



► PSEN sc ME 5.5 08-17

PILZ
THE SPIRIT OF SAFETY

Operating Manual-1005388-EN-06
- PSEN sensor technology



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SD means Secure Digital

1	Introduction	7
1.1	Validity of documentation	7
1.2	Using the documentation	7
1.3	Definition of symbols	7
2	Overview	9
2.1	Device features	9
2.2	Device view	11
3	Safety	14
3.1	Intended use	14
3.2	Safety regulations	15
3.2.1	Safety assessment	15
3.2.2	Use of qualified personnel	15
3.2.3	Warranty and liability	16
3.2.4	Disposal	16
3.3	For your safety	16
4	Security	17
4.1	Required security measures	17
5	Function description	19
5.1	Basic function of the safety laser scanner	19
5.1.1	Single connection	19
5.1.2	Series connection	20
5.2	Stationary and mobile danger zone	22
5.2.1	Horizontal application	23
5.2.2	Vertical application	23
5.2.3	Mobile application	24
5.3	Reference outline monitoring	24
5.4	Use of zone sets and switching of zone sets	25
5.5	Automatic and monitored start/restart	25
5.6	Manual restart	26
5.7	OSSD	27
5.8	Reset	27
5.9	Encoder	27
5.10	Coding against interference	28
5.11	Alarms	29
5.12	EDM	29
5.13	Wave	30
5.14	Rest condition	30
5.15	Muting	30
5.16	Override	32
5.17	Multiple evaluation	33
5.18	Restore configuration (Fast Replacement)	33
5.19	Report generation	33
5.20	Protection against manipulation	34
5.21	Output of measured data	35

6	Project configuration	36
6.1	Maintaining the safety distance	36
6.1.1	General	36
6.1.2	Horizontal application with stationary danger zone	38
6.1.3	Horizontal application with automated guided vehicle systems	41
6.1.4	Vertical application	45
6.1.4.1	Detect body parts	46
6.2	Calculation of the overall response time	47
6.3	Switching of zone sets	48
6.4	Monitoring of reference outlines	50
6.5	Operating range to detection capability	52
6.6	Area with limited detection capability	53
6.7	Installation of several adjacent safety laser scanners	53
6.8	Dust filtration	54
6.9	Ambient conditions	55
6.10	Distance to intense light sources and to reflective surfaces	55
6.11	Distance from walls	56
6.12	Planning of safety and warning zones and zone sets	57
6.13	Switchover time with zone selection	57
6.14	Encoder	58
6.15	Muting	62
6.15.1	General	62
6.15.2	Muting in two directions	64
6.15.3	Muting in one direction	67
6.15.4	Dynamic muting	69
6.16	Override	69
6.17	Rest condition	71
7	Wiring	73
7.1	General guidelines	73
7.2	Connector assignment master unit	73
7.3	Connector pin assignment for subscriber unit	76
7.4	Configurable inputs/outputs	76
7.5	Configurable inputs	77
7.6	Wiring of the configurations	77
7.7	Connect supply voltage and safety controller	78
7.8	Connection to PSENscan Configurator	79
7.8.1	Single connection	80
7.8.2	Series connection	81
7.9	Connections for muting sensors	82
8	Installation and alignment	83
8.1	Installation options	83
8.2	Installation directly on to mounting surface	83
8.3	Installation of the protective bracket PSEN sc bracket H at the safety laser scanner	84
8.4	Installation on the floor	85
8.5	Installation for inclination to the side or upwards and downwards	86
8.6	Installation for inclination upwards and downwards	88

8.7	Set the angle of inclination of the safety laser scanner	89
8.8	Set the side inclination of the safety laser scanner	89
8.9	Measures to safeguard unsecured areas	90
8.10	Installation for a mobile application	91
9	PSEnscan Configurator	92
9.1	Basics	92
9.2	Installation	92
9.2.1	System requirements	92
9.2.2	Install PSEnscan Configurator	92
9.2.3	Ethernet Connections	93
9.2.3.1	Factory default settings for the IP addresses	93
9.2.3.2	Create firewall rule	93
9.2.3.3	Connect automatically	94
9.3	Download configuration to device	94
9.4	Create backup copy of a configuration	95
9.5	Change password	95
9.6	Reset password	95
10	First commissioning	96
10.1	Requirements for commissioning	96
10.2	System connection	96
10.3	Configuration of zones	97
10.3.1	Example for a 17-pin connection	98
10.3.2	Example for a 17+8-pin connection	101
10.3.3	Example for a 17+8-pin connection with encoder inputs	105
10.4	Testing	111
11	Operation	113
11.1	Display of the monitoring status	113
11.2	Display during normal operation	113
11.3	Diagnostic information	114
11.3.1	Error	114
11.3.2	Warnings	120
11.3.3	Information	121
11.3.4	Log file	124
11.4	Text messages in the display	125
11.5	Restore configuration	126
11.6	Reset	127
11.7	Activate rest condition	127
11.8	Deactivate rest condition	128
12	Cleaning, checks and maintenance	129
12.1	Cleaning	129
12.2	Checks	130
12.2.1	Regular check	130
12.2.2	Check after plant/machine modification	130
12.3	Maintenance	130

12.3.1	Update firmware	130
12.3.2	Exchange of a memory module	131
12.3.3	Exchange PSEN sc head	134
13	Dimensions	139
14	Technical details order no. 6D000034	143
15	Technical details order no. 6D000020-6D000021	146
16	Safety characteristic data	149
17	Network data	150
18	Order reference	151
18.1	System	151
18.2	Accessories	151
18.2.1	Cable	152
19	Appendix	155
19.1	Check list	155
20	Identification	158
21	EC declaration of conformity	159
22	UKCA-Declaration of Conformity	160

1 Introduction

1.1 Validity of documentation

This documentation is valid for the following products from version 1.0. It is valid until new documentation is published.

Product type	Designation in this operating manual
PSEN sc ME 5.5 08-17	Master unit or PSEN sc ME 5.5 08-17
PSEN sc S 3.0 08-12	Subscriber unit or
PSEN sc S 5.5 08-12	PSEN sc S 3/5

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

2.1 Device features

Safety laser scanners of the PSEN sc ME 5.5 08-17 constitute electrosensitive protective equipment (ESPE type: 3) in accordance with EN 61496-3 for workspaces in which machines, robots, and automated systems might pose a physical danger to their operators.

Overview of the options of all the safety laser scanner PSEN sc models

Product	Male connector	max. number					max. number of configurable			Operating range
		Sub- scribe r units	OSSD pairs	Zone sets	En- coder inputs	Zone set switch- ing in- puts	Inputs	Outputs	Inputs/ outputs	
PSEN sc L 3.0/5.5 08-12	8-pin	-	1	3	-	3	2	-	1	3.0 m/
	12-pin		2	10		5	1		4	5.5 m
PSEN sc M 3.0/5.5 08-12	8-pin	3	1	3	-	3	2	-	1	3.0 m/
	12-pin		2	10		5	1		4	5.5 m
PSEN sc M 5.5 08-17	17-pin	3	3	20	-	6	6	2	2	5.5 m
	17+8-pin			70		14	8			
PSEN sc ME 5.5 08-17	17-pin	3	3	20	-	6	4	2	2	5.5 m
	17+8-pin			70	4	14	8			

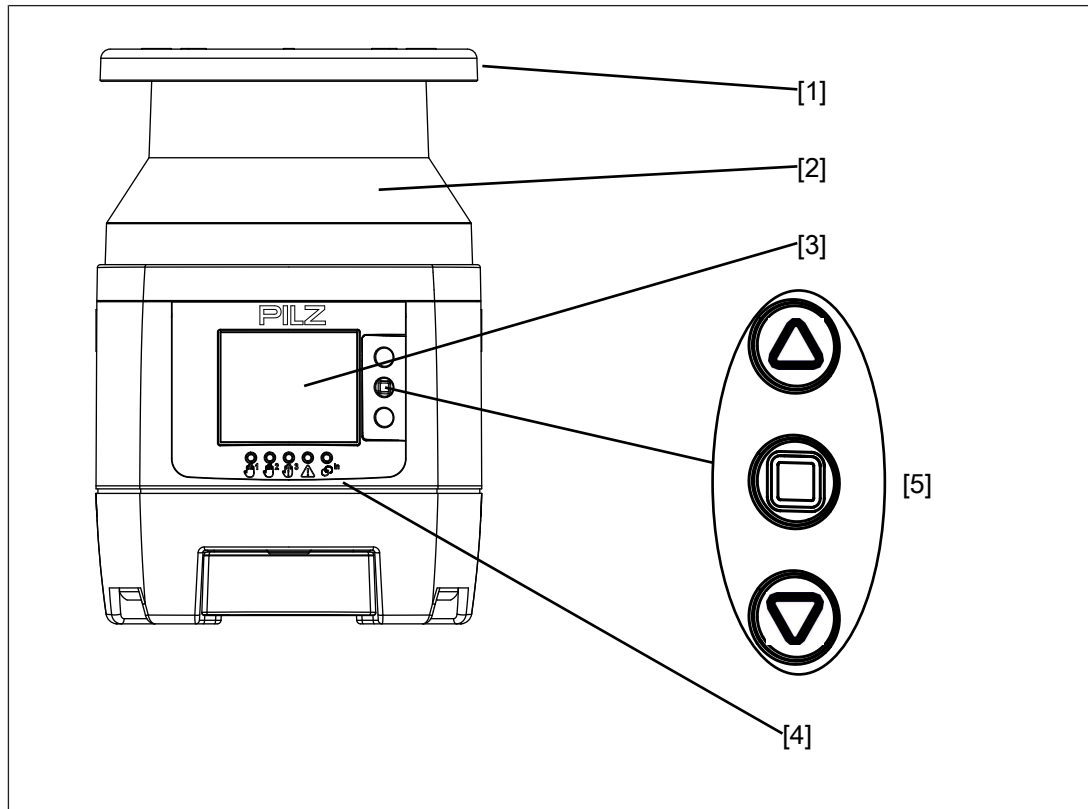
► The max. number of inputs that can be used simultaneously for switching zone sets depends on the connected safety controller.

Product	Male connector	Max. number of zone set switching inputs	
		Connection to a safety controller with test pulses	Connection to a safety controller without test pulses
PSEN sc L 3.0/5.5 08-12	8-pin	2	3
	12-pin	1	5
PSEN sc M 3.0/5.5 08-12	8-pin	2	3
	12-pin	1	5
PSEN sc M 5.5 08-17	17-pin	4	6
	17+8-pin	8	14
PSEN sc ME 5.5 08-17	17-pin	4	6
	17+8-pin	8	14

- Four safety laser scanners can be connected in series (1 master and 3 subscribers)
- Configurations are created with the PSEnscan Configurator:
 - With teach-in function when creating zones.
 - Support for several zone sets for a difference at exactly two points.
- In a series connection with master and subscriber units, devices with different operating ranges and different detection capabilities can be freely combined
- Detection capability: 30 mm, 40 mm, 50 mm, 70 mm, 150 mm
- Connection
 - With 17-pin M12 connector on supply voltage, evaluation device and inputs **or**
 - With 17-pin M12 connector on supply voltage, evaluation device and inputs **and** 8-pin M12 connector on inputs
- 3 safety zones independent of each other (one OSSD pair per safety zone)
- 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
- Enhanced availability by configurable multiple evaluation
- Muting (2 outputs, 2 inputs)
 - Muting in one direction
 - Muting in two directions
 - Dynamic muting
- Override
- Transferable configuration by saving the configuration in an exchangeable memory module
- Protection against manipulation

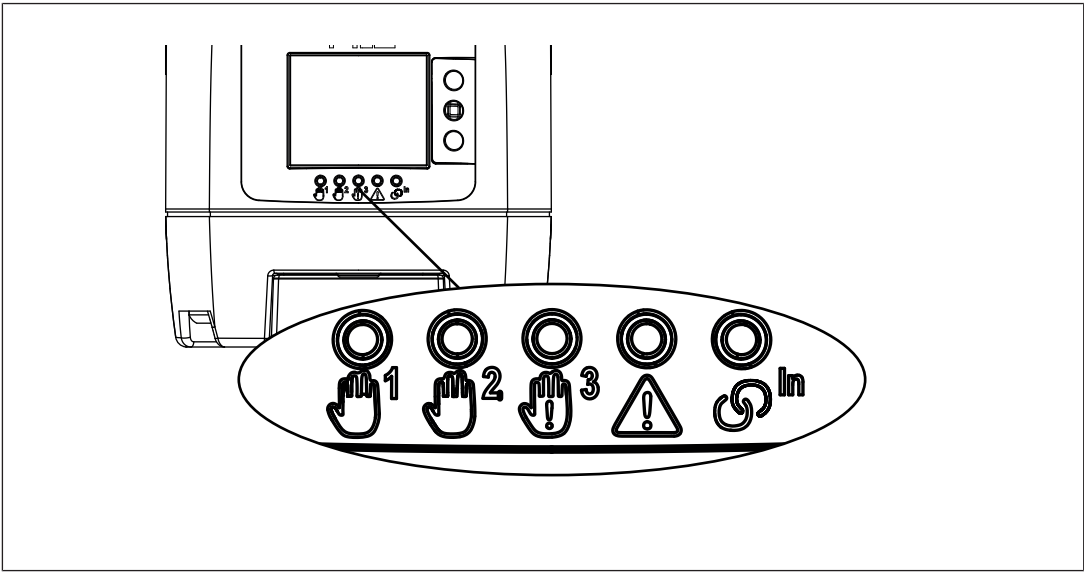
When indicators for manipulation are detected the OSSDs switch to the OFF state.
- Rest condition to save energy
- The safety laser scanner can be installed and operated overhead.

2.2 Device view



Legend

- [1] Metal cover upper side
- [2] Front panel (exit laser beams)
- [3] Display for device messages
- [4] LEDs as status indicator
- [5] Buttons for scrolling in the display or to confirm the message in the display
-  Scroll up
-  Confirm message in the display
-  Scroll down



Legend

-  State OSSD 11/12
-  State OSSD 21/22
-  State OSSD 31/32 **or** warning zone 2
-  Status warning zone 1
-  Status interlock

Detailed description of the LEDs:

Icon	State	 = LED on  = LED off	Meaning
	OSSD 11/12	 Green	No object detected in safety zone 1
		 Red	Object detected in safety zone 1
	OSSD 21/22	 Green	No object detected in safety zone 2
		 Red	Object detected in safety zone 2

Icon	State	 = LED on  = LED off	Meaning
	OSSD 31/32 or	 Green	No object detected in safety zone 3
		 Red	Object detected in safety zone 3
	Warning zone 2	 Yellow	No object detected in warning zone 2
		 Yellow	Object detected in warning zone 2
	Warning zone 1	 Yellow	No object detected in warning zone 1
		 Yellow	Object detected in warning zone 1
	Locking	 yellow and  lights up red	No object detected in safety zone, PSEN sc ME 5.5 08-17 waits for manual restart
		 and  lights up green	No object detected in safety zone, PSEN sc ME 5.5 08-17 is ready for operation
		 and  lights up red	Object detected in safety zone, PSEN sc ME 5.5 08-17 in OFF state

3 Safety

3.1 Intended use

The safety laser scanners in the PSEN sc ME 5.5 08-17 are electrosensitive protective equipment of ESPE type 3. They are used to protect personnel and systems. The safety laser scanners are designed to

- ▶ Safeguard the danger zone,
- ▶ Safeguard danger zones of automated guided vehicle systems (AGVS) and
- ▶ Guard access 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 30 mm, 40 mm, 50 mm, 70 mm, 150 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 machine or automated guided vehicle system (AGVS) can be restarted using a manual or automatic restart.

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

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 danger zone.

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

Improper use

The following is deemed improper use in particular:

- ▶ Any component, technical or electrical modification to the product,
- ▶ Use of the product outside the areas described in this operating manual,
- ▶ Use of the product outside the technical details (see chapter entitled [Technical Details](#)  143).

**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

3.2 Safety regulations

3.2.1 Safety assessment

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

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

3.2.2 Use of qualified personnel

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

A competent person is a qualified and knowledgeable person who, because of their training, experience and current professional activity, has the specialist knowledge required. In order to inspect, assess and handle products, devices, systems, plant and machinery, this person must be familiar with the state of the art and the applicable national, European and international laws, directives and standards.

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

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

3.2.3 Warranty and liability

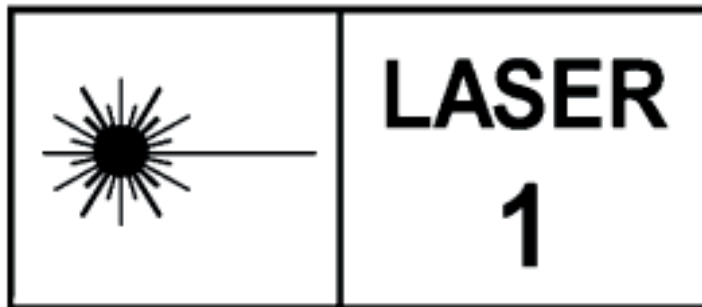
All claims to warranty and liability will be rendered invalid if

- ▶ 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 operating manual,
- ▶ the operating personnel are not suitably qualified, or
- ▶ changes of any kind were made that this document does not describe.

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 ME 5.5 08-17 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 Security

To secure plants, systems, machines and networks against cyberthreats it is necessary to implement (and continuously maintain) an overall industrial security concept that is state of the art.

Perform a risk assessment in accordance with VDI/VDE 2182 or IEC 62443-3-2 and plan the security measures with care. If necessary, seek advice from Pilz Customer Support.

4.1 Required security measures

- ▶ The product is not protected from physical manipulation or from reading of memory contents during physical access. Use appropriate measures to ensure that there is no physical access by unauthorised persons. You should also use security seals so that you can detect any manipulation of the product or interfaces. Installation inside a lockable control cabinet is recommended as a minimum measure.
- ▶ The configuration computer that accesses the product has to be protected from attacks by a firewall or other suitable measures. We recommend that a virus scanner is used on this configuration computer and updated regularly.
- ▶ Protect the product from unauthorised data exchange via the network by using a firewall or providing other appropriate measures. Only allow the data exchange that's required for the application. Any data exchange that is not required for the application must be prevented by the firewall.

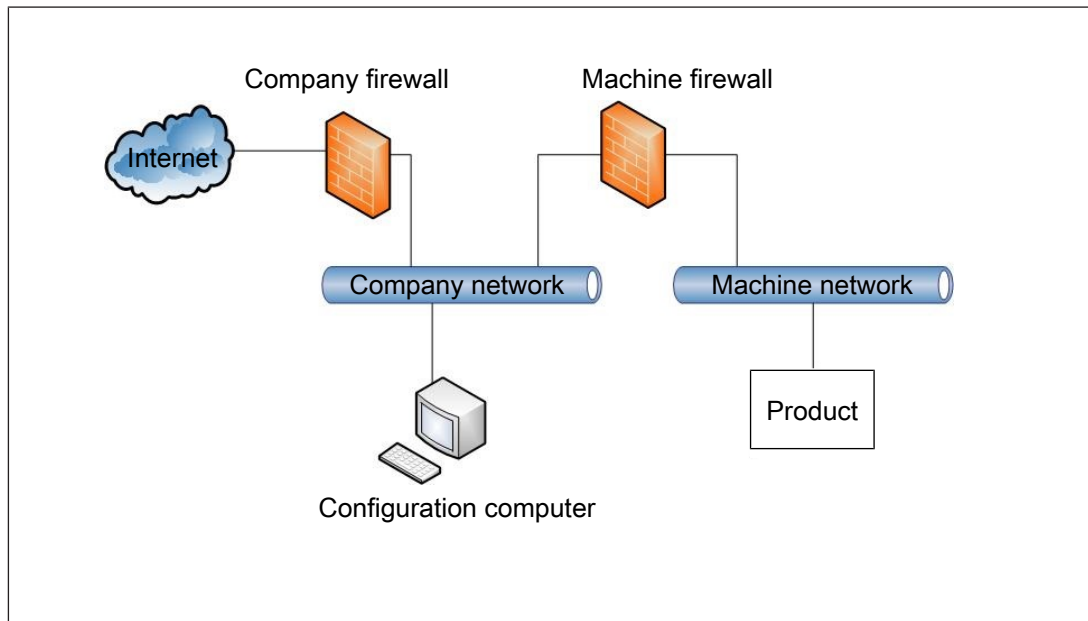


Fig.: Example network topology

- ▶ If necessary, protect the configuration computer and the product from unauthorised use by assigning passwords and taking further measures if required. We also recommend that the user logged on to this configuration computer does not have administrator rights.

- ▶ Only assign strong passwords and handle the passwords carefully. Be guided by generally accepted guidelines such as NIST 800-63b for example.
- ▶ Assign different permissions for the various user groups (e.g. diagnostics - configuration).
- ▶ As soon as possible, install firmware updates that Pilz provides for the product.
- ▶ Before disposal, the product must be safely decommissioned. To do this, all the data must be deleted from the device.
 - Set the configuration back to its default settings or delete the configuration.
 - Switch off the product.
- ▶ Note the [network data](#)  [150](#) for risk analysis and the security measures.

5 Function description

5.1 Basic function of the safety laser scanner

5.1.1 Single connection

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

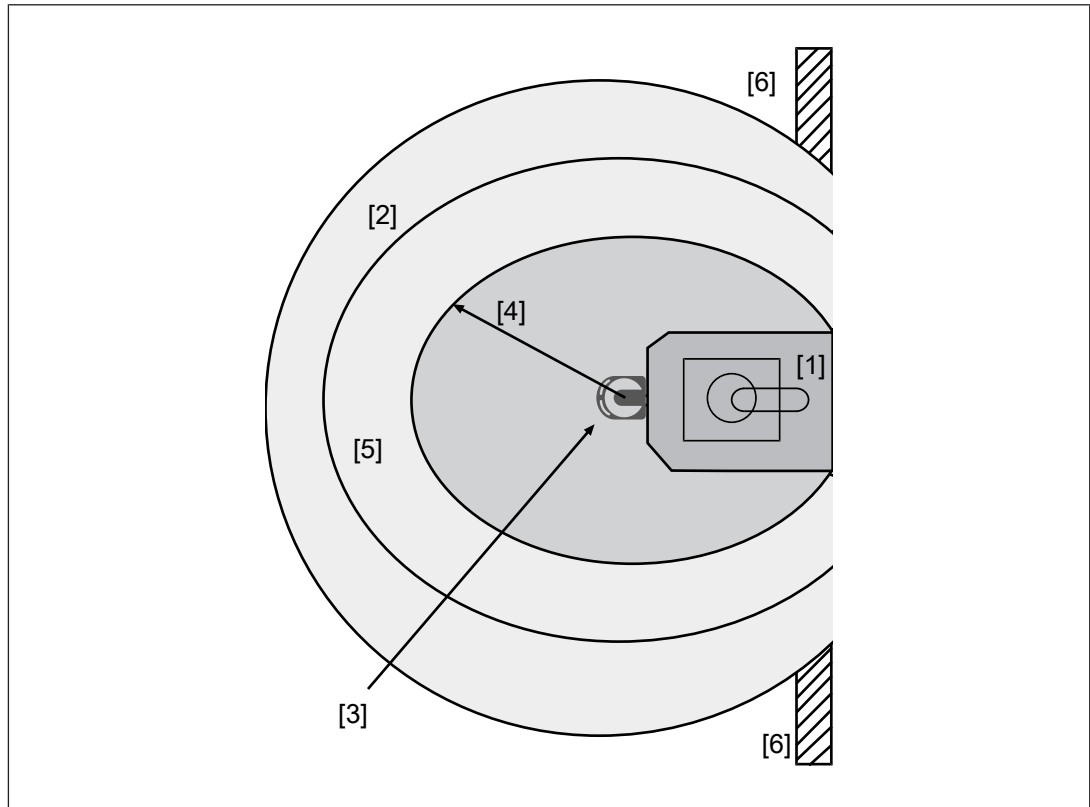


Fig.: Operating principle safety laser scanner

Legend

- [1] Danger zone
- [2] Area covered by the laser beam
- [3] Safety laser scanner
- [4] Safety zone
- [5] Warning zone
- [6] Additional protective equipment for securing the danger zone that is not covered by the safety laser scanner

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

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

If an object or a person enters the warning zone, a warning output can trigger an action (e.g. switch on indicator light unit).

You can specify for each warning output whether activation is to occur when a Low signal or a High signal is present.

5.1.2

Series connection

The series connection of safety laser scanners means using several safety laser scanners in a configuration (safety laser scanner arrangement). The OSSDs are in the controlling master unit that is connected to an evaluation device.

In a series connection, each of the connected safety laser scanners monitors the area that is covered by the light beam emitted from the safety laser scanner.

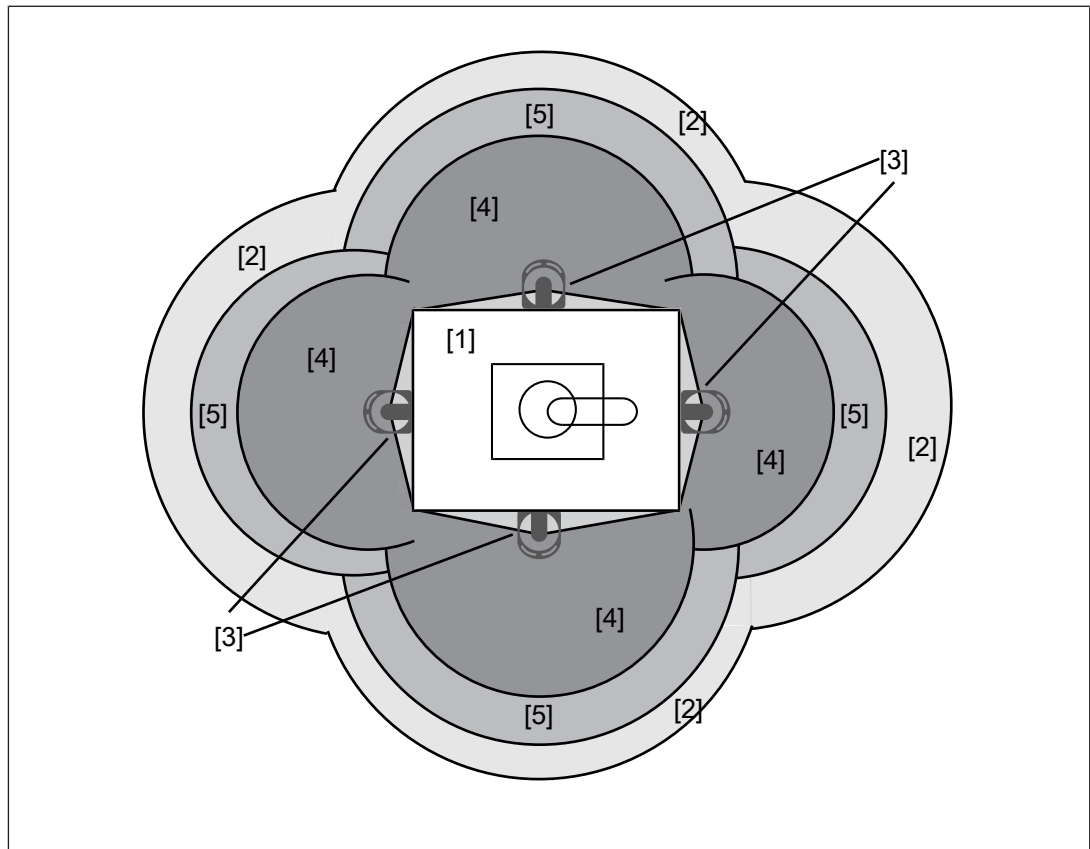


Fig.: Operating principle safety laser scanner with series connection

Legend

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

The safety zones and warning zones can be defined independently of each other for each safety laser scanner.

When an object or a person intrudes into the warning zone or safety zone, the status of the relevant safety laser scanner is changed, shown in the display and signalled to the master.

Depending on the violated zone, the master triggers the relevant configured actions.

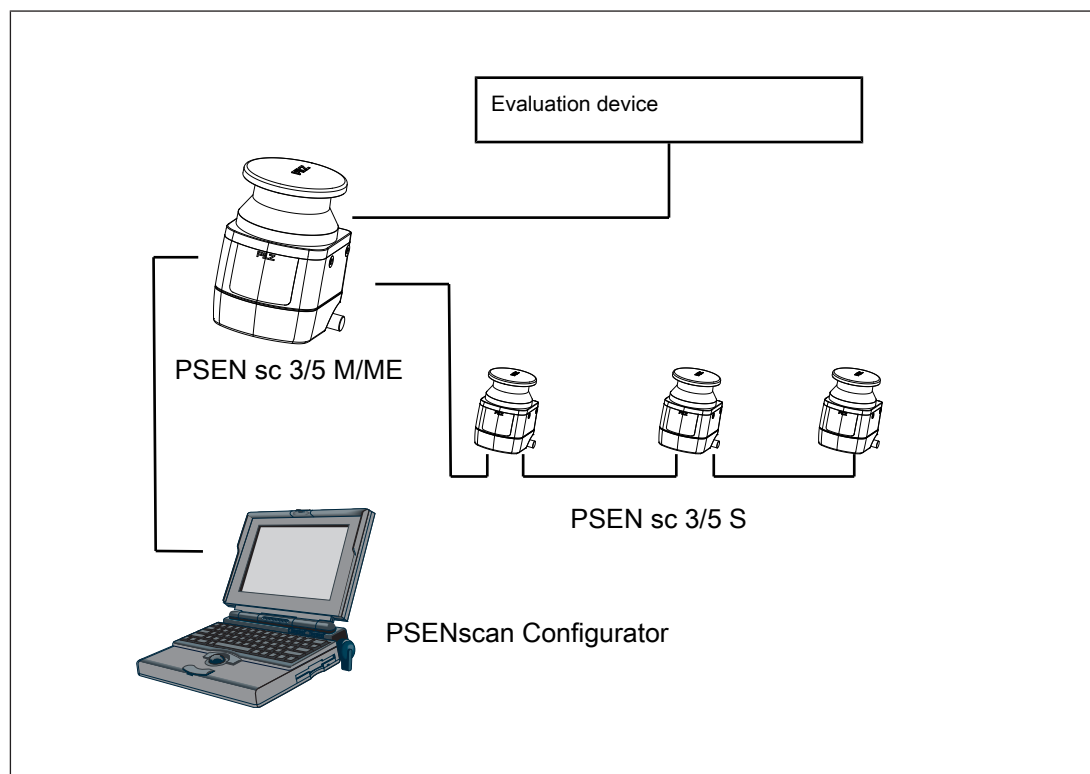
For a violated safety zone, the OSSDs switch to the OFF state, for a violated warning zone an indicator light unit can be switched on, for example.

Functions of the master unit in the series connection

- ▶ Supply voltage for the connected subscriber units
- ▶ Connection to the PSENscan Configurator
- ▶ Control of the subscriber units in accordance with the functionality configured in the PSENscan Configurator

In s series connection the safety outputs of a safety laser scanner PSEN sc ME 5.5 08-17 are connected to an evaluation device. On this safety laser scanner, max. three safety laser scanners PSEN sc S 3/5 can be connected in series. The safety laser scanner PSEN sc ME 5.5 08-17 is the master unit, the other safety laser scanners PSEN sc S 3/5 connected to the master are subscriber units.

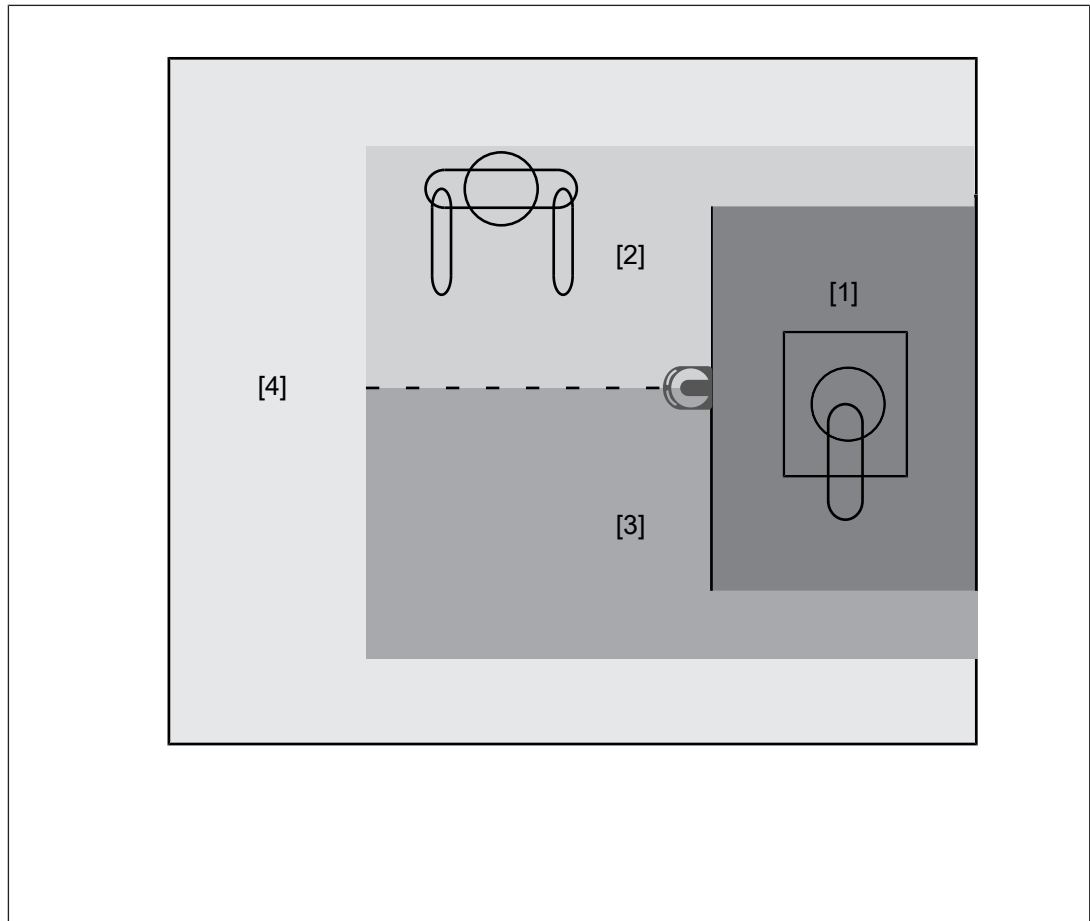
A safety laser scanner PSEN sc S 3/5 can only be connected to a safety laser scanner PSEN sc M or PSEN sc ME or to a PSEN sc S 3/5 that is connected to such a safety laser scanner.



5.2 Stationary and mobile danger zone

You can use the safety laser scanner to monitor a stationary or mobile danger zone, e.g. the environment of a machine that is installed in a fixed position or an area in front of an automated guided vehicle system or a mobile robot.

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



Legend

- [1] Danger zone
- [2] Configured zone 1, monitoring not activated
- [3] Configured zone 2, monitoring not activated
- [4] Warning zone

If a violation of the safety zone is detected, the OSSDs switch to the OFF state.

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.

When using 2 warning zones, different reactions can be configured.

5.2.1 Horizontal application

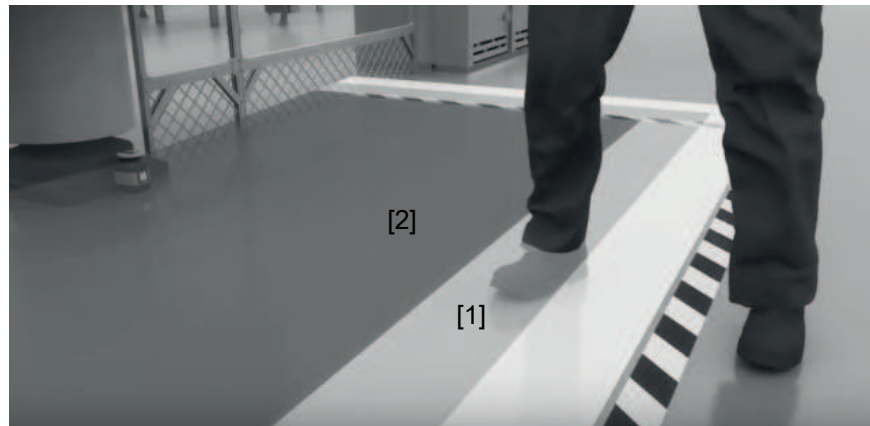


Fig.: Application example PSENscan safety laser scanner - horizontal configuration

Legend

- [1] Warning zone
- [2] Safety zone

5.2.2 Vertical application



Fig.: Application example PSENscan safety laser scanner - vertical configuration

Legend

- [1] Safety zone

5.2.3 Mobile application

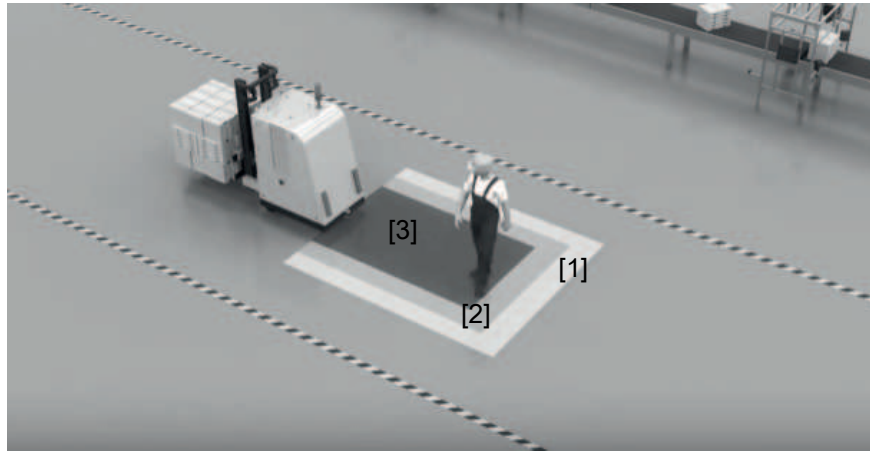


Fig.: Application example PSENscan safety laser scanner - mobile configuration

Legend

- [1] Warning zone 1
- [2] Warning zone 2
- [3] Safety zone

The safety laser scanner scans the area in front of an automated guided vehicle system to prevent collisions. When an object or a person is detected, the safety laser scanner sends a signal to the automated guided vehicle system.

