



Visualisation; Diagnostics

Easy to Configure

Programming IEC 61131-3

Rapid Installation

PSEN sc B 5 Series

PILZ

THE SPIRIT OF SAFETY

► PSEN sensor technology

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SD means Secure Digital

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1 Introduction

1.1 Validity of documentation

This documentation is valid for the product PSEN sc B 5 Series. 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.

1.2 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.

1.3 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.

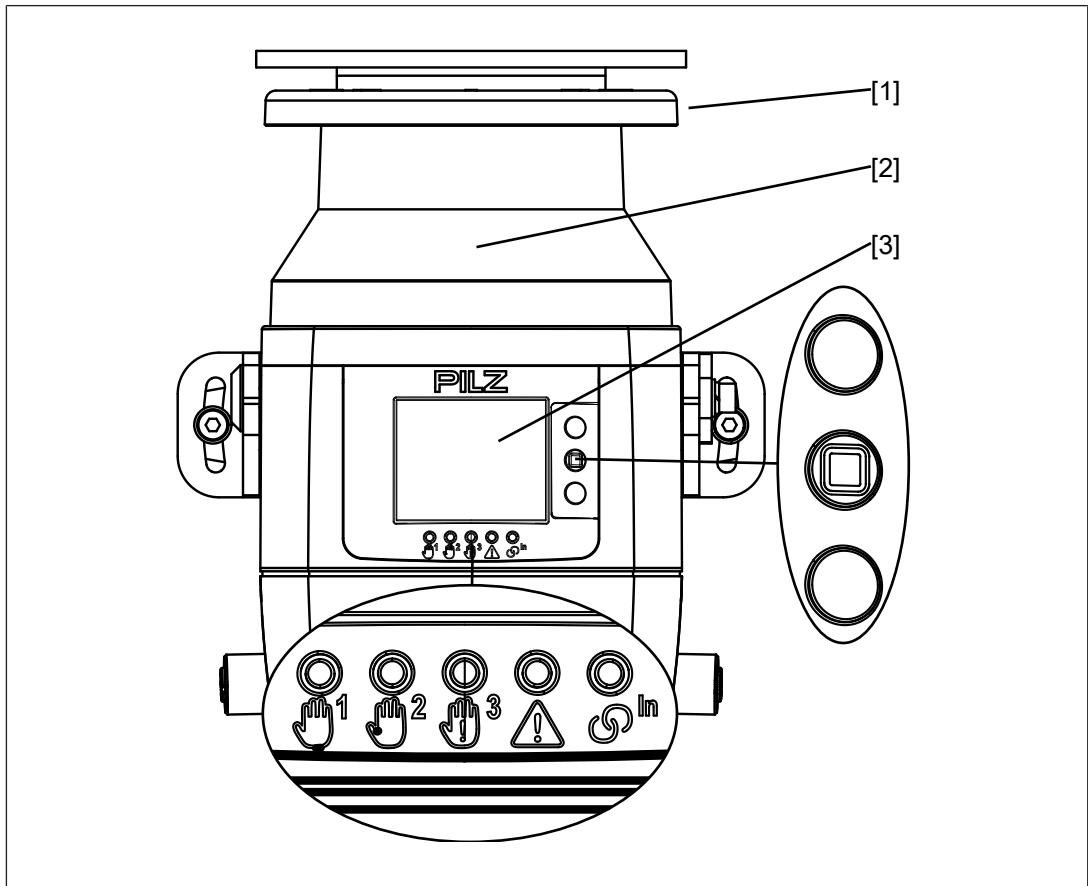
2 Overview

The safety laser scanners of the PSEN sc B 5 Series are electrosensitive protective equipment (ESPE type: 3) in accordance with EN 61496-3 for workspaces in which machines, robots, and automated systems could endanger the physical integrity of operators.









Unit features

- ▶ Detection capability: 70 mm
- ▶ LED display and display for status information
- ▶ Scan angle: 275°
- ▶ Infrared laser beams build up a 2-dimensional protected area
- ▶ Separation of the protected area in a safety zone and a warning zone
- ▶ max. 3 switchable **zone sets**  13] possible
- ▶ Enhanced availability by configurable multiple evaluation
- ▶ The safety laser scanner can be installed and operated overhead.

2.1 Unit view



Legend

- [1] Metal cover upper side
- [2] Front panel (exit laser beams)
- [3] Display for device messages
-  Button for scrolling upwards in the display
-  Button for confirming the display
-  Button for scrolling downwards in the display
-  ¹ Status of the OSSD 1/2 (red/green)
-  ² Not used
-  ³ Not used
-  State of the warning field exit
-  ^{In} Locking

3 Safety

3.1 Intended use

The safety laser scanners of the PSEN sc B 5 Series are electrosensitive protective equipment of ESPE type 3. They are used to protect personnel and systems. The safety laser scanners are designed to

- ▶ secure hazardous areas within buildings,
- ▶ secure hazardous areas of vehicles and
- ▶ access protection within buildings.

The safety laser scanner may only be used for personal protection on machinery if

- ▶ the hazardous state can be removed by the safety laser scanner and
- ▶ the starting of the machine is controlled by the safety laser scanner and
- ▶ the safety assessment prescribes no better detection capability than 70 mm.

The safety level PL d (Cat. 3)/SIL CL 2 is only achieved if

- ▶ The safety outputs must be processed safety-related in 2-channel mode.

The restart of the machine or vehicle can be performed using a manual or an automatic start.


- ▶ It must not be possible to operate the pushbutton for manual restart from inside the hazardous area. The pushbutton must be located at a position from which there is a full, unobstructed view of the hazardous area.

Prevent circumvention of the safety zone. This means that other electrosensitive protective equipment and protective measures may be required in addition to the safety laser scanner. These should be determined via a safety assessment based on the specific application range and specific local conditions (e.g. official specifications).

Refer to IEC/TS 62046 to determine other necessary safeguards for securing the hazardous area.

Their application must fulfil the site's relevant national regulations (e. g. EN 60204-1, NFPA 79:17-7).

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 manual,
- ▶ Use of the product outside the technical details (see [Technical details](#) [ 66]).



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.

Foreseeable misuse

- ▶ The safety laser scanner may **not** be accessed and may **not** be used as a step.
- ▶ The PSEN sc bracket H mounted on the safety laser scanner may **not** be accessed and **not** be used as a step
- ▶ The safety laser scanner may **not** be used at an ambient temperature below 0°.
- ▶ The safety laser scanner may **not** be built into an additional housing.

3.2 Safety regulations

3.2.1 Safety assessment

Before using a device 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.

3.2.2 Use of qualified personnel

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

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.

3.2.3 Warranty and liability

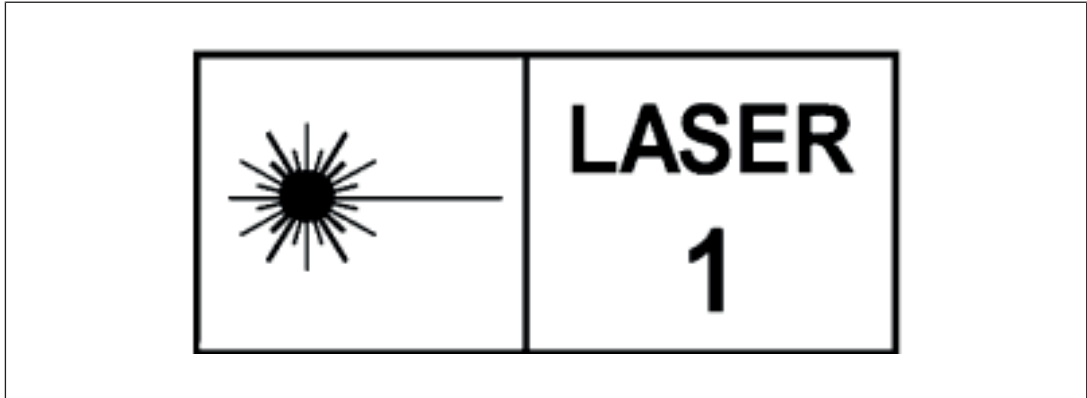
All claims to warranty and liability will be rendered invalid if

- ▶ 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.).

3.2.4 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).

3.3 For your safety



INFORMATION

Laser radiation of the safety laser scanner

The safety laser scanner of the PSEN sc B 5 Series corresponds to the laser class 1 in accordance with EN 60825-1. Additional measures to shield the laser beams are not required (eye-safe).

4 Function description

4.1 Basic function of the safety laser scanner

The safety laser scanner monitors an area that is covered by the light beam emitted by the safety laser scanner.

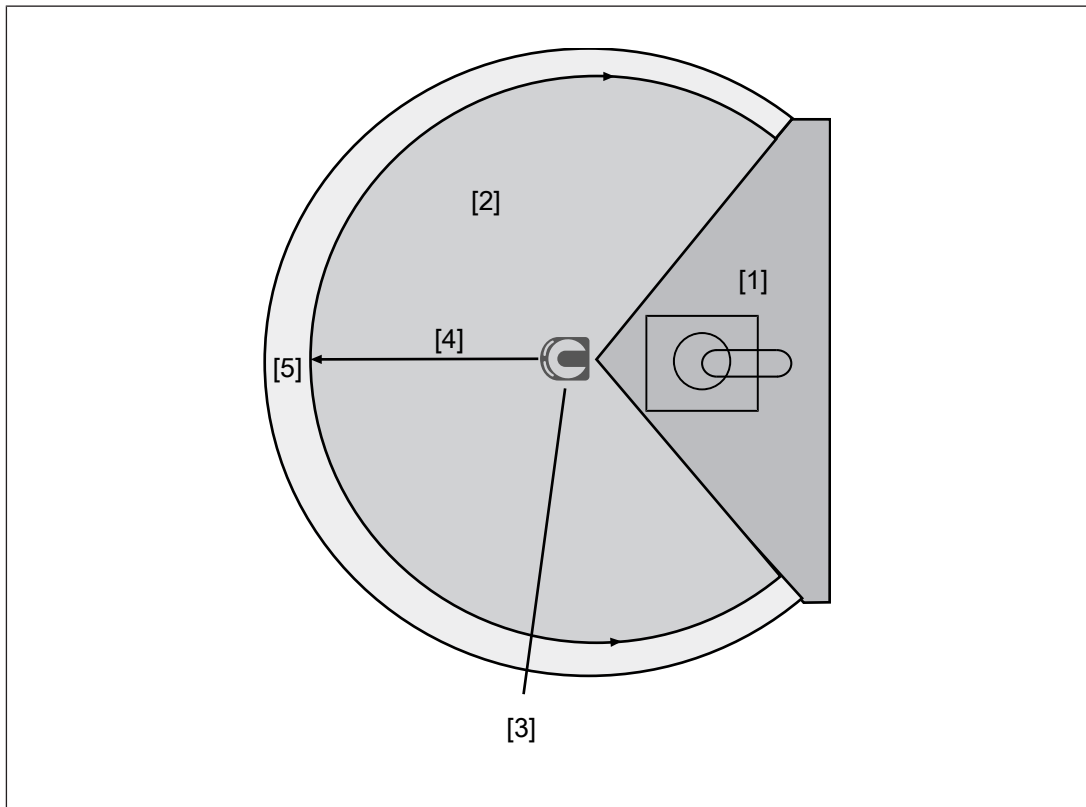


Fig.: Operating principle safety laser scanner

Legend

- [1] Hazardous area
- [2] Area covered by the laser beam
- [3] Safety laser scanner
- [4] Safety zone
- [5] Warning zone

The area can be divided into a safety zone and a warning zone.

If an object or a person enters the warning zone, corresponding actions can be triggered (e.g. switch on indicator light unit).

If an object or a person violates the safety zone, the OSSDs switch to an OFF state.

4.2 Use of zone sets and monitoring cases

A safety zone and a warning zone constitute a zone set.

A monitoring case is a defined signal at the control inputs for the current machine state. For **one** specific machine state, **one** specific monitoring case can be assigned.

The safety laser scanner uses the defined signal at the control inputs to activate the zone set, which is assigned to this monitoring case and therefore to a specific machine state.

When a machine has e.g. different operating statuses, a safety laser scanner can be used to monitor several operating statuses.

When using two zone sets, the monitoring of zone set 1 can be switched to the monitoring of zone set 2. The switching is controlled by the configurable inputs.

The standard behaviour when switching the monitoring cases does not plan an overlap of the zone sets.

4.3 Automatic and monitored start/restart

Automatic start/restart

After switching on the safety laser scanner or re-release of the protected field, the safety laser scanner automatically starts to the ON condition under these conditions:

- ▶ both OSSDs are wired correctly **and**
- ▶ no error has occurred **and**
- ▶ the safety zone is free.

If the safety zone is violated, the OSSDs switch to the OFF state.

Monitored start/restart function

The OSSDs switch to the ON state during operation under the following conditions:

- ▶ both OSSDs are wired correctly **and**
- ▶ no error has occurred **and**
- ▶ the protected field is clear **and**
- ▶ at least 80 ms have elapsed since switching to the OFF state **and**
- ▶ The start button has been operated and then released again for a min. 0.5 s and a max. 5 s. The start occurs with a falling edge.

4.4 Manual restart

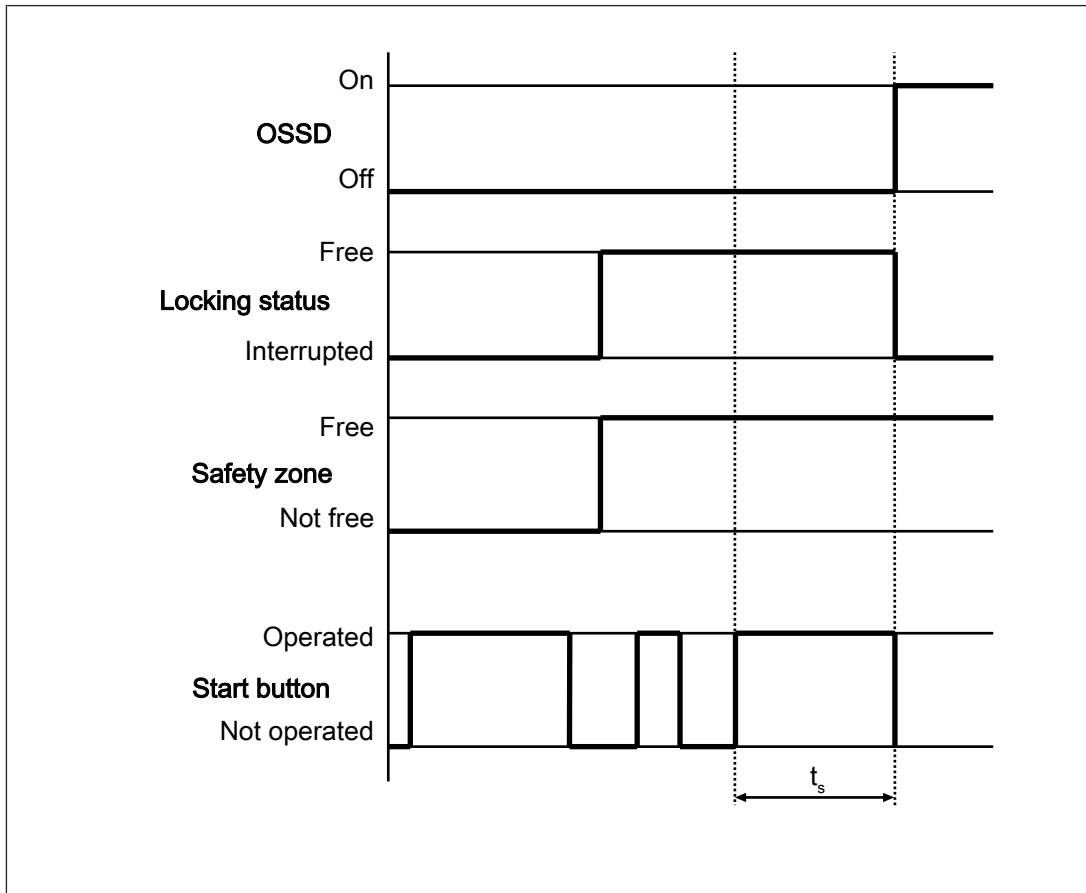


Fig.: Timing diagram for manual restart

Legend

t_s Operate the start button for 0.5 s to 5 s to trigger a manual restart

4.5 OSSD

The switched-on OSSD outputs are permanently checked by monitored test pulses. In the case of detected errors at the OSSD outputs the safety laser scanner switches to the error status.

4.6 Reset

The Reset function can be used to set the safety laser scanner back to normal operation when the safety laser scanner has changed to an error state because of a non-critical error.

The reset pushbutton has to be connected to the reset input.

To trigger a reset, the reset pushbutton has to be pressed for at least 500 ms.

