

VMS6200

Track and trace system

SICK
Sensor Intelligence.



Described product

VMS6200

Manufacturer

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Germany

Legal information

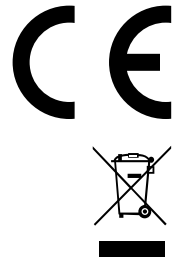
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Original document

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1 About this document

1.1 Information on the operating instructions

Read these operating instructions carefully before starting any work in order to familiarize yourself with the product and its functions.

The operating instructions are an integral part of the product and should remain accessible to the personnel at all times. When handing this product over to a third party, include these operating instructions.

These operating instructions do not provide information on the handling and safe operation of the machine or system in which the product is integrated. Information on this can be found in the operating instructions for the machine or system.

1.2 Scope

This document applies to the following products:

- VMS6200

1.3 Target group

This document is intended for persons who operate and maintain the product.

1.4 Further information

You can find the product page with further information via the SICK Product ID: pid.sick.com/{P/N}/{S/N} (see "Product identification via the SICK product ID", page 10).

The following information is available depending on the product:

- This document in all available language versions
- Data sheets
- Other publications
- CAD files and dimensional drawings
- Certificates (e.g., declaration of conformity)
- Software
- Accessories

1.5 Related applicable documents

Important information



NOTE

The following details apply depending on the particular device type. The device type can be found in the project-specific documents.

Related applicable documents from SICK

Document	Title	Part number	Source
Operating instructions	LMS5xx 2D LiDAR sensor	8013795	www.sick.com/LMS5xx
Operating instructions	SIM2000-2 P	8025453	www.sick.com/1117588
Operating instructions	MSC800	8011539	www.sick.com/1040571

Document	Title	Part number	Source
Operating instructions	APU8520 industrial computer	8025811	On request
Operating instructions	WLA16P photoelectric sensor	8020348	www.sick.com/wla16p
Operating instructions	Measuring wheel encoder, e.g. DFV60	8013709	www.sick.com/dfv60
Operating instructions	Control cabinet	8026899	On request
Circuit diagrams	Project-specific	Project-specific	
CAD data	Project-specific	Project-specific	

1.6 Symbols and document conventions

Warnings and other notes



DANGER

Indicates a situation presenting imminent danger, which will lead to death or serious injuries if not prevented.



WARNING

Indicates a situation presenting possible danger, which may lead to death or serious injuries if not prevented.



CAUTION

Indicates a situation presenting possible danger, which may lead to moderate or minor injuries if not prevented.



NOTICE

Indicates a situation presenting possible danger, which may lead to property damage if not prevented.



NOTE

Highlights useful tips and recommendations as well as information for efficient and trouble-free operation.

Instructions to action

- ▶ The arrow denotes instructions to action.
- 1. The sequence of instructions is numbered.
- 2. Follow the order in which the numbered instructions are given.
- ✓ The tick denotes the results of an action.

2 Safety information

2.1 Basic safety notes

Please observe the safety notes and the warnings listed here and in other sections of this product documentation to reduce the possibility of risks to health and avoid dangerous situations.



CAUTION

Failure to observe the relevant work safety regulations may lead to physical injury or cause damage to the system.

Laser notes



CAUTION

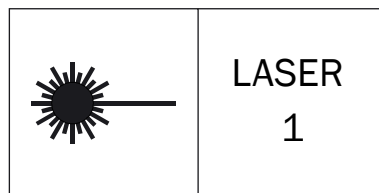
Optical radiation: Class 1 Laser Product

The accessible radiation does not pose a danger to the eyes or skin when viewed directly for up to 100 seconds.

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. Opening the housing will not switch off the laser. Opening the housing may increase the level of risk.

It is not possible to entirely rule out temporary disorienting optical effects, particularly in conditions of dim lighting. Disorienting optical effects may come in the form of dazzle, flash blindness, afterimages, photosensitive epilepsy, or impairment of color vision, for example.



EN/IEC 60825-1:2014

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.

Further laser protection regulations that need to be observed may apply (e.g. national laws).

Mounting and electrical installation



DANGER

Death or severe injury due to electrical voltage and/or an unexpected startup of the machine

- ▶ Make sure that the machine is (and remains) disconnected from the voltage supply during mounting and electrical installation.
- ▶ Make sure that the dangerous state of the machine is and remains switched off.



DANGER

Risk of fatal electric shock

Electrical work may only be performed on the system by qualified specialist personnel.