- ▶ If the warning zone is violated, an alarm on the automated guided vehicle system can be triggered. The person can leave the route or remove the object from the route.
- ▶ When the safety zone is violated, a stop of the automated guided vehicle system is triggered.
- ▶ The safety distance is calculated from the danger source, not from the safety laser scanner.

5.3 Reference outline monitoring

For vertical applications, national and international standards recommend monitoring a reference outline.

The reference outline is configured during the first installation of PSEN sc ME 5.5 08-17. The distances measured during configuration are used as reference values for monitoring the reference outline.

5.4 Use of zone sets and switching of zone sets

A zone set must include a safety zone and it can include a max. of two warning zones.

Each zone can include any number of geometrical shapes.

Each machine state can be assigned a signal at the control inputs or a combination of signals at the control inputs. Each assignment is assigned a zone set. The zone set is always active whose control input signal/combination of signals is present.

Therefore, a change of signals at the control inputs triggers a change of the active zone set.

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

When using several zone sets, the monitoring of a zone set can be switched to the monitoring of the next zone set. The configurable inputs must be used as switches.

The standard behaviour when switching the zone sets does not provide for an overlap of the zone sets.

► Max. number of inputs that can also be used for switching zone sets

- PSEN sc ME 5.5 08-17 with the use of the 17-pin connection and connection to a safety controller without test pulses: 6
- PSEN sc ME 5.5 08-17 with the use of the 17-pin connection and connection to a safety controller with test pulses (for example a configurable safe small controller PNOZmulti): 4
- PSEN sc ME 5.5 08-17 with the use of the 17+8-pin connection and connection to a safety controller without test pulses: 14
- PSEN sc ME 5.5 08-17 with the use of the 17+8-pin connection and connection to a safety controller with test pulses (for example a configurable safe small controller PNOZmulti): 8

► Max. number of zone sets

- PSEN sc ME 5.5 08-17 using 17-pin connection: 20
- PSEN sc ME 5.5 08-17 using 17+8-pin connection: 70

5.5 Automatic and monitored start/restart

Automatic start/restart

When the safety laser scanner is switched on or when the safety zone is re-released, the safety laser scanner starts automatically and the OSSDs switch to the ON state under these conditions:

- Both OSSDs are wired correctly **and**
- No fault has occurred **and**
- The safety zone is free.

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

Monitored manual start/restart

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

- ▶ Both OSSDs are wired correctly **and**
- ▶ No fault has occurred **and**
- ▶ The safety zone is free **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. 4.5 s. The start occurs with a falling edge.

If the start button was operated for a shorter or longer period, no start occurs.

It is not possible to use start/restart to bring a safety laser scanner to normal operation when it has been in an error state.

When the error has been rectified, a reset is required.

5.6 Manual restart

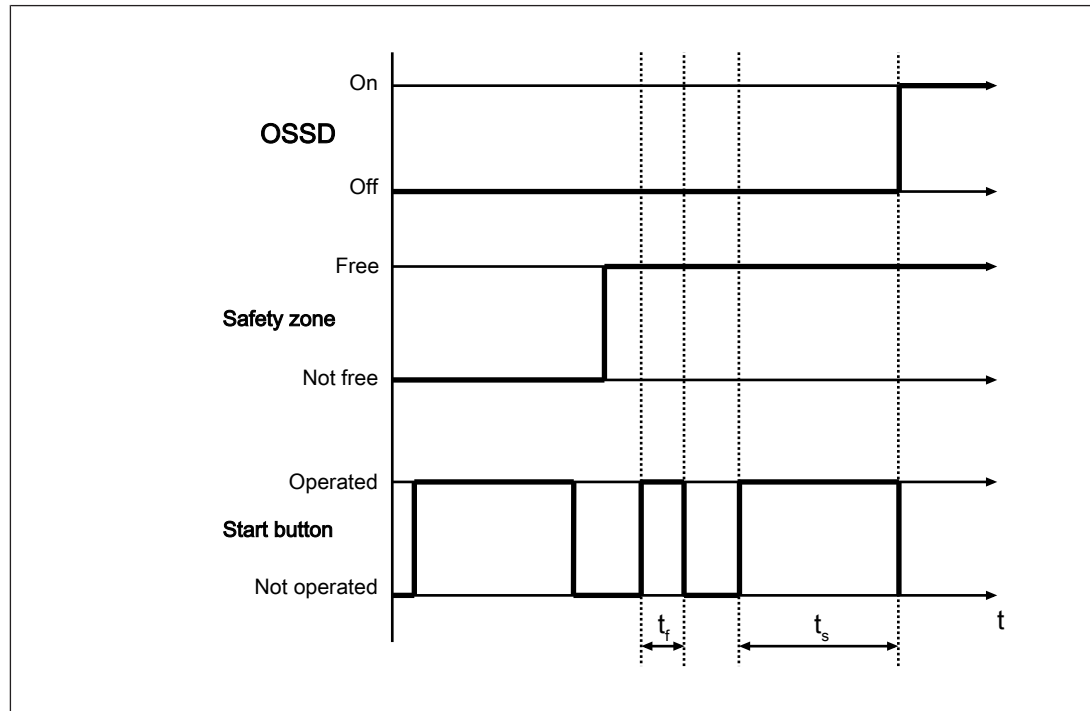


Fig.: Timing diagram for manual restart

Legend

t_f Start pushbutton pressed for < 0.5 s, no manual reset triggered

t_s Start pushbutton pressed 0.5 s to 5 s, manual restart is triggered

With the manual restart it is not possible to bring a safety laser scanner to normal operation when it was in an error state, and whose error is rectified.

5.7 OSSD

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

5.8 Reset

With the reset function, the safety laser scanner can be set to normal operation when the safety laser scanner is in an error state, and the error was rectified.

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.

Automatic reset

With the automatic reset function the safety laser scanner is set to normal operation when the safety laser scanner was in an error state, and the error was rectified.

When the function of the automatic reset is activated, there is an attempt to restore normal operation automatically 10 seconds after an error state is determined.

The automatic reset function is permanently deactivated when the PSEN sc ME 5.5 08-17 switches to an error state more than 5 times within 15 minutes with an INTFx error.

The PSEN sc ME 5.5 08-17 must be switched off and then on again.

5.9 Encoder

Encoders can be connected and configured to process movement data (e.g. automated guided vehicles) in dynamic applications.

- ▶ 4 inputs are available for output signals from encoders, to continuously determine the speed of an automated guided vehicle system.
- ▶ To use encoder inputs, these must be configured in PSENscan Configurator.

The following values must be specified (see [Encoder](#)  58):

- max. deviation from rated speed in %
- Number of measured values per centimetre of rotation
- Speed range in cm/s

5.10 Coding against interference

Safety laser scanners that can influence each other can be operated in the same room when beam coding of the safety laser scanner is set up.

For this, each laser scanner must be assigned a code during configuration (***configure detection capability***).

Four codes can be selected.

The selected code extends the response time per measurement cycle of the safety laser scanner.

For the four codes there are the following response time extensions per measurement cycle.

Code	Response time per measurement cycle
0	30 ms
1	30.5 ms
2	31 ms
3	31.5 ms

5.11 Alarms

When using the 17-pin connection you can configure the output of an alarm for certain states of the safety laser scanner.

► Alarm 1

CLEANW2 is shown on the display of the safety laser scanner. The front panel must be cleaned to prevent the safety laser scanner switching to the fault condition.

► Alarm 2

Safety laser scanner in fault condition.

5.12 EDM

Contactors installed outside the safety laser scanner can be monitored (external device monitoring = EDM, also known as feedback loop monitoring).

EDM only needs to be activated if the contactors are controlled directly.

A test is performed to see that the N/C contacts switch if the state of the OSSDs changes; this serves to monitor and detect malfunctions on the contactors. If a malfunction is detected, the safety laser scanner switches to a safe state and stops the connected machine. This check is carried out each time the OSSDs are triggered and before restarting.

The EDM function is only available for OSSD pairs 1 and 2:

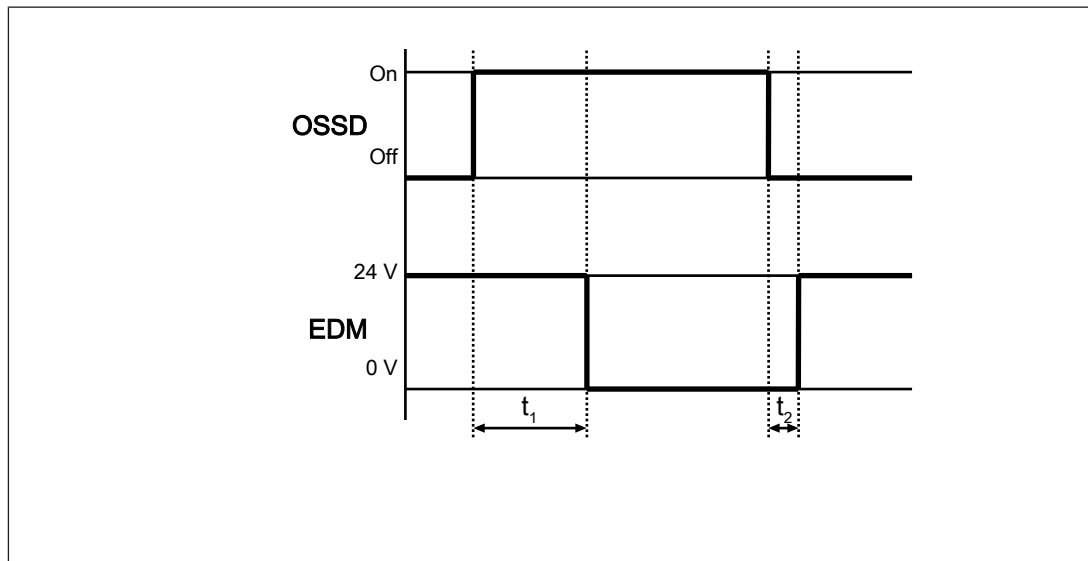


Fig.: Timing diagram for EDM

Legend

- t_1 After the OSSD has changed to the ON state, the EDM circuit must open within 350 ms
- t_2 After the OSSD has changed to the OFF state, the EDM circuit must close within 100 ms

Use control elements whose dynamics match the times stated at t_1 and t_2 .

When [wiring](#)  73], a configurable input must be used for the function.

The function must be activated in the PSENscan Configurator.

5.13 Wave

With the wave function, a safety laser scanner that is to be configured in a network can be identified more easily from its position.

When starting the automatic search for a safety laser scanner in a network the wave button can be selected.



The device found registers with the flashing message in the display.

5.14 Rest condition

In a rest condition the functions of the safety laser scanner are deactivated to save energy.

This enables the use of the safety laser scanner with a supply voltage by battery (e.g. in an automated guided vehicle system).

In a rest condition no safety or warning zones are monitored.

The safety laser scanner is still available for the operation and it can be switched back to normal operation, if necessary.

5.15 Muting

Muting is the temporary, automatic suspension of a safety function. This suspension is triggered via muting sensors, which are connected to the configurable inputs and detect an object under defined conditions.

The muting function can be used to suspend the safety function of the safety laser scanner during operation, subject to special operating conditions.

► Example of a special operating condition:

Material is transported into the safety zone on a conveyor and the safety function is overridden for the time it takes the material to pass through.

Muting is suitable when, under certain operating conditions, an object is permitted to pass through the danger zone but a person is not.



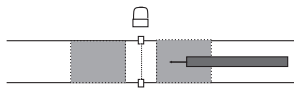
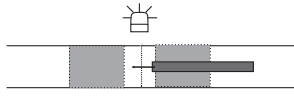
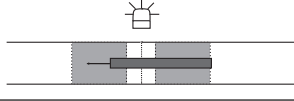
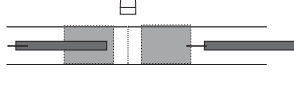
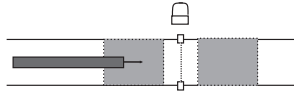
CAUTION!

Risk of injury due to loss of the safety function

In muting status, the OSSDs continue to be in ON state. The connected machine remains in operation and represents a potential hazard.

- Prevent the possibility of access to the danger zone during muting.

Sequence for T-muting cycle when material passes from the right-hand side

Phase in the muting cycle	Explanation
	Material has already passed the first muting sensor and is being transported on the conveyor in the direction of the second muting sensor, muting lamp off.
	Material on the conveyor passes the second muting sensor (max. 4 s after the first sensor was passed). Muting lamp flashes, signalling the muting status.
	Material on the conveyor passes the PSEN sc ME 5.5 08-17 and the first muting sensor on the output side, muting lamp flashes, signalling the muting status.
	Material has left the area of the first muting sensor on the output side, muting lamp is off, muting status is ended. The next piece of material arrives at the first muting sensor.
	If material is transported from the left-hand side, the cycle is reversed. The output side becomes the input side and the flow starts with the second muting sensor on the output side.

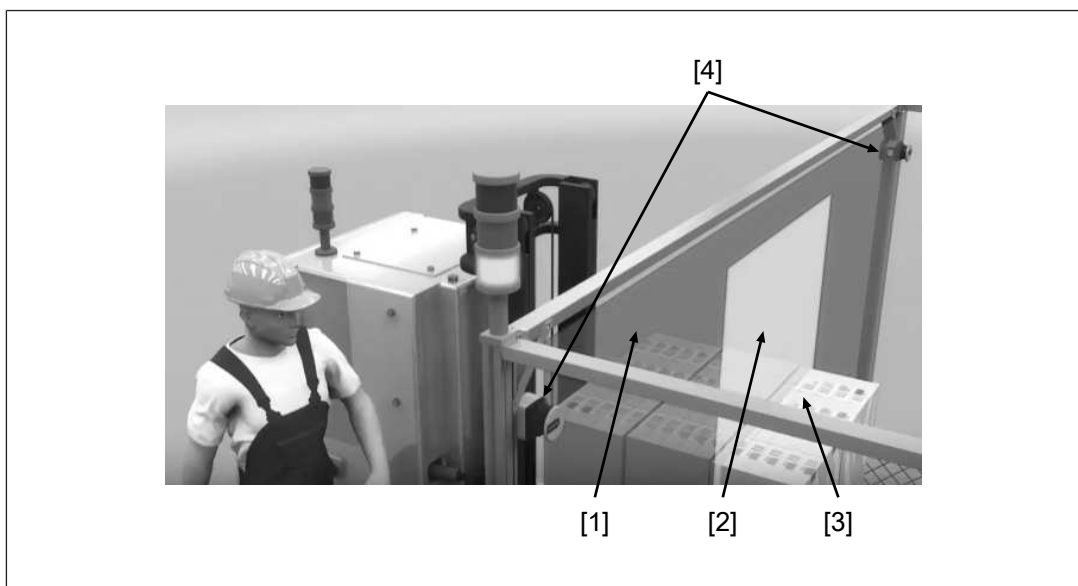
Identification of the conveyed material (pallets, vehicles...) must be guaranteed with all

- ▶ Material dimensions and
- ▶ Conveyor speeds

that are intended to arise during operation.

- ▶ When the muting state of the safety laser scanner is detected, the safety laser scanner triggers the configured actions for the muting state (e.g. switch on warning lamp or warning sound).
- ▶ Two muting areas can be created in a safety zone.
- ▶ Muting can be used in various versions.
 - L muting: Only for removing material from the danger zone
 - T muting: Transport of material in two directions
 - Dynamic muting: Available for L muting and T muting

In addition to the conditions for L muting and T muting, activation and deactivation of the muting state can be controlled by the connected safety controller.



Legend

- [1] Safety zone
- [2] Muting zone
- [3] Transported material
- [4] Safety laser scanner

5.16

Override

With the override function, a machine can be restarted even though the safety zone is violated by material.

The aim is to clear the danger zone of any material that may have accumulated due to a fault in the operating cycle.

If there is a pallet in the safety zone, for example, and the conveyor can no longer be switched on because the OSSDs of the safety laser scanner have switched to the OFF state (because the safety zone is not free), the accumulated material cannot be transported away from the zone.

Activating the override function allows intervention and enables the conveyor to be restarted.

The override function can be activated for the first two OSSDs each when muting is activated for these OSSDs.

Condition for the override function

The override function can be started when the following conditions are met:

- ▶ The safety laser scanner is in a safe condition
- ▶ At least one muting sensor is active

Automatic ending of override function

The override function is ended automatically when one of the following conditions is met:

- ▶ Muting timeout has elapsed
- ▶ The conditions necessary for activation are no longer present.
- ▶ Max. duration of override function has elapsed: After 120 s, the safety laser scanner switches back to its normal operating state.
- ▶ No muting sensor is active
- ▶ Safety zone is not violated

5.17 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 \[47\]](#)) results from the value of the multiple evaluation and the valid response time (see [Technical details \[143\]](#)).

5.18 Restore configuration (Fast Replacement)

If you experience problems with the configuration, a failed firmware update or any other situation in which the system is no longer functional, it may be necessary to reset the system by restoring a different configuration (=Fast Replacement).

With this function, a configuration can be adopted for further systems and therefore simplify the configuration of further systems.

Typical situations for restoring a configuration:

- ▶ Configuration of further systems with a similar design
- ▶ Interruption of the supply voltage during the firmware update
- ▶ Forgotten password
- ▶ Incorrect configuration of the IP address

5.19 Report generation

A report can be created for each configuration on the safety laser scanner.

A report includes all the settings that are valid for a configuration.

A report must be checked for correctness and it can be saved as PDF and printed to a connected printer.

5.20 Protection against manipulation

The safety laser scanner permanently monitors the environment to detect manipulations in the workspace or on the safety laser scanner.

Possible consequences of manipulations:

- ▶ Loss of the safety function,
- ▶ Reduced performance,
- ▶ Operational malfunctions.

If a manipulation indication is detected, the OSSDs switch to the OFF state. The display of



the safety laser scanner shows

If required, monitoring of the environment can be set in the PSENscan Configurator in the **Configure detection capability** window.

- ▶ Monitoring can be completely deactivated.

Select **Manipulation protection = Deactivated**.

- ▶ Activation of the OFF state can be delayed.

Select **Activation delay [s]** to activate the OFF state after the configured time has elapsed, starting from the moment at which the condition is met.

Manipulation protection remains activated.



WARNING!

Loss of safety function due to deactivation of manipulation protection

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

By deactivating manipulation protection, manipulations that lead to the loss of the safety function may remain undetected.

- Carry out a safety assessment each time manipulation protection is modified.

- ▶ The OFF state of the OSSD is activated within the configured delay time when the following condition is met:
 - With at least 700 consecutive light beams from the safety laser scanner, the return signal (echo) that is received is of insufficient strength. The area covered by the light beams corresponds to at least a sector of 70° width.
- ▶ The ON state of the OSSD is reactivated 120 ms after the condition for at least 50 consecutive light beams from the 70° wide sector is no longer met. The light beams must cover an area of at least 5° width.

Situations that may lead to activation of the OFF state as a result of monitoring:

- ▶ Up to a maximum working distance of 50 m there are no objects on a part of the scanning area.
- ▶ In the danger zone covered by the light beams of the safety laser scanner there are objects. Due to their low diffuse reflectivity they do not produce a sufficiently strong return signal (echo).

Examples:

- Objects with a diffuse reflectivity of 1.8 % may not be detected at a distance of > 8 m
- Objects with a diffuse reflectivity of 18 % may not be detected at a distance of > 22 m
- ▶ The front screen of a safety laser scanner is concealed within the detection limit area (by a cloth, for example); the area covered by the laser beams will be partly or completely obscured.
- ▶ In the area covered by light beams there are reflective areas that are positioned in a way that the incoming light beams from the receive area of the safety laser scanner are deflected.

5.21 Output of measured data

The data measured by the safety laser scanner is provided for further processing in other applications.

Further information for measured data processing:

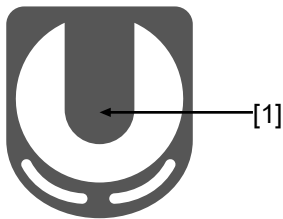
- ▶ Description of the measured data that is generated: PSENscan_UDP_Communication_Shortform-1005879_EN-01
(Download from www.pilz.com)
- ▶ ROS packages: https://github.com/PilzDE/psen_scan_v2

6 Project configuration

6.1 Maintaining the safety distance

6.1.1 General

- ▶ The minimum distance from the start of the area protected by the safety laser scanner to the dangerous machine component should be such that the operator cannot reach the danger zone until the movement of the dangerous machine component has stopped.
- ▶ All distance specifications and measured values refer to the mirror's rotation axis [1].



Influencing factors in accordance with EN ISO 13855

- ▶ Overall response time of the safety laser scanner
Time between the response of the safety laser beam to an event and the change of the OSSDs to the OFF state (see [Calculating the overall response time](#) [47]).
- ▶ 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 evaluation device)
- ▶ Approach speed
The speed with which the object to be detected is nearing the danger zone in mm/s
- ▶ Direction of approach
 - Orthogonal = vertical application
The object to be detected approaches the danger zone at a right angle to the danger zone.
 - Horizontal = horizontal application
The object to be detected approaches the danger zone in parallel to the danger zone.
- ▶ Reflection of the ambient light
- ▶ Prevent stepping behind/circumvention of the protective equipment and, if necessary, the resulting additions
 - Height of the scan plane
 - Detection capability
 - Switchover times

The general formula for calculating the minimum distance in accordance with EN ISO 13855 is:

$$S = (K * T) + C$$

- S Minimum distance in mm, measured from the start of the safety zone to the danger source
- K Approach speed at which the object (body) to be detected is nearing the danger zone in mm/s
- T Overall time from the occurrence of a safety zone violation to the complete stop of the machine
The value is separated for the calculation in t_1 and t_2 , with $T = t_1 + t_2$.
- C Addition depending on the height of the scan plane, the detection capability, the ambient light and if necessary, additions for the installation on automated guided vehicle systems

6.1.2 Horizontal application with stationary danger zone

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

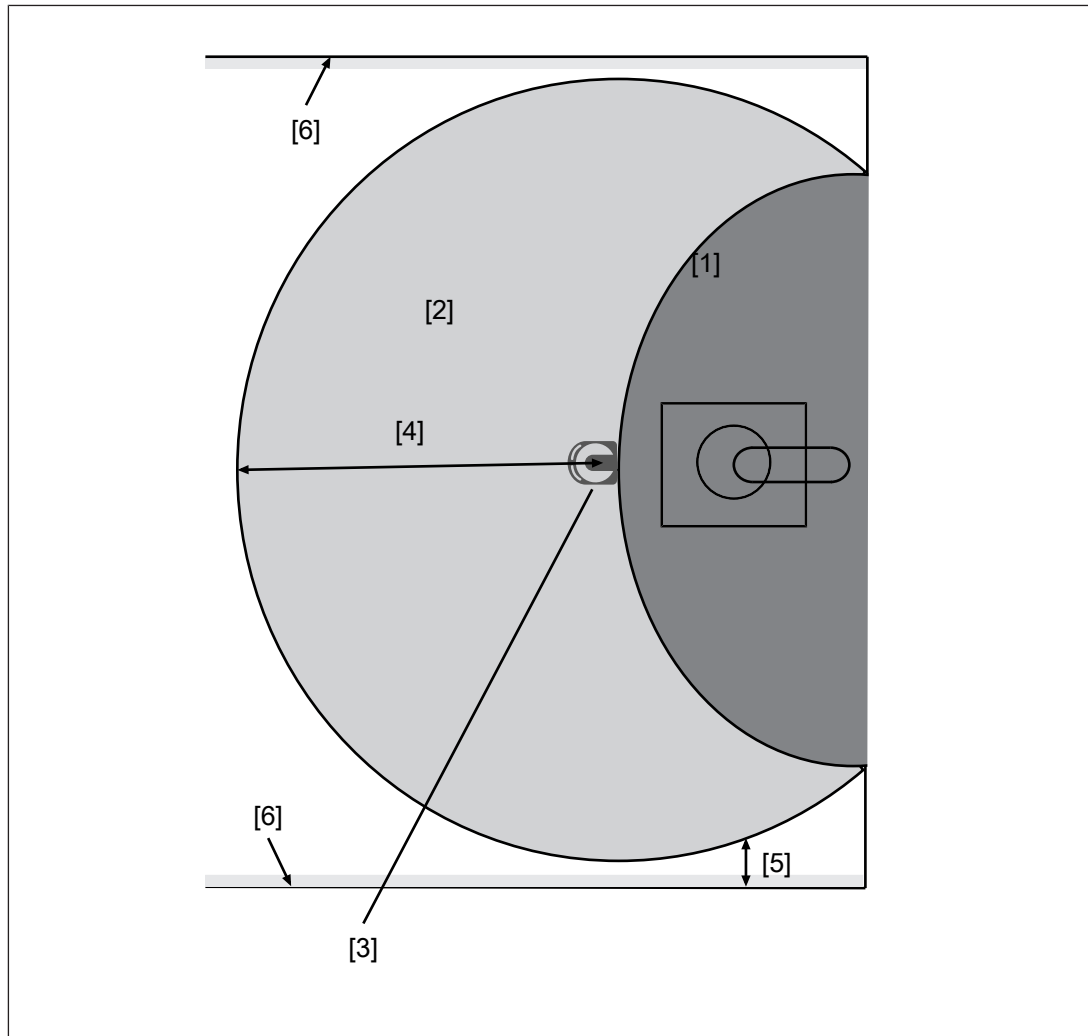


Fig.: Schematic representation minimum distance from the start of the protected area to the danger zone

Legend

- [1] Danger zone
- [2] Area covered by the laser beam
- [3] Safety laser scanner
- [4] Minimum distance to the danger zone (corresponds max. to the operating range of the safety laser scanner)
- [5] Safety allowance Z_T for the distance from fixed objects or walls
- [6] Wall

The following applies for these applications:

$$S = K * (t_1 + t_2) + Z_T + Z_R + C$$

Icon	Meaning
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 danger zone in mm/s $K = 1600 \text{ mm/s}$ when $S > 500 \text{ mm}$ $K = 2000 \text{ mm/s}$ when $S \leq 500 \text{ mm}$
t_1	Overall response time of the safety laser scanner in seconds (see Calculation of the overall response time  47) Time 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
Z_T	General safety allowance Standard value in the calculation and the teach-in function = 100 mm, (see distance from walls  56)
Z_R	Allowance when installing near intense light sources or reflective surfaces (see Distance to intense light sources and to reflective surfaces  55)
C	Additional distance depending on the height of the scanning plane

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

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

Note:

► Permitted height H of the scanning plane

- Max. 1000 mm
- Min. $h = 15(d-50)$ for $d \geq 70 \text{ mm}$
The height H must not be less than 0.

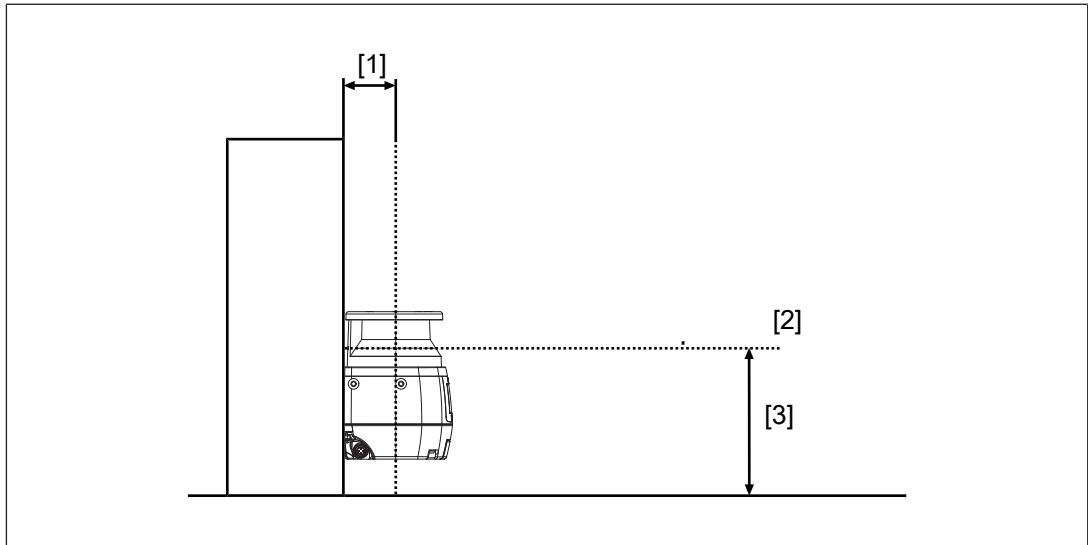
d = Resolution (see [Technical details](#)  143)

- If the height of the scanning plane is specified, the lowest permitted resolution d_r can be calculated.

$$d_r = H/15 + 50$$

d_r = lowest permitted resolution

- When the safety laser scanner is to be placed at a height of $H > 300$ mm, there is a risk of creeping underneath the safety zone. This is to be taken into account in the risk assessment, and if required additional protective measures must be taken.



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 due to insufficient safeguard

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

- Prevent reaching into the opening by using a suitable safeguard.

6.1.3 Horizontal application with automated guided vehicle systems

The following applies for these applications:

$$S = S_{Br} + (T_{RtV} + t_1) * V_{maxAGVS} + Z_T + Z_R + Z_F + Z_B$$

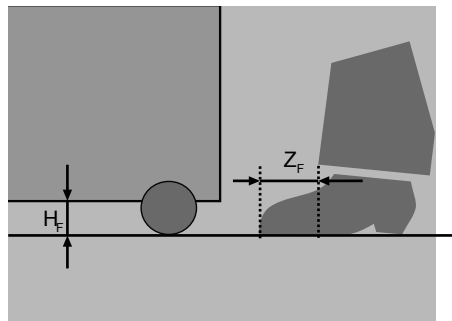
Icon	Meaning
S	Minimum distance in mm, measured from the start of the safety zone to the danger source
S_{Br}	Braking distance of the automated guided vehicle system (AGVS) (see Technical details of the AGVS)
T_{RtV}	Response time of the vehicle control system (see Technical details of the vehicle control system)
t_1	Overall response time of the safety laser scanner in seconds (see Calculation of the overall response time [47]) Time between the violation of a safety zone and signal change at the OSSD output on the safety laser scanner
$V_{maxAGVS}$	Max. approach speed of the automated guided vehicle system (AGVS)
Z_T	General safety allowance Standard value in the calculation and the teach-in function = 100 mm, (see distance from walls [56])
Z_R	Allowance when installing near intense light sources or reflective surfaces (see Distance to intense light sources and to reflective surfaces [55])
Z_F	Allowance for missing ground clearance (length of a foot)
Z_B	Allowance for decreasing braking power of the automated guided vehicle system (AGVS) in mm (10 % of braking distance S_{Br})

Note:

► Height of the scan plane

Pilz recommends a scan plane height of 15 cm.

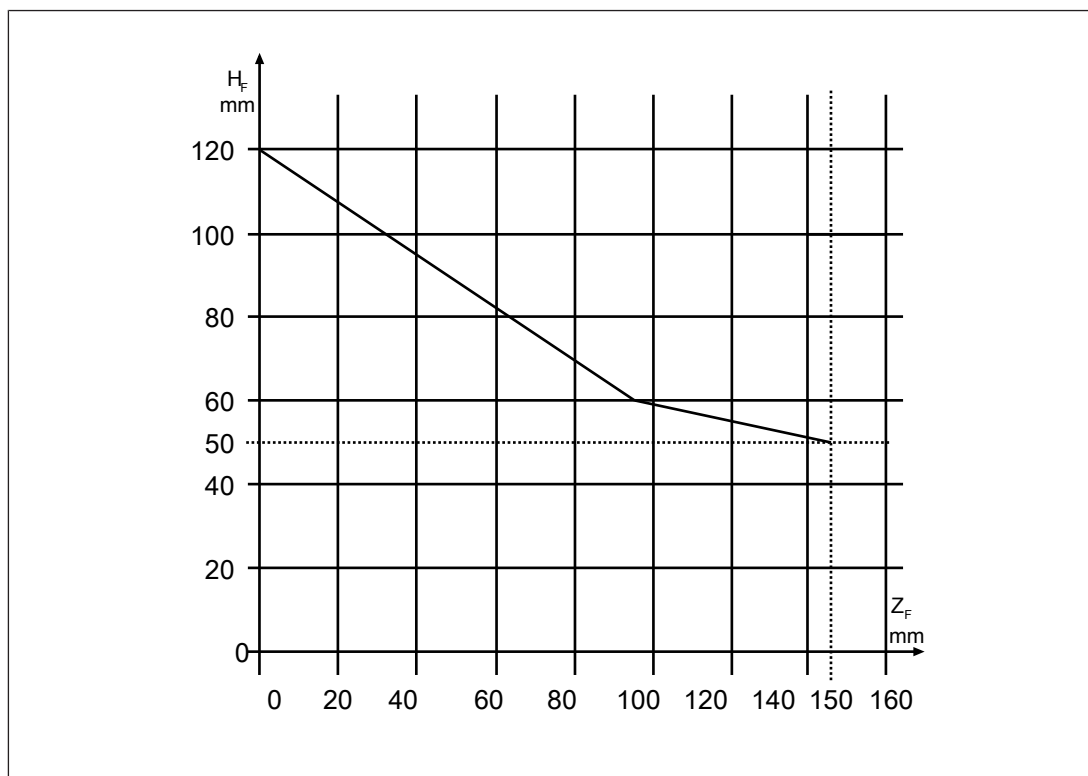
A person lying on the floor is detected. A lower height would lead to reduced availability because of the increased dust formation on the floor.



Legend

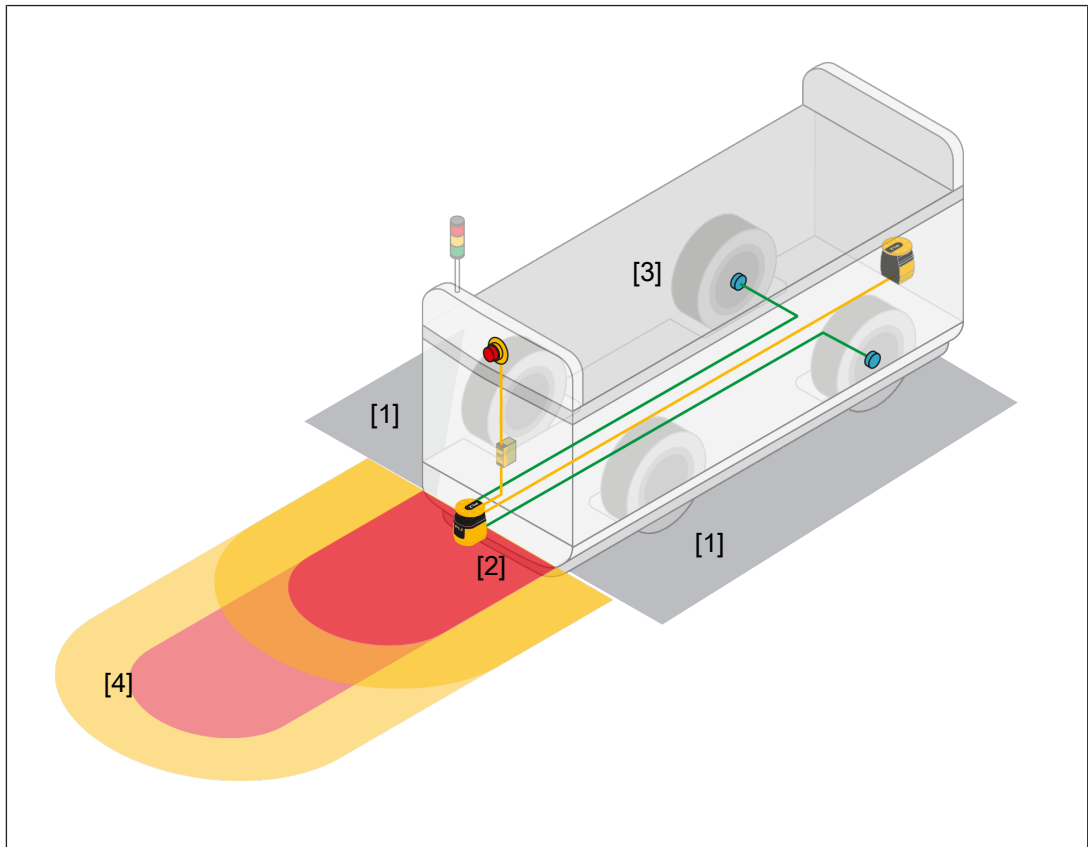
Z_F Allowance for missing ground clearance (length of a foot)

H_F Distance of the vehicle underside to the ground



- If required, prevent access to dead zones on the sides of the automated guided vehicle system through additional safeguards.

If this is not possible, the speed of the automated guided vehicle system must be limited to 0.3 m/s.



