



Visualisation; Diagnostics

Easy to Configure

Programming IEC 61131-3

Rapid Installation

## PSEN ml b 1.1

► PSEN sensor technology

**PILZ**  
THE SPIRIT OF SAFETY

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SD means Secure Digital

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## Introduction

### Validity of documentation

This documentation is valid for the product PSEN ml b 1.1. 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 gate system is used for guard locking and interlocking swing gates and sliding gates.

The safety gate system prevents the safety gate from being unlocked while there is any hazard within the danger zone (conditional unlock).

The hazardous machine function may only be executed under the following conditions:

- ▶ There is a high signal at safety outputs 12 and 22 and
- ▶ There is a low signal at safety outputs S31 (Lock/Unlock Request 1) and S41 (Lock/Unlock Request 2).

Safety inputs S31 and S41 (solenoid operation) may only be operated under the following condition:

- ▶ Plant is in a safe condition

Make sure that this is the case with an AND operation in the safety system immediately before the output is operated.

The safety switch meets the requirements in accordance with:

- ▶ EN 60947-5-3 with the actuator PSEN ml 1.1: PDDB
- ▶ EN 62061: SIL CL 3
- ▶ EN ISO 13849-1: PL e (Cat. 4 )
- ▶ EN ISO 14119: Coding level Low, Type4

The safety switch may only be used with the corresponding actuator PSEN ml 1.1.

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

- ▶ the safety outputs use 2-channel processing
- ▶ The solenoid has 2-channel operation via safe, tested outputs, suitable for PL e (Cat. 4 )/SIL CL 3 applications.

### Foreseeable misuse

- ▶ Safety switches and actuators of the safety gate system PSEN ml b 1.1 must **not** be used as mechanical limit stops
- ▶ Use of the PSEN ml b 1.1 under corrosive environmental conditions (cooling emulsions, surface treatment, gases, ...)

Please contact Pilz.

## Safety regulations

### Safety assessment

Before using a unit it is necessary to perform a safety assessment in accordance with the Machinery Directive.

Functional safety is guaranteed for the product as a single component. However, this does not guarantee the functional safety of the overall plant/machine. In order to achieve the required safety level for the overall plant/machine, define the safety requirements for the plant/machine and then define how these must be implemented from a technical and organisational standpoint.

### Use of qualified personnel

The products may only be assembled, installed, programmed, commissioned, operated, maintained and decommissioned by competent persons.

A competent person is someone who, because of their training, experience and current professional activity, has the specialist knowledge required to test, assess and operate the work equipment, devices, systems, plant and machinery in accordance with the general standards and guidelines for safety technology.

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 this description under "Safety"
- ▶ And 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 substituting an actuator from the interlocking and guard locking system

Substituting an actuator for an inappropriate actuator may lead to serious injury and death.

- You should prevent the interlocking and guard locking system from being manipulated with an inappropriate 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](#)  16]
- If the original actuators are replaced with substitute actuators, the original actuators must be destroyed before disposal.

**Unit features**

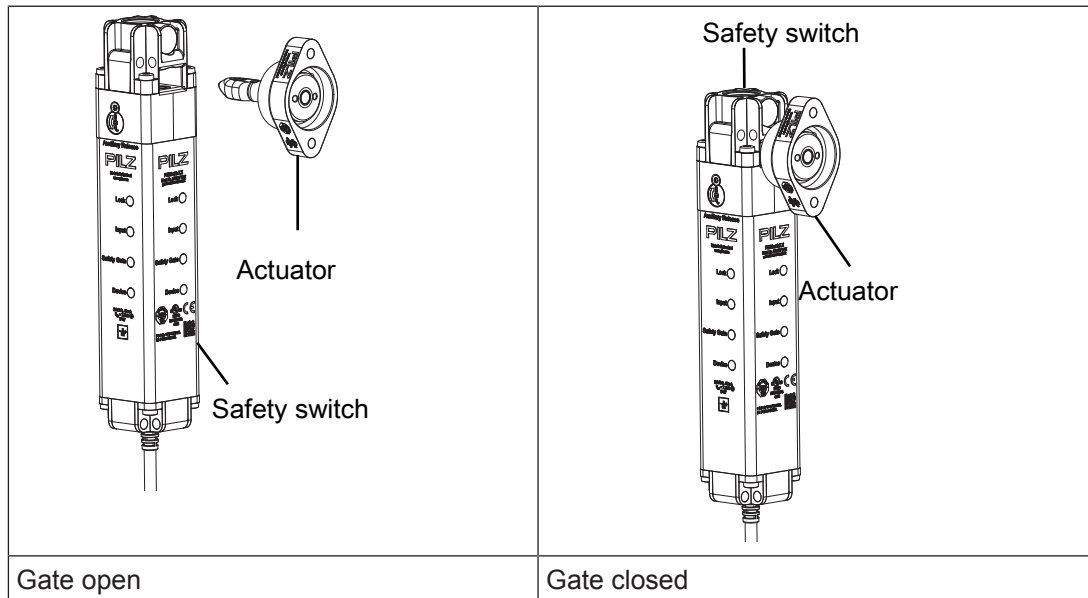
- ▶ Safe guard locking for swing gates and sliding gates
- ▶ Safe interlocking (position monitoring)
- ▶ Transponder technology
- ▶ 2 safety outputs
- ▶ Monitoring of shorts between the safety outputs
- ▶ Guard locking element keeps the safety gate from being opened unintentionally
- ▶ Auxiliary release for opening the safety gate
- ▶ 1 signal output
- ▶ Suitable for left and right hinged safety gates
- ▶ Pilz coding type: Coded
- ▶ M12, 8-pin male connector
- ▶ LEDs:
  - Supply voltage/fault
  - Status of actuator
  - Status of guard locking
  - Input lights up yellow (without function)
- ▶ The bolt in the actuator can be rotated 90° in the actuator housing before the actuator is installed. As a result, the actuator can be installed vertically or horizontally.



## Function description

The interlocking and guard locking system prevents the safety gates to the danger zone from being opened while there is any hazard within the danger zone (machine movement, voltage, ...).

The safety outputs may have a high or low signal, depending on the position of the actuator and the signal path of safety inputs S31 and S41 (solenoid operation).



### Safety outputs 12 and 22

Under these conditions there is a high signal at safety outputs 12 and 22:

- ▶ Actuator is detected **and**
- ▶ Guard locking pin has successfully been activated (guard locking pin is in the locked position)

If one of these conditions is not met, the signal at the safety outputs will be low.

### Signal output Y32

There is a high signal at the signal output Y32 if the actuator is within the response range (safety gate closed).

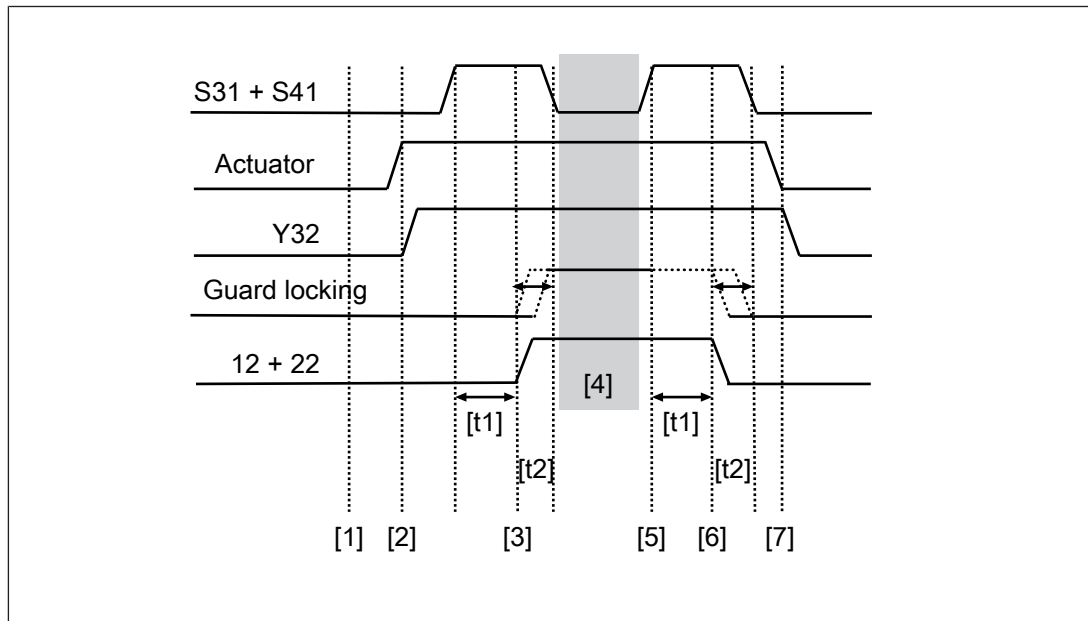
### Safety inputs S31 and S41 (solenoid operation)

- ▶ If there is a low signal at safety inputs S31 and S41, the guard locking pin does not change its position.

Guard locking is activated through a high signal (length  $2 \pm 0,5$  s) at inputs S31 and S41 (solenoid operation). After activation, the inputs must be low. Another pulse (length  $2 \pm 0,5$  s) at these inputs deactivates guard locking.