- ▶ Interrupt the voltage supply.
 - ▶ Check residual voltage on the system components.
 - ▶ Use extra caution.
 - ▶ Always connect equipotential bonding (earthing).
 - ▶ Ensure that the ground potential is the same at all grounding points.
 - ▶ Do not disconnect or remove the protective conductor.
-



WARNING

Risk of injury due to falling components

- ▶ Make sure that the components are secured against falling.
 - ▶ Make sure that a second person can secure the components if required during mounting.
-

Repairs and modifications



DANGER

Improper work on the product

A modified product may not offer the expected protection if it is integrated incorrectly.

- ▶ Apart from the procedures described in this document, do not repair, open, manipulate or otherwise modify the product.
-

2.2 Intended use

Track and trace systems are products for industrial environments and comprise several components (e.g. sensors, controller, control cabinet and software).

The VMS system is a track and trace system for multidimensional measurement and position determination of objects.

In the VMS6200 system, two LMS500 2D LiDAR sensors detect the object dimensions to determine the smallest enveloping cuboid (bounding box) using light waves in the infrared range. In addition to the detection of conventional surfaces, this allows problem-free data acquisition for very dark or foiled surfaces.

Objects are usually bags or freight items on conveyor systems in airports or goods in commercial centers, distribution centers or warehouses.

Objects can be measured with or without a pallet.

The product must only be used within the limits of the prescribed and specified technical specifications and operating conditions at all times.

Incorrect use, improper modification or manipulation of the product will invalidate any warranty from SICK; in addition, any responsibility and liability of SICK for damage and secondary damage caused by this is excluded.

2.3 Improper use

Impermissible use

- As a safety component as defined in the relevant applicable safety standards for machines, e.g. Machinery Directive.
- Detection of persons and animals

Impermissible ambient conditions

- Outdoor areas
- Direct UV radiation (sunlight)
- Precipitation
- Inadequate protection against moisture and contamination
- Publicly accessible areas
- Explosion-hazardous area
- Corrosive environment

2.4 Qualification of personnel

Any work on the product may only be carried out by personnel qualified and authorized to do so.

Qualified personnel are able to perform tasks assigned to them and can independently recognize and avoid any potential hazards. This requires, for example:

- technical training
- experience
- knowledge of the applicable regulations and standards

3 Product description

3.1 Scope of delivery



NOTICE

- ▶ After delivery, inspect the product for transport damage and report any such damage immediately.
- ▶ Check that the delivery includes all components listed on the delivery note.

Table 1: Scope of delivery

Component	VMS6200
LMS500-20000S60 2D LiDAR sensor	2
Control cabinet	1
Connecting cables	Yes
Aluminum profiles for assembling the frame	Application-dependent as per purchase order
Fasteners for the control cabinet and sensors	Application-dependent as per purchase order
Incremental encoder	Optional
Photoelectric sensor	Optional

3.2 Product identification

3.2.1 Product identification via the SICK product ID

SICK product ID

The SICK product ID uniquely identifies the product. It also serves as the address of the web page with information on the product.

The SICK product ID comprises the host name pid.sick.com, the part number (P/N), and the serial number (S/N), each separated by a forward slash.

The SICK product ID is displayed as text and QR code on the type label and/or on the packaging.



Figure 1: SICK product ID

3.3 Overview of the product

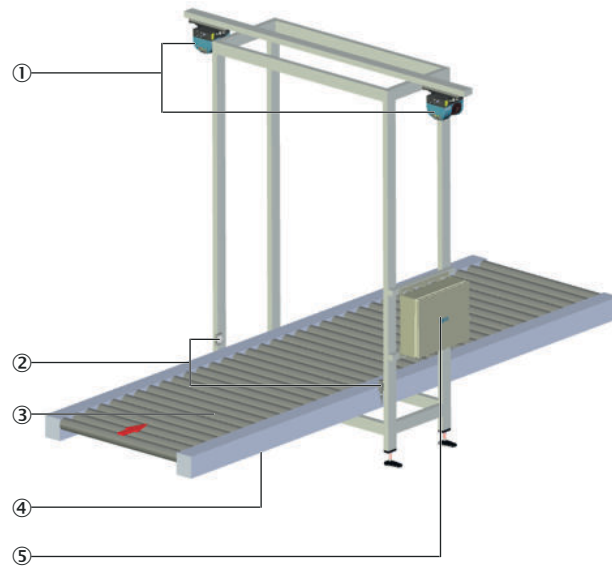


Figure 2: VMS6200

- ① 2D LiDAR sensors
- ② Photoelectric sensor and reflector
- ③ Detailed of the conveyor system (not included with delivery)
- ④ Incremental encoder (underside of the conveyor system)
- ⑤ Control cabinet