Legend

- [1] Dead zones at the sides of the automated guided vehicle system
- [2] Safety laser scanner
- [3] Automated guided vehicle system
- [4] Area covered by the laser beam

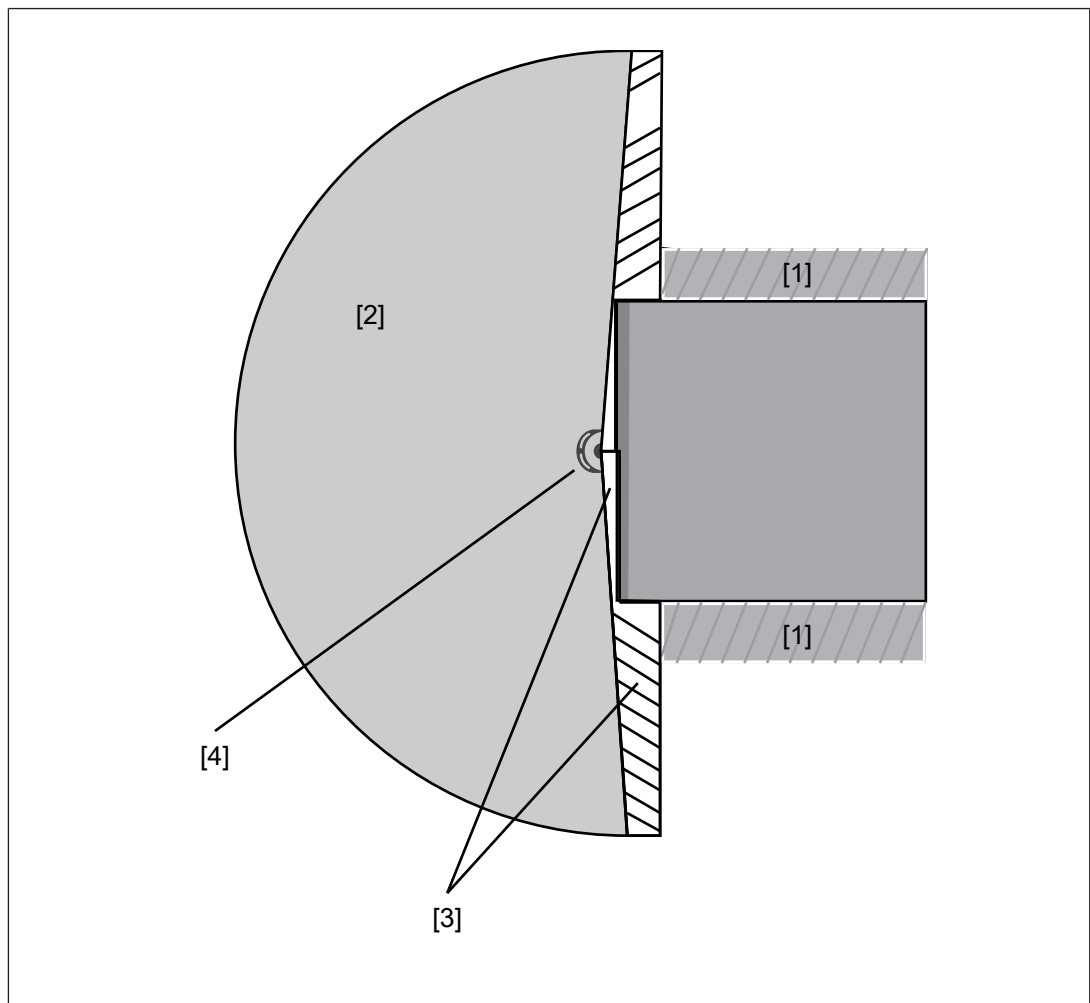


CAUTION!

Risk of injury due to insufficient safeguard

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

- Prevent reaching into the opening by using a suitable safeguard.



Legend

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

6.1.4 Vertical application

A vertical application is given when the safety laser scanner is aligned at an angle of over $\pm 30^\circ$ with the floor level.

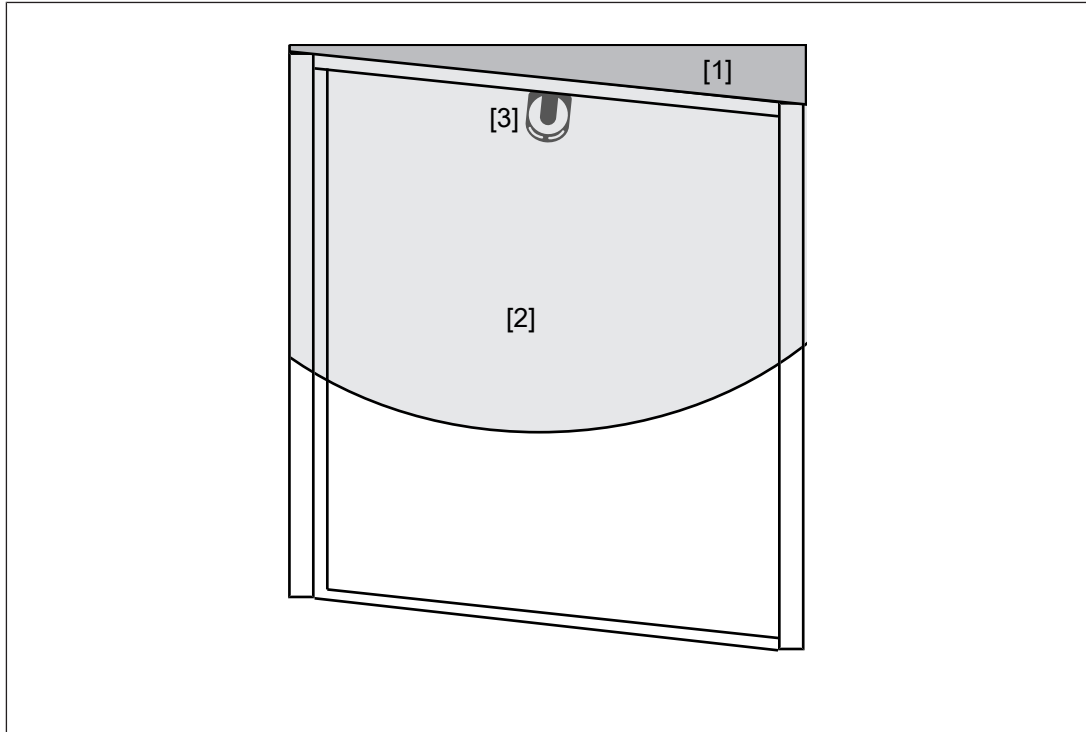


Fig.: Schematic representation of a vertical application on a passage

Legend

- [1] Danger zone
- [2] Area covered by the laser beam
- [3] Safety laser scanner

The following applies for these applications:

$$S = K * (t_1 + t_2) + 8 * (d-14 \text{ mm})$$

Icon	Meaning
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 danger zone in mm/s $K = 1600 \text{ mm/s}$ when $S > 500 \text{ mm}$ $K = 2000 \text{ mm/s}$ when $S \leq 500 \text{ mm}$
t_1	Overall response time of the safety laser scanner in seconds (see Calculation of the overall response time [47]) Time 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

Icon	Meaning
d	Resolution (see Technical details [ 143])

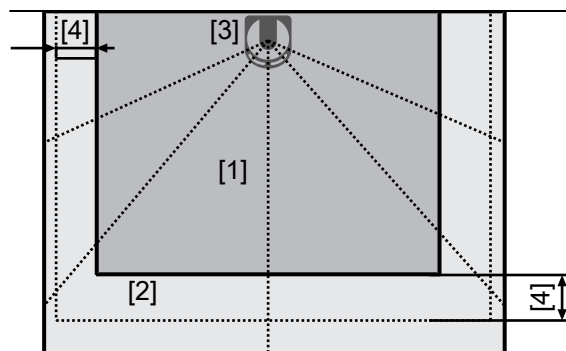
Safety distance	Use this value
$S \leq 100 \text{ mm}$	$S = 100 \text{ mm}$
$100 \text{ mm} < S \leq 500 \text{ mm}$	established value for S
$S > 500 \text{ mm}$	$S = 1600 \text{ mm/s} * T + 8 * (d - 14 \text{ mm})$ New value for $S > 500 \text{ mm} \Rightarrow$ use the recalculated value New value for $S \leq 500 \text{ mm} \Rightarrow$ use 500 mm

6.1.4.1 Detect body parts

If the safety laser scanner is used to detect body parts, a physical limit must be monitored in vertical applications. This monitoring is performed by comparison between a reference distance and the distance currently measured by the safety laser scanner.

Limit points are determined during the installation of the safety laser scanner. The distance between these limit points and the safety laser scanner forms the reference distance.

The detection capability of the safety laser scanner required for this must be between 30 mm and 70 mm.



Legend

- [1] Danger zone
- [2] Area covered by the laser beam
- [3] Safety laser scanner
- [4] Tolerance zone

If a limit point overlaps with the limit of the protected zone, the tolerance zone in mm must not exceed half of the selected detection capability. If this is exceeded, the zone must be protected by an additional safety device.

6.2 Calculation of the overall response time

The overall response time results from the response time t_1 (see [Technical details \[143\]](#)), an allowance of t_{multiple} for each additional detection required for multiple evaluation > 2 and for a series connection an allowance of $t_{\text{Subscriber}}$ per subscriber.

Overall response time T_{overall}

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

t_1	Response time t_1 (see Technical details [143])
t_{multiple}	Allowance 30 ms for each further rotation of the safety laser scanner (for multiple evaluation > 2)
$t_{\text{Subscriber}}$	Allowance of 10 ms per subscriber

In a multiple evaluation = 3 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.

6.3 Switching of zone sets

For each zone set, a unique combination of signals must be defined at the control inputs. To prevent unintended switching of the monitored zone sets, two consecutive zone sets must differ in at least two positions in the assigned signals at the control inputs.

In the PSENscan Configurator the automatic assignment ensures a difference in exactly two positions.

Pilz recommends that the automatic assignment by the PSENscan Configurator is used.

	Zone switching1	Zone switching2	Zone switching3	Zone switching4
☐ Zone set 1	0	0	1	1
☐ Zone set 2	0	1	1	0
☐ Zone set 3	0	1	0	1
☐ Zone set 4	1	1	0	0
☐ Zone set 5	1	0	1	0
☐ Zone set 6	1	0	0	1

Fig.: Example for the automatic coding of 6 zone sets by the PSENscan Configurator to ensure the differentiation to the next monitoring case (Hamming code)

When using encoders, a speed range has to be specified for each zone set.

The speed ranges can be used to also implement a distinction between two zone sets, if necessary.

- ▶ The speed ranges of the zone sets may overlap when the automatic assignment already ensures a difference at two points.
- ▶ When two consecutive zone sets are not coded differently in two places, a difference has to be coded with the speed ranges. The speed ranges must **not** overlap then.



NOTICE

Malfunctions arising from switching over too early.

Firmware version from 3.1.5

Switching from one zone set to another takes approx. 60 ms. The next switchover must not occur until the 60 ms has elapsed.

Ensure that there is a period of min. 60 ms between two switchovers (see diagram).

Within this time, ensure that interference does not influence the inputs and that there is no unintended change of state.

Firmware version < 3.1.5

Switching from one zone set to another takes approx. 250 ms. The next switchover must not occur until the 250 ms has elapsed.

Ensure that there is a period of min. 250 ms between two switchovers (see diagram).

Within this time, ensure that interference does not influence the inputs and that there is no unintended change of state.



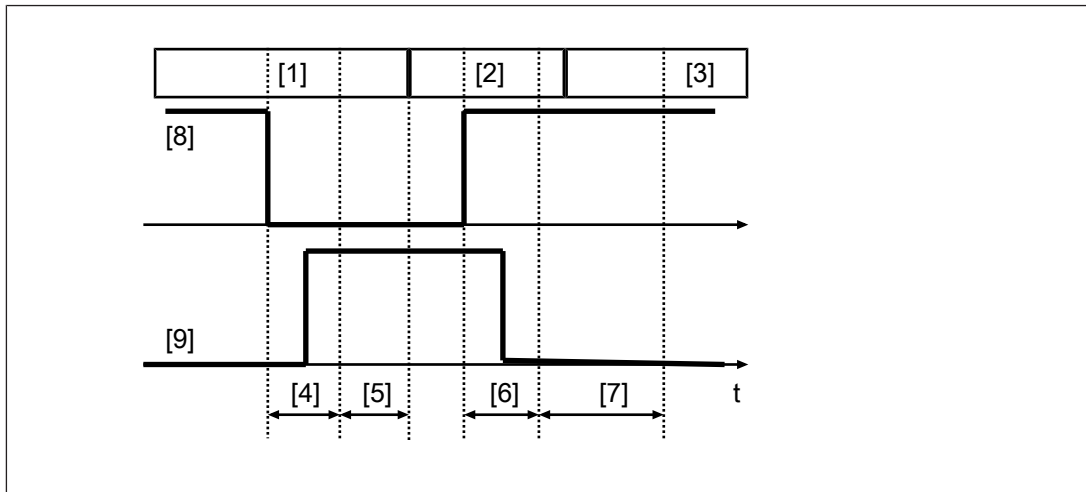
WARNING!

Firmware version < 3.1.5: Loss of the safety function by switching within the 250 ms processing time

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

If there is a switchover from one zone set to the next within the processing time of 250 ms, this may not be detected. In this case, the selected zone set does not correspond to the expected zone set.

- Ensure that no other switchover of the zone set takes place during the processing time of 250 ms.

**Legend**

- [1] Zone set 1 is monitored
- [2] Zone set 2 is monitored
- [3] Zone set 1 is monitored again
- [4] Input delay
- [5] Processing time for switchover
 - Firmware version from 3.1.5: 60 ms
 - Firmware version < 3.1.5: 250 ms
- [6] Input delay for the next switchover
- [7] Processing time for the second switchover
- [8] Input1
- [9] Input2

6.4 Monitoring of reference outlines

An outline within the area covered by laser beams can be defined and monitored in PSENscan Configurator as a reference outline.

The outline must be outside the safety zone and it consists of at least 3 and a max. of 15 reference points.

When PSEN sc ME 5.5 08-17 detects a change of the outline, the safety laser scanner switches the OSSDs to the OFF state. A change in the area of a tolerance that can be set in PSENscan Configurator is accepted.

For vertical applications, national and international standards recommend monitoring a reference outline.

The reference outline is configured during the first installation of PSEN sc ME 5.5 08-17. The distances measured during configuration are used as reference values for monitoring the reference outline.

Monitoring of reference outlines is used to detect any changes or changes to the environment of the safety laser scanner.

- ▶ Changes to the installation position of the safety laser scanner due to vibration
- ▶ Changes of the safety laser scanner due to manipulation
- ▶ Changes of an additional protective equipment

Applications of a reference outline for protecting moveable constructions

When the reference points are set to the position of a moveable construction, for example a door, the safety laser scanner switches the OSSDs to the OFF state when the position of the door changes.

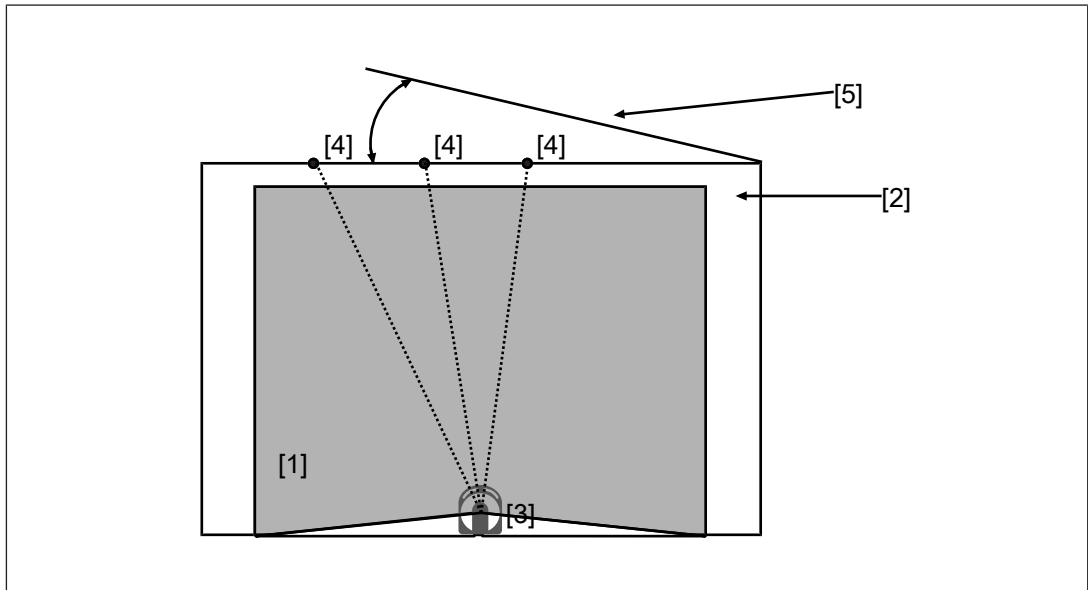


Fig.: Using a reference outline for protecting a moveable construction

Legend

- [1] Danger zone
- [2] Area covered by the safety laser scanner
- [3] Safety laser scanner
- [4] Reference points
- [5] Moveable construction that is protected by the reference points

Applications of a reference outline for protecting additional protective equipment

When the reference points are set to the positions of additional protective equipment, for example mechanical barriers, the safety laser scanner switches the OSSDs to the OFF state when one of the marked positions changes.

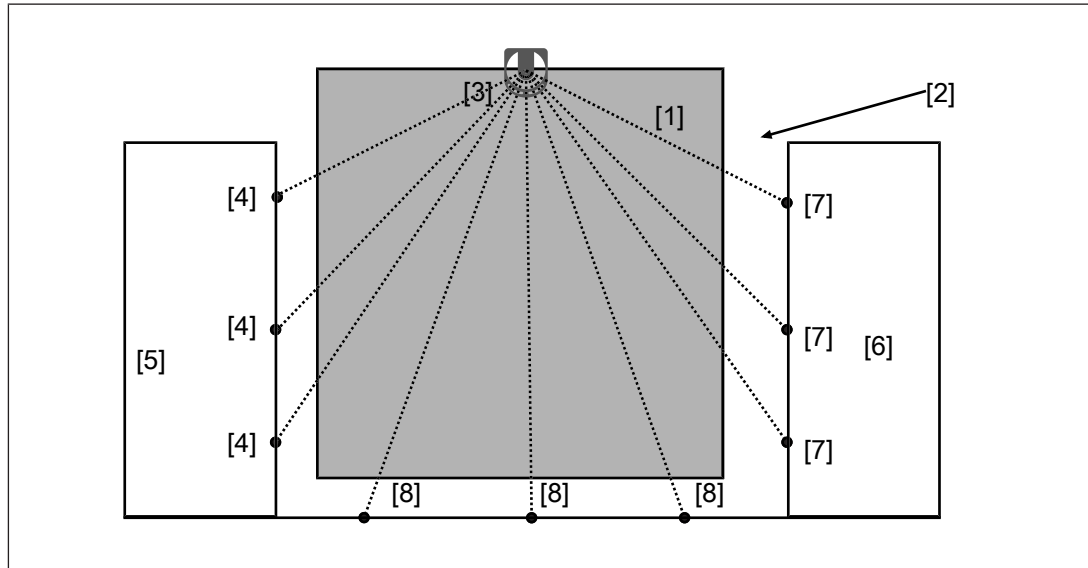


Fig.: Using a reference outline for protecting additional protective equipment

Legend

- [1] Danger zone
- [2] Area covered by the safety laser scanner
- [3] Safety laser scanner
- [4] Reference points at protective equipment 1
- [5] Additional protective equipment 1 that is protected by the reference points
- [6] Additional protective equipment 2 that is protected by reference points
- [7] Reference points at protective equipment 2
- [8] Reference points on the floor

6.5 Operating range to detection capability

Note the change of range depending on the selected **detection capability**.

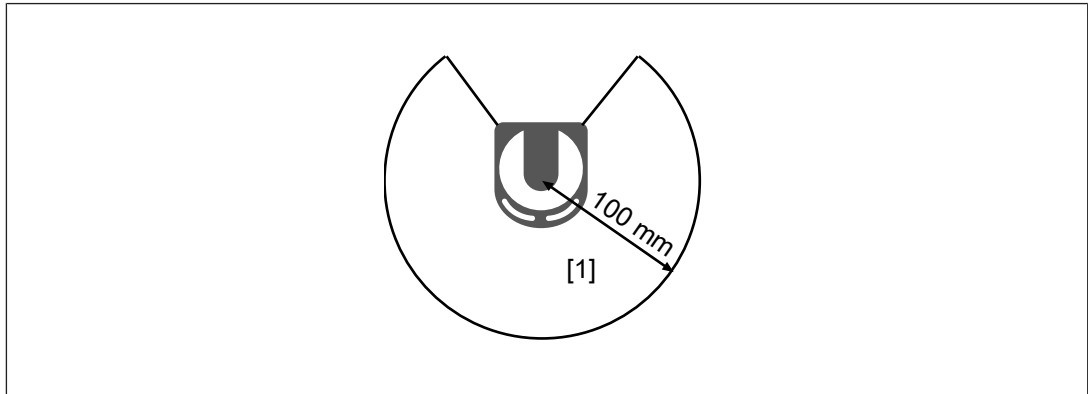
Detection capability	Max. operating range in m
	sc x 5.5
30	2.5
40	3.0
50	4.0
70	5.5
150	5.5

6.6 Area with limited detection capability

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

Note:

- ▶ Ensure that the area is not part of the danger zone.
- ▶ Install the safety laser scanner so that no objects can enter the zone with limited detection capability.



Legend

[1] Area with limited detection capability

6.7 Installation of several adjacent safety laser scanners

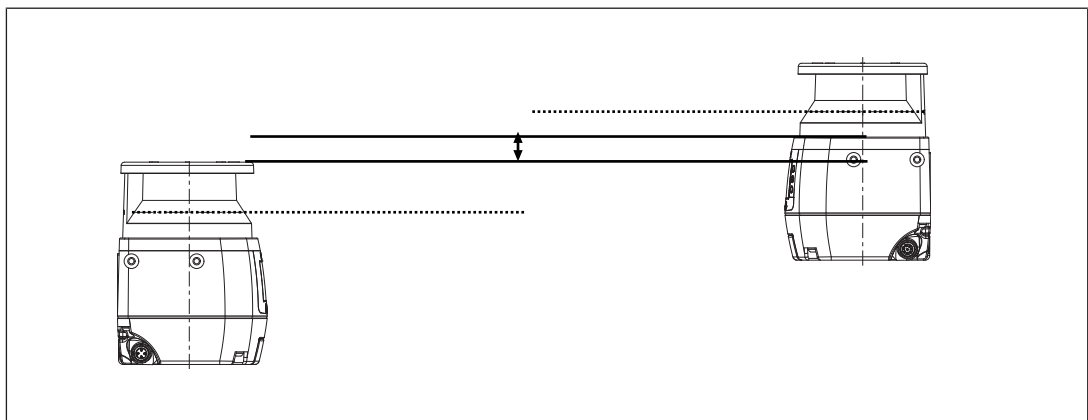
When safety laser scanners must be installed in an area, it must be ensured that the safety laser scanners do not influence each other.

This can be achieved in two ways:

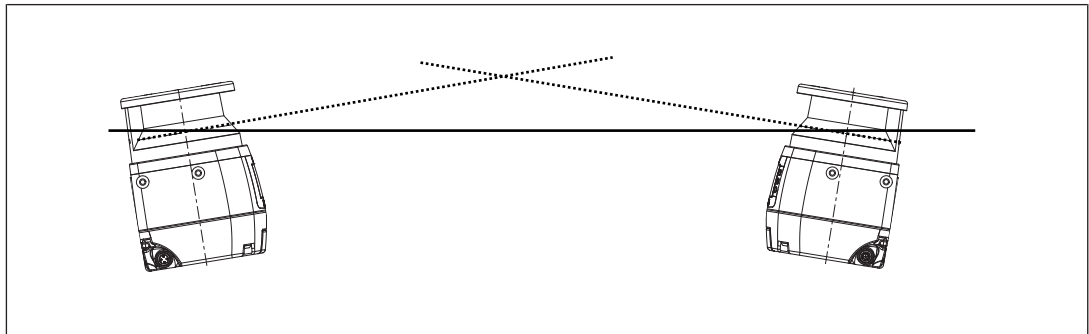
With coding  28: Define different codes for the individual safety laser scanners in the detection capability configuration,

Without coding: Install safety laser scanner at various heights or inclinations.

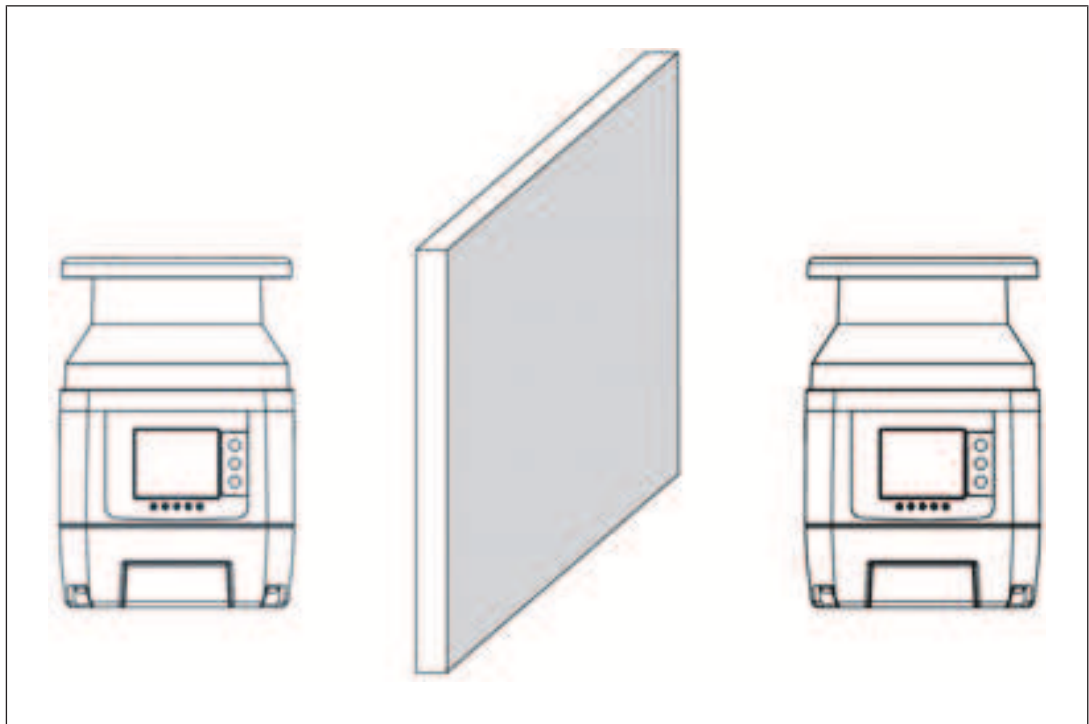
- ▶ Change the height of the safety laser scanners



- Change the inclination of the safety laser scanners.



- Place an opaque object between the safety laser scanners



6.8 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 two levels:

- Low for clean environments/low dust formation
- High for contaminated environments/strong dust formation

The default setting is low.

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 (see [Distance to intense light sources and to reflective surfaces](#) [ 55]).

6.9 Ambient conditions

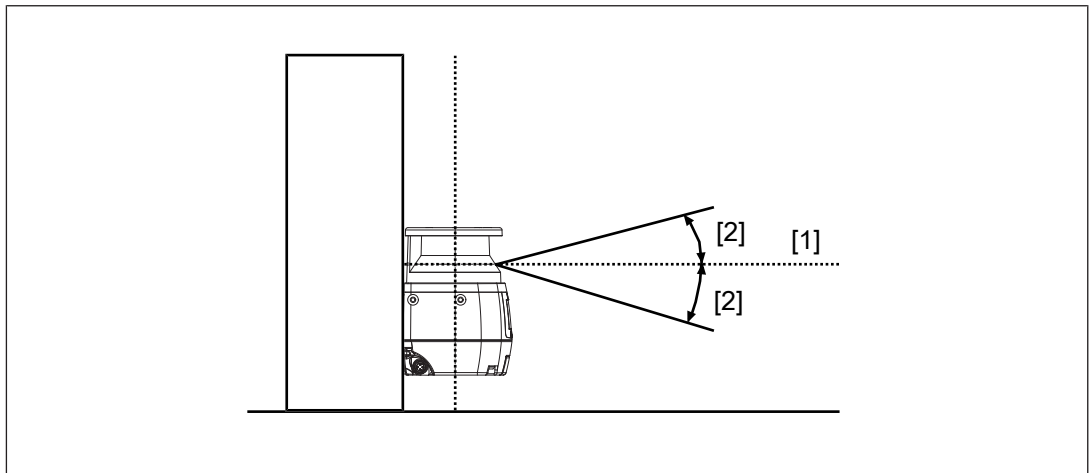
- ▶ Information given in the [Technical details \[143\]](#) must be followed.
- ▶ If there is a highly reflective background within a distance of 2.5 m from the safety zone perimeter (e.g. a shiny metallic surface), errors in the calculation of the exact distance to the detected object may occur.
 - 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 \[55\]](#)).
- ▶ Avoid strong electromagnetic interference when operating the safety laser scanner.
- ▶ When operating the safety laser scanner, avoid strong smoke, mist, and dust formation that would reduce the safety laser scanner's operating range or lead to switching to the OFF state.
- ▶ In the safety laser scanner's overall scanning plane, avoid fixed objects that impede monitoring of the safety zone.

6.10 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 (e.g. flash units).

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] Scan plane
- [2] Area of $\pm 5^\circ$ to the scan plane

Minimum distance from reflective surfaces

- Pilz recommends that reflective surfaces with a distance of 3 m to the safety zone are removed.

If this is not possible, the allowance Z_R must be considered when calculating the safety distance.

(The recommendation was determined with a background reflection of $300 \frac{\text{cd}}{\text{m}^2 \cdot \text{lx}}$. For highly reflective backgrounds an additional safety assessment is required, taking into account the reflective background. This may result in a higher allowance.)

- Objects that may be influenced by safety laser scanners through ambient light, must not be placed within the opening angle of the laser beam.

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](#) [ 38].

The value for the allowance Z_R depends on the selected level of the dust filter.

- $Z_R = 87 \text{ mm}$ for dust filter level = low
- $Z_R = 200 \text{ mm}$ for dust filter level = high

**INFORMATION**

Determining of the allowance when the safety laser scanner has to be installed near particularly intense or flashing light sources and a reflective background.

Use the higher value of the relevant allowances.

6.11**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](#) [ 55]).

**INFORMATION**

Used standard value of the teach-in function for the distance from walls

The PSENscan Configurator teach-in function uses a standard value of 100 mm. The value can be changed.

6.12 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.

Number of zones	Number of required outputs on the safety controller
4-6	4
7-10	5
11-20	6
21-35	7
36-70	8

mx. number of zones			Required outputs on PSEN sc ME 5.5 08-17
Safety zone	Warning zone	Muting zone	
1	2 (optional)	1 (optional)	2 safe outputs 2 standard outputs
2	1 (optional)	1 (optional)	4 safe outputs 1 standard outputs
3	-	1 (optional)	6 safe outputs

6.13 Switchover time with zone selection



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 results in the loss of the safety function. There may be people in the safety zone 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 danger zone.

The zone selection is performed by signals that are present at the control inputs. For the changeover process a maximum switchover time (input delay in PSENscan Configurator) is defined. For this time, not 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 safety controller can switch an input in a defined way.

► Avoid switchover times that are too short.

- Firmware version from 3.1.5: Avoid switchover times ≤ 90 ms (processing time + min. input delay) for switching between two zone sets.
- Firmware version $< 3.1.5$: Avoid switchover times ≤ 280 ms (processing time + min. input delay) for switching between two zone sets.

6.14 Encoder

When the safety laser scanner is used in dynamic applications (e.g. on an automated guided vehicle system (AGVS)), the safety zone changes depending on the vehicle's position, direction and speed. The faster the vehicle moves, the greater the safety distance.

So encoders must continuously detect the speed of the vehicle and use this data to calculate the safety distance.

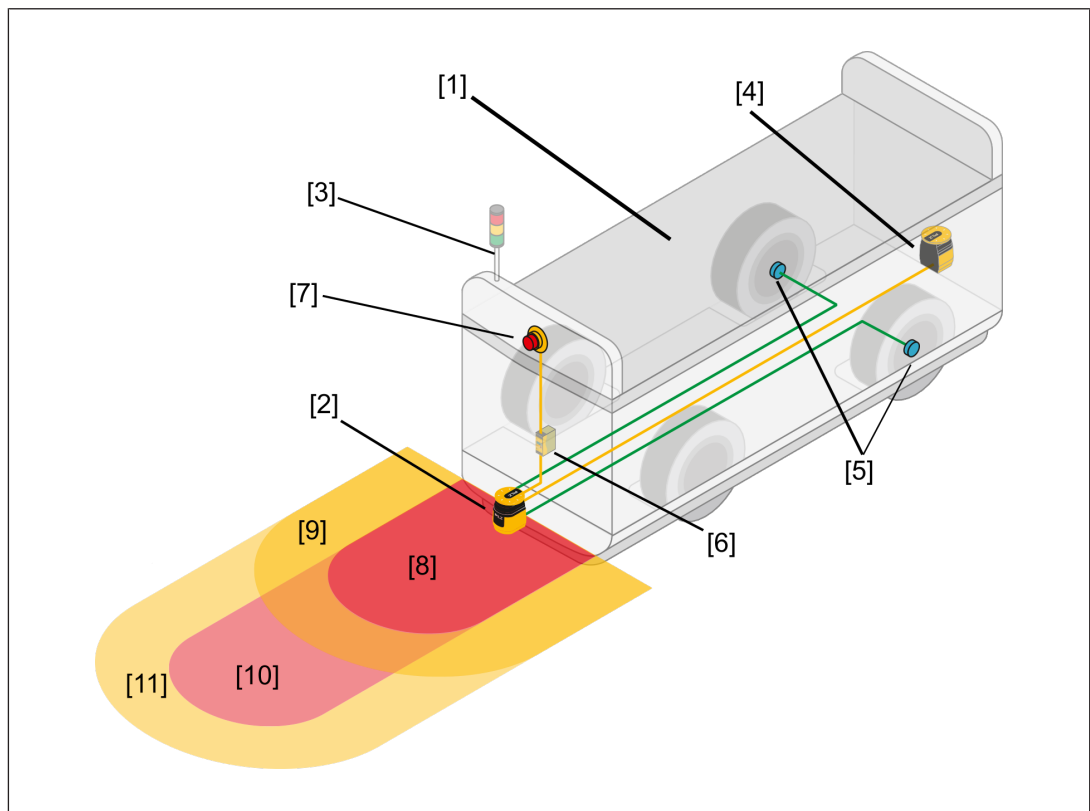


Fig.: Application example with a PSEN sc ME as master and a PSEN sc S

Legend

- [1] Automated guided vehicle system (AGVS)
- [2] Safety laser scanner PSEN sc ME
- [3] Indicator light unit
- [4] Safety laser scanner PSEN sc S
- [5] Encoder for measuring speed
- [6] Safety controller
- [7] Reset button

- [8] Safety zone for high speed
- [9] Warning zone for high speed
- [10] Safety zone for low speed
- [11] Warning zone for low speed

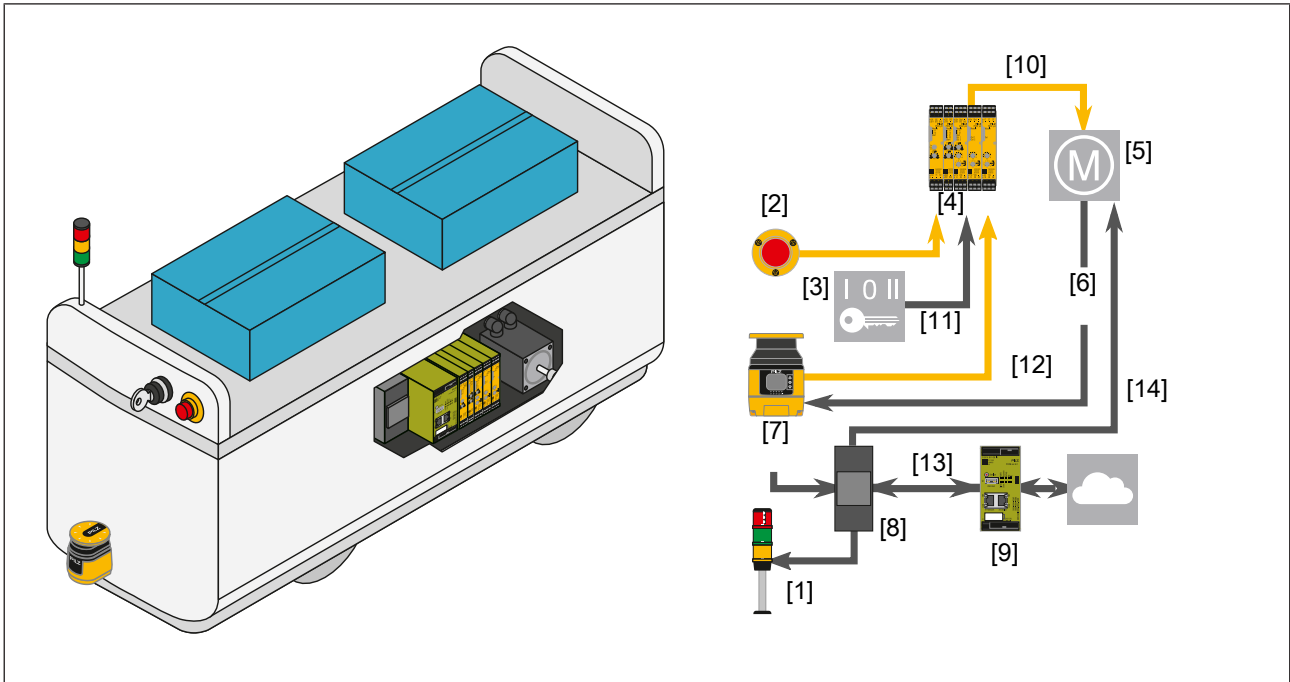


Fig.: Example of a mobile application of the PSEN sc ME in an arrangement with a safe controller and vehicle controller

Legend

- [1] Indicator light unit PITsign
- [2] PITestop
- [3] Key switch
- [4] myPNOZ
- [5] Drive motor
- [6] Encoder signals
- [7] PSEN sc ME
- [8] PC for vehicle navigation
- [9] SecurityBridge
- [10] Safe torque off (STO)
- [11] Permission switch
- [12] Speed-dependent zone switching in accordance with encoder signals
- [13] PC for vehicle navigation to SecurityBridge
- [14] Command for speed control

You can use a safety encoder or two encoders.

The following requirements have to be met:

- ▶ Incremental square output signals A and B
- ▶ Differential output of type HTL
- ▶ Track position 90 ° electric
- ▶ Max. output frequency 100 kHz
- ▶ Supply voltage 24 V DC

Value ranges for the configuration of the encoders

▶ Speed deviation **Encoder Δ [%]**

When a vehicle travels straight ahead, there are generally an equal number of pulses at the encoder inputs. So the encoder inputs register the same speeds. However, the values at the inputs may vary when cornering or due to wear on the vehicle components.

These deviations must not exceed a configurable tolerance **Encoder Δ [%]**.

- Maximum value is 45 %, default setting is 25 %
- Formula for the max. permitted deviation in an application

$$\text{Encoder } \Delta = ((V_{\max} - V_{\min}) / V_{\min}) * 100$$

- Use of the highest measured value of the two encoders

When the two encoder signals measure different speeds, the highest value is used for this calculation.

