S100
2D-LIDAR-SENSORS

SICK
Sensor Intelligence.

QUALITÄTSMANAGEMENTSYSTEM

DQS-zertifiziert nach
DIN EN ISO 9001   Reg.-Nr. 462-03

Contents

Contents

1   Important safety notes

- Only for use in NFPA79 applications.
- Use only with an insulated supply voltage.
- Protect cable with a listed overcurrent protection.
  Overcurrent protection data: Min. 32 V, max. 5 A
- UL-listed adapters equipped with field wiring cables are available.
- See product information. → See www.sick.com > Search "S100" > Downloads >
  Documentation

2 About this document

Please read this chapter carefully before you begin working with this documentation and the S100.

2.1 Purpose of this document

These operating instructions provide *technical personnel of the machine manufacturer or the machine operator instructions* regarding the correct assembly, electrical installation, commissioning, operation and maintenance of the LiDAR sensor (and laser scanner) S100.

These operating instructions do *not* provide information on operating the machine, the system or the vehicle in which the LiDAR sensor is or will be integrated. For more information, refer to the operating instructions of the respective machine, system or vehicle.

2.2 Target group

These operating instructions are intended for *planning engineers*, developers, and operating entities of machines, plants and systems into which one or more S100 LiDAR sensors are to be integrated. They are also intended for persons integrating the S100 into a machine, system or vehicle and performing initial commissioning and operation.

2.3 Scope

These operating instructions only apply to the S100 LiDAR sensor with the following type label entry in the *Operating Instructions*: 8012236 field.

This document is included with SICK part number 8012236 ("S100 - LiDAR sensor" operating instructions in all available language versions):

You will require a CDS-S100 of version 1.00 or higher in order to configure and diagnose these devices. To check the software version, select the **Module info...** item in the **?** menu.

2.4 Information depth

These operating instructions contain information about the S100 LiDAR sensor. It features the following components:

- Mounting
- Electrical installation
- Commissioning and configuration
- Care

- Fault diagnosis and troubleshooting
- Part numbers
- Accessories
- Conformity and approval

When planning and using LiDAR sensors such as the S100, technical skills are required that are not covered by this document.

The official and legal regulations for operating the S100 must always be complied with.

Note　　Please also refer to the SICK AG website at: www.sick.com.

There you will find:

- Application examples
- These operating instructions in different languages, available for viewing and for downloading

2.5   Abbreviations used

ANSI	American National Standards Institute
AWG	American wire gage = standardization and classification of wires and cables according to type, diameter, etc.
CAN	Controller area network
CANopen	Open protocol standard for CAN in automation engineering
CDS-S100	SICK Configuration & Diagnostic Software – S100 = software for configuring and diagnosing the S100
CiA	CAN in Automation = CAN users and manufacturer association
EHB	Electrical overhead conveyor
EMCY	CANopen emergency messages = error messages via CANopen
EMC	Electromagnetic compatibility
ESD	Electrostatic discharge
AGV	Automated guided vehicle
LiDAR	Light detection and ranging = principle of operation of the sensor, distance measurements are taken using laser beams on one (2D) or several levels (3D).

2.6   Symbols used

Recommendation   Recommendations are designed to assist you in the decision-making process with respect to the use of a certain function or a technical measure.

Note   Notes inform you about special aspects of the device.
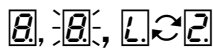
8, 8, L2   Display indicators shown the status of the 7-segment display of the S100:

8   Constant display of characters, e.g. 8

8   Flashing display of characters, e.g. 8

L2   Alternating display of characters, e.g. L and 2

Character representation of the 7-segment display can be rotated 180° using the CDS-S100. In this document, however, character representation of the 7-segment display is always shown in a non-rotated state.

(STOP) (Q1) (Q2) (⚡) (OK)   LED symbols describe the status of an LED:

(STOP)   The "Switching output in OFF state" LED lights up permanently.

(⚡)   The "Error/Contamination" LED flashes.

(OK)   The LED is switched off.

➢ Take action …   Instructions for taking action are indicated by an arrow. Carefully read and follow the instructions for action.

⚠ **Warning!**

WARNING   A warning indicates a specific or potential hazard. Observing the warning should protect you from accidents.

Carefully read and follow the warnings.

💻   Software notes show which settings you can make in the CDS-S100 (Configuration & Diagnostic Software - S100).

3   Safety

This chapter concerns your own safety and the safety of the system operator.

➢ Please read this chapter carefully before you begin working with the S100.

3.1   Intended use

The S100 LiDAR sensor must only be used as described in Section 3.3 "Applications of the device" on page 9. It may only be used by qualified personnel in the machine in which it was mounted and initially commissioned by authorized safety personnel in accordance with these operating instructions.

Observe the specifications in accordance with chapter 1 "Important safety notes".

Note   If used in any other way or if alterations are made to the device – including in the context of assembly and installation – this will render warranty claims directed to SICK AG void.

3.2   Authorized personnel

The S100 must only be mounted, commissioned, and maintained by adequately qualified personnel. The following qualifications are necessary for the various tasks:

3.2.1   Mounting and maintenance

- Basic practical technical training
- Knowledge of the current safety regulations in the workplace

3.2.2   Electrical installation and device replacement

- Practical electrical training
- Knowledge of current electrical safety regulations
- Knowledge of the operation and control of the devices in their particular application

3.2.3   Commissioning, operation, and configuration

- Knowledge of the operation and control of the devices in their particular application
- Knowledge of the software and hardware environment in the particular application
- Basic knowledge of the Windows operating system used

3.3   Applications of the device

The S100 LiDAR sensor is used to protect systems. It is intended for use in closed rooms. The S100 is not intended for use outdoors.

Note   The S100 does **not** constitute a safety component as defined by relevant legislation on machine safety.

The S100 satisfies the requirements of Class A (industrial environment) of the generic EMC standard; the S100 is therefore only suitable for use in industrial environments.

Among others, the S100 is suited for

- Exit monitoring
- Distance monitoring
- Load monitoring
- Protrusion monitoring
- Object detection
- Collision protection

3.4   General safety notes and protective measures

WARNING

Observe the safety notes.

Observe the following to ensure the S100 LiDAR sensor is used correctly as intended.

Laser class 1

CAUTION

Caution!

Optical radiation: Class 1 Laser Product

Caution - if any operating or calibrating equipment other than those specified here are used or other methods are employed, this can lead to dangerous exposure to radiation.

- Use only the tools and auxiliary equipment specified in this documentation.
- Only carry out the procedures specified in this documentation.
- Do not open the housing unless carrying out the mounting and maintenance operations provided in this documentation.

CLASS 1
LASER PRODUCT

Complies with 21 CFR 1040.10 and
1040.11 except for conformance
with IEC 60825-1 Ed. 3,
as described in Laser Notice
No. 56, dated May 8, 2019.
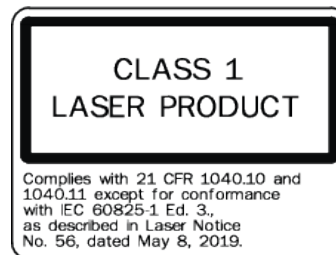
- This device complies with the following standards:
  - EN 60825-1:2014 + A11:2021
  - IEC 60825-1:2014
  - 21 CFR 1040.10 and 1040.11, except compliance with IEC 60825-1:2014, as described in Laser Notice No. 56 dated May 8, 2019
- Additional measures to shield the laser beam are not required (eye-safe).
- Do not open the housing (opening the housing will not switch off the laser). Only exchange the optics cover in accordance with the description in the operating instructions, see chapter 10.2 "Replacing the optics cover" on page 50.
- Observe the standards and guidelines applicable in your country during the mounting, installation and applications of the S100.

- The manufacturer and operator of the machine on which the S100 is used are responsible for coordinating and complying with the applicable safety specifications and regulations, in cooperation with the relevant authorities.

- The notes, particularly the test notes (see chapter 9 "Commissioning" on page 48) in these operating instructions (e.g. regarding use, mounting, installation, or integration into the machine controller) must be observed.

- Changes to the device's configuration may impair the function. The effectiveness of the device must be checked after any change to the configuration. Please always use the password hierarchy provided by SICK for changes to the configuration to ensure that only authorized persons can make changes to the configuration. The SICK service team is available if needed.

- These operating instructions must be made available to the operator of the machine in which the S100 is used.

- The external voltage supply of the devices should be capable of buffering brief power failures of 20 ms as specified in EN 60 204. Suitable power supply units are available as accessories from SICK (see section 13.3 "Accessories/Spare parts" on page 73).

3.5 Protecting the environment

The S100 LiDAR sensor has been designed to minimize its impact on the environment and to consume a minimal amount of energy and resources.

➢ Always act in an environmentally responsible manner at work.

3.5.1 Disposal

Always dispose of unusable or irreparable devices in accordance with the applicable waste disposal regulations specific to your country (e.g.European waste codes 16 02 14).

Notes
- We will be glad to help you dispose of these devices. Please contact us.

- Information on the individual materials of the S100 can be found in chapter 12 "Technical specifications" starting on page 60.

3.5.2 Material separation

⚠
WARNING

Materials must only be separated by authorized staff.

Caution is urged when disassembling the device. There is a risk of injury.

Before disposing of the devices in the environmentally-friendly recycling process, certain materials of the S100 must be separated.

➢ Separate the housing from the remaining components (particularly from the PCBs).

➢ Add the separated components to the respective recycling section (see Tab. 1).

Tab. 1: Overview of the disposal of components

Components	Disposal
Product	
Housing	Metal recycling (aluminum)
Motor mount	Metal recycling (zinc die cast)
Optics cover	Plastic recycling
PCBs, cables, male connectors and electrical connection parts	Recycling of electronics
Packaging	
Cardboard, paper	Paper/Cardboard recycling
Polyethylene packaging	Plastic recycling

4   Product description

This chapter provides information on the special properties of the S100 LiDAR sensor. It describes the design and operating principle of the device.

Always read this chapter before you mount, install, and commission the device.

4.1   Device components

The S100 LiDAR sensor consists of three components:

- The sensor with the opto-electronic detection system, the LEDs and the 7-segment display
- The optics cover with the light emission window
- The system plug with the configuration memory (the system plug features all electrical connections and must be purchased separately)

Fig. 1: Device components
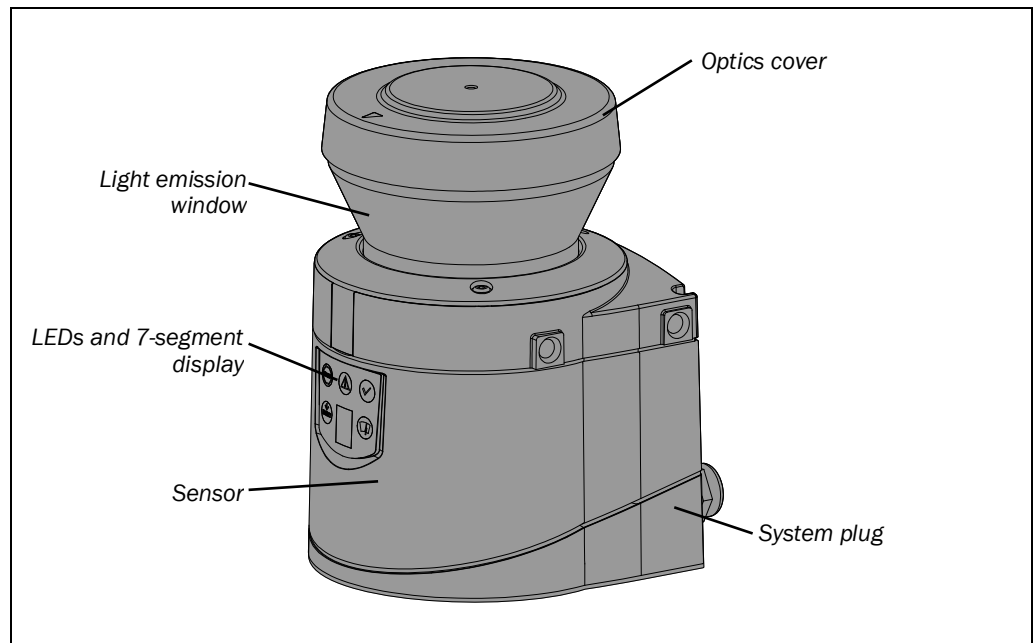
4.2   Specific features

- 270° aperture angle
- 0.5° angular resolution
- Switching fields can be configured up to 10 m
- CANopen integrated
- Status display via LEDs and 7-segment display
- Minimum response time 40 ms
- Configuration via PC or notebook with SICK Configuration & Diagnostic Software - S100
- Configuration memory in the system plug If the device is exchanged, the existing configuration is automatically transmitted to the newly-connected S100. This makes it possible to considerably reduce downtimes.
- Excellent resistance to ambient light and dust due to configurable dazzle and particle algorithms.

Tab. 2: Functions of the S100 variants

S100 variants

Two S100 variants are available to cover various fields of application.

| Functions	Standard	Professional
Maximum protective field range [m]	10	10
Object resolution [mm]	Maximum/ 30/40/ 50/70/150	Maximum/ 30/40/ 50/70/150
Switching fields		
At 0.5° angular resolution	2	8
At 1.0° angular resolution	2	16
Programmable monitoring cases	1	16
"Assigned switching field free" switching output Q1	■	■
"Assigned switching field free" switching output Q2	■	■
Maximum source switching current of switching outputs Q1 or Q2 [mA]	250	250
"Assigned switching field interrupted" application diagnostic output $\overline{Q}1$	■	■
"Assigned switching field interrupted" application diagnostic output $\overline{Q}2$	■	■
"Error/Contamination" application diagnostic output	■	■
Control inputs for switching over between the monitoring cases	–	4
Stand-by mode	■	■
CANopen	■	■
Configuration memory in the system plug	■	■

4.3   Mode of operation

The S100 LiDAR sensor can only fulfill its function when the following requirements are satisfied:

- It must be possible to influence the machine, system or vehicle control electrically.
- The S100 must be arranged and configured so that is detects objects when they breach the monitored area (see chapter 5 "Mounting" on page 27 and chapter 9 "Commissioning" on page 48).

### 4.3.1   Principle of operation

The S100 is an optical sensor which scans its environment in two dimensions with infrared laser beams. It is used to protect machines or vehicles.

Fig. 2:Time-of-flight measurement principle of operation of the S100
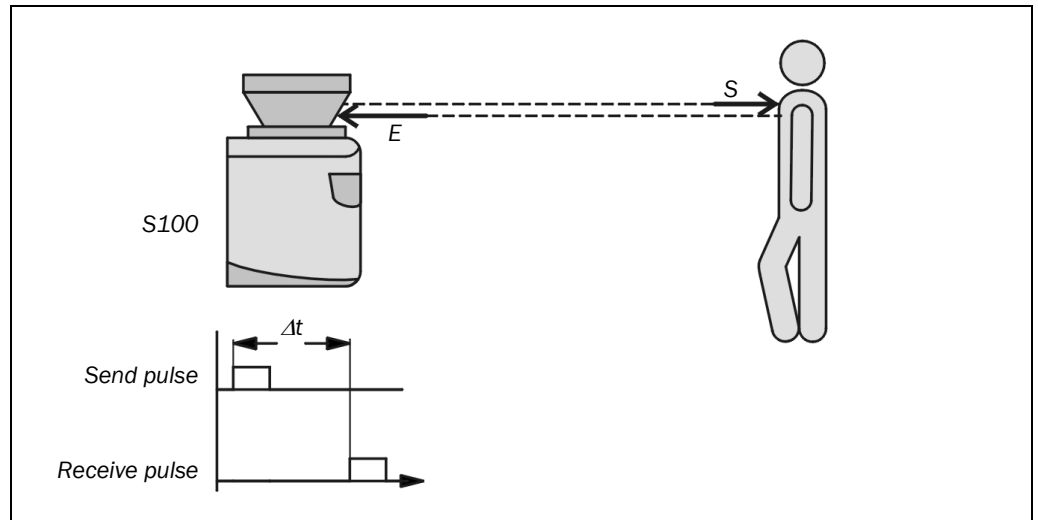
The S100 operates on the principle of time-of-flight measurement. It sends very short light pulses (S) while an "electronic stopwatch" runs simultaneously. If the light strikes an object, it is reflected and received by the LiDAR sensor (E). The S100 calculates the distance to the object based on the time interval between the moment of transmission and moment of receipt (Δt).

Fig. 3:Rotation principle of operation of the S100
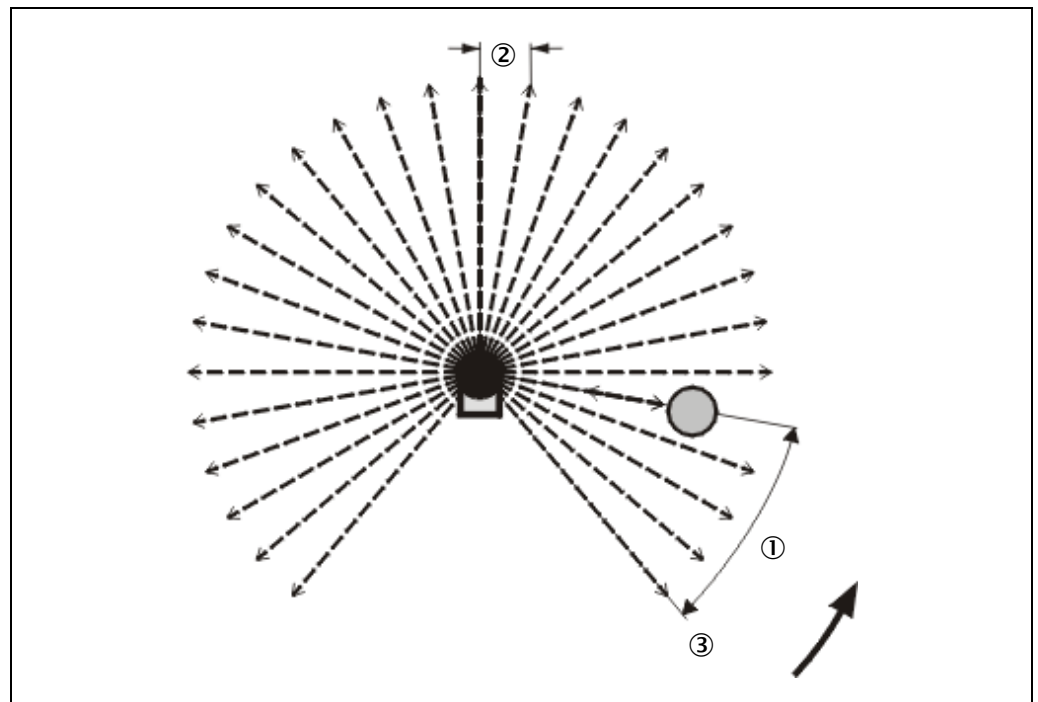
A uniformly rotating mirror is also situated in the S100. The mirror deflects the light pulses so that they extend over a 270° sector of a circle ①. This means an object in the switching field can be detected within 270°. The first beam ③ of a scan begins at −45° in relation to the rear side of the LiDAR sensor.

The S100 sends its light pulses with an angular resolution of 0.5° (in order to configure more than eight switching fields, it is possible to switch to a 1° angular resolution for the S100 Professional) ②.

With its active scanning principle, the S100 does not need external receivers or reflectors. This has the following advantages:

• Less time and money is needed for installation.

• You can easily adapt the monitored area to the monitored area of the machine.

• In contrast to tactile sensors, non-contact scanning is nearly wear-free.

4.3.2 Field set and switching fields

Fig. 4: Switching field 1 and 2 and distance measurement range
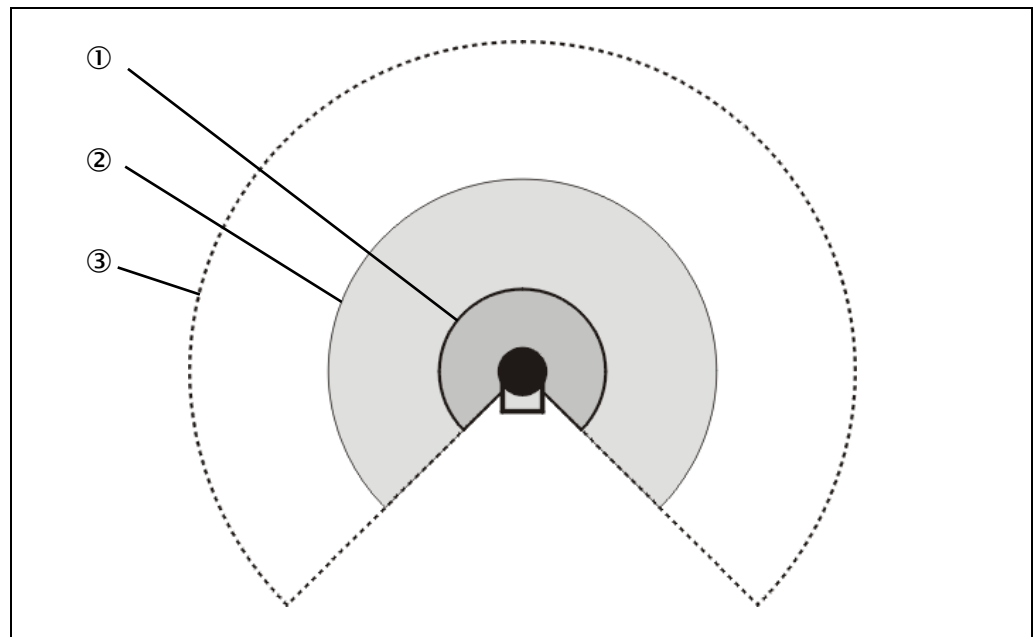
The S100 monitors areas of the machine or a vehicle with its freely definable switching fields ① and ②. As soon as the LiDAR sensors detects an object in the switching field, it switches assigned output Q1 or Q2 to the OFF state.

