safety switch in place. Do not fully tighten the 2nd screw on the safety switch.

### Actuator cs2.1 or cs4.1

#### Procedure actuator PSEN cs4.1:

1. Only use M4 screws with a flat head (e.g. M4 cheese-head or pan head screws). Provide the mounting surface with two drill holes for the actuator screw connection (see [Dimensions](#) [22]).
2. Attach the screws for the actuator, leaving a distance of 3 ... 6 mm between the screw head and plate.
3. Slide the actuator on to the screws. The arrows on the labelled surfaces of the safety switch and actuator must face each other. Align the actuator and tighten the screws.
4. The actuator should be protected from unauthorised removal and from contamination. Close the mounting holes using the seals provided. The use of seals should be regarded as equivalent to using permanent fastenings in accordance with EN ISO 14119.



**Procedure actuator PSEN cs2.1:**

1. Use permanently secured M5 safety screws with a flat head (e.g. M5 cheese-head or pan head screws).

Provide the mounting surface with two drill holes for the actuator screw connection (see [Dimensions \[22\]](#)).

2. Use two screws to fix the actuator in place. Align the actuator and tighten the screws.

**Actuator cs3.1 low profile****WARNING!****Loss of the manipulation protection by inadequate environmental conditions**

The loss of the manipulation protection can allow manipulation of the interlocking device and it may lead to serious injury or death.

- Make sure that the actuator has no direct or repetitive contact with materials such as methyl ethyl ketone (MEK), petrol or isopropanol.

- ▶ The actuator is secured against unauthorised removal, and against contamination by the sealing. The seal should be regarded as equivalent to using permanent fastenings in accordance with EN ISO 14119.
- ▶ By removing the actuator, the actuator will be destroyed.
- ▶ The actuator's adhesive force on the materials aluminium, stainless steel, polycarbonate and glass was checked. For deviating surface materials check the adhesive force on the surface.
- ▶ After a cure time of 24 hours, 90 % of the final adhesive force are achieved. The hardening must take place at min. 20 °C. With lower temperatures the cure time is clearly extended.
- ▶ No continuous force must affect the actuator.

### Procedure actuator PSEN cs4.1 low profile glue

1. To seal the low profile actuators correctly, it is necessary to prepare the surface to which the actuator is to be attached.

The surface must be clean, dry and free of grease.

Wipe off any solved grease and contaminations with a new, dry paper cloth.

Clean the surface with 70% isopropanol. Use lint-free paper cloths and change the paper cloths frequently.

The adhesive surface is clean when the paper remains clean.

The cleaned surfaces must be sealed immediately to prevent any new contamination by dust and fingerprints.

2. Remove the protective foil from the assembly aid and fix it to the sensing area of the safety switch.

3. Place the actuator into the assembly aid so that the actuator's covered adhesive surface is on the surface.

Make sure that the actuator's centre is on the same level as the orientation arrows of the sensor and in the centre of the sensor.