3.4 Product characteristics

3.4.1 Design and function

Design

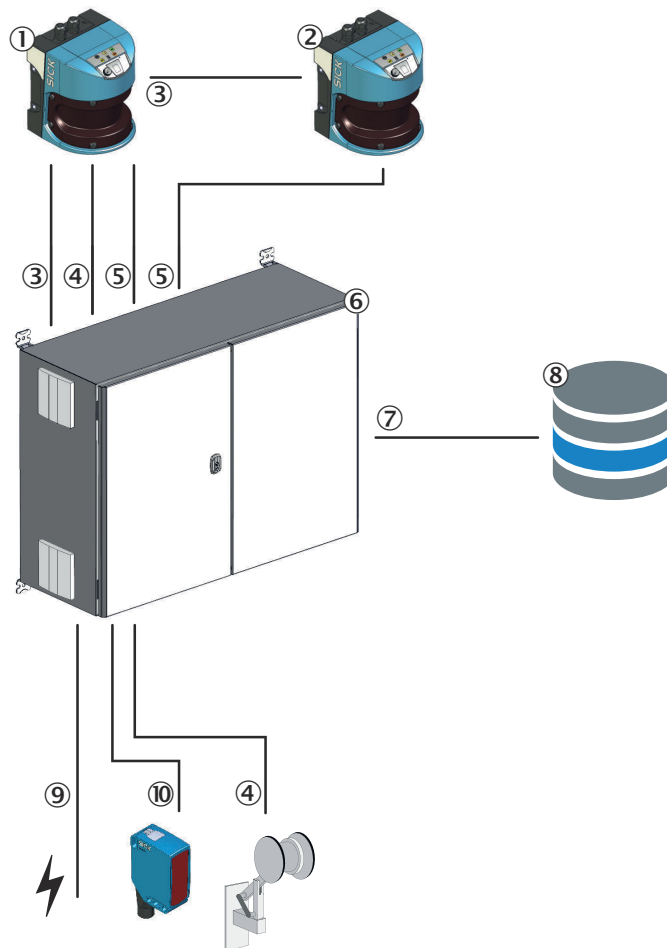


Figure 3: System setup

- ① 2D LiDAR sensor (primary)
- ② 2D LiDAR sensor (secondary)
- ③ CAN bus
- ④ Increment
- ⑤ Ethernet
- ⑥ Control cabinet with controller
- ⑦ Connection to the higher-level system: Ethernet, fieldbus or serial
- ⑧ Superordinate system
- ⑨ Voltage supply
- ⑩ Trigger

Function

If a photoelectric sensor is installed, the measuring process is started as soon as an object passes the photoelectric sensor.

If no photoelectric sensor is installed, the measuring process is started as soon as the user's system sends a suitable signal.

During the measuring process, the LMS500 2D LiDAR sensors scan the area and determine the surface of the object on the conveyor system.

The measured values are further processed by the controller in the control cabinet.

The controller determines the following parameters from the scan data:

- 3D image of the object
- Smallest enveloping cuboid (bounding box) with dimensional values (length, width, height)
- Position and rotation on the conveyor system

The controller processes the data into a data string, the host telegram, and sends the host telegram to the higher-level system for further processing.

Measurement of pallets

In the case of objects on pallets of the same height, the pallets can be excluded from the measurement so that only the objects are recorded.

For this purpose, the top edge of the pallet is defined as the constant zero point of the measurements instead of the surface of the conveyor system.