For example, you can define one of the two switching fields so that the LiDAR sensor detects an object before the actual monitored area in order to trigger a warning signal.

The maximum distance in which the LiDAR sensor can detect an object is defined by the distance measurement range ③.

The two switching fields build a pair, the so-called field set. Depending on the variant used (see section 4.2 under "S100 variants" on page 14), you can define up to 16 field sets and save them in the LiDAR sensor. In this way, you can switch the S100 Professional LiDAR sensor over to another field set if the monitoring situation changes (see section 4.3.3 "Monitoring cases" on page 17).

Configure these field sets using the CDS-S100 and transmit them to the S100. When the area to be monitored changes, you can reconfigure the S100 with software without additional mounting effort.
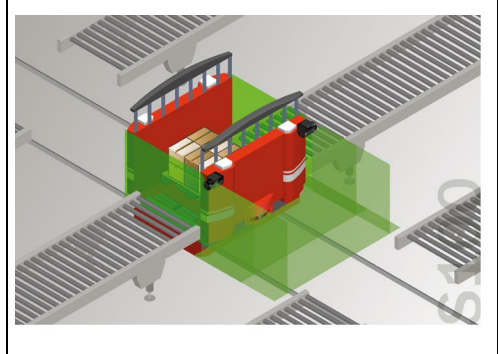
4.3.3 Monitoring cases

Depending on the variant used (see section 4.2 under "S100 variants" on page 14), you can define up to 16 monitoring cases and select them during operation via static control inputs.

Fig. 5: Two S100 with two monitoring cases each on a transfer vehicle
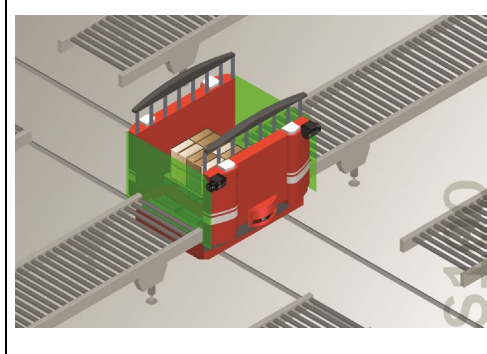
Monitoring case 1 (loading) with two small switching fields

Monitoring case 2 (transport) with two small switching fields in the direction of travel

Using one monitoring case, define ...

- Which switching fields are used for a field set.
- Which multiple sampling is applied for the respective switching field.
- For which input conditions (control signals) it is switched to the respective field set.

© SICK AG • Subject to change without notice **17**

4.4   Fields of application
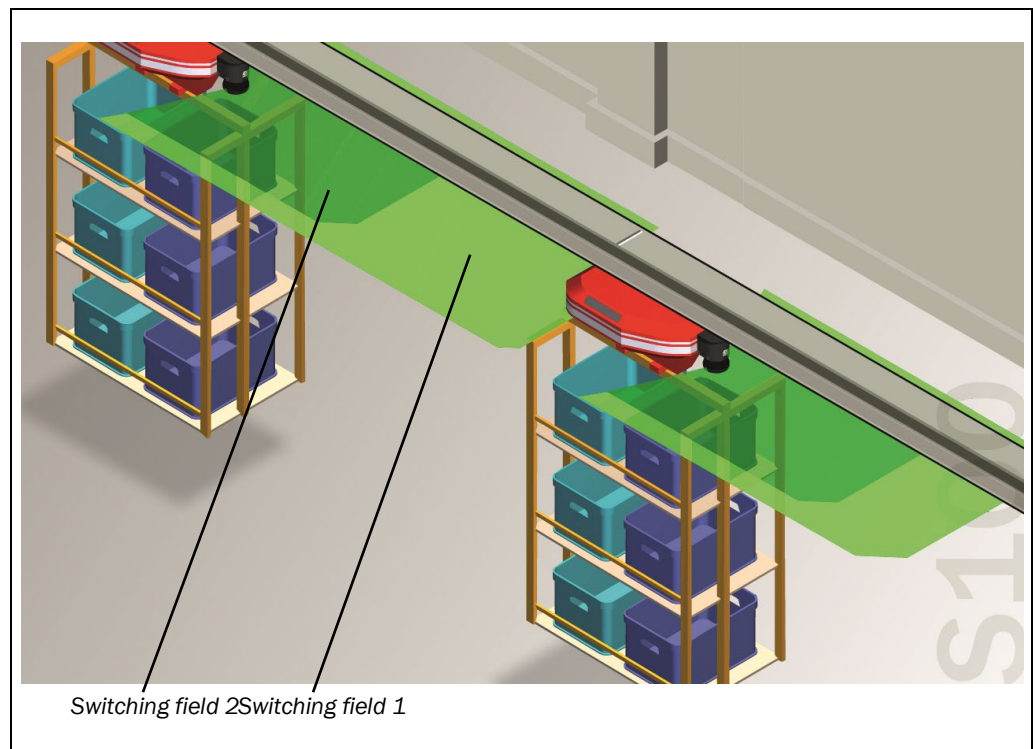
4.4.1   Storage bay check

Switching field 2   *Switching field 1*
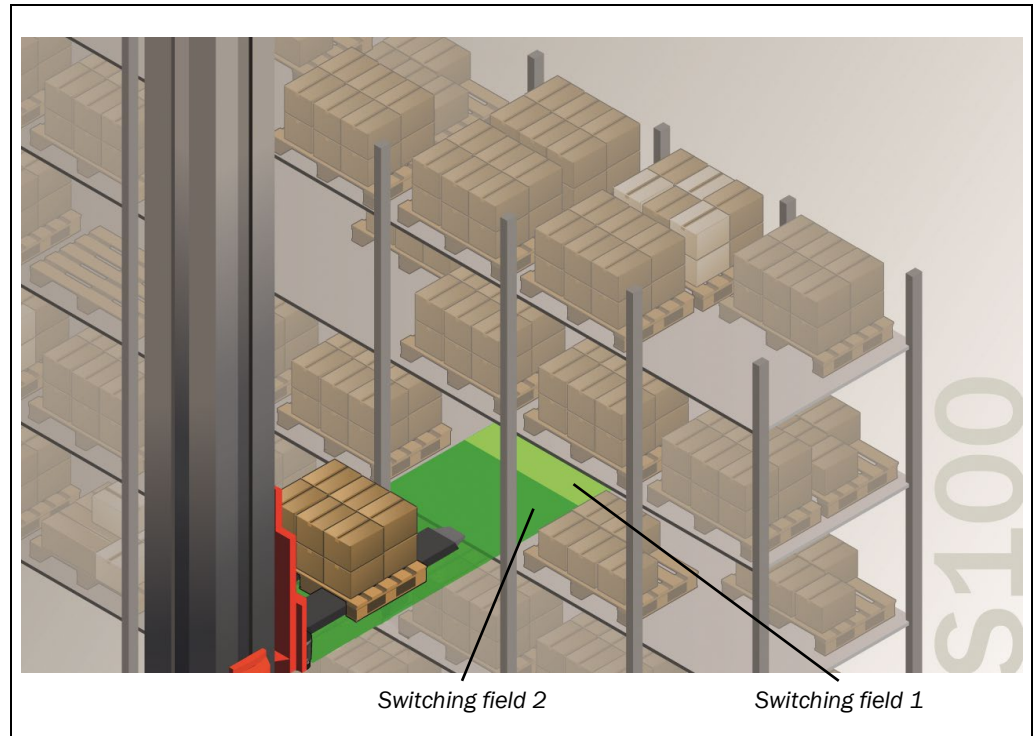
With the simultaneous use of two switching fields of different lengths, whether a storage bay is free or not, and if yes, at what depth, can be reported to a connected control.

### 4.4.2   Approach protection

Switching field 2Switching field 1

The S100 is used as approach protection for vehicles in an electrical overhead conveyor. For example, the LiDAR sensor is integrated into the control so that interruption of switching field 1 slows down the vehicle and interruption of switching field 2 stops the vehicle.
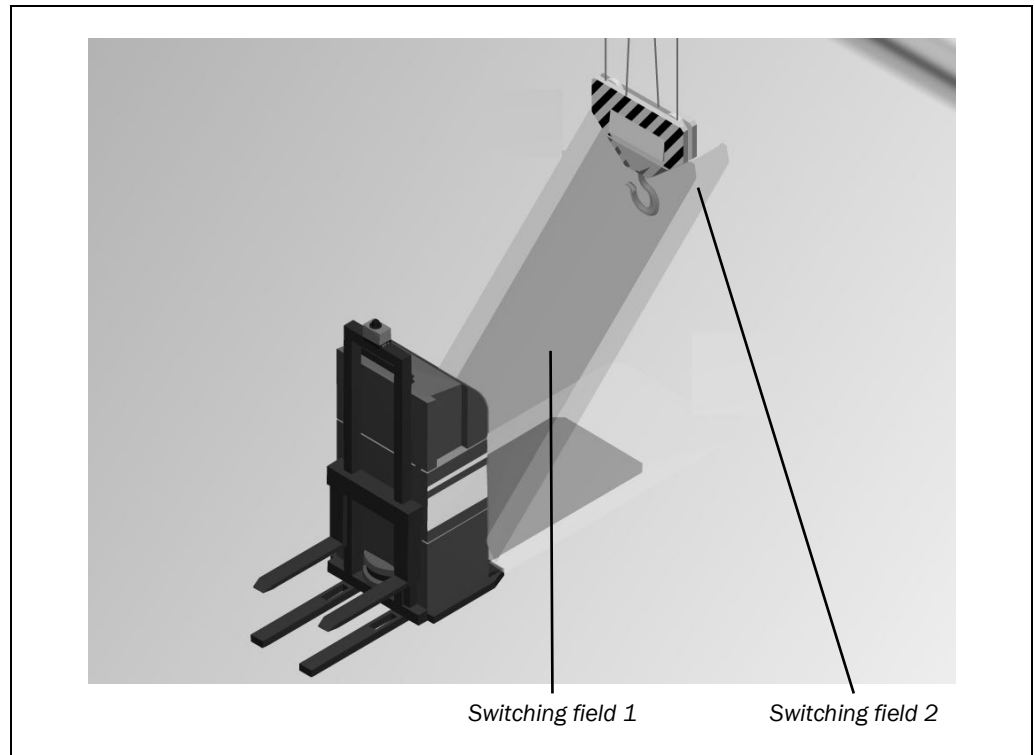
4.4.3   Rear area protection

Fig. 8: Example of rear area protection

Switching field 2   Switching field 1
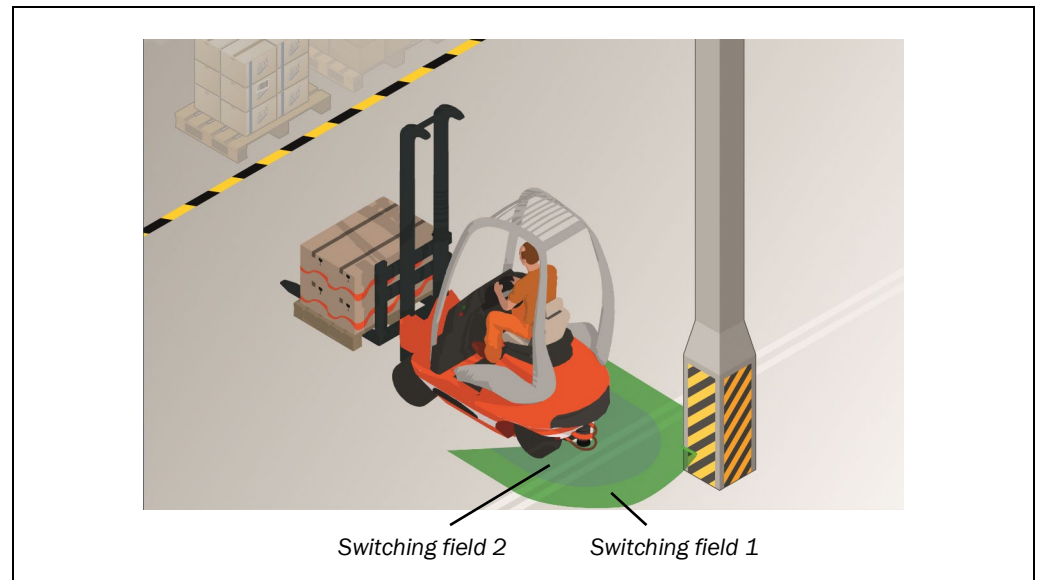
The S100 supports the driver when driving backwards. Switching field 2 switches a warning signal, switching field 1 reduces the driving speed to crawling speed.

4.4.4   Collision protection

Switching field 1   Switching field 2

The S100 prevents FTFs from colliding. Switching field 2 slows down the vehicle, switching field 1 stops the vehicle. The switching fields in the example are facing upwards at a slant so as to detect handing objects, for example.

4.5   Configurable functions

4.5.1   Name for application and LiDAR sensor

A name can be given to each configured application and for the LiDAR sensor(s). The names are saved in the devices after transmitting the configuration. For example, the name can be the description of the vehicle, the system or the machine.

Enter the application name or name of the LiDAR sensor used in the CDS-S100.

4.5.2 Switching fields

Configure the shape and size of each individual switching field in the CDS-S100. You can create any field shape.

Note The area to be monitored is scanned radially by the S100. The S100 cannot see through objects, however. The surface behind objects which are located in the area to be monitored (support columns, separator grids, etc.) can therefore not be monitored.

The switching fields can encompass an angle of up to 270°.

- You can configure two switching fields in the S100 Standard.
- In the S100 Professional, you can …
  - Configure 8 switching fields at an angular resolution of 0.5°.
  - Configure 16 switching fields at an angular resolution of 1.0°.

Two switching fields are always combined in a field set. These switching fields each switch switching output Q1 or Q2.

Having the LiDAR sensor suggest switching fields

You can also have the switching fields in the CDS-S100 suggested to you. To do so, the LiDAR sensor scans the visible spatial contour several times. The CDS-S100 suggests the contour and size of the field from the data acquired in this way.

Fig. 10: Reading in switching fields
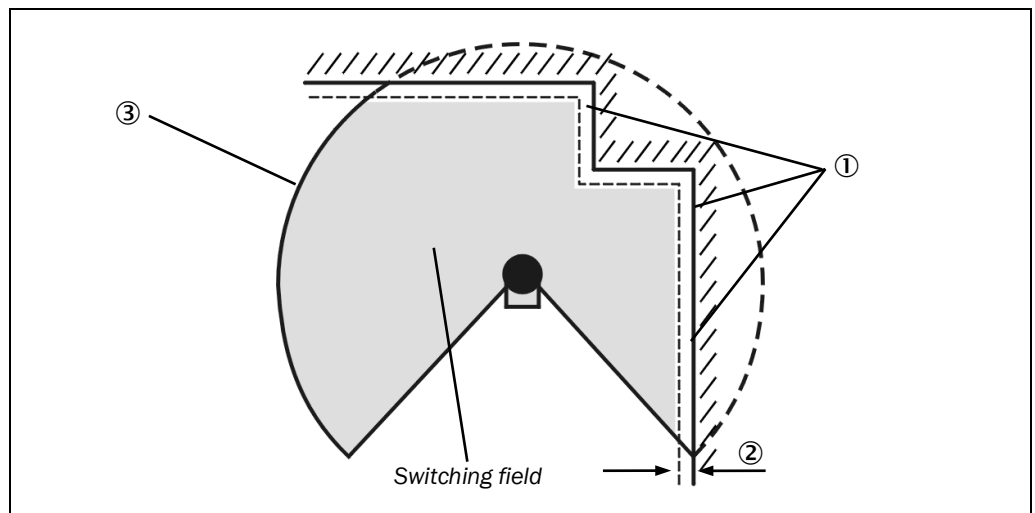
At the places where the spatial contour is smaller than the maximum protective field range (e.g. for ①), the switching field corresponds to the spatial contour.

A general error tolerance range of 100 mm is subtracted radially from the switching field contour. This means the switching field is always a little bit smaller than the detected surface ②.

There, where the spatial contour is larger than the protective field range ③, the switching area corresponds to the protective field range (see Tab. 3 on page 22).

Note Before commissioning, check whether the size of the suggested switching fields corresponds with the necessary switching field sizes of your application.

You can have a switching field suggested in the field set editor of the CDS-S100.

4.5.3   Resolution

With its standard resolution, the S100 reaches a sensing range of up to 10 m.

Due to its radial beam path (see Fig. 3 on page 15), the LiDAR sensor exhibits its highest object resolution at close range. This decreases as the distance from the LiDAR sensor increases. The detection capability of the S100 is dependent on the remission value of the object to be detected and its distance to the LiDAR sensor. The resolution is thereby determined by the object diameter, the remission value and the distance to the LiDAR sensor.

Which diameter and remission an object must possess to be detected can be found in Fig. 36 on page 58.

In addition to the standard resolution, you can configure the resolution using the CDS-S100 on different object diameters to be detected. Then only objects with a diameter ≥ of the set resolution are reliably detected.

If a fixed object resolution is selected, the possible protective field radius is reduced to the following sensing ranges for this resolution:

Tab. 3: Sensing ranges of the resolutions which can be permanently set

Resolution	Sensing range of the resolution
30 mm	1.30 m
40 mm	1.70 m
50 mm	2.10 m
70 mm	3.00 m
150 mm	6.60 m

Note   The switching fields which you configure in the field set editor can be larger than the specified sensing range. The resolution, however, can only be guaranteed up to the specified distance.

4.5.4   "Error/Contamination" application diagnostic output

The S100 is equipped with a configurable application diagnostic output. The following configuration options are available in the CDS-S100:

- Light emission window contamination
- Fault
- Light emission window contamination or error
- Deactivated

4.5.5   Restart

You can configure a restart delay of 0 to 60 seconds for switching outputs Q1 and Q2 on the S100. The respective switching output of the S100 goes to the ON state if there is no longer an object in the switching field for the specified duration.

You configure the type of restart in the CDS-S100.

4.5.6   Multiple sampling.

If multiple sampling is set, an object must be scanned several times before the S100 switches its switching outputs to the OFF state. In this way, you can reduce the probability that weld spark, insects or other particles cause the system to shut off.

If multiple sampling of, for example, 3 (pre-setting = 2) is configured, an object must be detected three times in a row before the S100 switches the switching outputs to the OFF state.

WARNING

Use of the multiple sampling function increases the overall response time.

At multiple sampling >1, consider that you have to add a supplement to the basic response time (see section 12.2 "Response times" on page 59).

For the S100, a multiple sampling of 1 is the minimum setting. You can set the multiple sampling up to 16 using the CDS-S100.

Recommendation

You increase the availability of the system with multiple sampling.

You configure the multiple sampling in the CDS-S100. You can set an individual multiple sampling for each monitoring case.

4.5.7   Dazzle suppression

The S100 is configured without dazzle suppression in the delivery condition.

If the S100 is dazzled by sun radiation or by other light sources, this can cause the outputs to switch off. You can activate dazzle suppression, the switching outputs then also remain active if the S100 is dazzled.

You configure the dazzle suppression in the CDS-S100.

4.5.8   Monitoring cases for the S100 Professional

If you use the S100 Professional, you can define up to 16 monitoring cases. Assign a switching field each to the switching outputs Q1 and Q2 for every monitoring case.

You can also always actively configure one or both switching outputs. In this case, the respective switching outputs Q1 and Q2 remain in the ON state during the monitoring case.

Note

If switching to stand-by mode is done during such a monitoring case, the always-active switching outputs also switch to the OFF state.

Switching is done in these monitoring cases during operation via static control inputs (see section 4.5.10 on page 24).

4.5.9   Stand-by mode

If vehicles are not moved for a time in mobile applications, the switching outputs and laser of the S100 can switch off. This reduces the energy consumption of the device.

Recommendation

Use this function, if, e.g., you use several vehicles and they do not move for a time.

An independent single-channel *STBY* input is available to switch to stand-by mode (see section 6.1 under "Pin assignment on the system plug" on page 38).

4.5.10 Static control inputs in the S100 Professional

➢ Ensure that the wiring of the control inputs complies with the expected ambient conditions in order to rule out systematic and conceptual influences and errors caused by these when switching over between monitoring cases.

➢ Ensure that the control guarantees on-time switchover between the monitoring cases. Bear in mind that an object may already be in the switching field when switchover takes place. Detecting the object is possible if switchover is done on-time.