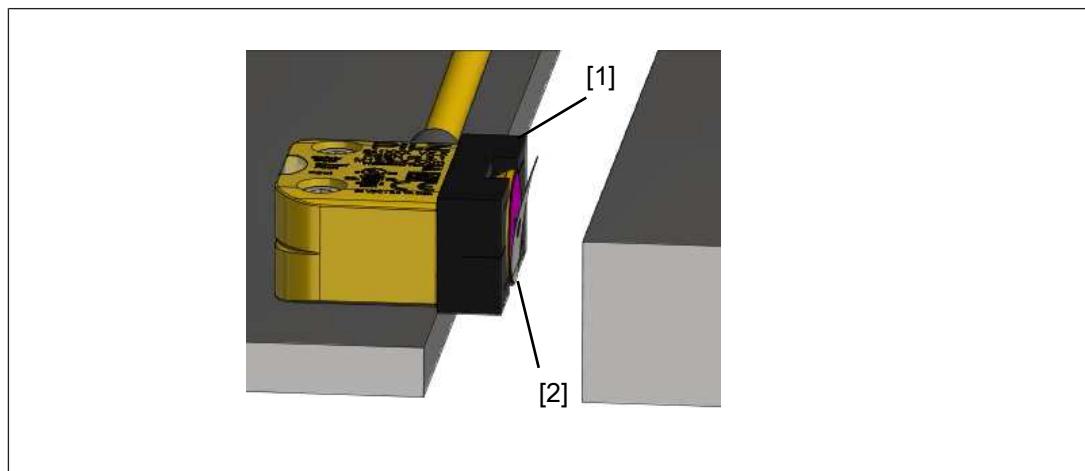


Fig.: Safety switch with assembly aid and low profile actuator

#### Legend

[1] Assembly aid for low profile actuator

[2] low profile actuator

4. Remove the protective foil from the adhesive foil of the actuator.

Do not touch the adhesive foil after removing the protective foil!

5. Close the safety gate carefully and then press the actuator to the adhesive position.

6. Press on the actuator for at least 3 seconds with approx. 50 N.

After this time, an adhesive force of approx. 50 % is achieved. The full adhesive force is achieved after 72 hours at an ambient temperature of at least 20 °C.



7. Check the adhesive force of the glue after 10 minutes.

The actuator must not move when pressed sideways.

8. Remove the assembly aid from the safety switch and clean the sensing area of the safety switch.

#### Procedure actuator PSEN cs4.1 low profile screw

1. Provide the mounting surface with a drill hole for an additional actuator screw connection (see [Dimensions](#) [22]).

2. To seal the low profile actuators correctly, it is necessary to prepare the surface to which the actuator is to be attached.

The surface must be clean, dry and free of grease.

Wipe off any solved grease and contaminations with a new, dry paper cloth.

Clean the surface with 70% isopropanol. Use lint-free paper cloths and change the paper cloths frequently.

The adhesive surface is clean when the paper remains clean.

The cleaned surfaces must be sealed immediately to prevent any new contamination by dust and fingerprints.

3. Remove the protective foil from the assembly aid and fix it to the sensing area of the safety switch.

4. Place the actuator into the assembly aid so that the actuator's covered adhesive surface is on the surface.

Make sure that the actuator's centre is on the same level as the orientation arrows of the sensor and in the centre of the sensor.

5. Remove the protective foil from the adhesive foil of the actuator.

Do not touch the adhesive foil after removing the protective foil!

6. Insert the screw into the actuator's hole and position the screw at the hole on the mounting surface.

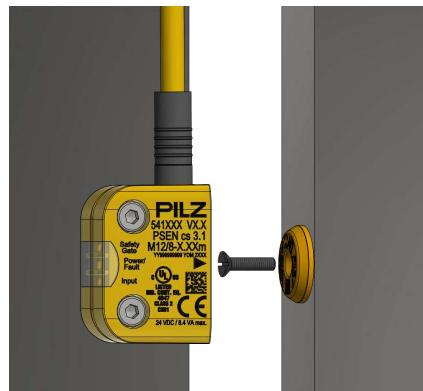
To screw on the actuator, use the supplied plastic M3 countersunk screw.

When using a screw mad from metal the operating distance change, please note the

**Warning** [15].

7. Press on the actuator for at least 3 seconds with approx. 50 N.

After this time, an adhesive force of approx. 50 % is achieved. The full adhesive force is achieved after 72 hours at an ambient temperature of at least 20 °C.



8. Check the adhesive force of the glue after 10 minutes.

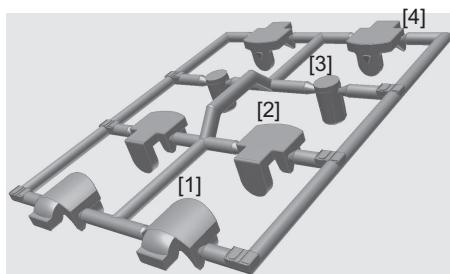
The actuator must no move when pressed sideways.

9. Tighten the M3 plastic screw to 0.1 Nm.

## Align safety switch and actuator

### Procedure:

1. Align the safety switch and tighten the screws.
2. Actuator PSEN cs4.1  
Align the actuator and tighten the screws.
3. Close the mounting holes using the seals provided (see diagram).  
Use the seals [1] for UL approval or [4] without UL approval.