Guard locking may only be deactivated once the hazardous movement has been completed.

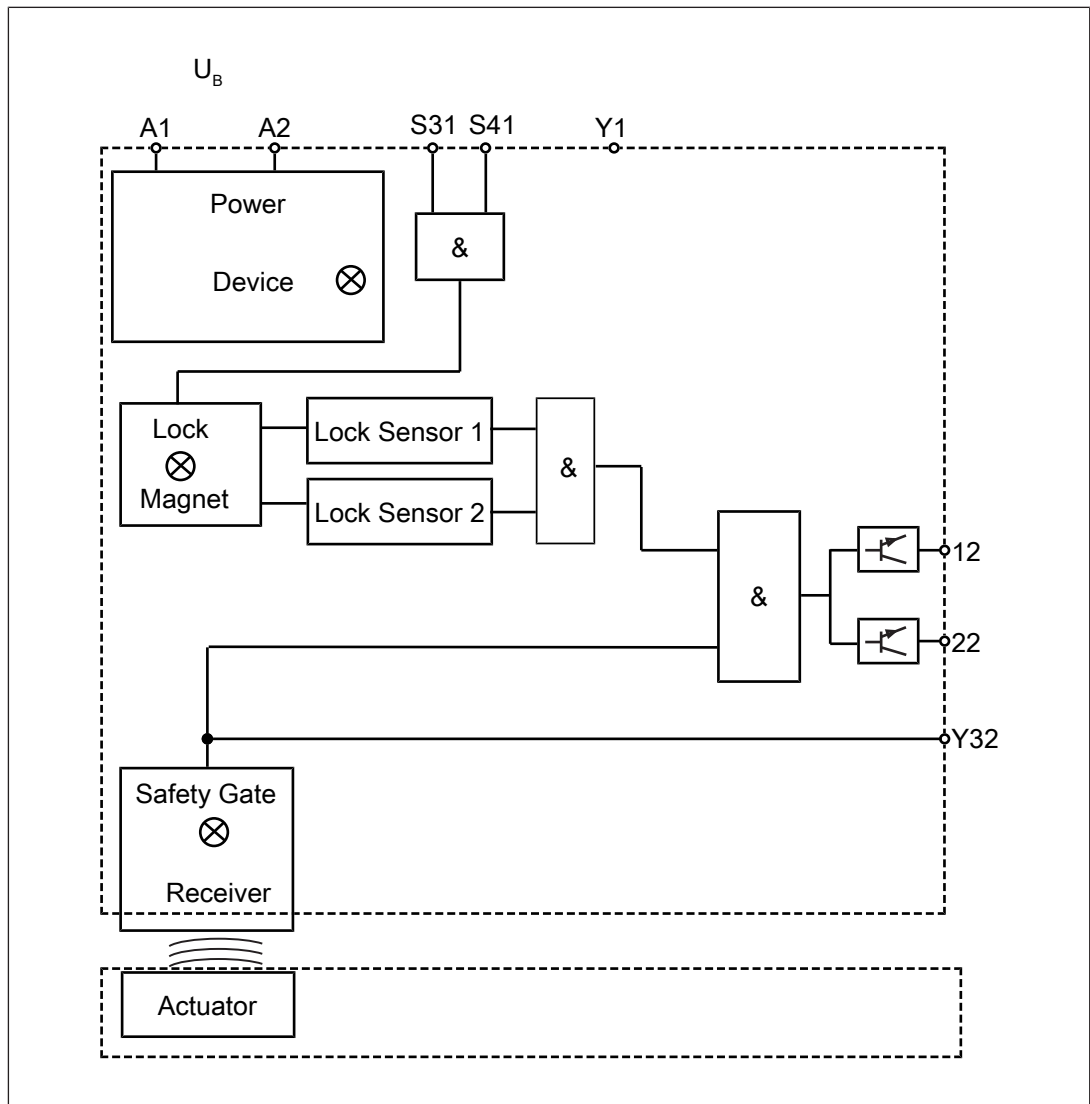
### Timing diagram



### Legend

- [1] Gate is open
- [2] Gate is closed
- [3] Guard locking is activated
- [4] Execution of the hazardous machine function is permitted
- [5] Outputs will be deactivated
- [6] Guard locking will be deactivated
- [7] Gate is open
- [t1] Processing time of guard locking signal = 100 ms
- [t2] Time window for changing guard locking status

**Block diagram**



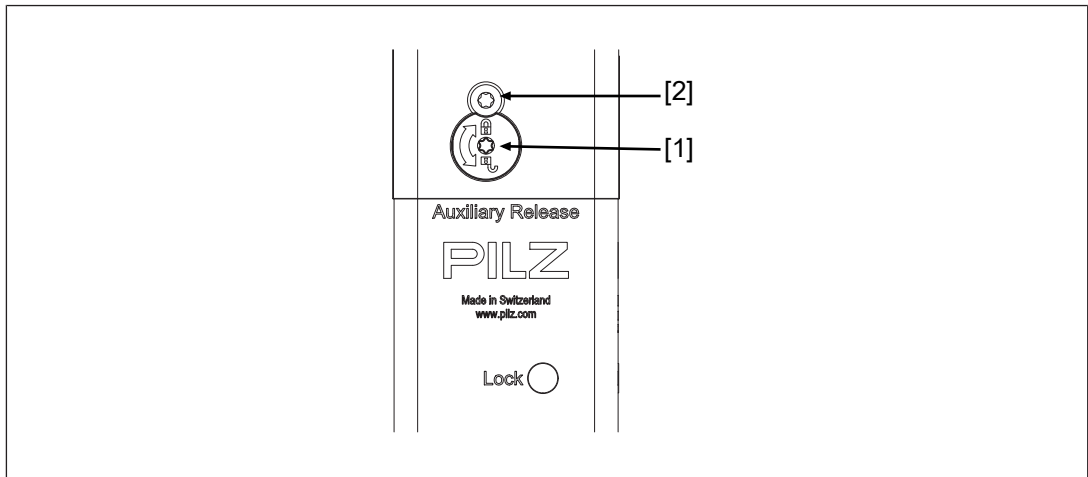
**Auxiliary release**

The auxiliary release enables guard locking to be opened from the access side to the danger zone.



**INFORMATION**

If guard locking is deactivated using the auxiliary release, there is a low signal at safety outputs 12 and 22. An error code will be issued (see under [Operation \[27\]](#)) and the safety switch switches to a fault condition.



### Legend

- [1] Auxiliary release screw Torx T10
- [2] Security screw Torx T10, sealed with varnish when delivered

### Mode of operation:

1. Remove the security screw [2] using a Torx T10 screwdriver.
2. Rotate the auxiliary release screw [1] half a turn anti-clockwise using a Torx T10 screwdriver. The guard locking pin is displaced and the bolt is released.

The safety gate to the danger zone can be opened.

### Recommissioning

#### Recommission PSEN ml b 1.1

1. Rotate the auxiliary release screw [1] (see [Figure \[12\]](#)) half a turn clockwise using a Torx T10 screwdriver.
2. Re-insert the security screw [2] (see [Figure \[12\]](#)) using a Torx T10 screwdriver.
3. Seal the security screw with varnish.
4. Switch the voltage off and then on again.
5. Carry out a function test on the safety switch and actuator. The safety function may only be checked by qualified personnel.

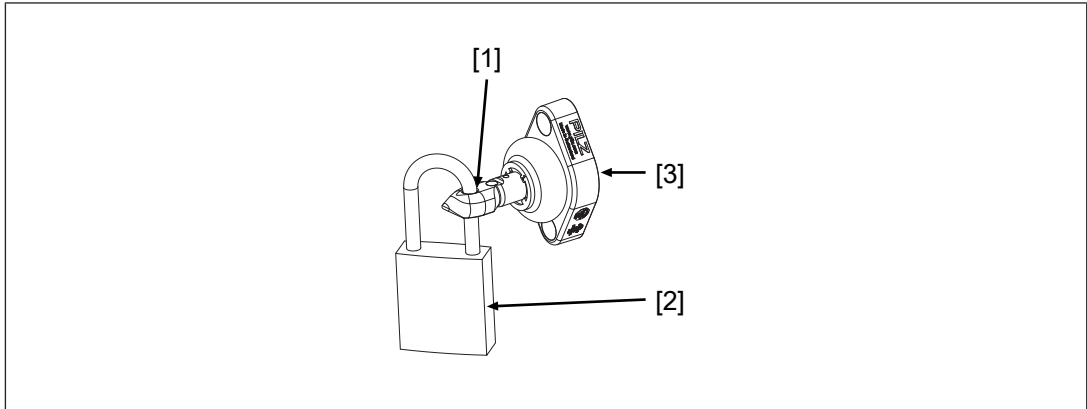


#### INFORMATION

If the auxiliary release screw is not turned back correctly after use, the PSEN ml b 1.1 switches to a fault condition.

**Prevent restart**

To prevent the machine restarting (unintentionally) while there is someone inside the danger zone, a padlock can be attached via the through hole on the actuator (see diagram). As a result the actuator cannot engage with the safety switch, guard locking is not activated and the machine is prevented from starting.