The S100 Professional contains four control inputs which can be used to switch into 16 possible monitoring cases:

Tab. 4: Example of monitoring case switchover in the S100 Professional

Input				Z.g. monitoring case no.
T	**B**	**C**	**D**	
0	0	0	0	1
0	0	0	1	2
0	0	1	0	3
0	0	1	1	4
0	1	0	0	5
0	1	0	1	6
0	1	1	0	7
0	1	1	1	8
1	0	0	0	9
1	0	0	1	10
1	0	1	0	11
1	0	1	1	12
1	1	0	0	13
1	1	0	1	14
1	1	1	0	15
1	1	1	1	16

Input delay

The drive which you use to switch the static control inputs must be able to switch to the defined input condition within 10 ms. If this is the case (e.g. due to bounce times of the connecting switching contacts), the switch-on delay can be increased in 40-ms steps.

The following empirical values exist for the switchover time using various methods:

Tab. 5: Empirical values for the required input delay

Switchover method	Required input delay
Electronic control signals, switching signals without bounce time	10 ms
Contact-based drive (switch, relay, contactor)	30–150 ms
Control via independent sensors	130–480 ms

You configure the control inputs of the S100 Professional in the CDS-S100.

Note If you have entered the switch-on delay for the inputs in the S100 Professional, you must, in some cases, move up the switchover time of the monitoring case switchover.

4.5.11 CANopen

The S100 supports CANopen in accordance with CiA standards DS301 and DS401. The S100 represents a so-called SDO server, is a SYNC consumer, an NMT slave and supports a PDO in every direction of transmission with the entire user data area of the 8-byte CAN message. The S100 supports the following functions:

- Service data object (SDO)
- Process data object (PDO)
- Network management objects (NMO)
- Heartbeat
- Life/Node guarding
- Special function object (SFO)
  - Synchronization (SYNC)
  - Emergency messages (EMCY)

Recommendation Use the *Electronic Data Sheet* for the S100 for configuring the master. The functions and properties of the are described in standardized form in ASCII format inS100 this data sheet. The Electronic Data Sheet for the S100 is available online at /www.sick.com/S100.

Settings for CANopen

These must be activated and configured in the CDS-S100 to use the CANopen interface.

In order to operate the S100 as a CANopen node, its address (Node ID) and the baud rate of the network must be set. The baud rate must match the respective setting in the network.

Communication of the S100 via CANopen (sensor side)

Cyclical data can be exchanged via CANopen.

The S100 outputs the following data:

- Status of switching outputs Q1, $\overline{Q}$1, Q2, $\overline{Q}$2 as well as Error/Contamination (see Tab. 11 on page 45)
- Status of inputs A, B, C, D (S100 Professional only) as well as the Stand-by input (see Tab. 12 on page 46)
- Active switching fields for Q1 and Q2 (see Tab. 13 on page 46)
- Current device status (see Tab. 14 on page 46)

The S100 can react to the following data:

- Input values of A, B, C, D (S100 Professional only) as well as the Stand-by input (see Tab. 15 on page 47)

Note The input data is only evaluated by the S100 if this has been activated in the CDS-S100.

Error information via CANopen

The S100 offers the emergency message as a CANopen slave. CANopen error code 1000h (generic error) is used for the messages. Device-specific error codes are entered in the available manufacturer-specific area. The error information can be found in Tab. 22 on page 54.

4.6   Status indicators

The S100 signals the operational status using the LED and the 7-segment display. These are found on the front side of the LiDAR sensor.

Character representation of the 7-segment display can be rotated 180° using the CDS-S100 (Configuration & Diagnostic Software). If the character representation is rotated, the point in the 7-segment display goes out.

- Point visible: The lower edge of the character representation of the 7-segment display points to the base of the LiDAR sensor.

- Point not visible: The lower edge of the character representation of the 7-segment display points to the optics cover.

Fig. 11: Status indicators of the S100

The icons have the following meanings:

OK	Both switching outputs are in the ON state (no object in the switching field)
STOP	One of the switching outputs is in the OFF state (e.g. with an object in the switching field)
🧹	Optics cover is dirty
Q1	Switching output 1 in OFF state
Q2	Switching output 2 in OFF state

5 Mounting

This chapter describes how to prepare and mount the S100 LiDAR sensor. The mounting process requires four steps:

- Definition of the application and of the required mounting location of the LiDAR sensor
- Definition of the protective field sizes
- Definition of the switchover time between monitoring cases (S100 Professional only)
- Mounting of the LiDAR sensor with or without mounting kits

Notes
➢ Mount the S100 in a dry place and protect the device from dirt and damage.

➢ Avoid installing the S100 near strong electrical fields. These can, for example, be caused by a welding cable, induction cables or cell phones operated in the immediate vicinity.

➢ Make sure that there are no obstacles in the area to monitored which impair the field of view of the S100 or could cause movement shadows. Such shadowed areas cannot be monitored by the S100. If unavoidable shadowed areas exist, check whether they pose a risk. Take possible additional protective measures.

➢ Keep the area to be monitored free of smoke, fog, steam and other air impurities. There must not be any condensation on the light emission window. The function of the S100 can otherwise be impaired and it can lead to unintended shutdowns.

➢ Avoid strongly reflective objects in the scan plane of the S100. Example: Retro-reflectors can influence the measurement result of the S100. Strongly reflective objects inside the switching field can blank part of the surface to be monitored in some cases.

➢ Mount the S100 so that it is cannot be blanked by incoming sunlight. Do not arrange the stroboscope and fluorescent lights or other strong light sources directly on the scan plane since they can influence the S100 under certain circumstances.

The following steps are necessary after mounting and installation:

- Establishing the electrical connections (chapter 6 "Electrical installation")
- Configuration of the switching field (chapter 8 "Configuration")
- Commissioning and checking the installation (chapter 9 "Commissioning")

5.1 Definition of the protective field size in mobile applications

In order to prevent collisions between vehicles and between vehicles and fixed objects, the switching field must have sufficient length and width.

Observe the stopping distance of the vehicle when calculating the switching field length. This consists of

- The braking distance, found in the vehicle documentation
- The distance covered during the vehicle control's response time, found in the vehicle documentation
- The distance covered during the response time of the LiDAR sensor

  The distance covered during the response time of the LiDAR sensor depends on the response time of the LiDAR sensor and the maximum speed of the vehicle in its mobile applications.

  Response time T_S of the LiDAR sensor can be found in section 12.2 "Response times" on page 59.

Notes
- We recommend adding a supplement of 100 mm to the protective field length in order to stop the vehicle before a possible collision.
- If retro-reflectors are situated in the path of the vehicles or if it can be expected that the braking force of the vehicle is diminishing, you must increase the recommended supplement in some cases.
- The width of the switching field should cover the vehicle width. You should also configure a supplement of 100 mm on every side.

5.1.1　Protective field length

You must configure the protective field so that a minimum distance to the vehicle is upheld. This ensures that a vehicle monitored by the S100 stops before an object is reached.

If you use a S100 Professional, you can define several monitoring cases with different protective fields. These can be switched over dynamically via static control inputs, for example to adjust the protective field size to the respective vehicle speed.

In such an application, you must calculate the protective field sizes (especially the protective field lengths) for all speeds.

How to calculate protective field length S_L (see EN ISO 13855):

➤Calculate required protective field length S_L using the formula:

$S_L = S_A + Z_G + Z_R + Z_F + Z_B$

Where...

S_A = Stopping distance
Z_G = General safety supplement of the S100 = 100 mm
Z_R = Supplement for a possible reflection-based measurement error of the S100
Z_F = Supplement for a possible lack of ground clearance of the vehicle
Z_B = Supplement for the decreasing braking force of the vehicle, found in the respective vehicle documentation

Stopping distance S_A

The stopping distance comprises the vehicle's braking distance and the distance covered during the response time of the LiDAR sensor and the vehicle control's response time.

Fig. 12: Stopping distance
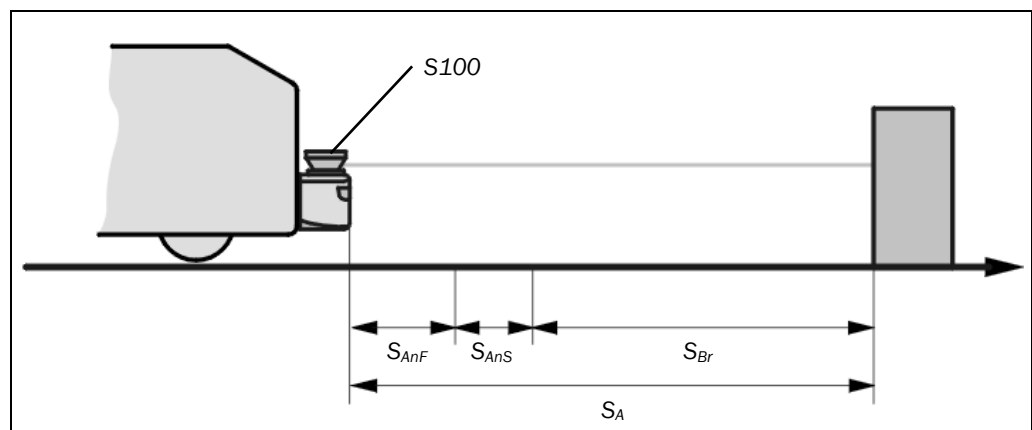
Note　Please note that a vehicle's braking distance does not increase linearly with increasing speed, but rather in a squared relationship. This is particularly important if you switch over the protective fields of various sizes depending on the speed.
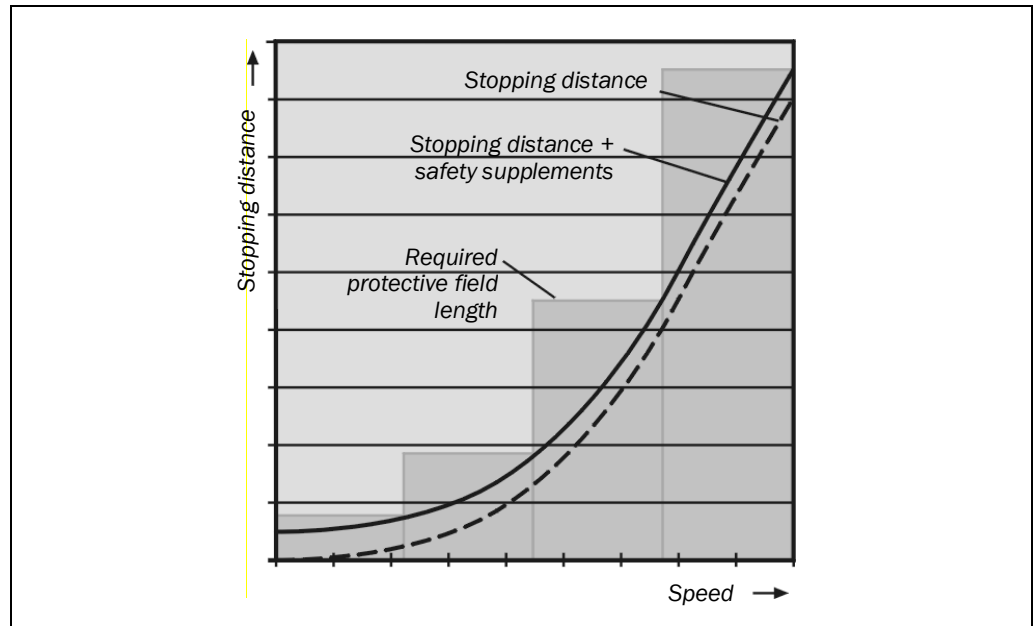
How to calculate stopping distance S_A:

➢ Calculate stopping distance S_A using the formula:

$S_A = S_{Br} + S_{AnF} + S_{AnS}$

Where...

S_{Br} = The braking distance, found in the vehicle documentation

S_{AnF} = The distance covered during the vehicle control's response time, found in the vehicle documentation

S_{AnS} = The distance covered during the response time of the LiDAR sensor

Distance covered during the response time of the LiDAR sensor

The distance covered during the response time of the LiDAR sensor depends on ...

• The response time of the LiDAR sensor

• The maximum speed of your vehicle in your mobile application

Response time T_S of the S100 depends on ...

• The basic response time of the S100

• The set multiple sampling

See section 12.2 "Response times" on page 59.

How to calculate distance covered S_{AnS} during the response time of the LiDAR sensor:

➢ Calculate distance S_{AnS} using the formula:

$S_{AnS} = T_S \times V_{max}$

Where...

T_S = Response time of the LiDAR sensor

V_{max} = Maximum speed of the vehicle found in the respective vehicle documentation

Supplement Z_R for reflection-based measurement errors

For retro-reflectors in the background less than 1 m from the protective field boundary, the supplement Z_R is 200 mm.

Supplement Z_F due to lack of ground clearance

This supplement is necessary because the ground clearance of the vehicle is lower than the protective field height. Objects below the protective field height are not detected.

Fig. 14: Supplement due to lack of ground clearance
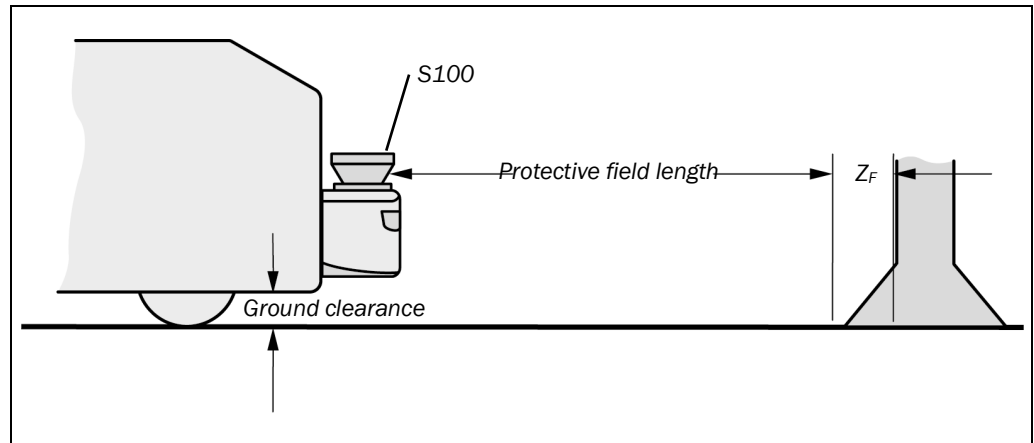
➤ The lump supplement for ground clearance under 120 mm is 150 mm. This supplement may be reduced further in individual cases.

5.1.2   Protective field width

The width of the protective field must cover the width of the vehicle and take into account the supplements for the measurement errors and the lack of ground clearance.

How to calculate protective field width S_B (see EN ISO 13 855):

➤ Calculate protective field width S_B using the formula:

$S_B = F_B + 2 \times (Z_G + Z_R + Z_F)$

Where…

F_B =   Vehicle width

Z_G =   General safety supplement of the S100 = 100 mm

Z_R =   Supplement for a possible reflection-based measurement error of the S100

Z_F =   Supplement for a possible lack of ground clearance of the vehicle

5.1.3 Height of the scan plane

We recommend aligning the scan plane horizontally to 150 mm. A large part of all objects are typically detected in this case.

Fig. 15: Mounting height
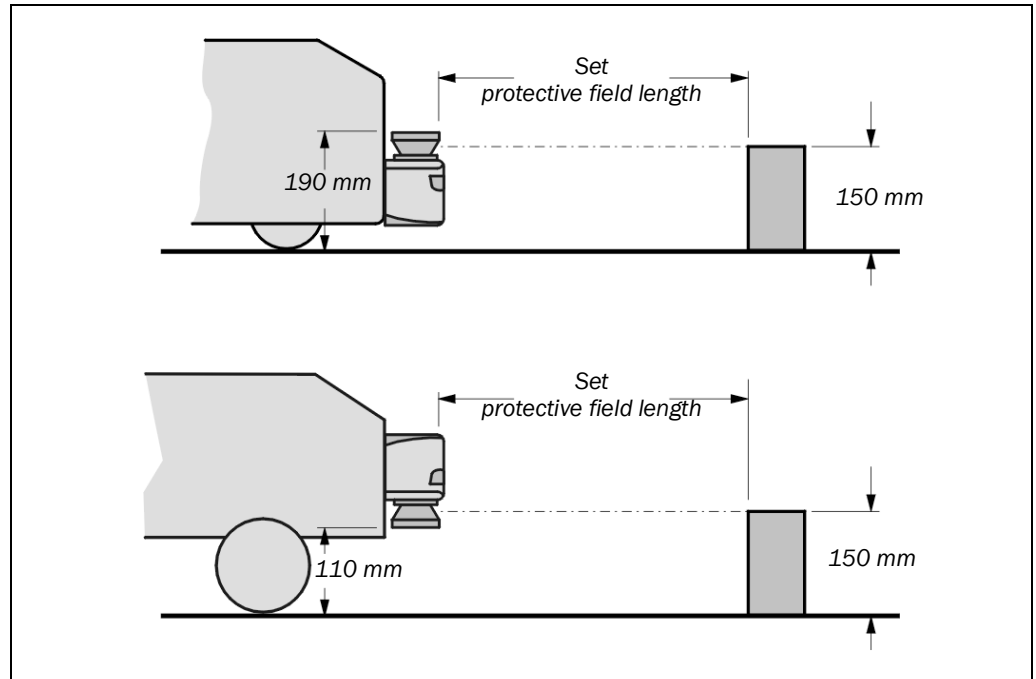
Note In order to achieve the optimal scan plane, you can mount the S100 upside down.

5.2 Steps for mounting

WARNING

Please noted the following points in particular during mounting:

➤ Mount the S100 so that it is protected from moisture, dirt, and damage.

➤ Ensure that the entire field of view of the S100 is not restricted.

➤ Mount the LiDAR sensor so that the status indicators can be clearly seen.

➤ Always mount the S100 so that there is still enough space for mounting and dismantling the system connector.

➤ Avoid excessive shock and vibration exposure of the LiDAR sensor.

➤ On systems that experience heavy vibration, prevent the fixing screws from accidentally coming loose using screw-locking devices.

➤ Regularly check the tightness of the fixing screws.

The beginning of the scan plane is located 116 mm above the lower edge of the S100 (see section 12.4.3 "Beginning of the scan plane" on page 70).

There are three ways of mounting the S100:

- Direct mounting without mounting kit

- Mounting with mounting kit 1a or 1b

- Mounting with mounting kit 2 (only in combination with mounting kit 1a or 1b) and, if applicable, mounting kit 3 (also with shock mount, only in combination with mounting kit 2).

The part numbers of the mounting kits are provided in the section 13.3.1 "Mounting kits" on page 71.

Note   Pay attention to the maximum torque of 5.9 Nm for the S100 M5 fixing screws.

5.2.1   Direct mounting

The S100 has four M5 × 8 threaded holes on the rear. They can be used to mount the S100 directly on the intended mounting surface. To prevent possible oscillations, the reference plane located on the rear can be used at a third support point if necessary ①.

Fig. 16: Direct mounting
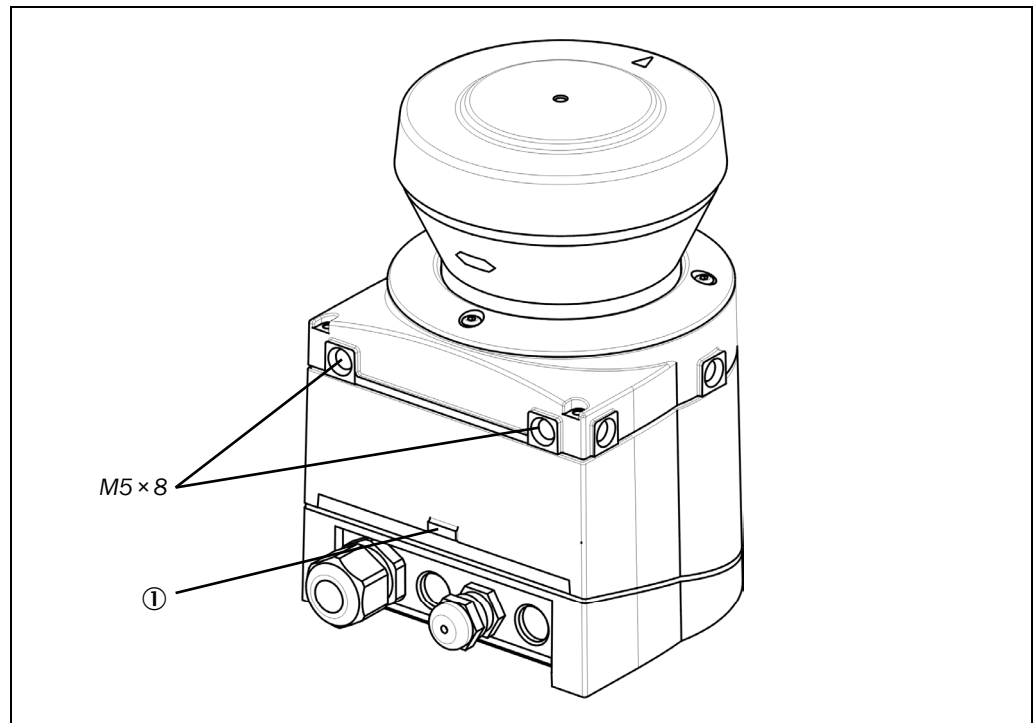
Notes   During mounting, observe the dimensional drawings (see section 12.4 "Dimensional drawings" on page 66).