### Legend

- [1] Side seal with UL approval
- [2] Bottom seal
- [3] Top seal, sensing side
- [4] Side seal without UL approval

4. Use the seals to close the mounting holes on the sensing face of the safety switch (see diagram, [3]).
5. If necessary, use the seals to close the unused mounting holes on the actuator (see diagram, [2]).

## Adjustment

- The stated operating distances (see [Technical details](#) [25]) only apply when the safety switch and actuator are installed facing each other in parallel. Operating distances may deviate if other arrangements are used.
- Note the maximum permitted lateral and vertical offset (see [Operating distances](#) [10] and [Lateral and vertical offset](#) [10]).

## Operation



### NOTICE

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

Check the function of the safety switch before commissioning.

#### Status indicators:

- "POWER/Fault" LED lights up green: The unit is ready for operation
- "Safety Gate" LED lights up yellow: Actuator is within the response range

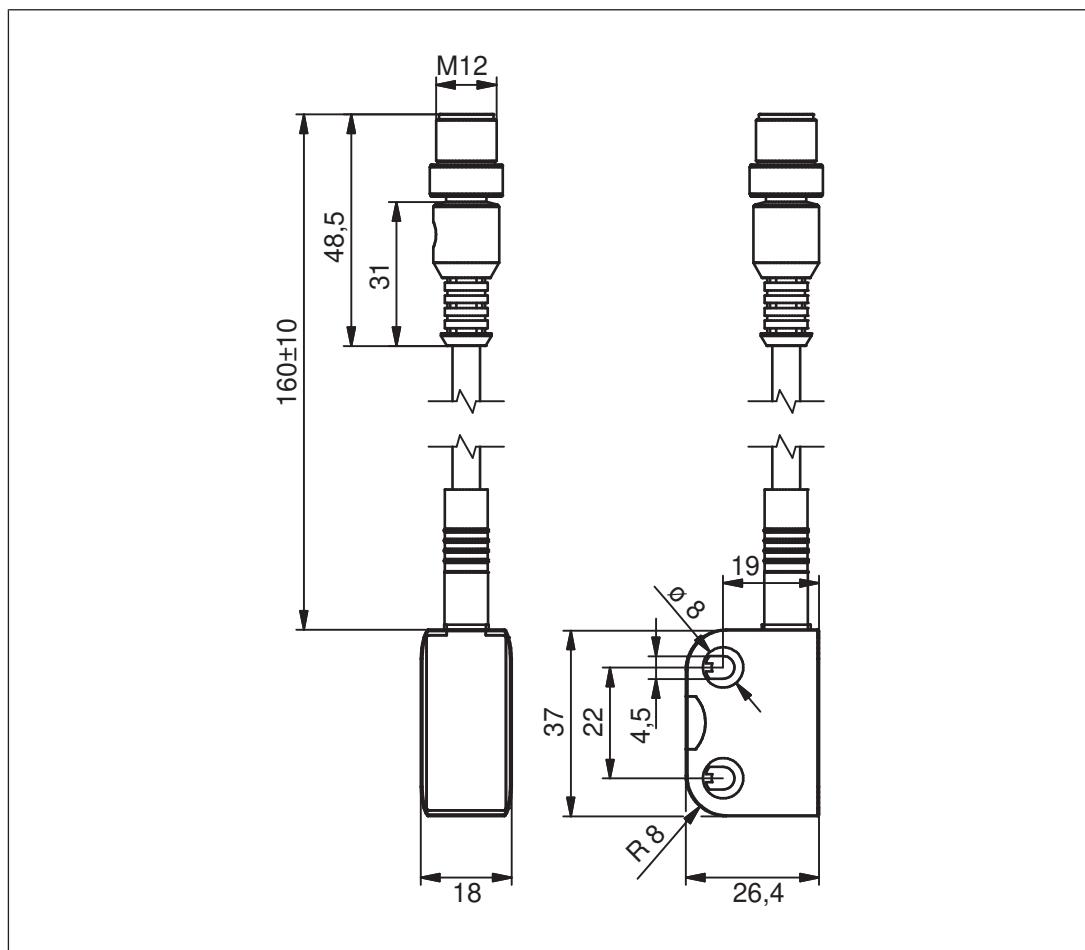
#### Fault indicator:

- "POWER/Fault" LED lights up red: Error message.