▶ Number of measured values of **Encoder 1** and **Encoder 2** per centimetres of rotation

The minimum value is 50 (default value), the maximum value is 1000.

- Example to determine the number of measured values

For this example, it is assumed that the safety laser scanner is installed on a vehicle.

The vehicle's wheel has a diameter of 50 cm and therefore a perimeter of $50 \pi = 157.08$.

The shaft to which the encoder is fixed has a diameter of 5 cm

The used encoder provides 1000 pulses per rotation (see Technical details of the encoder).

$$\text{Anz}_{\text{ImpFZWeg}} = \text{Diameter}_{\text{FZRad}} / \text{Diameter}_{\text{Welle}} * \text{Anz}_{\text{ImpEnc}} / \text{Umfang}_{\text{FZRad}}$$

$\text{Anz}_{\text{ImpFZWeg}}$ = Number of pulses per centimetre of the path that the vehicle has travelled

$\text{Diameter}_{\text{FZRad}}$ = Diameter of the vehicle's wheel

$\text{Diameter}_{\text{Welle}}$ = Diameter of the shaft to which the encoder is fixed

$\text{Anz}_{\text{ImpEnc}}$ = Number of pulses of the used encoders per rotation

In the example there is $\text{Anz}_{\text{ImpFZWeg}}$ to $50/5*1000/157.08 = 63.66$.

- Exceeding the configured encoder Δ during operation is permitted only under specific conditions.

If the configured encoder Δ is exceeded outside of these conditions during operation, the OSSDs switch to the safe state.

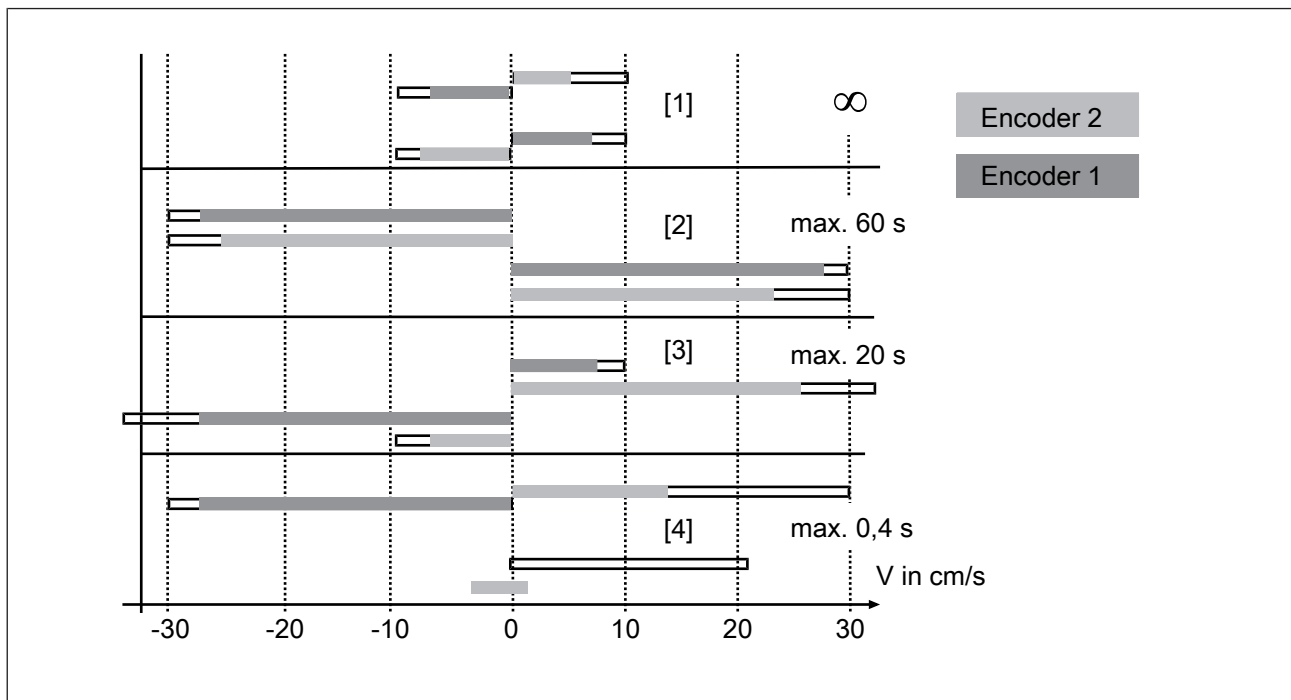


Fig.: Max. duration for exceeding the configured speed deviation

Legend

- [1] Speed -10 cm/s to 10 cm/s
- [2] Speed -30 cm/s to -10 cm/s or 10 cm/s to 30 cm/s
- [3] Speed ≤ -30 cm/s or ≥ 30 cm/s
- [4] Different directions of rotation of the incremental encoders at a speed of ≤ -30 cm/s or ≥ 10 cm/s

► Speed maximum and minimum

- Formula for the max. permitted speed

$$V_{\max} = F_{\max} / \text{Anz}_{\text{ImpFZWeg}}$$

$F_{\max} = 100,000$ and it corresponds to the max. frequency that PSEN sc ME 5.5 08-17 can read.

In the example, $100,000/63.66 = 1,570.845$.

- Formula for the min. permitted speed

$$V_{\max} = - F_{\max} / \text{Anz}_{\text{ImpFZWeg}}$$

$F_{\max} = 100,000$ and it corresponds to the max. frequency that PSEN sc ME 5.5 08-17 can read.

In the example there is $- 100,000/63.66 = - 1,570.845$.

► Speed range in cm/s

The minimum value is -2000, the maximum value is 2000

The values must therefore be integers divisible by 10.

- When using encoders please note the specifications in [Switchover time with zone selection](#)  57].

Safely reduced speed:

With speeds that are not defined in the PSENscan Configurator, PSEN sc ME goes to a safe stop.

PSEN sc ME monitors the maximum speed and switches off the OSSDs within the response time.

The error message INPUTCF1 is displayed.

Display of the current speed:

When encoders are used to determine the speed an they are configured in PSENscan Configurator, the currently measured speed is displayed in the Monitoring work window of the PSENscan Configurator.

6.15 Muting

6.15.1 General



CAUTION!

Risk of injury due to loss of the safety function

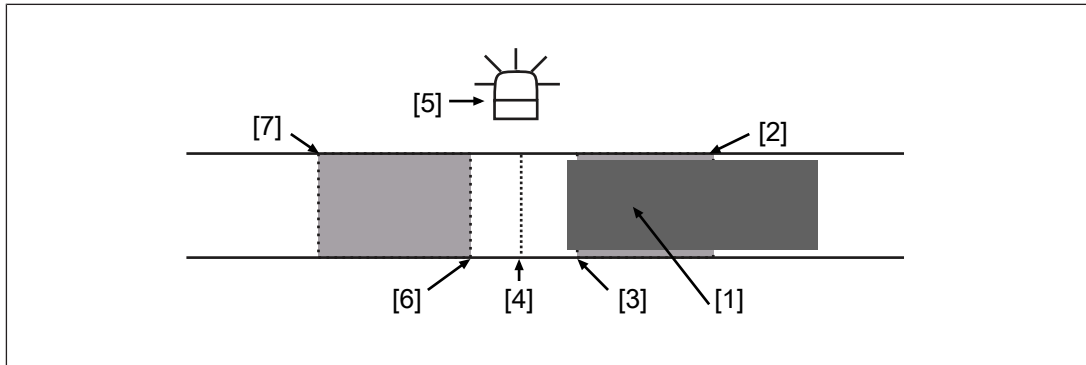
In muting status, the OSSDs continue to be in ON state. The connected machine remains in operation and represents a potential hazard.

- Prevent the possibility of access to the danger zone during muting.

Muting means a temporary suspension of the safety function. For this reason, the muting function must have a time restriction. When the muting sensors are activated and the muting status begins, an internal clock is started. If the muting sensors are still active after 10 minutes (status when delivered), the muting status is cancelled and the safety laser scanner grid switches to a safe condition.

The time monitoring of the muting function can be set in PSENscan Configurator.

Example of a muting cycle when material passes from the right-hand side



Legend

- [1] Conveyed material on conveyor
- [2] First muting sensor on the input side of the conveyor, connected to configurable input **Muting 11**
- [3] Second muting sensor on the input side of the conveyor, connected to configurable input **Muting 12**
- [4] PSEN sc ME 5.5 08-17
- [5] Muting lamp
- [6] First muting sensor on the output side of the conveyor, connected to configurable input **Muting 11**
- [7] Second muting sensor on the output side of the conveyor, connected to configurable input **Muting 12**

- Inform staff of the
 - hazard potential from the muting function,
 - absence of protection during muting.
- Mark the area that is protected by the safety laser scanner.
- The two muting areas cannot be activated simultaneously.
- A muting activation is not possible when the safety laser scanner is in a safe state (LED  lights up red, object detected in safety zone).
- Different conveyor speeds in the area of a PSEN sc ME 5.5 08-17 should be prevented.
- The first muting sensor on the input side and the first muting sensor on the output side must be connected to the configurable input **Muting 11**.
The second muting sensor on the input side and the second muting sensor on the output side must be connected to the configurable input **Muting 12**.
- The muting state is shown by the muting lamp and in the display of PSEN sc ME 5.5 08-17.
The muting lamp must be connected to the PSEN sc ME 5.5 08-17 and positioned so that the muting lamp is clearly visible from the whole danger zone.



- Use a muting lamp with an LED lamp and a max. current consumption of 250 mA.

- Indicate clearly visible near the protected area that there is no protection when the muting lamp is lit.
- The muting sensors have to be positioned in a way that the muting area cannot be reached while muting is active.

6.15.2 Muting in two directions

- The muting status occurs
 - If the signal at the second muting input **Muting 12** switches to High after muting input **Muting 11** has also switched to high (or muting input **Muting 11** switches to High after muting input **Muting 12**) **and**
 - The delay between the two signal changes is within the configurable range **Muting activation delay [ms]**. The max. delay can be configured for between 1 and 16 seconds.
- The muting state is ended
 - When the configured time is reached **or**
 - When the signal at one of the two muting inputs switches to low **and**
 - the internal delay of max. 30 ms has elapsed.

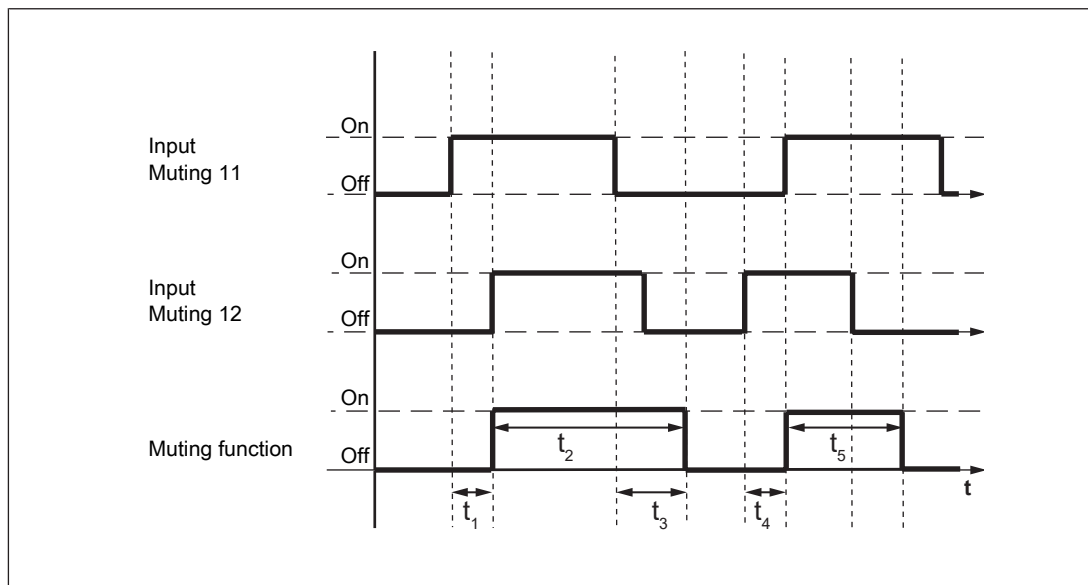
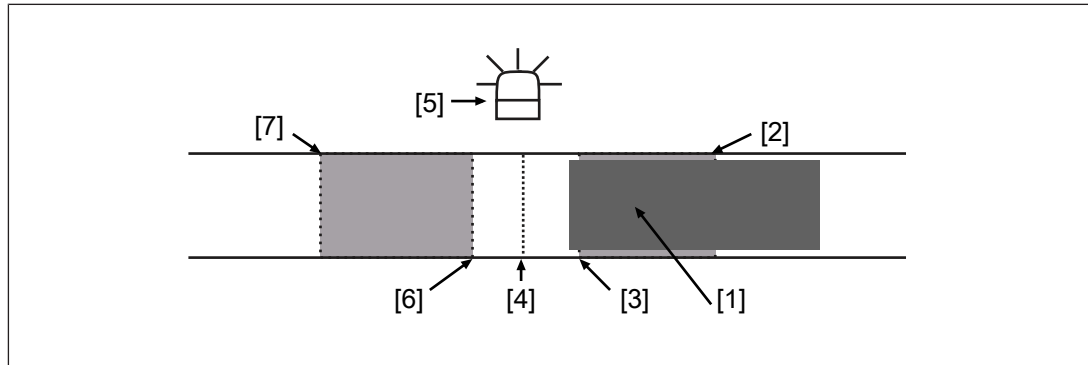


Fig.: Timing diagram T-muting

Legend

- t_1 Delay between **Muting 11** and **Muting 12** (configurable from 1-16 s)
- t_2 Duration of the muting state (max. up to the configured timeout)
- t_3 Internal delay before the muting state is ended (max. 30 ms)
- t_4 Delay between **Muting 11** and **Muting 12** (configurable from 1-16 s)
- t_5 Duration of the muting state (max. up to the configured timeout)

Sequence for T-muting cycle when material passes from the right-hand side



Legend

- [1] Conveyed material on conveyor
- [2] First muting sensor on the input side, connected to **Muting 11**
- [3] Second muting sensor on the input side, connected to **Muting 12**
- [4] PSEN sc ME 5.5 08-17
- [5] Muting lamp
- [6] First muting sensor on the output side, connected to **Muting 11**
- [7] Second muting sensor on the output side, connected to **Muting 12**

Phase in the muting cycle	Explanation
	Material has already passed the first muting sensor and is being transported on the conveyor in the direction of the second muting sensor, muting lamp off.
	Material on the conveyor passes the second muting sensor (max. 4 s after the first sensor was passed). Muting lamp flashes, signalling the muting status.
	Material on the conveyor passes the PSEN sc ME 5.5 08-17 and the first muting sensor on the output side, muting lamp flashes, signalling the muting status.
	Material has left the area of the first muting sensor on the output side, muting lamp is off, muting status is ended. The next piece of material arrives at the first muting sensor.
	If material is transported from the left-hand side, the cycle is reversed. The output side becomes the input side and the flow starts with the second muting sensor on the output side.

Please note the following distances and times when installing the safety laser scanner and using the muting function:

$D_{\text{MutingOff}}$ = Distance between muting sensor A1 and muting sensor A2 and between muting sensor B1 and muting sensor B2

► $D_{\text{MutingOff}} < L$

– L = Length of the object that triggers the muting state as it passes the muting sensors

D_{A-B} = Max. distance between muting sensor A1 and muting sensor B1 and between muting sensor A2 and muting sensor B2

► $D_{A-B} = V * t_1 * 100$

– V = Conveyor speed of the transported material in m/s

– t_1 = Delay between Muting 11 and Muting 12

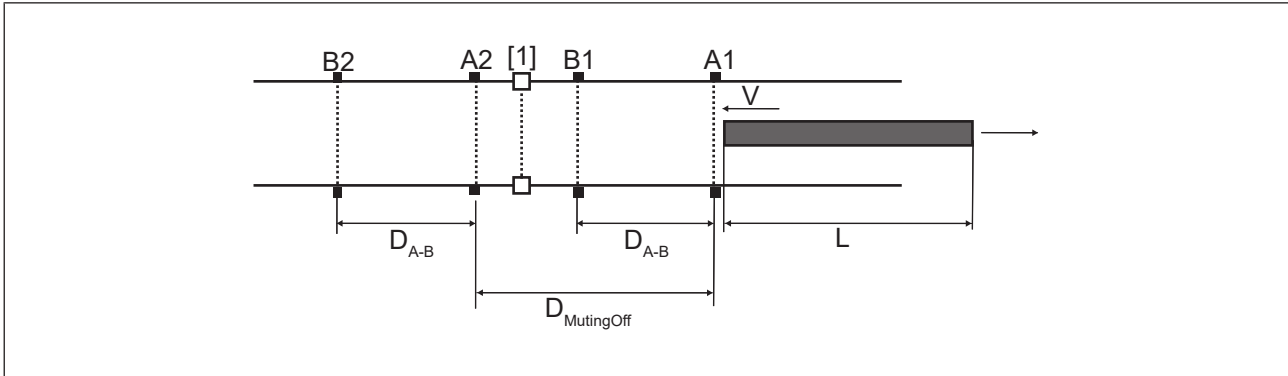


Fig.: Distances between muting sensors - 4 muting sensors

Legend

[1] Safety laser scanner

A1 First muting sensor on the input side, connected to **Muting 11**

B1 Second muting sensor on the input side, connected to **Muting 12**

A2 First muting sensor on the output side, connected to **Muting 11**

B2 Second muting sensor on the output side, connected to **Muting 12**

L Length of the object that triggers the muting state as it passes the muting sensors

V Speed at which the object is moving

D_{A-B} Distance between the muting sensors A1 and B1, and between A2 and B2

$D_{MutingOff}$ Distance between muting sensor A1 and muting sensor A2

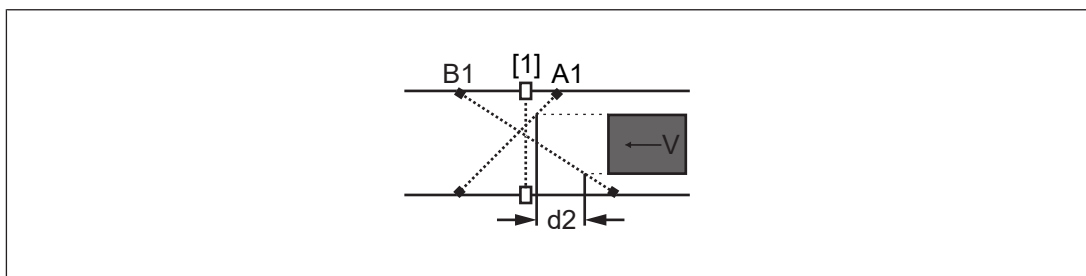


Fig.: Distances between muting sensors - Cross muting

Legend

[1] Safety laser scanner

A1 First muting sensor on the input side, connected to **Muting 11**

B1 Second muting sensor on the input side, connected to **Muting 12**

d2 Distance that the object covers from the first muting sensor A1 to the second muting sensor B2 in max. 4 s

V Speed at which the object is moving

6.15.3 Muting in one direction



NOTICE

Faulty application of L-muting

- Only use L-muting to remove material from the danger zone.

► The muting status occurs

- If the signal at the second muting input **Muting 12** switches to High after muting input **Muting 11** has also switched to high (or muting input **Muting 11** switches to High after muting input **Muting 12**) and
- The delay between the two signal changes is within the configurable range **Muting activation delay [ms]**. The max. delay can be configured for between 1 and 16 seconds.

► The muting state is ended

- When the configured time is reached **or**
- after a multiple of the delay between the activation of the two muting sensors.
The **Factor activation delay** can be selected between 2 and 16.

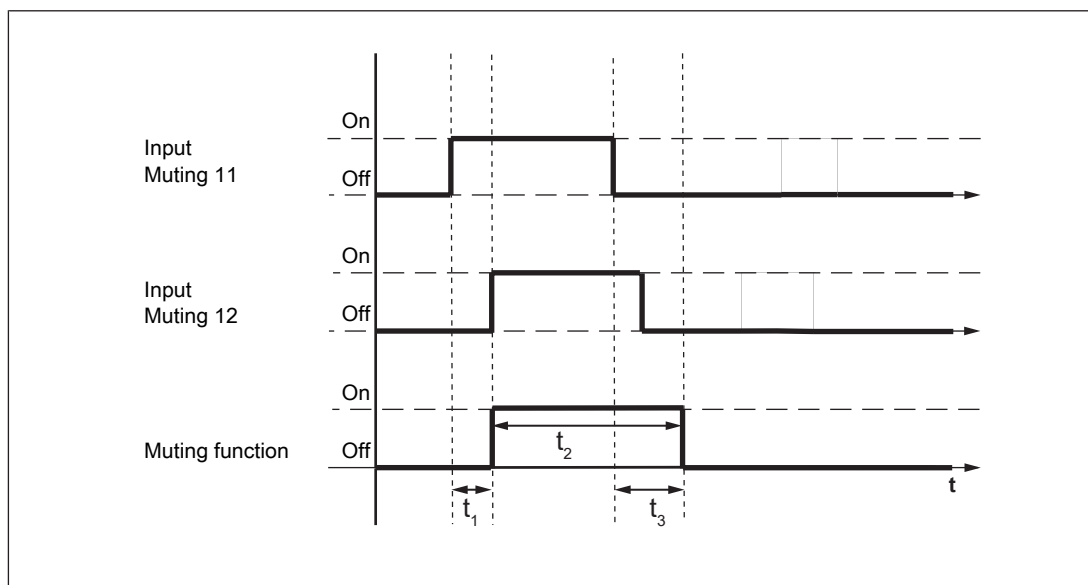
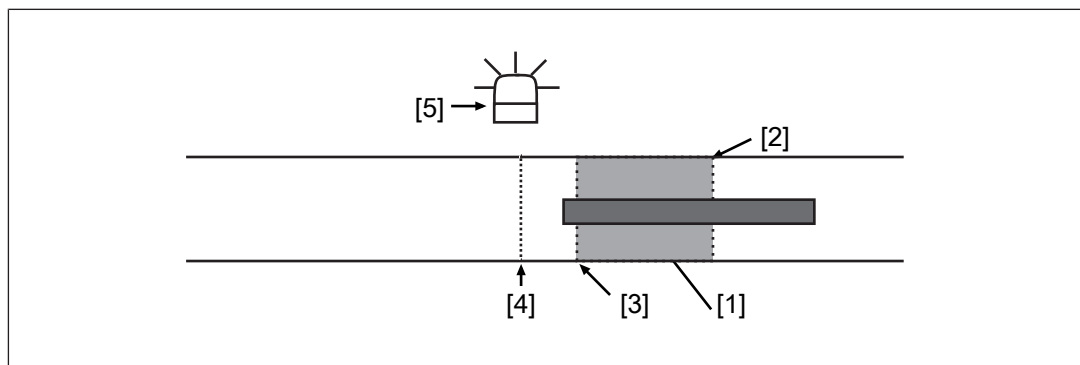


Fig.: Timing diagram L-muting

Legend

- t_1 Delay between **Muting 11** and **Muting 12** (configurable from 1-16 s)
- t_2 Duration of the muting state (max. up to the configured timeout)
- t_3 Internal delay before the muting state is ended (max. 30 ms)

Sequence of an L-muting cycle in accordance with flow of material



Legend

- [1] Material is taken away from the danger zone
- [2] First muting sensor on the input side, connected to **Muting 11**
- [3] Second muting sensor on the input side, connected to **Muting 12**
- [4] PSEN sc ME 5.5 08-17
- [5] Muting lamp

Please note the following distances and times when installing the safety laser scanner and using the muting function:

Phase in the muting cycle	Explanation
	Material has already passed the first muting sensor and is being transported in the direction of the second muting sensor, muting lamp off.
	Material passes the second muting sensor (max. 4 s after the first sensor was passed). Muting lamp flashes, signalling the muting status.
	Material passes the PSEN sc ME 5.5 08-17 and the first muting sensor on the output side, muting lamp flashes, signalling the muting status.
	Material has left the area of the first muting sensor on the output side, muting lamp is off, muting status is ended.

Muting in one direction

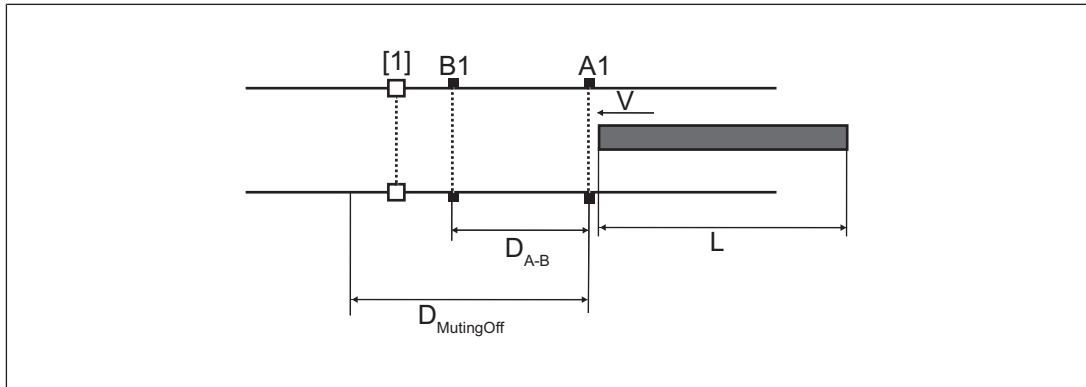


Fig.: Distances between muting sensors - 2 muting sensors

Legend

- [1] Safety laser scanner
- A1 First muting sensor on the input side, connected to **Muting 11**
- B1 Second muting sensor on the input side, connected to **Muting 12**
- L Length of the object that triggers the muting state as it passes the muting sensors
- V Speed at which the object is moving
- D_{A-B} Distance between the muting sensors A1 and B1
- $D_{MutingOff}$ Distance between muting sensor A1 and the position from which the muting function is turned off again

6.15.4

Dynamic muting

When **Activate muting** is selected for an input, muting can be activated and deactivated dynamically.

- Conditions for the occurrence of muting
 - one of the configurable inputs/outputs is connected to a safety controller and it receives a high signal from there when muting is activated.
 - When configuring the inputs, **Activate muting** is configured for this input in PSEnscan Configurator
 - the first sensor has detected conveyed material and the second sensor also detected it max. 4 s afterwards

6.16

Override

The override function can be used for the three types in accordance with the timing diagrams:

- Single-channel pulses
- Activation is edge-triggered
- Activation is signal-triggered (only when using the 17-pin connection)

The Override function can only be activated when the input signals are controlled in accordance with the timing diagrams.

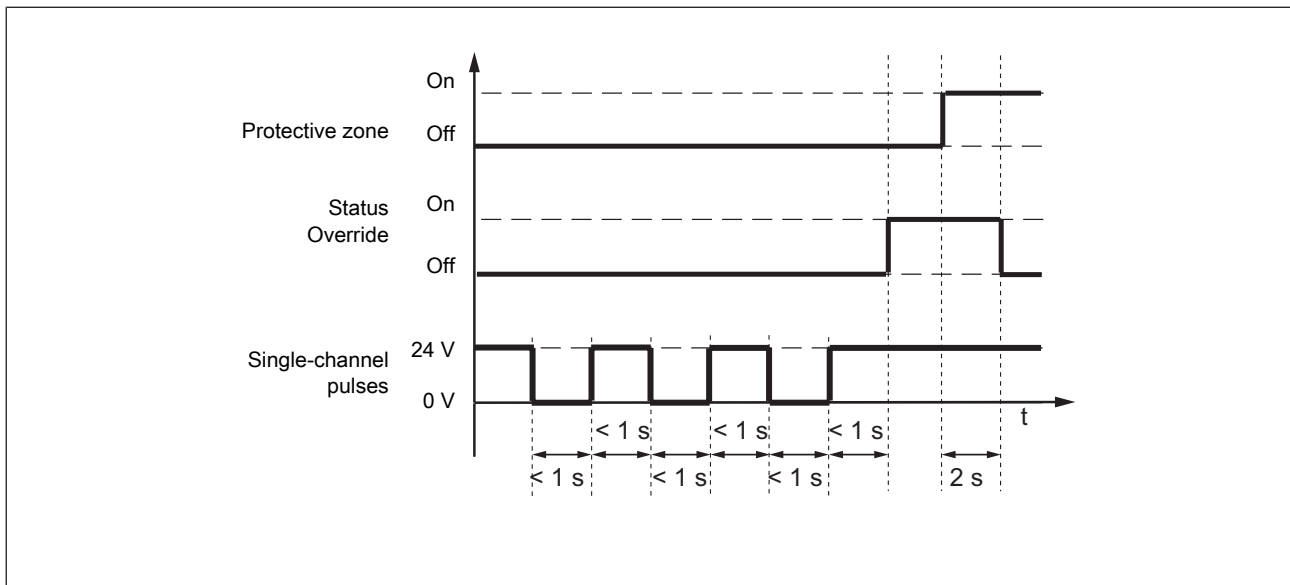


Fig.: Timing diagram for override function single-channel pulses

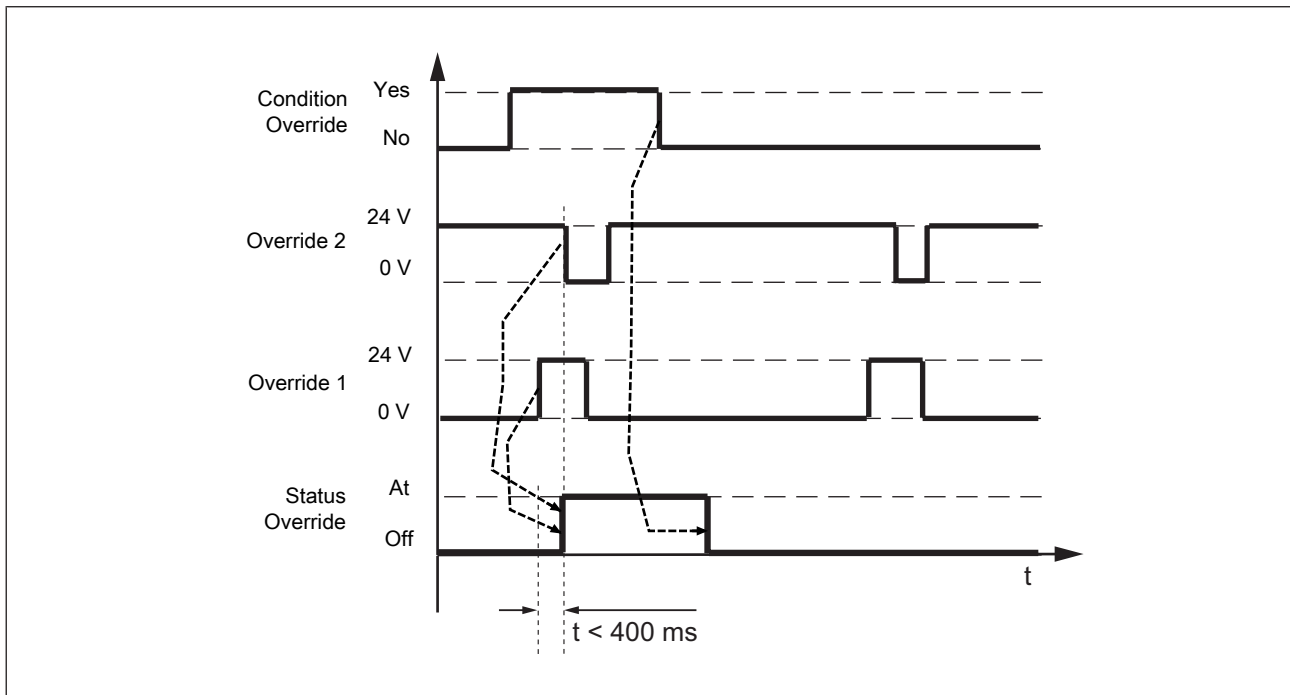


Fig.: Timing diagram for override function edge-triggered

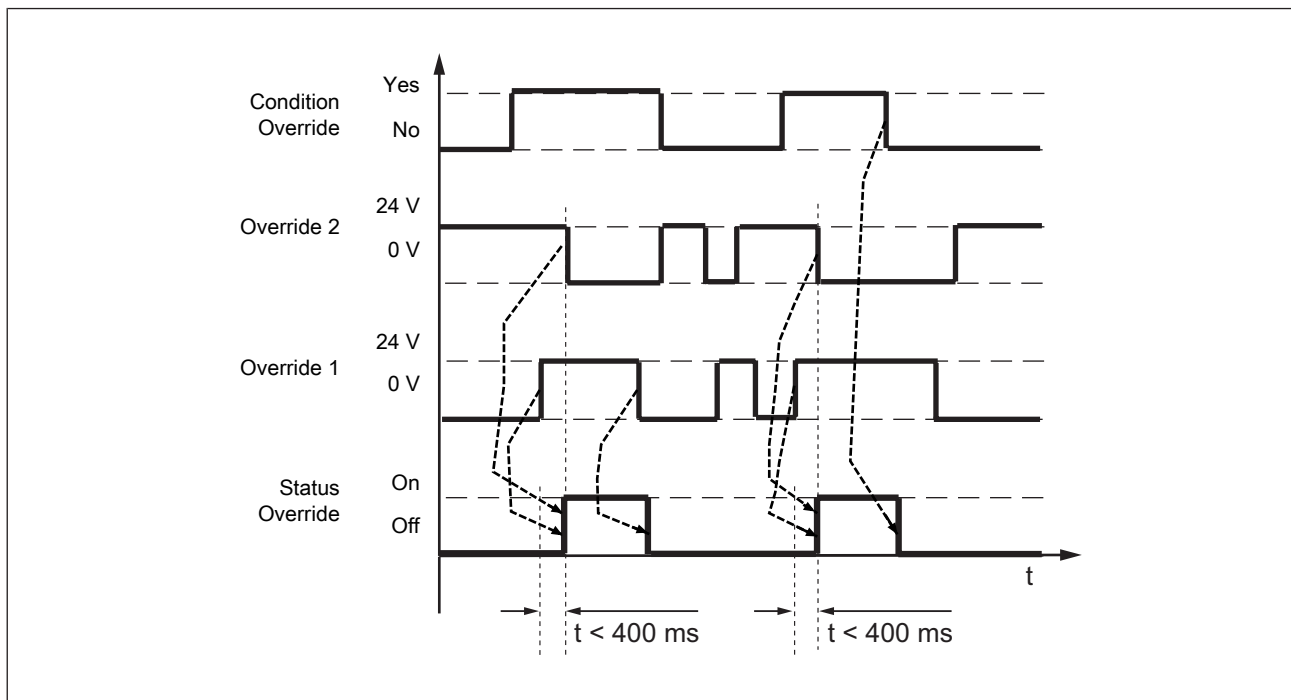


Fig.: Timing diagram for override function signal-triggered

6.17 Rest condition

The safety laser scanner can only be switched to the rest state when

- ▶ more than one zone set is configured
- ▶ no safety or warning zones are configured in the relevant zone set.

Settings of encoders in the relevant zone set are deleted.

The settings in a configuration remain saved.

Forms drawn in a configuration are deleted when the rest condition is activated.

During the rest condition, the following actions are not possible:

- ▶ Changes to the configuration
- ▶ Update firmware
- ▶ Changes of network settings (e.g. IP address)

Remove device from the safety laser scanner arrangement

If a device is removed from a safety laser scanner arrangement while this arrangement is in a rest state, error message INTF18 is displayed when the arrangement is switched on.

Switch off the arrangement again, deactivate the rest state in the configuration and switch the arrangement back on.

The master unit displays the error INTF18, the subscriber units are in normal operation.

Now change the structure of the safety laser scanner arrangement.

Maximum power consumption of the safety laser scanner in normal operation and in the rest state

Product type	Consumption in normal operation (without load)	Consumption in rest state
Master without subscriber	300mA	200mA
Master + 1 subscriber	600mA	400mA
Master + 2 subscribers	900mA	600mA
Master + 3 subscribers	1200mA	800mA

7 Wiring

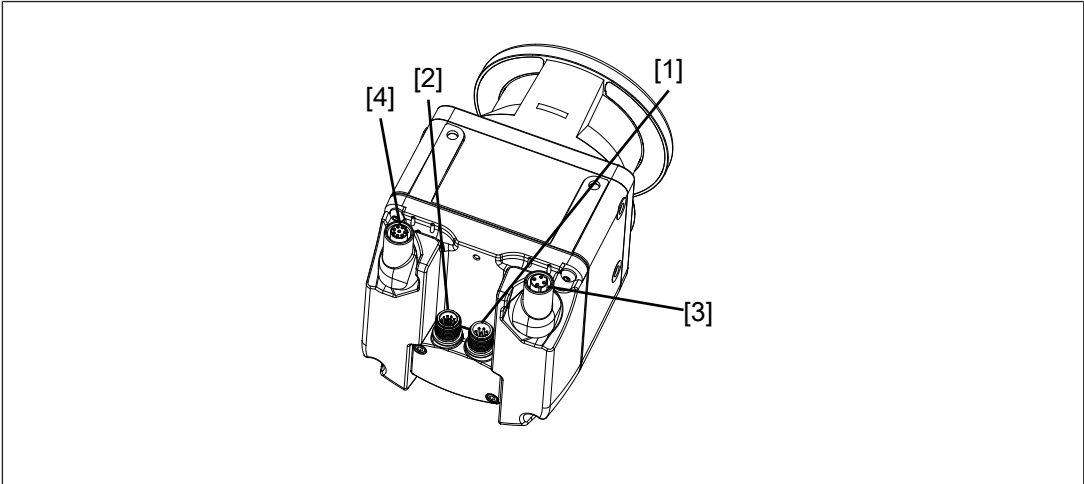
7.1 General guidelines

- ▶ Information given in the [Technical details \[143\]](#) 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 \[143\]](#)) 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 \[151\]](#)) or equivalent cables.
 - The terminals for connection to the evaluation device must be kept in a lockable control cabinet. This prevents unauthorised modifications.
- ▶ When shielded cables are used, the shield must be placed at one end.
- ▶ Ensure compliance with permissible cable bending radii (see [Technical details \[143\]](#)).
- ▶ Do not connect outputs with test pulses to the inputs on the safety laser scanner.