5.2.2   Mounting with mounting kit 1a or 1b

You can use mounting kit 1 to mount the S100 indirectly on a mounting surface. The mounting kit is available as mounting kit 1a without a protective device for the optics cover and as mounting kit 1b with a protective device for the optics cover.

Fig. 17: Mounting using mounting kit 1a
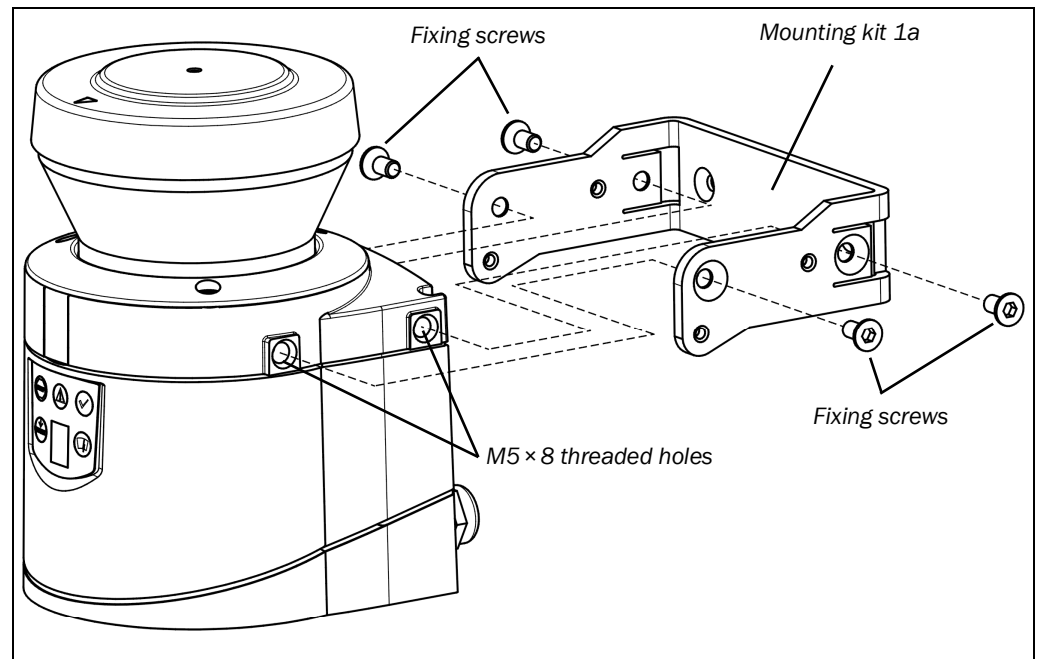
Fig. 18: Mounting with mounting kit 1b including optics cover protection
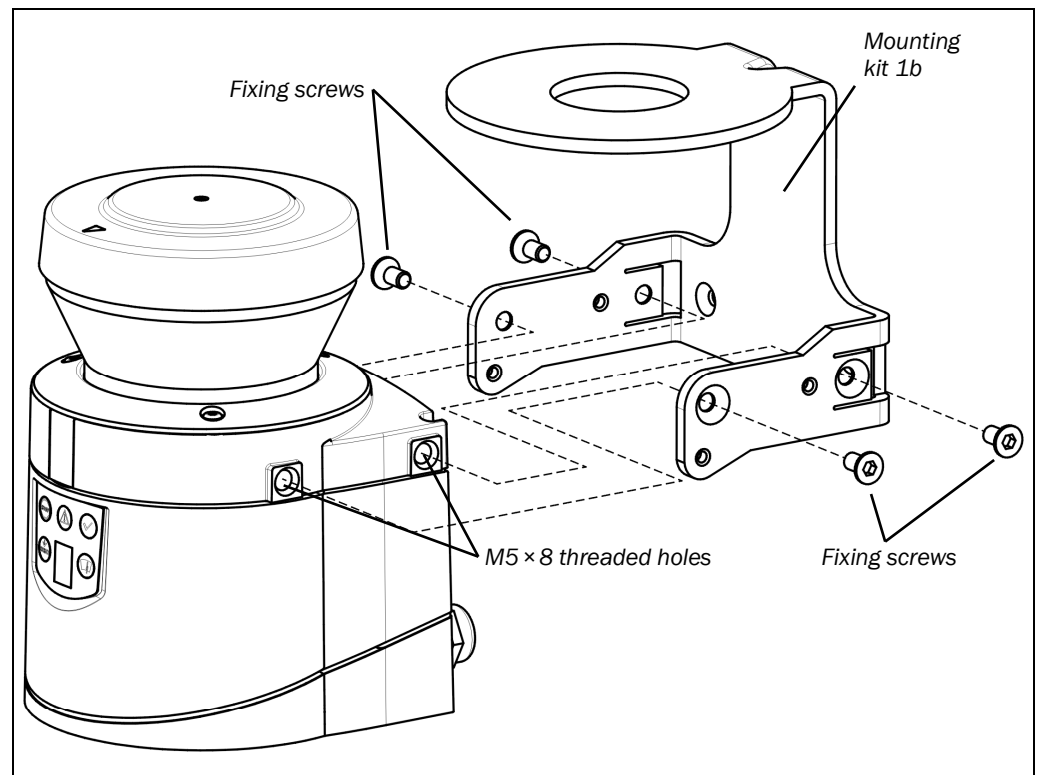
➢ Mount mounting kit 1a or 1b on the mounting surface.

➢ Then mount the S100 on mounting kit 1a or 1b.

Note   During mounting, observe the dimensional drawings (see section 12.4 "Dimensional drawings" on page 66).

5.2.3   Mounting with mounting kit 2 and 3

You can use mounting kits 2 and 3 (only in conjunction with mounting kit 1a or 1b) to align the S100 in two planes. The maximum adjustment angle is ± 11° in both planes.

Fig. 19: Mounting with mounting kit 2 and 3
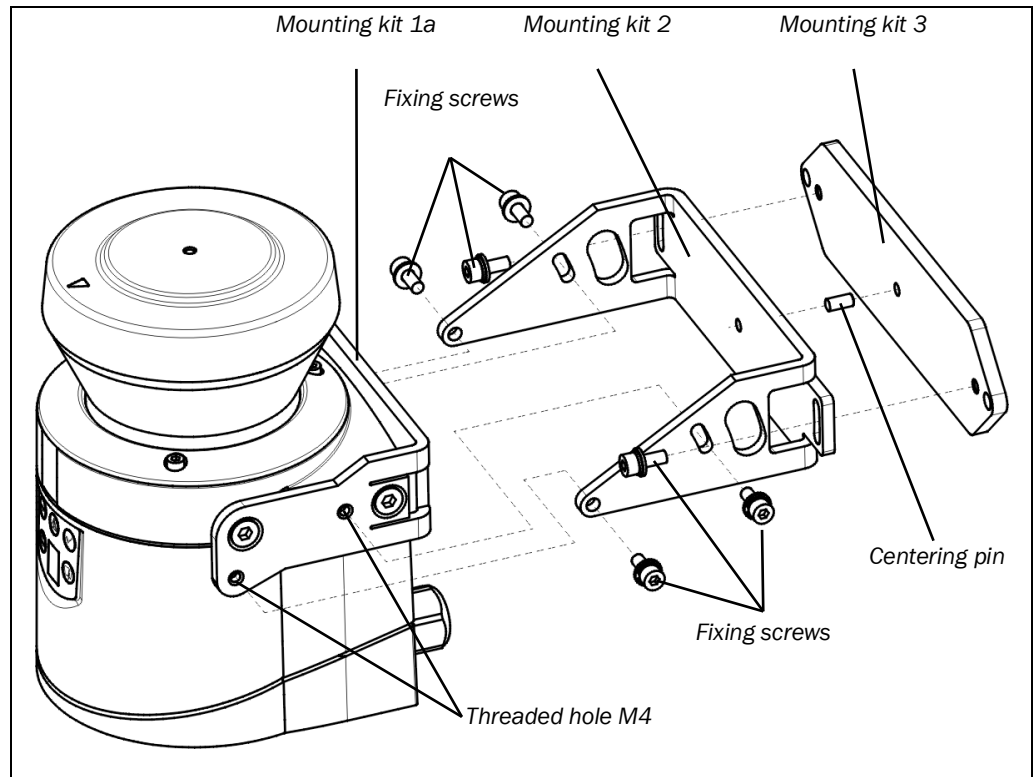
Fig. 20: Mounting with mounting kit 3 with shock mount
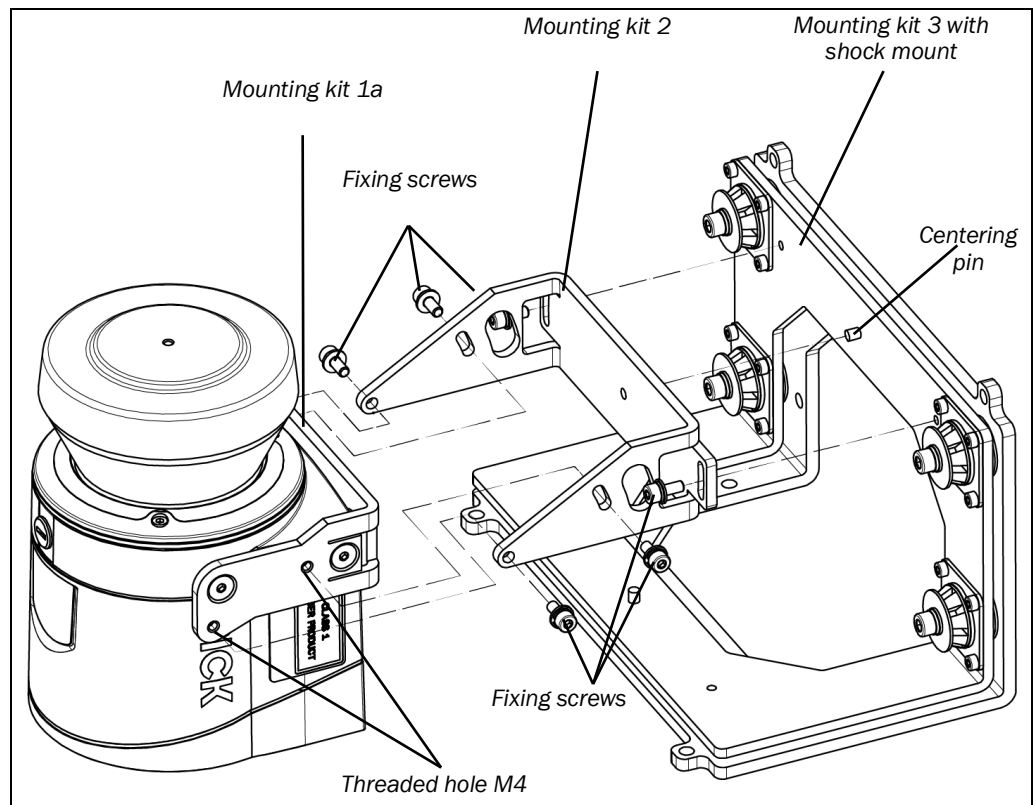
➢ Mount mounting kit 1a or 1b on the S100.

➢ Mount mounting kit 3 or mounting kit 3 with shock mount on the mounting surface.

> ➢ Insert the centering pin (4 mm) into the center hole of mounting kit 3.

> ➢ Fit the mounting kit 2 onto mounting kit 3 and mount using two M4 × 10 fixing screws.

> ➢ Then, mount the S100 on mounting kit 2 using the threaded holes in mounting kit 1a.

> ➢ Adjust the S100 along the longitudinal and transversal axis and then tighten the six fixing screws on the mounting kits.

Note   During mounting, observe the dimensional drawings (see section 12.4 "Dimensional drawings" on page 66).

5.2.4   When using several S100 LiDAR sensors

The S100 has been designed to minimize the probability of mutual interference of several LiDAR sensors. To completely rule out unintended shutdowns, we recommend mounting the LiDAR sensors as shown in the following examples.

Use mounting kits 1 to 3 to adjust the LiDAR sensors to various angles (see section 13.3.1 "Mounting kits" on page 71).

Fig. 21: Mounting on opposite sides

Min. 3°
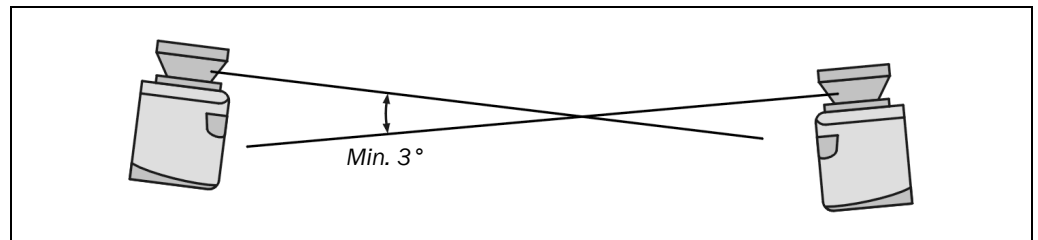
Fig. 22: Mounting offset parallel

Min. 100 mm
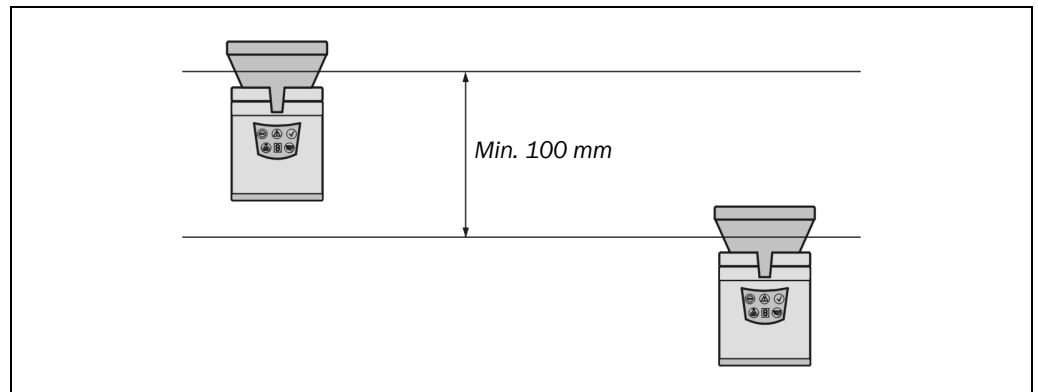
Fig. 23: Mounting crosswise

Min. 3°
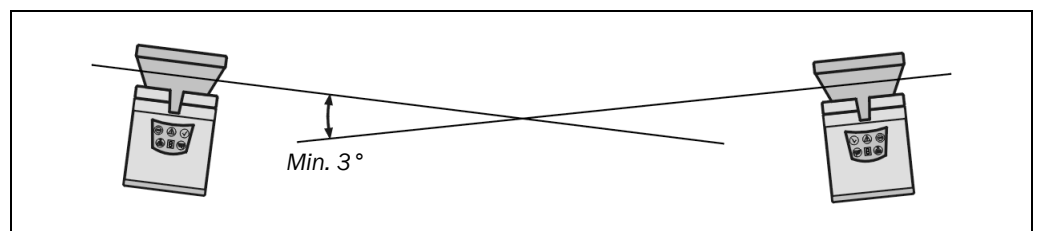
Fig. 24: Mounting upside down, offset parallel

Min. 100 mm
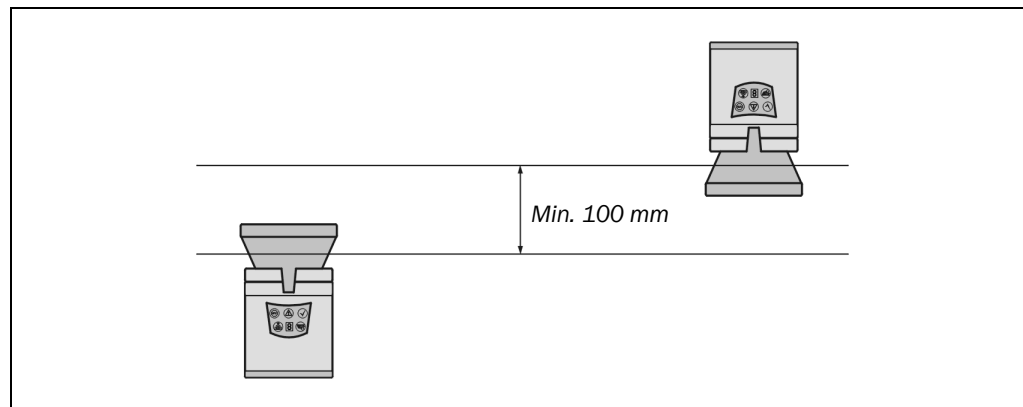
Fig. 25: Mounting both S100 upside down, offset parallel

Min. 100 mm
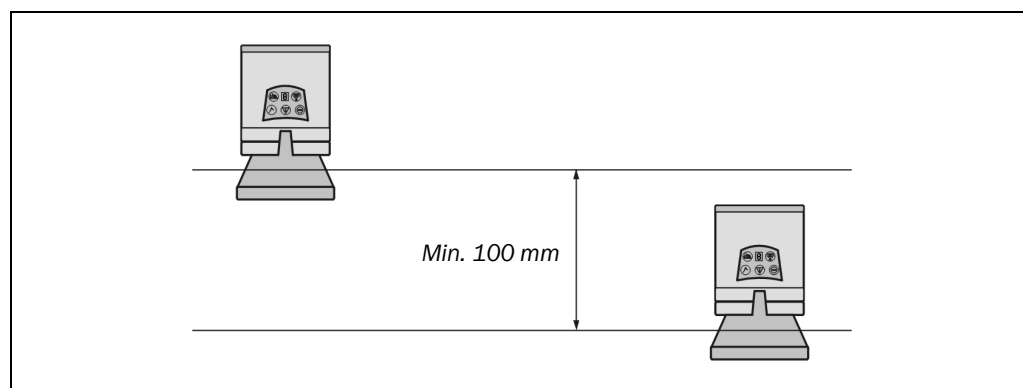
Fig. 26: Mounting one S100 upside down, offset parallel

Min. 100 mm

8012238/1QN0/2024-12-30
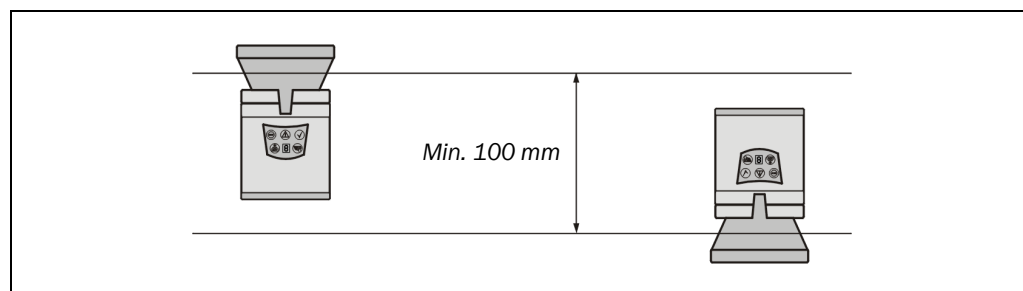
6 Electrical installation

<div style="border:1px solid; display:inline-block;">⚠️</div>

WARNING

Disconnect the power to the system!

The system could inadvertently start while you are connecting the devices.

➢ To prevent an unintentional start, make sure that the entire system is disconnected from the voltage supply during the electrical installation work.

Notes

➢ Lay all connecting cables so that they are protected from damage.

➢ If you used shielded cables, lay the shield flat on the cable gland.

➢ Make sure that the S100 is provided with appropriate electrical fuse protection. The electrical data required for dimensioning the fuse is found in section 12.3 "Data sheet" on page 60.

➢ Observe the specifications in accordance with chapter 1 "Important safety notes".

The electrical installation of the S100 is done using the system plug. Both pre-assembled and unassembled plug variants are available (see section 6.2 "Unassembled system plug" on page 39 and section 6.3 "Pre-assembled system plug" on page 40).

6.1 System connection

All inputs and outputs of the S100 can be found on the 24-pin screw connection + FE in the system plug available for separate purchase.

Fig. 27: Screw connection of the system plug
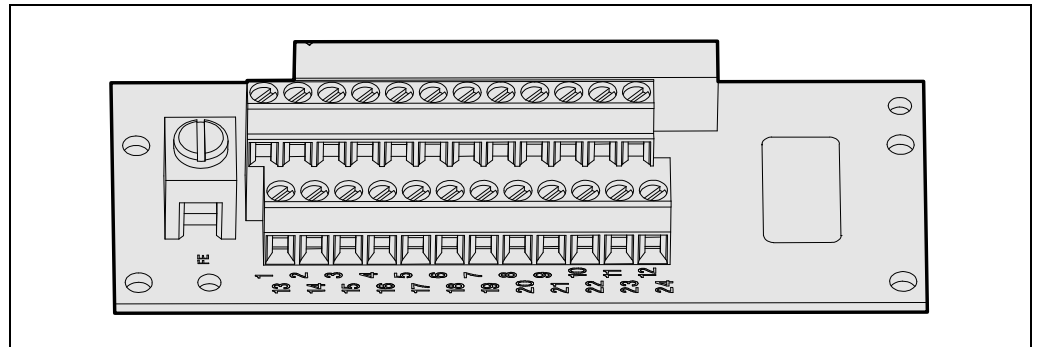
The system connection has different pin assignments depending on the S100 variant.