Remedy: Rectify fault and interrupt power supply.

## Dimensions in mm

### Safety switch



**Actuator**

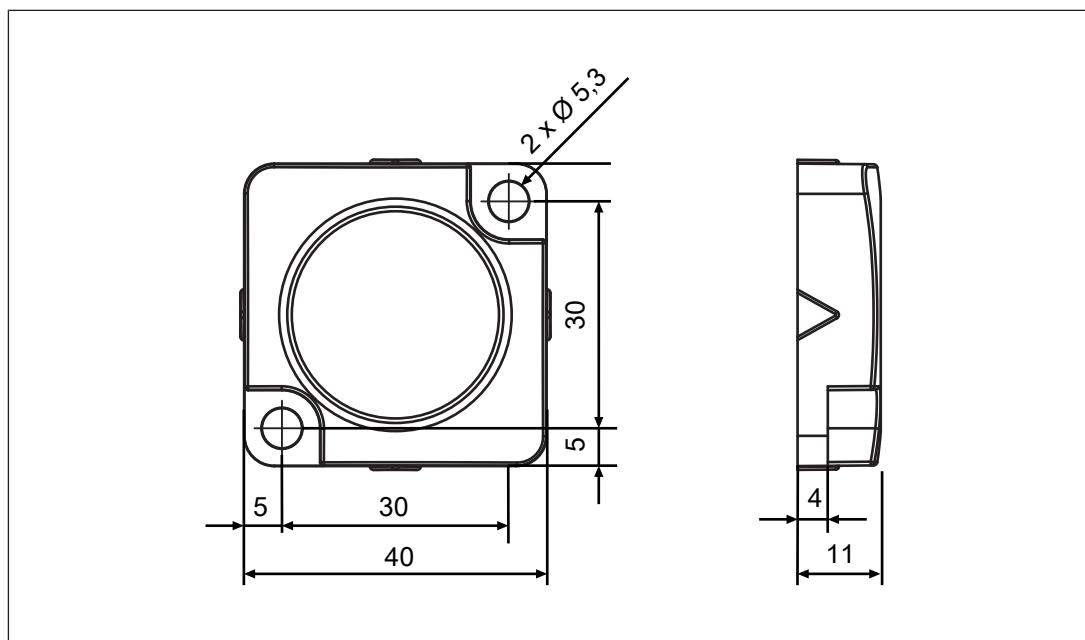


Fig.: Actuator PSEN cs2.1

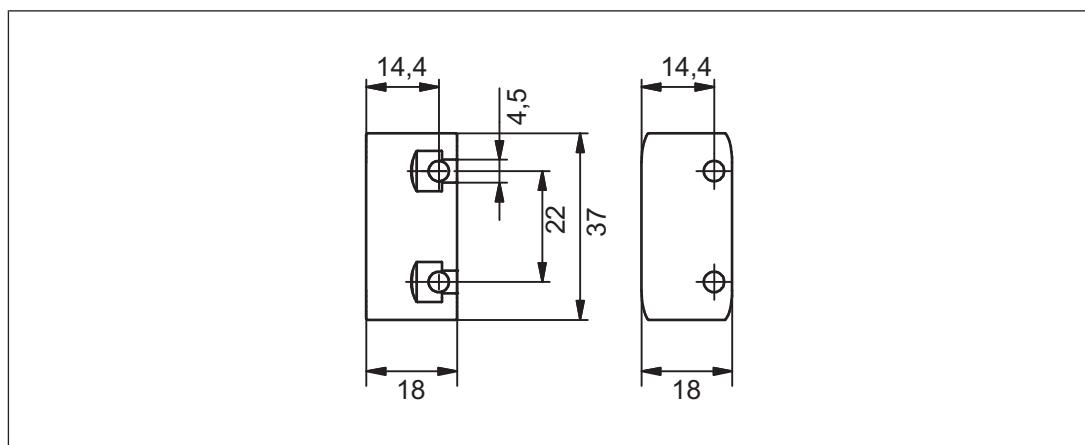
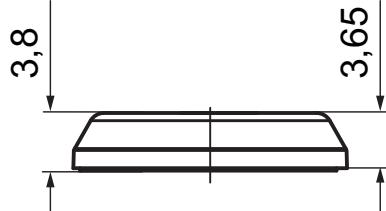
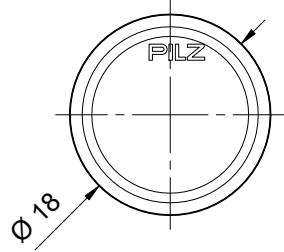
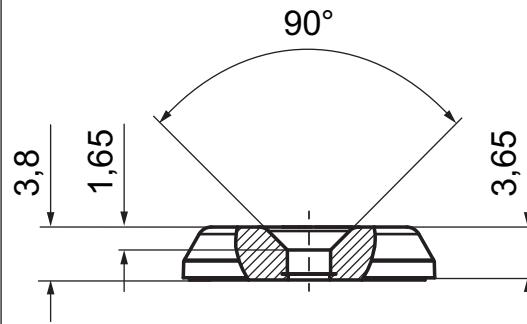
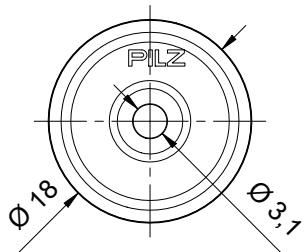