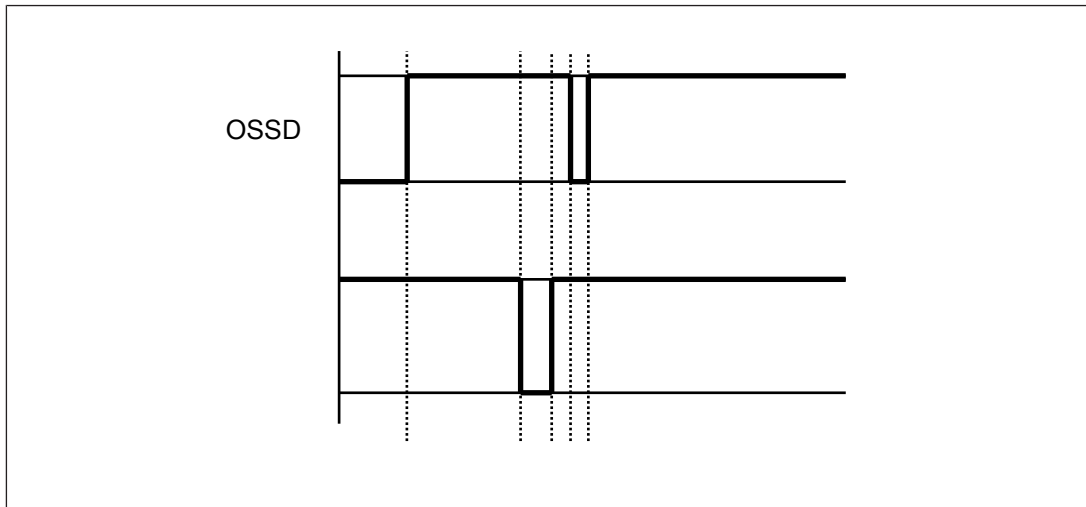
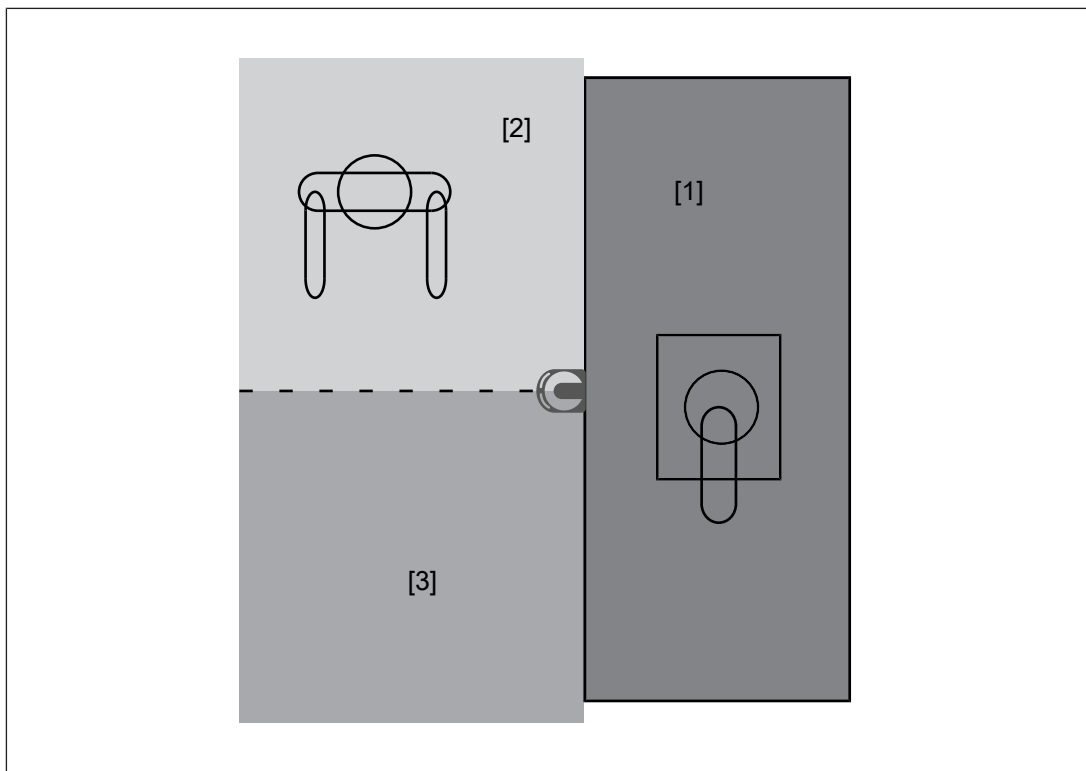


Fig.: Timing diagram reset

4.7 Stationary hazardous area

Using the safety laser scanner, you can monitor a stationary hazardous area, e.g. the environment of a machine that is installed in a fixed position.

The monitored area can be divided into subsections, for which monitoring can be activated and deactivated each.



Legend

- [1] Hazardous area
- [2] Configured zone 1, monitoring not activated
- [3] Configured zone 2, monitoring not activated

4.8 Multiple evaluation

When multiple evaluation is active, an object has to be scanned several times consecutively before the safety laser scanner switches the OSSDs to the OFF state. This reduces the probability that insects, welding sparks or other particles lead to a shutdown of a plant.

If a multiple evaluation of 4 is configured, an object has to be detected 4 times in succession in the safety zone, so that the safety laser scanner switches the OSSDs to the OFF state.

With a multiple evaluation > 2 an allowance has to be made to the response time. The height of the allowance (see [Calculation of the overall response time \[📖 21\]](#)) results from the value of the multiple evaluation and the valid response time (see [Technical details \[📖 66\]](#)).

4.9 Examples of application

If a violation of the safety zone is detected, the evaluation device switches off the outputs configured for this. The machine is brought to a safe condition via the connected OSSDs.

If a violation of the warning zone is detected, the actions configured in PSENscan Configurator are performed. A visual or audible signal can be activated as advance warning.

4.9.1 Horizontal application

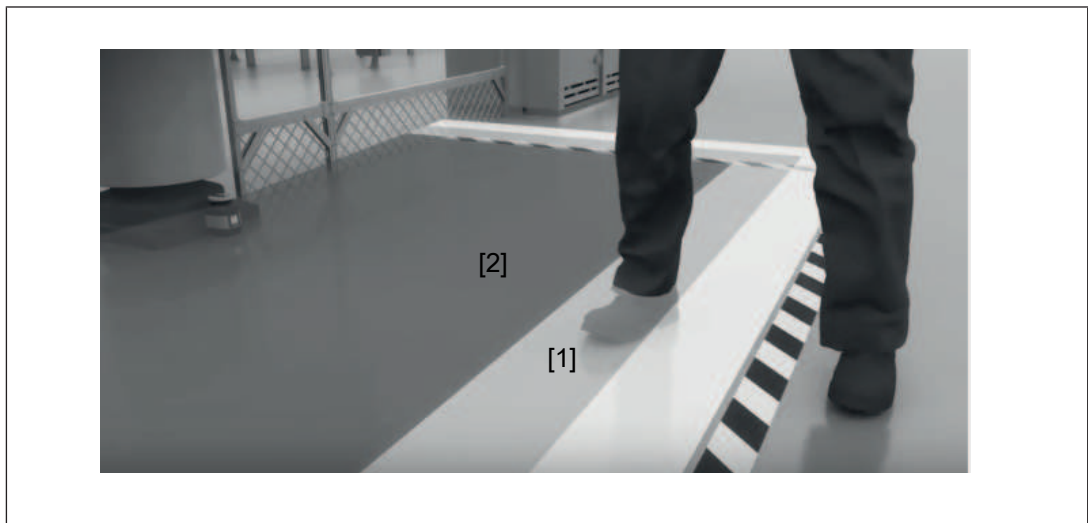


Fig.: Application example PSEN scan safety laser scanner - horizontal configuration

Legend

[1] Warning zone

[2] Safety zone

5 Project configuration

5.1 Maintaining the safety distance

5.1.1 Horizontal application

A horizontal application has been achieved when the safety laser scanner is aligned at an angle of max. 30° with the floor level.

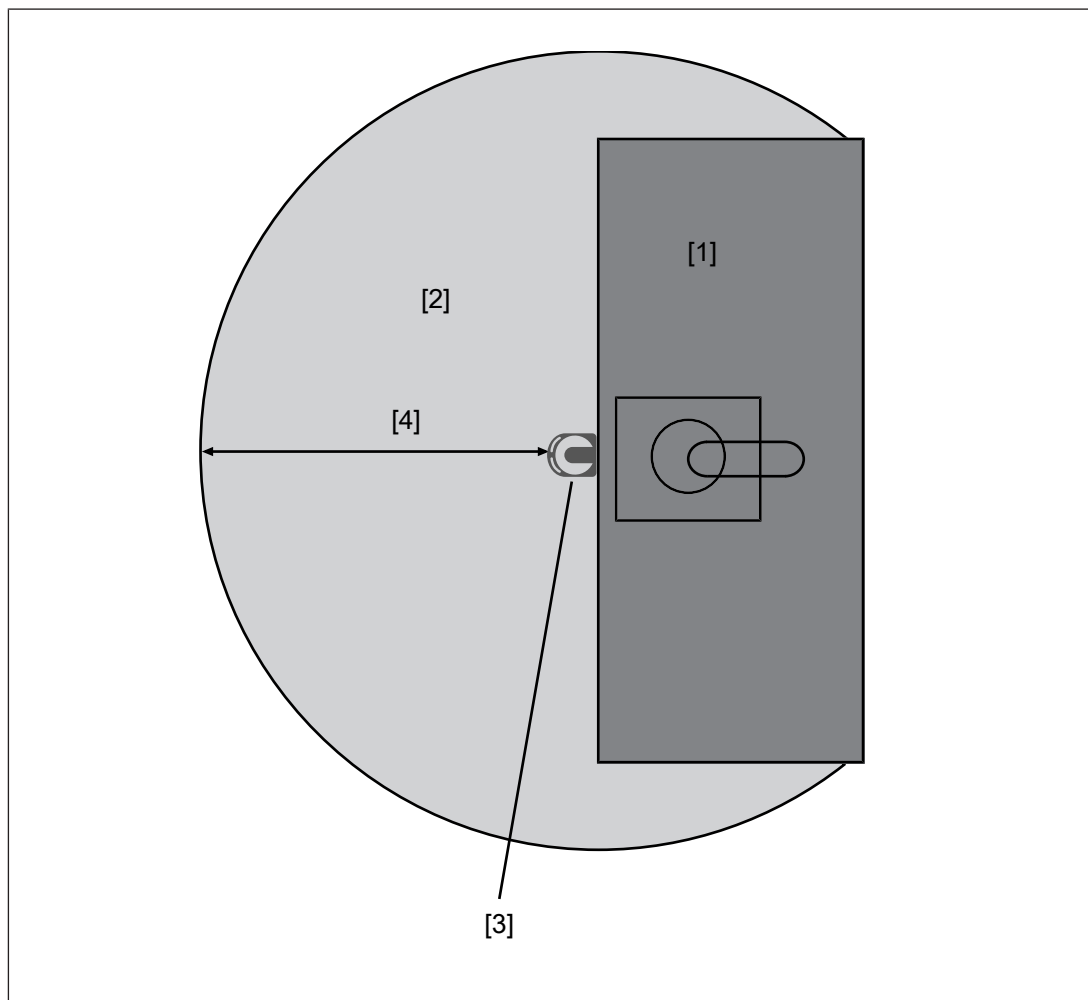


Fig.: Schematic representation minimum distance from the start of the protected area to the hazardous area

Legend

- [1] Hazardous area
- [2] Area covered by the laser beam
- [3] Safety laser scanner
- [4] Minimum distance to the hazardous area (corresponds max. to the operating range of the safety laser scanner)

The minimum distance from the start of the protected area by the safety laser scanner to the hazardous machine component should be such that the operator cannot reach the hazardous area until the movement of the hazardous machine part has stopped.

In accordance with the standard

- ▶ EN ISO 13855

this distance depends on the following factors:

- ▶ Overall response time of the safety laser scanner
Time between the interruption of the laser beam and the OSSDs' change to the OFF state (see [Calculating the overall response time](#) [📖 21]).
- ▶ Machine's stopping time
Interval between the change of the OSSD to the OFF state and the stopping of the hazardous machine movement (including the reaction time of the connected relay)
- ▶ Approach speed
The speed with which the object to be detected is nearing the hazardous area in mm/s

The following applies for PSEN sc B 5 Series:

$S = K * (t_1 + t_2) + Z_T + Z_R + C$	
S	Minimum distance in mm, measured from the start of the safety zone to the danger source
K	Approach speed with which the object to be detected is nearing the hazardous area in mm/s (in accordance with EN ISO 13855) K = 1600 mm/s for S > 500 mm
t ₁	Overall response time of the safety laser scanner in seconds Time it between the violation of a safety zone and signal change at the OSSD output on the safety laser scanner
t ₂	Machine's stopping time in seconds The time required for the machine to stop after the signal at the OSSD output changes
C	Additional distance depending on the height of the scanning plane and the detection capability
Z _T	General safety allowance = 150 mm
Z _R	Allowance when installing near intense light sources or reflective surfaces (see Distance to intense light sources and to reflective surfaces [📖 24])

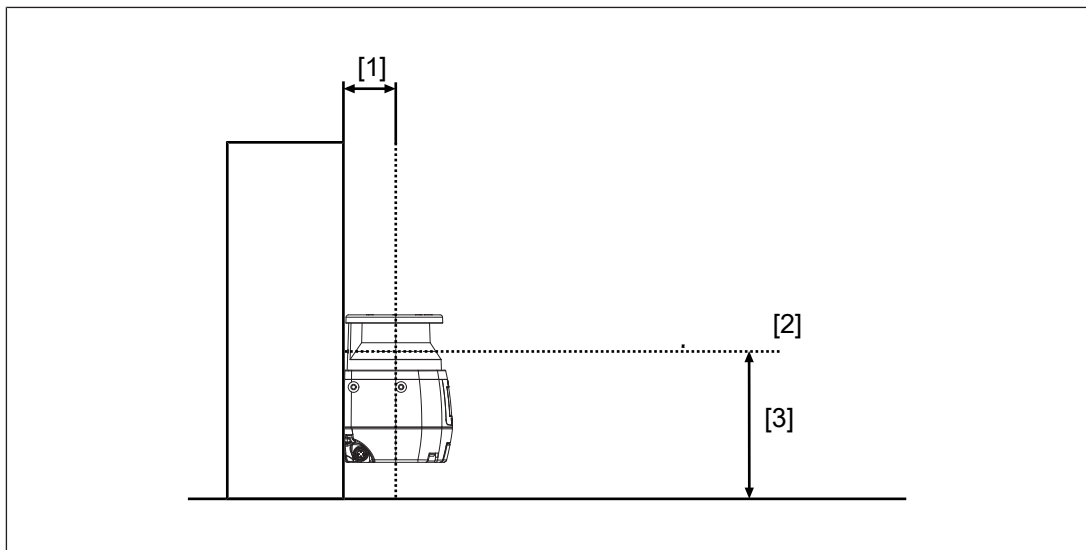
Determining the additional distance C depending on the height of the scanning plane and the detection capability (see EN ISO 13855)

$$C = (1200 - 0.4H)$$

Please note:

- ▶ Permitted height H of the scanning plane
 - H = 15(d-50)
 - d = resolution (see [Technical details](#) [📖 66])
 - Max. 1000 mm

- ▶ When the safety laser scanner is to be placed at a height of $H > 300$ mm, creeping underneath the safety zone must be excluded.

**Legend**

- [1] Opening between the origin of the laser beam of the safety laser scanner and the mounting area
- [2] Scanning plane
- [3] Height H between scanning plane and base area

**CAUTION!**

Risk of injury by reaching into the opening between safety laser scanner and mounting area

Reaching into the opening between safety laser scanner and mounting area can lead to injuries.

- Prevent any possibility of reaching into the opening

5.2 Calculation of the overall response time

The overall response time is composed of the response time t_1 depending on the selected detection capability (see [Technical details \[66\]](#)) and an allowance t_{multiple} for a multiple evaluation.

Overall response time T_{overall}

$$T_{\text{overall}} = t_1 + t_{\text{multiple}}$$

t_1	Response time t_1 , depending on the selected detection capability (see Technical details [66])
t_{multiple}	Allowance for multiple evaluation > 2

In a multiple evaluation = 3 and detection capability = 70 mm the allowance is $T_{\text{multiple}} = 30$ ms.

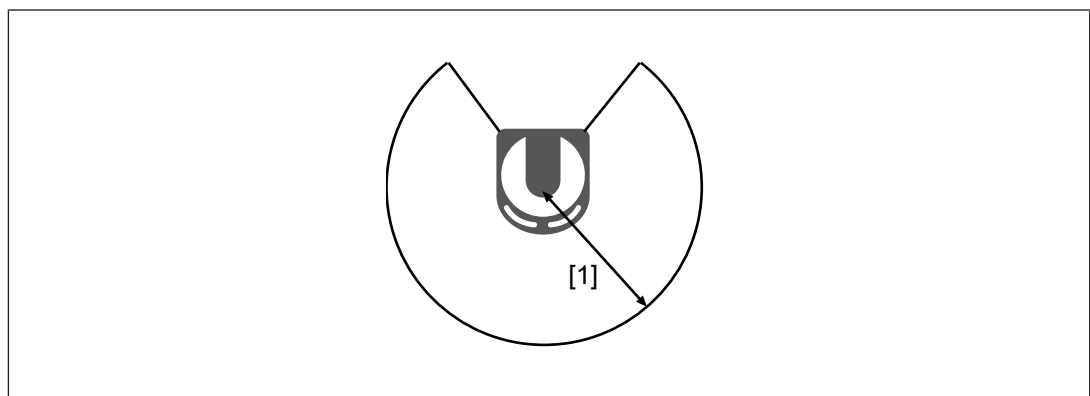
Each further increase of the multiple evaluation by 1 increases the allowance T_{multiple} by 30 ms.