Example

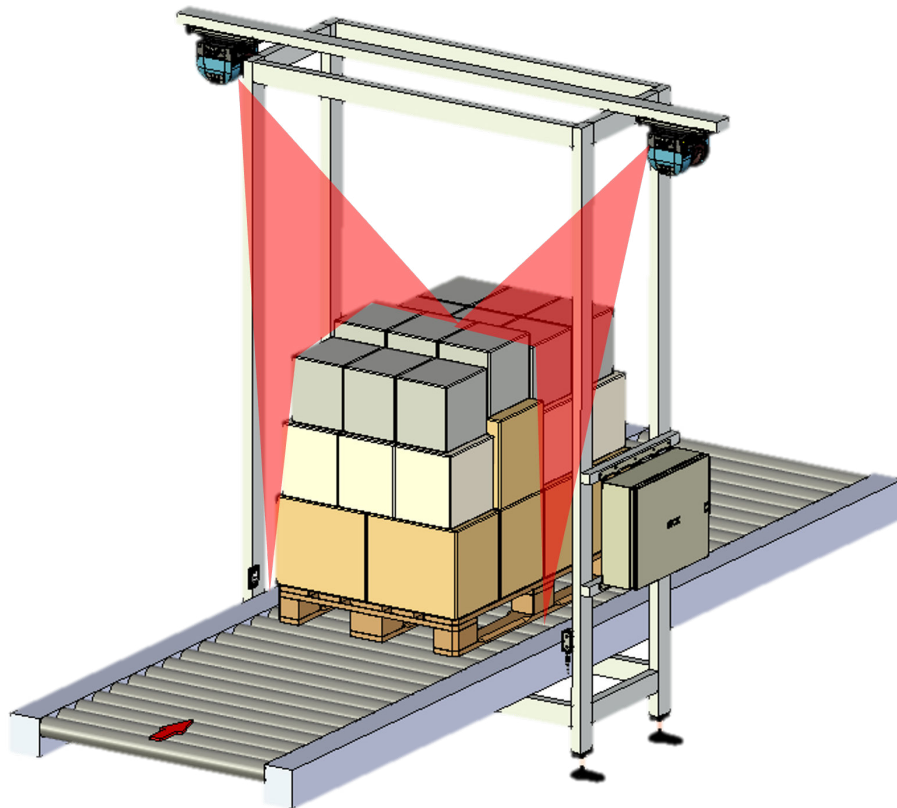


Figure 4: Measurement of objects on a pallet

3.4.2 System components

3.4.2.1 LMS500 2D LiDAR sensor

Overview

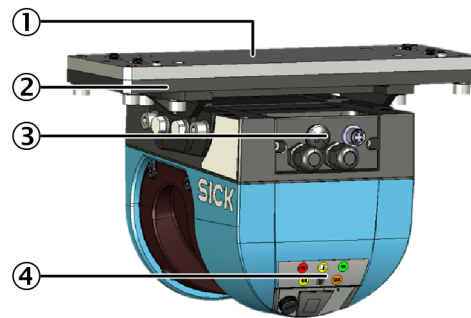


Figure 5: LMS500 with adapter plate

- ① Mounting plate for mounting on a frame
- ② Adapter plate with alignment aid
- ③ System plug with parameter set
- ④ Display elements

Two laser scanners, 2D LiDAR sensors of type LMS500, are mounted on a profile on the right and left above the conveyor system. The 2D LiDAR sensors have been pre-mounted on an adapter plate with alignment aid, and aligned at the factory. The unit comprising LMS500 and adapter plate is attached to a frame by means of a mounting plate.

Important information



NOTICE

The fixing screws on the frame must not be loosened. Otherwise measurements with the specified accuracy cannot be guaranteed.



NOTE

Detailed information can be found in the operating instructions for the component.

Functionality

The LMS500 2D LiDAR sensor is an opto-electronic LiDAR sensor that scans the outline of its surroundings in a non-contact manner using laser beams. The device measures its surroundings in two-dimensional polar coordinates, relative to its measurement origin. This is indicated by small markings on the sides of the optics cover. If a laser beam strikes an object, the position of that object is determined in terms of distance and angle.

3.4.2.2 Photoelectric sensor

Overview

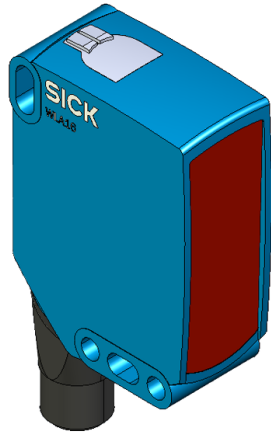


Figure 6: Photoelectric sensor

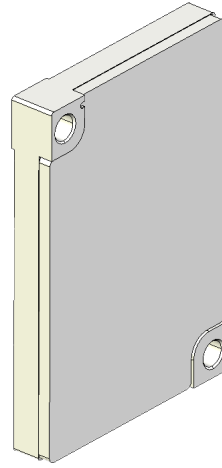


Figure 7: Reflector

Important information



NOTE

Detailed information can be found in the operating instructions for the component.

Function

A photoelectric sensor can be used to start a measurement (also triggering). The measurement is triggered as soon as the leading edge of the object passes through the photoelectric sensor.

The photoelectric sensor is optional. The trigger can also come from a user-provided programmable logic controller.

3.4.2.3 Incremental encoder

Overview

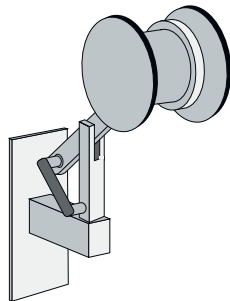


Figure 8: Incremental encoder

Important information



NOTE

Detailed information can be found in the operating instructions for the component.

Function

The incremental encoder determines the position and speed directly on the running surface of the conveying equipment. The signal from the incremental encoder is referred to as an increment signal.

The incremental encoder is optional. The increment signal can also come from a user-supplied programmable logic controller.