7.2 Connector assignment master unit

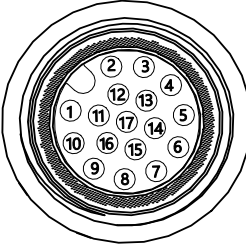
The safety laser scanner PSEN sc ME 5.5 08-17 has configurable inputs and outputs. In PSENscan Configurator these can be configured for the specific application.

Product	Male connector	max. number					max. number of configurable			Operating range
		Sub-scribe r units	OSSD pairs	Zone sets	En-coder inputs	Zone set switch-ing in-puts	Inputs	Outputs	Inputs/ outputs	
PSEN sc ME 5.5 08-17	17-pin	3	3	20	-	6	4	2	2	5.5 m
	17+8-pin			70	4	14	8			



Legend

- [1] M12 8-pin male connector for connection to an evaluation device and the supply voltage
- [2] M12 17-pin male connector for connection to an evaluation device and the supply voltage
- Use a shielded cable (see [Order reference: Accessories \[151\]](#)).
- [3] M12 4-pin female connector, hinged, for connection to configuration PC
- [4] M12 8-pin female connector, hinged, for connection to a subscriber unit

Male connector	OSSD pairs			Supply voltage		
	Pin	Colour	OSSD	Pin	Colour	Application
17-pin 	13	Grey	OSSD 11	1	Brown	24 VDC
	8	Pink	OSSD 12	10	Brown	24 VDC
				11	Brown	24 VDC
				2	Blue	0 VDC
				3	Blue	0 VDC
				12	Blue	0 VDC
				16	Yellow/ green	Functional earth

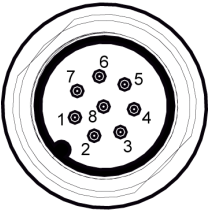
The configurable inputs and outputs can be used for both input signals and output signals.

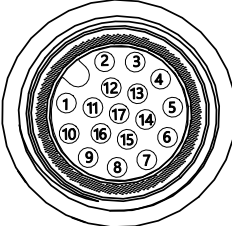
The configurable inputs can be used for all input signals.

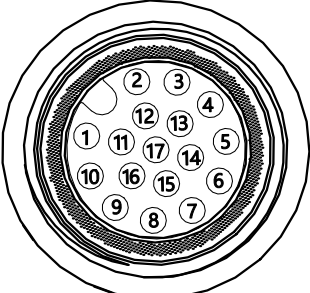
- Restart and reset
- EDM (when using the 17-pin connection)
- Switching the monitoring of zone sets

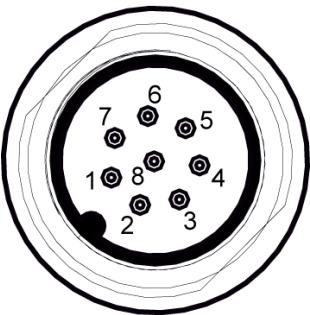
The maximum number of inputs that can be used to simultaneously connect zone sets depends on the connected safety controller (see table).

- Dynamic and static muting

Male connector	Configurable inputs		Encoder		
	Pin	Colour	Pin	Colour	Application
8-pin 	1	White	4	Yellow	Encoder 11 or 12
	2	Brown	6	Pink	Encoder 11 or 12
	3	Green	5	Grey	Encoder 21 or 22
	7	Blue	8	Red	Encoder 21 or 22

Male connector	Configurable connections					
	Input		Output		Input/output	
	Pin	Colour	Pin	Colour	Pin	Colour
	14	White	4	Green	5	White/black
	7	Black				
	6	Orange	15	Yellow	9	Red
	17	Violet				

Male connector	Configurable connections as an input for switching zone sets			
	Connection to a safety controller without test pulses		Connection to a safety controller with test pulses	
	Pin	Colour	Pin	Colour
	6	Orange	6	Orange
	7	Black	7	Black
	14	White	14	White
	17	Violet	17	Violet
	5	White/black	-	-
	9	Red	-	-

Male connector	Configurable connections as an input for switching zone sets			
	Connection to a safety controller without test pulses		Connection to a safety controller with test pulses	
	Pin	Colour	Pin	Colour
	8-1	White	8-1	White
	8-2	Brown	8-2	Brown
	8-3	Green	8-3	Green
	8-7	Blue	8-7	Blue
	8-4	Yellow	-	-
	8-5	Grey	-	-
	8-6	Pink	-	-
	8-8	Red	-	-

7.3 Connector pin assignment for subscriber unit

The subscriber unit of the safety laser scanner PSEN sc ME 5.5 08-17 has two hinged 8-pin M12 sockets for connection to the master unit or to another subscriber unit. In the PSENscan Configurator, this configuration must also be made when creating a new configuration.

- ▶ Two hinged 8-pin M12 sockets for connection to the master unit or a subscriber unit
 - Two inputs on the socket to the master or an upstream subscriber unit
 - Two outputs on the socket to the master or an upstream slave unit
 - Two connections each for the supply voltage via the master unit and functional earth

7.4 Configurable inputs/outputs

When using the 17-pin connection or both male connectors (17- and 8-pin), the configurable inputs/outputs at PIN 4, 5, 9 and 15 can be used for the following functions:

- ▶ Warning output
- ▶ Alarms 1 or 2
- ▶ Muting lamp
- ▶ Dynamic activation of the muting state
- ▶ Status override 1 or 2
- ▶ PIN 4 and PIN 15 can be used for OSSD 2
- ▶ PIN 5 and PIN 9 can be used for OSSD 3
- ▶ For PINs that you do not use as outputs, select **No function**. Therefore, the configurable inputs/outputs are free for the configuration as inputs.

7.5 Configurable inputs

Note:

- ▶ PINs you have already used as an output are no longer available in the configuration of the inputs.
- ▶ When using the 17-pin connection, the configurable inputs at PIN 5, 6, 7, 9, 14 and 17 can be used for the following functions:
 - Restart
 - Reset
 - Restart or reset
 - If the safety laser scanner is in an error state, a reset is performed,
 - If the safety laser scanner is **not** in an error state, a restart is performed
 - EDM
 - Zone set switching
 - Muting 1 and 2
 - Dynamic activation of the muting state
 - Override
- ▶ When using the 17-pin connection **and** the 8-pin connection, the configurable inputs at PIN 5, 6, 7, 9, 14 and 17 and PIN 8-1 to PIN 8-8 can be used for the following functions:
 - Encoder (the inputs are selected automatically)
 - Restart
 - Reset
 - Restart or reset
 - If the safety laser scanner is in an error state, a reset is performed,
 - If the safety laser scanner is **not** in an error state, a restart is performed
 - EDM
 - Zone set switching
 - Muting 1 and 2
 - Dynamic activation of the muting state
 - Override

The configurable inputs for encoder can be used for input signals of encoders. When no encoders are used, these inputs can also be used as configurable inputs.

7.6 Wiring of the configurations

The wiring has to match the specifications in PSENscan Configurator.

When an existing configuration is transferred to the safety laser scanner, the configurable inputs/outputs must be wired in accordance with this configuration.

The configuration of the safety laser scanner PSEN sc ME 5.5 08-17 is carried out in PSENscan Configurator on a configuration PC.

7.7 Connect supply voltage and safety controller

The supply voltage connection is in the memory module that is protected by a screwed-on cover. The memory module can be uninstalled for simpler connection.

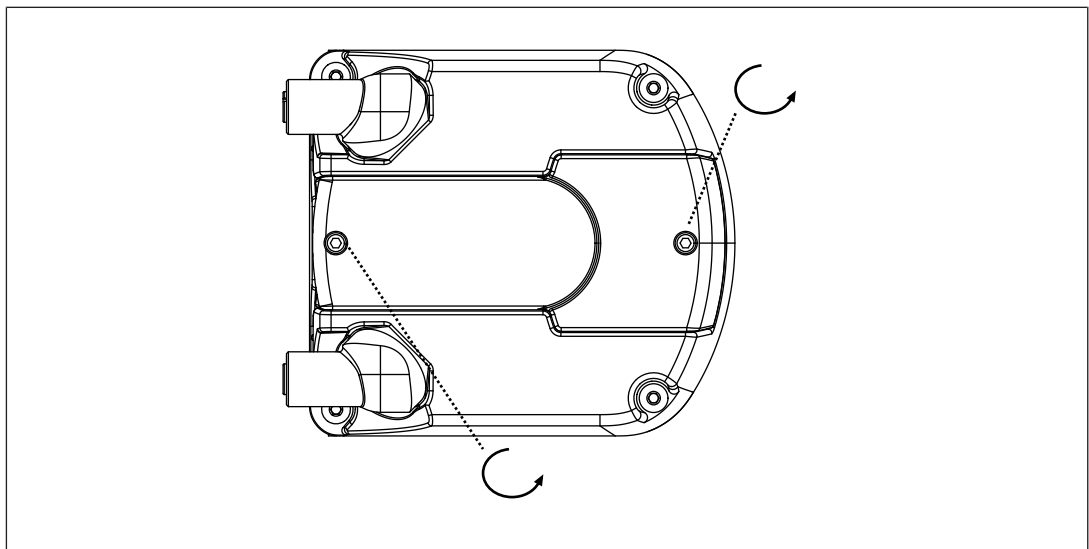
Note:

The memory module must only be uninstalled when the supply voltage is switched off.

Procedure:

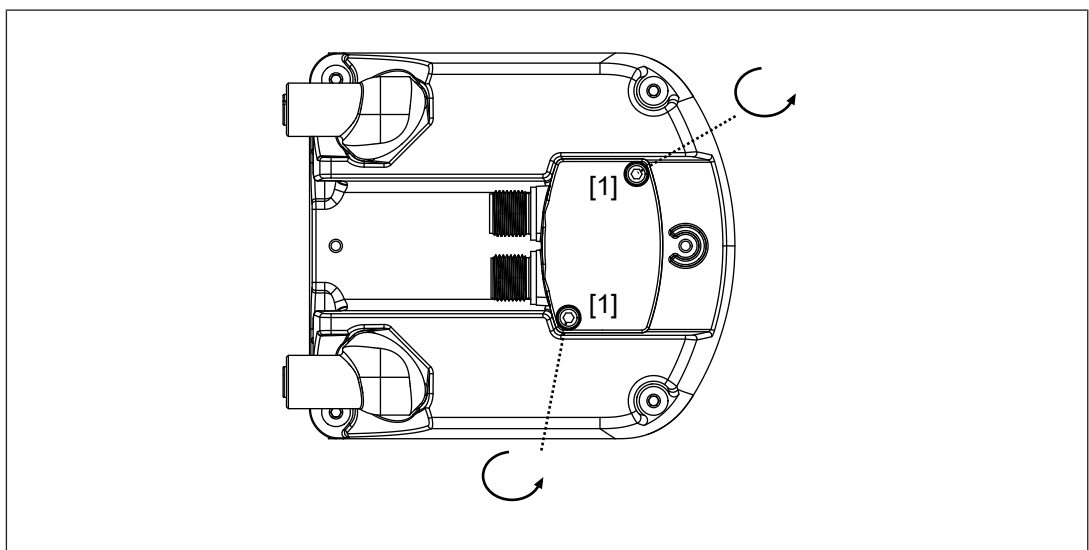
1. Turn the safety laser scanner PSEN sc ME 5.5 08-17 for better access to the memory module.
2. Loosen the M3 screws of the protective cover and remove the protective cover.

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



3. Loosen the M3 screws [1] of the memory module and pull out the memory module.

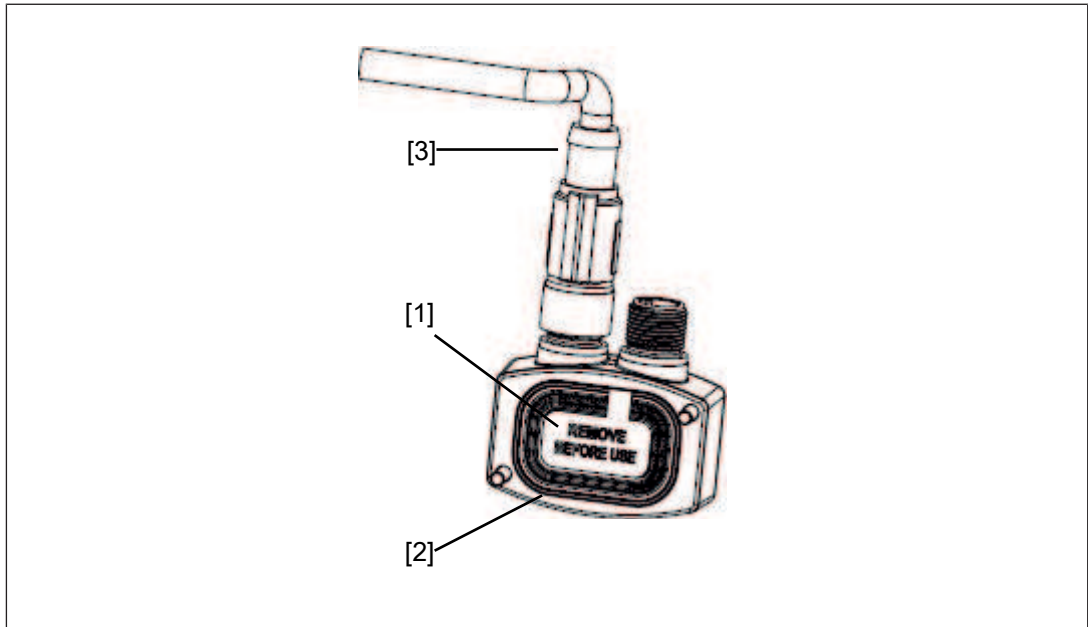
The screws are secured against loss and they cannot be removed.



Legend

[1] M3 screws for attaching the memory module

4. Connect the supply voltage and the safety controller to the 17-pin socket on the memory module.
5. Remove the protective membrane [1] from the memory module and insert the memory module at the safety laser scanner.



Legend

- [1] Protective membrane
- [2] Memory module
- [3] Cable with connector

6. Screw the memory module with 1 Nm.
7. Place the protective cover at the safety laser scanner and screw the protective covers with 1 Nm.

7.8 Connection to PSENscan Configurator

Note:

- Ensure that the software PSENscan Configurator is installed on the configuration PC.
We recommend that you always use the latest version (download from www.pilz.com)
- Ensure that the safety laser scanner is switched off when creating a connection to the configuration PC.

100BaseTX cable

Bit rate	100 MBit/s
Max. segment length	100 m
Medium	STP (shielded twisted pair) ^{*1} 2 pairs Category 5 ^{*2}
Connection	4-pin M12 male connector / 4-pin RJ45 male connector

Topology	Point-to-point/hub (hub, switch)
----------	-------------------------------------

*1

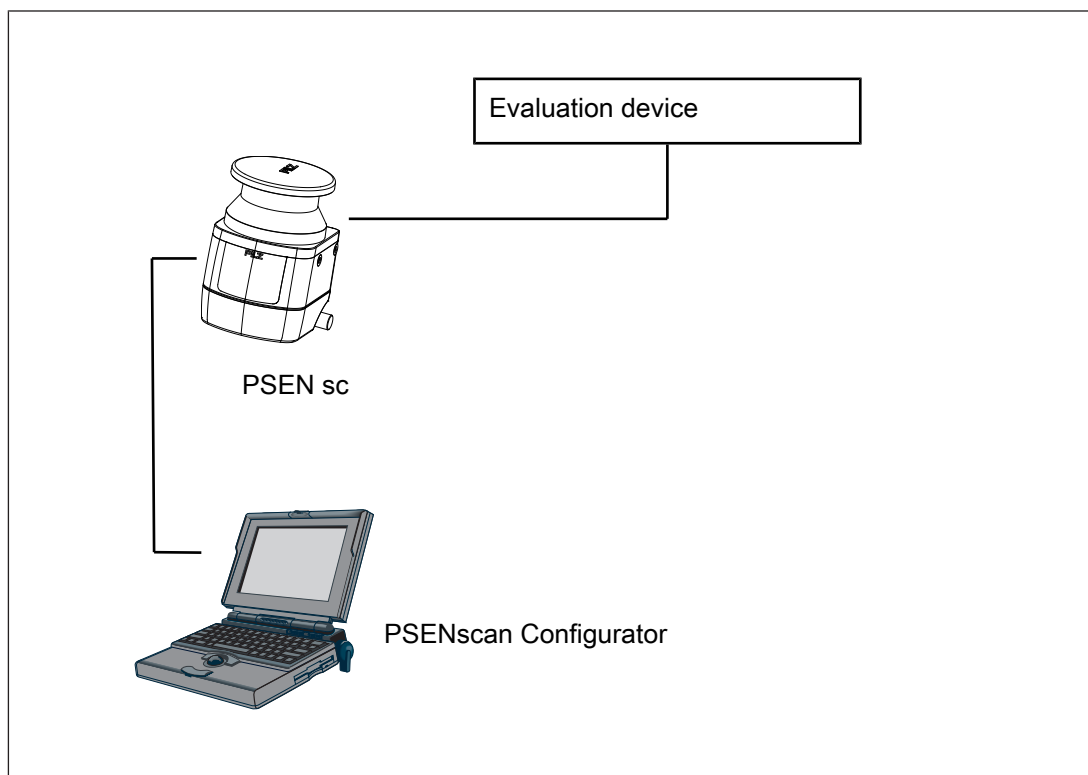
For use in an industrial environment, Pilz recommends double-shielded twisted pair cables (S/STP). Only **shielded RJ45 connectors** should be used.

*2

Twisted pair cables (TP cable) consist of twisted core-pairs. Twisted pair cables are divided into categories in accordance with their electrical features (attenuation, cross-talk). **Category 5 cables are specified** for transferring data with Pilz Ethernet interfaces.

TP cables for Ethernet applications generally have an impedance level of 100 Ohm.

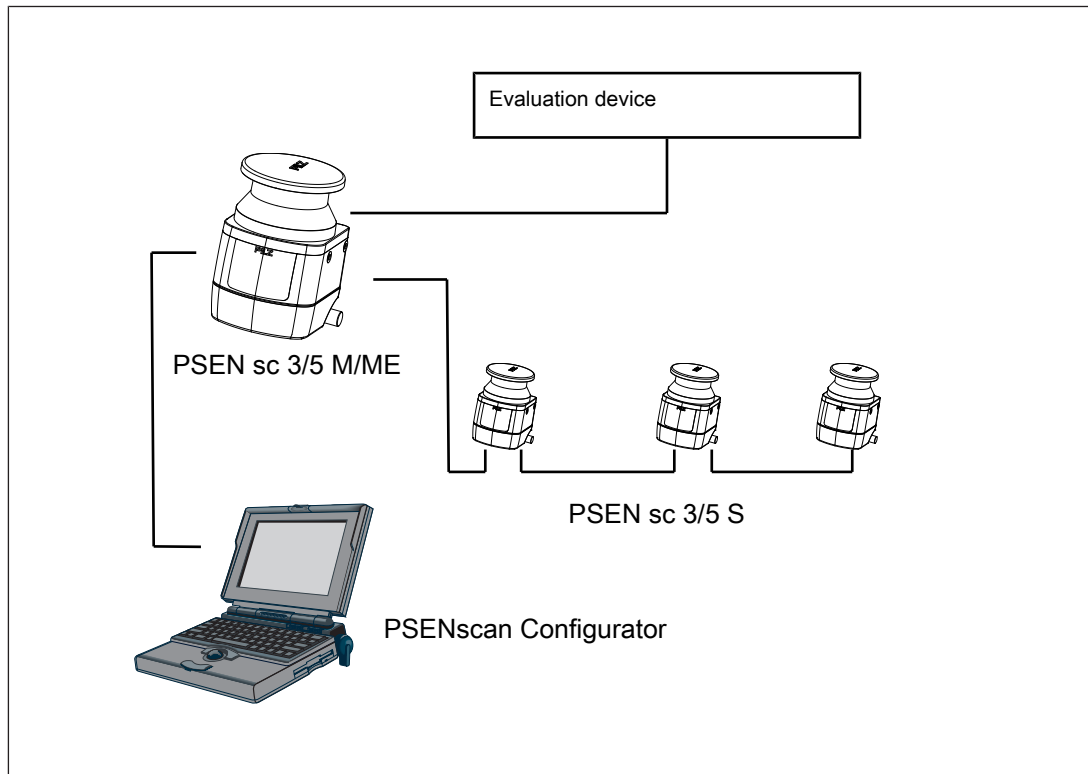
7.8.1 Single connection



Procedure:

1. Use a 4-pin cable (see [Order references \[151\]](#)) to connect the configuration PC to the safety laser scanner.
2. Connect the safety laser scanner to the supply voltage and an [evaluation device \[96\]](#).
Use an 8- or 17-pin cable or both cables (see [Order references \[151\]](#)).
3. Switch the safety laser scanner on.
4. [Configure the safety laser scanner in PSENscan Configurator. \[92\]](#)

7.8.2 Series connection



Procedure:

1. Use a 4-pin cable (see [Order references \[151\]](#)) to connect the configuration PC to the safety laser scanner.

2. Use a 8-pin cable (see [Order references \[151\]](#)) to connect the master unit to the subscriber unit.

With several subscriber units, connect the subscriber unit to the following subscriber unit.

3. Connect the safety laser scanner to the supply voltage and an [evaluation device \[96\]](#).

Use a 17-pin cable or both cables (see [Order references \[151\]](#)).

4. Switch the safety laser scanner on.
5. Is a warning displayed?

"Firmware versions differ. Update the firmware."

When the firmware versions in a safety laser scanner arrangement differ from each other, the firmware version must be matched to each other.

[Update the firmware versions \[130\]](#) of all the devices to the firmware version of the master unit.

If no warning is displayed, continue with the next step.

6. [Configure the safety laser scanner in PSENscan Configurator. \[92\]](#)

7.9 Connections for muting sensors

Wire the muting sensors as shown in the following diagrams.

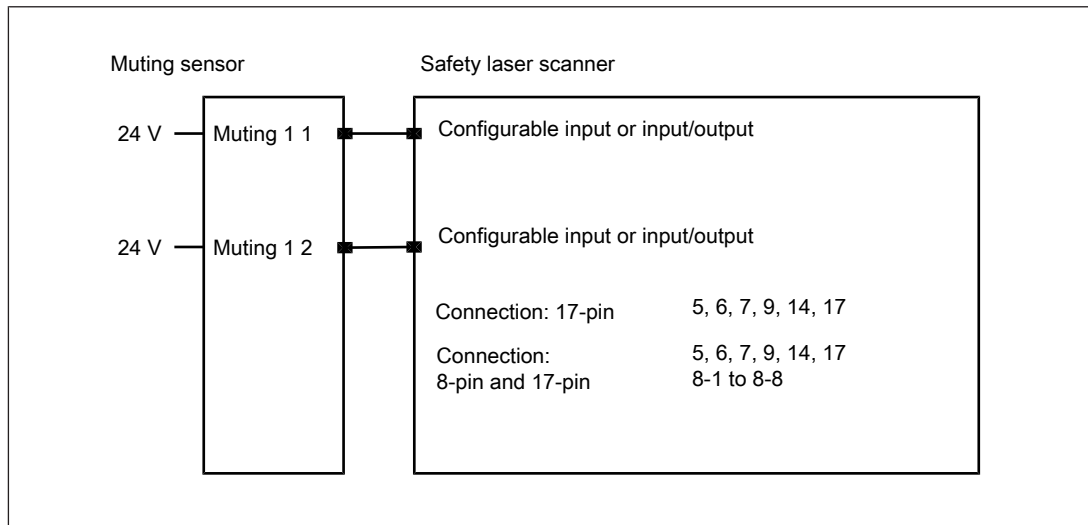


Fig.: Wiring of 2 muting sensors on the master unit

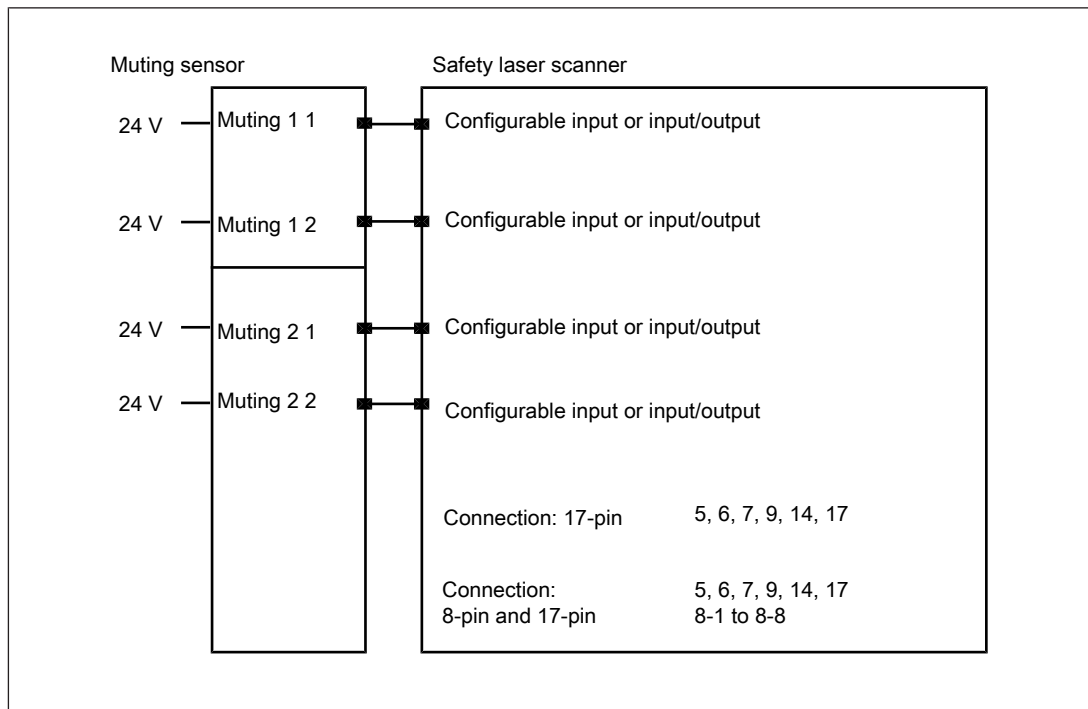


Fig.: Wiring of 4 muting sensors on the master unit

8 Installation and alignment

8.1 Installation options

The safety laser scanner can be installed in various ways.

- ▶ [Installation directly on to mounting surface](#)  83]
- ▶ [Installation of the protective bracket PSEN sc bracket H on the safety laser scanner](#)  84]

(Prerequisite for the following installation options)

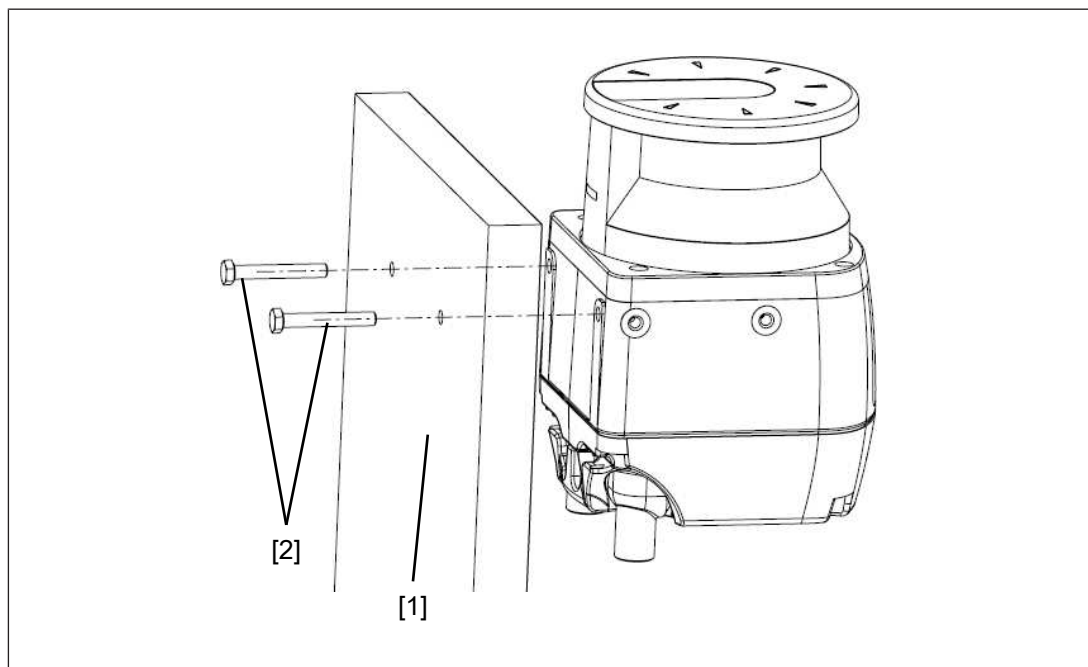
- ▶ [Installation on the floor](#)  85]
- ▶ [Installation for inclination to the side or upwards and downwards](#)  86]
- ▶ [Installation for inclination upwards and downwards](#)  88]

8.2 Installation directly on to mounting surface

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

Note:

- ▶ 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.
- ▶ Ensure that the front panel of the safety laser scanners is not covered by a wall or another plane. Note the [distance to the walls](#)  56].
- ▶ 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:

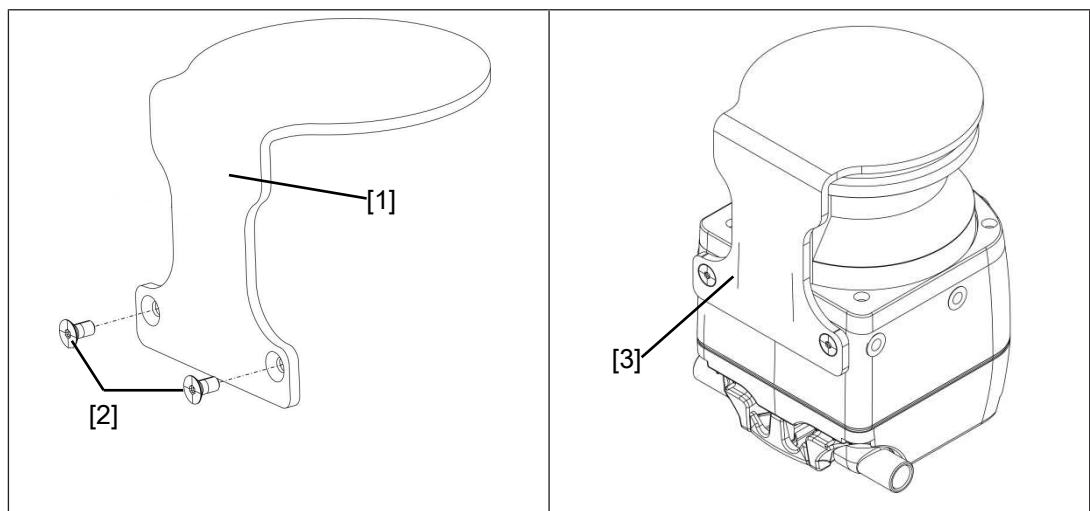
1. Turn the safety laser scanner when the safety laser scanner is to be operated with the top side down.
2. Use two M5 screws to fix the safety laser scanner to the mounting surface. Tighten the screws to 3 Nm.

8.3 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 \[151\]](#)). 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 (for inclination to the side or upwards and downwards) or PSEN sc bracket P (for inclination upwards and downwards) (see [Order reference: Accessories \[151\]](#)).

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

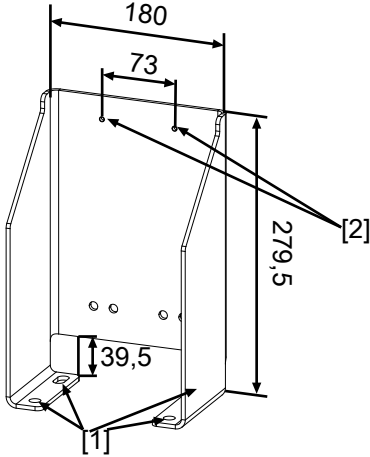
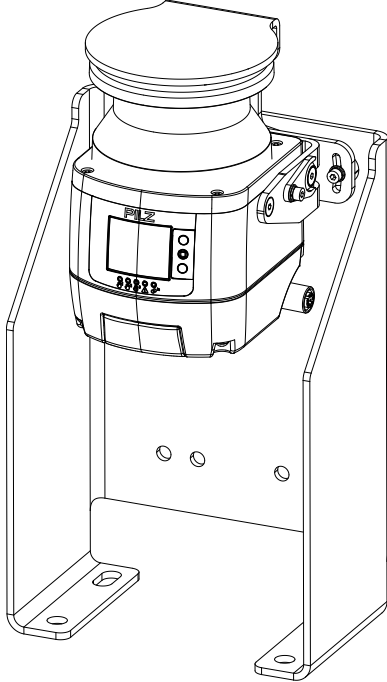
- [1] PSEN sc bracket H (protective bracket for safety laser scanner)
- [2] M5 screws for fixing the PSEN sc bracket H at the safety laser scanner
- [3] PSEN sc bracket H installed at the safety laser scanner

8.4 Installation on the floor

Prerequisites

- ▶ The protective bracket PSEN sc bracket H must already be attached to the safety laser scanner (see [Installation of the protective bracket PSEN sc bracket H on the safety laser scanner](#) [84]).
- ▶ PSEN sc bracket P or PSEN sc bracket PR (see [Order references](#) [151])

Procedure:

	
[1] Drill holes for attachment to floor	PSEN sc with PSEN sc bracket installed on PSEN sc bracket F
[2] Through holes for attaching the PSEN sc bracket P or PSEN sc bracket PR to PSEN sc bracket F	

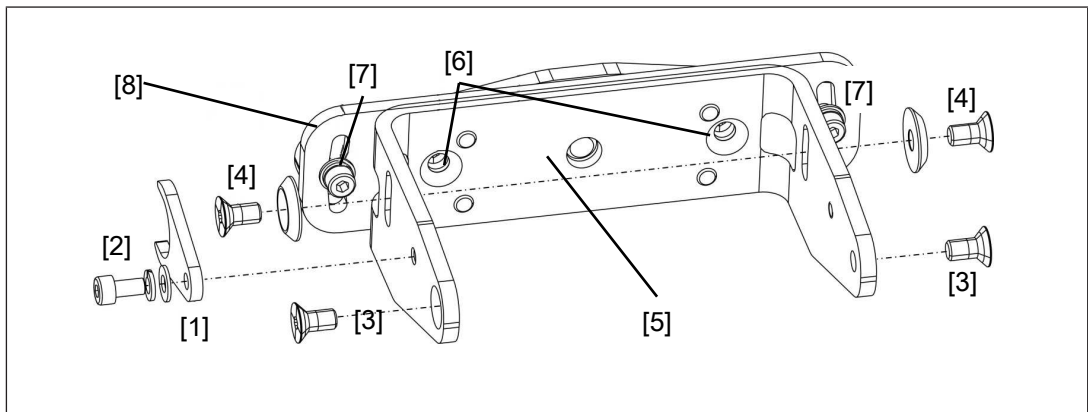
1. Fix PSEN sc bracket F with the fixing screws to the floor and tighten the fixing screws alternately and evenly with 3 Nm.
2. Fix PSEN sc bracket PR or PSEN sc bracket P with the fixing screws to PSEN sc bracket F and tighten the fixing screws alternately and evenly with 3 Nm.
3. Fix the adjusting disc for angle of inclination [1] with the set screws and washers [2] on the 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.
5. Insert the safety laser scanner in PSEN sc bracket PR or PSEN sc bracket P 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.
6. [Set the angle of inclination of the safety laser scanner, if necessary.](#) [89]
7. [Set the side inclination of the safety laser scanner, if necessary](#) [89].

8.5 Installation for inclination to the side or upwards and downwards

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

Prerequisites

- ▶ PSEN sc bracket PR (see [Order references](#)  151)
- ▶ Mounting surface with 2 drill holes, 10 mm deep, distance 73 mm horizontally to each other for attaching the PSEN sc bracket PR
- ▶ The protective bracket PSEN sc bracket H must already be attached to the safety laser scanner (see [Installation of the protective bracket PSEN sc bracket H on the safety laser scanner](#)  84).

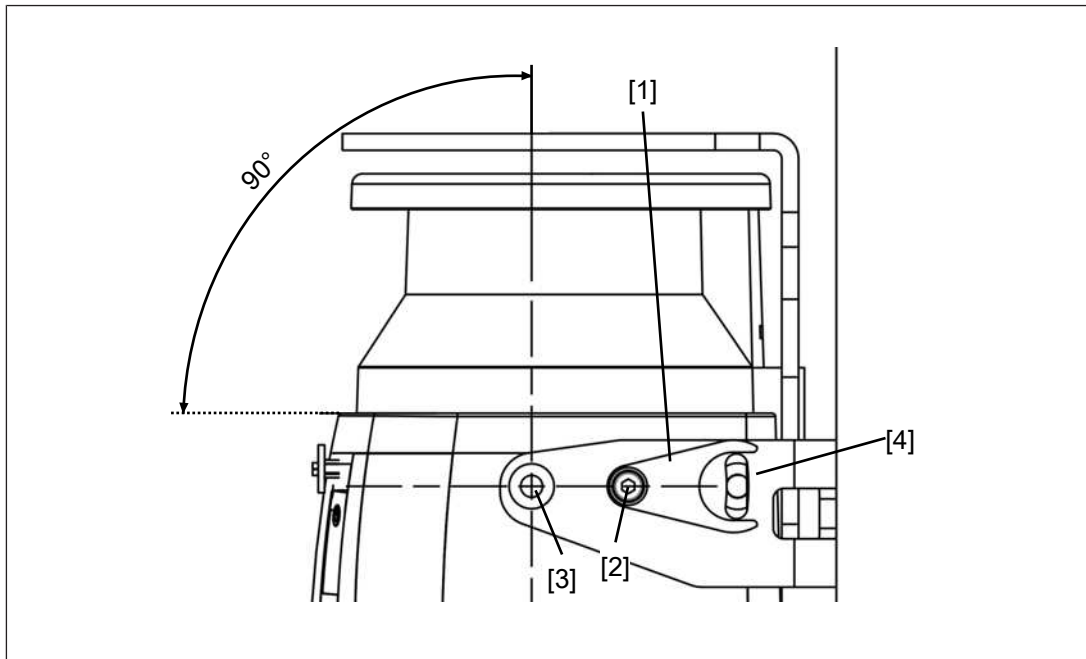


Legend

- [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 screws and washers [2] on the PSEN sc bracket PR (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.

