OPERATING INSTRUCTIONS

OLS10

Line guidance sensors

SICK
Sensor Intelligence.

Described product

OLS10

Manufacturer

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Germany

Legal information

Original document

This document is an original document of SICK AG.

Contents

1 About this document

1.1 Information on the operating instructions

These operating instructions provide important information on how to use sensors from SICK AG.

Prerequisites for safe work are:

- Compliance with all safety notes and handling instructions supplied.
- Compliance with local work safety regulations and general safety regulations for sensor applications.

The operating instructions are intended to be used by qualified personnel and electrical specialists.

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

The instructions constitute an integral part of the product and are to be stored in the immediate vicinity of the sensor so they remain accessible to staff at all times. If the sensor is passed on to a third party, these operating instructions should be handed over with it.

These operating instructions do not provide information on operating the machine in which the sensor is integrated. For information about this, refer to the operating instructions of the particular machine.

1.2 Scope

These operating instructions explain how to incorporate a sensor into a customer system. Instructions are given in stages for all actions required.

These instructions apply to all available device variants of the sensor.

Available device variants are listed on the online product page.

▶ www.sick.com/ols10

Commissioning is described using one particular device variant as an example.

Simplified device designation in the document

In the following, the sensor is referred to in simplified form as “OLS10”.

1.3 Explanation of symbols

Warnings and important information in this document are labeled with symbols. The warnings are introduced by signal words that indicate the extent of the danger. These warnings must be observed at all times and care must be taken to avoid accidents, personal injury, and material damage.

DANGER
... indicates a situation of imminent danger, which will lead to a fatality or serious injuries if not prevented.

WARNING
... indicates a potentially dangerous situation, which may lead to a fatality or serious injuries if not prevented.

CAUTION
... indicates a potentially dangerous situation, which may lead to minor/slight injuries if not prevented.

NOTICE
... indicates a potentially harmful situation, which may lead to material damage if not prevented.

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

1.4 Further information

NOTE
All the documentation available for the sensor can be found on the online product page at:

▶ www.sick.com/ols10

The following information is available for download from this page:

- Type-specific online data sheets for device variants, containing technical data and dimensional drawings
- EU declaration of conformity for the product family
- Dimensional drawings and 3D CAD dimension models in various electronic formats
- These operating instructions, available in English and German, and in other languages if necessary
- Other publications related to the sensors described here
- Publications dealing with accessories
- EDS device description file

1.5 Customer service

If you require any technical information, our customer service department will be happy to help. To find your representative, see the final page of this document.

NOTE
Before calling, make a note of all type label data such as type code etc. to ensure faster processing.

2 Safety information

2.1 Intended use

The OLS10 line guidance sensor is an opto-electronic sensor intended for detecting luminescent guide tracks as well as reading out 1D codes when they are driven over by automated guided vehicles.

SICK AG assumes no liability for losses or damage arising from the use of the product, either directly or indirectly. This applies in particular to use of the product that does not conform to its intended purpose and is not described in this documentation.

NOTICE
Radio interference may occur when the sensor is used in residential areas.

- ▶ Only use the device in industrial environments (EN 61000-6-4).

2.2 Improper use

- The sensor does not constitute a safety-relevant device according to the EC Machinery Directive (2006/42/EC).
- The sensor must not be used in explosion-hazardous areas.
- Any other use that is not described as intended use is prohibited.
- Any use of accessories not specifically approved by SICK AG is at your own risk.

NOTICE
Danger due to improper use!

Any improper use can result in dangerous situations.

Therefore, take note of the following information:

- ▶ The sensor should be used only in line with intended use specifications.
- ▶ All information in these operating instructions must be strictly complied with.

2.3 Notes on UL approval

The device must be supplied by a Class 2 source of supply.

UL Environmental Rating: Enclosure type 1

2.4 Limitation of liability

Applicable standards and regulations, the latest state of technological development, and our many years of knowledge and experience have all been taken into account when assembling the data and information contained in these operating instructions. The manufacturer accepts no liability for damage caused by:

- Failing to observe the operating instructions
- Improper use
- Use by untrained personnel
- Unauthorized conversions
- Technical modifications
- Use of unauthorized spare parts, consumables, and accessories

With special variants, where optional extras have been ordered, or owing to the latest technical changes, the actual scope of delivery may vary from the features and illustrations shown here.

2.5 Requirements for skilled persons and operating personnel

WARNING
Risk of injury due to insufficient training.

Improper handling of the sensor may result in considerable personal injury and material damage.

- All work must only ever be carried out by the stipulated persons.

The operating instructions state the following qualification requirements for the various areas of work:

- **Instructed personnel** have been briefed by the operating entity about the tasks assigned to them and about potential dangers arising from improper action.
- **Skilled personnel** have the specialist training, skills, and experience, as well as knowledge of the relevant regulations, to be able to perform tasks assigned to them and to detect and avoid any potential dangers independently.
- **Electricians** have the specialist training, skills, and experience, as well as knowledge of the relevant standards and provisions to be able to carry out work on electrical systems and to detect and avoid any potential dangers independently. In Germany, electricians must meet the specifications of the BGV A3 Work Safety Regulations (e.g., Master Electrician). Other relevant regulations applicable in other countries must be observed.

The following qualifications are required for various activities:

Activities	Qualification
Mounting, maintenance	▪ Basic practical technical training ▪ Knowledge of the current safety regulations in the workplace
Electrical installation, device replacement	▪ Practical electrical training ▪ Knowledge of current electrical safety regulations ▪ Knowledge of the operation and control of the devices in their particular application
Commissioning, configuration	▪ Basic knowledge of the design and setup of the described connections and interfaces ▪ Basic knowledge of data transmission ▪ Knowledge of the operation and control of the devices in their particular application
Operation of the devices in their particular application	▪ Knowledge of the operation and control of the devices in their particular application ▪ Knowledge of the software and hardware environment in the application

2.6 Hazard warnings and operational safety

Please observe the safety notes and the warnings listed here and in other chapters of these operating instructions to reduce the possibility of risks to health and avoid dangerous situations.

The OLS10 is equipped with LED illumination. The sensor meets the criteria of risk group 1 according to IEC 62471:2006. No special measures are required (e.g., eye protection).

2.7 Repairs

Repair work on the sensor may only be performed by qualified and authorized personnel from SICK AG. Interruptions or modifications to the sensor on the part of the customer will invalidate any warranty claims against SICK AG.