Notes

- Enclosure rating IP 65 cannot be upheld if the cable gland/blind plug are missing or not fastened or the fixing screws of the system plug are missing or not fastened.

- All inputs and outputs of the S100 must be used only in the specified manner.

Pin assignment on the system plug

Tab. 6: Terminal assignment on the system plug

Pin	Signal	Function	Standard	Professional
FE	Functional earth		■	■
1	+24 V DC	Supply voltage S100	■	■
2	0 V DC	Supply voltage S100	■	■
3	Q1	Switching output 1	■	■
4	Q2	Switching output 2	■	■
5	IN A	Static control input A		■
6	IN B	Static control input B		■
7	IN C	Static control input C		■
8	IN D	Static control input D		■
9	–	Reserved		
10	–	Reserved		
11	–	Reserved		
12	–	Reserved		
13	ERR	"Error/Contamination" application diagnostic output	■	■
14	$\overline{Q}1$	Application diagnostic output for switching output 1 inverted	■	■
15	$\overline{Q}2$	Application diagnostic output for switching output 2 inverted	■	■
16	STBY	Control input for activating stand-by mode	■	■
17	CAN_LO	CANopen connection	■	■
18	CAN_HI	CANopen connection	■	■
19	–	Reserved	■	■
20	CAN_GND	CANopen connection	■	■
21	–	Reserved	■	■
22	–	Reserved	■	■
23	–	Reserved	■	■
24	–	Reserved	■	■

Note
- In order to achieve the specified EMC safety, the FE functional earth must be connected (e.g. to the central ground star point of the vehicle or the system).

- CANground must generally be connected for CANopen. CANground can only be left out in completely galvanically-isolated CANopen networks.

- For CANopen cables over 30 m in length, either the device itself or the screen of the CANopen cable must be grounded in the immediate vicinity of the cable entry into the system plug.

- A label is included in the scope of delivery of the LiDAR sensor for correct labeling of the pins. Please attach this to the system plug used.

M8 × 4 configuration connection (serial interface)

Fig. 28: Pin assignment of the M8 × 4 configuration connection
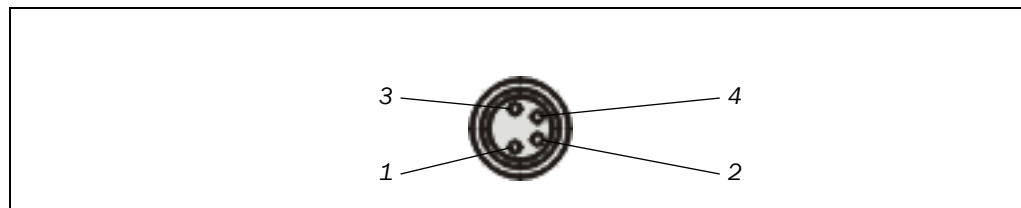
Tab. 7: Pin assignment of the M8 × 4 configuration connection

Pin	S100	PC-side RS-232 D-Sub
1	Reserved	Not connected
2	RxD	Pin 3
3	0 V DC input (voltage supply)	Pin 5
4	TxD	Pin 2

Notes
➢ Always pull the connection cable out of the configuration connection after configuration!

➢ Always plug the protective cap fastened to the device back to the configuration connection after you have configured the device.

6.2 Unassembled system plug

The system plugs have cable entries and cable glands on the lower and rear side:

- SX0B-A0000G system plug for S100 Standard and S100 Professional:
  - 1 cable entry with M16 cable gland
  - 1 cable entry without M16 cable gland (blind plug)
  - 2 cable entries without M12 cable gland (blind plug)
- SX0B-A0000J system plug for S100 Standard and S100 Professional:
  - 1 cable entry with M16 cable gland
  - 1 cable entry without M16 cable gland (blind plug)
  - 6 cable entries without M12 cable gland (blind plug)

Note
You can also purchase the S100 with pre-assembled system plugs with various lengths of cable (see section 6.3 "Pre-assembled system plug" on page 40 and section 13.3.2 "S100 system plug" on page 72).

⚠ **WARNING**

Keep the cable reserve short enough that the system plug cannot accidentally be plugged into an adjacent S100!

Experience has shown that 20 to 30 cm of cable reserve on the LiDAR sensor is ideal. This prevents the system plug from accidentally being plugged into an adjacent S100 and putting a S100 with incorrect configuration into operation. You can easily exchange the S100 with the cable reserve if needed.

Fig. 29: SX0B-A0000G system plug for S100 Standard and S100 Professional

6.2.1   Cable glands

Depending on the application, use the suitable cable gland on the bottom or rear side. You must select the EMC-compliant cable gland for the CANopen cables.
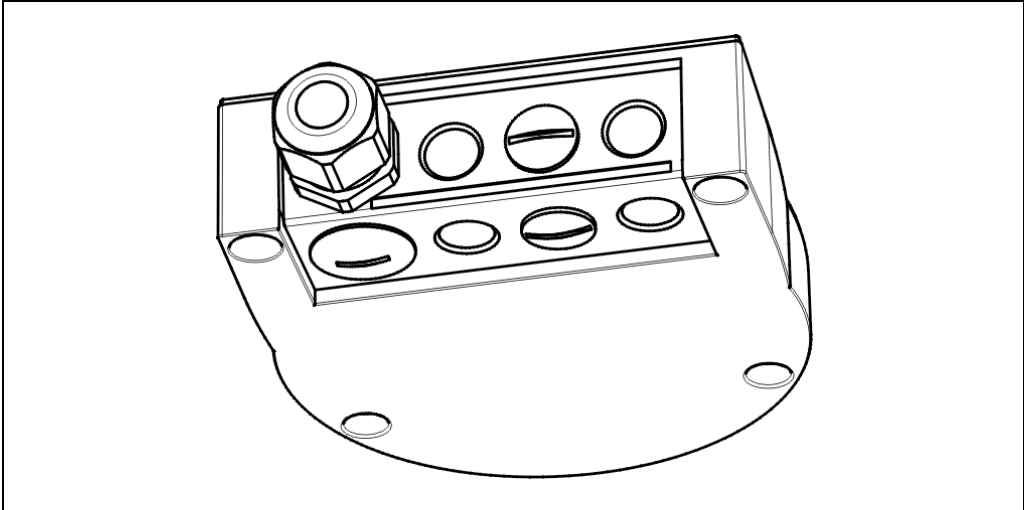
Tab. 8: Use of the supplied cable glands

Cable gland	Cable diameter	Use
M16 (included with delivery of the system plug)	5–9 mm	• System cables for supply voltage, outputs, inputs
M16, EMC-compliant (included with delivery of the S100)[1]	5–9 mm	• CANopen

6.2.2   Wire cross-section

Use the following wire cross-sections for the individual connections:

Tab. 9: Recommended wire cross-sections

Cable	Recommended wire cross-sections	Shielded
System cables for supply voltage, outputs, static inputs	9–15 wires, 0.5–1 mm^2	No[2]
CANopen	3 × 0.22 mm^2	Yes

Recommendation   If you would like to assemble the system plug yourself, you will find suitable cables in the order data (see section 13.3.4 "Connecting cables for self-assembly" on page 73).

6.3   Pre-assembled system plug

The following pre-assembled system plugs are available for connecting the S100- variants (see also section 13.3.2 "S100 system plug" on page 72):

For S100 Standard: SX0B-B1105G, SX0B-B1110G, SX0B-B1114G and SX0B-B1120G

With 11 wires, unshielded (cable gland M16), 5, 10, 14 or 20 m long

---

[1]   Can be used with M12 and M16 extension included in the scope of delivery of the S100.
[2]   A shield is recommended if there are high EMC charges in the surroundings.

Electrical installation

For S100 Professional: With static inputs SX0B-B1505G and SX0B-B1510G

With 15 wires, unshielded (cable gland M16), 5 or 10 long

Tab. 10: Pin assignment of pre-assembled system plugs

Pin	Signal	Wire color	SX0B-B1105G SX0B-B1110G SX0B-B1114G SX0B-B1120G	SX0B-B1505G SX0B-B1510G
FE		Green	■	■
1	+24 V DC	Brown	■	■
2	0 V DC	Blue	■	■
3	Switching output Q1	Gray	■	■
4	Switching output Q2	Pink	■	■
5	IN A	Red		■
6	IN B	Yellow		■
7	IN C	White/Blue		■
8	IN D	White/Gray		■
9	–	White/Violet		■
10	–	White		■
13	ERR	White/black	■	■
14	$\overline{Q}1$	White/brown	■	■
15	$\overline{Q}2$	Red/Blue	■	■
16	STBY	White/Green	■	■

7 Application and connection diagrams

The examples shown are only intended to help with planning. You might have to consider additional protective measures for your application.

Notes
- Ensure arc-suppression at the relays/contactors is sufficient. Keep in mind that arc-suppressors can extend the response time.

- The arc-suppressors must be laid parallel to the relays/contactors (not via the contacts).

7.1 Applications with the S100 Standard

Fig. 30: Applications with the S100 Standard
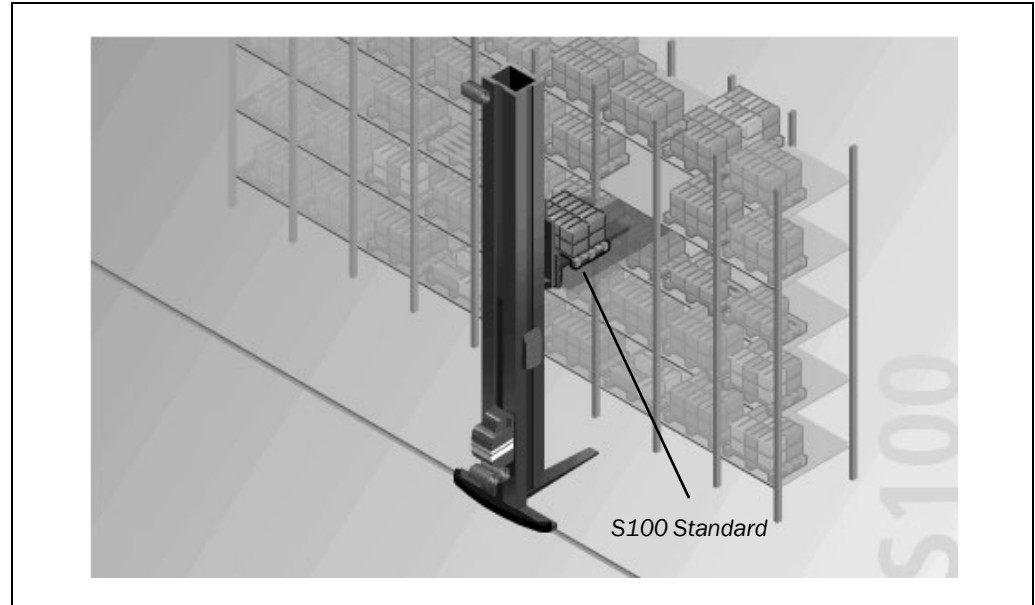
S100 Standard

Monitoring the storage bay with the S100 in a storage and retrieval system.

Fig. 31: S100 Standard connection diagram
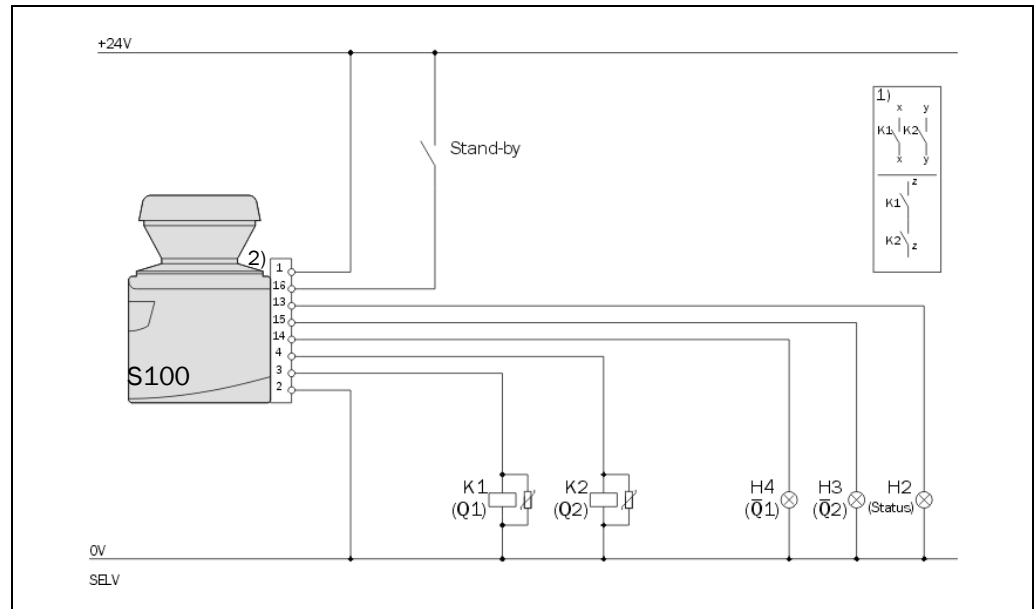
S100 Standard in connection cable with relays/contactors at switching outputs Q1 and Q2. LEDs H4 and H3 connected to outputs $\bar{Q}1$ and $\bar{Q}2$ show the status of the respective switching outputs. The LED H2 connected to the application diagnostic output shows the status (error/contamination) of the S100.

7.2 Applications with the S100 Professional

Distance monitoring by the S100 Professional on an electrical overhead conveyor.
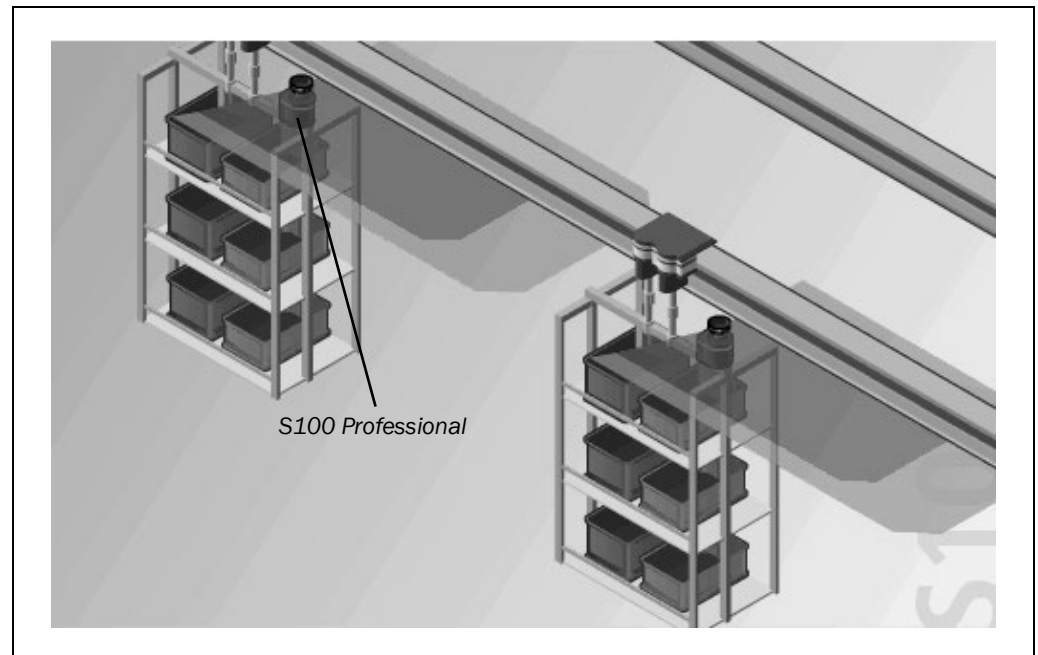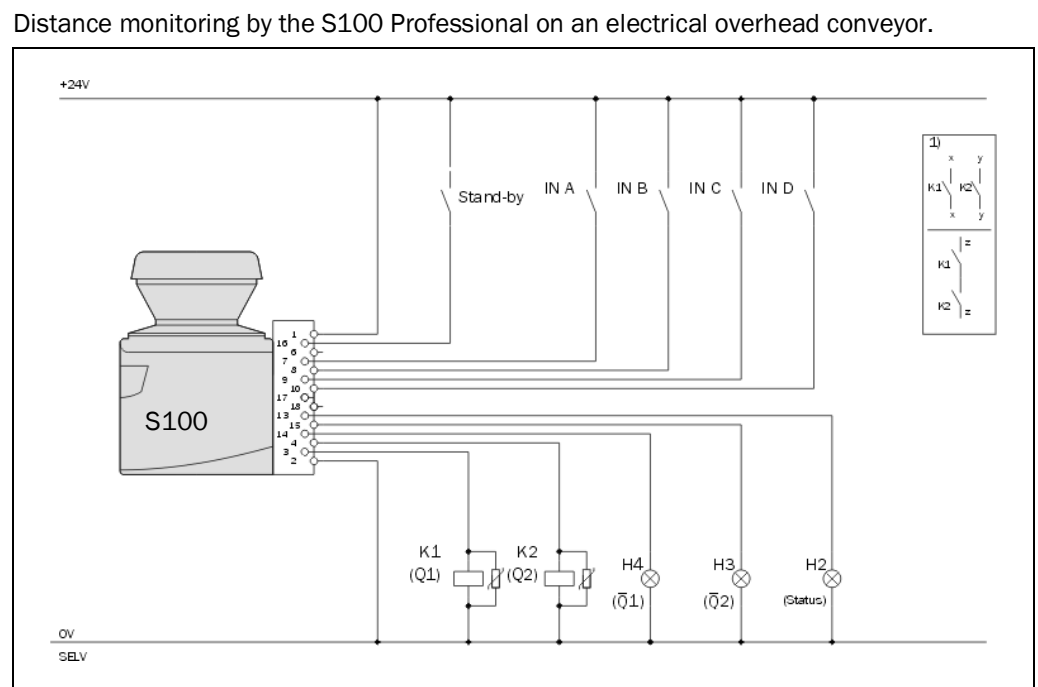
The S100 Professional in combination with relays/contactors, protective field switchover via static inputs A, B, C and D. LEDs H4 and H3 connected to outputs $\overline{Q}1$ and $\overline{Q}1$ show the status of the respective switching outputs. The LED H2 connected to the application diagnostic output shows the status (error/contamination) of the S100.

8   Configuration

8.1   Delivery state

When delivered, the S100 is not configured.

- It has the **Wait for configuration** operational status.
- The switching outputs are in the OFF state, the red LED lights up: 🛑.
- The 7-segment display shows 6.
- The CANopen interface is deactivated.

8.2   Preparation for configuration

How to prepare the configuration:

➢ Make sure that the LiDAR sensor is correctly mounted and connected to the electricity.

➢ Prepare the necessary auxiliary aids.

You need the following to configure the LiDAR sensor:

- CDS-S100 (Configuration & Diagnostic Software – S100), Download from www.sick.com/S100

- PC/Notebook with serial RS-232 or USB interface (required interface depends on the service cable used for configuration: not included with delivery)
    - Operating system Windows 10/8/7/Vista/XP or 2000 and Microsoft.Net Framework (from 2.0 on)
    - Required disk space: 300 MB
    - Working memory and frequency: 1 GB RAM, 1 GHz
    - Minimum resolution: 1,024 px x 768 px
- Service cable for connecting the PC and S100 (not included with delivery)

How to configure the S100 using the CDS-S100:

Connect the PC to the configuration connection for configuration and diagnostics with the CDS-S100.

Fig. 34: Configuration connection

Configuration connection
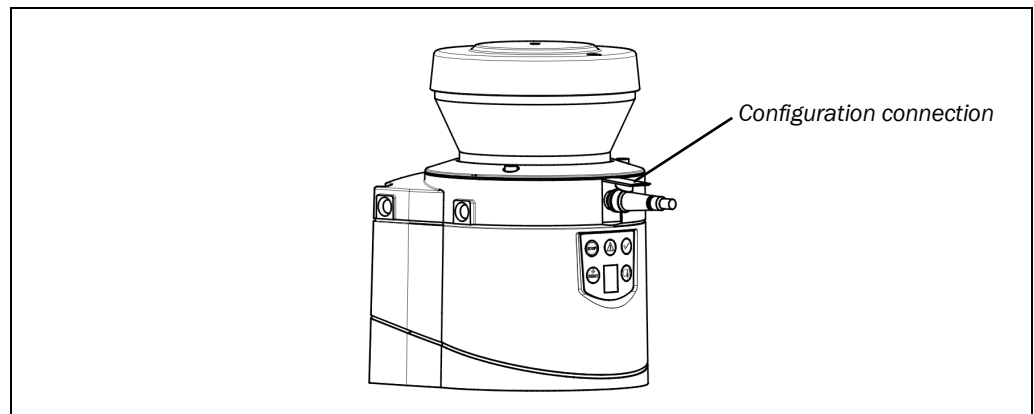
Four service cables of various lengths and connection types (USB / RS-232) are available for connecting the S100 (see 13.3 on page 71).