**Legend**

- [1] Through hole on the actuator for attaching a padlock
- [2] Padlock
- [3] Actuator

If the actuator is to be blocked using several locks in parallel, a multiple lock can be used (e.g. Brady – Lockout device, article no. 852439).

**Wiring**

Please note:

- ▶ Information given in the [Technical details \[31\]](#) must be followed.

**Pin assignment, connector and cable**

<p>The diagram shows a circular 8-pin M12 connector. The pins are numbered 1 through 8 in a clockwise direction starting from the bottom. Pin 1 is at the bottom, pin 2 is at the bottom-right, pin 3 is at the right, pin 4 is at the top-right, pin 5 is at the top, pin 6 is at the top-left, pin 7 is at the left, and pin 8 is at the bottom-left.</p>	8-pin M12 connector
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PIN	Function	Terminal designation	Cable colour (Pilz cable)
1	Operation of solenoid to open and close guard locking (channel 2)	S41	White
2	+24 V UB	A1	Brown
3	Safety output channel 1	12	Green
4	Safety output channel 2	22	Yellow
5	Signal output/diagnostic output	Y32	Grey

PIN	Function	Terminal designation	Cable colour (Pilz cable)
6	Operation of solenoid to open and close guard locking (channel 1)	S31	Pink
7	0 V UB	A2	Blue
8	Reserved	Y1	Red

**NOTICE**

The colour marking for the connection lead only applies for the cable that Pilz supplies as an accessory

**EMC requirements**

- ▶ Ensure the wiring and EMC requirements of IEC 60204-1 are met.
- ▶ The power supply must meet the regulations for extra low voltages with protective separation (SELV, PELV).
- ▶ The inputs and outputs of the safety switch must have a protective separation to voltages over 60 VDC.

**INFORMATION**

Only use safety relays with a 24 VDC supply voltage. Safety relays with a wide-range power supply or in AC device versions have internal potential isolation and are not suitable as evaluation devices.

- ▶ UL requirement: The supply voltage to the safety switch must be protected with a quick-acting fuse (see [Technical details \[31\]](#)).

**Connection to control systems and evaluation devices**

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

- ▶ 2-channel with feasibility monitoring
 

Both OSSDs must change switch state synchronously. In particular, the evaluation device must monitor that the state of **both** OSSDs was "Gate unlocked" before **both** return to the "Gate locked" state and vice-versa.
- ▶ OSSD signals are evaluated through 2 channels
- ▶ The state of the OSSDs must be tested before and after safety inputs S31 and S41 are activated (solenoid operation) (see [Timing diagram \[10\]](#))

**WARNING!**

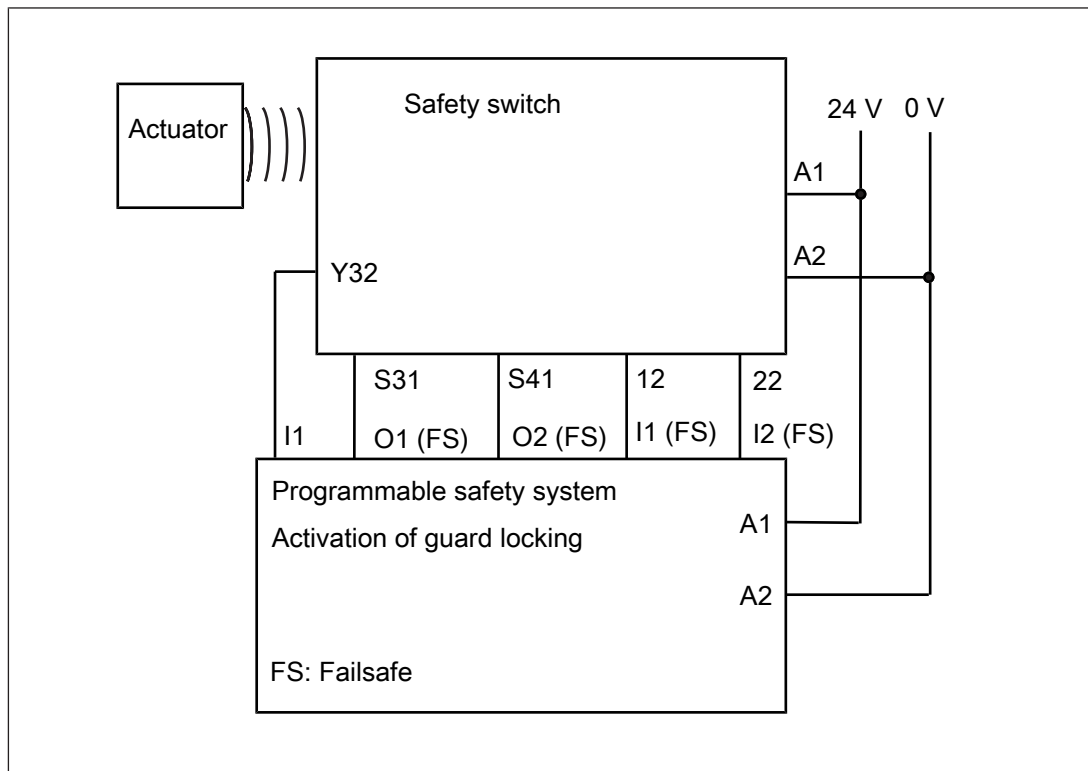
Potential loss of safety function due to failure to test for a safe condition

Depending on the application, serious injury or death may result.

- Use an evaluation device/safety system to test whether the plant is in a safe condition.
- Do not operate the solenoid of the PSEN ml b 1.1 via S31/S41 unless the plant is in a safe condition.

▶ Use in PL e (Cat. 4 )/SIL CL 3 applications

- Safety inputs S31 and S41 (solenoid operation) have 2-channel operation via safe outputs, which are suitable for PL e (Cat. 4 )/SIL CL 3 applications

**Connection to Pilz evaluation devices**

The safety switch PSEN ml b 1.1 can be connected to Pilz evaluation devices, for example.

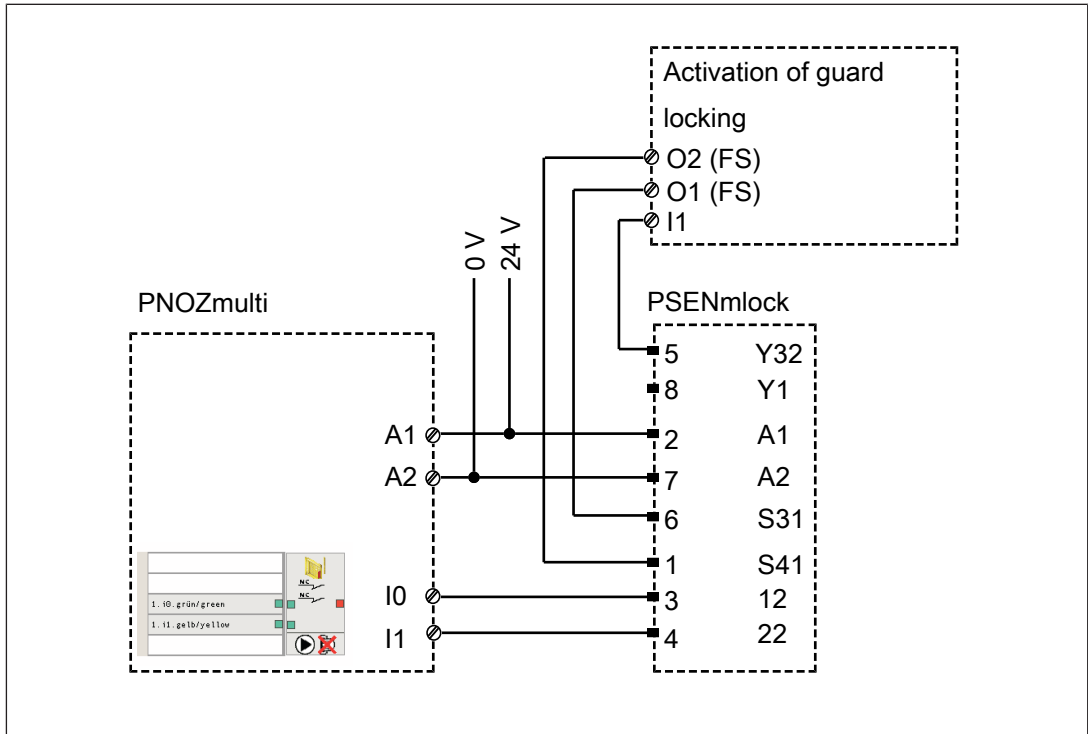
Suitable Pilz evaluation devices are, for example:

- ▶ 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.

Connection to PNOZmulti is illustrated by way of example.

**Connection example PNOZmulti**




**Teaching in the actuator**

**PSEN ml 1.1**

Any corresponding Pilz actuator (see [Technical Details \[31\]](#)) is detected as soon as it is brought into the response range.

**Installation**

 **NOTICE** Install the safety switch and actuator so that the possibilities of defeat are reduced to a minimum (see guidelines for reducing the possibilities for defeating interlocking devices in EN ISO 14119).