3 Product description

3.1 Product identification

3.1.1 Type label

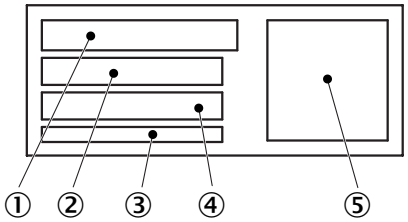


Figure 1: Type label

① Type designation
② ID no.
③ MAC address
④ Serial number
⑤ Machine readable code

3.1.2 Operating and status indicators

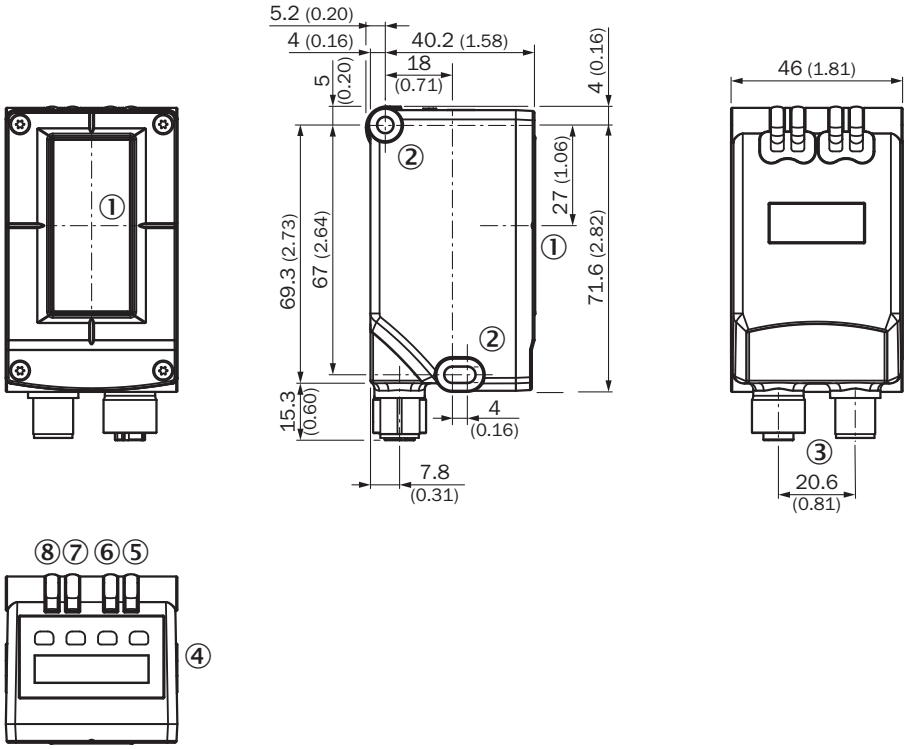


Figure 2: Device view

① Center of the optical axis
② Fixing hole
③ M12 male connector, 12-pin/M12 female connector, 4-pin, rotatable
④ Display and control unit
⑤ Function indicator (green) “ON”
⑥ Function indicator (yellow) “Q”
⑦ Function indicator (green) “Link”

⑧ Function indicator (yellow) “Act”

Function indicators (LEDs)

Table 1: Function indicators (LEDs)

Function indicator	Description
Act	Data transfer display • Yellow LED: Data transfer • LED off: No data transfer
Link	Ethernet connection display • Green LED: Ethernet connection available • LED off: No Ethernet connection available
Q	Switching output display • Yellow LED: Output high • LED off: Output low • LED flashing (10 Hz): Overcurrent/short-circuit protection has triggered
ON	Operating status display • Green LED: Normal operation/Supply voltage on • LED off: No operation

Symbols on the control panel

The following three symbols may appear on the control panel: RUN, MEN and SET.

Table 2: Symbols on the control panel

Symbol	Description
RUN	RUN lights up: Sensor is in RUN operational status. The value of the detected code is displayed.
MEN	MEN lights up: The current position in the menu structure is displayed.
SET	SET lights up: Lowest menu level has been reached. Sensor settings and values can be changed here.

Pushbuttons

Table 3: Pushbuttons

Pushbutton	Description
⌄	• Select operating menu, parameter, or option. • Reduce value.
⌃	• Select operating menu, parameter, or option. • Increase value.
Set	• Short press: - switch to the next-lowest menu level - save parameter change - confirm selection • Long press (> 2 sec.): - entry to the operating menu.
Esc	• Short press: Exit parameters without saving. Switch to the next-highest menu level. • Long press: Exit parameters without saving. Switch to the default display.

3.2 Product features

The OLS10 line guidance sensor is an opto-electronic sensor which detects the line center point of up to three luminescent tracks. To do so, the sensor stimulates the guide track(s) with blue light and detects the remitted light using a receiver array.

This track is typically conventional adhesive tape or a colorful luminescence track. It is not necessary to teach in the sensor.

For additional information on the adhesive tape and bar code labels recommended by SICK, see (accessories link).

In addition, the sensor reads 1D codes in “interleaved 2/5” format attached perpendicular to the track.

4 Transport and storage

4.1 Transport

Improper transport

CAUTION DAMAGE TO THE PATTERN SENSOR DUE TO IMPROPER TRANSPORT!
Substantial material damage may result in the event of improper transport.
For this reason:

- The device should be transported only by trained specialist staff.
- The utmost care and attention is required at all times during unloading and transportation on company premises.
- Note the symbols on the packaging.
- Do not remove packaging until immediately before starting installation work.

4.2 Transport inspection

Immediately upon receipt at the receiving work station, check the delivery for completeness and for any damage that may have occurred in transit. In the case of transit damage that is visible externally, proceed as follows:

- Do not accept the delivery or only do so conditionally.
- Note the scope of damage on the transport documents or on the transport company's delivery note.
- File a complaint.

NOTE
Complaints regarding defects should be filed as soon as these are detected. Damage claims are only valid before the applicable complaint deadlines.

4.3 Storage

Store the device under the following conditions:

- Recommendation: Use the original packaging.
- Do not store outdoors.
- Store in a dry area that is protected from dust.
- To allow any residual dampness to evaporate, do not package in airtight containers.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see "Ambient conditions", page 38.
- Relative humidity: see "Ambient conditions", page 38.
- For storage periods of longer than 3 months, check the general condition of all components and packaging on a regular basis.