5.3 Area with limited detection capability

In the area of max. 100 mm before the laser scanner there is an area with limited detection capability.

Please note:

- ▶ The area with limited detection capability must not be accessible for objects or persons.
- ▶ Install the safety laser scanner so that no objects can enter the zone with limited detection capability. Avoid installing the safety laser scanner below cable trays, so that cables cannot enter the area with limited detection capability.



Legend

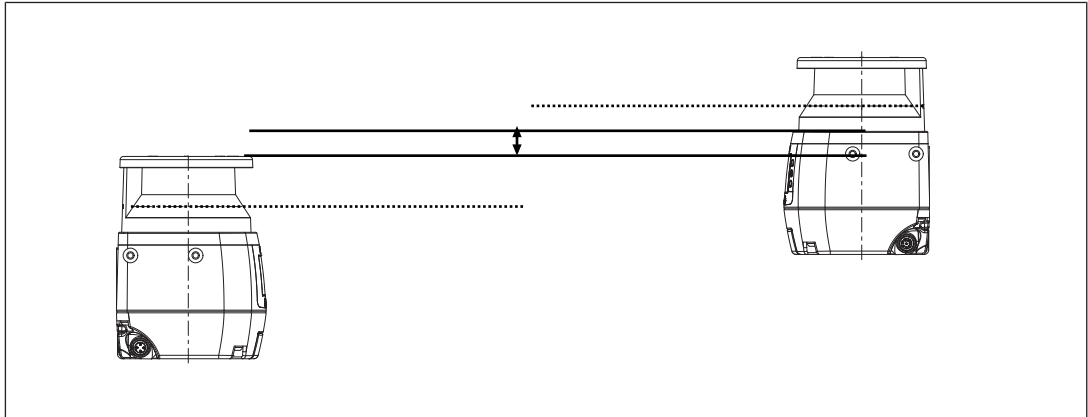
[1] Area with limited detection capability

5.4 Installation of several adjacent safety laser scanners

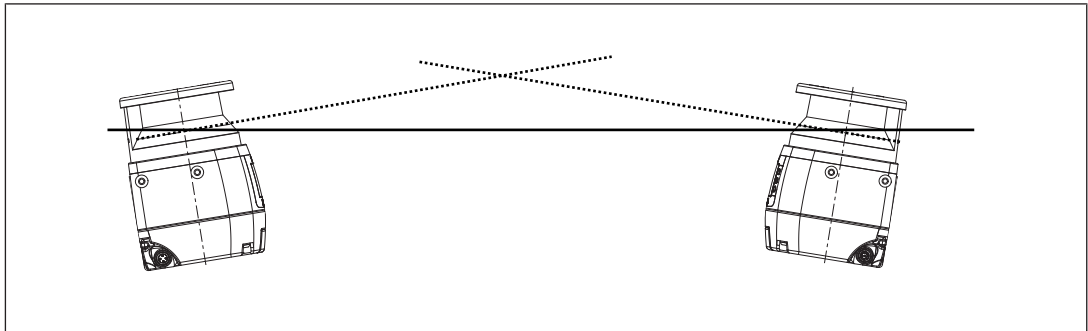
When safety laser scanners have to be installed in an area, it must be ensured that an interference between the safety laser scanners occur at a maximum for the duration of the double rotation time (see [Technical details](#) [[66](#)]).

This can be achieved by installing the safety laser scanner in various heights or inclination or by an opaque object between two laser scanners.

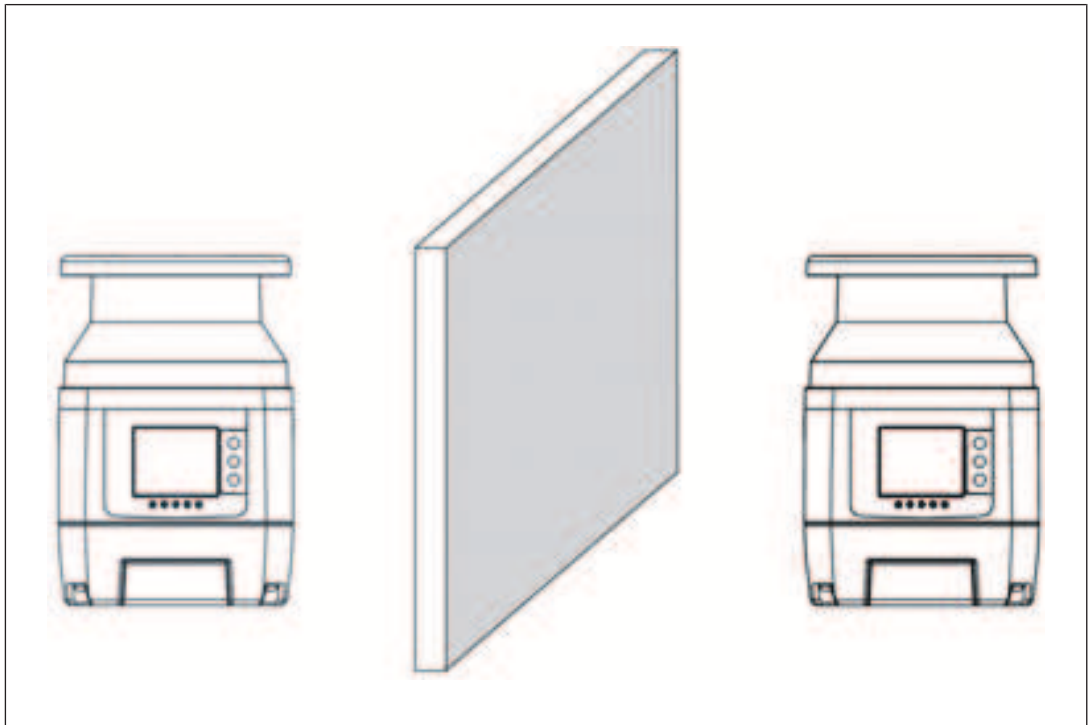
- ▶ Change the height of the safety laser scanners





- ▶ Change the inclination of the safety laser scanners.



- ▶ Place an opaque object between the safety laser scanners



5.5 Ambient conditions

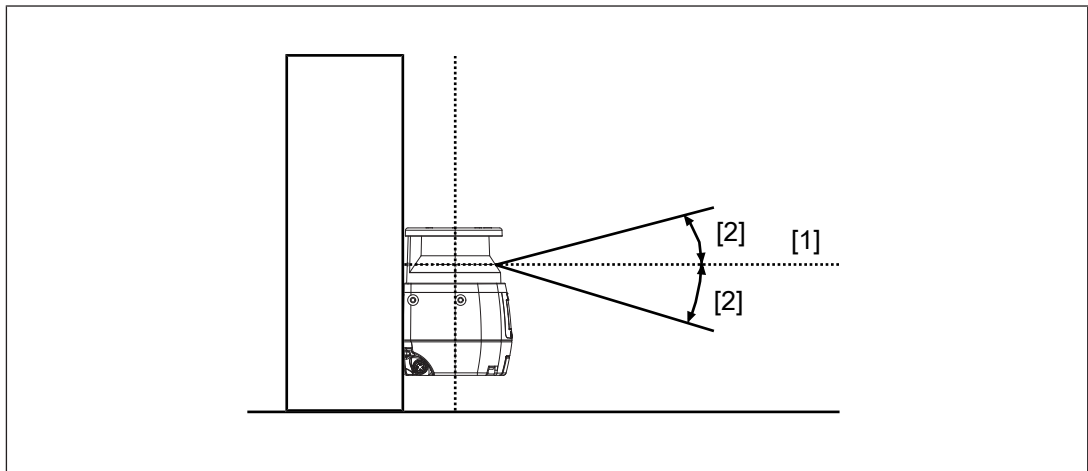
- ▶ Install the safety laser scanner in an environment that corresponds to the environmental data provided in the [Technical details](#) [ 66].
- ▶ If there is a highly reflective background within a distance of 2.5 m from the protection field perimeter (e.g. a shiny metallic surface), errors in the calculation of the exact distance to the detected object will occur.
 - Reduce the reflection of the background or remove the background **or**
 - add the allowance Z_R to the minimum safety distance (see [Distance to intense light sources and to reflective surfaces](#) [ 24]).
- ▶ The transmitter of a safety laser scanner must not interfere with another safety laser scanner .
- ▶ Avoid strong electromagnetic interference when operating the safety laser scanner.
- ▶ When operating the safety light grid, avoid the development of smoke, mist, or dust that would reduce the safety laser scanner's range.

5.6 Distance to intense light sources and to reflective surfaces

Minimum distance to especially intense or flashing light sources

Pilz recommends that the safety laser scanner is not installed near particularly intense or flashing light sources.

When especially intense or flashing light sources are near the safety laser scanner (area of $\pm 5^\circ$ to the scanning plane, see figure), an allowance has to be considered when calculating the safety distance.



Legend

- [1] Scanning plane
- [2] Area of $\pm 5^\circ$ to the scanning plane

Minimum distance from reflective surfaces

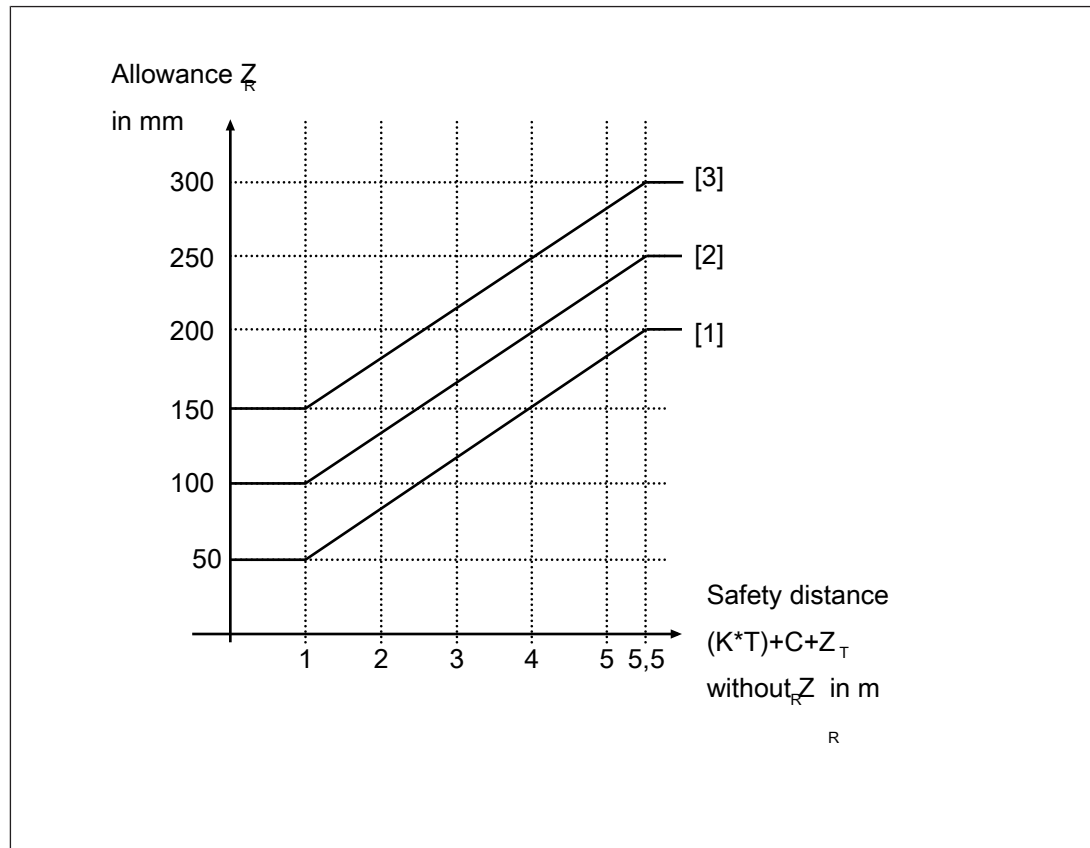
If there are reflective surfaces near the laser beams emitted from the safety laser scanner (whether from above, below, or from the side), passive reflections can cause an object within the safety zone to remain undetected (see diagrams).

- ▶ Objects that may be influenced by safety laser scanners through ambient light, must not be placed within the opening angle of the laser beam.
- ▶ Pilz recommends that the safety laser scanner is installed at a minimum distance of 2.5 m from reflective surfaces (The recommendation has been determined with a reflection of the background of $\frac{cd}{300m^2 * lx}$. For highly reflective backgrounds an additional safety assessment is required, taking into account the reflective background. This may result in a higher allowance.)

Allowance Z_R with distances below the recommended minimum distances to intense light sources or reflective surfaces

If the recommended distances cannot be met, the allowance Z_R must be considered when [calculating the safety distance](#) [18].

The value for the allowance Z_R depends on the selected level of the dust filter and on the determined safety distance without this allowance.



Legend

- [1] Low level
- [2] Medium level
- [3] High level

5.7 Distance from walls

The edges of the safety zone must have a distance of 40 mm to walls or fixed objects on all sides.

With this value, the function of the safety laser scanner is ensured. Depending on the reflective conditions of the walls or objects, higher allowances may be necessary (see [Distance to intense light sources and to reflective surfaces](#) [24]).

5.8 Planning of safety and warning zones and zone sets

- ▶ Specify the location and the size of the safety zone and the warning zone in accordance with the safety assessment.
- ▶ Specify in what situations the switching operation of the zone sets are to take place.

5.9 Switchover time with zone selection

The zone selection is done by digital signals that are controlled by the control system. For the changeover process a maximum switchover time (input delay in PSEnscan Configurator) is defined. For this time, non-permitted signals may be present at the entrances to the zone selection. After the switchover time has elapsed, a valid code for a zone must be present at the inputs for zone selection. The switchover time can be adjusted in increments of 30 ms, and it must be adapted to the performance of the control system.

Select the time where the control system can switch an input in a defined way.

5.10 Determining the moment of switchover

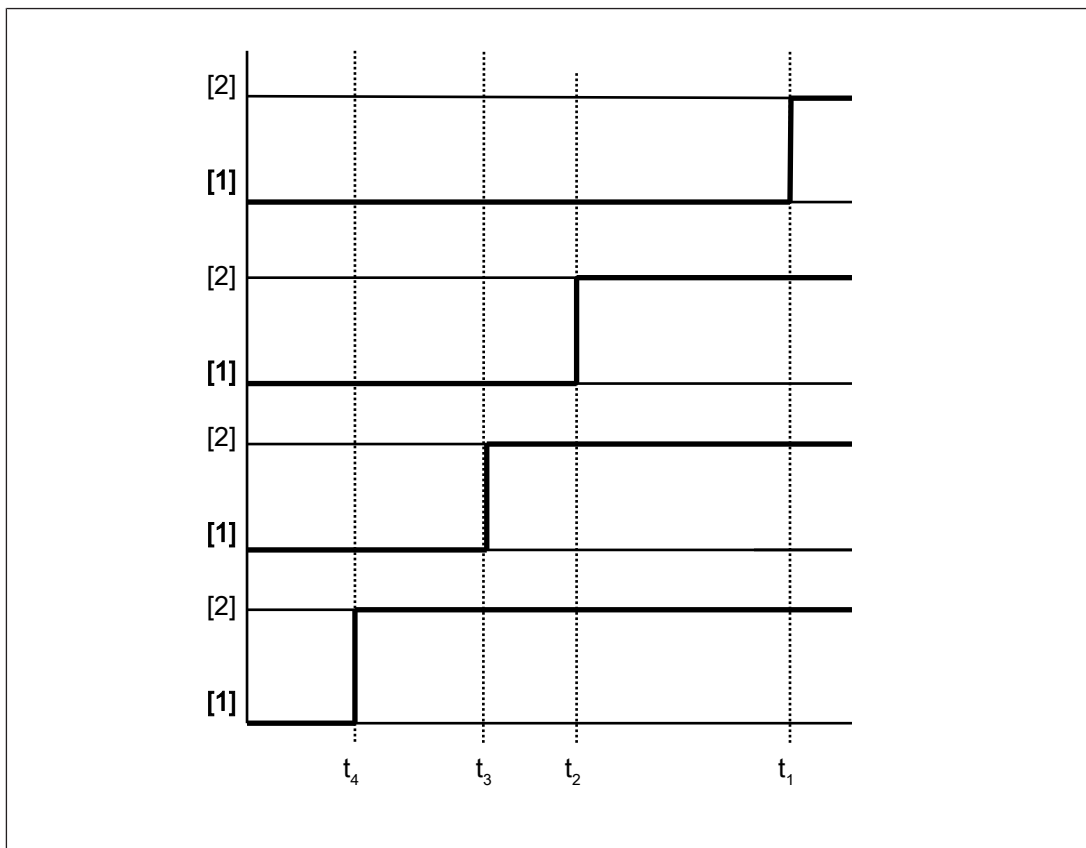


WARNING!

Loss of the safety function by switching the monitoring too late

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

- ▶ Switching the monitoring of zone sets too late means that a person is in the safety zone even before switching.
 - Use switching of monitoring in time or overlapping zone sets to ensure that no person is in the safety zone when this area changes to a hazardous area.