Notes
- Make sure that the service cable is not in the immediate vicinity of strong electric drives or lead along power lines. This prevents EMC influence on the service cable.

• The service cable must only be connected for configuration and diagnostics. The service cable must be plugged in and the protective cap attached during operation.

Please read the user manual of the CDS-S100 (Configuration & Diagnostic Software - S100) for configuration and use the program's online help.

8.3 CANopen master configuration

Use the *Electronic Data Sheet* (EDS file) for the S100 for configuring the master. The functions and properties of the S100 are described in standardized form in ASCII format in this data sheet. You can find the EDS file for the S100 online at www.sick.com/S100.

Data transmission via CANopen

Tab. 11: Status of the outputs (CAN IO state – outputs)

Byte	Bit	Description
0	0	Status of switching output Q1 0: Q1 deactivated (switching field interrupted) 1: Q1 active (switching field free)
0	1	Status of output $\bar{Q}$1 0: $\bar{Q}$1 deactivated (switching field free) 1: $\bar{Q}$1 active (switching field interrupted)
0	2	Status of switching output Q2 0: Q2 deactivated (switching field interrupted) 1: Q2 active (switching field free)
0	3	Status of output $\bar{Q}$2 0: $\bar{Q}$2 deactivated (switching field free) 1: $\bar{Q}$2 active (switching field interrupted)
0	4–5	Status of the "Error/Contamination" application diagnostic output 0: Optics cover is dirty, operation is not guaranteed 1: Optics cover is dirty, operation is still guaranteed 2: Device in lock-out system status 3: No error/No contamination
0	6–7	Reserved

Configuration

Tab. 12: Status of the inputs (CAN IO state – inputs)

Byte	Bit	Description
1	0	Status of control input A (only S100 Professional) 0: LOW 1: HIGH
1	1	Status of control input B (only S100 Professional) 0: LOW 1: HIGH
1	2	Status of control input C (only S100 Professional) 0: LOW 1: HIGH
1	3	Status of control input D (only S100 Professional) 0: LOW 1: HIGH
1	4–6	Reserved
1	7	Status of stand-by mode control input 0: LOW 1: HIGH

Tab. 13: Active switching fields (CAN field data)

Byte	Bit	Description
2	0–4	Active switching field of switching output Q1 0 to 15: Switching field 1 to 16
2	5–7	Reserved
3	0–4	Active switching field of switching output Q2 0 to 15: Switching field 1 to 16
3	5–7	Reserved

Tab. 14: Device status (CAN device state)

Byte	Bit	Description
4	0–3	Device status 0: Device is ready 1: Waiting for configuration 2: Lock-out system status 3: Initialization of the device 4: Waiting for valid input signals 5: Calibration of the optics cover
4	4–7	Reserved
5–7	0–7	Reserved

 8012238/1QN0/2024-12-30

S100

Tab. 15: Status of the virtual inputs
(CAN virtual input state)

Byte	Bit	Description
0	0	Status of control input A (only S100 Professional) 0: LOW 1: HIGH
0	1	Status of control input B (only S100 Professional) 0: LOW 1: HIGH
0	2	Status of control input C (only S100 Professional) 0: LOW 1: HIGH
0	3	Status of control input D (only S100 Professional) 0: LOW 1: HIGH
0	4–6	Reserved
0	7	Status of stand-by mode control input 0: LOW 1: HIGH
1–7	0–7	Reserved
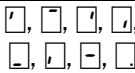
9 Commissioning

9.1 Initial Commissioning

After the S100 is switched on, it goes through power-up cycle. During the power-up cycle, the 7-segment display indicates the device status.

The following display values are possible during initial commissioning of a S100.

Tab. 16: 7-segment display during and after the power up sequence during initial commissioning

Step	Display	Meaning
1	⌐, ⌐, ⌐, ⌐, ⌐, ⌐, ⌐, ⌐	Power-up cycle, test of the 7-segment display All segments are activated consecutively.
2	⌐	Power-up cycle, during initial commissioning: Device in configuration mode
	Other display	Interlocking activated Malfunction in the external conditions or in the device itself. See section 11.3 "Error and status indicators on the 7-segment display" on page 54.

Tab. 17: Display of LEDs after the power up sequence

Step	Display					Meaning
	STOP	Q1	Q2	🚩	OK	
1	●	○	○	○	○	Device self-test
2	●	●	●	●	○	Device self-test
3	●	●	●	○	○	Device status: Waiting for configuration or object in the switching field, switching outputs in the OFF state
	Other display					Interlocking activated Malfunction (see section 11.2 "Error and status indicators on LEDs" on page 52).
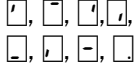
Note The switch-on time depends on the extent of the configuration data and can take up to 25 seconds.

9.2 Recommissioning

If the S100 has already been put into operation but the device has been replaced or exchanged since then, the S100 automatically reads the saved configuration from the system plug remaining on the machine or the system.

The following display values are possible:

Tab. 18: 7-segment display during and after the power up sequence during recommissioning

Step	Display	Meaning
1	ˈ, ¯, ˈˌ, ˌ, ␣, ˌ, ⁻, ▢	Power-up cycle, test of the 7-segment display All segments are activated consecutively.
2	3	Waiting for device in the CAN bus
3	4	Waiting for valid local inputs
		Or
	5 or 5	Waiting for valid virtual inputs via CANopen 5 is displayed in Pre-operational CAN status, 5 Operational CAN status. (Only possible with S100 Professional.)
		Or
	⁻ ↻ ▢	Device in Pre-operational CAN status
4	No display	Device is ready
	Or	Or
	ˈ	Device ready for operation, but object is in switching field
	Other display	Interlocking activated Malfunction (see section 11.2 "Error and status indicators on LEDs" on page 52).

Tab. 19: Display of LEDs after the power up sequence

Display					Meaning
STOP	Q1	Q2	⚡	OK	
●	○	○	○	○	Power-up cycle, step 1
●	●	●	●	○	Power-up cycle, step 2
○	○	○	○	●	The device is ready for operation, no object in one of the switching fields.
●	●	○	○	○	Or: The device is ready for operation, object in the switching field that switching output Q1 is assigned to.
●	○	●	○	○	Or: The device is ready for operation, object in the switching field that switching output Q2 is assigned to.
Other display					Interlocking activated Malfunction (see section 11.2 "Error and status indicators on LEDs" on page 52).

10 Care

⚠️ WARNING

Do not do any repairs on the device!

The S100 components do not contain any parts that you can repair. Do not open the S100 components and only exchange the parts described as replaceable in the following.

Disconnect the power to the system!

The system could inadvertently start while you are replacing the optics cover. Switch off the machine's voltage for all work on the machine and LiDAR sensor.

10.1 Cleaning the optics cover

The LiDAR sensor is largely maintenance-free. However, the optics cover of the LiDAR sensor should be cleaned regularly and in the event of contamination.

➢ Do not use aggressive cleaning agents.

➢ Do not use abrasive cleaning agents.

Note Static charges cause dust particles to be attracted to the optics cover. You can mitigate this effect by using anti-static plastic cleaner (SICK part no. 5600006) and a SICK lens cloth (part no. 4003353) (see section 13.3 "Accessories/Spare parts" on page 71).

How to clean the optics cover:

➢ Use a clean, soft brush to remove dust from the optics cover.

➢ Then wipe the light emission window of the optics cover with a clean, damp cloth.

10.2 Replacing the optics cover

⚠️ WARNING

Carry out optics cover calibration using the CDS-S100 every time the optics cover is replaced.

The degree of contamination is continuously measured during operation of the S100 The optics cover calibration needs to be carried out for this purpose. This serves as a reference for contamination measurement (status = uncontaminated).

The optics cover calibration must only be carried out with a new optics cover. The new optics cover must be free of contamination when the calibration is carried out. The optics cover calibration must be done at room temperature (10–30°C).

If the optics cover is scratched or damaged, you must replace it. Order the replacement optics cover from SICK (see section 13.3 "Accessories/Spare parts" on page 71).

Notes
- The optics cover of the S100 is an optical component which must not be contaminated or scratched during replacement.
- The optics cover may only be replaced by authorized safety personnel in a clean, dust- and dirt-free environment.
- Never replace the optics cover during continuous operation, as this could destroy the inner components and dust particles could get into the device.
- You must prevent contamination on the inside, for example due to fingerprints.

- Do not use an additional sealant, such as silicone, since these materials could influence the optics.

- Mount the optics cover according to the following instructions to ensure IP 65 leak tightness of the housing.

Replace the optics cover as follows:

Notes
- Only use a **new** optics cover (see 13.3.6 on page 73).

- You must provide ESD protection during the replacement of the optics cover.

- Set a torque wrench to 1.2 Nm tightening torque (hand-tight) and have it ready.

➢ Pull out the system plug and disassemble the S100.

➢ Move the S100 to a clean location (office, maintenance shops or similar).

➢ First clean the S100 from the outside. This prevents foreign matter from getting into the open device.

➢ Undo the fixing screws ① to ③ of the optics cover.

Fig. 35: Loosening the front screen fixing screws
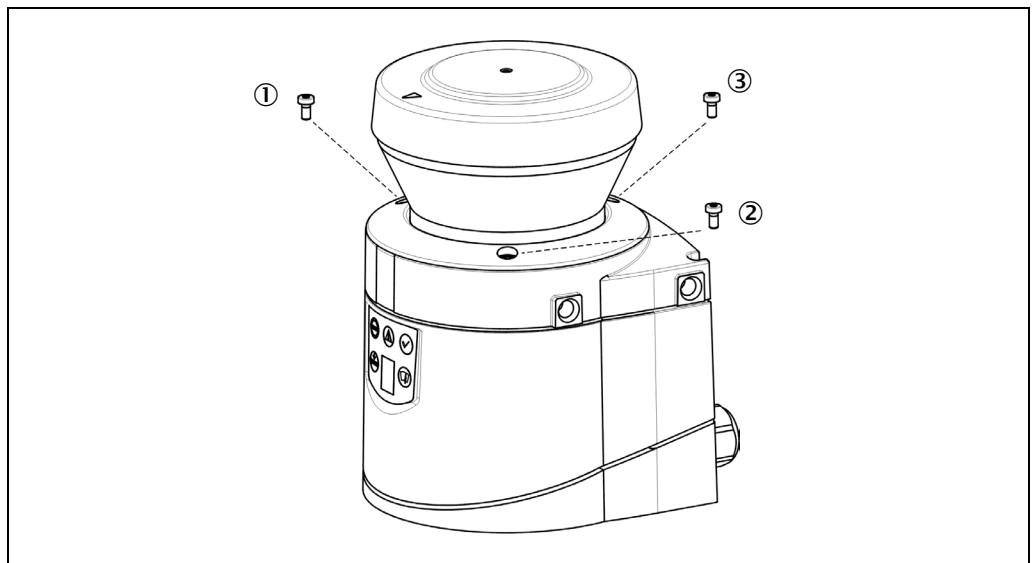
➢ Then remove the optics cover.

➢ Check whether the mirror on the motor is dirty and, if necessary, remove dirt using an optic brush.

➢ Take the optics cover out of the packaging and remove the protective cap for the seal.

➢ Remove any packaging residues.

➢ Set the optics cover on the LiDAR sensor and attach fixing screws ① to ③.

➢ When putting on the new hood, make sure that the arrow on the upper side of the hood is pointing forward and that the optics cover is lying completely on the device **without** a gap.

➢ Then tighten the screws with the set torque.

➢ Make sure that the optics cover is clear of dirt and damage.

How to recommission the S100:

➢ Remount the S100 properly (see chapter 5 "Mounting" on page 27).

➢ Connect the system plug of the S100.
After the S100 is switched on, it automatically reads the saved configuration from the system plug (see section 9.2 "Recommissioning" on page 49).

➢ Then run optics cover calibration with the CDS-S100.

11 Diagnostics

This chapter describes how to identify and remedy faults in the LiDAR sensor.

11.1 SICK Support

If you cannot remedy the fault with the help of the information provided in this chapter, please contact your respective SICK subsidiary.
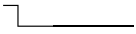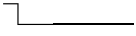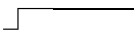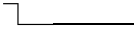
Enter the telephone number of your SICK subsidiary so that other users have quick access to them. The telephone number can be found on the rear side of these operating instructions.

Telephone numbers of your SICK subsidiary

11.2 Error and status indicators on LEDs
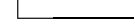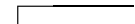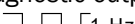
This section describes what the displays and fault indicators on the LED mean and how to respond to them. A description of the status indicators can be found in section 4.6 "Status indicators" on page 26, the connections of the outputs in section 6.1 "System connection" on page 37.

Tab. 20: Status indicators of the LEDs

Display	Output level	Possible cause
(STOP) (Q1)	At switching output Q1 At switching output $\bar{Q}1$	Object in switching field 1 • Switching output Q1 in OFF state • Switching output $\bar{Q}1$ in ON state
(STOP) (Q2)	At switching output Q2 At switching output $\bar{Q}2$	Object in switching field 1 • Switching output Q2 in OFF state • Switching output $\bar{Q}2$ in ON state
(STOP) (✓)	At switching outputs Q1 and Q2 At switching outputs $\bar{Q}1$ and $\bar{Q}2$	Switching fields free • Switching outputs Q1 and Q2 in ON state • Switching outputs $\bar{Q}1$ and $\bar{Q}2$ in OFF state

S100

Tab. 21: Fault indicators of the LEDs

Display	Output level	Possible cause	Remedy
(STOP) ✓ (icon)	At the switching outputs At application diagnostic output	No supply voltage or supply voltage too low	➢ Check the voltage supply and switch it on if necessary.
(icon)	At application diagnostic output	No error	
(icon)	At application diagnostic output	Optics cover is dirty, operation is not guaranteed	➢ Clean the optics cover.
(icon)	At application diagnostic output 1 Hz	Optics cover is dirty, operation is still guaranteed	➢ Clean the optics cover.
(icon)	At application diagnostic output 4 Hz	System error	➢ Refer to the fault indicator of the 7-segment display or run diagnostics with the CDS-S100. ➢ Switch off the device and turn it on again, if necessary.

11.3　Error and status indicators on the 7-segment display

Lock-out system status

The system can change to the lock-out system status if certain errors occur or the configuration is faulty. The 7 segment display of the LiDAR sensor then shows ⦚8⦚, 9, A, c, d, E, F, I, 3, L, n, P or u. Do the following to put the device back into operation:

➢ Fix the cause of the error in accordance with Tab. 22.

➢ Switch the voltage supply of the S100 off and then on again.

　　　Or

➢ Restart the LiDAR sensor by means of the CDS-S100.

This section explains what the fault indicators of the 7-segment display mean and how to respond to them. A description of the positions and icons on the S100 can be found in section 4.6 "Status indicators" on page 26.

Tab. 22:Error and status indicators on the 7-segment display

EMCY = Emergency messages on the CAN bus

Display/ (EMCY)	Possible cause	Remedy
ˈ, ˉ, ˈ, ˌ, ˌ, ˌ, ˗, ˌ	Power-up cycle - all segments are activated consecutively.	No error
I	Object in switching field Q1	No error
I	Object in switching field Q2	No error
3	Initialization of the device	The display automatically goes out when the S100 is initialized. If the 3 display does not go out: ➢ Check the configuration of the system using the CDS-S100. Retransmit the correct configuration to the S100.
4 (1010h)	Wait for valid local input signals	The display goes out automatically if an input signal is pending which corresponds to a configured monitoring case. If the 4 display does not go out: ➢ Check the cabling. ➢ Check the control signals for correct switching behavior. ➢ Check the configuration of the system using the CDS-S100. Retransmit the correct configuration to the S100. ➢ Check the CANopen communication to the BUS master.

Display/ (EMCY)	Possible cause	Remedy
5 or 5	Wait for valid virtual input signals on the CAN bus	The display goes out automatically if an input signal is pending which corresponds to a configured monitoring case. 5 is displayed in Pre-operational CAN status, 5 Operational CAN status. If the display does not go out: ➢ Check the cabling. ➢ Check the CAN communication. ➢ Check the provision of the virtual input signals. ➢ Check the control signals for correct switching behavior. ➢ Check the configuration of the system using the CDS-S100. Retransmit the correct configuration to the S100.
6 (1020h)	Wait for configuration or configuration not complete	No error ➢ Create a configuration using the CDS-S100 (Configuration & Diagnostic Software – S100) or transmit an existing configuration to the S100.
- ↻ □	Device in Pre-operational CAN status	No error ➢ Initiate the Operation CAN status via the CAN master.
C ↻ 0	CAN communication stopped	➢ This status can only be initiated by the CAN master. This device now no longer outputs data and only accepts a change of status from the CAN master in Pre-operational and Operational.
C ↻ 1	At least one CAN error counter has exceeded the warning threshold.	➢ Check whether the device is connected to the CAN bus. ➢ Check whether a CAN master is active. ➢ Check the termination of the CAN bus. The display goes out after the S100 has received enough messages via CANopen which rest the error counter.
C ↻ 2	An expected event in CAN communication did not occur (node guarding or heartbeat message).	➢ Check the CAN communication. The display goes out after the S100 has received enough messages via CANopen which rest the error counter.
C ↻ 3	The CAN controller has the busoff status.	➢ Check the CAN cable for short-circuits between the cables and against ground.
E ↻ 1 (1030h)	S100 Defective	➢ Switch off the voltage supply to the S100 for at least 2 seconds and then switch it

Display/ (EMCY)	Possible cause	Remedy
E ↻ ∃	Configuration memory in the system plug defective	back on. If the display does not go out: ➢ Send the S100 to the manufacturer for repair.
F ↻ i	Overcurrent at switching output Q1	➢ Check the connected switching element (contactor, relay) Replace it if necessary. ➢ Check the wiring for a short-circuit to 0 V.
F ↻ Ч	Overcurrent at switching output Q2	➢ Check the connected switching element (contactor, relay) Replace it if necessary. ➢ Check the wiring for a short-circuit to 0 V.
i ↻ ᒋ (1050h)	Device is blanked	➢ Check whether the S100 is blanked by an external light source, e.g. a headlight, infrared light sources, stroboscope light, sun, etc. If necessary, remount the device.
i ↻ ∃ (1060h)	Temperature error The operating temperature of the S100 has exceeded or fallen below the permitted range.	➢ Check whether the S100 is being operated in accordance with the permissible ambient conditions.
n ↻ i (1070h)	Input signal for a non-defined monitoring case	➢ Check the vehicle path. Or: ➢ Check the work process of the monitored machine or system. ➢ If necessary, check the configuration of the monitoring case using the CDS-S100.
o (1080h)	Stand-by mode, switching outputs are in the OFF state, laser is switched off.	No fault If the criteria for stand-by mode are withdrawn, operational readiness is restored. If the o display does not go out: ➢ Check the level on the STBY input.
u ↻ i (1090h)	Light emission window of the optics cover contaminated	➢ Clean the light emission window of the optics cover.
u ↻ 9 (10A0h)	Front screen calibration not run successfully	➢ Check the front screen for contamination. Or ➢ Check the mounting of the front screen.

Note If you have difficulties during error correction, contact SICK Support. Keep a printout of the diagnostic results handy.

11.4 Advanced diagnostics

The supplied CDS-S100 (Configuration & Diagnostic Software – S100) software contains extended diagnostic options. It allows you to confine the problem if the error situation is unclear or there are availability problems. You can find detailed information ...