Fig.: Actuator PSEN cs4.1

Actuator PSEN cs4.1 low profile glue



Actuator PSEN cs4.1 low profile screw



## Technical details safety switch

General	
Certifications	CE, EAC, FCC, IC, TÜV, UKCA, cULus Listed
Sensor's mode of operation	Transponders
Coding level in accordance with EN ISO 14119	High
Design in accordance with EN ISO 14119	4
Classification in accordance with EN 60947-5-3	PDDB
Pilz coding type	fully coded
Transponders	
Frequency band	122 kHz - 128 kHz
Max. transmitter output	15 mW
Electrical data	
Supply voltage	
Voltage	24 V
Kind	DC
Voltage tolerance	-20 %/+20 %
Output of external power supply (DC)	1 W
Max. switching frequency	3 Hz
Max. cable capacitance at the safety outputs	
No-load, PNOZ with relay contacts	400 nF
PNOZmulti, PNOZelog, PSS	400 nF
Max. inrush current impulse	
Current pulse, A1	0,58 A
Pulse duration, A1	1 ms
No-load current	20 mA
Semiconductor outputs	
OSSD safety outputs	2
Switching current per output	100 mA
Breaking capacity per output	2,4 W
Potential isolation from system voltage	No
Short circuit-proof	Yes
Residual current at outputs	20 µA
Voltage drop at OSSDs	3,5 V
Lowest operating current	2 mA
Utilisation category in accordance with EN 60947-1	DC-12
Times	
Max. test pulse duration, safety outputs	450 µs
Switch-on delay	
after UB is applied	1 s
Actuator typ.	60 ms
Actuator max.	150 ms
Delay-on de-energisation	
Actuator typ.	40 ms
Actuator max.	260 ms

<b>Times</b>	
Risk time in accordance with EN 60947-5-3	<b>260 ms</b>
Supply interruption before de-energisation	<b>10 ms</b>
Simultaneity, channel 1 and 2 max.	$\infty$
<b>Environmental data</b>	
Ambient temperature	
in accordance with the standard	<b>EN 60068-2-14</b>
Temperature range	<b>-25 - 70 °C</b>
Storage temperature	
in accordance with the standard	<b>EN 60068-2-1/-2</b>
Temperature range	<b>-25 - 70 °C</b>
Climatic suitability	
in accordance with the standard	<b>EN 60068-2-78</b>
Humidity	<b>93 % r. h. at 40 °C</b>
EMC	<b>EN 60947-5-3</b>
Vibration	
in accordance with the standard	<b>EN 60947-5-2</b>
Frequency	<b>10 - 55 Hz</b>
Amplitude	<b>1 mm</b>
Shock stress	
in accordance with the standard	<b>EN 60947-5-2</b>
Acceleration	<b>30g</b>
Duration	<b>18 ms</b>
Airgap creepage	
Overvoltage category	<b>III</b>
Pollution degree	<b>3</b>
Rated insulation voltage	<b>75 V</b>
Rated impulse withstand voltage	<b>0,8 kV</b>
Protection type	
Housing	<b>IP6K9K</b>
Connectors	<b>IP67</b>
<b>Operating distances</b>	
Actuator 1	
Type	<b>PSEN cs4.1</b>
Assured operating distance Sao	<b>8 mm</b>
Typical operating distance So	<b>11 mm</b>
Assured release distance Sar	<b>20 mm</b>
Typical release distance Sr	<b>14 mm</b>
Repetition accuracy switching distances	<b>10 %</b>
Change of operating distance with temperature changes	<b>+0,01mm/°C</b>
Typ. hysteresis	<b>2 mm</b>