The diagram shows a side view of the safety laser scanner assembly. A dashed line indicates the maximum range of inclination to the top/bottom, labeled as $\text{max. } \pm 6^\circ$.	The diagram shows a top view of the safety laser scanner assembly. A dashed line indicates the maximum range of inclination to the side (roll), labeled as $\text{max. } \pm 8.5^\circ$.
Inclination to the top/bottom	Inclination to the side (roll)

8.6

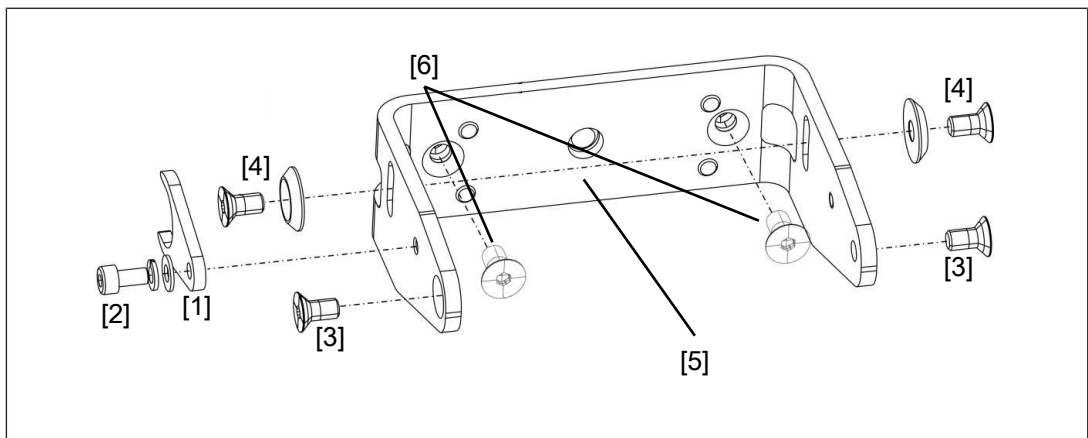
Installation for inclination upwards and downwards

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

Prerequisites

- ▶ PSEN sc bracket P (see [Order references](#)  151)
- ▶ Mounting surface with 2 drill holes, 10 mm deep, distance 73 mm horizontally to each other for attaching the PSEN sc bracket P
- ▶ The protective bracket PSEN sc bracket H must already be attached to the safety laser scanner (see [Installation of the protective bracket PSEN sc bracket H on the safety laser scanner](#)  84).

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

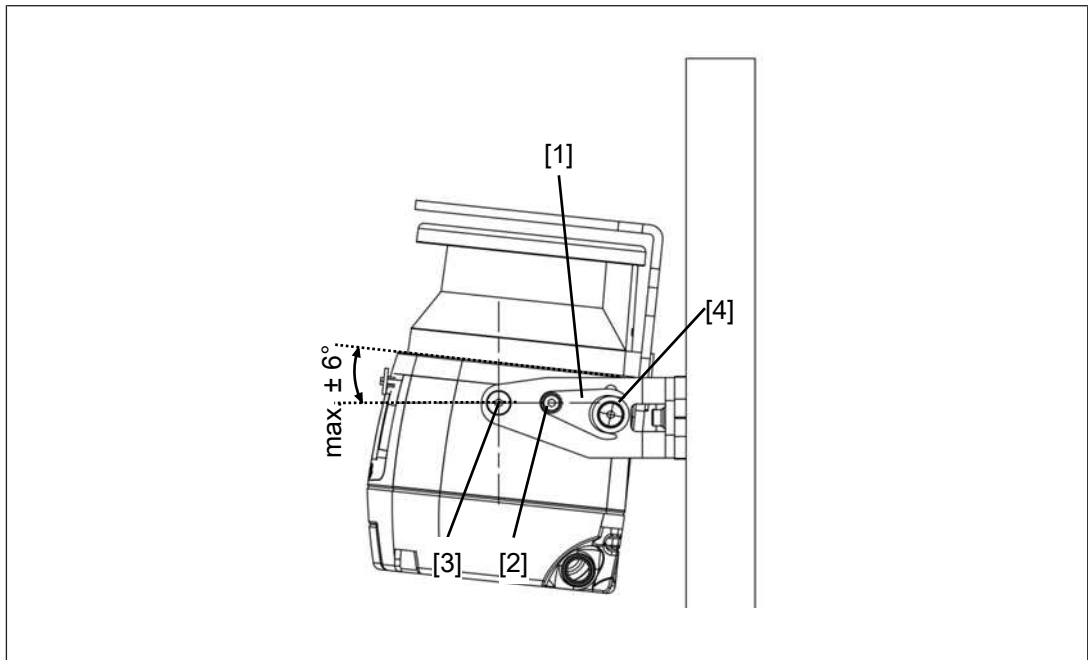
Procedure:

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 screws and washers [2] on the 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.

8.7 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. 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.

8.8 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:

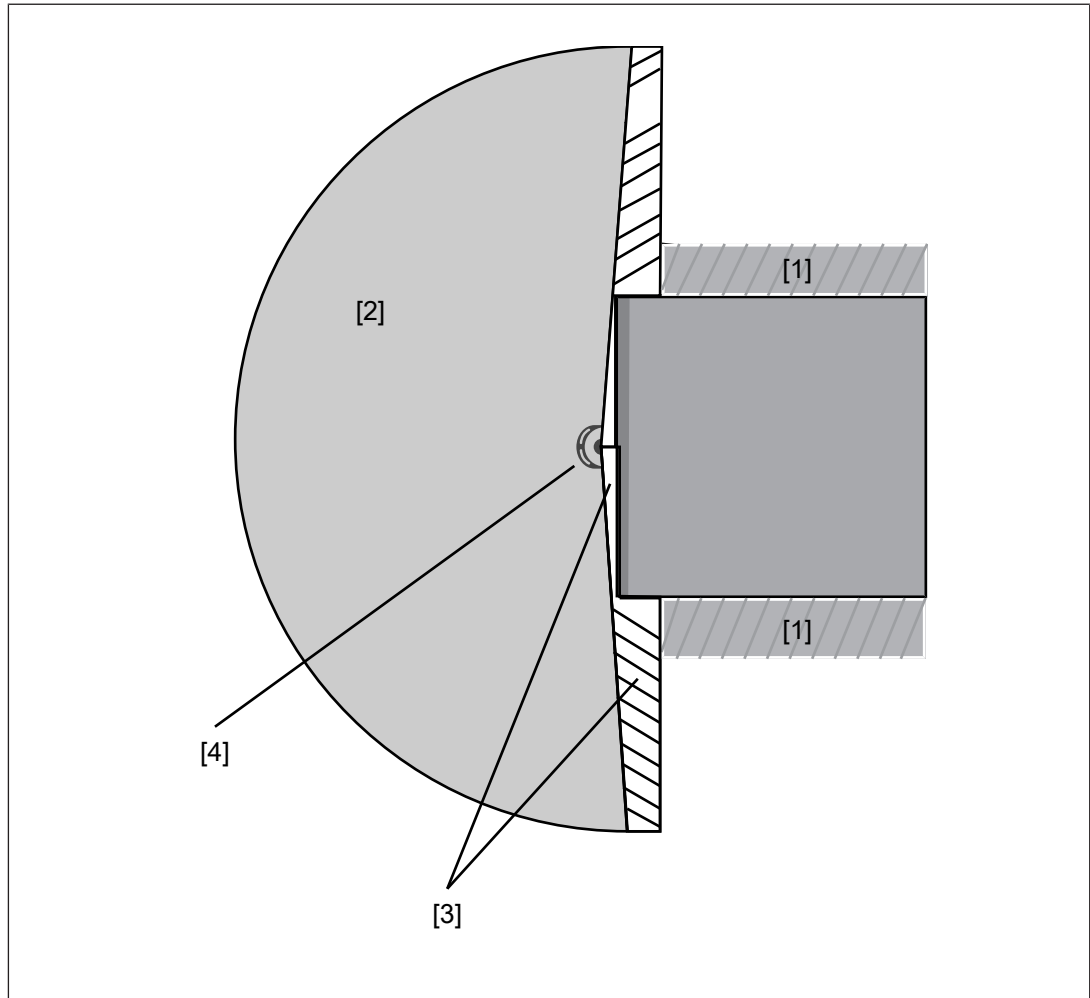
1. Change the side inclination of the safety laser scanner within the permitted range of $\pm 8.5^\circ$.
If necessary, loosen the roll angle fine adjustment screws [7] (see diagram [Installation for inclination to the side or upwards and downwards](#) 86)).
2. Tighten up the roll angle fine adjustment screws [7] (see diagram [Installation for inclination to the side or upwards and downwards](#) 86)) to 2,5 Nm.

8.9 Measures to safeguard unsecured areas

When installing the PSEN sc ME 5.5 08-17 areas may result that are not detected by the safety laser scanner.

If required, install additional protective devices to safeguard the danger zone.

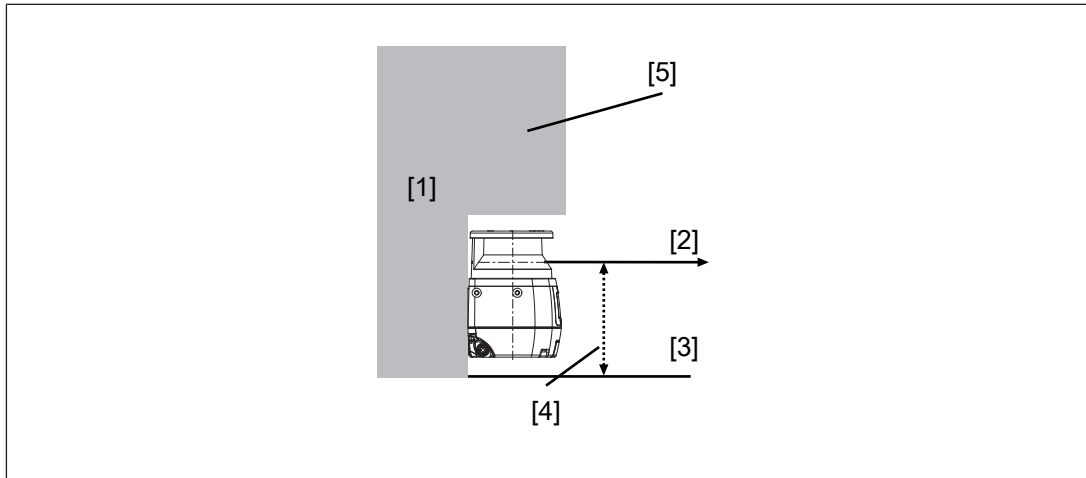
Prevent stepping behind



Legend

- [1] Danger zone 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

8.10 Installation for a mobile application

Note:

- ▶ Unevenness of the vehicle's travel route (such as holes, bumps, gradients, slopes) and changes to the surface of the travel route.
- ▶ Deviations in the springs and the attenuation behaviour that may cause a change of the safety zone area.
- ▶ By installing the PSEN sc ME 5.5 08-17, no monitored areas must be created.
- ▶ The typical installation position for the safety laser scanner is the middle of the vehicle's front edge. The safety laser scanner must be aligned horizontally to the vehicle level.
- ▶ Height of the scan plane

Pilz recommends a scan plane height of 15 cm.

A person lying on the floor is detected. A lower height would lead to reduced availability because of the increased dust formation on the floor.

9 PSEnscan Configurator

9.1 Basics

The PSEnscan Configurator is a graphic tool

- ▶ For configuration of the safety laser scanners of the PSEN sc ME 5.5 08-17,
- ▶ For incorporation of the safety laser scanner into a network,
- ▶ For monitoring the safety laser scanners in the network,
- ▶ For creating reports,
- ▶ For management of passwords on the safety laser scanner PSEN sc ME 5.5 08-17,

The safety laser scanner cannot be configured via the network. The configuration can only be downloaded via a point-to-point connection.

9.2 Installation

9.2.1 System requirements

Operating system:	Windows 7, 10 or XP (32 Bit and 64 Bit)
Processor:	Pentium 4, 2 GHz 3 GHz recommended
RAM:	min. 2 GB
Available hard drive space:	approx. 70 MB
Graphics card:	Min. 1024 x 768 pixel resolution, 65536 colours For optimum performance of the system, a current graphics card with 3D acceleration should be used, and the 3D acceleration should be activated.
To view the documentation:	Adobe Acrobat Reader, from Version 7.1.0
Interfaces:	A free 100 Mbps Ethernet interface for data transfer to the safety laser scanner
Access rights:	Network access for PSEnscan Configurator, profile Private

9.2.2 Install PSEnscan Configurator

Procedure:

1. Download the software PSEnscan Configurator from the download area on the Pilz homepage at <http://www.pilz.com/support/downloads/>.
2. Double-click on the unpacked 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).

9.2.3 Ethernet Connections

9.2.3.1 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 IP 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.

Example: First address = 192.168.0.10, second address = 192.168.0.11

- Ensure that the subsequent IP address is not used by any other network subscriber.



INFORMATION

Use the correct IP address for subscribers

The addresses of the subscribers in a safety laser scanner arrangement must always follow the addresses of the master in the arrangement.

Example:

Master addresses = 192.168.0.10 and 192.168.0.11

Addresses of 1st subscriber = 192.168.0.12 and 192.168.0.13

Addresses of 2nd subscriber = 192.168.0.14 and 192.168.0.15

- Ensure that the subsequent IP addresses are not used by any other network subscriber.

9.2.3.2 Create firewall rule

A firewall or any other security mechanisms on the PC and network may prevent the PSEnscan Configurator from communicating correctly with the connected devices. In this case, it will be necessary to adjust the security settings and firewall settings.

Firewalls allow access to explicitly registered programs.

PSEnscan Configurator must have access to the **Private** profile.

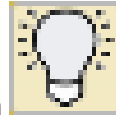
9.2.3.3 Connect automatically

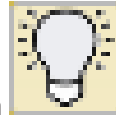
The PSEnscan Configurator offers the option of automatically finding a device available in the network.

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

The network is searched for connected devices of the PSEN sc ME 5.5 08-17.

Connected devices of the PSEN sc ME 5.5 08-17 are listed under **Network environment**.



To locate the PSEN sc ME 5.5 08-17, click on . The wave symbol is shown on the display of the selected PSEN sc ME 5.5 08-17.

2. Double-click on the safety laser scanner found in the **Network environment**.

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

On a safety laser scanner with a connected subscriber unit or several subscriber units, all safety laser scanners are displayed as an arrangement.

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

Enter the password for the safety laser scanner (the factory-set default 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](#)  97].

9.3 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 **Download**.

The configuration in the PSEnscan Configurator is downloaded to the connected device. The connected device goes offline as the configuration is 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:
 - ▶ 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.

9.4 Create backup copy of a configuration

For restoring an existing configuration (see [Restore configuration](#) [ 126]) you need a backup copy of this configuration.

Procedure:

- ▶ Select Project -> Save.

The dialogue box for saving is opened. Please enter a name for the MIB file.

The MIB file includes all the data for configuration.

9.5 Change password

Prerequisites

- ▶ There is a connection to the safety laser scanner.

Procedure:

1. In the PSEnscan Configurator, select **Device -> Settings -> Change access rights and password**.

Enter the current password and click "OK".

2. Enter the new password twice and select the access rights for the password.

Enter the new password in the field **New password**. Repeat the password in the field **Check new password**. Select the access rights for the password and confirm with **OK**.

9.6 Reset password

Prerequisites

- ▶ There is a connection to the safety laser scanner.

Procedure:

1. In PSEnscan Configurator, select **Device-> Settings -> Reset password**.

Take down the counter shown and the serial number of the safety laser scanner. Do **not** close the window unless you have a new password.

2. For resetting the password, please contact Pilz.

Name the counter shown and the serial number of the safety laser scanner.

You will receive a new password.

3. Enter any text in the **Reset password** window and click **OK**.

You can access the safety laser scanner again.

10 First commissioning

10.1 Requirements for commissioning

Note:

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



CAUTION!

Deterioration in the detection of safety zone violations

If the safety laser scanner is commissioned under deviating conditions, there may be a deterioration in the detection of safety zones violations.

10.2 System connection

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

- OSSD signals are evaluated through 2 channels with plausibility monitoring

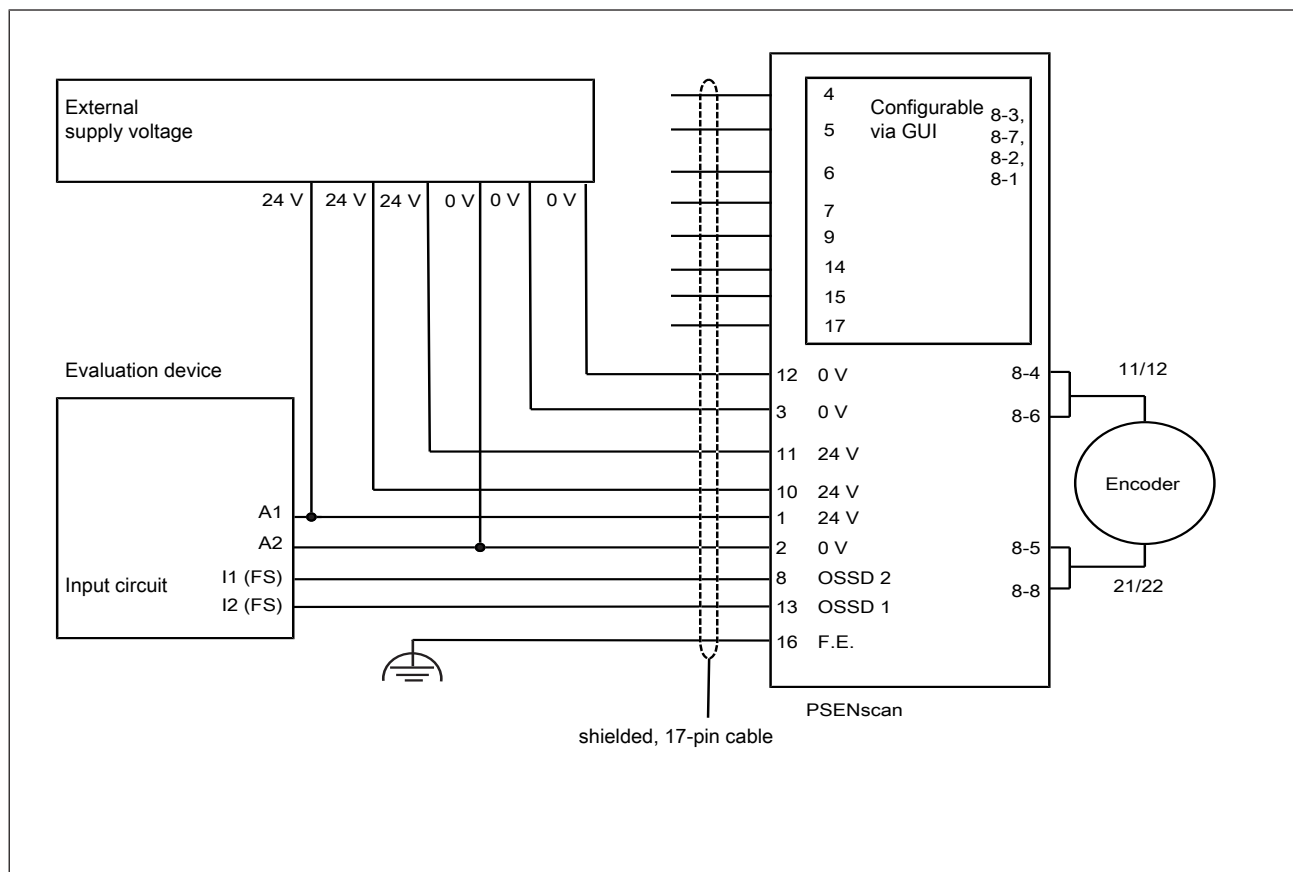


Fig.: Dual-channel connection of the safety laser scanner with 17-pin and 8-pin male connector on the input circuit of an evaluation device and on an encoder (1 zone set, warning message, automatic restart)

Suitable Pilz evaluation devices are, for example:

- ▶ myPNOZ
- ▶ PNOZmulti for monitoring safety laser scanners
Configure the safety laser scanner in the PNOZmulti Configurator as a "Light curtain" function element 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 in accordance with the specifications in the operating manual for the selected evaluation device.

10.3 Configuration of zones

Note:

- ▶ Outputs
 - Warning
 - Alarm 1
 - Alarm 2
 - Override status
 - Muting lamp
- ▶ Inputs
 - Encoder
 - Manual restart
 - Activation EDM
 - Muting (per sensor one pin)
 - Dynamic activation muting
 - Activation override
 - Override mode = Edge or signal

When these inputs/outputs are used, a pin has to be assigned for each used input or output.

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.

10.3.1 Example for a 17-pin connection

Settings in the PSENscan Configurator for a safety laser scanner with 17-pin connection:
Vertical application with reference outline monitoring, 2 OSSD pairs, 3 zone sets, no warning output, no muting, alarm for a device error, manual restart for the first safety zone, manipulation protection is active

Prerequisites

- ▶ The safety laser scanner is already connected to the 17-pin male connector.

Procedure:

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

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

2. Select the connected 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 the application VERTICAL and **17-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**.

Safety laser scanner arrangement

You can enter a title for the safety laser scanner arrangement under **Name**.

You can enter names for the devices in the safety laser scanner arrangement under **Device**.

Click on the arrow . The next window Output configuration is opened and the number of OSSD pairs is already preset with 1x2. The next window **Output configuration**. The number of OSSD pairs is already preset with **1x2**.

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

One of the outputs is set to **No function**.

Pins 8 and 13 are reserved for the first OSSD pair and cannot be changed.

Select **2x2** for **OSSD**. Two of the remaining outputs are reserved for the second OSSD pair.

Select **Activated** for **Alarm 2** and select an output for the alarm.

With ALARM 1, an alarm is triggered when the front screen of the safety laser scanner is dirty (CLEANW1 is displayed on the safety laser scanner).

With ALARM 2, an alarm is triggered when a device error has occurred.

5. Select **Automatic reset = Activated** for this safety laser scanner. An automatic reset occurs if an error state is detected.
6. Click on the arrow . The next window **Configure zone sets** is opened.
7. Select **Zone set = 3**. Enter the input delay.

The pins are automatically assigned to the zone sets by PSEnscan Configurator. The assignment can be changed manually.

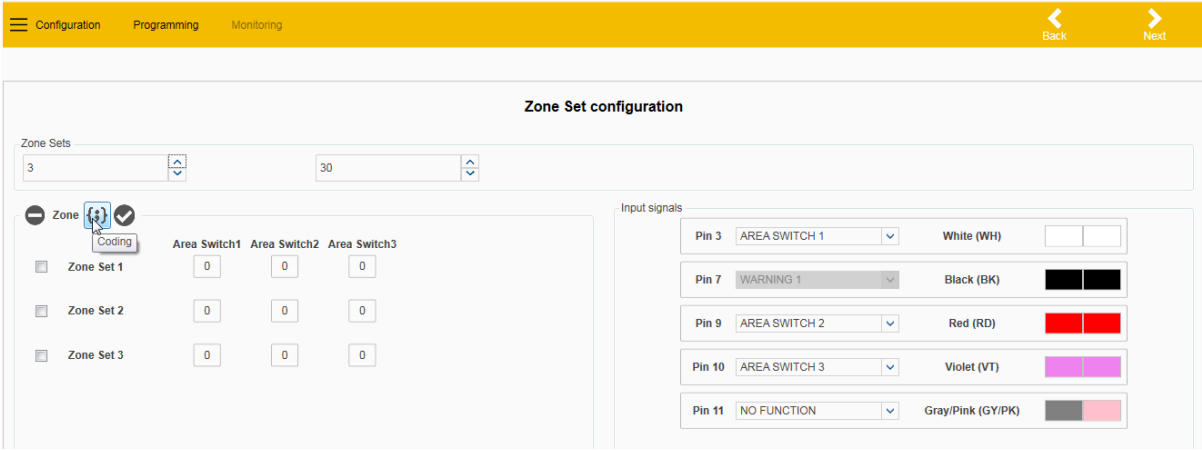
Note when mapping manually: Zone sets where a 0 or 1 is entered for all the zone switching, are not permitted.

Automatic coding using PSEnscan Configurator



Click  for automatic coding of zone sets

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



Pin	Function	Color
Pin 3	AREA SWITCH 1	White (WH)
Pin 7	WARNING 1	Black (BK)
Pin 9	AREA SWITCH 2	Red (RD)
Pin 10	AREA SWITCH 3	Violet (VT)
Pin 11	NO FUNCTION	Gray/Pink (GY/PK)

8. In the first safety zone, select the value **Manual** for **Restart** and assign a pin to the manual restart.

In the second safety zone, select the value **Automatic** for **Restart** and define the re-start delay time (min. 80 ms).

For both safety zones, select whether **EDM** is to be activated. If EDM is activated, a pin must be assigned to the EDM input.

If more than one OSSD pair is configured, the settings must be selected for each OSSD pair.

9. Click on the arrow . The next window **Configure detection capability** is opened.
10. Under **Coding: against interference**, select the code that is to be assigned to this safety laser scanner.

The response time of the safety laser scanner is increased in relation to the relevant **Increased response time per measurement cycle**  28 and is shown with the new value.

11. In the **Multiple evaluation field** specify the number of consecutive scans required for detection.

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

12. Select the **detection capability [mm]** for this safety laser scanner. Specify the value for each configured **Safety zone**.

Note:

The operating range of the zones changes with the change of resolution.

Operating ranges of the safety zone

Detection capability 30 mm = 2.50 m

Detection capability 40 mm = 3 m

Detection capability 50 mm = 4 m

Detection capability ≥ 70 mm = 5.50 m

Operating ranges of the warning zone

Detection capability 30 mm = 19 m

Detection capability 40 mm = 22 m

Detection capability 50 mm = 23 m

Detection capability ≥ 70 mm = 40 m

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

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



WARNING!

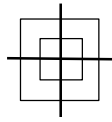
Loss of safety function due to a safety distance that is too low

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](#) [55]).
 - 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.

14. Click on the arrow . The next window **Configure zones** is opened.

Create the zones using the symbols in the tool bar on the right-hand side.



15. Click on

Specify at least 3 (max. 15) reference points. Specify a max. permitted tolerance for each reference point. **Tol -** is the tolerance for the side that faces the safety laser scanner, **Tol +** is the tolerance for the side that is facing away from the safety laser scanner.

16. In a safety laser scanner arrangement you can configure the detection capability and the zones for each subscriber unit separately.

When configuring a safety laser scanner arrangement, configure the detection capability and the zones separately for each subscriber unit.

Select the subscriber unit(s) you want to configure one after the other and configure the detection capability, the zones and the reference outlines, as required.



17. Switch the display in the work window to a live image by clicking on

Check the safety function of the safety laser scanner as indicated in [Inspection \[111\]](#).

Each time the test piece enters into the safety zone, the OSSDs must switch to the OFF state and the status of the OSSDs in the Monitoring work window must show the violation of the safety zone.

The OSSDs must switch to the OFF state each time the reference point changes beyond the tolerance range, and the status of the OSSDs in the Monitoring work window must show the changing of the reference points.

18. Select **Download configuration to device**, to transfer the configuration to the device.

Click **Accept** to activate the downloaded configuration in the connected device and reject the existing configuration on the connected device.

Save the report in PDF format.

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.

10.3.2 Example for a 17+8-pin connection

Settings in the PSENscan Configurator for a safety laser scanner with 17+8-pin connection: Vertical application with reference outline monitoring, 2 OSSD pairs, muting and override for the first OSSD pair, 3 zone sets, no warning output, an alarm, manual restart, manipulation protection is active

Prerequisites

- ▶ The safety laser scanner is already connected to the 17-pin **and** the 8-pin male connector.

Procedure:

1. From the start page, select **Create new configuration**.
The **Device selection** window is displayed with a tab for **Online** and **Overview of all types**.
2. Select the connected 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 the application VERTICAL and **17+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**.

Safety laser scanner arrangement

You can enter a title for the safety laser scanner arrangement under **Name**.

You can enter names for the devices in the safety laser scanner arrangement under **Device**.

Click on the arrow . The next window Output configuration is opened and the number of OSSD pairs is already preset with 1x2. The next window **Output configuration**. The number of OSSD pairs is already preset with **1x2**.

4. Select **Warning zone** = 0.
One of the outputs is set to **No function**.
Pins 8 and 13 are reserved for the first OSSD pair and cannot be changed.
Select **2x2** for **OSSD**. Two of the remaining outputs are reserved for the second OSSD pair.
Select **Activated** for **Alarm 2** and select an output for the alarm.
With ALARM 1, an alarm is triggered when the front screen of the safety laser scanner is dirty (CLEANW1 is displayed on the safety laser scanner).
With ALARM 2, an alarm is triggered when a device error has occurred.
For the first OSSD pair, select: **Muting** = **Activated** and **Override status** = **Activated**.
Select an output for Override status.
5. Select **Automatic reset** = **Activated** for this safety laser scanner. An automatic reset occurs if an error state is detected.

6. Click on the arrow  . The next window **Configure zone sets** is opened.
7. Select **Zone set** = 3. Enter the input delay.

The pins are automatically assigned to the zone sets by PSEnscan Configurator. The assignment can be changed manually.

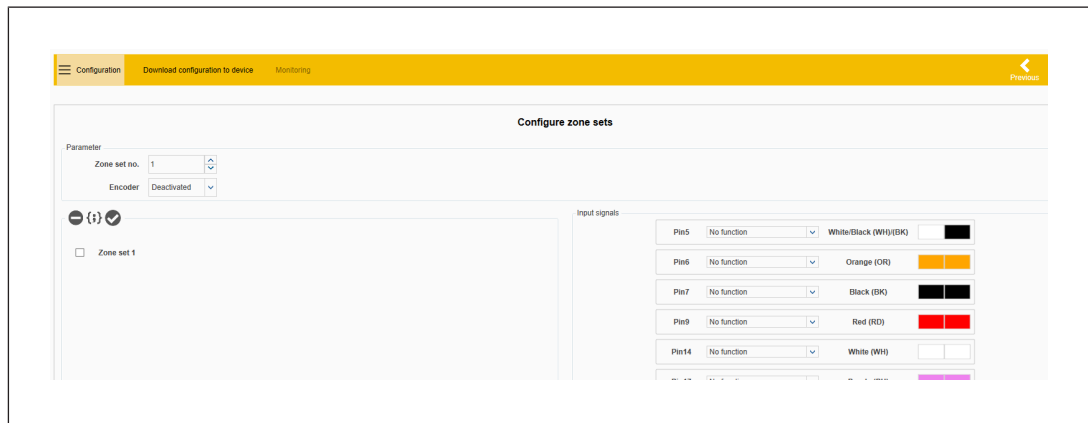
Note when mapping manually: Zone sets where a 0 or 1 is entered for all the zone switching, are not permitted.

Automatic coding using PSEnscan Configurator



Click  for automatic coding of zone sets

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



8. In the first safety zone, select the value **Manual** for **Restart** and assign a pin to the manual restart.
 In the second safety zone, select the value **Automatic** for **Restart** and define the re-start delay time (min. 80 ms).
 For both safety zones, select whether **EDM** is to be activated. If EDM is activated, a pin must be assigned to the EDM input.
 In the first safety zone, select the settings for muting.
 In the first safety zone, select **Override = Activated** and **Override mode = Edge**.
 Select 2 outputs for muting, and also for override and override mode.
 If more than one OSSD pair is configured, the settings must be selected for each OSSD pair.
9. Click on the arrow  . The next window **Configure detection capability** is opened.
10. Under **Coding: against interference**, select the code that is to be assigned to this safety laser scanner.
 The response time of the safety laser scanner is increased in relation to the relevant [increased response time per measurement cycle](#)  28 and is shown with the new value.

11. In the **Multiple evaluation field** specify the number of consecutive scans required for detection.

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

12. Select the **detection capability [mm]** for this safety laser scanner. Specify the value for each configured **Safety zone**.

Note:

The operating range of the zones changes with the change of resolution.

Operating ranges of the safety zone

Detection capability 30 mm = 2.50 m

Detection capability 40 mm = 3 m

Detection capability 50 mm = 4 m

Detection capability ≥ 70 mm = 5.50 m

Operating ranges of the warning zone

Detection capability 30 mm = 19 m

Detection capability 40 mm = 22 m

Detection capability 50 mm = 23 m

Detection capability ≥ 70 mm = 40 m

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

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



WARNING!

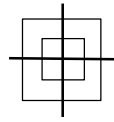
Loss of safety function due to a safety distance that is too low

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](#) [55]).
 - 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.

14. Click on the arrow . The next window **Configure zones** is opened.

Create the zones using the symbols in the tool bar on the right-hand side.



15. Click on

Specify at least 3 (max. 15) reference points. Specify a max. permitted tolerance for each reference point. **Tol -** is the tolerance for the side that faces the safety laser scanner, **Tol +** is the tolerance for the side that is facing away from the safety laser scanner.

16. In a safety laser scanner arrangement you can configure the detection capability and the zones for each subscriber unit separately.

When configuring a safety laser scanner arrangement, configure the detection capability and the zones separately for each subscriber unit.

Select the subscriber unit(s) you want to configure one after the other and configure the detection capability, the zones and the reference outlines, as required.



17. Switch the display in the work window to a live image by clicking on

Check the safety function of the safety laser scanner as indicated in [Inspection \[111\]](#).

Each time the test piece enters into the safety zone, the OSSDs must switch to the OFF state and the status of the OSSDs in the Monitoring work window must show the violation of the safety zone.

The OSSDs must switch to the OFF state each time the reference point changes beyond the tolerance range, and the status of the OSSDs in the Monitoring work window must show the changing of the reference points.

18. Select **Download configuration to device**, to transfer the configuration to the device.

Click **Accept** to activate the downloaded configuration in the connected device and reject the existing configuration on the connected device.

Save the report in PDF format.

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.

10.3.3 Example for a 17+8-pin connection with encoder inputs

Settings in the PSENscan Configurator for a safety laser scanner with 17+8-pin connection: Vertical application with reference outline monitoring, 2 OSSD pairs, muting and override for the first OSSD pair, 3 zone sets, no warning output, an alarm, manual restart, manipulation protection is active, encoder

Prerequisites

- ▶ The safety laser scanner is already connected to the 17-pin **and** the 8-pin male connector.

Procedure:

1. From the start page, select **Create new configuration**.
The **Device selection** window is displayed with a tab for **Online** and **Overview of all types**.
2. Select a PSEN sc ME 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 the application VERTICAL and **17+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**.

Safety laser scanner arrangement

You can enter a title for the safety laser scanner arrangement under **Name**.

You can enter names for the devices in the safety laser scanner arrangement under **Device**.

Click on the arrow . The next window Output configuration is opened and the number of OSSD pairs is already preset with 1x2. The next window **Output configuration**. The number of OSSD pairs is already preset with **1x2**.

4. Select **Warning zone** = 0.
One of the outputs is set to **No function**.
Pins 8 and 13 are reserved for the first OSSD pair and cannot be changed.
Select **2x2** for **OSSD**. Two of the remaining outputs are reserved for the second OSSD pair.
Select **Activated** for **Alarm 2** and select an output for the alarm.
With ALARM 1, an alarm is triggered when the front screen of the safety laser scanner is dirty (CLEANW1 is displayed on the safety laser scanner).
With ALARM 2, an alarm is triggered when a device error has occurred.
For the first OSSD pair, select: **Muting** = **Activated** and **Override status** = **Activated**.
Select an output for Override status.
5. Select **Automatic reset** = **Activated** for this safety laser scanner. An automatic reset occurs if an error state is detected.

6. Click on the arrow  . The next window **Configure zone sets** is opened.
7. Select **Zone set** = 3. Enter the input delay.

The pins are automatically assigned to the zone sets by PSEnscan Configurator. The assignment can be changed manually.

Note when mapping manually: Zone sets where a 0 or 1 is entered for all the zone switching, are not permitted.

Automatic coding using PSEnscan Configurator



Click  for automatic coding of zone sets

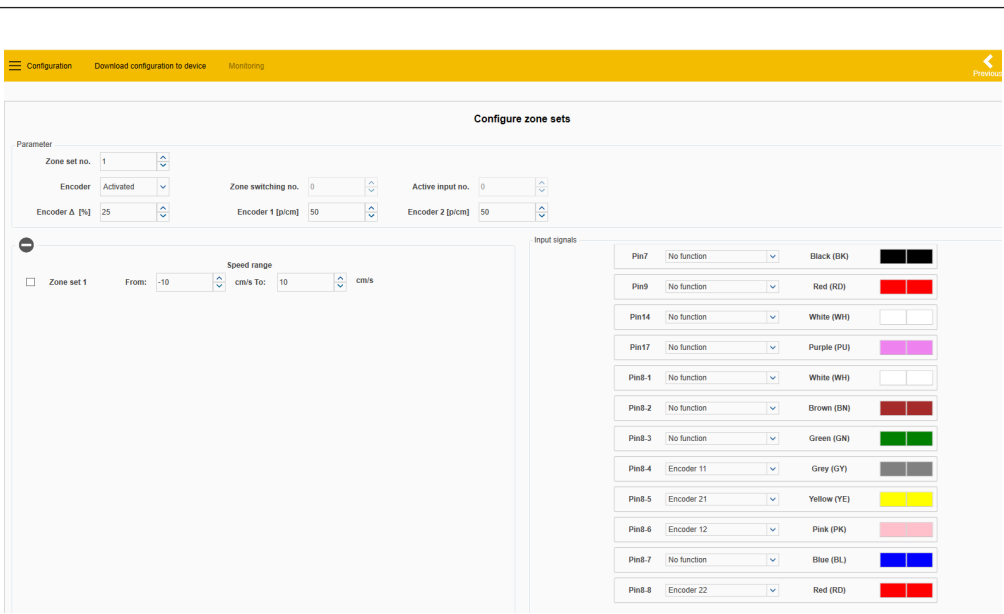
Select **Encoder** = **Activated**. The inputs for the encoders are automatically selected.