- In the CDS-S100 (Configuration & Diagnostic Software – S100) online help

- In the user manual of the CDS-S100

12 Technical specifications

12.1 Characteristic curves

Fig. 36: Diagram of the object diameter or the necessary remission required for switch-off.
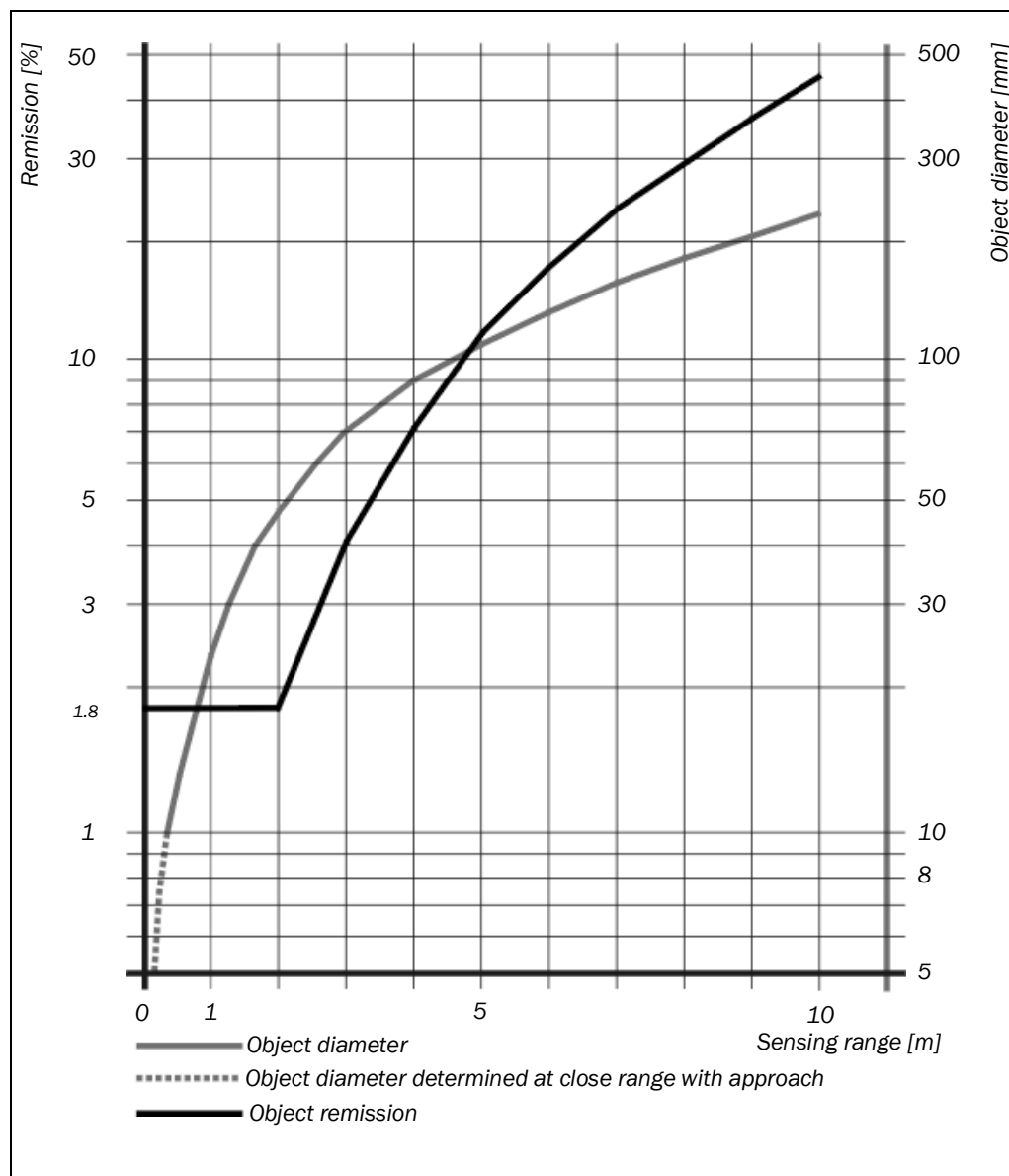
Tab. 23: Examples for reflectance of various materials

Remission	Material
Approx. 2 %	Black shoe leather
Approx. 5 %	Matt black paint
Approx. 20 %	Gray cardboard
Approx. 80 %	Writing paper
Approx. 100 %	White plaster
>300 %	Reflective tapes
>2000 %	Reflectors

Technical specifications

12.2 Response times

The overall response time of your application depends on ...

- The basic response time of the S100
- The set multiple sampling

Calculating overall response time T_S:

$T_S \quad = t_B + T_{MFA}$

Where...

$t_B \quad$ = Basic response time = 40 ms

T_{MFA} = Supplement due to multiple sampling > 1

Multiple sampling.

Two-fold multiple sampling is set in the S100 from the factory. From a multiple sampling of 2 you must add 40 ms to the basic response time.

Tab. 24: Supplements for multiple sampling

Multiple sampling.	Supplement	Basic response time + supplement
1-fold	0 ms	40 ms
2-fold (default setting)	40 ms	80 ms
3-fold	80 ms	120 ms
4-fold	120 ms	160 ms
5-fold	160 ms	200 ms
6-fold	200 ms	240 ms
7-fold	240 ms	280 ms
8-fold	280 ms	320 ms
9-fold	320 ms	360 ms
10-fold	360 ms	400 ms
11-fold	400 ms	440 ms
12-fold	440 ms	480 ms
13-fold	480 ms	520 ms
14-fold	520 ms	560 ms
15-fold	560 ms	600 ms
16-fold	600 ms	640 ms

12.3   Data sheet

Tab. 25: S100 data sheet

	Minimum	Typical	Maximum

General details

Laser class	Laser class 1 (according to IEC 60825-1 as well as CDRH 21 CFR 1040.10 and 1040.11, except compliance with IEC 60825-1:2014, as described in Laser Notice No. 56 dated May 8, 2019)		
Enclosure rating in accordance with EN 60 529	IP 65		
Protection class in accordance with EN 50 178:1997-10	II		
Ambient operating temperature	–10 °C		+50 °C
Storage temperature	–25 °C		+70 °C (≤ 24 h)
Humidity, non-condensing (taking into account the operating temperature range)			95 %
Vibration in accordance with IEC 60 068-2-6			
Frequency range	10 Hz		150 Hz
Amplitude	0.35 mm or 5 g		
Shock resistance in accordance with IEC 60 068-2-29			
Single shock	15 g, 11 ms		
Continuous shock	10 g, 16 ms		
Sender	Pulsed laser diode		
Wavelength	895 nm	905 nm	915 nm
Divergence of collimated beam (full angle)		14 mrad	
Pulse duration			4.5 ns
Average output power			1.76 mW
Light spot size on the optics cover		8 mm	
Light spot size at 2.0 sensing range		28 mm	
Light spot size at 10.0 sensing range		140 mm	
Housing			
Material	Aluminum die cast		
Color	RAL 9005 (black)		
Optics cover			
Material	Polycarbonate		
Interface	Outside with scratch-resistant coating		

	Minimum	Typical	Maximum
System plug	ESD-protected		
Material	Aluminum die cast		
Color	RAL 9005 (black)		
Dimensions S100[3)]			
Height			152 mm
Width			102 mm
Depth			105 mm
Total weight (without connecting cables)		1.2 kg	

Functional information

	Minimum	Typical	Maximum
Working range (switching field of the S100)	0 m		10 m
Resolution	See Fig. 36 on page 58.		
Configurable resolution	30, 40, 50, 70, 150 mm		
Sensing range at 30 mm resolution			1.30 m
Sensing range at 40 mm resolution			1.70 m
Sensing range at 50 mm resolution			2.10 m
Sensing range at 70 mm resolution			3.00 m
Sensing range at 150 mm resolution			6.60 m
Sensing range at 230 mm resolution			10.00 m
Scan angle			270°
Remission at 2 m	1.8 %		Several 1000 % (reflectors[4)])
Angular resolution		0.5°	
Recommended supplement for retro-reflectors on scan plane with a distance of less than 1 m to protective field boundary			200 mm
Measurement error			
Systematic error			
Without reflectors in the measuring range		±15 mm	
With reflectors in the measuring range		±30 mm	
Statistical error at (21° C)			
At 1 σ		8[5)] mm	
at 2 σ		16 mm	
at 3 σ		24 mm	
at 4 σ		32 mm	
at 5 σ		40 mm	
Flatness of the scan field at 2 m			±50 mm

[3)]   Without fixing screws and overrun of cable glands with a mounted system plug.
[4)]   Corresponds to Diamond Grade 3000X™ (approx. 1250 cd/lx × m²).
[5)]   Without reflector in the measuring range.

	Minimum	Typical	Maximum
Distance of mirror rotational axis (zero point of X- and Y-axis) to rear side of device		55 mm	
Distance between center point of scan plane and bottom edge of the housing		116 mm	
Distance measurement range (in data recorder)	0 m		30 m
Number of multiple samplings (can be configured via CDS-S100)	1		16
Power-up delay			
Of a configurable device		15 s	
When the configuration is read out of the system plug			25 s
Restart after (can be configured)	0 s		60 s
Basic response time	40 ms		

Electrical data

	Minimum	Typical	Maximum
Supply voltage (SELV)[6]	16.8 V	24 V	30 V
Permissible residual ripple[7]			±5 %
Switch on current[8]			2 A
Operating current at 24 V without output load		0.25 A	0.33 A
Operating current with maximum output load			1.65 A
Power consumption without output load		6 W	8 W
Power consumption with maximum output load			40 W
Electromagnetic compatibility (EMC)	EN 61000-6-2:2005-08		
Electrical connection	System plug with screw connections		
FE screw terminal technical data			
Rigid wire cross-circuit	0.3 mm²		1.6 mm²
Flexible wire cross-circuit[9]	0.3 mm²		1.6 mm²
American wire gage (AWG)	22		14
Wire stripping length		5 mm	
Screw tightening torque			0.5 Nm
Screw terminal technical data			
Rigid wire cross-circuit	0.14 mm²		1.5 mm²
Flexible wire cross-circuit[10]	0.14 mm²		1.0 mm²
American wire gage (AWG)	26		16
Wire stripping length		5 mm	
Screw tightening torque	0.22 Nm		0.3 Nm

[6] The external voltage supply must be capable of buffering brief power failures of 20 ms as specified in EN 60204. Suitable power supply units are available as accessories from SICK (tested in accordance with DIN 40839-1, test pulse 5 (load dump) limited to 58 V).

[7] The voltage level must not fall below the specified minimum voltage.

[8] The charging currents of the input capacitors are not taken into account.

[9] Ferrules are not needed.

[10] Ferrules are not needed.

	Minimum	Typical	Maximum
Length of cable at network tolerance ±10 %			
At wire cross-section 1 mm^2			50 m
At wire cross-section 0.5 mm^2			25 m
At wire cross-section 0.25 mm^2			12 m
Length of cable at network tolerance ±5 %			
At wire cross-section 1 mm^2			60 m
At wire cross-section 0.5 mm^2			30 m
At wire cross-section 0.25 mm^2			15 m
Length of cable at network tolerance ±1 %			
At wire cross-section 1 mm^2			70 m
At wire cross-section 0.5 mm^2			35 m
At wire cross-section 0.25 mm^2			17 m
Stand-by mode input			
Input resistance at HIGH		2 kΩ	
Voltage for HIGH	11 V	24 V	30 V
Voltage for LOW	–3 V	0 V	5 V
Static input current	6 mA		15 mA
Static control inputs			
Input resistance at HIGH		2 kΩ	
Voltage for HIGH	11 V	24 V	30 V
Voltage for LOW	–3 V	0 V	5 V
Static input current	6 mA		15 mA
Input frequency (max. switching sequence)	$1/t_{UFVz}$ + 40 ms (t_{UFVz} = set time for moving forward the switchover time)		
"Error/Contamination" application diagnostic output			
Switching voltage HIGH at 200 mA	V_s – 3.3 V		V_s
Source switching current		100 mA	200 mA
Current limiting (after 5 ms at 25 °C)	600 mA		920 mA
Switch-on delay		1.4 ms	2 ms
Switch-off delay		0.7 ms	2 ms

	Minimum	Typical	Maximum
Switching outputs Q1 or Q2	PNP semiconductor, short-circuit protected[11]		
Switching voltage HIGH at 250 or 150 mA	$V_S - 2.7$ V		V_S
Switching voltage LOW	0 V	0 V	3.5 V
Source switching current[12]	6 mA		0.25 A
Leakage current			250 µA
Load inductance			2.2 H
Load capacity			2.2 µF at 50 Ω
Switching sequence (without switchover)			5 $^1/_s$
Permissible cable resistance			2.5 Ω
Application diagnostic outputs $\overline{Q}1$ and $\overline{Q}2$			
Switching voltage HIGH at 200 mA	$V_S - 3.3$ V		V_S
Source switching current		100 mA	200 mA
Current limiting (after 5 ms at 25 °C)	600 mA		920 mA
Switch-on delay		1.4 ms	2 ms
Switch-off delay		0.7 ms	2 ms
Configuration and diagnostic interface			
Communication protocol	RS-232 (proprietary)		
Transmission rate	38 400 baud		
Lengths of cable at 38 400 baud and 0.25-mm² cables			15 m
Galvanic separation	No		
Output TxD HIGH	5 V		15 V
Output TxD LOW	−15 V		−5 V
Voltage range RxD	−15 V		15 V
Switching threshold RxD LOW	−15 V		0.4 V
Switching threshold RxD HIGH	2.4 V		15 V
Short-circuit current at TxD	−60 mA		60 mA
Max. voltage level at RxD	−15 V		15 V
Max. voltage level at TxD	−11 V		11 V

[11] Applies to the voltage range between V_S and 0 V.
[12] Switching currents up to 500 mA are permitted for short periods (≤100 ms).

	Minimum	**Typical**	**Maximum**
CANopen connection			
Baud rate	10 kBit/s		1 MBit/s
Address range	1		127
Number of nodes			64
Wire cross-section of the cable to be connected	0.22 mm^2		
Lengths of cable of 0.22-mm^2 cables			
Up to 500 kBit/s			40 m
Up to 800 kBit/s			30 m
Up to 1 MBit/s			15 m
Galvanic separation	Yes		
Cable type to be connected	Wrapped in pairs with copper shielding		
Impedance of the cable to be connected	108 Ω	120 Ω	132 Ω
CAN_HI output voltage	2.0 V		4.5 V
CAN_LO output voltage	0.5 V		3.0 V
Differential input voltage (recessive)	–1.0 V		0.5 V
Differential input voltage (dominant)	0.9 V		5.0 V
CAN_HI short-circuit current			–200 mA
CAN_LO short-circuit current			200 mA
Maximum voltage at CAN_HI	30 V		–30 V
Maximum voltage at CAN_LL	–30 V		30 V
Terminator		External	

12.4   Dimensional drawings

12.4.1   S100

Fig. 37: Dimensional drawing of the S100 (mm)
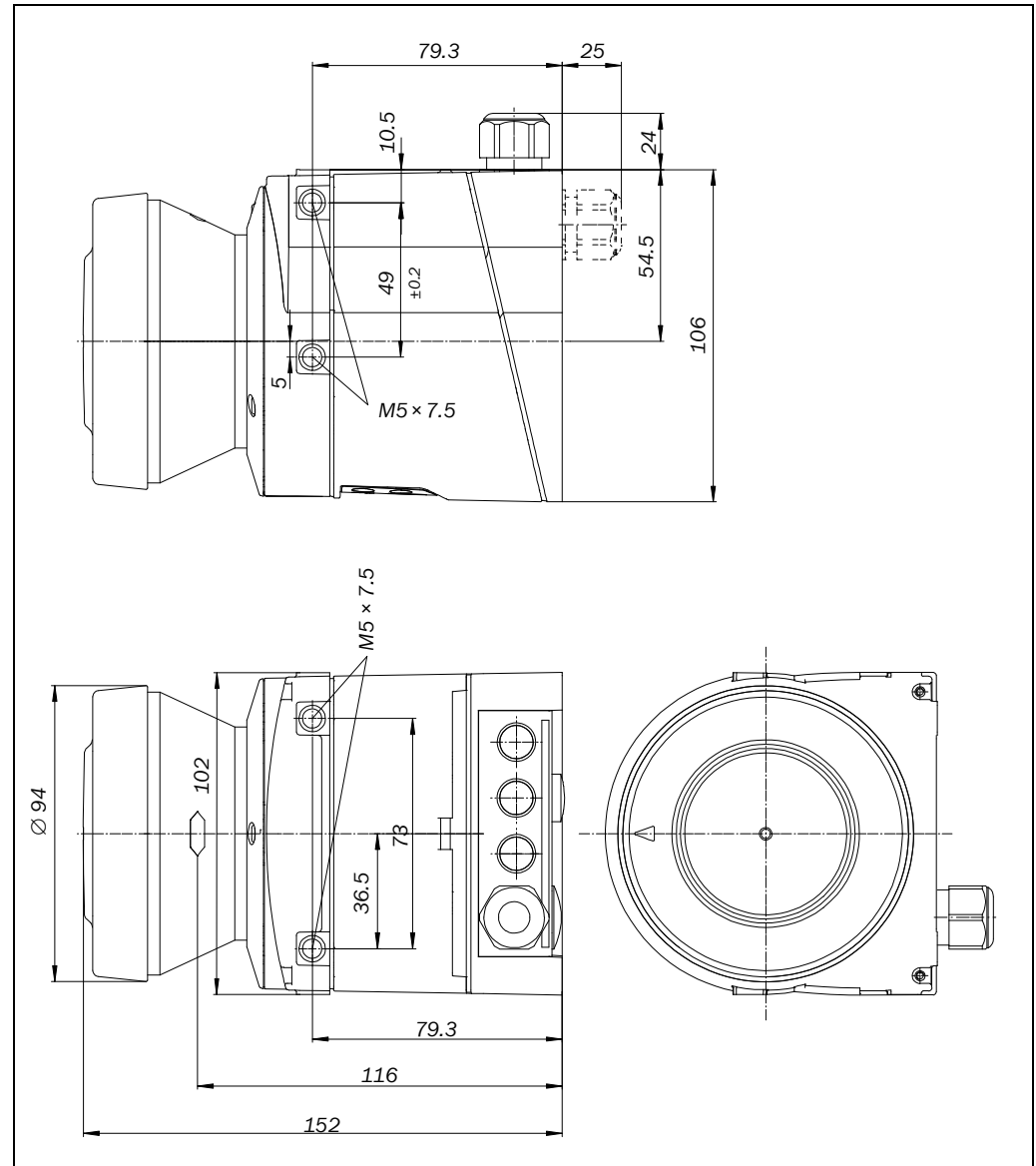
12.4.2 Mounting kits

Fig. 38: Dimensional drawing mounting kit 1a (mm)

Part number 2034324
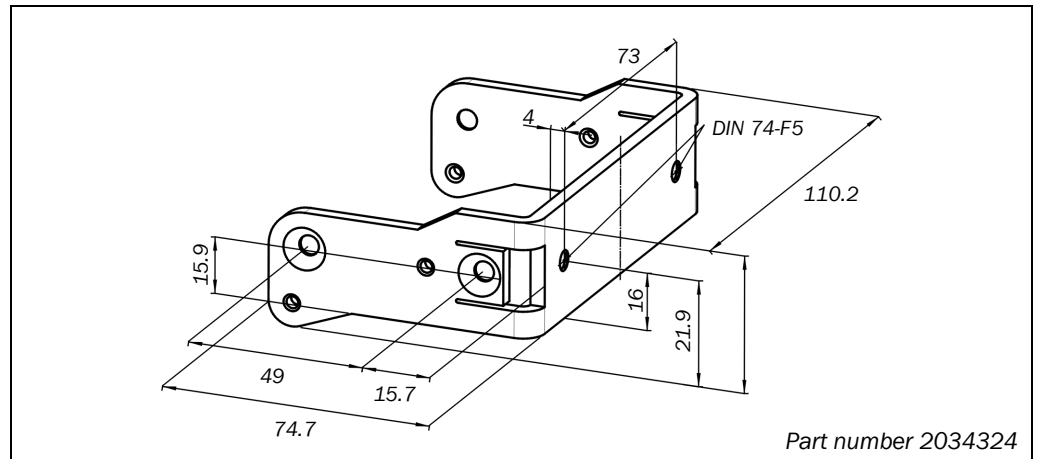
Fig. 39: Dimensional drawing mounting kit 1b (mm)

Part number 2034325
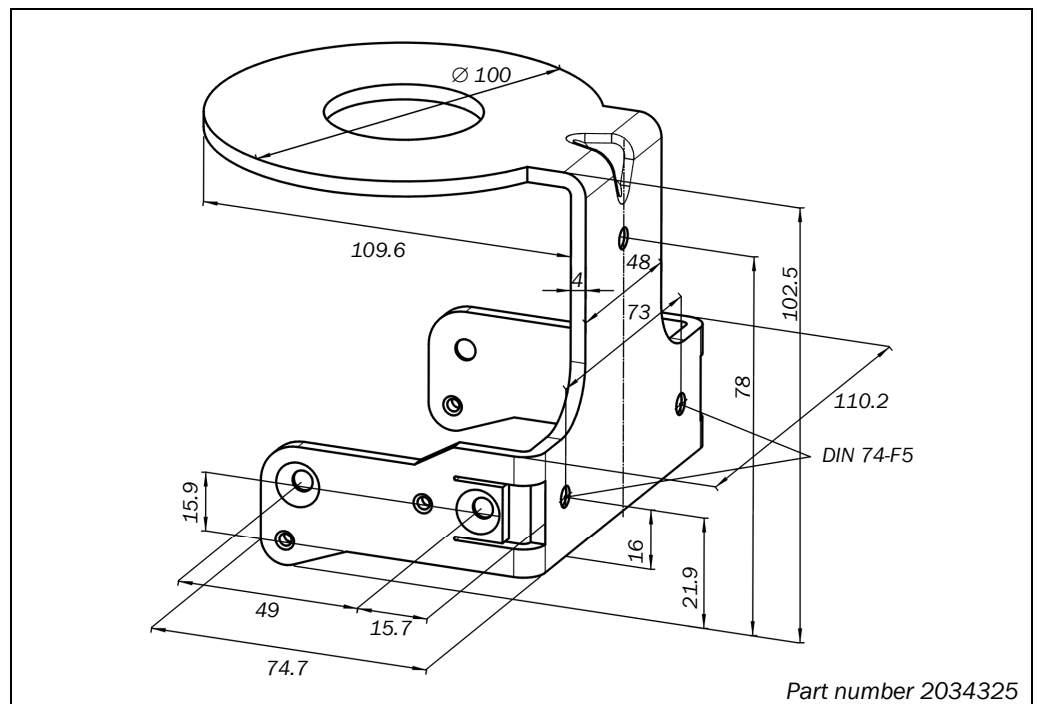
Fig. 40: Dimensional drawing mounting kit 2 (mm)