Legend

- t_1 Switchover time without advance
- t_2 Advance of the switchover time by the input delay
- t_3 Advance of the switchover time when using inputs of another device
- t_4 Advance of the switchover time when using inputs of external OSSDs
- [1] Monitoring zone set 1 is active
- [2] Monitoring zone set 2 is active

5.11 Dust filtration

The safety laser scanner has a dust filtration function. This changes the sensitivity of the safety laser scanner, and the availability in dusty environments can be improved.

There are three levels:


- ▶ High for high level of dust generation
- ▶ Average for medium level of dust generation
- ▶ Low of low level of dust generation



WARNING!

Loss of safety function due to a safety distance that is too low

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

- ▶ Depending on the degree of dust filtering, it is necessary to consider an allowance for calculating the safety distance when installing the safety laser scanner near intense light sources or reflective surfaces into account (see [Distance to intense light sources and to reflective surfaces](#) [ 24]).
 - When calculating the safety distance, ensure that the allowance is considered depending on the dust filtering.
 - Ensure that the new safety distance fulfils the specifications of the safety assessment.

6 Installation and alignment

6.1 Installation options

The safety laser scanner can be installed in various ways.

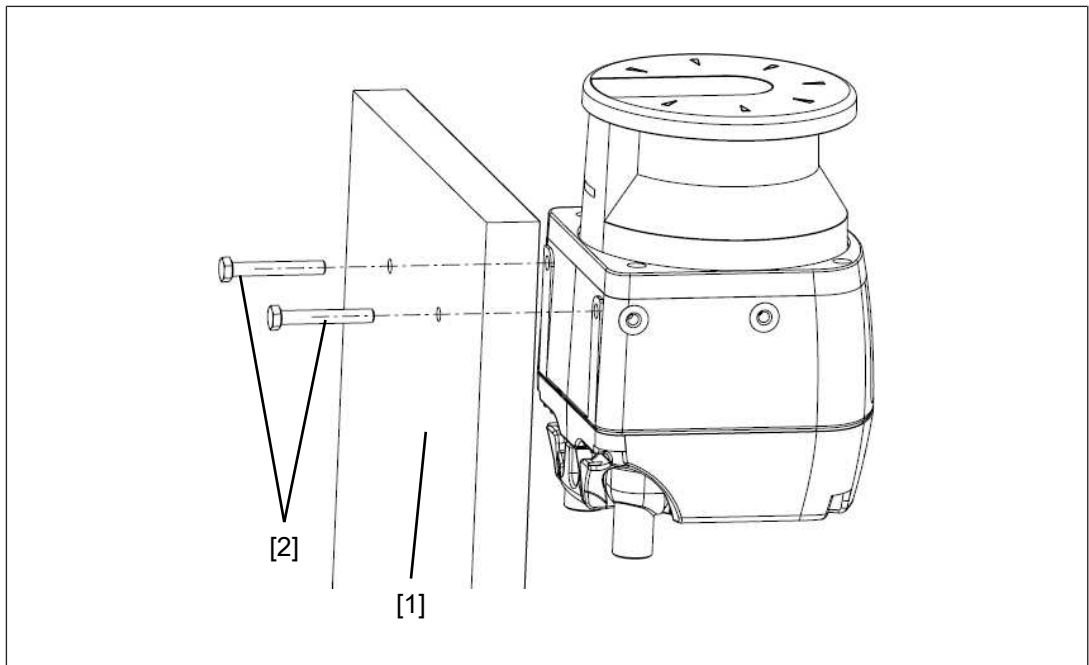
- ▶ Installation directly at the mounting surface [📖 29]
- ▶ Installation with protective bracket PSEN sc bracket H [📖 30]
- ▶ Installation with PSEN sc bracket PR for inclination to the side or to the top or bottom [📖 31]
- ▶ Installation with PSEN sc bracket P for inclination to the top and bottom [📖 33]

6.2 Installation without PSEN sc bracket H

For direct installation of the safety laser scanner at the mounting surface, two threaded holes are provided at the rear of the safety laser scanner.

Please note:

- ▶ With direct installation of the safety laser scanner at the mounting surface, the accessory PSEN sc bracket H cannot be used.
- ▶ With direct installation of the safety laser scanner at the mounting surface, the safety laser scanner cannot be inclined to the side or to the top/bottom.
- ▶ To fix the safety laser scanner, use M5 screws for a max. screw depth of 10 mm.



Legend

- [1] Mounting surface
- [2] M5 screws

Prerequisites

- ▶ Mounting surface with 2 through-holes for screws M5x10 mm, distance 73 mm horizontally towards each other for fixing the bracket of the safety laser scanner.
- ▶ The mounting surface has to be accessible from both sides for installation.

Procedure:

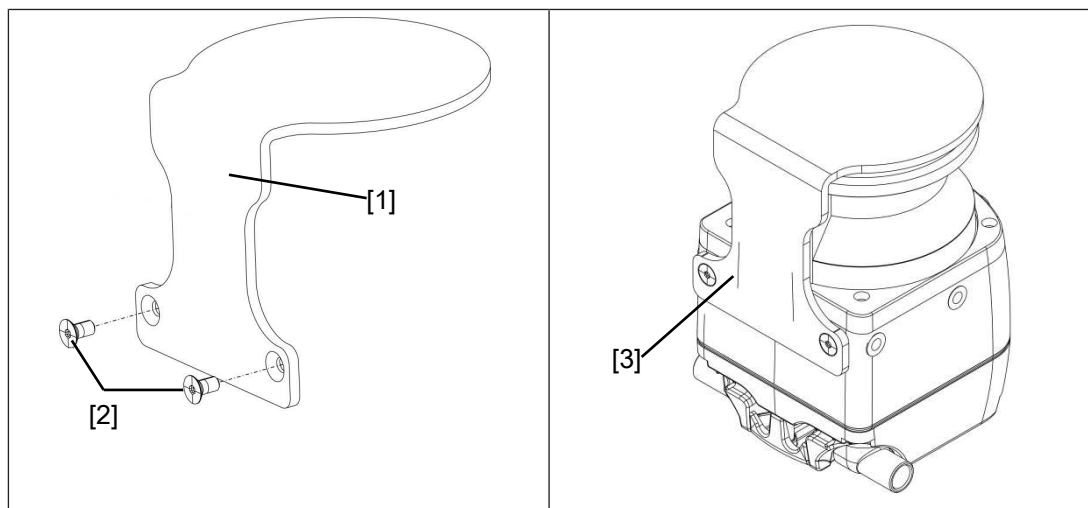
1. Turn the safety laser scanner when the safety laser scanner is to be operated with the top side down.
2. Use two M5 screws to fix the safety laser scanner to the mounting surface. Tighten the screws to 3 Nm.

6.3 Installation of the protective bracket PSEN sc bracket H at the safety laser scanner

For easy and flexible installation of the safety laser scanner, the safety laser scanner is fixed to a protective bracket PSEN sc bracket H (see [Order reference accessories \[70\]](#)). The protective bracket protects the safety laser scanner against damage by falling objects.

With this protective bracket the safety laser scanner can be used in both brackets PSEN sc bracket PR or PSEN sc bracket P (see [Order reference accessories \[70\]](#)).

1. Turn the safety laser scanner when the safety laser scanner is to be operated with the top side down.
2. Fix the PSEN sc bracket H at the rear of the safety laser scanner with two M5 screws and tighten both screws with 3 Nm.


**Legend**

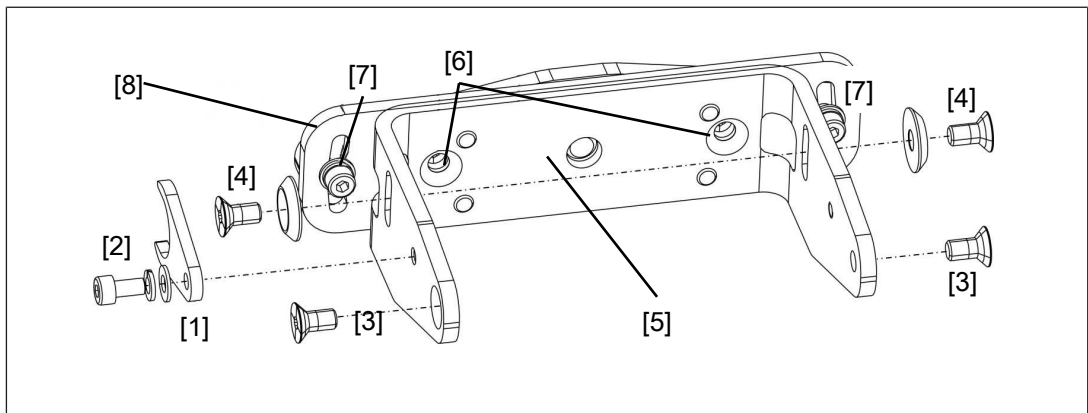
- | | |
|-----|--|
| [1] | PSEN sc bracket H (protective bracket for safety laser scanner) |
| [2] | M5 screws for fixing the PSEN sc bracket H at the safety laser scanner |
| [3] | PSEN sc bracket H installed at the safety laser scanner |

6.4 Installation with setting of angle of inclination/roll angle - bracket PSEN sc bracket P

- ▶ The setting of the angle of inclination of the safety laser scanner is not changed when exchanging the safety laser scanner.

Prerequisites

- ▶ Mounting surface with 2 drill holes, 10 mm deep, distance 73 mm horizontally towards each other for fixing the PSEN sc bracket PR or PSEN sc bracket P
- ▶ The protective bracket PSEN sc bracket H must already be fixed at the safety laser scanner (see [Installation of the protective bracket PSEN sc bracket H at the safety laser scanner](#) [ 30]).

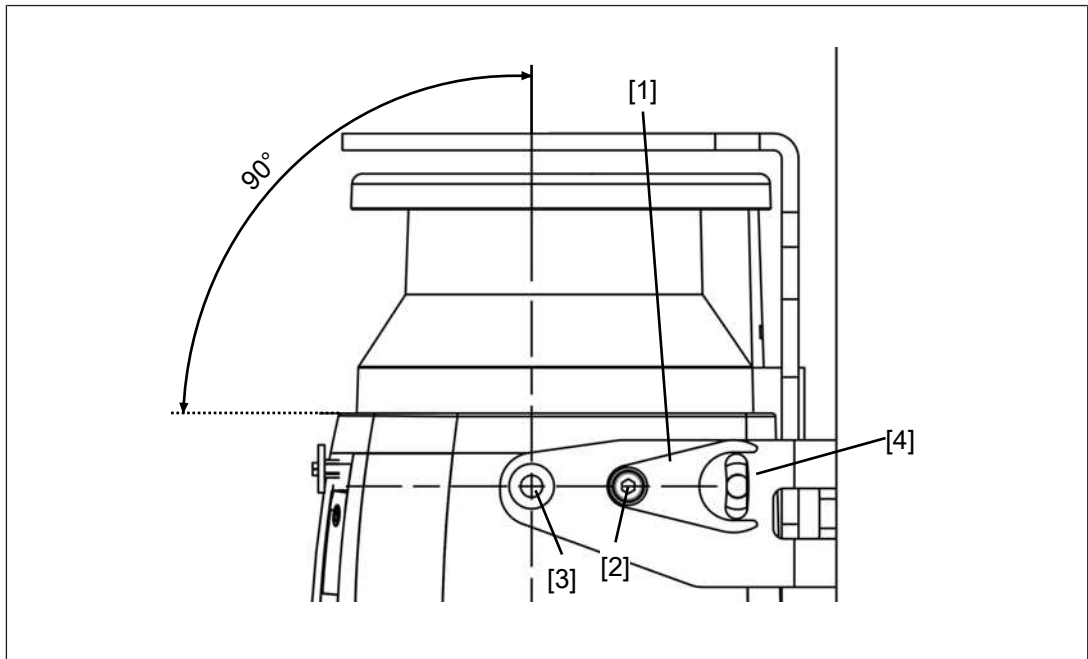


Legend

- [1] Adjusting disc for angle of inclination
- [2] Set screw for adjusting disc for angle of inclination
- [3] Fixing screws for safety laser scanner
- [4] Fine adjustment screws for the incline of the safety laser scanner
- [5] Front part of the PSEN sc bracket PR
- [6] Fixing screws for fixing to the mounting surface
- [7] Roll angle fine adjustment screws
- [8] Rear part of the PSEN sc bracket PR

Procedure:

1. Loosen the roll angle fine adjustment screws [7] of PSEN sc bracket PR slightly, if required, and align the front part [5] of PSEN sc bracket PR to the rear part [8].
The bracket is pre-assembled.
2. Fix PSEN sc bracket PR with the fixing screws [6] to the mounting surface and tighten the fixing screws [6] alternately and evenly with 3 Nm.
3. Fix the adjusting disc for angle of inclination [1] with the set screw and washers [2] at PSEN sc bracket P (right or left).
4. Align the middle of the adjusting disc for angle of inclination [1] with the center of the fixing for the safety laser scanner [3] and tighten the set screw for the adjusting disc for angle of inclination [2] with 2,5 Nm.



Legend


- [1] Adjusting disc for angle of inclination
 - [2] Set screw for the adjusting disc for angle of inclination
 - [3] Fixing screws for safety laser scanner
 - [4] Fine adjustment screws for the incline of the safety laser scanner
5. Insert the safety laser scanner in PSEN sc bracket PR with the bracket PSEN sc bracket H to the top and fix the safety laser scanner with the screws [3] and [4]. Tighten all four screws to 3 Nm.

<p>Inclination to the top/bottom</p>	<p>Inclination to the side (roll)</p>

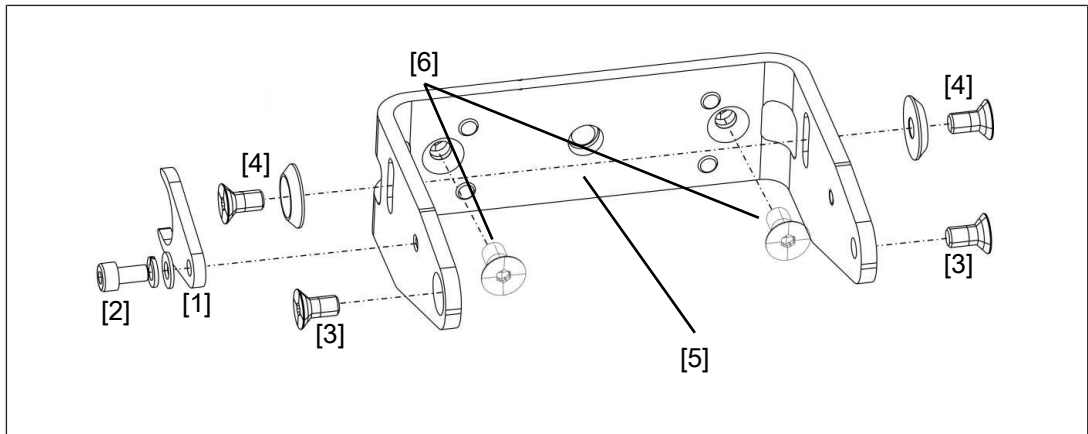
6.5 Installation with angle of inclination setting - holder PSEN sc bracket P

- ▶ The setting of the angle of inclination of the safety laser scanner is not changed when exchanging the safety laser scanner.

Prerequisites

- ▶ Mounting surface with 2 drill holes, 10 mm deep, distance 73 mm horizontally towards each other for fixing the PSEN sc bracket PR or PSEN sc bracket P
- ▶ The protective bracket PSEN sc bracket H must already be fixed at the safety laser scanner (see [Installation of the protective bracket PSEN sc bracket H at the safety laser scanner](#) [ 30]).

Procedure:



Legend

- [1] Adjusting disc for angle of inclination
- [2] Set screw for adjusting disc for angle of inclination
- [3] Fixing screws for safety laser scanner
- [4] Fine adjustment screws for the incline of the safety laser scanner
- [5] PSEN sc bracket P
- [6] Fixing screws for fixing to the mounting surface

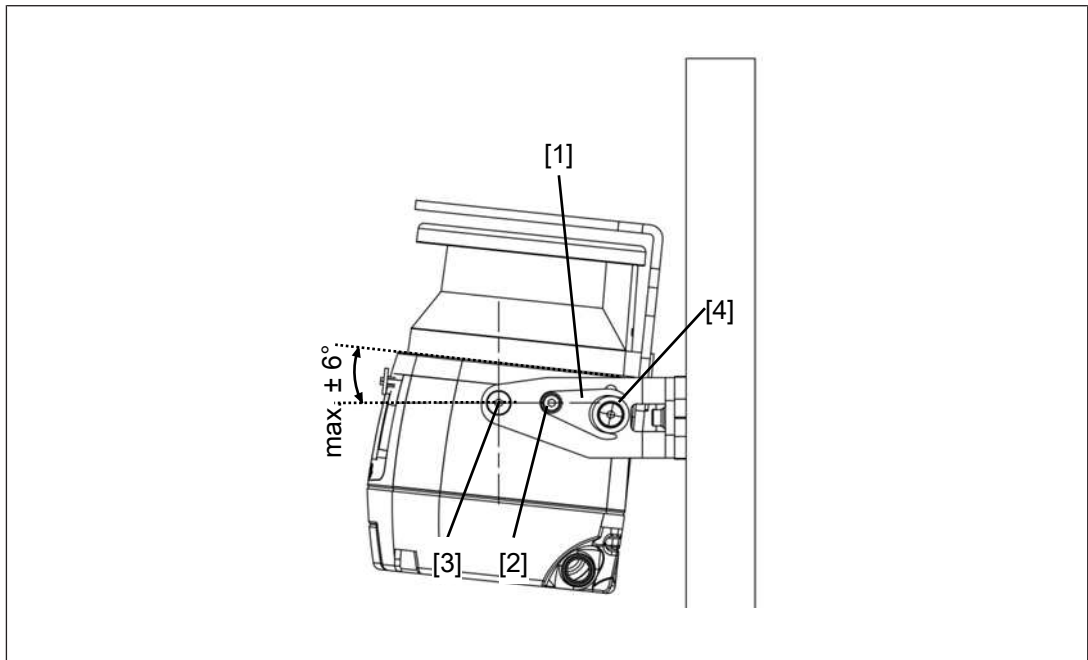
Procedure:

1. Fix PSEN sc bracket P with the fixing screws [6] to the mounting surface and tighten the fixing screws [6] alternately and evenly with 3 Nm.
2. Fix the adjusting disc for angle of inclination [1] with the set screw and washers [2] at PSEN sc bracket P (right or left).
3. Align the middle of the adjusting disc for angle of inclination [1] with the center of the fixing for the safety laser scanner [3] and tighten the set screw for the adjusting disc for angle of inclination [2] with 2,5 Nm.