3.4.2.4 Control cabinet

Overview



Figure 9: Control cabinet

Important information



NOTE

Detailed information can be found in the operating instructions for the component.

Function

The control cabinet contains the components for voltage supply and control. The components may vary depending on the system.

Components

- Controller
- Power supply units
- Fuses
- Ethernet switches

3.4.2.5 Controller

Overview



Figure 10: SIM2000-2 P

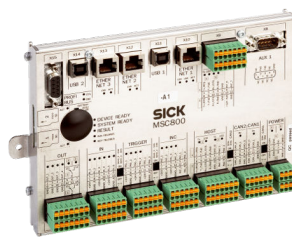


Figure 11: MSC800

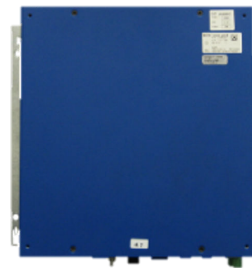


Figure 12: APU8520

Important information



NOTE

Detailed information can be found in the operating instructions for the component.

Function

The controller calculates the measurement results from the sensor data and transmits them to the higher-level system.

The devices used as controllers are:

- SIM2000-2 P
- MSC800
- APU8520

The devices can be used in the following combinations:

Table 2: Possible system variants

Variant	System controller	Dimensioning controller
1	SIM2000-2 P (can perform both functions)	
2	SIM2000-2 P	APU8520
3	MSC800	APU8520
4	MSC800	SIM2000-2 P

A distinction is made between two different functions:

System controller

- Coordinates all connected sensors.
- Processes trigger and increment.
- Receives the results from the dimensioning controller (in the case of two controllers).
- Transmits the measurement results to the higher-level system.

Dimensioning controller

- Receives the measuring points from the 2D LiDAR sensors.
- Calculates from the data of the 2D LiDAR sensors and the increment:
 - A three-dimensional model, the smallest enveloping cuboid
 - Dimensional values (length, width, height)
 - Position and rotation
- Transfers these results to the system controller.

4 Project planning

4.1 Requirements on the conveyor system

Prerequisites

- Belt conveyor or roller conveyor
- Non-slip transport
- Vibration-free transport
- Consistent, defined speed
- No incline or decline
- Forward operation only
- Conveying speed between 0.1 m/s and 2.0 m/s
- No guides for measuring objects in the measuring range

4.2 Requirements on the measuring objects

Prerequisites

General

- Not deformable
- Not transparent
- Measuring objects must lie still on the conveyor system during the measurement.
- Projecting items (e.g., film, straps) or inaccurately stacked layers may impact negatively on the measurements.
- Remission factor of the object surface between 2% and 200%.
- Objects can be measured with or without a pallet.

Measurement with pallet

- It is not possible to switch between measurements with or without a pallet during operation.
- If objects are measured on pallets and the pallet is excluded from the measurement, all pallets must have the same height for valid measurement results.

Complementary information

The remission factor is a measure of the diffuse reflection on surfaces, expressed as a percentage.

Table 3: Example remission factors for various surfaces (approximate)

	Object surface and color	Remission factor [%]
Natural surfaces	Glass, transparent plastic	0 to 5
	Black surface	10 to 15
	Brown surface (e.g. cardboard)	38 to 45
	Blue surface	18 to 25
	Red surface	72 to 78
	White cardboard	85 to 92
	White paper	approx. 98
Reflective surfaces	Glossy black	107
	Reflective tapes	> 300
	Reflectors	> 2,000

4.3 Requirements on the transport of objects on the conveyor system

- Measure objects individually, one after the other. Avoid objects touching or lying next to each other.
- Minimum distance between the objects: 200 mm
- When calculating the minimum distance, take into account protruding items (e.g. code labels, pallet foils, strapping).