5 Mounting

5.1 Preparation for mounting

1 Select the mounting site for the OLS10 in accordance with the following chapter "Mounting requirements", page 14.
2 Mount the OLS10 using the fixing holes.
"Operating and status indicators", page 10
"Mounting systems", page 40

5.1.1 Mounting requirements

NOTICE
Radio interference may occur when the sensor is used in residential areas.
Only use the device in industrial environments (EN 61000-6-4).

- Typical space requirements for sensor, see "Structural design", page 38.
- Comply with technical parameters such as the permitted ambient conditions for the operation of the sensor (e.g., temperature range, EM interference), see "Ambient conditions", page 38.
- Protect the sensor from direct sunlight.
- Only affix the sensor using accessories supplied for this purpose -> there are no screw connections on the sensor.
- The light spot must cover the possible area of the three tracks. The center of the light spot is marked with a notch on the upper side of the housing.
- Sensing distance: 100 mm
  The sensing distance is the distance from the front sensor edge (housing edge) to the track or the ground.

5.1.2 Scope of delivery

The following are included with delivery:

- OLS10 Optical Line Guidance Sensor
- Blind plug for M12 Ethernet connection
- 1 quick-start guide

Accessories:

Accessories (e.g., cables, fastening adapters) are only supplied if ordered separately.

5.2 Mounting the sensor

Arrangement over guide track

The OLS10 must be aligned orthogonally to the guide track with its light spot. The sensing range is 100 mm.

The sensor should be attached vertically over the guide track.

Table 4: Mounting

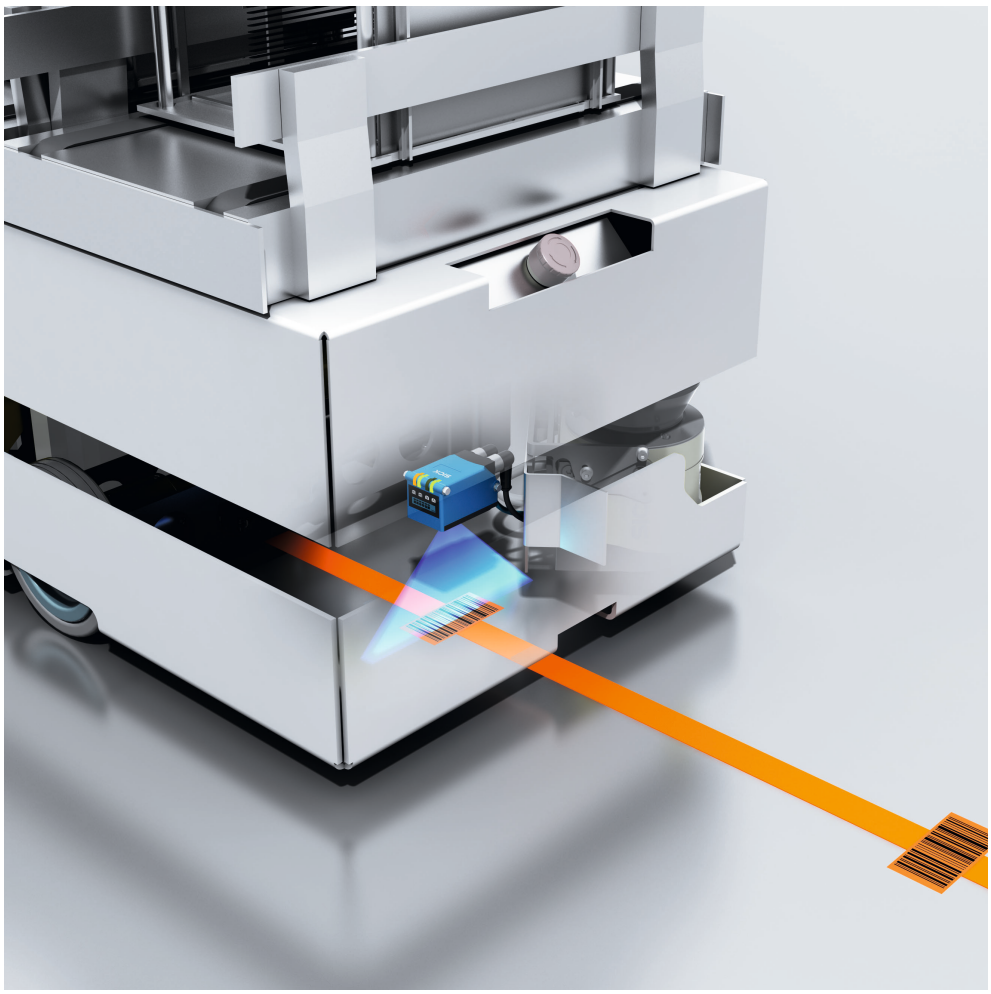


Figure 3: Arrangement over guide track

The code can be arranged directly on the track or next to the track. If it is arranged next to the track (field of view +/-50 mm), it is detected as an additional track.

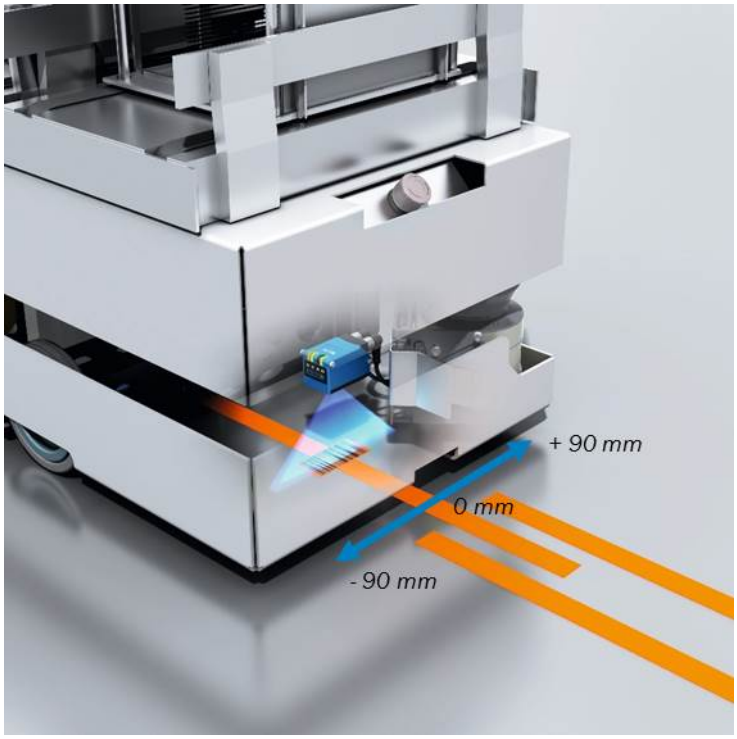


Figure 4: Arrangement with branches and junctions

Arrangement with branches and junctions

If there are branches or junctions, we recommend arranging the tracks as illustrated. The minimum distance between the tracks is 7 mm.