6.6 Set the angle of inclination of the safety laser scanner

Procedure:

1. Change the inclination of the safety laser scanner within the permitted range of $\pm 6^\circ$.
If necessary, loosen the fixing screws for the safety laser scanner [3], the fine adjustment screws for the inclination of the safety laser scanner [4] and the set screw for the adjusting disc for angle of inclination [2].



Legend



- [1] Adjusting disc for angle of inclination
 - [2] Set screw for adjusting disc for angle of inclination
 - [3] Fixing screws for safety laser scanner
 - [4] Fine adjustment screws for the incline of the safety laser scanner
2. Tighten the fixing screws for the safety laser scanner [3] with 3 Nm and tighten the fine adjustment screws for the inclination of the safety laser scanner [4].
 3. Tighten the set screw for the adjusting disc for angle of inclination [2] with 2,5 Nm.

6.7 Set the side inclination of the safety laser scanner

Prerequisites

- ▶ The bracket PSEN sc bracket PR has to be installed at the mounting surface.

Procedure:

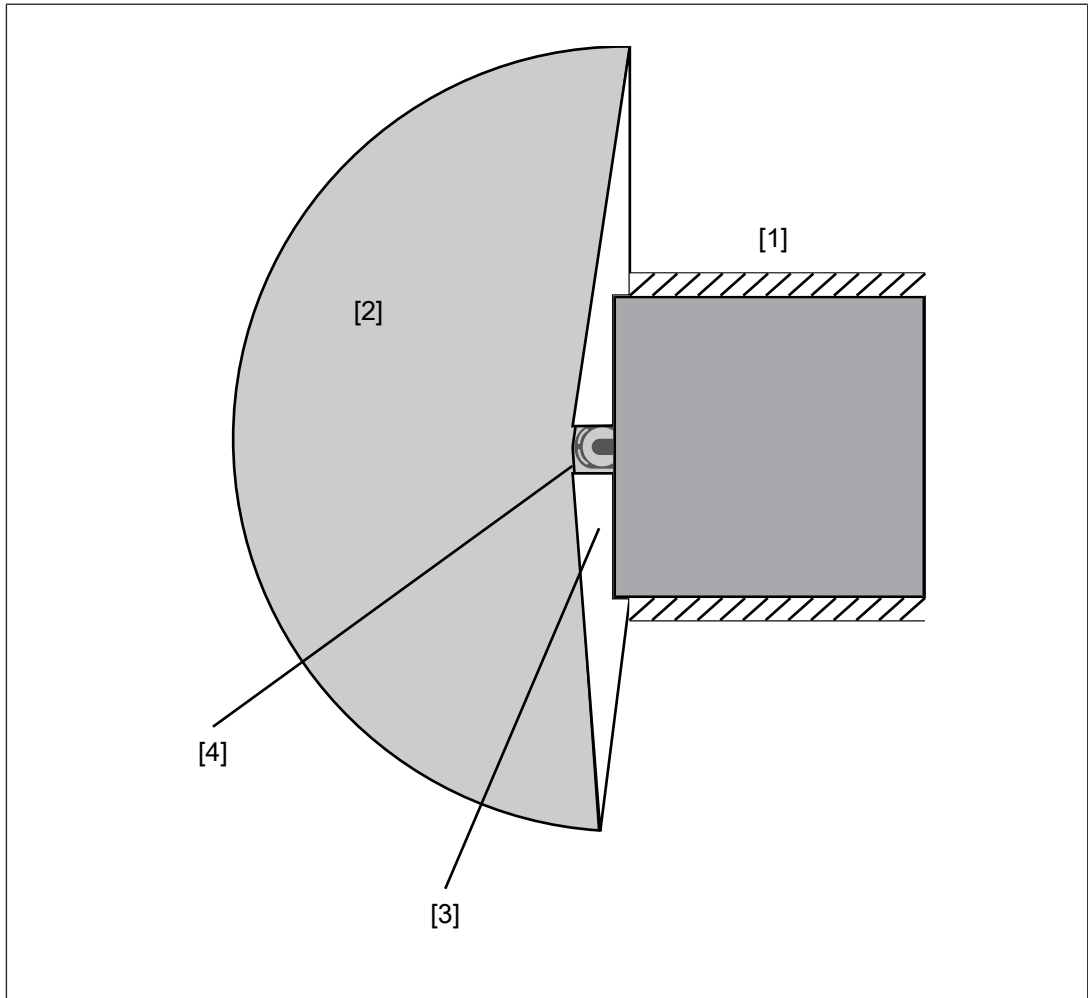
1. Change the side inclination of the safety laser scanner within the permitted range of $\pm 8.5^\circ$.
If required, loosen the roll angle fine adjustment screws [7] (see figure [Installation with setting of angle of inclination/roll angle - bracket PSEN sc bracket P](#)  31).
2. Tighten the roll angle fine adjustment screws [7] (see figure [Installation with setting of angle of inclination/roll angle - bracket PSEN sc bracket P](#)  31) with 2,5 Nm.

6.8 Measures to safeguard unsecured areas

When installing the PSEN sc B 5 Series areas may result that are not detected by the safety laser scanner.

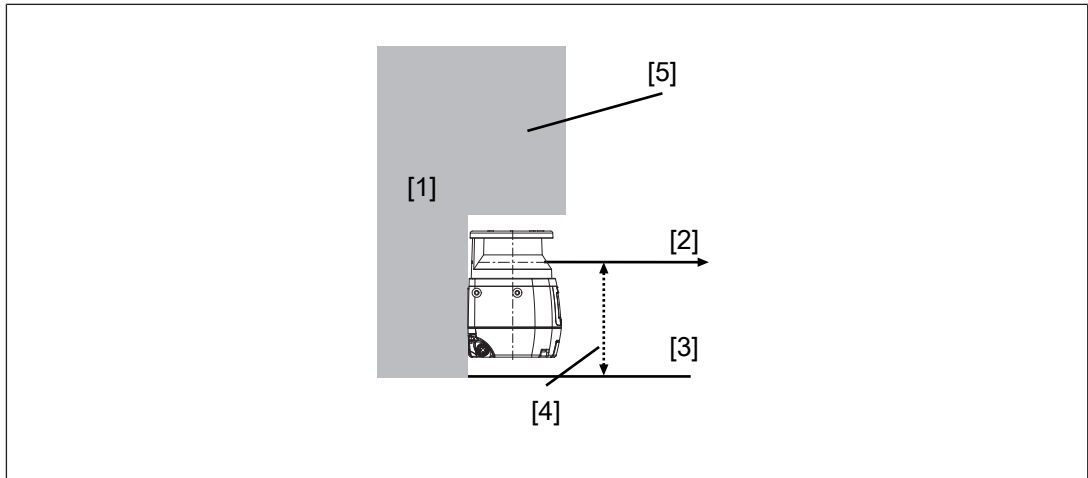
If required, install additional protective devices to safeguard the hazardous area.

Prevent stepping behind



Legend

- [1] Hazardous area with fence
- [2] Safeguarded area
- [3] Not safeguarded area - safeguard against stepping behind
- [4] Safety laser scanner

Prevent creeping underneath**Legend**

- [1] Mounting surface
- [2] Scanning plane
- [3] Base area
- [4] Safeguard area against creeping underneath
- [5] Edge at the mounting surface

7 Wiring

7.1 General guidelines

- ▶ Information given in the [Technical details \[66\]](#) must be followed.
- ▶ Do not lay the connecting cable near or in contact with cables that carry high or highly volatile currents.
- ▶ Use separate cables to connect the wires to the OSSDs of different safety laser scanners or safety switches.
- ▶ For supply voltage, use only PELV/SELV power supplies that have a voltage buffer in accordance with EN 60204-1.
- ▶ The protection type (see [Technical details \[66\]](#)) can only be achieved by using the Pilz connection leads available as an accessory.
- ▶ Connection to evaluation devices
 - Use the cables listed in the order reference (see Order references for accessories)
 - The clamps for connection to the evaluation device must be kept in a locked control cabinet. This prevents unauthorised modifications.
- ▶ Ensure compliance with permissible cable bending radii (see [Technical details \[66\]](#)).

7.2 Connector pin assignment

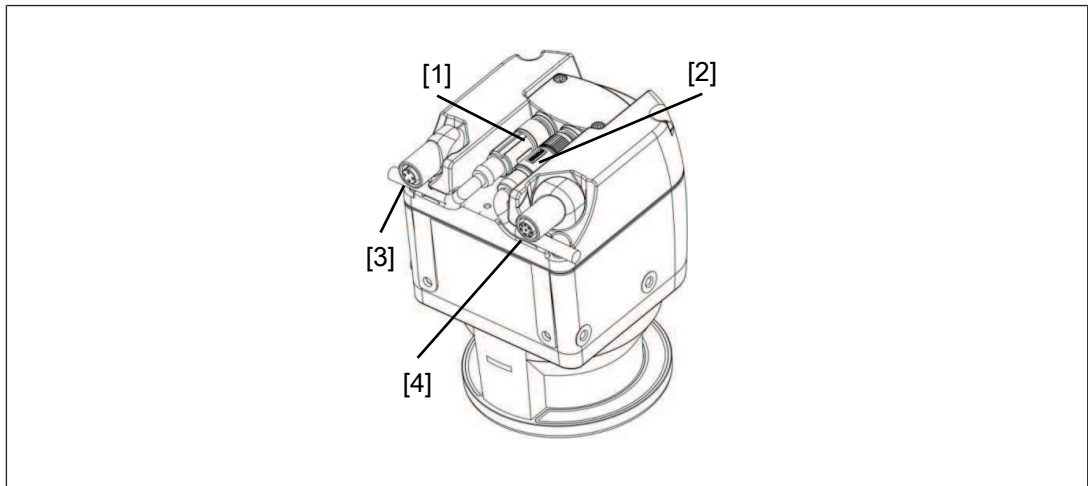
The safety laser scanner PSEN sc B 5 Series has configurable inputs and outputs. In PSENscan Configurator these can be configured for the specific application.

- ▶ M12 8-pin socket for connection to an evaluation device and the voltage supply
 - An OSSD pair
 - Two configurable inputs
 - One configurable input/output
 - Supply voltage
 - Functional earth
- ▶ M12, 12-pin socket
not used
- ▶ M12 4-pin socket, hinged
Connection of the safety laser scanner to the configuration PC
- ▶ M12 8-pin socket, hinged
not used

The configurable inputs can be used for all input signals.

- ▶ Restart and reset
- ▶ Switching the monitoring of zone sets

The configurable inputs and outputs can be used for both input signals and output signals.



Legend

- [1] M12 8-pin socket for connection to an evaluation device and the voltage supply
- [2] M12 12-pin socket, not used
- [3] M12 4-pin socket, hinged, for connection with a configuration PC
- [4] M12 8-pin socket, hinged, not used

7.3 Wiring of the configurations

A configuration is already preset in the PSENscan Configurator; this can be used and changed.

The wiring has to match the specifications in PSENscan Configurator.

Available configurations

- ▶ Horizontal
 - 1 OSSD pair
 - 1 warning output
 - 8 Area Switch Inputs
- ▶ Expert
 - 1 OSSD pair

Configuration options:

Configuration	Warning zone	Number of zone sets	Restart
A	1	1	Automatic
B	1	1	Manual
C	1	2	Automatic
D	0	2	Automatic
E	0	2	Manual
F	0	3	Automatic



Overview of the wiring of the six configurations:

Pin/colour		Configuration (Details of the wiring for the configurations [39])					
		A	B	C	D	E	F
2	Brown	24 V DC					
7	Blue	0 V DC					
3	Green	n.c.	n.c.	Zone set 1	Zone set 1	Zone set 1	Zone set 1
4	Yellow	n.c.	Restart	Zone set 2	Zone set 2	Zone set 2	Zone set 2
1	White	Warning	Warning	Warning	n.c.	Start button	Zone set 3
5	Grey	OSSD 1					
6	Pink	OSSD 2					
8	Red	Functional earth					


7.3.1 Wiring configuration example A

8-pin socket at the safety laser scanner	PIN	Assignment	Cable colour
24 V 2 — 24 V	2	24 VDC	Brown
0 V 7 — 0 V	7	0 V DC	Blue
n. c. 3	3	n. c.	Green
n. c. 4	4	n. c.	Yellow
Warning message — PLC	1	Warning message	White
OSSD 1 5	5	OSSD 1	Grey
OSSD 2 6	6	OSSD 2	Pink
⏏ 8	8	Functional earth	Red

7.3.2 Wiring configuration example B

8-pin socket at the safety laser scanner	PIN	Assignment	Cable colour
24 V 2 — 24 V	2	24 VDC	Brown
0 V 7 — 0 V	7	0 V DC	Blue
n. c. 3	3	n. c.	Green
Restart 4 — 	4	Restart	Yellow
Warning message — PLC	1	Warning message	White
OSSD 1 5 —	5	OSSD 1	Grey
OSSD 2 6 —	6	OSSD 2	Pink
 8 —	8	Functional earth	Red

7.3.3 Wiring configuration example C

8-pin socket at the safety laser scanner	PIN	Assignment	Cable colour
24 V 2 — 24 V	2	24 VDC	Brown
0 V 7 — 0 V	7	0 V DC	Blue
3 — PLC	3	Monitoring zone set 1	Green
4 — PLC	4	Monitoring zone set 2	Yellow
Warning message — PLC	1	Warning message	White
OSSD 1 5 —	5	OSSD 1	Grey
OSSD 2 6 —	6	OSSD 2	Pink
 8 —	8	Functional earth	Red

7.3.4 Wiring configuration example D

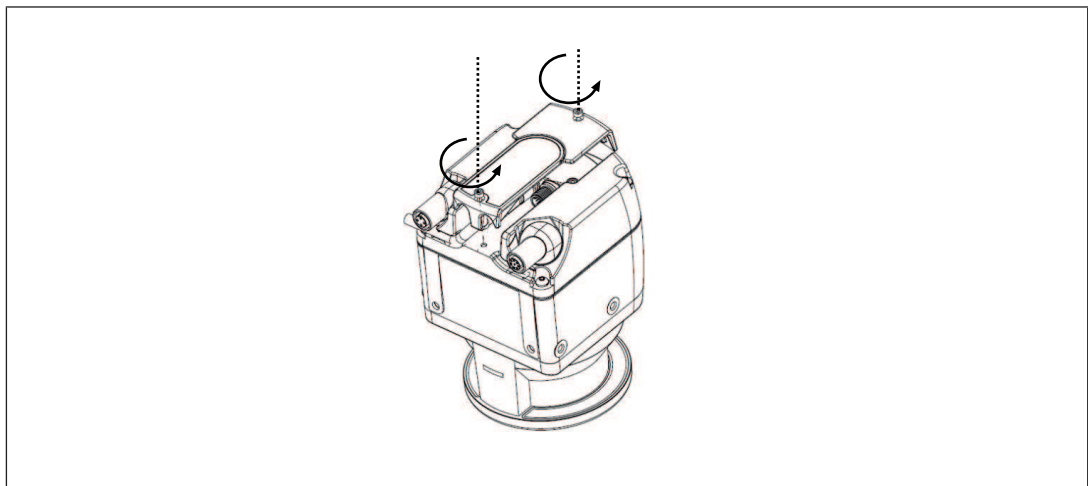
8-pin socket at the safety laser scanner	PIN	Assignment	Cable colour
24 V 2 — 24 V	2	24 VDC	Brown
0 V 7 — 0 V	7	0 V DC	Blue
3 — PLC	3	Monitoring zone set 1	Green
4 — PLC	4	Monitoring zone set 2	Yellow
1 — PLC	1	Monitoring zone set 3	White
OSSD 1 5 —	5	OSSD 1	Grey
OSSD 2 6 —	6	OSSD 2	Pink
⏏ 8 —	8	Functional earth	Red

7.4 Connect supply voltage and safety controller

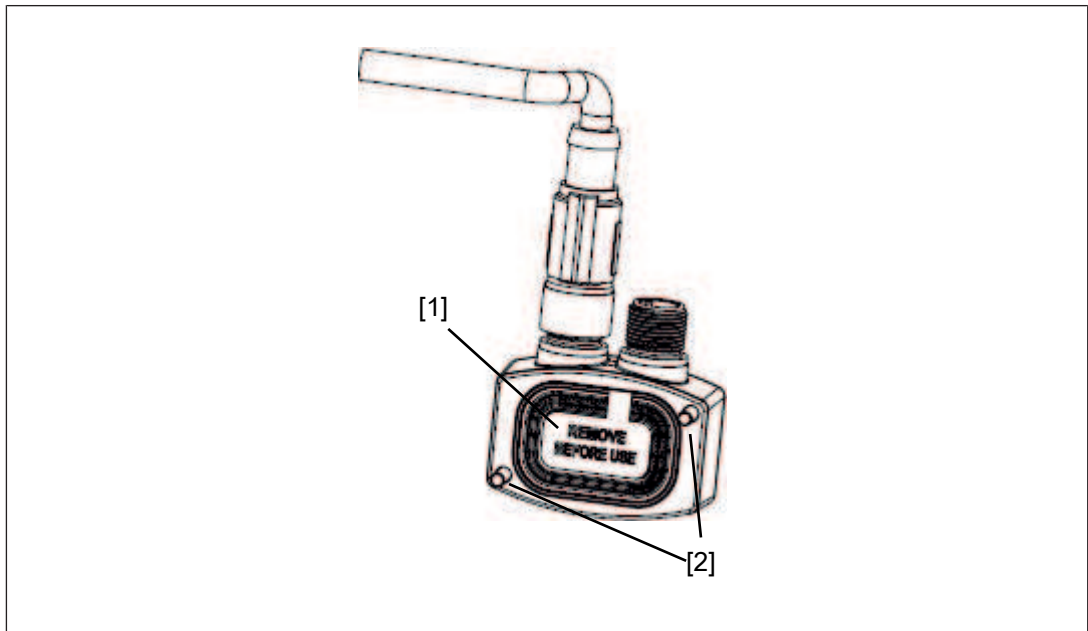
The connection for the supply voltage is underneath a memory module. The memory module can be uninstalled for simpler connection.