Example

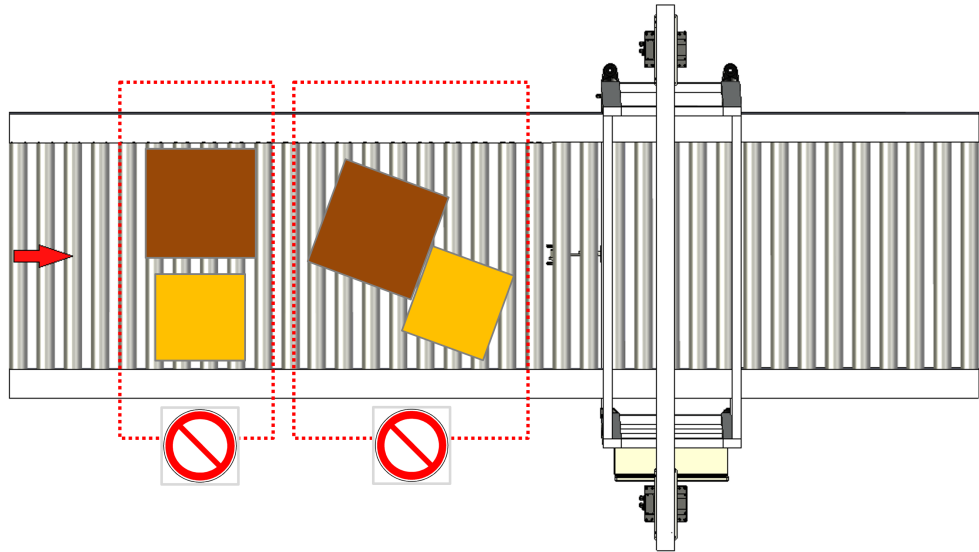


Figure 13: Avoid objects touching or lying next to each other

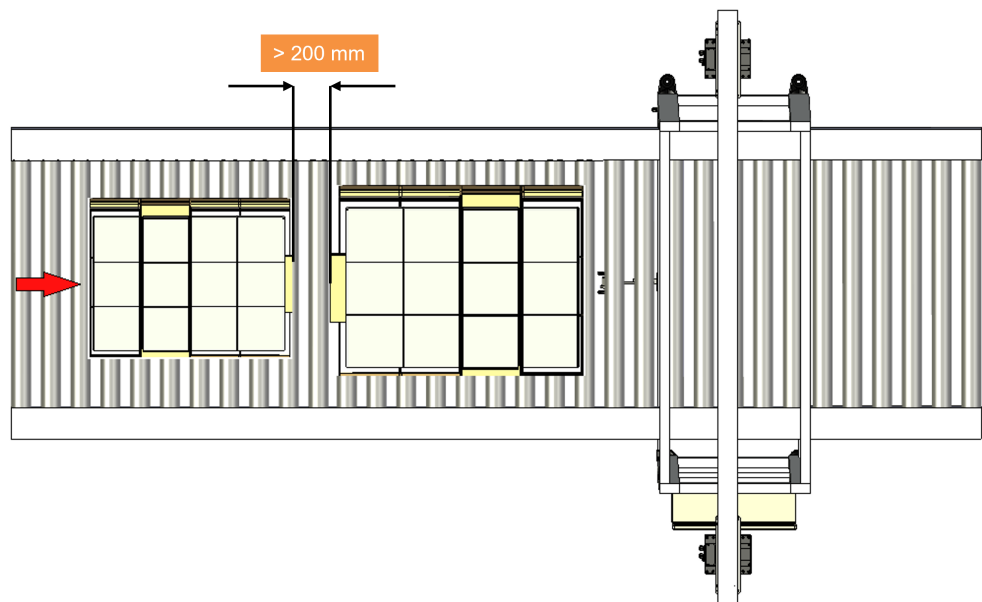


Figure 14: Take foils and strapping into account when determining the minimum distance

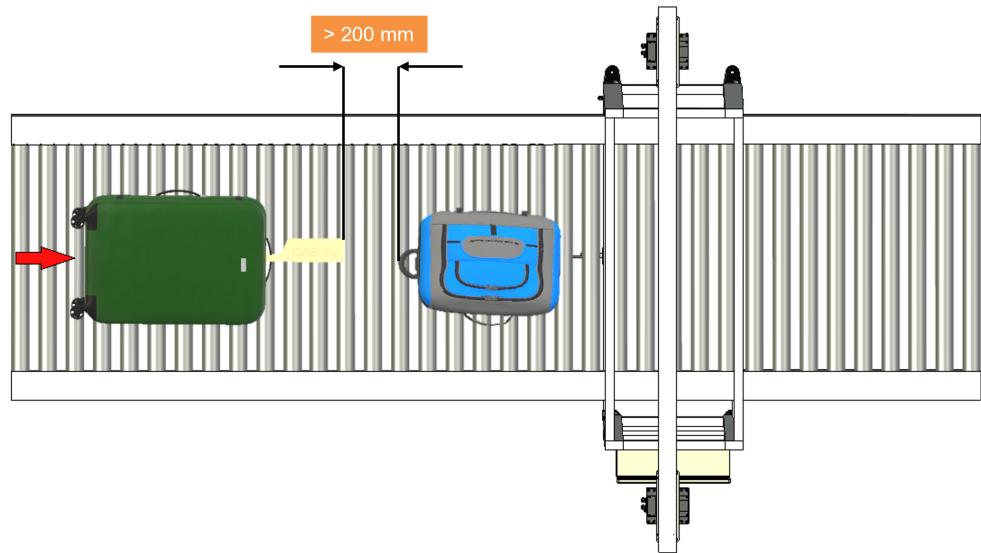


Figure 15: Take code labels into account when determining the minimum distance

4.4 Integration into the network

Host telegram via Ethernet

The host telegram is a signal that is usually configured to the requirements of the operator entity.