### Operating distances

## Actuator 2

Type	<b>PSEN cs2.1</b>
Assured operating distance Sao	<b>10 mm</b>
Typical operating distance So	<b>25 mm</b>
Assured release distance Sar	<b>33 mm</b>
Typical release distance Sr	<b>29 mm</b>
Repetition accuracy switching distances	<b>10 %</b>
Change of operating distance with temperature changes	<b>+0,1mm/°C</b>
Typ. hysteresis	<b>3 mm</b>

## Actuator 3

Type	<b>PSEN cs4.1 low profile glue</b>
Assured operating distance Sao	<b>5 mm</b>
Typical operating distance So	<b>10 mm</b>
Assured release distance Sar	<b>20 mm</b>
Typical release distance Sr	<b>12 mm</b>
Repetition accuracy switching distances	<b>10 %</b>
Change of operating distance with temperature changes	<b>+0,01mm/°C</b>
Typ. hysteresis	<b>2 mm</b>

## Actuator 4

Type	<b>PSEN cs4.1 low profile screw</b>
Assured operating distance Sao	<b>5 mm</b>
Typical operating distance So	<b>10 mm</b>
Assured release distance Sar	<b>20 mm</b>
Typical release distance Sr	<b>12 mm</b>
Repetition accuracy switching distances	<b>10 %</b>
Change of operating distance with temperature changes	<b>+0,01mm/°C</b>
Typ. hysteresis	<b>2 mm</b>

### Mechanical data

Min. bending radius (fixed permanently) K1	<b>5 x Ø</b>
Min. bending radius (moving) K1	<b>10 x Ø</b>
Cable diameter K1	<b>5,55 mm</b>
Min. distance between safety switches	<b>100 mm</b>
Sensor flush installation in accordance with EN 60947-5-2	<b>yes, follow installation guidelines</b>
Connection type	<b>M12, 5-pin male connector</b>
Cable	<b>Li9Y11Y 8 x 0.14 mm<sup>2</sup></b>
Material	
Top	<b>PBT</b>
Max. fixing screws torque settings	<b>0,8 Nm</b>
Dimensions	
Height	<b>37 mm</b>
Width	<b>26 mm</b>
Depth	<b>18 mm</b>

**Mechanical data**

Weight of safety switch	<b>40 g</b>
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Where standards are undated, the 2016-10 latest editions shall apply.

**Technical details actuator****Order no. 540180 - 541180**

See below for more order numbers

<b>General</b>	<b>540180</b>	<b>541180</b>
Certifications	<b>CE, TÜV, UKCA, cULus Listed</b>	<b>CE, EAC, TÜV, UKCA, cULus Listed</b>
Sensor's mode of operation	<b>Transponders</b>	<b>Transponders</b>
Coding level in accordance with EN ISO 14119	<b>High</b>	<b>High</b>
Pilz coding type	<b>fully coded</b>	<b>fully coded</b>
<b>Transponders</b>	<b>540180</b>	<b>541180</b>
Frequency band	<b>122 kHz - 128 kHz</b>	<b>122 kHz - 128 kHz</b>
<b>Environmental data</b>	<b>540180</b>	<b>541180</b>
Ambient temperature		
in accordance with the standard	<b>EN 60068-2-14</b>	<b>EN 60068-2-14</b>
Temperature range	<b>-25 - 70 °C</b>	<b>-25 - 70 °C</b>
Storage temperature		
in accordance with the standard	<b>EN 60068-2-1/-2</b>	<b>EN 60068-2-1/-2</b>
Temperature range	<b>-40 - 85 °C</b>	<b>-25 - 70 °C</b>
Climatic suitability		
in accordance with the standard	<b>EN 60068-2-78</b>	<b>EN 60068-2-78</b>
Humidity	<b>93 % r. h. at 40 °C</b>	<b>93 % r. h. at 40 °C</b>
EMC	<b>EN 60947-5-3</b>	<b>EN 60947-5-3</b>
Vibration		
in accordance with the standard	<b>EN 60947-5-2</b>	<b>EN 60947-5-2</b>
Frequency	<b>10 - 55 Hz</b>	<b>10 - 55 Hz</b>
Amplitude	<b>1 mm</b>	<b>1 mm</b>
Shock stress		
in accordance with the standard	<b>EN 60947-5-2</b>	<b>EN 60947-5-2</b>
Acceleration	<b>30g</b>	<b>30g</b>
Duration	<b>11 ms</b>	<b>18 ms</b>
Protection type		
Housing	<b>IP6K9K</b>	<b>IP6K9K</b>
<b>Mechanical data</b>	<b>540180</b>	<b>541180</b>
Material		
Top	<b>PBT</b>	<b>PBT</b>
Max. fixing screws torque settings	<b>1 Nm</b>	<b>0,8 Nm</b>