In addition, we recommend a minimum overlap length of the tracks of at least 10 cm. At speeds higher than 2 m/s as well as when commissioning via Ethernet, this area must be increased.

Figure 4 also shows the sign convention of the LCP with the factory settings. (-90 mm ... +90 mm on the cable side).

6 Electrical installation

6.1 Safety

6.1.1 Notes on electrical installation

CAUTION
Danger due to incorrect supply voltage!

An incorrect supply voltage may result in injuries from electric shocks and/or damage to the device.

- Only operate the sensor with safety/protective extra-low voltage (SELV/PELV).

NOTICE
Sensor damage or unpredictable operation due to working with live parts.

Working with live parts may result in unpredictable operation.

- Only carry out wiring work when the power is off.
- Only connect and disconnect electrical connections when the power is off.

- **The electrical installation must only be performed by electrically qualified personnel.**
- **Standard safety requirements must be observed when working on electrical systems.**
- Only switch on the supply voltage for the device when the connection tasks have been completed and the wiring has been thoroughly checked.
- When using extension cables with open ends, ensure that bare wire ends do not come into contact with each other (risk of short-circuit when supply voltage is switched on!). Wires must be appropriately insulated from each other.
- Wire cross-sections in the supply cable from the user's power system must be designed in accordance with the applicable standards. When this is being done in Germany, observe the following standards: DIN VDE 0100 (Part 430) and DIN VDE 0298 (Part 4) and/or DIN VDE 0891 (Part 1).
- Electrical circuits connected to the device must be configured as SELV circuits (SELV = safety extra-low voltage/PELV = protective extra-low voltage).
- Protect the device with a separate fuse at the start of the supply circuit.

A shielded cable is not required in order to adhere to the electromagnetic compatibility guidelines specified by DIN EN 60947-5-2. It is recommended, however, especially when working with longer connecting cables.

The IP enclosure rating for the sensor is only achieved if the connected cable is completely screwed in.

6.1.2 Wiring notes

NOTE
Preassembled cables can be found online at:

▶ www.sick.com/ols10

Please observe the following wiring notes:

- During installation, pay attention to the different cable groups. The cables are grouped into the following four groups according to their sensitivity to interference or radiated emissions:

- Group 1: Cables very sensitive to interference, such as analog measuring cables
- Group 2: Cables sensitive to interference, such as sensor cables, communication signals, bus signals
- Group 3: Cables which are a source of interference, such as control cables for inductive loads, motor brakes
- Group 4: Cables which are powerful sources of interference, such as output cables from frequency inverters, welding system power supplies, power cables

▷ Cables in groups 1, 2 and 3, 4 must be crossed at right angles, see figure 5.

▷ Cables in groups 1, 2 and 3, 4 must be routed in different cable channels or metallic separators must be used, see figure 6 and see figure 7. This applies particularly where cables of devices with a high level of radiated emission, such as frequency converters, are laid parallel to sensor cables.

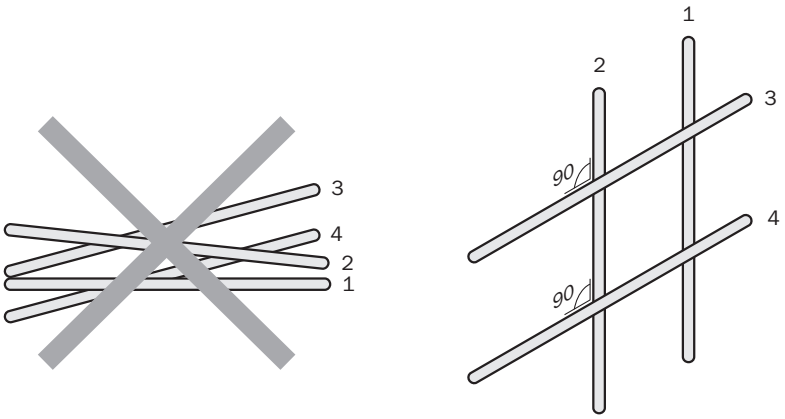


Figure 5: Cross cables at right angles

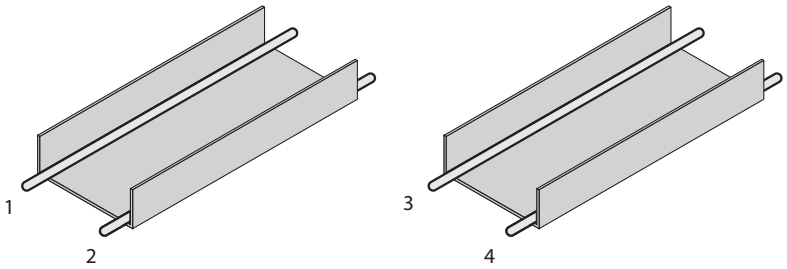


Figure 6: Ideal laying – Place cables in different cable channels

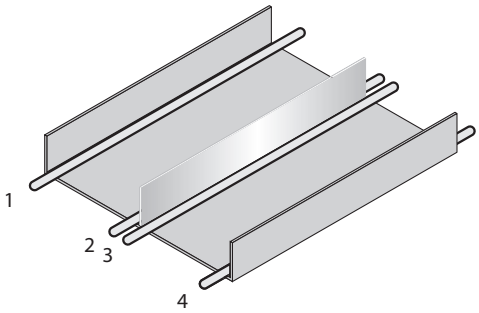


Figure 7: Alternative laying – Separate cables with metallic separators

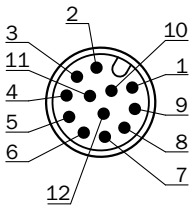
NOTE

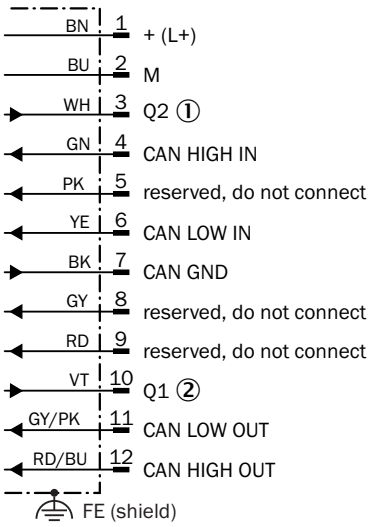
Prevent equipotential bonding currents via the cable shield with a suitable grounding method, see "Safety", page 17.