SICK may, in individual cases, use its own standard for the host telegram if no specifications are available from the operating entity.

5 Configuration

5.1 Configuration of the IP addresses

Overview

The devices are preset with the same IP address at the factory. Each device must be assigned its own unique address to ensure proper operation.

The IP addresses are edited using the SOPAS ET configuration program.

Table 4: Default IP addresses

Component	IP address
System controller (SIM2000-2 P, MSC800)	192.168.0.1
Dimensioning controller (APU8520)	192.168.0.100
2D LiDAR sensor (primary)	192.168.0.1
2D LiDAR sensor (secondary)	192.168.0.1

Allocation of IP addresses

- ✓ All devices must be properly mounted and connected according to the circuit diagram.
- 1. Disconnect all Ethernet connections from the Ethernet switch.
- 2. Connect the computer to the Ethernet switch for configuration.
- 3. Ensure that the IP address of the configuration computer is in the number range of the device components to be connected.
- 4. If necessary, change the IP address of the configuration computer accordingly.
- 5. Start SOPAS ET.
- 6. First connect only one device to the Ethernet switch.
The order of the devices does not matter.
- 7. In SOPAS ET, load the device using the connection wizard, load the driver, and edit the IP address.

Example

Table 5: Recommended allocation of IP addresses (example)

Component	CAN	IP address
System controller	32	192.168.0.32
Dimensioning controller	31	192.168.0.31
2D LiDAR sensor (primary)	34	192.168.0.34
2D LiDAR sensor (secondary)	35	192.168.0.35

6 Operation

6.1 Switching on the system



NOTE

Detailed information can be found in the operating instructions for the component.

1. Connect the voltage supply to the control cabinet.
2. Wait until the components are ready for operation.
The system is ready for operation as soon as the Device Ready LED on the controller in the control cabinet lights up.
3. Start operation.

6.2 Operation

Important information

NOTE

The system runs fully automatically after startup.

Further topics

- ["Project planning", page 18](#)
- ["Technical data", page 29](#)

7 Maintenance

7.1 Regular maintenance work

Important information



NOTICE

Maintenance work on electrical devices may only be carried out by qualified personnel.



NOTE

The intervals are to be determined by the operating entity depending on the ambient conditions and the importance to the customer process.

These details are to be understood as recommendations.



NOTE

For details of the maintenance work for the individual components, refer to the respective operating instructions.

Maintenance recommendations

Table 6: Maintenance recommendations

Interval	Task	By whom
Regular	Visual inspection for contamination	Trained personnel
	Visual inspection of the conveyor system for foreign objects or damage	
	Visual inspection of the electrical connections to ensure they are sound and secure	
When restarting the system	Checking the measurement accuracy using test objects	
Annually	Checking the entire system with regard to read performance, image quality, reading range, measurement accuracy	Service technicians

Further topics

- ["Related applicable documents", page 5](#)

7.2 Replacing the LMS500 sensor

Important information



DANGER

Risk of fatal electric shock

Electrical work may only be performed on the system by qualified specialist personnel.

- ▶ Interrupt the voltage supply.
- ▶ Check residual voltage on the system components.
- ▶ Use extra caution.
- ▶ Always connect equipotential bonding (earthing).
- ▶ Ensure that the ground potential is the same at all grounding points.
- ▶ Do not disconnect or remove the protective conductor.



CAUTION

Optical radiation: Class 1 Laser Product

The accessible radiation does not pose a danger to the eyes or skin when viewed directly for up to 100 seconds.

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. Opening the housing will not switch off the laser. Opening the housing may increase the level of risk.



NOTICE

Maintenance work on electrical devices may only be carried out by qualified personnel.

Procedure

1. Interrupt the voltage supply.
2. Undo the hexagon socket screws on the system plug of the sensor.
3. Remove the system plug.
4. Secure the device against falling.
5. Undo and remove the four hexagon socket screws on the adapter plate of the sensor.
6. Detach the adapter plate plus sensor from the mounting plate.
The mounting plate remains attached to the frame.
The replacement device is supplied pre-mounted on an adapter plate and has already been aligned.
7. Remove the system plug from the replacement device.
8. Screw the replacement device to the mounting plate hand-tight with the previously used hexagon socket screws.
9. Check that the device is seated securely.
10. Attach the system plug (with connecting cables) of the old device to the new device and screw it in place.
11. Switch the voltage supply back on.
- ✓ The sensor starts and, after initialization, automatically loads the parameter set stored in the system plug.
12. Check that the status LED lights up green after about 40 seconds.
13. Perform a test run and check the functionality.
14. If necessary, calibrate the new device using SOPAS ET.