<b>Mechanical data</b>	<b>540180</b>	<b>541180</b>
Dimensions		
Height	11 mm	37 mm
Width	40 mm	18 mm
Depth	40 mm	18 mm
Weight	20 g	11 g
<b>Order no. 541187 - 541188</b>		
<b>General</b>	<b>541187</b>	<b>541188</b>
Certifications	CE, EAC, TÜV, UKCA, cULus Listed	CE, EAC, TÜV, UKCA, cULus Listed
Sensor's mode of operation	<b>Transponders</b>	<b>Transponders</b>
Coding level in accordance with EN ISO 14119	High	High
Pilz coding type	fully coded	fully coded
<b>Transponders</b>	<b>541187</b>	<b>541188</b>
Frequency band	122 kHz - 128 kHz	122 kHz - 128 kHz
<b>Environmental data</b>	<b>541187</b>	<b>541188</b>
Ambient temperature		
in accordance with the standard	<b>EN 60068-2-14</b>	<b>EN 60068-2-14</b>
Temperature range	-25 - 70 °C	-25 - 70 °C
Max. at max. operating height	+60 °C	+60 °C
Max. at operating height < 2000 m	+70 °C	+70 °C
Storage temperature		
in accordance with the standard	<b>EN 60068-2-1/-2</b>	<b>EN 60068-2-1/-2</b>
Temperature range	-40 - 85 °C	-40 - 85 °C
Climatic suitability		
in accordance with the standard	<b>EN 60068-2-30</b>	<b>EN 60068-2-30</b>
Humidity	93 % r. h. at 40 °C	93 % r. h. at 40 °C
Max. operating height above SL	<b>4000 m</b>	<b>4000 m</b>
EMC	<b>EN 60947-5-3</b>	<b>EN 60947-5-3</b>
Vibration		
in accordance with the standard	<b>EN 60947-5-2</b>	<b>EN 60947-5-2</b>
Frequency	10 - 55 Hz	10 - 55 Hz
Amplitude	1 mm	1 mm
Shock stress		
in accordance with the standard	<b>EN 60947-5-2</b>	<b>EN 60947-5-2</b>
Acceleration	30g	30g
Duration	11 ms	11 ms
Protection type		
Housing	<b>IP67</b>	<b>IP67</b>
<b>Mechanical data</b>	<b>541187</b>	<b>541188</b>
Material		
Top	<b>PBT</b>	<b>PBT</b>
Max. fixing screws torque settings	–	<b>0,1 Nm</b>

Mechanical data	541187	541188
Dimensions		
Height	3,8 mm	3,8 mm
Width	18 mm	18 mm
Depth	18 mm	18 mm
Weight	2 g	2 g

Where standards are undated, the 2016-10 latest editions shall apply.

### Classification according to ZVEI, CB241

The following tables describe the classes and specific values of the product interface and the classes of interfaces compatible with it. The classification is described in the ZVEI position paper "Classification of Binary 24 V Interfaces - Functional Safety aspects covered by dynamic testing".