- ▶ Use non-removable flat head locking screws to attach the safety switch and actuator (e.g. cheese-head or pan head screws) or rivets.
- ▶ Use the same type of screw to attach the safety switch and actuator.
- ▶ Installation of the safety switch and actuator must be concealed.










### INFORMATION

Refer to the guidelines for designing guards and integrating interlocks with guard locking in EN ISO 14120.

- ▶ The safety switch and actuator should be installed opposite each other in parallel.
- ▶ Prevent the safety switch and actuator being exposed to heavy shock or vibration
- ▶ The fastening of safety switch and actuator has to be sufficiently stable to ensure the proper operation of the safety switch and the actuator.
- ▶ For a minimum screw depth of 6 mm, M5 screws with resistance class 8.8 should be used to attach the safety switch and actuator.
- ▶ Prevent self-loosening of the fastening elements on the safety switch and actuator.
  - On the safety switch: through torque (see [Technical details](#)  31))
  - On the actuator: through torque (see [Technical details](#)  31)) and bonded screw retention
- ▶ Torque setting: Please note the information provided under [Technical details](#)  31).
- ▶ To attach the safety switch, drill holes are provided on three sides to enable the switch to be attached in the three potential mounting positions.

As a result, the safety switch can be installed on the frames of left and right hinged sliding gates and swing gates. If necessary use a [Mounting plate](#)  24] or [Mounting bracket](#)  23] (see [Order reference: Accessories](#)  35]).

Different holding forces arise, based on the installation.

- [Fixing screws in parallel to actuator](#)  19]:
  - Holding force  $F_{zh} = 7.500 \text{ N}$ ,
  - Holding force  $F_{1max}$  in accordance with EN ISO 14119 = 15.000 N
- [Fixing screws side-on to actuator](#)  20]:
  - Holding force  $F_{zh} = 5.000 \text{ N}$ ,
  - Holding force  $F_{1max}$  in accordance with EN ISO 14119 = 10.000 N

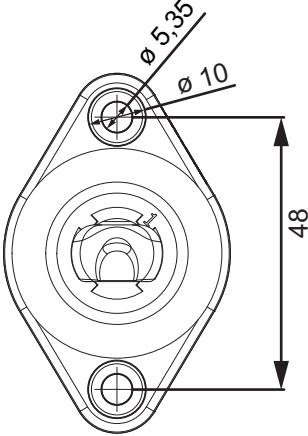
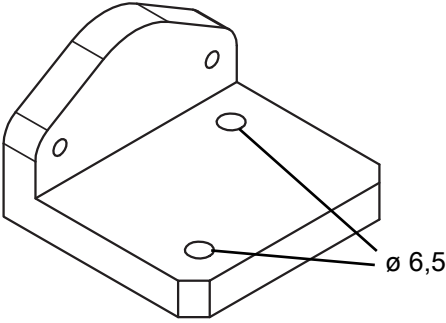
**Tapped hole**

The tapped holes must have a depth of at least 6 mm.

Installation of safety switch	Tapped hole
Fixing screws in parallel/side-on to actuator, no mounting plate	Tapped holes for four M5 screws on the mounting surface.
Fixing screws in parallel/side-on to actuator, with mounting plate	Tapped holes for two M8 screws on the mounting surface, for attaching the mounting plate.

	<p><b>Fixing screws in parallel/side-on to actuator, no mounting plate</b></p> <p>Provide the mounting surface with tapped holes as indicated.</p>
--	--

	<p><b>Fixing screws in parallel/side-on to actuator, with mounting plate</b></p> <p>Provide the mounting surface with tapped holes as indicated.</p>
--	--

	<p><b>Actuator, no mounting bracket</b></p> <p>Provide the mounting surface with tapped holes for two M5 screws (see diagram).</p>
	<p><b>Actuator, with mounting bracket</b></p> <p>Provide the mounting surface with tapped holes for two M6 screws (see diagram).</p>

### Install fixing screws in parallel to actuator

Use four M5 screws to attach the switch to the mounting surface.

- ▶ Torque setting: Please note the information provided under [Technical details](#)  31].

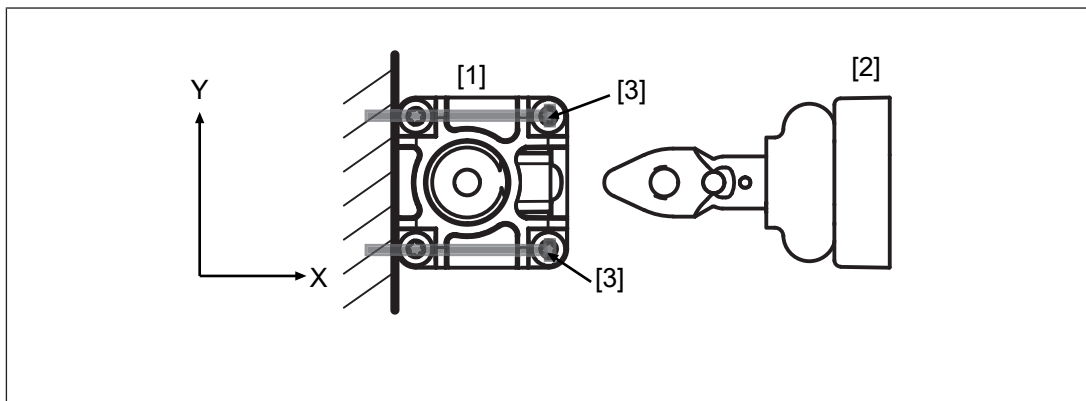
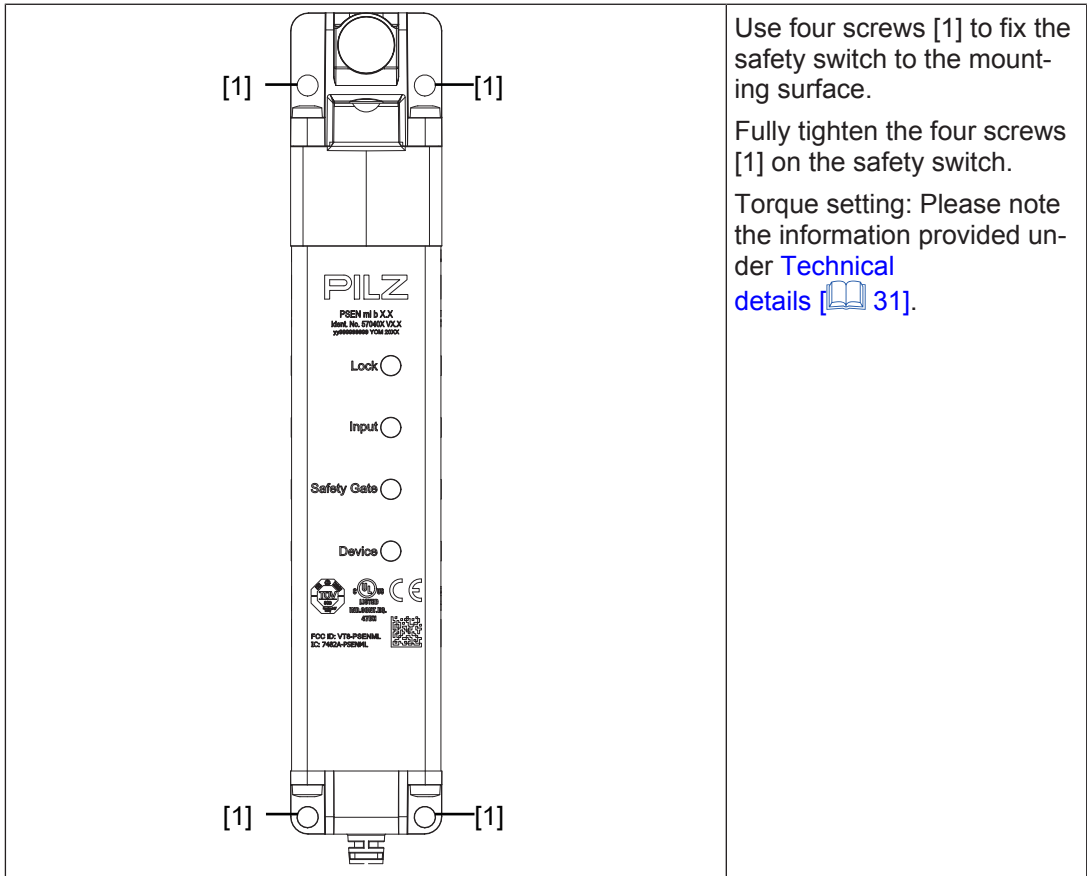
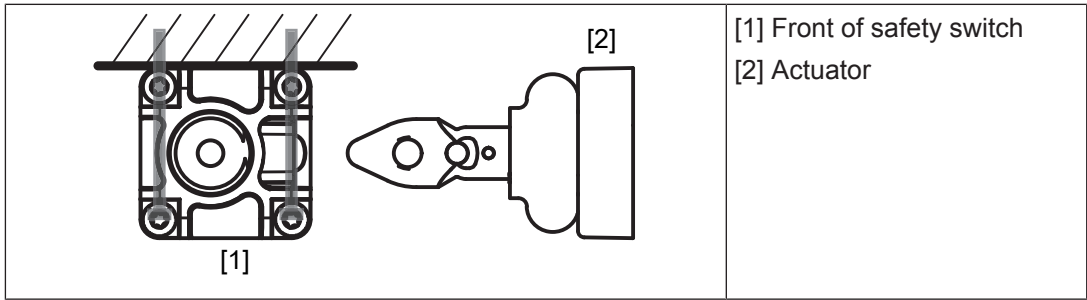