6.2 Pin assignment of the connections

M12 connection

M12 (A-coded)





Pin	Assignment
1 - BN	VIN
2 - BU	GND
3 - WH	Q2 - valid bar code read
4 - GN	CAN HIGH IN
5 - PK	reserved, do not connect
6 - YE	CAN LOW IN
7 - BK	CAN GND
8 - GY	reserved, do not connect
9 - RD	reserved, do not connect
10 - VT	Q1 - track detected
11 - GY/PK	CAN LOW OUT
12 - RD/BU	CAN HIGH OUT

Ethernet connection diagram

The OLS10 features a 100 base-T Ethernet connection.

Table 5: Ethernet connection diagram, M12 female connector, 4-pin, D-coded

M12 (D-coded)

Table 6: Ethernet female connector description

Pin	Marking	Wire color	Description
1	Tx+	White/Orange	Send data signal, not inverted
2	Rx+	White/Green	Receive data signal, not inverted
3	Tx-	Orange	Send data signal, inverted
4	Rx-	Green	Receive data signal, inverted

6.3 Connecting the supply voltage

The sensor must be connected to a voltage supply with the following properties:

- Supply voltage DC 12 V ... 30 V (stabilized safety extra-low voltage (SELV/PELV) as per current standard EN 60950-1)
- Electricity source with at least 5 W power

Protecting the supply cables

To ensure protection against short-circuits/overload in the customer's supply cables, the wire cross-sections used must be appropriately selected and protected.

The following standards must be observed in Germany:

- DIN VDE 0100 (part 430)
- DIN VDE 0298 (part 4) and/or DIN VDE 0891 (part 1)

Electrical connection of OLS10

- Ensure the voltage supply is not connected.
- If necessary, turn the swivel connector into the desired position as shown in the

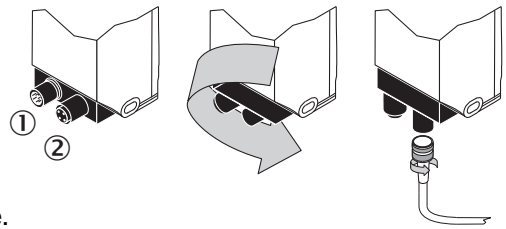


figure.
- Connect the sensor according to the connection diagram.

6.4 CAN connection

We recommend connecting the ground cable to the CANopen communication interface as a reference.

If there is no separate CAN GND in the system, this pin is to be connected to the FE.

7 Commissioning

7.1 Overview of commissioning steps

- Connect the voltage supply.
- Commission the sensor using the factory settings.
- Configure the sensor.

7.2 Commissioning the sensor for the first time

NOTICE PUSHBUTTON DAMAGE DUE TO IMPROPER HANDLING!

Improper handling of the pushbuttons can damage them. This will make operation difficult or impossible.

For this reason:

- Only operate the pushbuttons with your fingers or a suitable pointing device.
- Do not operate the pushbuttons using sharp or hard objects.

Establish voltage supply: When the sensor voltage supply is correct, the green “ON” LED lights up.

If at least one track is detected, switching output Q1 is “high” and the yellow “Q” LED lights up.

If an Ethernet connection is established, the green “Link” LED lights up.

7.3 First step to commissioning with CANopen

7.3.1 Setting the ID and baud rate

The following conditions must be met for communication with the CAN master:

- A correct node ID must be set on the OLS10.
  The following are correct:
  - A node ID which is free in the CANopen network
  - A node ID which the master expects
- The same baud rate must be set in the OLS10 as in the master.

The following parameters are factory set on the OLS10:

- Node ID: 10
- Baud rate: 125 kbit/s

The following communication parameters can be allocated to the OLS10:

- Node ID: 1 to 127 (0 is generally assigned to the master)
- Baud rate: 10 kbit/s, 20 kbit/s, 50 kbit/s, 125 kbit/s, 250 kbit/s, 500 kbit/s, 800 kbit/s, 1,000 kbit/s

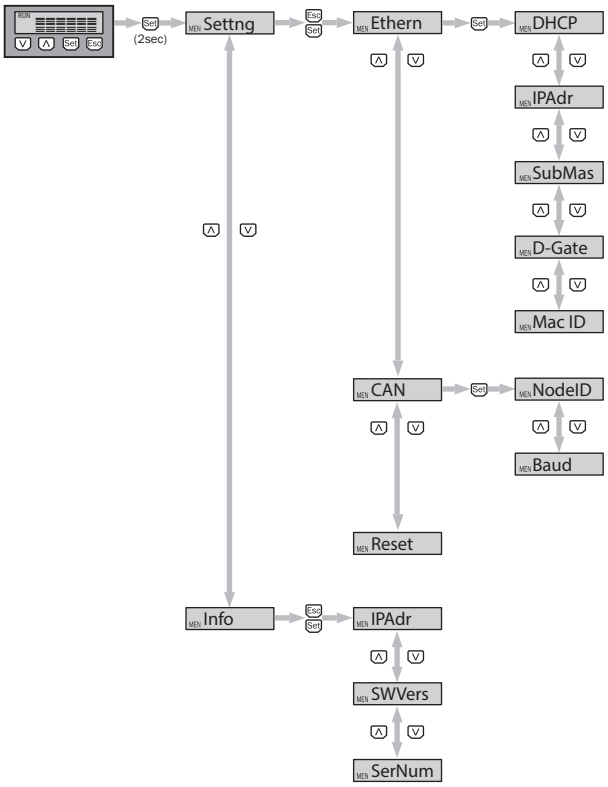
The sensor supports the configuration with LSS with a CANopen master.