### Single-pole output

#### Interfaces

##### Source

Interface	Sensor
Class	C2

##### Drain

Interface	Evaluation device
Class	C1, C2

### Source parameters

Max. test pulse duration	450 µs
Max. rated current	0,1 A
Max. capacitive load	0,4 µF

## 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	EN ISO 13849-1: 2015	EN IEC 62061	EN IEC 62061	EN/IEC 61511	EN/IEC 61511	EN ISO 13849-1: 2015
PL	Category	SIL	SIL CL/max.	61508	61508	61508	T <sub>M</sub> [year]
2-ch. OSSD	PL e	Cat. 4	SIL CL 3	2,62E-09	–	7,68E-05	20

Explanatory notes for the safety-related characteristic data:

- 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/IEC 61508-6 and EN/IEC 61511 and as the proof test interval and mission time in accordance with EN IEC 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 differ from these.

## Supplementary data

### Radio approval

USA/Canada



FCC ID: VT8-PSENCS3  
IC: 7482A-PSENCS3

#### FCC/IC-Requirements:

This product complies with Part 15 of the FCC Rules and with Industry Canada licence-exempt RSS standards.

Operation is subject to the following two conditions:

- 1) this product may not cause harmful interference, and
- 2) this product must accept any interference received, including interference that may cause undesired operation.

Changes or modifications made to this product not expressly approved by Pilz may void the FCC authorization to operate this equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Le présent produit est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) le produit ne doit pas produire de brouillage, et
- (2) l'utilisateur de le produit doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

**Order reference****Safety switch**

Product type	Features		Order no.
PSEN cs4.1n 1switch	Safety switch, fully coded	5-pin M12 male connector	541153

**Actuator**

Product type	Features		Order no.
PSEN cs2.1 1 actuator	Actuator, fully coded		540180
PSEN cs4.1 1actuator	Actuator, fully coded		541180
PSEN cs4.1 low profile glue 1 actuator	Actuator fully coded, without screw		541187
PSEN cs4.1 low profile screw 1 actuator	Actuator fully coded, with screw		541188

**Complete systems**

Product type	Features		Order no.
PSEN cs4.1n /PSEN cs4.1 1 Unit	Safety gate system, fully coded	5-pin M12 connector	541103

**Accessories****Installation material**

Product type	Features	Order no.
PSEN bracket	Mounting bracket	532110
PSEN mag/cs bracket straight	Mounting aid	532111
PSEN screw M4x20 10pcs	Safety screws made from stainless steel with one-way slot	540313
PSEN screw M4x26 10pcs	Safety screws made from stainless steel with one-way slot	540314
PSEN screw M5x10 10pcs	Safety screws made from stainless steel with one-way slot	540311
PSEN screw M5x20 10pcs	Safety screws made from stainless steel with one-way slot	540312
PSEN cs1/2 bracket cable fix	Mechanical protection against defeat, protecting against unauthorised cable disconnection or damage for safety switches PSENcode cs1/2, PSENcode cs5/6 M12, PSENslock	532112

**Cable**

Product type	Connection 1	Connection 2	Length	Order No.
PSS67/PDP67 cable M12-5sf	straight, M12, 5-pin, socket	straight, M12, 5-pin, connector	3 m	380208
			5 m	380209
			10 m	380210
			20 m	380220
			30 m	380211
PSS67/PDP67 cable M12-5af	Angled, M12, 5-pin, socket	Angled, M12, 5-pin, connector	3 m	380212
			5 m	380213
			10 m	380214
			30 m	380215
PSEN cable M12-5sf	straight, M12, 5-pin, socket	Open cable	3 m	630310
			5 m	630311
			10 m	630312
			20 m	630298
			30 m	630297
PSEN cable M12-5af	Angled, M12, 5-pin, socket	Open cable	3 m	630347
			5 m	630348
			10 m	630349
			30 m	630350
PDP67 F 8DI ION	Decentralised input module IP67 for PNOZmulti			773600

## **EC declaration of conformity**

This product/these products meet(s) the requirements of the following directives of the European Parliament and of the Council.

- 2006/42/EC on machines
- 2014/53/EU on radio equipment

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

Representative: 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) Regulations 2008
- Radio Equipment Regulations 2017

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

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