Part number 2039302
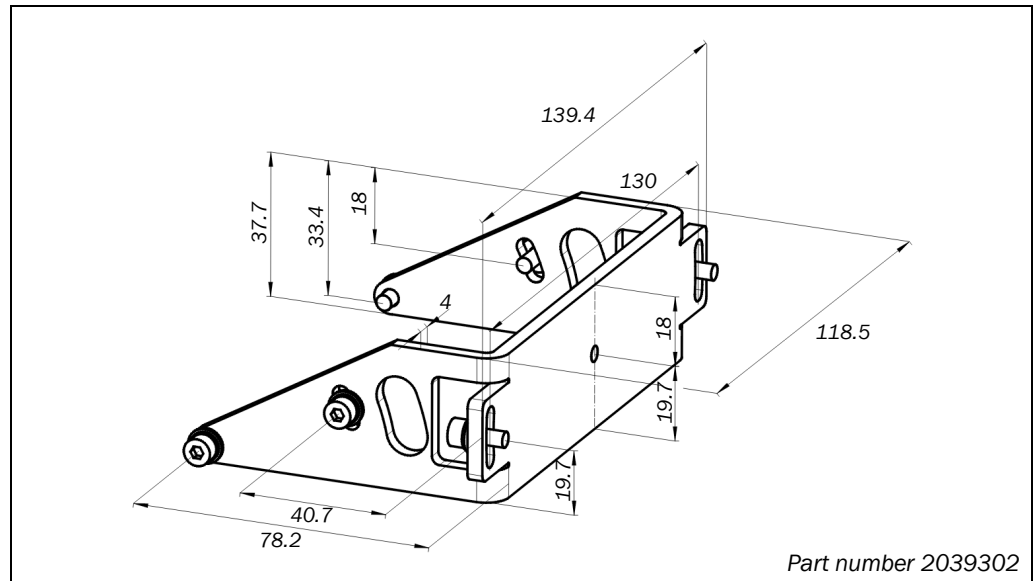
Fig. 41: Dimensional drawing mounting kit 3 (mm)

Part number 2039303
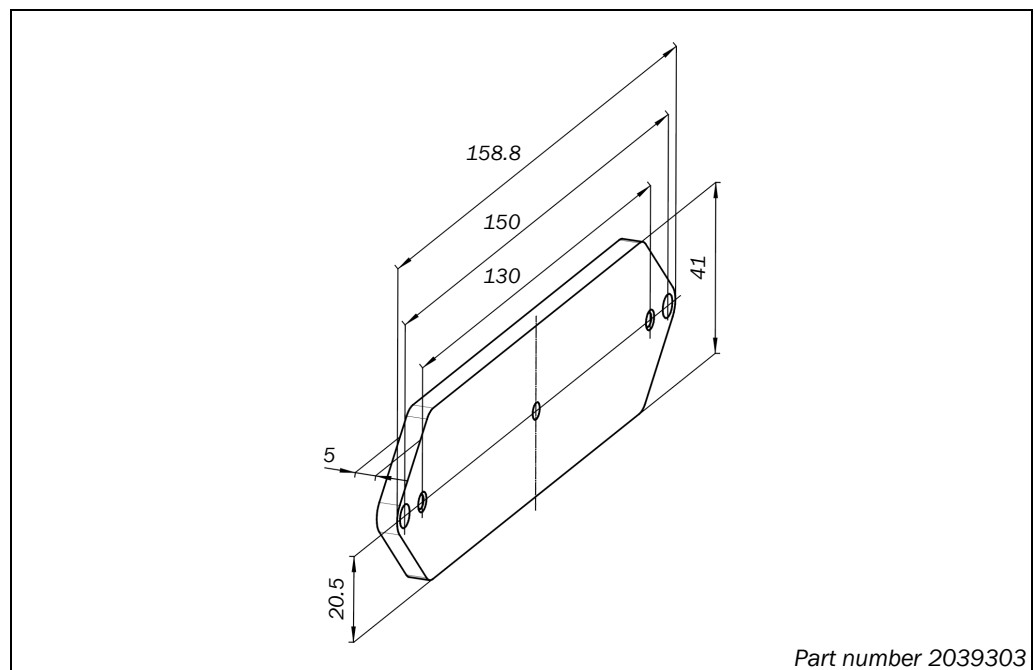
Fig. 42: Dimensional drawing of mounting kit 3 with shock mount (mm)

Part number 2058723
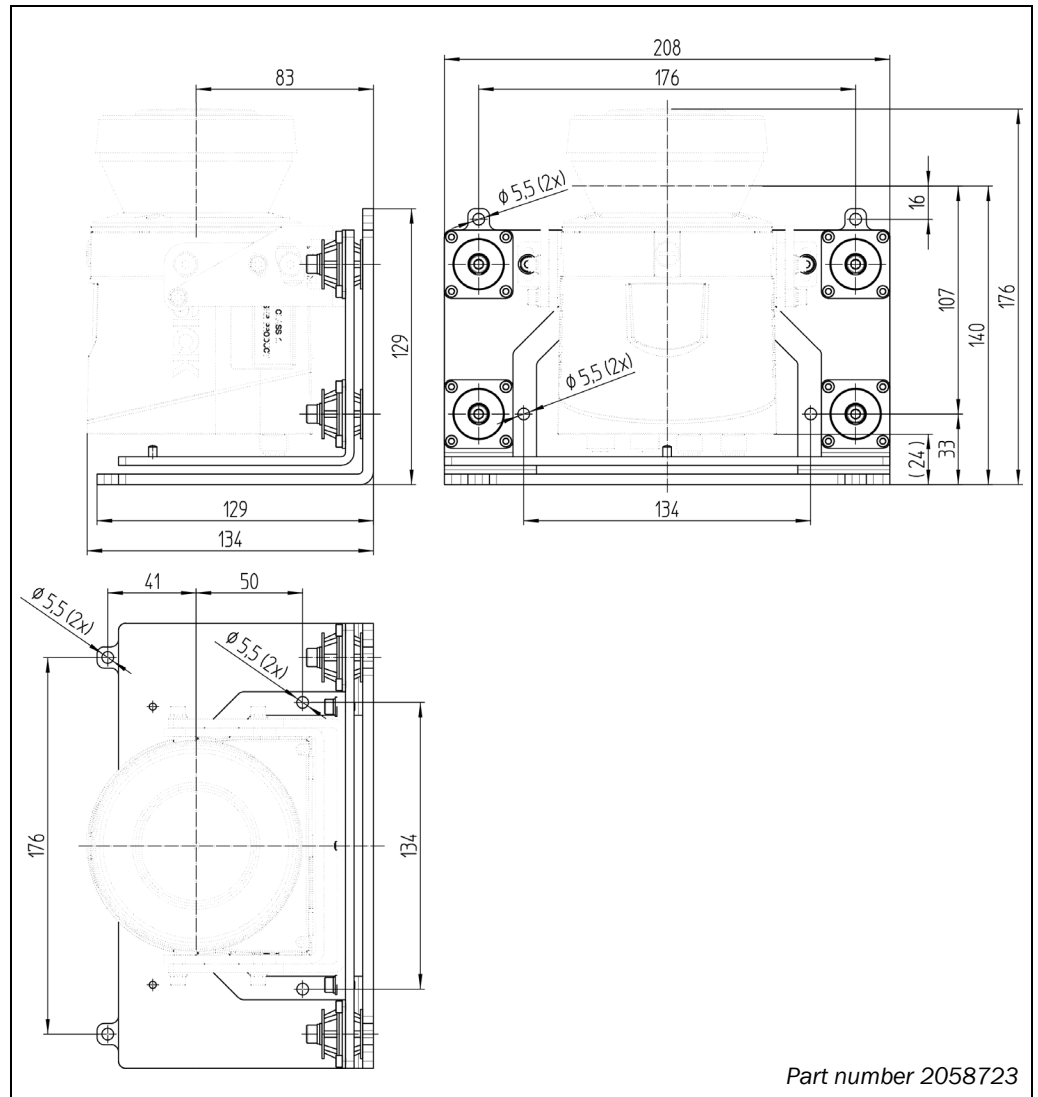
12.4.3 Beginning of the scan plane

Fig. 43:Dimensional drawing of the scan plane with mounting kit 1a (mm)
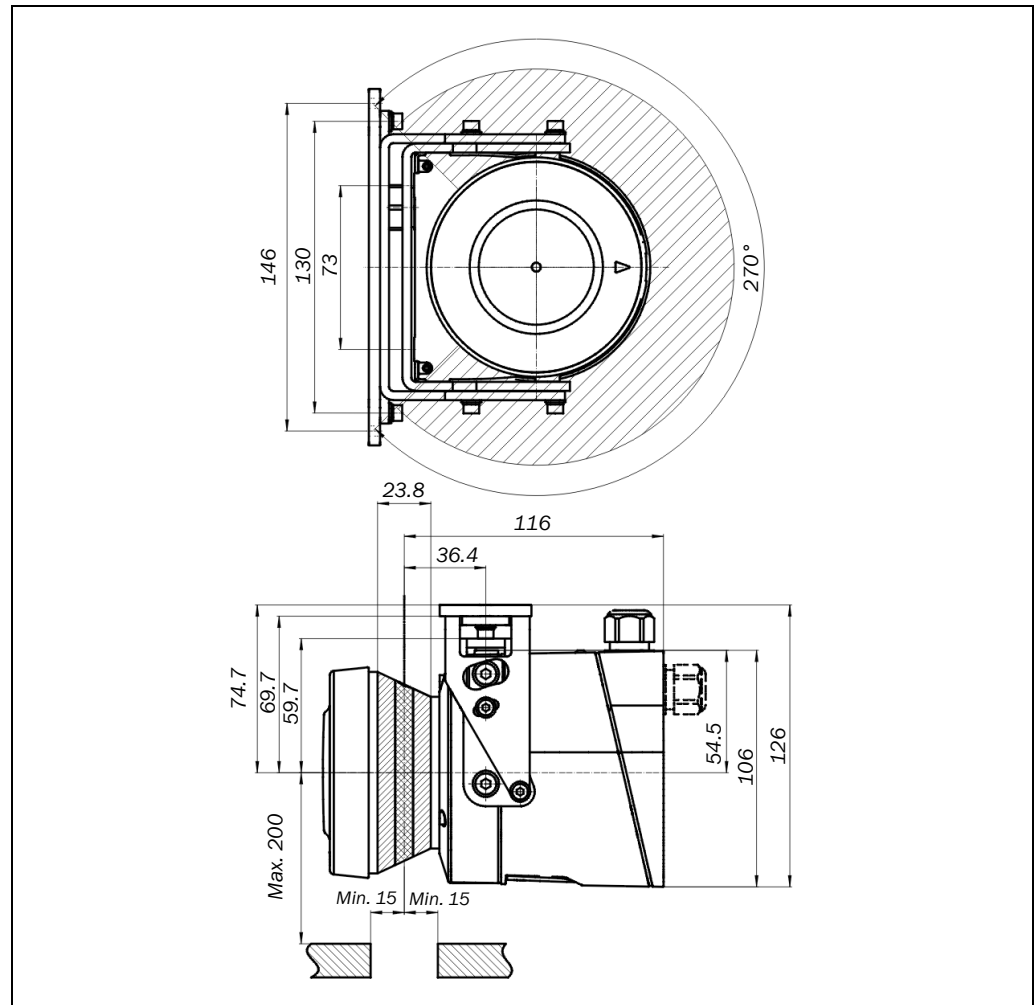
13   Ordering information

13.1   Scope of delivery S100

- LiDAR sensor

- Extension for cable entry from M12 to M16

- EMC-compliant M16 cable gland

Note   System plug not included with delivery.

System plug without cable and pre-assembled system plug are available from SICK AG (see section 13.3.2 "S100 system plug" on page 72). For additional information, see section 6.2 "Unassembled system plug" on page 39 and section 6.3 "Pre-assembled system plug" on page 40.

13.2   Available systems

Tab. 26: System part numbers

Device type	Part	Part number
S10B-9011BA	S100 Standard	1042266
S10B-9011DA	S100 Professional	1042267

13.3   Accessories/Spare parts

13.3.1   Mounting kits

Tab. 27: Mounting kit part numbers

Part	Part number
Mounting kit 1a: Mounting bracket for direct rear mounting on the wall or the machine.	2034324
Mounting kit 1b: Mounting bracket for direct rear mounting on wall or machine with optics cover protection.	2034325
Mounting kit 2: Mounting bracket only in conjunction with mounting brackets 1a or 1b. Lateral axis adjustment possible	2039302
Mounting kit 3: Holding plate only in conjunction with mounting bracket 2. Longitudinal axis adjustment possible	2039303
Mounting kit 3 with shock mount: Holding plate only in conjunction with mounting bracket 2. Longitudinal axis adjustment possible	2058723

13.3.2   S100 system plug

Tab. 28: System plug part numbers S100

System plug	For devices	Description	Part number
SX0B-A0000G	Standard & Professional	Without cable, 1 x cable gland, 3x blind plugs	2032807
SX0B-A0000J		Without cable, 1 x cable gland, 7x blind plugs	2032856
SX0B-B1105G	Standard	Pre-assembled, 5 m length of cable, 11 wires	2032859
SX0B-B1110G		Pre-assembled, 10 m length of cable, 11 wires	2032860
SX0B-B1114G		Pre-assembled, 14 m length of cable, 11 wires	2047875
SX0B-B1120G		Pre-assembled, 20 m length of cable, 11 wires	2032861
SX0B-B1505G	Professional	Pre-assembled, 5 m length of cable, 15 wires	2034264
SX0B-B1510G		Pre-assembled, 10 m length of cable, 15 wires	2034265

13.3.3   Service Management

Tab. 29: Service cable part numbers

Part	Part number
Service cable approx. 2 m: For connecting the configuration to the serial interface of the PC, M8 × 4-pin/D-Sub 9-pin (DIN 41 642)	6021195
Service cable approx. 10 m: For connecting the configuration to the serial interface of the PC, M8 × 4-pin/D-Sub 9-pin (DIN 41 642)	2027649
USB service cable approx. 2 m: For connecting the configuration connection to the USB interface of the PC, M8 x 4-pin / USB-A male connector	6034574
USB service cable approx. 10 m: For connecting the configuration connection to the USB interface of the PC, M8 x 4-pin / USB-A male connector	6034575
USB/RS-232 adapter: USB-A male connector on D-Sub female connector, 9-pin	6035396

13.3.4 Connecting cables for self-assembly

Part	Part number
15-pin, wire cross-section 0.56 mm^2 (AWG 20), in 100-m ring	6030795
CANopen cable, sold by the meter (2 × 2 × 0.22 mm^2)	6035263
EMC-compliant M16 cable gland for CANopen connections, permissible cable diameter 3–6,5 mm	5318530
Extension for cable entry from M12 to M16	5320690
EMC-compliant M12 cable gland for EFI connections, permissible cable diameter 3–6.5 mm, height 19 mm	5308757
EMC-compliant M12 cable gland for EFI connections, permissible cable diameter 3–6.5 mm, height 25 mm	5314772

13.3.5 Documentation

Available online at www.sick.com/S100.

13.3.6 Miscellaneous

Part	Part number
Spare part set for optics cover with replacement seal and screws	2039248
Plastic cleaner and polish, anti-static, 1 liter	5600006
Lens cloth for cleaning the optics cover	4003353
Power supply unit 24 V, 2.1 A, 100/240 V AC, 50 W	7028789
Power supply unit 24 V, 3.9 A, 120/240 V AC, 95 W	7028790
LS80-L: Scan finder	6020756
Weather hood, 190°	2046459
Compact weather hood, 190°	2082563
Weather hood, 270°	2046458
Compact weather hood, 270°	2082560

For additional accessories, see www.sick.com/S100.

14   Appendix

14.1   EU declaration of conformity

Note   You can obtain the complete EC declaration of conformity via the SICK homepage on the Internet at: www.sick.com/S100

14.2   Cybersecurity

To protect against cybersecurity threats, it is necessary to continuously monitor and maintain a comprehensive cybersecurity concept. A suitable concept consists of organizational, technical, procedural, electronic, and physical levels of defense and considers suitable measures for different types of risks. The measures implemented in this product can only support protection against cybersecurity threats if the product is used as part of such a concept.

You will find further information at www.sick.com/psirt, e.g.:

- General information on cybersecurity
- Contact option for reporting vulnerabilities
- Information on known vulnerabilities (security advisories)

14.3   Glossary

Resolution / Object resolution	The minimum size of an object detected by the LiDAR sensor and guaranteed by the manufacturer.
CANopen	CANopen is a layer-7 communication protocol with a CAN basis mainly used in automation engineering.
Field set	Two switching fields build a pair, the so-called field set.
Optics cover	Plastic component with light emission window. The optics cover is available as a spare part.
Remission	Reflection of luminance. The degree of remission is the reflectance defined as the relation of the luminance of a surface and reflected in the direction of measurement and the luminance of a completely matt-white surface (white standard).
Switching field	The switching field protects an area around a machine or vehicle. As soon as the LiDAR sensors detect an object in the switching field, it switches the respective switching output to the OFF state.
Control input	The monitoring cases are switched via the control inputs. The S100 Professional has four static control inputs.
System plug	Contains the configuration memory and has all electrical connections. This makes replacement of the S100 easy. After recommissioning, the configuration is read out of the system plug; the S100 is then typically ready for operation.
Monitoring case	A field set is assigned to a monitoring case. The monitoring case is switched via the control inputs. This makes is possible for the S100 to be adapted to the operating mode of the machine or system which it monitors.

14.4 List of tables

14.5 List of figures

Australia
Phone +61 (3) 9457 0600
        1800 33 48 02 – tollfree
E-Mail sales@sick.com.au

Austria
Phone +43 (0) 2236 62288-0
E-Mail office@sick.at

Belgium/Luxembourg
Phone +32 (0) 2 466 55 66
E-Mail info@sick.be

Brazil
Phone +55 11 3215-4900
E-Mail comercial@sick.com.br

Canada
Phone +1 905.771.1444
E-Mail cs.canada@sick.com

Czech Republic
Phone +420 234 719 500
E-Mail sick@sick.cz

Chile
Phone +56 (2) 2274 7430
E-Mail chile@sick.com

China
Phone +86 20 2882 3600
E-Mail info.china@sick.net.cn

Denmark
Phone +45 45 82 64 00
E-Mail sick@sick.dk

Finland
Phone +358-9-25 15 800
E-Mail sick@sick.fi

France
Phone +33 1 64 62 35 00
E-Mail info@sick.fr

Germany
Phone +49 (0) 2 11 53 010
E-Mail info@sick.de

Greece
Phone +30 210 6825100
E-Mail office@sick.com.gr

Hong Kong
Phone +852 2153 6300
E-Mail ghk@sick.com.hk

Hungary
Phone +36 1 371 2680
E-Mail ertekesites@sick.hu

India
Phone +91-22-6119 8900
E-Mail info@sick-india.com

Israel
Phone +972 97110 11
E-Mail info@sick-sensors.com

Italy
Phone +39 02 27 43 41
E-Mail info@sick.it

Japan
Phone +81 3 5309 2112
E-Mail support@sick.jp

Malaysia
Phone +603-8080 7425
E-Mail enquiry.my@sick.com

Mexico
Phone +52 (472) 748 9451
E-Mail mexico@sick.com

Netherlands
Phone +31 (0) 30 229 25 44
E-Mail info@sick.nl

New Zealand
Phone +64 9 415 0459
        0800 222 278 – tollfree
E-Mail sales@sick.co.nz

Norway
Phone +47 67 81 50 00
E-Mail sick@sick.no

Poland
Phone +48 22 539 41 00
E-Mail info@sick.pl

Romania
Phone +40 356-17 11 20
E-Mail office@sick.ro

Russia
Phone +7 495 283 09 90
E-Mail info@sick.ru

Singapore
Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Slovakia
Phone +421 482 901 201
E-Mail mail@sick-sk.sk

Slovenia
Phone +386 591 78849
E-Mail office@sick.si

South Africa
Phone +27 10 060 0550
E-Mail info@sickautomation.co.za

South Korea
Phone +82 2 786 6321/4
E-Mail infokorea@sick.com

Spain
Phone +34 93 480 31 00
E-Mail info@sick.es

Sweden
Phone +46 10 110 10 00
E-Mail info@sick.se

Switzerland
Phone +41 41 619 29 39
E-Mail contact@sick.ch

Taiwan
Phone +886-2-2375-6288
E-Mail sales@sick.com.tw

Thailand
Phone +66 2 645 0009
E-Mail marcom.th@sick.com

Turkey
Phone +90 (216) 528 50 00
E-Mail info@sick.com.tr

United Arab Emirates
Phone +971 (0) 4 88 65 878
E-Mail contact@sick.ae

United Kingdom
Phone +44 (0)17278 31121
E-Mail info@sick.co.uk

USA
Phone +1 800.325.7425
E-Mail info@sick.com

Vietnam
Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Detailed addresses and further locations at **www.sick.com**

SICK AG | Waldkirch | Germany | www.sick.com

SICK
Sensor Intelligence.