1. Turn the safety laser scanner for better access to the memory module.
2. Loosen the M3 screws of the protective cover and remove the protective cover.

The screws are secured against loss and they cannot be removed.



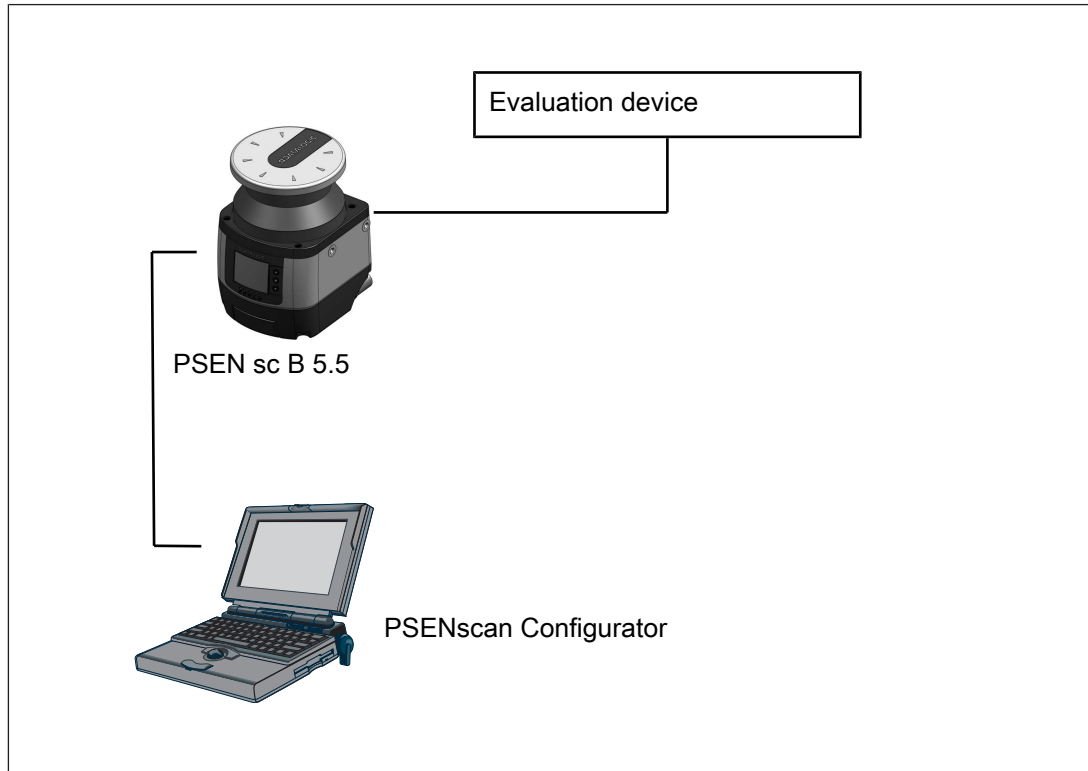
- Loosen the M3 screws [2] of the memory module and pull out the memory module.
The screws are secured against loss and they cannot be removed.

**Legend**

- [1] Protective membrane
 - [2] M3 screws for fixing the memory module
- Connect the supply voltage and the safety controller to the 8-pin socket on the memory module.
 - Remove the label [1] from the memory module and insert the memory module at the safety laser scanner.
 - Fix the screw of the memory module with a torque of 1 Nm.
 - Place the protective cover at the safety laser scanner and screw the protective covers with 1 Nm.

7.5 Connection to PSEnscan Configurator

The configuration of the safety laser scanner PSEN sc B 5 Series is carried out in PSEnscan Configurator on a configuration PC.



- ▶ Ensure that the software PSEnscan Configurator is installed on the configuration PC.
- ▶ Ensure that the safety laser scanner is switched off when creating a connection to the configuration PC.

Procedure:

1. Use a 4-pin cable (see [Order references \[📖 70\]](#)) to connect the configuration PC to the safety laser scanner.
2. Switch the safety laser scanner on.

8 PSEnscan Configurator

8.1 Basics

The PSEnscan Configurator is a graphic tool

- ▶ For configuration of the safety laser scanners of the PSEN sc B 5 Series,
- ▶ For incorporation of the safety laser scanner into the network,
- ▶ For monitoring the safety laser scanners in the network,
- ▶ For creating reports,
- ▶ For password administration of the safety laser scanner of the PSEN sc B 5 Series

8.2 Installation

8.2.1 System requirements

Operating system:	32 or 64-Bit version from Windows 7 or Windows XP
Processor:	Pentium 4, min. 2 GHz
RAM:	Min. 1 GB
Available hard drive space:	Approx. 70 MB
Graphics card:	min. 1024 x 768 pixel resolution, 65536 colours
Interfaces:	A free 100 Mbps Ethernet- interface for data transfer to the safety laser scanner.
To display the documentation:	Adobe Acrobat Reader, from Version 7.1.0

8.2.2 Install PSEnscan Configurator

Procedure:

1. Switch on your computer and start up the operating system.
2. Download the software PSEnscan Configurator from the download area on the Pilz homepage.

The software PSEnscan Configurator is in the download area on the Pilz homepage at <http://www.pilz.com/support/downloads/>

3. Double-click on the downloaded file.

The software PSEnscan Configurator is installed.

The installer will guide you through the installation.



INFORMATION

To ensure that PSEnscan Configurator functions correctly, the files and directories in the installation directory of PSEnscan Configurator must not be modified manually once installed (e.g. with the Windows Explorer or a text editor).

8.2.3 Ethernet Connections

8.2.3.1 Factory default settings for the IP addresses

The factory-set default of the IP address of the safety laser scanner: 192.168.0.10.



INFORMATION

Use the correct IP address

A second address has been set up for internal functions of the safety laser scanner. This address always follows directly after the IP address, specified in the network settings.

- Ensure that only one IP address is used when the following IP address is not assigned.

8.2.3.2 Connect automatically

The PSEnscan Configurator offers the option of automatically finding a device available in the network.

1. Select **Device -> Search device**.

The network is searched for connected PSEN sc B 5 Series.

Connected PSEN sc B 5 Series are listed under **Network environment**.

2. Double-click the safety laser scanner from **Network environment**.

The safety laser scanner is displayed in the work window with IP address, firmware version and status information.

3. Select **Settings -> Change network settings**.

Enter the password for the safety laser scanner (the ex-works setting for the password is **admin**).

4. Enter the network data for connecting to the network and click **OK**.
5. The safety laser scanner switches to the OFF state. Click **OK** to continue.
6. The safety laser scanner is displayed automatically with an updated IP address.
7. Double-click on the device to create a new configuration.

8.3 Download configuration to device

You can use the **Download configuration to device** function to download the configuration in the PSEnscan Configurator to a connected device. Once the configuration test has been completed, the new configuration in the connected device can be accepted or rejected.

Load configuration

1. Make sure that the **Download configuration** work window shows a report, listing the differences between the existing configuration on the connected device and the configuration in the PSEnscan Configurator.

The configuration on the connected device is labelled DEV.

The configuration in the PSEnscan Configurator is labelled GUI.

2. Check the whole report to ensure it is correct.
3. Click on **Load**.

The configuration in the PSEnscan Configurator is downloaded to the connected device. The connected device goes offline as the configuration is being downloaded. The configuration settings will not be available again until you **Accept** or **Reject** the configuration.

4. Select **Monitoring** and check the downloaded configuration.
5. Select **Download configuration** and **Accept** or **Reject** the downloaded configuration.

Check

- ▶ Click **Accept** to activate the downloaded configuration in the connected device and reject the existing configuration on the connected device.
- ▶ Click **Reject** to reject the downloaded configuration in the connected device and continue to use the existing configuration on the connected device. The downloaded configuration in the connected device will be deleted.

9 First commissioning

9.1 Requirements for commissioning

Please note:

- ▶ Ensure that the window of the safety laser scanner is clean, intact and without fingerprints.



CAUTION!

Detection of violations of the protected field deteriorates

If the safety laser scanner is commissioned in other conditions, the detection of violations of the protected field may deteriorate.

- Ensure that the conditions for commissioning are met.

9.2 System connection

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

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

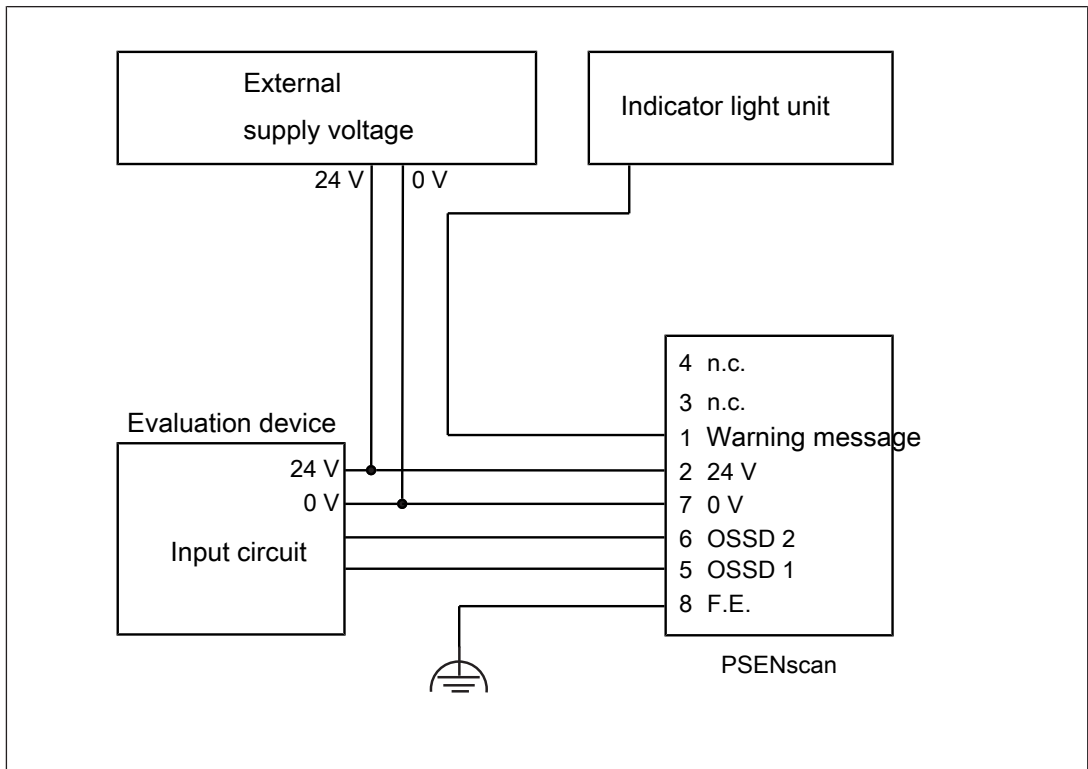


Fig.: Dual-channel connection of the safety laser scanner on the input circuit of an evaluation device (1 zone set, warning message, automatic restart)

Suitable Pilz evaluation devices are, for example:

- ▶ PNOZmulti for monitoring safety laser scanners
Configure the safety laser scanner in PNOZmulti Configurator as a function element "Light curtain" with switch type 3.
- ▶ Automation system PSS 4000

The correct connection to the respective evaluation device is described in the operating manual for the evaluation device. Connect the evaluation device according to the specifications in the selected evaluation device's operating manual.

9.3 Configuration of zones

For simultaneous monitoring of several zones and the switching of monitoring of zone sets, the configurable inputs of the safety laser scanner must be configured appropriately.

- ▶ Configuration of a static zone set
No configurable inputs are required.
- ▶ Configuration of two zone sets
Configure two configurable inputs.
- ▶ Configuration of three zone sets
Configure three configurable inputs.

9.3.1 Example configuration A

Settings in PSEnscan Configurator for [wiring example A](#) [ 39]: 1 zone set, 1 warning, automatic restart

Procedure:

1. From the start page, select **Create new configuration**.
The window **Device selection** is displayed with one tab each **Online** and **Overview of all types**.
2. Select a device from **Overview of all types**. Double-click the device.
The device is displayed in the work window and it can be configured.
3. Under **Application**, select **EXPERT** and **8-pin connection**.

Configuration

You can enter a title for the configuration under **Name**.

You can enter the name of the person who created the configuration under **Author**.

You can describe the configuration in detail under **Description**.


The **Configurator Version** is entered by the system and cannot be changed.




The **Check sum** is entered by the system and cannot be changed.

The **Creation date** is entered by the system and cannot be changed.

Device


You can enter a title for the connected device under **Name**.

Click on the arrow . The next window is opened: **Output configuration**. The number of OSSD pairs is already selected.

4. Select **Warning zone = 1**.
If **Warning zone = 1**, the warning zone is activated. The output Pin 1 must be set to **WARNING 1**. The output is used as a warning output. Outputs Pin 5 and 6 are reserved for OSSD 1 and OSSD 2 and cannot be changed.
Click on the arrow . The next window **Configure zone sets** is opened.
5. Click on the arrow . The next window **Input configuration** is opened
Zone set = 1 is already selected. Further settings are not required.
6. For **Restart** select the value **Automatic** and define the **Restart time** (min. 80 ms).
Click on the arrow . The next window **Configuration detection capability** is opened
The wiring of inputs has already been configured by the previous selection.
7. Under **Multiple evaluation**, define the number of consecutive scans needed for detection.
Increasing the number of consecutive scans will increase the response time of the safety laser scanner.
8. Select the **detection capability [mm]** for this safety laser scanner. Define the value for **Safety zone** or for **Warning zone**.
9. Select **Dust filter level** (level 1 = low, level 3 = high).
A higher level of dust filtering requires a longer safety distance.

**WARNING!****Loss of safety function due to a safety distance that is too low**

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

- ▶ Depending on the degree of dust filtering, it is necessary to consider an allowance for calculating the safety distance when installing the safety laser scanner near intense light sources or reflective surfaces into account (see [Distance to intense light sources and to reflective surfaces](#) [ 24]).
 - When calculating the safety distance, ensure that the allowance is considered depending on the dust filtering.
 - Ensure that the new safety distance fulfils the specifications of the safety assessment.

9.3.2 Example configuration B

Settings in PSEnscan Configurator for wiring example B: 1 zone set, 1 warning, manual restart

Procedure:

1. From the start page, select **Create new configuration**.
The window **Device selection** is displayed with one tab each **Online** and **Overview of all types**.
2. Select a device from **Overview of all types**. Double-click the device.
The device is displayed in the work window and it can be configured.

3. Under **Application**, select **EXPERT** and **8-pin connection**.

Configuration

You can enter a title for the configuration under **Name**.

You can enter the name of the person who created the configuration under **Author**.

You can describe the configuration in detail under **Description**.


The **Configurator Version** is entered by the system and cannot be changed.

The **Check sum** is entered by the system and cannot be changed.

The **Creation date** is entered by the system and cannot be changed.

Device


You can enter a title for the connected device under **Name**.