Enter with **Encoder Δ [%]** the max. deviation from rated speed in %.

For the relevant encoder, enter in **Encoder 1 [p/cm]** and **Encoder 2 [p/cm]** the number of measured values per centimetre of rotation.

For each zone set, set the **Speed range** to **cm/s**.

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



8. In the first safety zone, select the value **Manual** for **Restart** and assign a pin to the manual restart.

In the second safety zone, select the value **Automatic** for **Restart** and define the restart delay time (min. 80 ms).

For both safety zones, select whether **EDM** is to be activated. If EDM is activated, a pin must be assigned to the EDM input.

In the first safety zone, select the settings for muting.

In the first safety zone, select **Override** = **Activated** and **Override mode** = **Edge**.

Select 2 outputs for muting, and also for override and override mode.

If more than one OSSD pair is configured, the settings must be selected for each OSSD pair.

9. Click on the arrow  . The next window **Configure detection capability** is opened.

10. Under **Coding: against interference**, select the code that is to be assigned to this safety laser scanner.

The response time of the safety laser scanner is increased in relation to the relevant **Increased response time per measurement cycle**  28] and is shown with the new value.

11. In the **Multiple evaluation field** specify the number of consecutive scans required for detection.

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

12. Select the **detection capability [mm]** for this safety laser scanner. Specify the value for each configured **Safety zone**.

Note:

The operating range of the zones changes with the change of resolution.

Operating ranges of the safety zone

Detection capability 30 mm = 2.50 m

Detection capability 40 mm = 3 m

Detection capability 50 mm = 4 m

Detection capability ≥ 70 mm = 5.50 m

Operating ranges of the warning zone

Detection capability 30 mm = 19 m

Detection capability 40 mm = 22 m

Detection capability 50 mm = 23 m

Detection capability ≥ 70 mm = 40 m

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

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



WARNING!

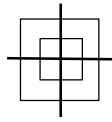
Loss of safety function due to a safety distance that is too low

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](#) [ 55]).
 - 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.

14. Click on the arrow  . The next window **Configure zones** is opened.

Create the zones using the symbols in the tool bar on the right-hand side.



15. Click on

Specify at least 3 (max. 15) reference points. Specify a max. permitted tolerance for each reference point. **Tol -** is the tolerance for the side that faces the safety laser scanner, **Tol +** is the tolerance for the side that is facing away from the safety laser scanner.

16. In a safety laser scanner arrangement you can configure the detection capability and the zones for each subscriber unit separately.

When configuring a safety laser scanner arrangement, configure the detection capability and the zones separately for each subscriber unit.

Select the subscriber unit(s) you want to configure one after the other and configure the detection capability, the zones and the reference outlines, as required.



17. Switch the display in the work window to a live image by clicking on

Check the safety function of the safety laser scanner as indicated in [Inspection](#) [111].

Each time the test piece enters into the safety zone, the OSSDs must switch to the OFF state and the status of the OSSDs in the Monitoring work window must show the violation of the safety zone.

The OSSDs must switch to the OFF state each time the reference point changes beyond the tolerance range, and the status of the OSSDs in the Monitoring work window must show the changing of the reference points.

18. Select **Download configuration to device**, to transfer the configuration to the device.

Click **Accept** to activate the downloaded configuration in the connected device and reject the existing configuration on the connected device.

Save the report in PDF format.

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.

10.4 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:

As a test piece, use an opaque object with a height of at least 300 mm and a diameter that corresponds to the selected detection capability.

- ▶ Move the test piece at various points along the limits of the safety zone into the safety zone:

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

- ▶ Switch off the safety laser scanner.

Both OSSDs have to automatically switch to the OFF state. The machine in the monitored danger zone is switched off and in cannot be started.

- ▶ Behaviour when the safety zone is free again

Remove the test piece from the safety zone.

- Automatic restart

The safety laser scanner starts automatically and the OSSDs switch to the ON state.

- Manual restart

The OSSDs remain in OFF state and they only switch to the ON state when the start pushbutton was operated for at least 0.5 s and a maximum of 5 s and released again.

Supplementary test step for vertical applications

Change the position of the reference points beyond the tolerance range of the reference points:

The OSSDs must switch to the OFF state with each change of the reference point beyond the tolerance range.

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](#) [ 38].

- ▶ 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](#)  36]) must completely secure the danger zone, 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 danger zone. The pushbutton must be located at a position from which there is a full, unobstructed view of the danger zone.

► Response time and stopping time must fulfil the requirements in [Maintaining the safety distance](#) 38].

Ensure that the safety laser scanner's response time and the machine's stopping time fulfil the requirements Maintaining the safety distance.

► 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 plane or highly reflective background within a distance of 2.5 m to the safety zone perimeter) has been considered when calculating the safety distance (see [Distance to intense light sources](#)  55]).

► Ambient conditions

Please observe the [environmental conditions](#)  55].

► Check the safety laser scanner's front panel.

– Scratched front panel: [Exchange the PSEN sc head](#).  134]

– Dirty front panel: [Clean the front panel](#)  130].

Create backup copy of a configuration

- After successfully checking the installation and configuration of the safety laser scanner, create a backup copy of the configuration.

Procedure:

- Select Project -> Save.

The dialogue box for saving is opened. Please enter a name for the MIB file.

The MIB file includes all the data for configuration.

11 Operation

11.1 Display of the monitoring status

Icon		Status	Description/measure
Valid configuration	Configuration not yet accepted		
		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. The area of violation is marked outside the semicircle with the yellow beams.
		Safety zone has been violated	A violation of the safety zone has been detected. The OSSDs are in the OFF state. The area of violation is marked outside the semicircle with the red beams.
		Change detected in the reference outline	A violation of the reference outline has been detected. The area of change is marked outside the semicircle with the blue beams. Check the cause for the change and eliminate the cause or adapt the reference outline.

11.2 Display during normal operation

Message in the display		Status	Description/measure
Icon	Text		
	ALIGN SW REQ	The firmware of the device must be updated. The OSSDs are in the OFF state.	Update the firmware [ 130].
	CLEANW2	The front panel of the safety laser scanner is contaminated and it must be cleaned to ensure normal operation.	Clean front panel

Message in the display		Status	Description/measure
Icon	Text		
	DLDNC	Download of a configuration or a report	A configuration or a report is downloaded.
	INPUTCF1	Faulty input	Faulty input, e.g. wrong number of inputs that are used for switching the zone sets.
		Error in the configuration or wiring.	Check that the wiring  73] and the configuration  97] match.
		The status of the network is checked	The status of the safety laser scanner in the network is checked.
	ITLOCK1	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.
	NOCONF	No configuration available	No configuration for the safety laser scanner could be found.
	MUTING	Muting on OSSD1 is active. The OSSDs are in the ON state.	
	OVERRIDE	Override is active.	

11.3 Diagnostic information

11.3.1 Error

Message in the display		Error/cause	Description/measure
Icon	Text		
	BKP FAILED	Creating a backup copy of a configuration has failed.	▶ Restart creating a backup copy  112] or ▶ Create a new configuration in PSEnscan Configurator  97].

Message in the display		Error/cause	Description/measure
Icon	Text		
	CLEANW1	The front panel of the safety laser scanner must be cleaned.	Clean front panel
	DEVICE EMPTY	No configuration is stored in the safety laser scanner.	► Create a new configuration in PSEnscan Configurator or ► Restore a configuration from the memory module [📖 126].
	EDM	EDM configured incorrectly.	Check the wiring of the EDM [📖 73]. Make sure that the configuration of the EDM matches the technical details of the EDM. If the error persists, please contact Pilz.
	ENC OUT OF FREQ	The pulses received from encoder 1 or encoder 2 exceed the maximum pulse frequency. The OSSDs of the safety laser scanner switch to the OFF state after the frequency has been exceeded three times.	Ensure that the max. pulse frequency is in the permitted range, as specified in the Technical details [📖 143].
	ENC ERROR	The difference between the speed values supplied by encoder 1 and encoder 2 exceeds the permitted deviation encoder Δ [%]. Or The encoders are not connected correctly.	Ensure that the deviation in speed is in the range of 25 % - 45 %.
			Check the wiring of the encoders.
	INPUTCF1	Error in the configuration or wiring.	► Check that the wiring [📖 73] and configuration [📖 97] match. ► Speed at the encoder inputs is outside the configured speed in the respective zone.
	INPUTCF2	Configuration error.	In the configuration, check the configured state transitions and switching operations. Ensure that no pulses with a length of $> 850 \mu s$ are connected to the inputs of the safety laser scanner.

Message in the display		Error/cause	Description/measure
Icon	Text		
	INTF1	An error occurred during the system test. Internal communication error.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF2	An error occurred during the system test. Internal communication integrity test failure.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF3	An error occurred during the system test. Micro integrity test failure – RAM Test.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF4	An error occurred during the system test. Micro integrity test failure – ROM Test	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF5	An error occurred during the system test. Micro integrity test failure - internal peripheral Test (Safety relevant).	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.

Message in the display		Error/cause	Description/measure
Icon	Text		
	INTF7	An error occurred during the system test. Micro integrity test failure - Function and operation test.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF8	An error occurred during the system test. Micro integrity test failure - Coherence check Up/Uw.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF9	An error occurred during the system test. Micro integrity test failure - Program Coherence check CRC failure.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF10	An error occurred during the system test. Micro-FPGA integrity test failure - Diagnostic test failure.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF11	An error occurred during the system test. FPGA integrity test failure - Internal self test failure.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.

Message in the display		Error/cause	Description/measure
Icon	Text		
	INTF12	An error occurred during the system test. FPGA power supply supervisor failure.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF13	An error occurred during the system test. Measurement integrity test failure - Internal target coherence test.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF14	An error occurred during the system test. Temperature measurement integrity check - Coherence comparison of sensors.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF15	An error occurred during the system test. Rotational speed coherence test failure.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF16	An error occurred during the system test. Dust detector integrity failure.	Perform a Reset of the safety laser scanner [127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.

Message in the display		Error/cause	Description/measure
Icon	Text		
	INTF17	An error occurred during the system test. Power supervisory failure.	Perform a Reset of the safety laser scanner [📖 127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF18	A device has been removed from an arrangement of safety laser scanners while the arrangement is in rest state or An error occurred during the system test.	Remove the device from the arrangement as described in the procedures in Activate rest condition [📖 127]. Perform a Reset of the safety laser scanner [📖 127]. Avoid external influences (using filtered supply voltage, shielded cables). If the error persists, please contact Pilz.
	INTF20	An error occurred in the connection between the devices in a safety laser scanner arrangement. Master/remote connection failure.	Ensure that the network is available. Ensure that there are suitable cables for the network connections (Order reference: Accessories [📖 151]) Check the network connections between the devices in the arrangement and the function of the subscriber unit(s). Perform a Reset of the safety laser scanner [📖 127]. If the error persists, please contact Pilz.
	MG EMPTY	No configuration is stored in the memory module.	▶ Create a new configuration in PSEnscan Configurator or ▶ Restore a configuration [📖 126].
	MG FAILURE	The memory module is faulty or not compatible with the current configuration.	▶ Create a new configuration in PSEnscan Configurator or ▶ Restore a configuration or ▶ Switch off the safety laser scanner and replace the memory module [📖 78] with a new one.

Message in the display		Error/cause	Description/measure
Icon	Text		
	MG NO MATCHING	The memory module is not compatible with the current configuration.	Switch off the safety laser scanner and replace the memory module [78] with a compatible module.
	OSSDF1	An error has occurred when testing the OSSD1.	Check the EDM state and the wiring of the OSSDs [73]. If the error persists, please contact Pilz.
	OSSDxF3	Overvoltage or an earth fault has occurred on an OSSD1.	Check the EDM state and the wiring of the OSSDs [73]. If the error persists, please contact Pilz.
	RES FAILED	Restoring a configuration has failed.	▶ Restore a configuration [126] or ▶ Create a new configuration in PSEnscan Configurator [97].
	SUB-Scriber Error	The master unit displays an error in a subscriber unit.	

11.3.2 Warnings

Message in the display		Error/cause	Description/measure
Icon	Text		
	BOOTF	An error has occurred when starting the system.	Perform a reset of the safety laser scanner [127]. If the error persists, please contact Pilz.
	INTF6	An error occurred during the system test.	Perform a reset of the safety laser scanner [127]. If the error persists, please contact Pilz.
	EXTTEMP	The ambient temperature is outside the temperature range indicated in the Technical details.	Ensure that the ambient temperature is in the temperature range specified in the Technical details [143].
	OVERTEMP	The temperature of the safety laser scanner is outside the permitted temperature range.	Ensure that the temperature of the safety laser scanner is within the temperature range specified in the Technical details [143].

Message in the display		Error/cause	Description/measure
Icon	Text		
	HIGH REFL-BKG	The reflection of the background is too strong.	Reduce the background reflection or increase the safety distance (see Distance to intense light sources and to reflective surfaces [ 55]).

11.3.3 Information

Message in the display		Error/cause	Description/measure
Icon	Text		
		The wave function is activated.	The symbol flashes. Select the safety laser scanner in PSEnscan Configurator and configure it.
	ANTITAMPERING	Protection against manipulation [ 34] has been activated.	
	BKP DONE	The backup copy of a configuration was completed successfully.	
	BKP IN PROGRESS	The backup copy of a configuration is created.	Wait until the backup copy was created successfully.
	CFG NO MATCHING	The configuration stored in the safety laser scanner does not match the configuration in the memory module.	Follow the instructions in Restore configuration [ 126].
	CHECK MASTER	A PSEN sc head is exchanged.	
	CLEANW2	The front panel of the safety laser scanner is contaminated and it must be cleaned to ensure normal operation.	Clean front panel
	COMMIT ON FIELD	A PSEN sc head was exchanged. The subsequent recommissioning must be confirmed.	Confirm the recommissioning of the safety laser scanner.
	DLDNC	Download of a configuration or a report	A configuration or a report is downloaded.

Message in the display		Error/cause	Description/measure
Icon	Text		
	DLDNF	A new firmware version is down-loaded.	
	INCOHER- ENCE	The configuration stored in the safety laser scanner does not match the configuration in the memory module.	Create a new configuration in PSEnscan Configurator [ 97].
	ITLOCK1	Safety laser scanner must be restarted	Perform a reset of the safety laser scanner [ 127].
	MUTING ERR	Could not activate muting because the specifications for activating the muting sensors were not met.	
	MUT TIMEOUT	Muting has elapsed (timeout).	
	OVERRIDE ERR	Could not activate override because the specifications for activation were not met.	
	OVR TIMEOUT	Override has elapsed.	
	RES ABORT	The user can cancel the restoring of the configuration. When the restoring was cancelled, it can be performed again or a new configuration can be created in PSEnscan Configurator.	Follow the instructions in Restore configuration [ 126].
	RES IN PRO- GRESS	The configuration in the safety laser scanner is changed to the configuration in the memory module.	Wait until the change of the configuration is complete.
	RES SHUT- OFF	The rest condition of the safety laser scanner has been deactivated.	
	RES VALIDA- TION	The restoring of the configuration in the safety laser scanner is checked. After the check is complete, you must confirm whether the restore was successful.	Wait until the check of the configuration is complete. Follow the instructions in Restore configuration [ 126].

Message in the display		Error/cause	Description/measure
Icon	Text		
	RESTORE DONE	The configuration was restored successfully.	
	SHUT-OFF	The rest condition of the safety laser scanner has been activated.	
	WAITING CONF	The safety laser scanner waits for a configuration (e.g. after restoring a configuration).	Configure the safety laser scanner (see Configuration of zones [ 97]).
	WR FAILED	Calibration of the new PSEN sc has failed.	Start the calibration of the new PSEN sc head again or exchange the PSEN sc head [ 134].

11.3.4 Log file

A series of events is stored in a log file.

The file is saved in the memory module and synchronously also in the safety laser scanner.

- ▶ Events at the safety outputs (violations of the safety zone)
- ▶ Events at the inputs for muting and override
- ▶ Error
- ▶ Updates (firmware, configurations etc.)
- ▶ Restoring of configurations
- ▶ Current configuration of zone sets
- ▶ Exchange of PSEN sc head

The log file is saved in csv format.

An entry is created in the log file for each logged event.

Format of the entries:

<Date> <Time> <Event type <Details on the event>

Example of a mistake:

10-Sep-20 5:24:30 PM;FAULT;FAULT INPUTCF2

Create log file

Procedure:

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

The network is searched for connected PSEN sc ME 5.5 08-17.

Connected PSEN sc ME 5.5 08-17 are listed under **Network environment**.

Select the safety laser scanner for which you want to log the events.

2. Select **Device -> Read from device -> Open protocol file in PSENscan memory**.

The requirement must be confirmed by entering the password. The safety laser scanner switches to **Out of operation**. Click OK to continue.

Select the directory in which the file is to be saved.

3. The safety laser scanner display is dark. A red LED is lit.
4. When creating the log file is finished, a message is output. Click OK to continue.

The safety laser scanner switches to **In operation**.

5. You can now open the log file.

In Windows explorer, switch to the directory you selected when saving the log file and open the log file on a text editor.

11.4 Text messages in the display

With the buttons under the display of PSEN sc ME 5.5 08-17 you can navigate in the message in the display.

	Confirm message in the display and open the next menu level or exit the last menu level
	Scroll down
	Scroll up

The LC display shows information and navigates the menu with the sections Information, Setting and Exit.

Information

Menu item	Menu second level	Meaning
Hardware		Device-specific displays
	Device name	The name of PSEN sc ME 5.5 08-17 is displayed.
	Product name	The product type of PSEN sc ME 5.5 08-17 is displayed.
	Order number	The order number of PSEN sc ME 5.5 08-17 is displayed.
	Serial number	The serial number of PSEN sc ME 5.5 08-17 is displayed.
	Firmware version	The firmware version of PSEN sc ME 5.5 08-17 is displayed.
	Device Lifetime (h)	The current operating time of PSEN sc ME 5.5 08-17 in hours is displayed
Configuration		Configuration-specific displays
	Configuration name	The name is displayed under which the configuration was saved in PSENscan Configurator.
	Check sum	The check sum is displayed that was created when saving the configuration.
	Last saved date	Date of last modification of the project
	IP address	The first IP address of the PSEN sc ME 5.5 08-17 is displayed.
	MAC address	The MAC address of the PSEN sc ME 5.5 08-17 is displayed.

Setting

Menu item	Menu second level	Meaning
Display settings		
	Rotate	The display is rotated.
Reset PSENscan		Confirming starts a reset of the PSEN sc ME 5.5 08-17.

Exit

Exit menu in the display.

11.5 Restore configuration

Prerequisites

- ▶ The memory module is installed correctly.
- ▶ The pin assignment must be compatible with the data in the memory module.
- ▶ The correct configuration for the application is ready on the memory module.

One of the following conditions must be met.

- ▶ The MIB files in PSEN sc ME 5.5 08-17 and in the memory module are different.
- ▶ The topologies in PSEN sc ME 5.5 08-17 and in the memory module are different.
- ▶ The serial numbers saved in PSEN sc ME 5.5 08-17 and in the memory module are different.

Procedure:

1. Switch the safety laser scanner on.

The system checks whether the conditions are met. When the conditions are met, restoring of the configuration is started.

2. Depending on the type of difference between memory module and PSEN sc ME 5.5 08-17 the restoring of the configuration varies.

Serial numbers differ: On the display of the master unit, CFG NO MATCHING is shown. Continue by selecting the data for the restoring.

Topology or MIB files vary: On the display of the master unit WAITING CONF is shown. Continue the configuration in PSENscan Configurator.

3. Use the buttons on the display of the master unit to select the data to be used for restoring.

Display master unit:

Restore cfg: The configuration in the memory module is used. Confirm the selection with **Confirm** and the configuration is copied from the memory module to the PSEN sc ME 5.5 08-17. Continue checking the configuration.

cfg from GUI: The new configuration created in the PSENscan Configurator is used. Confirm your selection with **Confirm** and continue with Create new configuration in PSENscan Configurator.

4. Display master unit: **Confirm / Cancel**
Display subscriber unit: CHECK MASTER
Confirm your entry with **Confirm**
5. Checking the configuration
Display master unit: RES FAILED. Could not copy the configuration successfully. Continue by selecting the data for the restoring.
Display master unit: RUN TEST MODE
On the display of the master unit, select **Enter Test**. Test operation starts. Continue with accept or reject configuration.
6. Accept or reject configuration
Test operation is complete.
Select **Validate conf** to accept the configuration. The safety laser scanner is ready for operation again.
Select **Reject conf** to reject the configuration. Continue by selecting the data for the restoring.
7. Create new configuration in the PSEnscan Configurator
Display master unit: WAITING CONF
Display subscriber unit: CHECK MASTER
Configure the safety laser scanner in the PSEnscan Configurator.

11.6 Reset

With the reset function, the safety laser scanner can be set to normal operation when the safety laser scanner is in an error state, and the error was rectified.

Procedure:

Hold the reset pushbutton down for at least 500 s.

11.7 Activate rest condition

Prerequisites

- ▶ At least two zone sets are configured.
- ▶ No safety or warning zones are configured in the respective zone set.

Procedure:

1. Select the Configure zone sets window.
Select **Rest condition = Activated**.
2. The display of the safety laser scanner shows for 30 seconds that the rest condition is started.
Then the display switches to the energy saving mode and the LEDs will go out.

Remove device from the safety laser scanner arrangement

If a device is removed from a safety laser scanner arrangement while this arrangement is in a rest state, error message INTF18 is displayed when the arrangement is switched on.

Switch off the arrangement again, deactivate the rest state in the configuration and switch the arrangement back on.

The master unit displays the error INTF18, the subscriber units are in normal operation.

Now change the structure of the safety laser scanner arrangement.

11.8 Deactivate rest condition

Procedure:

1. Select the Configure zone sets window.
Select **Rest condition = Deactivated**.
2. After approx. 30 seconds the safety laser scanner is again in normal operation.
The display and the LEDs of the safety laser scanner show normal operation.

12 Cleaning, checks and maintenance

12.1 Cleaning

The front panel and the underside of the metal cover on the upper side of the safety laser scanner need to be cleaned regularly. The frequency depends on the environmental conditions.



INFORMATION

Reduced availability by improper cleaning agents

Improper cleaning agents can damage the front screen and lead to faulty shutdowns.

- Use only the cleaning agents specified.

Contact Pilz and [exchange the PSEN sc head](#)  [134](#) if the front panel is scratched.

Contamination	Cleaning
Finger marks	Dampen PSEN sc cloth with PSEN sc cleaner (see order reference  151) and clean the front panel in one go without rubbing
Sticking particles	Dampen PSEN sc cloth with PSEN sc cleaner (see order reference  151) and clean the front panel in one go without rubbing
Loose, non-chafing particles	▶ Vacuum or gently blow away the particles without touching ▶ Remove particles using PSEN sc cloth in one go without rubbing
Loose, chafing particles	1. Vacuum or gently blow away the particles without touching 2. Remove particles using PSEN sc cloth in one go without rubbing
Oil drops	Dampen PSEN sc cloth with PSEN sc cleaner (see order reference  151) and clean the front panel in one go without rubbing
Statically charged particles	1. Vacuum particles without touching 2. Dampen PSEN sc cloth with PSEN sc cleaner (see order reference  151) and clean the front panel in one go without rubbing

12.2 Checks

12.2.1 Regular check

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

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

► Check the safety laser scanner's front panel:

- Scratched front panel: [Exchange the PSEN sc head](#)  134].
- Dirty front panel: [Clean the front panel](#)  129].

In a particularly dirty environment, the front panel should be checked for dirt more frequently.

- Ensure there are no fixed objects in the safety zone.
- Check the tightness of the safety laser scanner.

All screws must be tightened to the torque specified in the [Technical details](#)  143].

- Check the safety function of the safety laser scanner (see [Check the safety function of the safety laser scanner](#)  111]).

12.2.2 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](#)  155] which should help you perform the safety check.

12.3 Maintenance

12.3.1 Update firmware

The firmware of the safety laser scanner can be updated.

The update is started in PSENscan Configurator.

Prerequisites

- You have the authorisation to update the firmware.
- The current firmware is available on the configuration PC.

A current firmware can be provided by the Technical Support. Please contact Pilz.

Procedure:

1. Select a device under **Network environment**.

The following information is shown in the work window:

Device type

Configuration

Firmware version

Device status

Device IP address

2. Select **Device -> Firmware update**.

Enter the password and log on to the safety laser scanner.

3. Click on **Select** and, in the directory in which the current firmware is saved, select the package that is to be loaded.

A report showing information on the selected package is displayed in the **Firmware update** work window.

4. Click on **Download** under **Load configuration** to load the selected package.

The safety laser scanner switches to offline while the package is being loaded.

5. Switch to the offline check mode when the firmware was loaded successfully. Create a configuration and check the new firmware version.

[Perform a complete reset of the safety laser scanner. !\[\]\(f68066c94df598c855e579e69e85af35_img.jpg\) 111](#)

6. Click **Accept**, when the firmware works correctly or **Reject**, when the firmware does not work correctly.

12.3.2 Exchange of a memory module

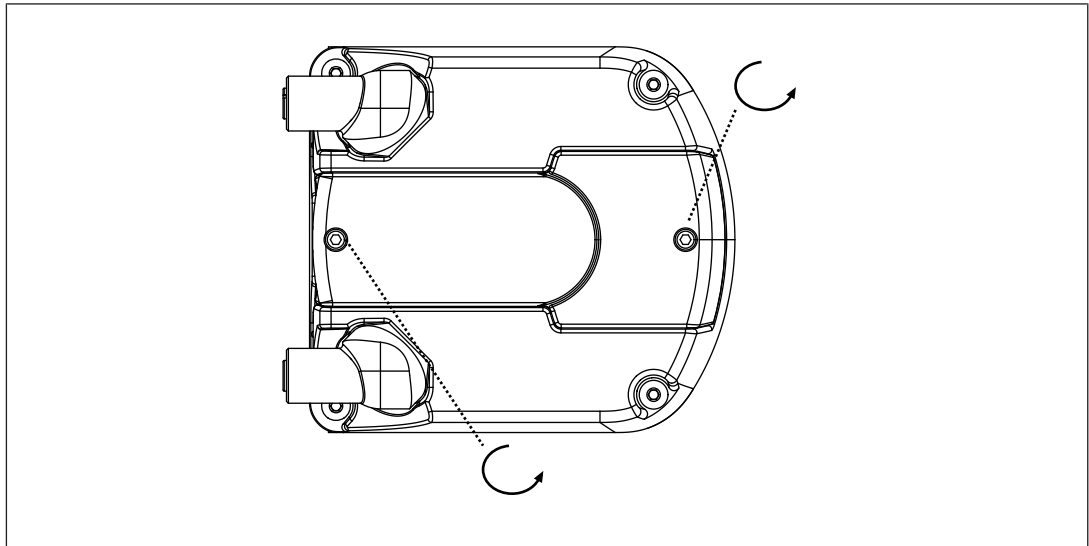
When exchanging a memory module, you can use a memory module without saved configuration or a memory module where a configuration is already saved. This configuration can be restored for use in the safety laser scanner.

Note:

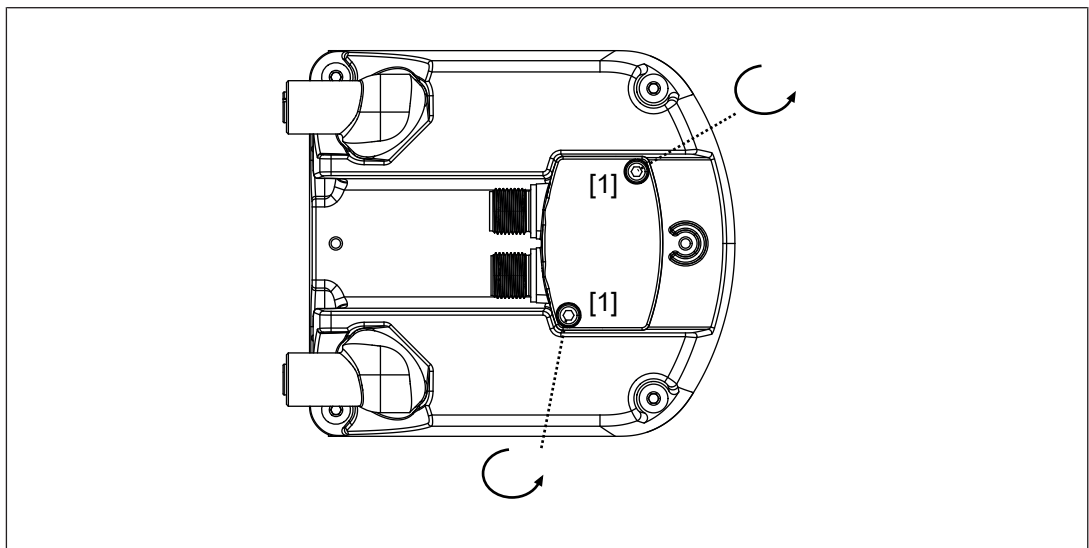
The memory module must only be uninstalled when the supply voltage is switched off.

Procedure:

1. Switch off the safety laser scanner.
2. Turn the safety laser scanner PSEN sc ME 5.5 08-17 for better access to the memory module.
3. Loosen the M3 screws of the protective cover and remove the protective cover.
The screws are secured against loss and they cannot be removed.



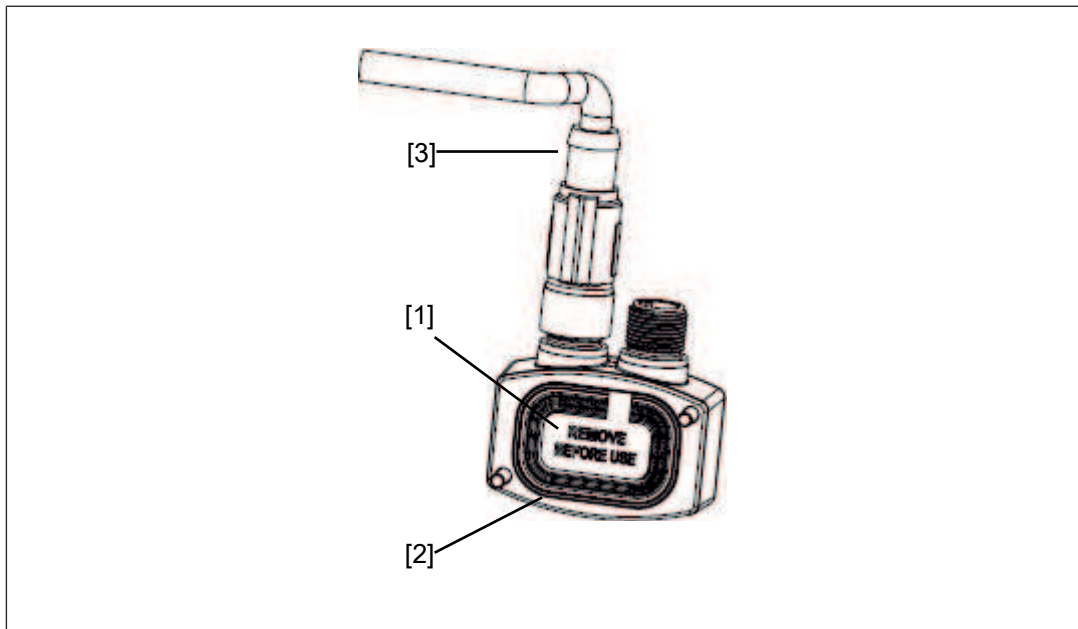
4. Loosen the M3 screws [1] of the memory module and pull out the memory module.
The screws are secured against loss and they cannot be removed.



Legend

[1] M3 screws for attaching the memory module

5. Connect the supply voltage and the safety controller to the 17-pin socket on the memory module.
6. Remove the protective membrane [1] from the memory module and insert the memory module at the safety laser scanner.



Legend

- [1] Protective membrane
- [2] Memory module
- [3] Cable with connector

7. Screw the memory module with 1 Nm.
8. Place the protective cover at the safety laser scanner and screw the protective covers with 1 Nm.
9. Switch the safety laser scanner on.

The system checks whether the conditions are met. When the conditions are met, restoring of the configuration is started.

10. Depending on the type of difference between memory module and PSEN sc ME 5.5 08-17 the restoring of the configuration varies.

Serial numbers differ: On the display of the master unit, CFG NO MATCHING is shown. Continue by selecting the data for the restoring.

Topology or MIB files vary: On the display of the master unit WAITING CONF is shown. Continue the configuration in PSENscan Configurator.

11. Use the buttons on the display of the master unit to select the data to be used for restoring.

Display master unit:

Restore cfg: The configuration in the memory module is used. Confirm the selection with **Confirm** and the configuration is copied from the memory module to the PSEN sc ME 5.5 08-17. Continue checking the configuration.

cfg from GUI: The new configuration created in the PSENscan Configurator is used. Confirm your selection with **Confirm** and continue with Create new configuration in PSENscan Configurator.

12. Display master unit: **Confirm / Cancel**

Display subscriber unit: CHECK MASTER

Confirm your entry with **Confirm**

13. Checking the configuration

Display master unit: RES FAILED. Could not copy the configuration successfully. Continue by selecting the data for the restoring.

Display master unit: RUN TEST MODE

On the display of the master unit, select **Enter Test**. Test operation starts. Continue with accept or reject configuration.

14. Accept or reject configuration

Test operation is complete.

Select **Validate conf** to accept the configuration. The safety laser scanner is ready for operation again.

Select **Reject conf** to reject the configuration. Continue by selecting the data for the restoring.

15. Create new configuration in the PSENscan Configurator

Display master unit: WAITING CONF

Display subscriber unit: CHECK MASTER

Configure the safety laser scanner in the PSENscan Configurator.

12.3.3 Exchange PSEN sc head



NOTICE

Error exchanging the PSEN sc head

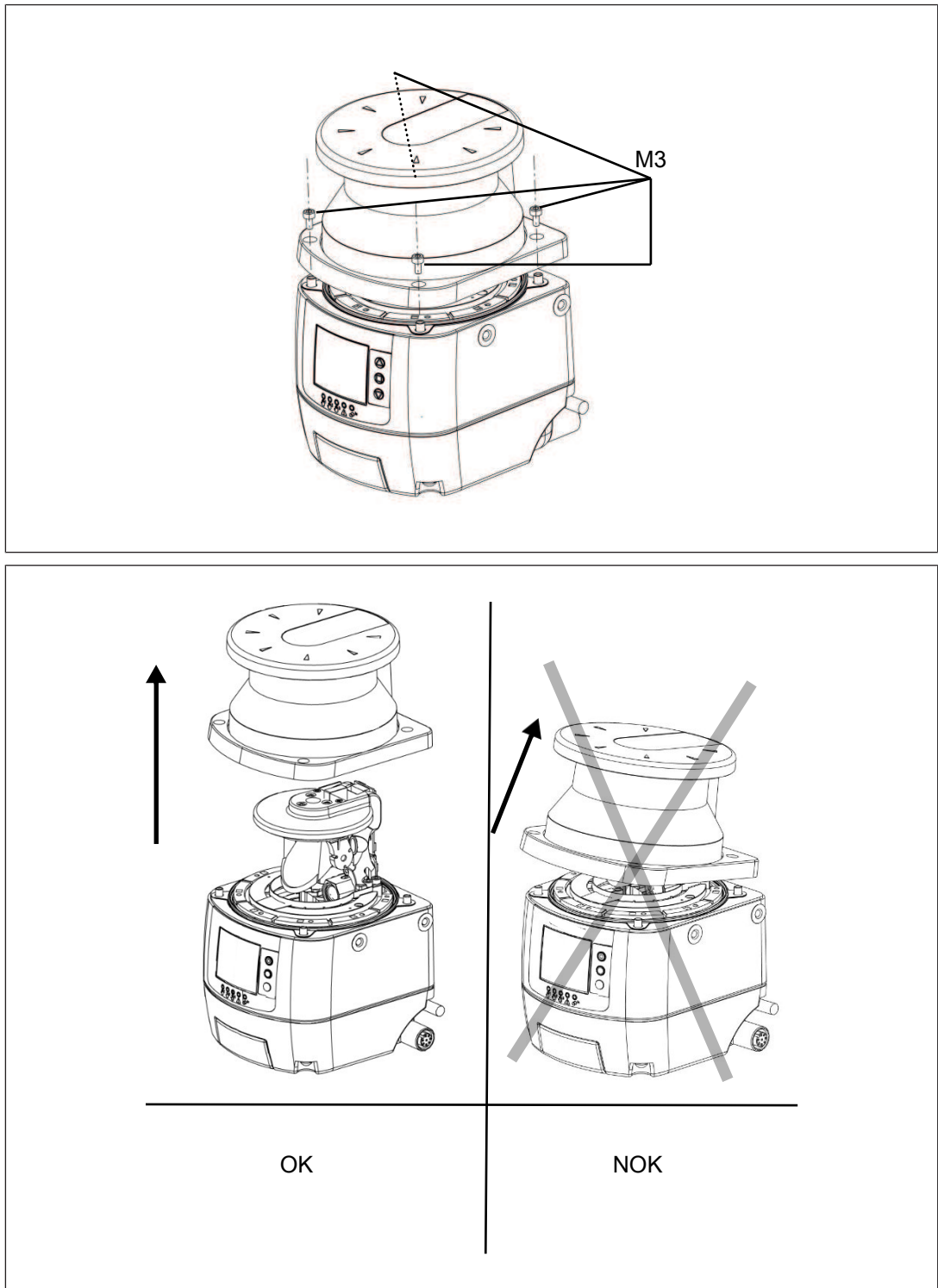
If PSEN sc head is incorrectly installed, this may lead to a not suitable behaviour of the safety laser scanner.