The node ID and baud rate are otherwise set as follows:

Setting the node ID via the control panel

1 Press and hold the SET pushbutton for at least 2 seconds to access the menu.
2 Select the “Setting” option: Menu path: Setting → CAN → NodeID

The new values do not become active until the next time the sensor is switched on.



Other adjustments to the control panel see "Operating the sensor", page 23.

Additional adjustment to the node ID and baud rate via webUI see "Operation via TCP/IP", page 25.

7.3.2 Process data objects (PDOs)

The OLS10 supports two transmit PDOs and no receive PDO.

Objects 0x1800 and 0x1801 contain the communication parameters. The mapping is fixed and cannot be changed.

7.3.3 PDO communication

The transmission type is factory-set to timer-driven for TPDO1 and TPDO2. A transmission period of 20 ms is factory-set for TPDO1 so that it is transmitted on a cyclical basis. TPDO2 is deactivated in the factory settings, i.e., the value of the transmission period is 0 ms.

Changing the factory-set transmission type

The following options are available for the cyclical or acyclical output of transmit PDOs by the OLS10:

- Change the event timer in object 0x1800 or 0x1801 (see table 10)
- Change the transmission type in object 0x1800 or 0x1801 (see table 10)

8 Operation

8.1 Operating the sensor

8.1.1 Navigation

You can select a menu, parameter, option or value using the Set, ▼ and ▲ pushbuttons.

The menu path is specified in the relevant chapters of these instructions. → For the overall menu structure and navigation, see "Menu structure", page 45.

8.1.2 Selecting an option

1 Select the desired parameter using the Set, ▼ and ▲ pushbuttons.
2 Select the desired option using the ▼ or ▲ pushbutton.
3 Perform one of the following steps:
- Press the Set pushbutton to save the change.
- Press the Esc pushbutton to cancel the process. The parameter name is displayed again.
4 Perform one of the following steps to return to the default display:
- Press the Esc pushbutton repeatedly until the status indicator is displayed again.
- Wait for approx. one minute. The display will automatically switch back to the status indicator if no buttons are pressed. Any settings you have made will also be saved.

8.1.3 Changing the value

1 Select the desired parameter using the Set, ▼ and ▲ pushbuttons.
2 Press the Set pushbutton. The current value of the parameter is displayed. The first digit on the left flashes.
3 Press the ▲ pushbutton to increase the digit. Press the ▼ pushbutton to decrease the digit.
4 Press the Set pushbutton to save the digit entered. The next digit flashes.
Press the Esc pushbutton to cancel the process.
5 Repeat steps 3 and 4 until the last digit is saved. The parameter name is displayed.
6 Press the Esc pushbutton repeatedly until the default display is displayed again. Alternatively, you can wait for approx. one minute. The display will automatically switch back to the default display if no pushbuttons are pressed.

8.1.4 Setting menu

The Setting menu – displayed as menSettng – is used to configure the sensor via the parameters listed below.

To access the parameters in the Setting menu, press Set then select the parameter using ▼▲.

The available options are selected by pressing Set and then ▼▲ and confirmed with Set.

8.1.5 Ethernet configuration (Ethern) parameter

NOTE
Changes to the “Ethern” parameter are not adopted until the device is restarted.

Set the Ethernet configuration using the “Ethern” parameter.

→ Menu structure and navigation (see figure 10, page 45).

Table 7: “Ethern” parameter - the default values are shown

Parameter	Description
IPAdr	Enter an IP address. Factory setting • MSB: 192 • Byte2: 168 • Byte1: 100 • LSB: 100
SubMas	Enter IP network mask. Factory setting • MSB: 255 • Byte2: 255 • Byte1: 255 • LSB: 0
D gate	Enter default gateway. Factory setting • MSB: 0 • Byte2: 0 • Byte1: 0 • LSB: 0
DHCP	Factory setting: Deactivated.
MAC ID	Individual address

Entering IPAdr, SubMas, DHCP, MAC ID and D gate

The “IPAdr”, “SubMas” and “D gate” parameters are entered in an identical manner. Entry for the IP address is described here.

1 Select the “IPAdr” parameter under “Ethern”.
2 Press the Set pushbutton. The current value for the “Most significant byte” is displayed. The first digit on the left flashes.
3 Press the ^ pushbutton to increase the digit. Press the v pushbutton to decrease the digit.
4 Press the Set pushbutton to save the digit entered. The next digit flashes.
5 Repeat steps 3 and 4 until the last digit is saved. The value of the next byte is displayed.
6 Repeat steps 3 to 5 for the second, third and fourth byte (least significant byte).
7 After you have confirmed entry for the value of the fourth byte with the Set pushbutton, the “IPAdr” parameter is displayed.

8.1.6 CANopen settings parameter

The NodeID and baud rate CANopen settings can be set via the “CAN” menu item.

Table 8: NodeID and baud rate settings

Parameter	Description
NodeID	Setting of the NodeID Options: Node ID: 1 to 127 (0 is generally assigned to the master) Factory setting: 10
Baud	Setting of the baud rate Options: 10 kbit/s, 20 kbit/s, 50 kbit/s, 125 kbit/s, 250 kbit/s, 500 kbit/s, 800 kbit/s, 1,000 kbit/s Factory setting: 125 kbit/s

Configuring NodeID

Press and hold the SET pushbutton for at least 2 seconds to access the menu. Select the “Setting” option: Menu path: Setting → CAN → NodeID

Configuring the baud rate

Press and hold the SET pushbutton for at least 2 seconds to access the menu. Select the “Setting” option: Menu path: Setting → CAN → Baud

8.1.7 Device reset (Reset) parameter

Performing a reset

Table 9: Reset

Parameter	Description
Reset	Perform a reset. Options • Yes: Perform a reset. • No Factory setting • No

1 Select the “Reset” parameter in the “Settng” menu.
2 Select the “yes” option.
3 Press the Set pushbutton to reset the device to its initial state. Press the Esc pushbutton to cancel the process.

8.1.8 Info menu

The IP address, serial number and software version parameters can be viewed in the Info menu.

The respective values are displayed after Set (parameter selection) is pressed.

8.2 Operation via TCP/IP

Configuration, operation and diagnostics of the OLS10 Optical Line Guidance Sensor can be performed using the Ethernet interface as an alternative to manual operation via the operating and display elements on the device. SICK AG offers a configuration and diagnostic interface via the web server integrated in the sensor in order to activate or evaluate the OLS10 via Ethernet TCP/IP. This can be called up by a PC or an HMI with a web browser.