Click on the arrow . The next window is opened: **Output configuration**. The number of OSSD pairs is already selected.


4. Select **Warning zone** = 1.

If **Warning zone** = 1, the warning zone is activated. The output Pin 1 must be set to **WARNING 1**. The output is used as a warning output. Outputs Pin 5 and 6 are reserved for OSSD 1 and OSSD 2 and cannot be changed.

Click on the arrow . The next window **Configure zone sets** is opened.

5. Click on the arrow . The next window **Input configuration** is opened

Zone set = 1 is already selected. Further settings are not required.

6. For **Restart** select the value **Manual** and define the **Restart time** (min. 80 ms). Click on the arrow . The next window **Configuration detection capability** is opened

The wiring of inputs has already been configured by the previous selection.

7. Under **Multiple evaluation**, define the number of consecutive scans needed for detection.

Increasing the number of consecutive scans will increase the response time of the safety laser scanner.


8. Select the **detection capability [mm]** for this safety laser scanner. Define the value for **Safety zone** or for **Warning zone**.

9. Select **Dust filter level** (level 1 = low, level 3 = high).

A higher level of dust filtering requires a longer safety distance.

**WARNING!****Loss of safety function due to a safety distance that is too low**

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

- ▶ Depending on the degree of dust filtering, it is necessary to consider an allowance for calculating the safety distance when installing the safety laser scanner near intense light sources or reflective surfaces into account (see [Distance to intense light sources and to reflective surfaces](#) [ 24]).
 - When calculating the safety distance, ensure that the allowance is considered depending on the dust filtering.
 - Ensure that the new safety distance fulfils the specifications of the safety assessment.

9.3.3 Example configuration C

Settings in PSEnscan Configurator for wiring example C: 2 zone sets, 1 warning, automatic restart

Procedure:

1. From the start page, select **Create new configuration**.

The window **Device selection** is displayed with one tab each **Online** and **Overview of all types**.

2. Select a device from **Overview of all types**. Double-click the device.

The device is displayed in the work window and it can be configured.

3. Under **Application**, select **EXPERT** and **8-pin connection**.

Configuration

You can enter a title for the configuration under **Name**.

You can enter the name of the person who created the configuration under **Author**.

You can describe the configuration in detail under **Description**.


The **Configurator Version** is entered by the system and cannot be changed.

The **Check sum** is entered by the system and cannot be changed.

The **Creation date** is entered by the system and cannot be changed.

Device

You can enter a title for the connected device under **Name**.

Click on the arrow . The next window is opened: **Output configuration**. The number of OSSD pairs is already selected.

4. Select **Warning zone** = 0 or 1.

If **Warning zone** = 0, the warning zone is activated. The output Pin 1 is automatically set to **NO FUNCTION**. The output cannot be used.

If **Warning zone** = 1, the warning zone is activated. The output Pin 1 must be set to

WARNING 1. The output is used as a warning output. Outputs Pin 5 and 6 are reserved for OSSD 1 and OSSD 2 and cannot be changed.

Click on the arrow . The next window **Configure zone sets** is opened.

5. Select **Zone set** = 2 and enter for the PINs 3 and 4 each the **Zone switching**. Enter the input delay.

For the configuration of switchable zones the PINs 3 and 4 have to be assigned to the zone sets.

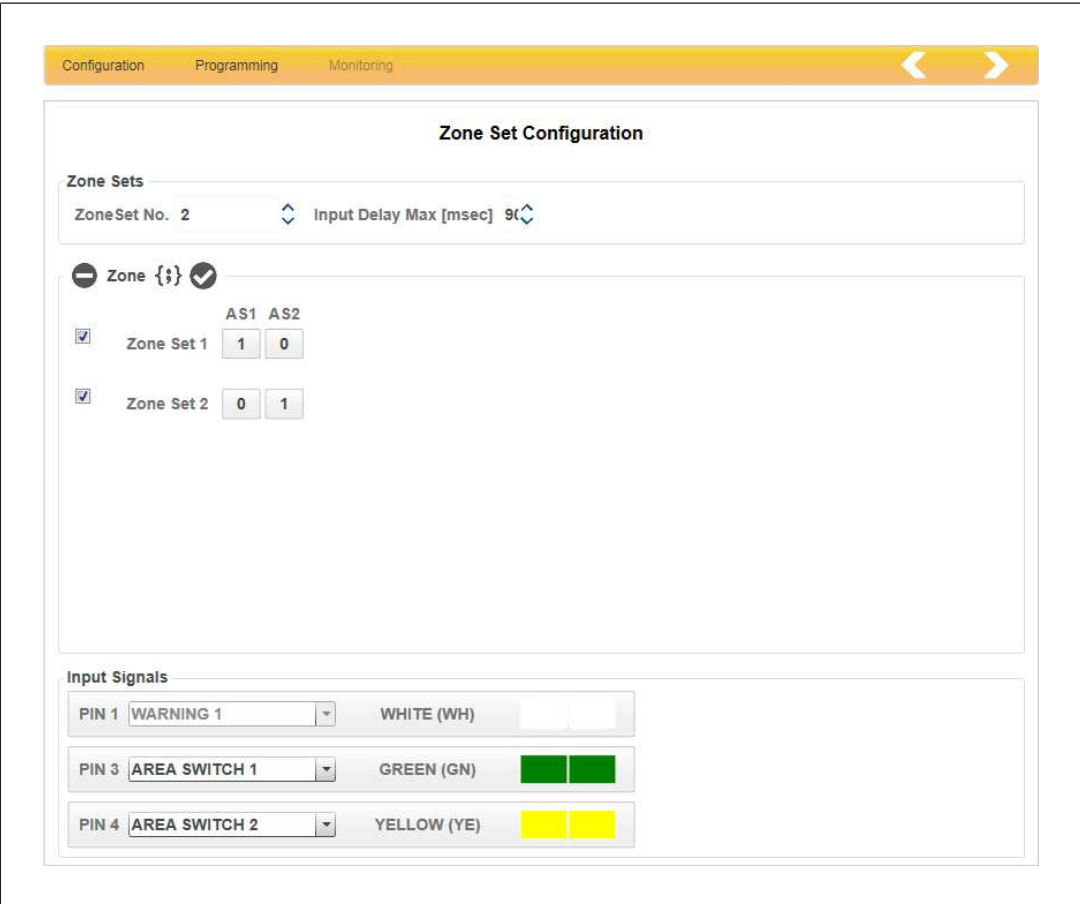
For **Zone set 1** enter **AS1 = 1**.

For **Zone set 2** enter **AS2 = 1**.


For PIN 3, enter AREA SWITCH 1.

For PIN 4, enter AREA SWITCH 2.

Click on the arrow . The next window **Input configuration** is opened.




The screenshot shows the 'Zone Set Configuration' window. At the top, there are tabs for 'Configuration', 'Programming', and 'Monitoring'. Below the tabs, there are navigation arrows. The main content area is titled 'Zone Set Configuration'. Under 'Zone Sets', 'ZoneSet No. 2' is selected, and 'Input Delay Max [msec]' is set to 9. A section for 'Zone {s}' is expanded, showing two checked entries: 'Zone Set 1' with AS1=1 and AS2=0, and 'Zone Set 2' with AS1=0 and AS2=1. Below this is the 'Input Signals' section, which shows three rows: PIN 1 (WARNING 1) with a white indicator, PIN 3 (AREA SWITCH 1) with a green indicator, and PIN 4 (AREA SWITCH 2) with a yellow indicator.

6. For **Restart** select the value **Manual** and define the **Restart time** (min. 80 ms). Click on the arrow . The next window **Configuration detection capability** is opened. The wiring of inputs has already been configured by the previous selection.
7. Under **Multiple evaluation**, define the number of consecutive scans needed for detection. Increasing the number of consecutive scans will increase the response time of the safety laser scanner.


8. Select the **detection capability [mm]** for this safety laser scanner. Define the value for **Safety zone** or for **Warning zone**.
9. Select **Dust filter level** (level 1 = low, level 3 = high).
A higher level of dust filtering requires a longer safety distance.

**WARNING!****Loss of safety function due to a safety distance that is too low**

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

- ▶ Depending on the degree of dust filtering, it is necessary to consider an allowance for calculating the safety distance when installing the safety laser scanner near intense light sources or reflective surfaces into account (see [Distance to intense light sources and to reflective surfaces](#) [ 24]).
 - When calculating the safety distance, ensure that the allowance is considered depending on the dust filtering.
 - Ensure that the new safety distance fulfils the specifications of the safety assessment.

9.3.4**Example configuration D**

Settings in PSEnscan Configurator for [wiring example](#) [ 39] D: 3 zone sets, no warning, automatic restart

Procedure:

1. From the start page, select **Create new configuration**.

The window **Device selection** is displayed with one tab each **Online** and **Overview of all types**.

2. Select a device from **Overview of all types**. Double-click the device.

The device is displayed in the work window and it can be configured.

3. Under **Application**, select **EXPERT** and **8-pin connection**.

Configuration

You can enter a title for the configuration under **Name**.

You can enter the name of the person who created the configuration under **Author**.

You can describe the configuration in detail under **Description**.


The **Configurator Version** is entered by the system and cannot be changed.

The **Check sum** is entered by the system and cannot be changed.

The **Creation date** is entered by the system and cannot be changed.

Device

You can enter a title for the connected device under **Name**.

Click on the arrow . The next window is opened: **Output configuration**. The number of OSSD pairs is already selected.

4. Select **Warning zone** = 0.

If **Warning zone** = 0, the warning zone is activated. The output Pin 1 is automatically set to NO FUNCTION. The output cannot be used.

Outputs Pin 5 and 6 are reserved for OSSD 1 and OSSD 2 and cannot be changed.

Click on the arrow **>**. The next window **Configure zone sets** is opened.

5. Select **Zone set** = 3 and enter for the PINs 1, 3 and 4 each the **Zone switching**. Enter the input delay.

For the configuration of switchable zones the PINs 1, 3 and 4 have to be assigned to the zone sets.

For **Zone set 1** enter **AS1 = 1**.

For **Zone set 2** enter **AS2 = 1**.

For **Zone set 3** enter **AS3 = 1**.

For PIN 1, enter **AREA SWITCH 1**.

For PIN 3, enter **AREA SWITCH 2**.

For PIN 4, enter **AREA SWITCH 3**.

Click on the arrow **>**. The next window **Input configuration** is opened.

Configuration Programming Monitoring

Zone Set Configuration

Zone Sets

ZoneSet No. 3 Input Delay Max [msec] 30

Zone {i}	AS1	AS2	AS3
<input checked="" type="checkbox"/> Zone Set 1	1	0	0
<input checked="" type="checkbox"/> Zone Set 2	0	1	0
<input checked="" type="checkbox"/> Zone Set 3	0	0	1

Input Signals

PIN 1 AREA SWITCH 1 WHITE (WH)

PIN 3 AREA SWITCH 2 GREEN (GN)

PIN 4 AREA SWITCH 3 YELLOW (YE)

6. For **Restart** select the value **Automatic** and define the **Restart time** (min. 80 ms).

Click on the arrow **>**. The next window **Configuration detection capability** is opened

The wiring of inputs has already been configured by the previous selection.

7. Under **Multiple evaluation**, define the number of consecutive scans needed for detection.
Increasing the number of consecutive scans will increase the response time of the safety laser scanner.
8. Select the **detection capability [mm]** for this safety laser scanner. Define the value for **Safety zone** or for **Warning zone**.
9. Select **Dust filter level** (level 1 = low, level 3 = high).
A higher level of dust filtering requires a longer safety distance.



WARNING!

Loss of safety function due to a safety distance that is too low

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

- ▶ Depending on the degree of dust filtering, it is necessary to consider an allowance for calculating the safety distance when installing the safety laser scanner near intense light sources or reflective surfaces into account (see [Distance to intense light sources and to reflective surfaces \[📖 24\]](#)).
 - When calculating the safety distance, ensure that the allowance is considered depending on the dust filtering.
 - Ensure that the new safety distance fulfils the specifications of the safety assessment.

9.4 Testing

Before finally commissioning the safety laser scanner after the installation and alignment, final inspections must be carried out.



INFORMATION

This inspection may only be carried out by qualified personnel.

Check safety function of the safety laser scanner





Procedure:

Use an opaque object with a height of at least 300 mm and a diameter of 70 mm as a test piece.

Move the test piece at various points along the safety zone into the safety zone:

The OSSDs must switch to the OFF state with each entry of the test piece.

Check ambient conditions and installation

- ▶ Correct alignment and fixing
Check that the fixing screws of the safety laser scanner are firmly seated.
- ▶ Safety distance
The safety distance must comply with the requirements in Maintaining the safety distance.
- ▶ Circumventing the safety zone
The hazardous area must be secured so that it is impossible to access by circumventing the safety zone.
- ▶ Safety zone perimeters
The safety zone perimeters (see [Project configuration](#)  18]) must completely secure the hazardous area, making it inaccessible.
- ▶ Position of the pushbutton for manual restart
It must not be possible to operate the pushbutton for manual restart from inside the hazardous area. The pushbutton must be located at a position from which there is a full, unobstructed view of the hazardous area.
- ▶ Response time and stopping time must fulfil the requirements in Maintaining the safety distance
Ensure that the safety laser scanner's response time and the machine's stopping time fulfil the requirements in Maintaining the safety distance.
- ▶ No intense or flashing light sources in the vicinity
The allowance Z_R for particularly intense or flashing light sources near the safety laser scanner (range of +/- 5° to the scan level or highly reflective background within a distance of 2.5 m to the protected field perimeters) has been considered when calculating the safety distance (see [Distance to intense light sources](#)  24]).
- ▶ Ambient conditions
Please observe the [environmental conditions](#)  23].
- ▶ Check the safety laser scanner's front panel.
 - Scratched front panel: Change the safety laser scanner.
 - Dirty front panel: [Clean the front panel](#)  63].

10 Operation

10.1 Diagnostic information

10.1.1 Error

Message (shown in the display)	Error/cause	Description/measure
CLEANW1	The front panel of the safety laser scanner must be cleaned.	Clean front panel
INPUTCF1	Error in the configuration or the wiring.	Check whether the wiring and the configuration will match.
INPUTCF2	Configuration error.	In the configuration check the configured state transitions and switching operations.
INTF1	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF2	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF3	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF4	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF5	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF7	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF8	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF9	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF10	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.

Message (shown in the display)	Error/cause	Description/measure
INTF11	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF12	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF13	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF14	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF15	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF16	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF17	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF18	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
INTF20	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
MEMF	An error has occurred in the memory module.	Check that the memory module is firmly seated and perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
OSSD1F3	Earth fault has occurred ad OSSD1.	Check the state and the wiring of the OSSD. If the error persists, please contact Pilz.
OSSDF1	An error has occurred when testing the OSSD1.	Check the state and the wiring of the OSSD. If the error persists, please contact Pilz.

10.1.2 Warnings










Message (shown in the display)	Error/cause	Description/measure
BOOTF	An error has occurred when starting the system.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
DLDNCF	An error occurred while downloading the new configuration.	
DLDNFF	An error occurred while downloading the new firmware version.	
INTF6	An error occurred during the system test.	Perform a reset of the safety laser scanner. If the error persists, please contact Pilz.
NOCONF	No configuration exists, or error in the configuration.	Perform the configuration again so that the conditions for normal operation are restored again. If the warning continues to be displayed, please contact Pilz.
SHOCK	The mechanical vibrations exceed the values on shock stress specified in the Technical details [66] .	Check the tightness of the safety laser scanner. If the warning continues to be displayed, please contact Pilz.
TEST MODE	The safety laser scanner is switched to test mode. The OSSDs are in the OFF state.	
EXTTEMP	The ambient temperature is outside the temperature range indicated in the Technical details [66] .	Ensure that the ambient temperature is in the temperature range specified in the Technical details [66] .


10.1.3 Information

Message (shown in the display)	Error/cause	Description/measure
CLEANW2	The front screen of the safety laser scanner is contaminated and it must be cleaned to ensure normal operation.	Clean front panel
DLDNC	A new configuration is downloaded.	
DLDNF	A new firmware version is downloaded.	
DREST	A delayed restart is performed.	

Message (shown in the display)	Error/cause	Description/measure
ITLOCK1	OSSD must be restarted	Reset the safety laser scanner.
WAINP	The safety laser scanner expects an input.	Check the wiring. Check the installation procedure.

10.2 Display during normal operation

Icon (shown in the display)	Status	Description/measure
	Device is switched on and operational	
	Warning zone has been violated	A violation of the warning zone has been detected. The configured action for a violation of the warning zone has been triggered.
	Safety zone has been violated	A violation of the safety zone has been detected. The OSSDs are in the OFF state.
	The front panel must be cleaned	Decommission the safety laser scanner and clean the front panel of the safety laser scanner.
	Restart is running	Restart of the safety laser scanner is performed.
	Download of a configuration or a report	A configuration or a report is downloaded.
	The status of the network is checked	The status of the safety laser scanner in the network is checked.
	Safety laser scanner in interlock condition	The safety laser scanner is in interlock condition. Normal operation is possible only after a successful restart of the safety laser scanner.
	Faulty input	Faulty input, e.g. wrong number of inputs that are used for switching the zone sets.
	The status of the network is checked	The status of the network is checked.