Prerequisites

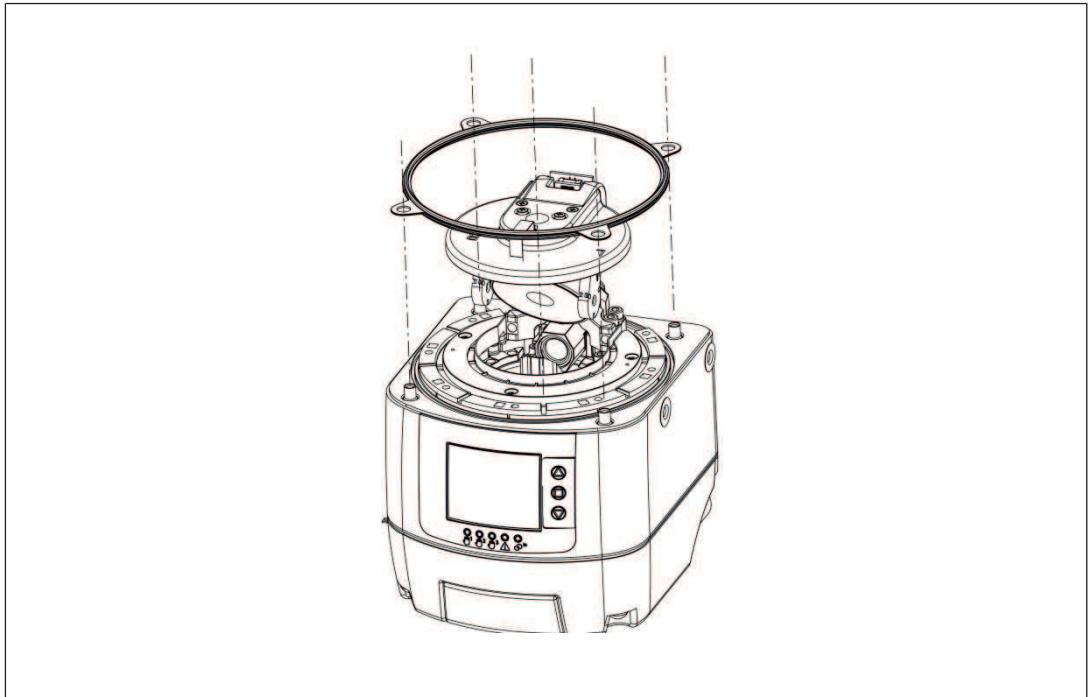
- ▶ In the serial number of the safety laser scanner (see [Identification](#) [ 158]) at least 2021 is specified as year of manufacture.
The serial number has the format XYYM#####.
YY must be ≥ 21 .
- ▶ A firmware version 3.1.1 or newer is installed on the device.
- ▶ The exchange of PSEN sc head is done only by qualified personnel
- ▶ The machine in the danger zone is switched off and protected against switching on again.
- ▶ The new PSEN sc head is dry and dust-free
- ▶ Safety laser scanner is dry and dust-free
- ▶ Exchange of the PSEN sc head takes place in a controlled and pollutant-free environment
 - Temperature between 18 and 30° C
 - Relative humidity < 80%
- ▶ Within a radius of 275° around the safety laser scanner an area of 2 m must remain free.
- ▶ Ensure that the front screen of the new PSEN sc head is not damaged when the PSEN sc head is installed.
- ▶ Use clean, thin gloves to install the PSEN sc head.
- ▶ Do not touch the front screen.
- ▶ During installation, hold the PSEN sc head by the metal cover on the upper side of the PSEN sc head.
- ▶ Required tool: Hexagon socket torque wrench 2.5 mm with long shaft

Procedure:

1. Check the scope of delivery of the new PSEN sc head.
Content of the package:
 - 1 new PSEN sc head
 - 1 seal
 - 4 M3 screws
2. Undo the four M3 screws on the PSEN sc head (see figure) and remove the PSEN sc head vertically upwards (see figures).



3. Replace the old seal with the new seal. Ensure that the new seal is seated correctly in the seal seat.

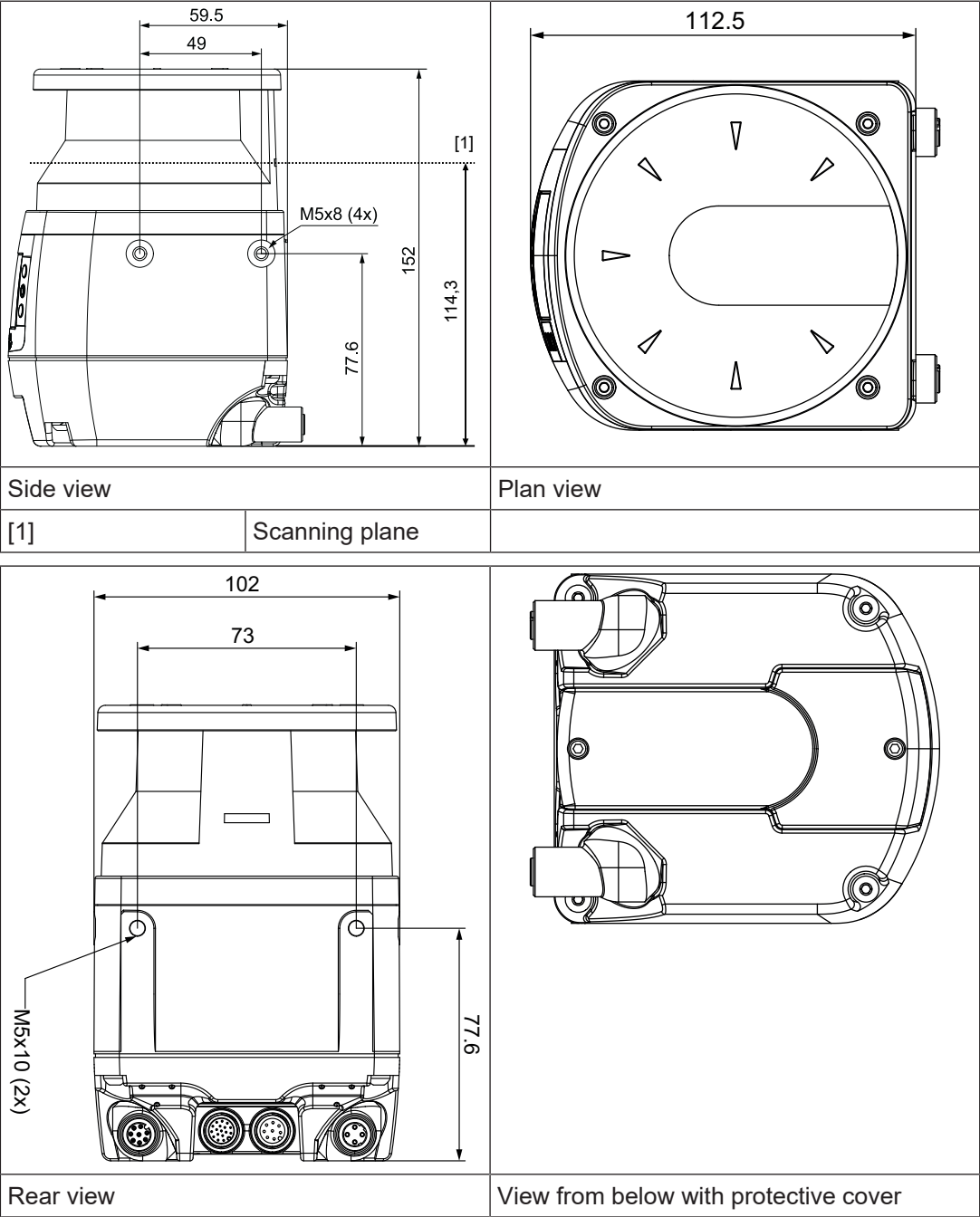


4. Check whether the interior of the safety laser scanner is free from contaminations.
Use dry compressed air for cleaning, if necessary.
5. Place the new PSEN sc head carefully on the lower part of the safety laser scanner.
Make sure that the new PSEN sc head is horizontally on the base of the safety laser scanner.
6. Fix the PSEN sc head with the four M3 screws and tighten the screws with 0.6 Nm.
7. Install the safety laser scanner again as it was before the removal of PSEN sc head.
Note the previous installation position, the wiring and the configuration of the safety laser scanner.
8. Switch the safety laser scanner on.
9. Create a connection to the safety laser scanner in the PSENscan Configurator.
If you have exchanged the PSEN sc head on a subscriber unit, establish the connection to the subscriber unit's master unit.
10. In PSENscan Configurator select **Device -> Exchange PSEN sc head**.
Enter the password for the safety laser scanner and follow the instructions.
11. Select the device with the exchanged PSEN sc head and enter the serial number of the new PSEN sc head.
12. Calibration of the new PSEN sc starts.
The safety laser scanner switches to offline and then into a state for checking the safety laser scanner. A warning is displayed.
13. The calibration of the new PSEN sc head is complete and it must be assessed.
14. Check the safety function of the safety laser scanner with a detection capability of 40 mm at a distance of 1 m to the safety laser scanner over the complete scanning area of 275° (see [Check the safety function of the safety laser scanner](#) [111]).

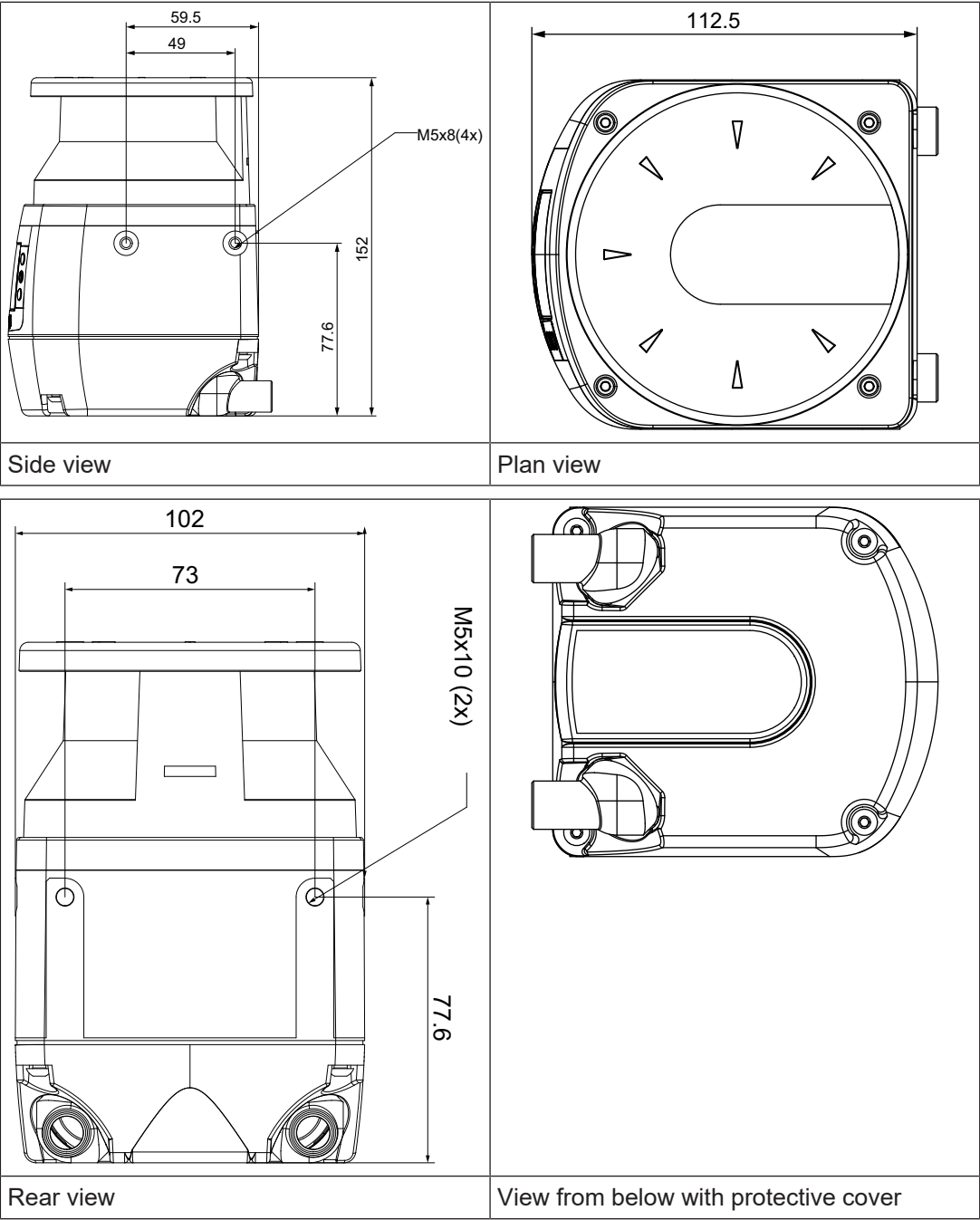
15. Switch off the safety laser scanner.
16. The OSSDs of the safety laser scanner switch to the OFF state.
Make sure that the danger zone cannot be used.
17. Switch the safety laser scanner on.
18. Click **Reject** or **Accept** to complete the calibration.
Click **Accept** to activate the downloaded 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.
19. The display of the safety laser scanner shows: COMMIT ON FIELD
20. In PSEnscan Configurator select **Device -> Exchange PSEN sc head**.
Confirm the exchange of PSEN sc head with **Finish**.

13 Dimensions

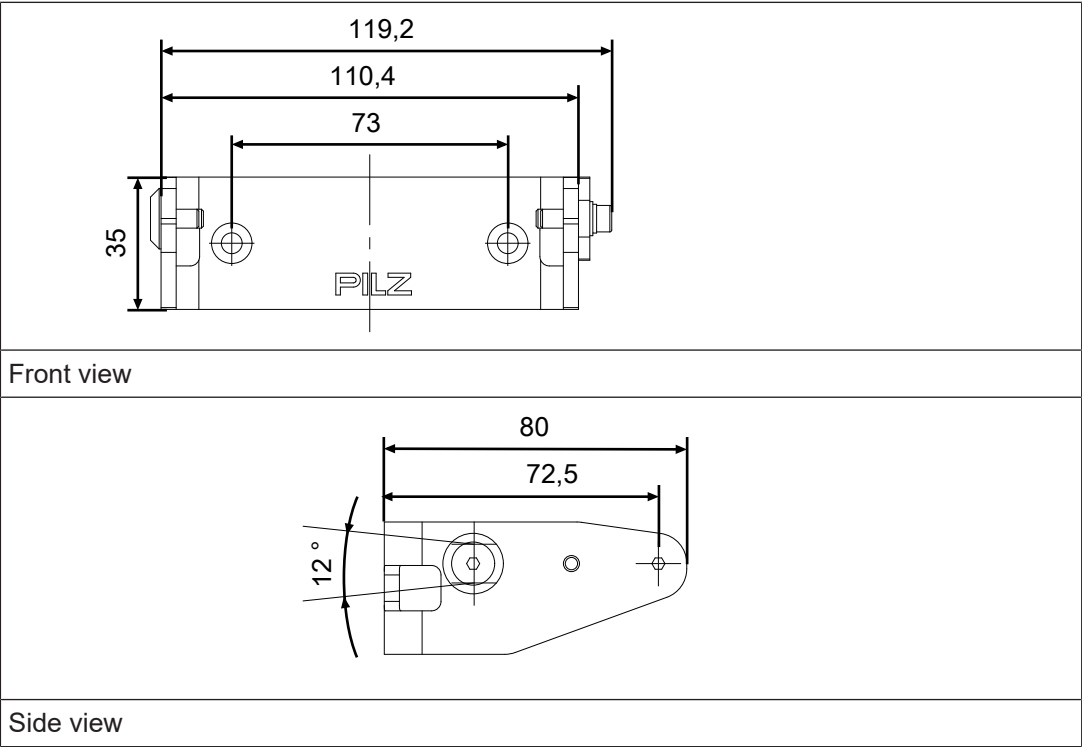
Master unit



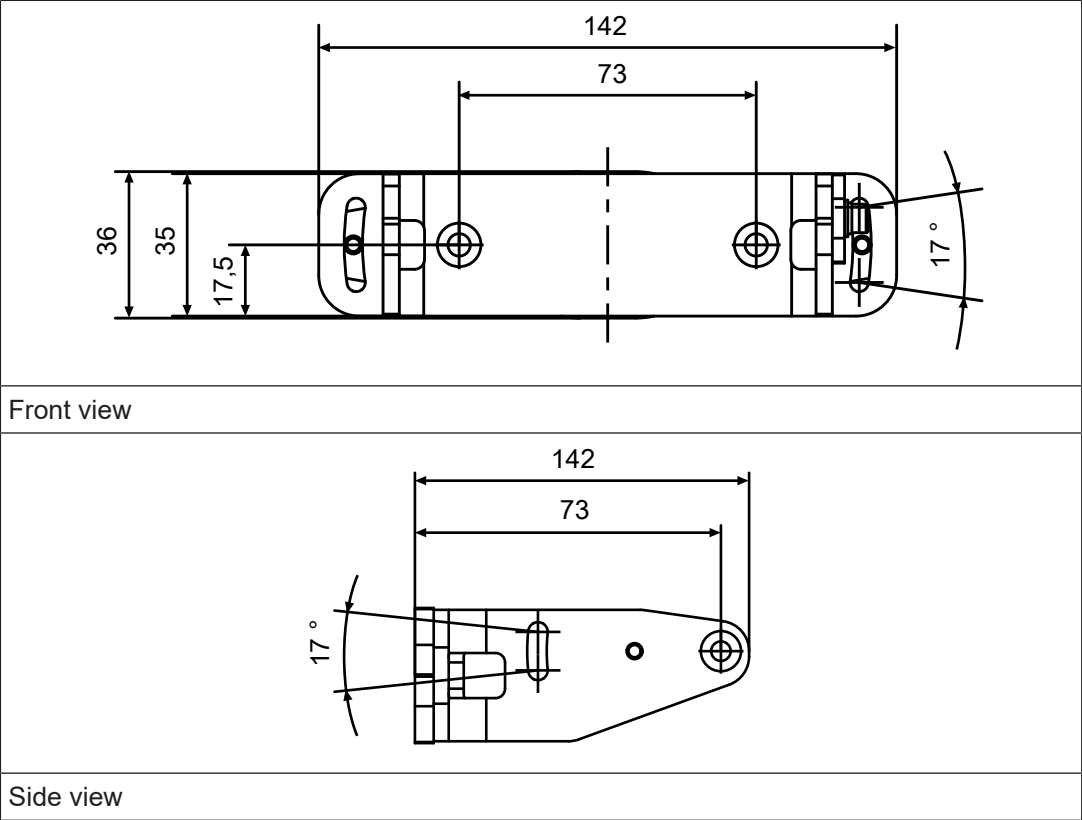
Subscriber unit



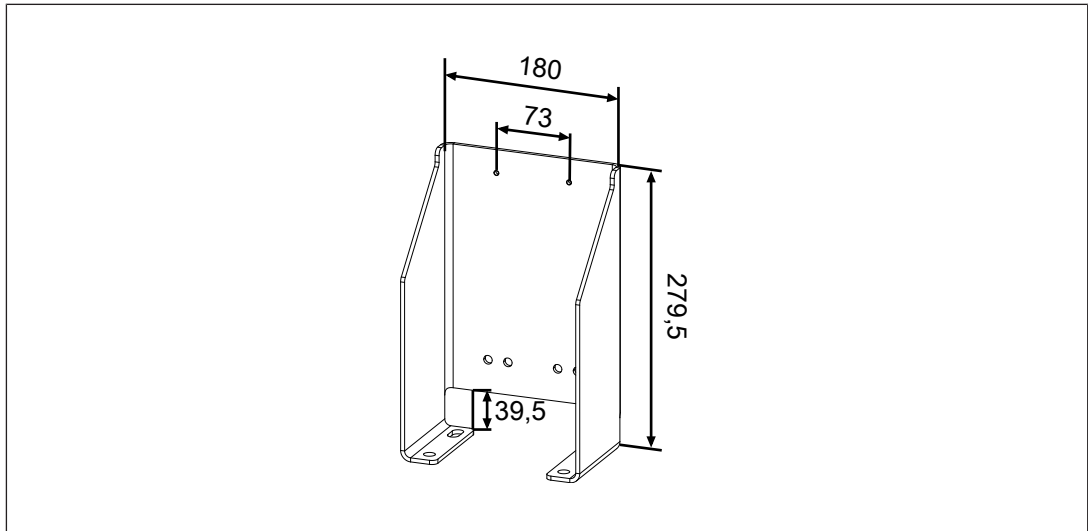
PSEN sc bracket P



PSEN sc bracket PR



PSEN sc bracket F



14 Technical details order no. 6D000034

General	
Certifications	CE, EAC, TÜV, UKCA, cULus Listed
ESPE type	3
Product type	Master
Sensor's mode of operation	Optical
Resolutions	30 mm, 40 mm, 50 mm, 70 mm, 150 mm
Number of zone sets that can be switched	70
Operating range	
Warning zone	19 m/resolution 30 mm, 22 m/resolution 40 mm, 23 m/resolution 50 mm, 40 m/resolution 150 mm, 40 m/resolution 70 mm
Safety zone	2.50 m/resolution 30 mm, 3 m/resolution 40 mm, 4 m/resolution 50 mm, 5.5 m/resolution 150 mm, 5.5 m/resolution 70 mm
Number of simultaneously monitored safety zones	3
Number of simultaneously monitored zones	3
Number of zone configurations	70
Electrical data	
Supply voltage	
Voltage	24 V
Kind	DC
Voltage tolerance	-20 %/+25 %
Output of external power supply (DC)	8 W
Max. output power	27 W
Residual ripple DC	5 %
Max. inductive load per output	2 H
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 of multiple evaluations	16
Detectable remission area	1,8 - 1.000 %
Pulse duration	3 ns
Typical output power laser	8 mW
Inputs	
Number of configurable inputs	8
Number of configurable inputs/outputs	2
Number of speed inputs	4
Signal level at g0 h	< 5 V

Inputs	
Signal level at "1"	> 12 V
Voltage at inputs	24 V
Current per input	2 mA
Input resistance	12 kOhm
Semiconductor outputs	
OSSD safety outputs	6
Number of configurable outputs	2
Number of configurable inputs/outputs	2
Residual current at "0" signal	< 700 µA
Output voltage at "1" signal	17,2 V
Output voltage at "0" signal	0 V
Max. output current at rated voltage	250 mA
Max. capacitive load	2,2 µF
Ethernet interface	
Quantity	1
Connection type	M12x1, 4-pin, D-code
Transmission rate	100 MBit/s
Times	
Max. test pulse duration, safety outputs	300 µs
Switch-on delay	
after UB is applied	120 s
Increased response time per measurement cycle	30 ms
Response time t1	62 ms
Rotation time	30 ms
Environmental data	
Ambient temperature	
Temperature range	-10 - 50 °C
Storage temperature	
Temperature range	-20 - 70 °C
Climatic suitability	
Humidity	max. 95 %
Condensation during operation	Not permitted
Max. operating height above SL	2000 m
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

Environmental data

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, 17-pin male connector, 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 2019-07 latest editions shall apply.

15 Technical details order no. 6D000020-6D000021

General	6D000020	6D000021
Certifications	CE, EAC, TÜV, UKCA, cULus Listed	CE, EAC, TÜV, UKCA, cULus Listed
ESPE type	3	3
Product type	Subscriber	Subscriber
Sensor's mode of operation	Optical	Optical
Resolutions	30 mm, 40 mm, 50 mm, 70 mm, 150 mm	30 mm, 40 mm, 50 mm, 70 mm, 150 mm
Number of zone sets that can be switched	10	10
Operating range		
Warning zone	19 m/resolution 30 mm, 22 m/resolution 40 mm, 23 m/resolution 50 mm, 40 m/resolution 150 mm, 40 m/resolution 70 mm	19 m/resolution 30 mm, 22 m/resolution 40 mm, 23 m/resolution 50 mm, 40 m/resolution 150 mm, 40 m/resolution 70 mm
Safety zone	2.50 m/resolution 30 mm, 3 m/resolution 150 mm, 3 m/resolution 40 mm, 3 m/resolution 50 mm, 3 m/resolution 70 mm	2.50 m/resolution 30 mm, 3 m/resolution 40 mm, 4 m/resolution 50 mm, 5.5 m/resolution 150 mm, 5.5 m/resolution 70 mm
Number of simultaneously monitored safety zones	1	1
Number of simultaneously monitored zones	2	2
Number of zone configurations	10	10
Electrical data	6D000020	6D000021
Supply voltage		
Voltage	24 V	24 V
Kind	DC	DC
Voltage tolerance	-20 %/+25 %	-20 %/+25 %
Output of external power supply (DC)	8 W	8 W
Max. output power	27 W	27 W
Residual ripple DC	5 %	5 %
Max. inductive load per output	2 H	2 H
Protection class	3	3
Optical data	6D000020	6D000021
Diameter light spot on front plate	8 mm	8 mm
Used wavelength range	905 nm	905 nm
Laser class (DIN EN 60825-1)	1	1
Scan area	275°	275°
Max. opening angle scanner	0,12°	0,12°
Angle resolution	0,1°	0,1°
Max. number of multiple evaluations	16	16
Detectable remission area	1,8 - 1.000 %	1,8 - 1.000 %
Pulse duration	3 ns	3 ns

Optical data	6D000020	6D000021
Typical output power laser	8 mW	8 mW
Inputs	6D000020	6D000021
Signal level at g0 h	< 5 V	< 5 V
Signal level at "1"	> 12 V	> 12 V
Voltage at inputs	24 V	24 V
Current per input	2 mA	2 mA
Input resistance	12 kOhm	12 kOhm
Semiconductor outputs	6D000020	6D000021
Residual current at "0" signal	< 700 µA	< 700 µA
Output voltage at "1" signal	17,2 V	17,2 V
Output voltage at "0" signal	0 V	0 V
Max. output current at rated voltage	250 mA	250 mA
Max. capacitive load	2,2 µF	2,2 µF
Ethernet interface	6D000020	6D000021
Quantity	1	1
Connection type	M12x1, 4-pin, D-code	M12x1, 4-pin, D-code
Transmission rate	100 MBit/s	100 MBit/s
Times	6D000020	6D000021
Max. test pulse duration, safety outputs	300 µs	300 µs
Switch-on delay after UB is applied	120 s	120 s
Increased response time per measurement cycle	30 ms	30 ms
Response time t1	62 ms	62 ms
Rotation time	30 ms	30 ms
Environmental data	6D000020	6D000021
Ambient temperature		
Temperature range	-10 - 50 °C	-10 - 50 °C
Storage temperature		
Temperature range	-20 - 70 °C	-20 - 70 °C
Climatic suitability		
Humidity	max. 95 %	max. 95 %
Condensation during operation	Not permitted	Not permitted
Max. operating height above SL	2000 m	2000 m
Vibration		
in accordance with the standard	EN 60068-2-6	EN 60068-2-6
Frequency	10 - 55 Hz	10 - 55 Hz
Amplitude	0,35 mm	0,35 mm

Environmental data	6D000020	6D000021
Shock stress		
in accordance with the standard	EN 60068-2-27	EN 60068-2-27
Number of shocks	1000	1000
Acceleration	10g	10g
Duration	16 ms	16 ms
Protection type		
Housing	IP65	IP65
Deviation from ideal flatness of the scan field at max. operating range	50 mm	50 mm
Mechanical data	6D000020	6D000021
Distance scanning plane to top edge	37,7 mm	37,7 mm
Distance mirror rotational axis to the rear	52,5 mm	52,5 mm
Material		
Housing	Aluminium	Aluminium
Top	PC	PC
Front screen	PMMA	PMMA
Max. torque setting		
Fixing screw	3 Nm	3 Nm
Adjusting screw for angle of inclination	2,5 Nm	2,5 Nm
PSEN sc Memory	1 Nm	1 Nm
Dimensions		
Height	152 mm	152 mm
Width	102 mm	102 mm
Depth	112,5 mm	112,5 mm
Weight	1.530 g	1.530 g

Where standards are undated, the 2019-07 latest editions shall apply.

16 Safety characteristic data



NOTICE

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

Operating mode	EN ISO 13849-1: 2015	EN ISO 13849-1: 2015	EN IEC 62061 SIL CL/max.	EN IEC 62061 61508	EN/IEC 61511 61508	EN/IEC 61511 61508	EN ISO 13849-1: 2015
	PL	Category	SIL	PFH _D [1/h]	SIL	PFD	T _M [year]
2-ch. OSSD	PL d	Cat. 3	SIL CL 2	6,38E-08	SIL 2	–	20

Explanatory notes for the safety-related characteristic data:

- T_M is the maximum mission time in accordance with EN ISO 13849-1. The value also applies as the retest interval in accordance with EN/IEC 61508-6 and EN/IEC 61511 and as the proof test interval and mission time in accordance with EN IEC 62061

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



INFORMATION

A safety function's SIL/PL values are **not** identical to the SIL/PL values of the units that are used and may differ from these.

17 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 Information for data exchange

18 Order reference

18.1 System

Product type	Features	Order no.
PSEN sc ME 5.5 08-17	Safety laser scanner, operating range 5.5 m, master unit, M12, 8/17-pin, encoder	6D000034
PSEN sc S 3.0 08-12	Safety laser scanner, range 3 m, subscriber unit	6D000020
PSEN sc S 5.5 08-12	Safety laser scanner, range 5.5 m, subscriber unit	6D000021

18.2 Accessories

Installation material

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	6D000002
PSEN sc bracket P	Mounting bracket for setting the tilt of the angle of inclination	6D000003
PSEN sc bracket C	Mounting bracket for corner mounting	6D000011
PSEN sc bracket F	Mounting bracket for floor mounting	6D000010
PSEN sc bracket H	Accessory for protection of the head part	6D000004
PSEN sc head	Spare for head part	6D000007
PSEN sc memory M12 17-08	Memory module 17- and 8-pin, M12	6D000005
PSEN sc cleaner	Antistatic cleaning agent	6D000008
PSEN sc cloth	Cleaning cloth	6D000009

Measuring systems

Product type	Features	Order no.
PSEN enc HTL 102 4 ss	1024 pulses/rotation, HTL, solid shaft	6Z000003
PSEN enc HTL 102 4 hs	1024 pulses/rotation, HTL, solid shaft	6Z000004

Muting

Product type	Features	Order no.
PIT si2.1 LED muting lamp	LED signal lamp for muting mode	620015

18.2.1 Cable

Master – subscriber connection, shielded

Product type	Features	Connector X1	Connector X2	Connector X3	Order no.
PSEN sc cable CAT5e M12-8sm/ M12-8sm, 1m	1 m	M12, 8-pin male con- nector, straight	M12, 8-pin male con- nector, straight		6D000022
PSEN sc cable CAT5e M12-8sm/ M12-8sm, 3m	3 m	M12, 8-pin male con- nector, straight	M12, 8-pin male con- nector, straight		6D000023
PSEN sc cable CAT5e M12-8sm/ M12-8sm, 5m	5 m	M12, 8-pin male con- nector, straight	M12, 8-pin male con- nector, straight		6D000024
PSEN sc cable CAT5e M12-8sm/ M12-8sm, 10m	10 m	M12, 8-pin male con- nector, straight	M12, 8-pin male con- nector, straight		6D000025
PSEN sc cable CAT5e M12-8sm/ M12-8sm, 20m	20 m	M12, 8-pin male con- nector, straight	M12, 8-pin male con- nector, straight		6D000026

M12, 8-pin, unshielded

Product type	Features	Connector X1	Connector X2	Connector X3	Order no.
PSEN cable axial M12 8-pole 3m	3 m	M12, 8-pin fe- male con- nector, straight			540319
PSEN cable axial M12 8-pole 5m	5 m	M12, 8-pin fe- male con- nector, straight			540320
PSEN cable axial M12 8-pole 10m	10 m	M12, 8-pin fe- male con- nector, straight			540321
PSEN cable M12-8sf, 20m	20 m	M12, 8-pin fe- male con- nector, straight			540333
PSEN cable axial M12 8-pole 30m	30 m	M12, 8-pin fe- male con- nector, straight			540326

M12, 8-pin, shielded

Product type	Features	Connector X1	Connector X2	Connector X3	Order no.
PSEN op cable axial M12 8-p. shield. 3m	3 m	M12, 8-pin female connector, straight			630313
PSEN op cable axial M12 8-p. shield. 5m	5 m	M12, 8-pin female connector, straight			630314
PSEN op cable axial M12 8-p. shield. 10m	10 m	M12, 8-pin female connector, straight			630315
PSEN op cable axial M12 8-p. shield. 30m	30 m	M12, 8-pin female connector, straight			630328
PSEN op cable axial M12 8-p. shield. 50m	50 m	M12, 8-pin female connector, straight			630368
PSEN op cable angle M12 8-p. shield. 3m	3 m	M12, 8-pin female connector, angled			630316
PSEN op cable angle M12 8-p. shield. 5m	5 m	M12, 8-pin female connector, angled			630317
PSEN op cable angle M12 8-p. shield. 10m	10 m	M12, 8-pin female connector, angled			630318
PSEN op cable angle M12 8-p. shield. 30m	30 m	M12, 8-pin female connector, angled			630329
PSEN op cable angle M12 8-p. shield. 50m	50 m	M12, 8-pin female connector, angled			630369

M12, 17-pin, unshielded

Product type	Features	Connector X1	Connector X2	Connector X3	Order no.
PSEN sc cable M12-17sf, 2m	2 m	M12, 17-pin female connector, straight			6D000027
PSEN sc cable M12-17sf, 5m	5 m	M12, 17-pin female connector, straight			6D000029
PSEN sc cable M12-17sf, 20m	20 m	M12, 17-pin female connector, straight			6D000031
PSEN sc cable M12-17sf, 50m	50 m	M12, 17-pin female connector, straight			6D000033

M12, 17-pin, shielded

Product type	Features	Order no.
PSEN sc cable M12-17sf sh, 2m	Connection cable for PSENscan, 17-pin M12 female connector, A-coded, shielded, cable length: 2 m	C1000063
PSEN sc cable M12-17sf sh, 5m	Connection cable for PSENscan, 17-pin M12 female connector, A-coded, shielded, cable length: 5 m	C1000064
PSEN sc cable M12-17sf sh, 10m	Connection cable for PSENscan, 17-pin M12 female connector, A-coded, shielded, cable length: 10 m	C1000065
PSEN sc cable M12-17sf sh, 20m	Connection cable for PSENscan, 17-pin M12 female connector, A-coded, shielded, cable length: 20 m	C1000066
PSEN sc cable M12-17sf sh, 50m	Connection cable for PSENscan, 17-pin M12 female connector, A-coded, shielded, cable length: 50 m	C1000067

For configuration only, unshielded

Product type	Features	Connector X1	Connector X2	Connector X3	Order no.
PSEN op Ethernet cable 1m	1 m	M12, 4-pin male connector, straight	4-pin RJ45 male connector, straight		631071
PSEN op Ethernet cable 3m	3 m	M12, 4-pin male connector, straight	4-pin RJ45 male connector, straight		631072
PSEN op Ethernet cable 10m	10 m	M12, 4-pin male connector, straight	4-pin RJ45 male connector, straight		631073

Configuration and output of measured data, shielded

Product type	Features	Connector X1	Connector X2	Connector X3	Order no.
Cable/PN/RJ45-4SM/M12-4SMX/D/003/Q324/GN	3 m	8-pin RJ45 male connector, straight	M12, 4-pin male connector, straight		C1000001
Cable/PN/RJ45-4SM/M12-4SMX/D/005/Q324/GN	5 m	8-pin RJ45 male connector, straight	M12, 4-pin male connector, straight		C1000002
Cable/PN/RJ45-4SM/M12-4SMX/D/010/Q324/GN	10 m	8-pin RJ45 male connector, straight	M12, 4-pin male connector, straight		C1000003
Cable/PN/RJ45-4SM/M12-4SMX/D/020/Q324/GN	20 m	8-pin RJ45 male connector, straight	M12, 4-pin male connector, straight		C1000004

19 Appendix

19.1 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 ME 5.5 08-17:

- ▶ 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
Check the safety category/standards Does the safety category of the safety laser scanner match the safety category required for the plant/machine? Have the standards applicable for the plant/machine been considered?			
Check ambient conditions for safety laser scanner Have the environmental conditions been met (see Ambient conditions [55])? Have the technical details been met for all the safety laser scanner components?			
Check access points to the danger zone Are all access points to the danger zone safeguarded either by safety laser scanners or by other safeguards?			

Action	OK	Not OK	Notes
Check minimum distance to danger zone Has the minimum distance been calculated in accordance with the applicable standards? Has the calculated minimum distance been maintained at all points?			
Check safety zone Has the ability to creep underneath the safety zone undetected been excluded?			
Check safety laser scanner Make sure that there are no objects in front of the safety laser scanner (e.g. trailing cables, crossbeams, struts, covers, etc.). Make sure that there are no transparent materials between the monitored safety zone and the safety laser scanner (such as the glass panel). Is the safety laser scanner fixed correctly? Are all the electrical connections to the safety laser scanner wired correctly?			
Check loaded configuration after switching on Was the correct configuration loaded after switching on the safety laser scanner?			
Check the effectiveness of the safety laser scanner during the hazardous movement Is the safety laser scanner effective throughout the whole of the hazardous movement of the plant/machine?			

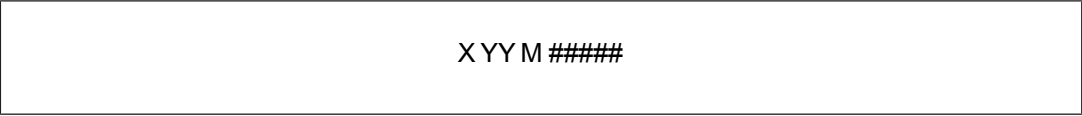
Action	OK	Not OK	Notes
Check the output circuitry of the programmable control system Have OSSDs been incorporated as required for the desired safety category? Are the switching elements that are connected to the OSSDs (valves, contactors, etc.) monitored with feedback loops? Does the wiring of the OSSDs match the circuit diagram?			
Check the protective function of the safety laser scanner Violate the safety zone at various points: The hazardous movement must be shut down.			
For vertical applications Change the position of the reference points beyond the tolerance ranges of the reference points. The OSSDs must switch to the OFF state with each change of the reference point beyond the tolerance range.			
Switch off the safety laser scanner Is the hazardous movement stopped immediately when you switch off?			

20

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		

21

EC declaration of conformity

This product/these products meet the requirements of the directive 2006/42/EC on 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.

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

22

UKCA-Declaration of Conformity

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

The complete UKCA Declaration of Conformity is available on the Internet at www.pilz.com/downloads.

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

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