In addition, communication with the sensor is possible via the SICK ColaB protocol. Comprehensive documentation can be found on the SICK AG homepage (www.sick.com/ols10).

8.2.1 Operating interface on the integrated web server

The “Device overview” tab first appears when the WebUI is started. The following information is displayed here:

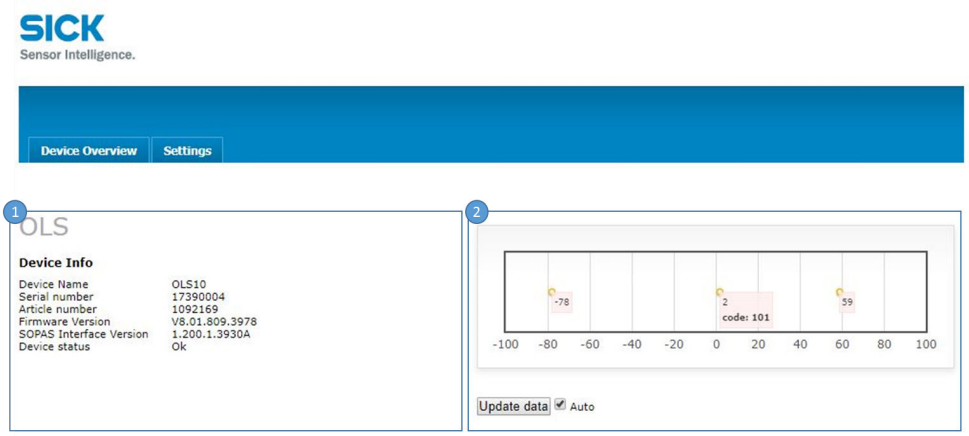


Figure 8: Device overview

1 Device information such as device name, serial number, part number, firmware version, SOPAS interface version as well as the device status.
2 Visualization of the (up to) three line center points as well as the read bar code value.

Various device parameters can be modified in the “Settings” tab.

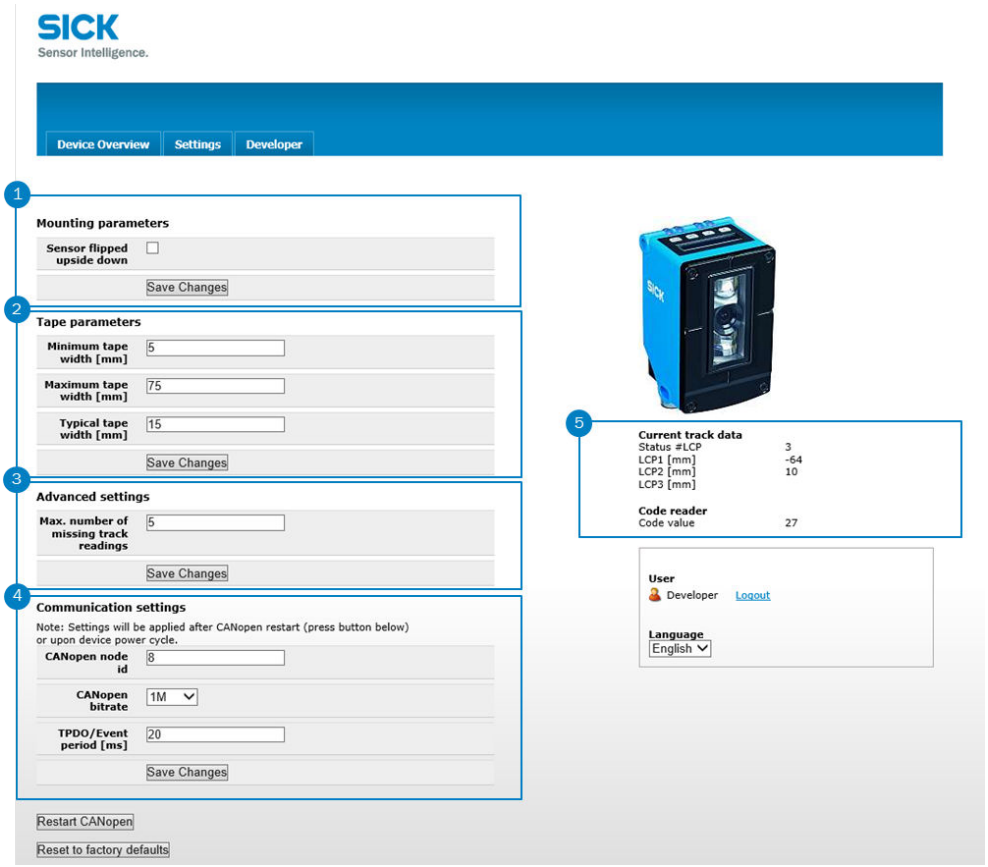


Figure 9: Settings

1 Sensor flipped upside down:
0 => Positive positions on cable outlet side
1 => Positive positions on display side

2 Minimum track width: Smaller tracks are ignored
Maximum track width: Wider tracks are ignored
Typical track width: Specification of the typical track width makes it possible to output the correct line center point even at the edge of the reading window

3 Missing line readings: If the track is not detected (contamination), the last detected line center point is output for a defined number of sensing processes

4 CANopen node ID: Setting of the node ID: Default value is 10
CANopen bit rate: Setting of the bit rate. Default value is 125K
TPDO/Event period: Setting of the TPDO/event period

5 Output of the three line center points, the number of detected tracks (status) as well as the read code.

8.3 Operation via CANopen

CANopen object directory

This chapter contains information on integration of the sensor using CANopen.

All sensor functions can be accessed via the CANopen interface. All settings can be configured in this interface. The EDS file can also be found at www.sick.com/ols10.

8.3.1 OBD

This section only describes the objects that do not have a fixed definition in the CANopen standard. Default values are listed only for parameters that can be modified by the user.