Icon (shown in the display)	Status	Description/measure
	No configuration available	No configuration for the safety laser scanner could be found.

11 Regular checks cleaning and maintenance

11.1 Cleaning

The front panel of the safety laser scanner must be cleaned regularly. The frequency depends on the ambient conditions.

A scratched front panel can lead to errors of the safety laser scanner.




Exchange the PSEN sc head when the front screen is scratched.

11.2 Checks

Regular checks can bring to light changes to the plant/machine, safeguards and ambient conditions.

11.2.1 Regular check

Pilz recommends that the safety laser scanner be checked every six months.

- ▶ Check the safety laser scanner's front panel.
 - Scratched front panel: Change the safety laser scanner.
 - Dirty front panel: [Clean the front panel](#)  63].
In a particularly dirty environment, front panel cleanliness should be checked more frequently.
- ▶ Check the tightness of the safety laser scanner.
All screws must be tightened to the torque specified in the [Technical details](#)  66].
- ▶ Check the safety function of the safety laser scanner (see [Check the safety function of the safety laser scanner](#)  55]).

11.2.2 Check after plant/machine modification

Check the safety laser scanner each time the plant/machine is modified. Changing the safety laser scanner or swapping components of the safety laser scanner should also be regarded as a modification.

You **must** comply with the requirements of the applicable national regulations.



INFORMATION

This inspection may only be carried out by qualified personnel.

The Appendix contains a [Checklist](#)  71] which should help you perform the safety check.

11.3 Maintenance

Other than cleaning the front panel, the safety laser scanner requires no other form of maintenance.



CAUTION!

Improper cleaning agents can cause damages to the safety laser scanner.

Malfunctions of the safety laser scanner can occur and the safety function is no longer guaranteed.

- Use only the following cleaning agents.

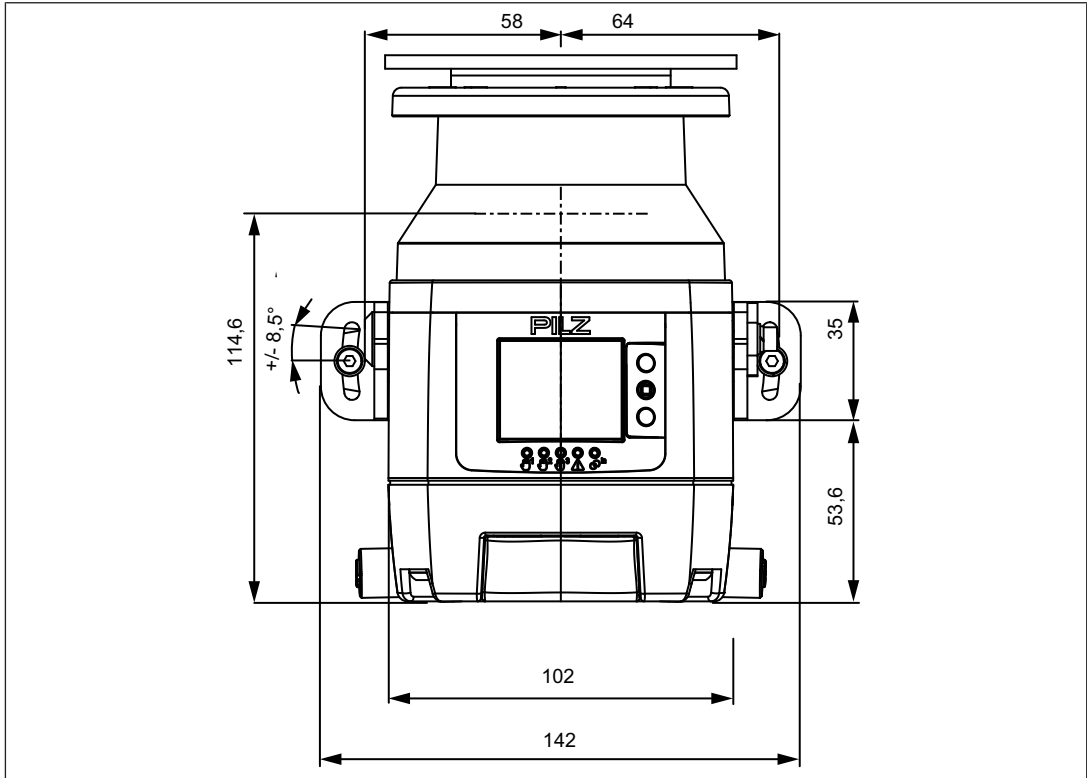
Moist cotton cloths should be used for cleaning.

Avoid using

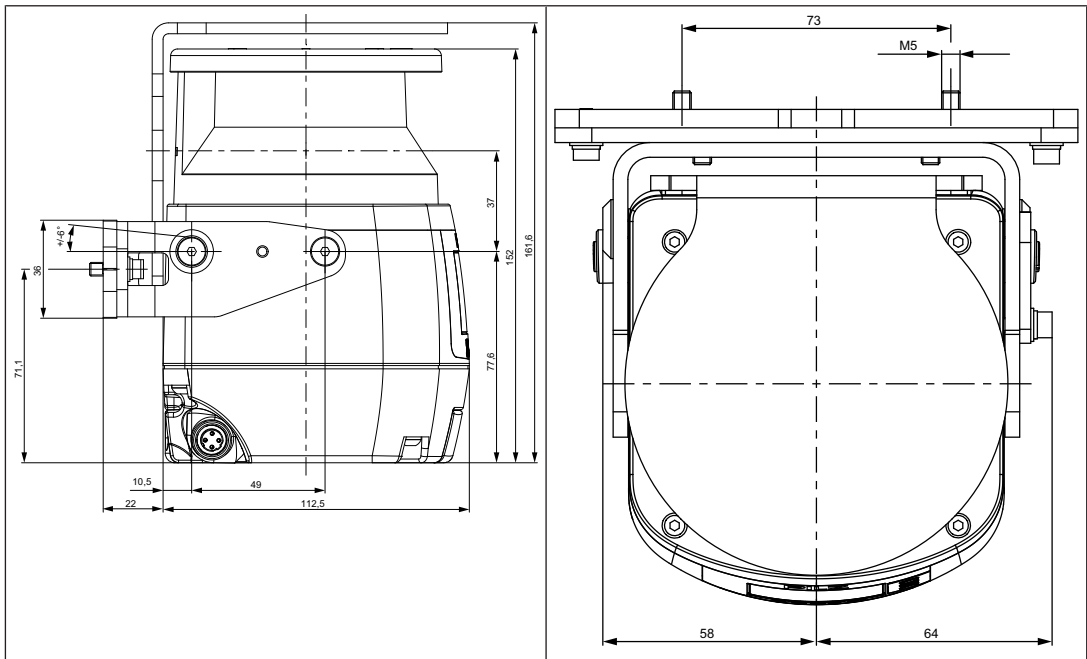
- ▶ Alcohol,
- ▶ Solvents,
- ▶ Cloths made of wool,
- ▶ Cloths made of synthetic material.

Clean the front panel during the regular [check of the safety laser scanner](#)  55].

12 Dimensions



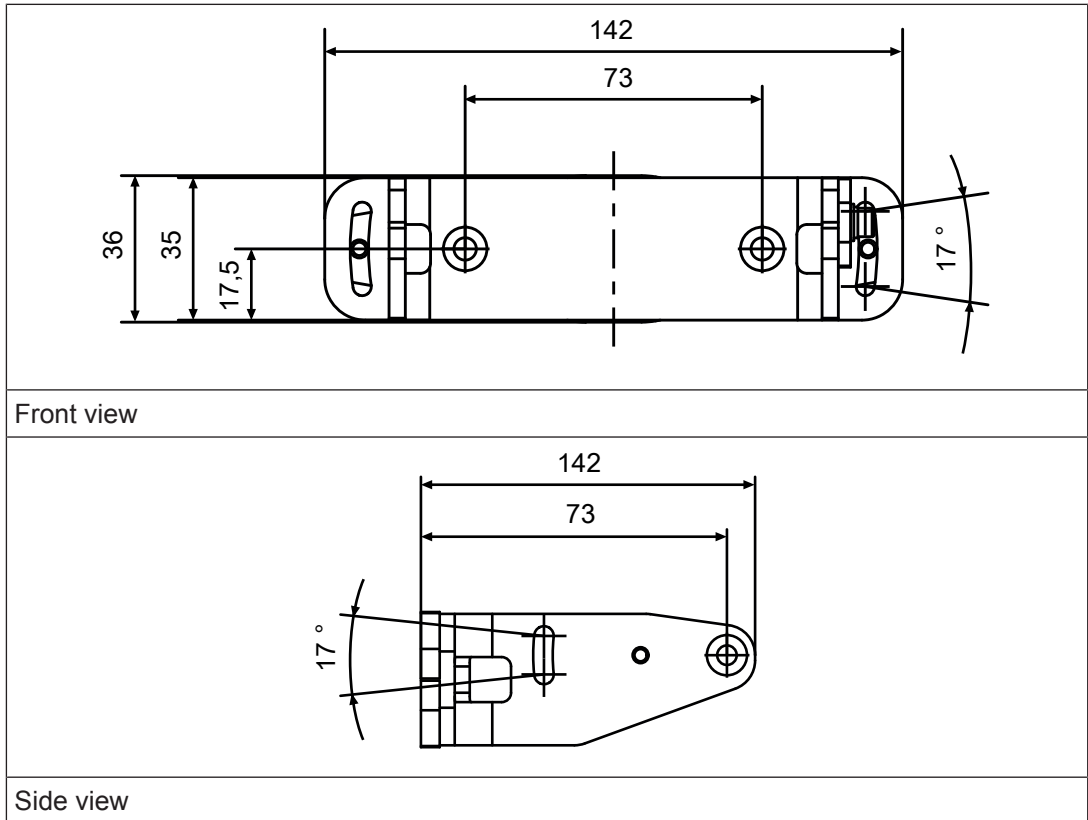
Front view



Side view

Plan view

PSEN sc bracket PR



Front view

Side view


13 Technical details

General	
Approvals	CE, TÜV, cULus Listed
ESPE type	3
Sensor's mode of operation	Optical
Resolutions	70 mm
Operating range	
Warning zone	40 m
Safety zone	5,5 m
Number of simultaneously monitored safety zones	1
Number of simultaneously monitored zones	2
Number of zone configurations	3
Electrical data	
Supply voltage	
Voltage	24 V
Kind	DC
Voltage tolerance	-20 %/+30 %
Residual ripple DC	5 %
Power consumption	27 W
Protection class	3
Optical data	
Diameter light spot on front plate	8 mm
Used wavelength range	905 nm
Laser class (DIN EN 60825-1)	1
Scan area	275°
Max. opening angle scanner	0,12°
Angle resolution	0,1°
Max. number multiple evaluation	16
Detectable remission area	1,8 - 1.000 %
Pulse duration	3 ns
Typical output power laser	8 mW
Inputs	
Max. overall line capacitance C _{lmax}	2.200 nF
Semiconductor outputs	
OSSD safety outputs	2
Switching current per output	250 mA
Voltage drop at OSSDs	2 V
Times	
Test pulse duration, safety outputs	300 µs
Response time t ₁	62 ms
Rotation time	30 ms

Environmental data	
Ambient temperature	
Temperature range	0 - 50 °C
Storage temperature	
Temperature range	-20 - 70 °C
Climatic suitability	
Humidity	max. 95 %
Condensation during operation	Not permitted
Vibration	
In accordance with the standard	EN 60068-2-6
Frequency	10 - 55 Hz
Amplitude	0,35 mm
Shock stress	
In accordance with the standard	EN 60068-2-27
Number of shocks	1000
Acceleration	10g
Duration	16 ms
Protection type	
Housing	IP65
Deviation from ideal flatness of the scan field at max. operating range	50 mm
Mechanical data	
Distance scanning plane to top edge	37,7 mm
Distance mirror rotational axis to the rear	52,5 mm
Connection type	M12, 8-pin male connector
Material	
Housing	Aluminium
Top	PC
Front screen	PMMA
Max. torque setting	
Fixing screw	3 Nm
Adjusting screw for angle of inclination	2,5 Nm
PSEN sc Memory	1 Nm
Dimensions	
Height	152 mm
Width	102 mm
Depth	112,5 mm
Weight	1.530 g

Where standards are undated, the 2017-11 latest editions shall apply.


13.1 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 _D [1/h]	IEC 61511 SIL	IEC 61511 PFD	EN ISO 13849-1: 2015 T _M [year]
2-ch. OSSD	PL d	Cat. 3	SIL CL 2	6,38E-08	–	–	20

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



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

14 Network data

Interface	Protocol	Direction	Transport log	Port No.	Can be de-activated	Description
User interface	proprietary	out	UDP	2000	No	Monitoring
User interface	proprietary	in/out	UDP	3000	No	Receive command
User interface	proprietary	in/out	UDP	4088	No	Find device in network
User interface	proprietary	in/out	UDP	12000	No	Poll configuration data

15 Order reference

15.1 System

Product type	Features	Order no.
PSEN sc B 5.5	Safety laser scanner, range 5.5 m, M12, 8/12-pole	6D 000 001

15.2 Accessories

Installation materials

Product type	Features	Order no.
PSEN sc bracket P R	Mounting bracket for setting the tilt of the angle of inclination and the roll angle	6D 000 002
PSEN sc bracket P	Mounting bracket for setting the tilt of the angle of inclination	6D 000 003
PSEN sc bracket C	Mounting bracket for corner mounting	6D 000 011
PSEN sc bracket F	Mounting bracket for floor mounting	6D 000 010
PSEN sc bracket H	Accessory for protection of the head part	6D 000 004
PSEN sc cleaner	Antistatic cleaning agent	6D 000 008
PSEN sc cloth	Cleaning cloth	6D 000 009

Cable

Product type	Features	Connector X1	Connector X2	Connector X3	Order no.
PSEN cable axial M12 8-pole 3m	3 m	M12, 8-pin female connector, straight			540 319
PSEN cable axial M12 8-pole 5m	5 m	M12, 8-pin female connector, straight			540 320
PSEN cable axial M12 8-pole 10m	10 m	M12, 8-pin female connector, straight			540 321
PSEN cable axial M12 8-pole 30m	30 m	M12, 8-pin female connector, straight			540 326
PSEN op Ethernet cable 3m	3 m	M12, 4-pin male connector, straight	4-pin RJ45 male connector, straight		631 072
PSEN op Ethernet cable 10m	10 m	M12, 4-pin male connector, straight	4-pin RJ45 male connector, straight		631 073

16 Appendix

16.1 Check list

The check list below is intended as an aid in for the following work on a safety laser scanner of the PSEN sc B 5 Series:

- ▶ During commissioning,
- ▶ recommissioning, and
- ▶ running the specified regular check.

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.

Action	OK	Not OK	Notes
<p>Check the category/standards</p> <p>Does the category of the safety laser scanner match the category required for the plant/machine?</p> <p>Have the standards applicable for the plant/machine been considered?</p>			
<p>Check ambient conditions for safety laser scanner</p> <p>Have the environmental conditions been met (see Ambient conditions [📖 23])?</p> <p>Have the technical details been met for all the safety laser scanner components?</p>			
<p>Check access points to the hazardous area</p> <p>Are all access points to the hazardous area safeguarded either by safety laser scanners or by mechanical safeguards?</p>			

Action	OK	Not OK	Notes
<p>Check minimum distance to hazardous area</p> <p>Has the minimum distance been calculated in accordance with the applicable standards?</p> <p>Has the calculated minimum distance been maintained at all points?</p>			
<p>Check safety zone</p> <p>Has the ability to creep underneath the protected field undetected been excluded?</p>			
<p>Check safety laser scanner</p> <p>Make sure that there are no objects in front of the safety laser scanner (e.g. trailing cables, crossbeams, struts, covers, etc.).</p> <p>Make sure that there are no transparent materials between the monitored protected field and the safety laser scanner (such as the glass panel).</p> <p>Are all the mechanical connections on the safety laser scanner attached correctly?</p> <p>Are all the electrical connections to the safety laser scanner wired correctly?</p>			
<p>Check the effectiveness of the safety laser scanner during the hazardous movement</p> <p>Is the safety laser scanner effective throughout the whole of the hazardous movement of the plant/machine?</p>			
<p>Check the output circuitry of the programmable safety and control system</p> <p>Have OSSDs been incorporated as required for the desired safety category?</p> <p>Are the switching elements that are connected to the OSSDs (valves, contactors, etc.) monitored with feedback loops?</p> <p>Does the wiring of the OSSDs match the circuit diagram?</p>			

Action	OK	Not OK	Notes
Check the protective function of the safety laser scanner Violate the protected field at various points: The hazardous movement must be shut down.			
Switch off the safety laser scanner Is the hazardous movement stopped immediately when you switch off?			

17 Identification

The safety laser scanner's year and month of manufacture is encoded within its serial number.

The serial number is a 9-digit code.



Legend

X Internal designation (any letter)

YY Year of manufacture	16 = 2016
	17 = 2017
	18 = 2018
	19 = 2019
	...
	30 = 2030

M Month of manufacture

A = January	G = July
B = February	H = August
C = March	I = September
D = April	L = October
E = May	M = November
F = June	N = December

Consecutive number within the month

18 **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.

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