Fig.: Fixing screws of the safety switch in parallel to actuator

### Legende

- [1] Safety switch
- [2] Actuator
- [3] Fixing screws of the safety switch in parallel to actuator

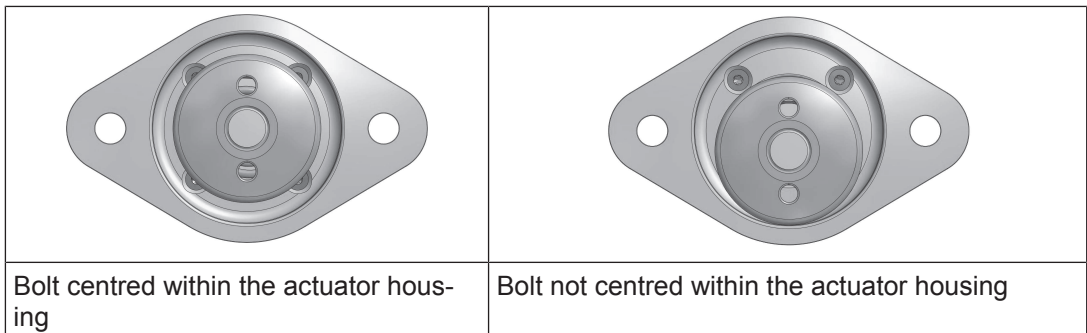
**Install fixing screws side-on to actuator**



**Centre the bolt in the actuator housing**

The bolt must be centred in the actuator housing in order to maintain the distances on setting gates.

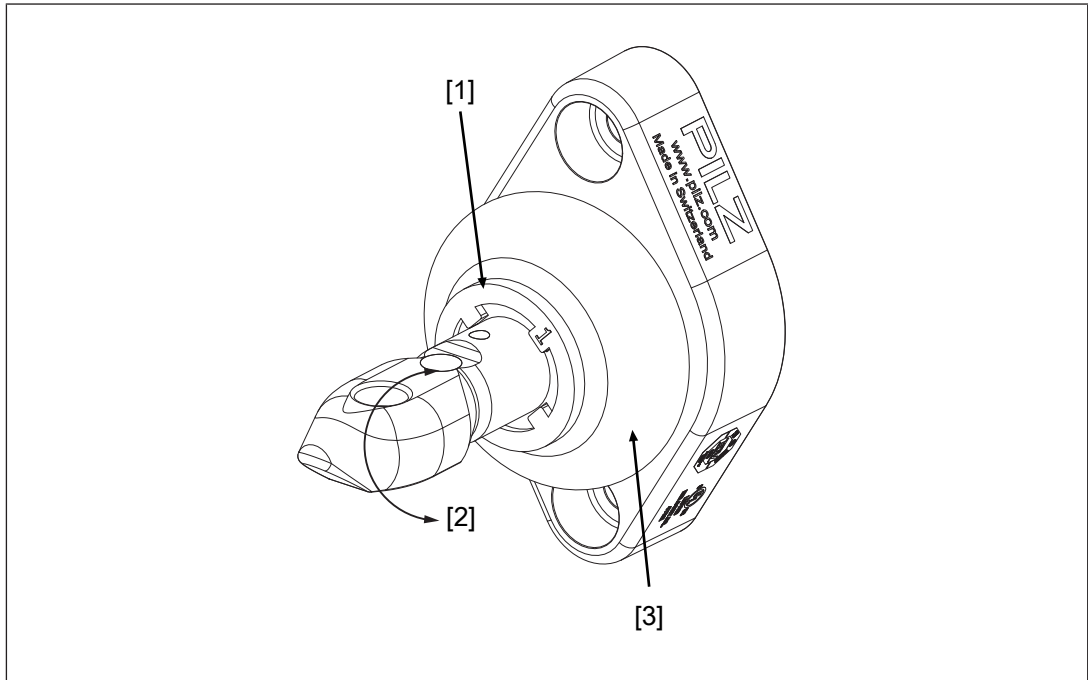
Centre the bolt in the actuator housing (see diagram).



### Rotate the bolt in the actuator housing 90°

The actuator can be installed vertically on a gate (see [Figure 9](#)). To install the actuator horizontally, the bolt can be rotated 90° in the actuator housing prior to installation.

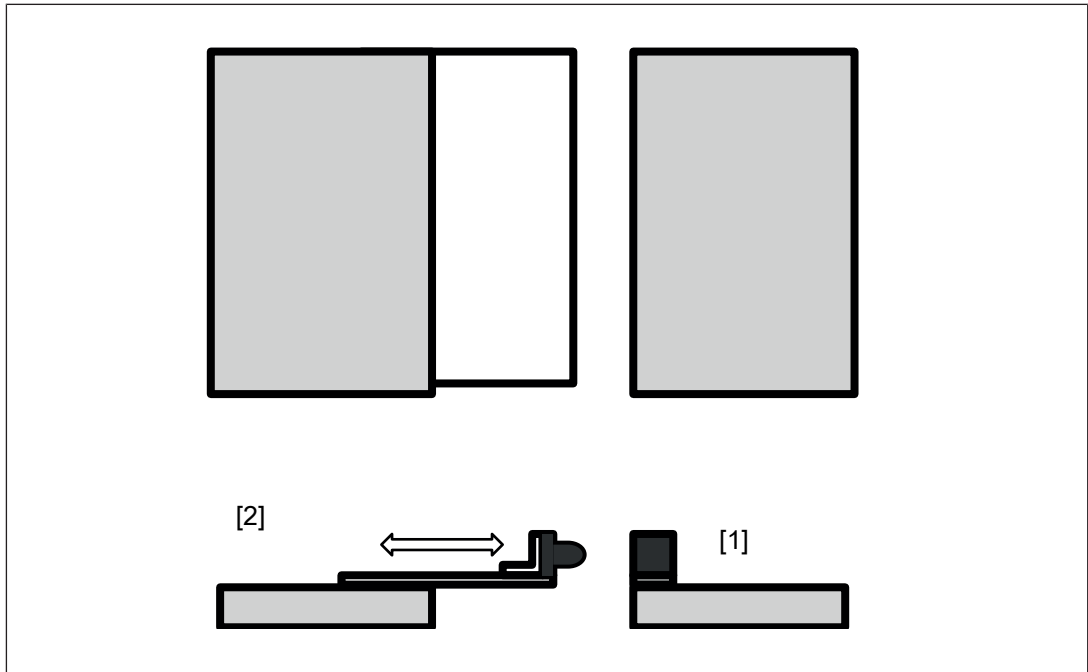
1. On the housing skin [3] in the actuator housing, press down the spring plate [1] on both sides of the bolt and keep the plate held down.
2. Rotate the bolt in the housing skin by 90° in the required direction ([2]).



### Legend

- [1] Spring plate in the housing skin
  - [2] Bolt, can be rotated 90°
  - [3] Housing skin
3. Centre the [bolt in the actuator housing](#) [[20](#)].

### Installation on sliding gate



#### Legend

[1] Safety switch, installed on gate frame

[2] Actuator with mounting bracket (available as [Accessory \[35\]](#)), installed on sliding gate

1. Install the safety switch with the [fixing screws of the safety switch in parallel to the actuator \[19\]](#) or [side-on to actuator \[20\]](#) on the gate frame.
2. Use two M5 screws to fix the actuator to the gate.

### Installation on swing gate

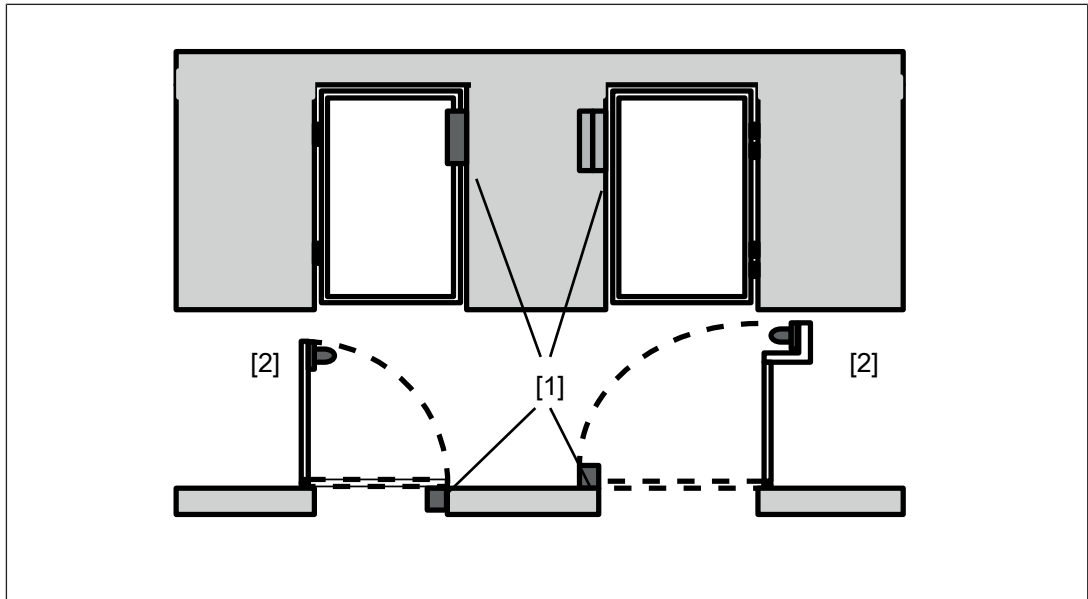


Fig.: Swing gate with internal and external hinge

#### Legende

- [1] Safety switch on gate frame
- [2] Actuator, installed on swing gate

1. Install the safety switch with the [fixing screws of the safety switch in parallel to the actuator \[19\]](#) or [side-on to actuator \[20\]](#) on the gate frame.
2. Use two M5 screws to fix the actuator to the gate.