Example

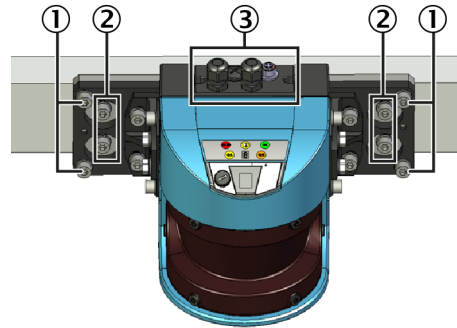


Figure 16: LMS500 on the adapter plate and mounting plate

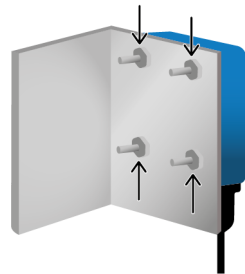
- ① Screws for securing the adapter plate to the mounting plate
- ② Screws for securing the mounting plate to the frame.
- ③ System plug with two hexagon socket screws

Further topics

- ["LMS500 2D LiDAR sensor", page 14](#)
- ["Related applicable documents", page 5](#)

7.3 Replacing the photoelectric sensor

Procedure



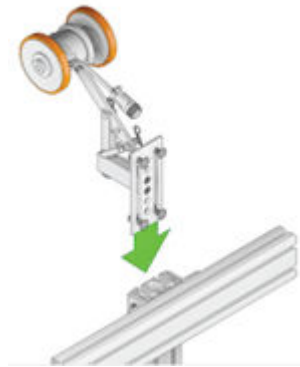
1. Unscrew the M12 plug connection from the male connector on the photoelectric retro-reflective sensor.
2. Secure the photoelectric sensor against falling.
3. Undo and remove the nuts on the mounting bracket.
4. Remove the photoelectric sensor from the mounting bracket.
5. Screw the replacement device hand-tight to the mounting bracket with the previously used nuts.
6. Screw the M12 plug connection onto the male connector on the photoelectric sensor.
7. If necessary, correctly align the photoelectric sensor with the reflector by moving the mounting bracket or the reflector up or down in the profile.
- ✓ The reflector must be positioned within the beam path of the photoelectric sensor.
8. Screw the photoelectric sensor and reflector tight after alignment.
9. Perform a test run and check the functionality.

Further topics

- ["Related applicable documents", page 5](#)

7.4 Replacing the incremental encoder

Procedure



1. Note the installation direction of the encoder in relation to the running direction of the conveyor system.
2. Unscrew the M12 plug connection from the male connector on the incremental encoder.
3. Secure the incremental encoder against falling.
4. Loosen and remove the fixing screws.
5. Remove the encoder from the bracket.
6. Screw the replacement device to the profile hand-tight with the previously used fixing screws. Ensure that the installation direction is correct.
7. To set the correct spring pretension of the measuring wheel, push the encoder against the conveyor system with the screws slightly loosened. Refer to the encoder operating instructions for the correct spring tension.
8. Screw in the encoder.
9. Screw the M12 plug connection onto the connector plug.
10. Perform a test run and check the functionality.

Further topics

- ["Related applicable documents", page 5](#)

7.5 Replacing components in the control cabinet

Important information



NOTE

Information is included in the operating instructions of the control cabinet.

Further topics

- ["Related applicable documents", page 5](#)

8 Troubleshooting

8.1 Fault indications of the components

**NOTE**

Information is included in the operating instructions for the components.

9 Decommissioning

9.1 Decommissioning



NOTICE

Disposal of batteries, electrical and electronic devices

- ▶ In accordance with international directives and regulations, batteries, accumulators, and electrical or electronic devices must not be disposed of with household waste.
- ▶ The owner is obligated to dispose of the devices at the end of their service life via the appropriate public disposal points.
- ▶ This icon on the product, packaging, or in this document indicates that a product is covered by these provisions:



NOTICE

The applicable local and statutory environmental regulations and guidelines for the disposal of industrial and electrical waste must be observed.

The following assemblies may contain substances that need to be disposed of separately:

- **Electronics:** Capacitors, accumulators, batteries
- **Displays:** Liquid in the LC displays

10 Technical data

10.1 Data sheet

**NOTE**

Information can be found on the home page at www.sick.com.

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