#### Installation with mounting bracket

1. Attach the mounting bracket to the sliding gate.
2. Use two M5 screws to fix the actuator to the mounting bracket.

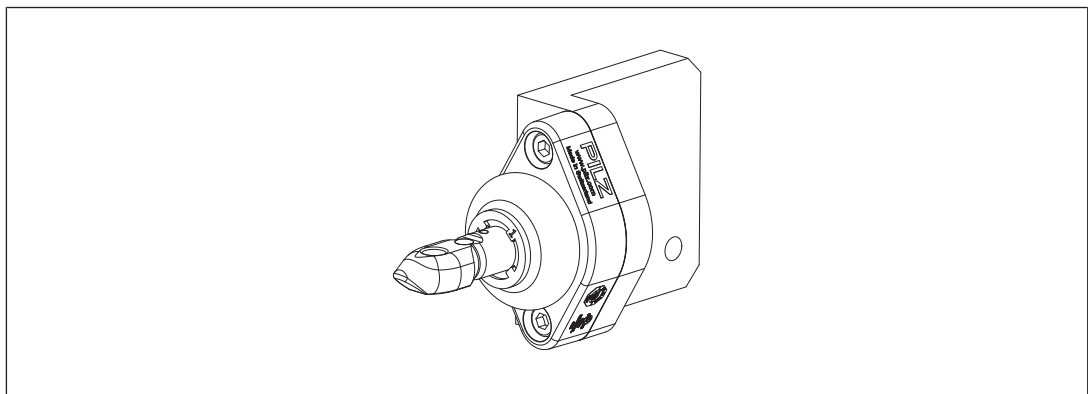


Fig.: Actuator, installed on mounting bracket

### Installation with mounting plate

1. Attach the mounting plate to the sliding gate.
2. Use four M5 screws to fix the safety switch [\[19\]](#) to the mounting plate.

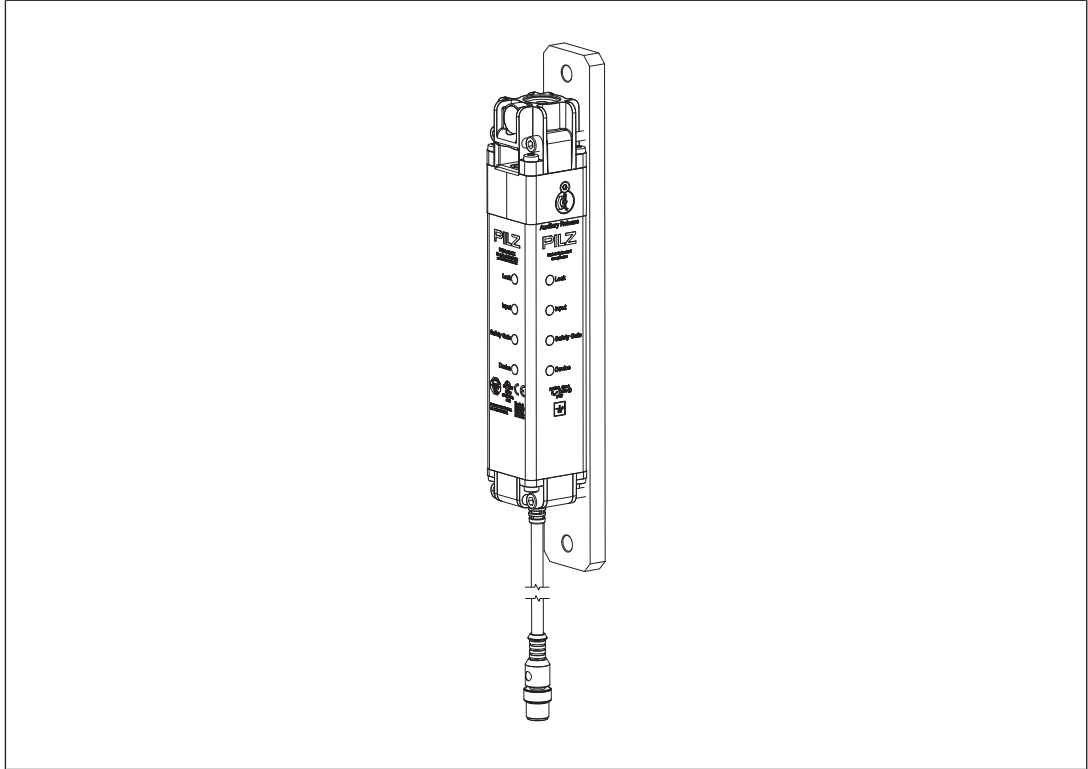


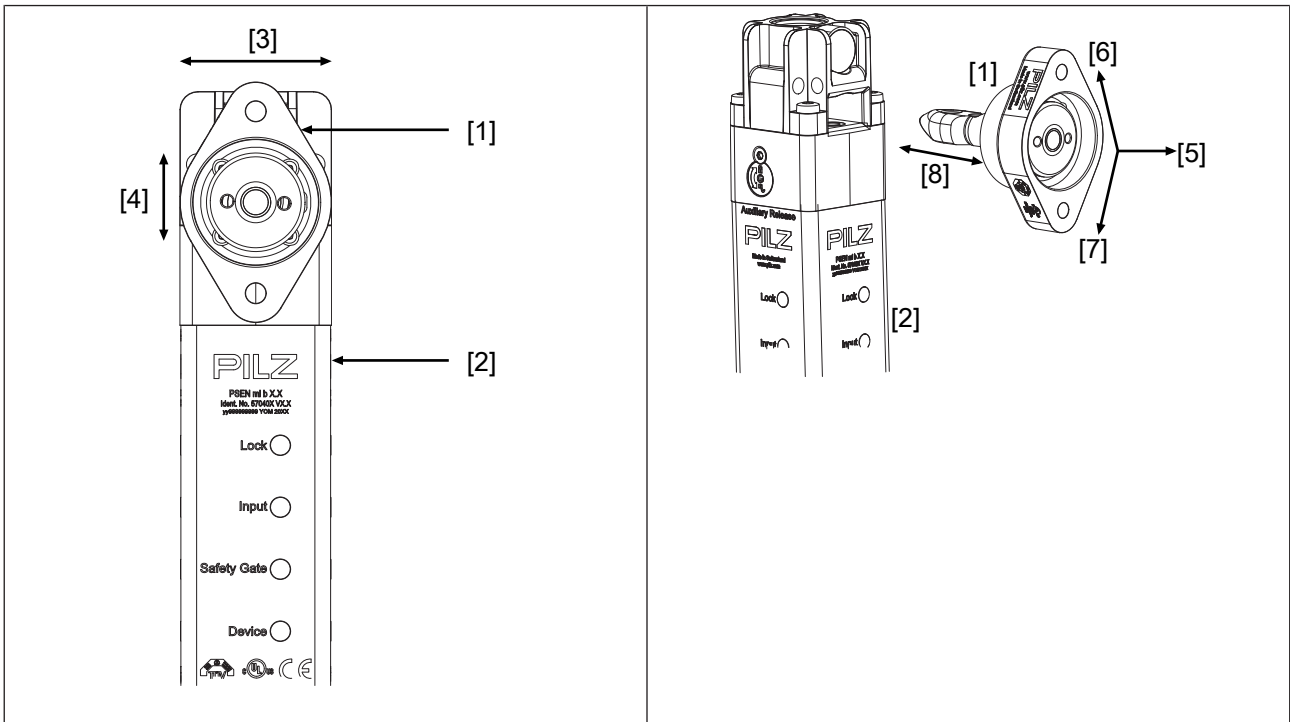
Fig.: Safety switch, installed on mounting plate

### Adjustment

Please note:

- ▶ Safety switch and actuator must be aligned correctly
- ▶ Distances are maintained as stated in the following diagram
- ▶ Actuator is centred (see [Centre bolt in actuator housing \[20\]](#))
- ▶ Always test the function with a connected evaluation device.






[1]	Actuator	
[2]	Safety switch	
[3]	Max. lateral offset	+/-3,0 mm
[4]	Max. vertical offset	+/-3,0 mm
[5]	Max. angular offset in X-direction	+/-2,0 deg
[6]	Max. angular offset in Y-direction	+/-2,5 deg
[7]	Max. angular offset in Z-direction	+/-7,5 deg
[8]	Max. offset in closing direction	+/-2 mm


**Attach safety switch and actuator**

Once the safety switch and actuator are correctly aligned, the actuator's screw connection must be tightened.

1. Tighten up one M5 screw.
2. For applications with increased safety requirements (e.g. SIL CL 3 PL e), swap the second M5 screw for an M5 locking screw
3. Tighten up the M5 screw or M5 locking screw.

Please note the max. torque setting stated in the [Technical details](#)  31].

### 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.

















**Status indicators:**

- ▶ "Device" LED illuminates green: The unit is ready for operation
- ▶ "Safety Gate" LED lights up yellow: Actuator is within the response range
- ▶ "Lock" LED lights up green: Guard locking active
- ▶ "Input" LED lights up yellow: The unit is ready for operation







**Legend:**

	LED off
	LED on
	LED flashes (500 ms on, 500 ms off)
	LED flashes quickly (50 ms on, 950 ms off)
	LED flashes very quickly (25 ms on, 475 ms off)











**Normal mode**

LED status				Switch status
Device	Safety Gate	Input	Lock	
 Green	 Yellow	 Yellow	 Green	PSEN ml b 1.1 is started
 Green	 ●	 Yellow	 ●	Safety gate open, actuator not detected, guard locking deactivated
 Green	 Yellow	 Yellow	 ●	Safety gate closed, actuator detected, guard locking deactivated
 Green	 Yellow	 Yellow	 Green	Safety gate closed, actuator detected, guard locking activated

## Warnings

LED status				Switch status	Remedy / measure
Device	Safety Gate	Input	Lock		
 Green	 Yellow	 Yellow	 Green	<p>Safety gate closed, actuator detected, guard locking cannot be activated / deactivated</p> <p>The supply voltage to safety inputs S31 and S41 was switched back on before the auxiliary release screw was turned back.</p>	<p>Check the actuator's <a href="#">alignment [12]</a> to the safety switch.</p> <p>Turn back the auxiliary release screw and then switch the supply voltage on (see <a href="#">Recommissioning [12]</a>).</p>
 Yellow	Display not definitive	 Yellow	Display not definitive	<p>Safety switch active despite over or undervoltage</p>	<p>Check the supply voltage.</p> <p>If safety inputs S31 and S41 are activated or deactivated while an undervoltage warning is present, the safety switch switches to a fault condition.</p>

**Error display**

LED status				Switch status	Remedy / measure
Device	Safety Gate	Input	Lock		
 red	 yellow	 yellow	●	Safety switch deactivated due to under or over-voltage	Check the supply voltage and switch the supply voltage off and then on again.
 red	Previous LED display is retained		●	Safety outputs in fault condition	Check the wiring and switch the supply voltage off and then on again.
 red	●	●	●	Auxiliary release activated	Turn back the auxiliary release screw and then switch the supply voltage on (see <a href="#">Recommissioning [12]</a> ).
				Fault	Please contact Pilz.
●	 Irrelevant	Irrelevant		Safety switch does not start	Change the safety switch
 Green	 Yellow	 Yellow	Display not definitive	Wrong actuator	Use the actuator PSEN ml 1.1 .

**Checks and maintenance**

Regular inspection of the switch function is required to guarantee the trouble-free, long-term function.

If the interlock and guard locking system is only used rarely (opening and closing the safety gate and activating/deactivating the guard locking device), a manual function test is required.

The correct function of the device should be checked at regular intervals and after each error.

Test intervals in accordance with EN ISO 14119:

- ▶ for SIL CL 3/PL e at least 1x per month
- ▶ for SIL CL 2/PL d at least 1x per year

The Appendix contains a [Check list \[37\]](#), which should help you perform the test.

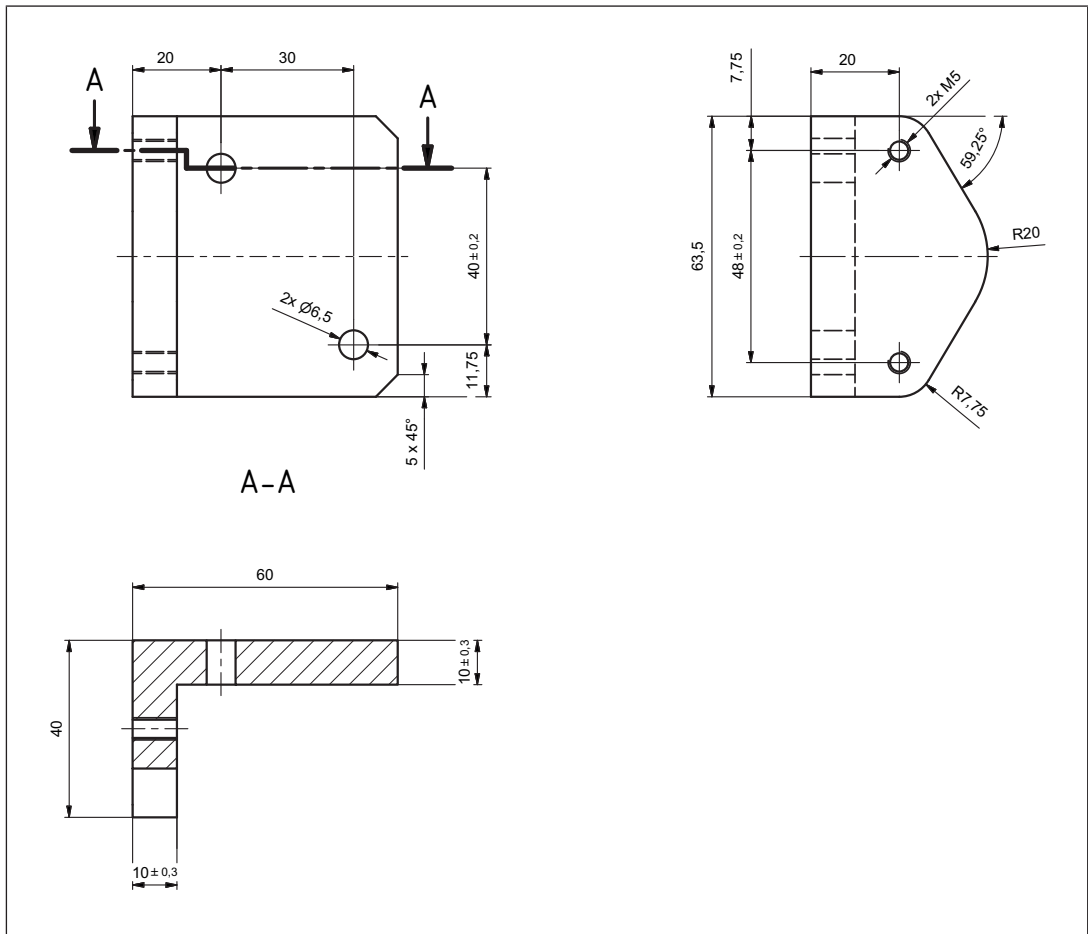
**Visual inspection:**

- ▶ Check that the seal on the security screw on the auxiliary release is intact. If the seal is not intact, make sure that the security screw is inserted and use varnish to seal the security screw.
- ▶ Check the safety switch and actuator for damage.
- ▶ Make sure that the safety switch and actuator are firmly secured.
- ▶ Check the offset of the safety switch and actuator.
  - Max. lateral offset
  - Max. angular offset
  - Max. vertical offset
- ▶ Check that the wiring is correct.
- ▶ Remove any dirt from the safety switch and actuator.

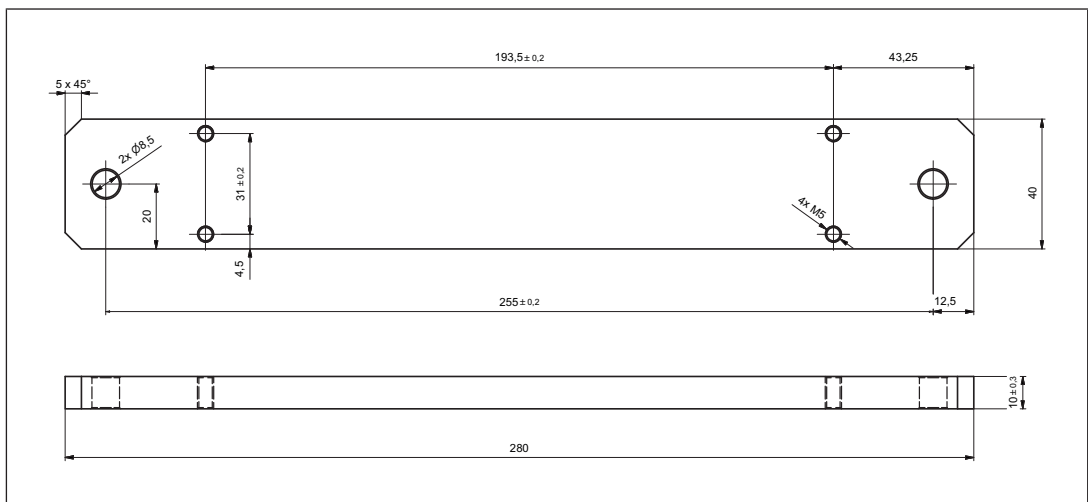
**Dimensions**

	<p>Actuator</p>
<p>Safety switch</p>	

Mounting bracket for sliding gate (see [Accessories \[35\]](#))



Mounting plate (see [Accessories \[35\]](#))



## Technical details

<b>General</b>	
Approvals	<b>CE, FCC, IC, TÜV, cULus Listed</b>
Sensor's mode of operation	<b>Transponder</b>
Coding level in accordance with EN ISO 14119	<b>Low</b>
Design in accordance with EN ISO 14119	<b>4</b>
Classification in accordance with EN 60947-5-3	<b>PDDB</b>
Pilz coding type	<b>Coded</b>
<b>Transponder</b>	
Frequency band	<b>125 kHz</b>
Max. transmitter output	<b>-3 dBm</b>
<b>Electrical data</b>	
Supply voltage	
Voltage	<b>24 V</b>
Kind	<b>DC</b>
Voltage tolerance	<b>-15 %/+20 %</b>
Max. switching frequency	<b>1 Hz</b>
Magnet. supply voltage	<b>24 V</b>
Max. solenoid current $t < 150$ ms	<b>1 A</b>
Max. cable capacitance at the safety outputs	
No-load, PNOZ with relay contacts	<b>40 nF</b>
PNOZmulti, PNOZelog, PSS	<b>70 nF</b>
Max. inrush current impulse	
Current pulse, A1	<b>5 A</b>
Pulse duration, A1	<b>0,0002 ms</b>
Max. unit fuse protection in accordance with UL	<b>3 A</b>
No-load current	<b>40 mA</b>
<b>Inputs</b>	
Number	<b>2</b>
Voltage at inputs	<b>24 V DC</b>
Input current range	<b>0,5 A</b>
<b>Semiconductor outputs</b>	
OSSD safety outputs	<b>2</b>
Signal outputs	<b>1</b>
Switching current per output	<b>100 mA</b>
Breaking capacity per output	<b>2,4 W</b>
Residual current at "0" signal	<b>2 mA</b>
Short circuit-proof	<b>yes</b>
Residual current at outputs	<b>500 <math>\mu</math>A</b>
Voltage drop at OSSDs	<b>1,5 V</b>
Conditional rated short circuit current	<b>100 A</b>
Lowest operating current	<b>1 mA</b>
Utilisation category in accordance with EN 60947-1	<b>DC-13</b>

<b>Times</b>	
Test pulse duration, safety outputs	<b>450 µs</b>
Switch-on delay	
after UB is applied	<b>1,1 s</b>
Actuator typ.	<b>30 ms</b>
Actuator max.	<b>50 ms</b>
Delay-on de-energisation	
Actuator typ.	<b>30 ms</b>
Actuator max.	<b>40 ms</b>
Risk time in accordance with EN 60947-5-3	<b>260 ms</b>
Supply interruption before de-energisation	<b>20 ms</b>
Simultaneity, channel 1 and 2 max.	<b>∞</b>
Pulse duration Lock/Unlock Request	<b>2+/-0,5 s</b>
Processing time activate/deactivate guard locking	<b>100 ms</b>
<b>Environmental data</b>	
Temperature of metal surface at ambient temperature: 25 °C	<b>40 °C</b>
Ambient temperature	
In accordance with the standard	<b>EN 60068-2-14</b>
Temperature range	<b>0 - 55 °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 55011: class A, EN 60947-5-3, EN 61326-3-1</b>
Vibration	
In accordance with the standard	<b>EN 60068-2-6</b>
Frequency	<b>10 - 55 Hz</b>
Amplitude	<b>1 mm</b>
Shock stress	
In accordance with the standard	<b>EN 60068-2-27</b>
Number of shocks	<b>3</b>
Acceleration	<b>30g</b>
Duration	<b>11 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>IP67</b>
<b>Mechanical data</b>	
Length of cable with connector	<b>230 mm</b>
Min. bending radius (fixed permanently) K1	<b>5 x Ø</b>



<b>Mechanical data</b>	
Min. bending radius (moving) K1	<b>10 x Ø</b>
Cable diameter K1	<b>6,2 mm</b>
Escape release available	<b>No</b>
Mechanical life	<b>1,000,000 cycles</b>
Holding force FZh	
Fixing screws in parallel to actuator	<b>7.500 N</b>
Fixing screws side-on to actuator	<b>5.000 N</b>
Holding force F1Max in accordance with ISO 14119	
Fixing screws in parallel to actuator	<b>15.000 N</b>
Fixing screws side-on to actuator	<b>10.000 N</b>
Latching force	<b>30 N</b>
Max. vertical offset	<b>+/-3,0 mm</b>
Max. lateral offset	<b>+/-3,0 mm</b>
Max. angular offset around the X axis	<b>+/-2,0 deg</b>
Max. angular offset around the Y axis	<b>+/-2,5 deg</b>
Max. angular offset around the Z axis	<b>+/-7,5 deg</b>
Max. offset in closing direction	<b>+/-2 mm</b>
Max. retract speed of actuator	<b>0,3 m/s</b>
Actuator 1	<b>PSEN ml 1.1</b>
Min. distance between safety switches	<b>0 mm</b>
Connection type	<b>M12, 8-pin male connector</b>
Cable	<b>LiYY 8 x 0.25 mm<sup>2</sup></b>
Max. cable length	<b>50 m</b>
Material	<b>Aluminium, stainless steel, plastic, galvanised steel, Zn</b>
Max. torque setting for fixing screws	<b>6 Nm</b>
Min. gate radius	<b>300 mm</b>
Dimensions	
Height	<b>217,2 mm</b>
Width	<b>40 mm</b>
Depth	<b>40 mm</b>
Actuator dimensions	
Height	<b>63,5 mm</b>
Width	<b>40 mm</b>
Depth	<b>67,2 mm</b>
Weight of safety switch	<b>950 g</b>
Weight of actuator	<b>145 g</b>
Weight	<b>1.100 g</b>

Where standards are undated, the 2015-11 latest editions shall apply.

**Safety characteristic data**



**NOTICE**

You must comply with the safety-related 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 IEC 62061 SIL CL	EN IEC 62061 PFH <sub>D</sub> [1/h]	Lambda d/ Lambda	EN ISO 13849-1 2015, EN IEC B10D	EN ISO 13849-1: 2015 T <sub>M</sub> [year]
2-ch. guard locking	<b>PL e</b>	<b>Cat. 4</b>	<b>SIL CL 3</b>	<b>2,35E-09</b>	–	–	<b>20</b>
2-ch. OSSD	<b>PL e</b>	<b>Cat. 4</b>	<b>SIL CL 3</b>	<b>2,44E-09</b>	–	–	<b>20</b>

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.



**NOTICE**

Be sure that you observe the mechanical life. The safety characteristic data are only valid as long as the values of mechanical life are met.

## Supplementary data

### Radio approval

#### USA/Canada

**FCC** ID: VT8-PSENML  
**IC:** 7482A-PSENML

#### 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

### System

Product type	Features	Connection type	Order no.
PSEN ml b 1.1 unit	Mechanical safety gate system with guard locking, coded	M12, 8-pin connector	570 400
PSEN ml b 1.1 switch	Mechanical safety switch with guard locking, coded	M12, 8-pin connector	570 401
PSEN ml 1.1 actuator	Actuator, coded		570 480

### Accessories

#### Installation accessories

Product type	Features	Order No.
PSEN ml mounting plate	Mounting plate for installing the safety switch, with 4 hexagonal socket head screws and 1 tamper-proof pan head locking screw, M5x40	570 490
PSEN ml bracket sliding door	Mounting bracket for installing the actuator on a sliding gate, with 2 hexagonal socket head screws and 1 tamper-proof pan head locking screw, M5x16	570 492

## Cable

Product type	Connection 1	Connection 2	Length	Order no.
PSEN cable M12-8sf	Straight, M12, 8-pin, socket	Open cable	3 m	540 319
			5 m	540 320
			10 m	540 321
			20 m	540 333
			30 m	540 326
PSEN cable M12-8sf M12-8sm	Straight, M12, 8-pin, socket	Straight, M12, 8-pin, pin	0.5 m	540 345
			1 m	540 346
			1.5 m	540 347
			2 m	540 340
			5 m	540 341
			10	540 342
			20 m	540 343
			30 m	540 344

**Appendix**

The following check list is intended as a guide to provide support during commissioning, re-commissioning and the prescribed regular testing of the PSEN ml b 1.1.

Note that the check list is not intended to replace the plant-specific safety analysis required for commissioning/recommissioning, nor the resulting inspections and actions.



**INFORMATION**

Commissioning, recommissioning and regular inspection may only be carried out by qualified personnel.

We recommend that you keep the completed check list and store it with the machine documentation for reference.

Date	Action	Safety switch Number	Actuator Number	OK	Not OK	Notes	Signature

**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

# ► 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.



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