Table 10: OBD

Index	Sub-idx	R/W	Object name	Default value	Type	Description
0x1000	-	RO	Device type		UINT32	No device profile supported
0x1001	-	RO	Error register		UINT8	
0x1008	-	RO	Manufacturer device name		STRING	Optical Line Guidance Sensor
0x1009	-	RO	Manufacturer hardware rev		STRING	Hardware version, sensor
0x100A	-	RO	Manufacturer software rev		STRING	Firmware version, sensor
0x100C	-	R/W	Guard time		UINT16	
0x100D	-	R/W	Life time		UINT8	
0x1017	-	R/W	Heart beat time		UINT16	
0x1018		RO	Identity object		UINT8	
	1	RO	Vendor ID		UINT32	0x01000056 (SICK AG)
	2	RO	Product code		UINT32	
	3	RO	Revision number		UINT32	
	4	RO	Serial number		UINT32	
0x1800			Transmit PDO communication parameter 0			
	1	R/W	COB ID	0x0000018A	UINT32	See chapter 8.3.2
	2	R/W	Transmission type	0xFF	UINT8	See chapter 8.3.2
	5	R/W	Event timer	0x014	UINT16	
0x1801			Transmit PDO communication parameter 2			
	1	R/W	COB ID	0x0000018A	UINT32	See chapter 8.3.2
	2	R/W	Transmission type	0xFF	UINT8	See chapter 8.3.2
	5	R/W	Event timer	0x014	UINT16	See chapter 8.3.2

Index	Sub-idx	R/W	Object name	Default value	Type	Description
0x2001			Mounting parameters			
	5	R/W	Flipped upside down		BOOL	0 => Positive positions on cable outlet side 1 => Negative positions on cable outlet side
0x2002			Tape parameters			
	1	R/W	Typ. width [m]		FLOAT	Typical track width. The specification of the typical track width makes it possible to output the correct line center point even at the edge of the reading window.
	2	R/W	Min. width [m]		FLOAT	Minimum track width. Smaller tracks are ignored.
	3	R/W	Max. width [m]		FLOAT	Maximum track width. Wider tracks are ignored.
0x2003			Advanced settings			
	1	R/W	Max. number of missing line readings		UINT16	If the track is not detected (contamination), the last detected line center point is output for a defined number of sensing processes.
0x2018		RO	Device status		UINT16	0: Sensor ok. 1: There is a short-circuit at output Q1 or Q2.
0x2019		RO	Order number		UINT32	
0x2021			Result data (LCPs)[1]			
	1	RO	LCP1[1]		INT16	See chapter 8.3.2
	2	RO	LCP2[1]		INT16	See chapter 8.3.2
	3	RO	LCP3[1]		INT16	See chapter 8.3.2
	4	RO	Status		UINT8	See chapter 8.3.2
	5	RO	Width LCP1[1]		INT16	See chapter 8.3.2
	6	RO	Width LCP2[1]		INT16	See chapter 8.3.2
	7	RO	Width LCP3[1]		INT16	See chapter 8.3.2
	8	RO	Code		UINT8	See chapter 8.3.2
	9	RO	Extended code		UINT32	See chapter 8.3.2

1 LCP = line center point

8.3.2 PDOs

The OLS10 has two TPDOs (TPDO01 and TPDO02) with fixed mapping and no RPDO. TPDO1 can be accessed under the index 0x0180 + node ID, TPDO02 under 0x280 + node ID. In its default state (node ID 0x0A), the index for TPDO1 is 0x018A.

The TPDO1 is structured as follows:

Table 11: CANopen PDO01

	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
TPDO1	LSB LCP1	MSB LCP1	LSB LCP2	MSB LCP2	LSB LCP3	MSB LCP3	Status	Bar code

Table 12: Byte 7 status

	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Status	#LCP bit 0	#LCP bit 1	#LCP bit 2	x	Device status	x	Code flipped	Code valid

Table 13: TPDO2

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
TPDO2	LSB Width line 1	MSP Width line 1	LSB Width line 2	MSP Width line 2	LSB Width line 3	MSP Width line 3	x	x

#LCP	UINT3	The numbers are assigned the following meanings: 0 => No track found 2 => One track found 3 => Two tracks found: Diverter on minus side (factory setting) 6 => Two tracks found: Diverter on plus side (factory setting) 7 => Three tracks found
Device status	Bool	0 => Sensor ok 1 => Sensor not OK, see 0x2018
Code flipped	Bool	0 => Code was read from the minus to the plus side of the sensor 1 => Code was read from the plus to the minus side of the sensor
Code valid	Bool	0 => No code read 1 => Valid code has been read

Table 14: Byte 8 bar code

	Bit 0-7
Bar code	Code 0 ... 255

8.3.3 Transmission types

The transmission type of the respective TPDO can be set in index 0x1800 or 0x1801. This index comprises the following subindexes:

Table 15: Subindexes

Subindex	Name	Permissible values	Description
1	COB-ID	-	The COB ID is automatically adjusted to the note ID and should not be amended by the user.

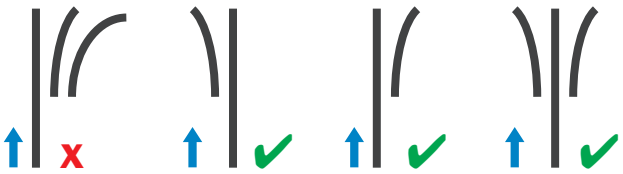
Subindex	Name	Permissible values	Description
2	Transmission type	0xFE, 0xFF	The transmission type is set here. The OLS supports all transmission types in the value range 0x00 to 0xFF.
3	not used	-	Not used
4	Compatibility entry	-	Not used
5	Event timer	0 ... 65535	The event timer sets the time between two transmissions from the TPDO in [ms]. A value of 0 deactivates the transmission of the process data. The smallest logical value recommended here is 10 ms.

8.4 General notes on operation

8.4.1 Output of line center points

The OLS10 is capable of detecting up to three line center points (LCPs). The position of each line center point is output to a resolution of 1 mm. The geometric center of the sensor's longitudinal axis is the zero point, see "optical center", page 12.

By default, the positive measuring range is towards the cable outlet, and the negative measuring range is on the opposite side.



If only one line center point is found, this is output as LCP2. If a further line center point is found, it is output as LCP1 or LCP3, depending on its direction. If three LCPs are found, then each LCP is output.

If there are multiple tracks in the field of view, the track closest to zero is the main track (LCP2).

To make it easier for the control system to evaluate this data, the combination of tracks detected is output in an additional data item #LCP. The LCPs are binary-weighted:

Table 16: Line center points

LCP1 detected	LCP2 detected	LCP3 detected	#LCP	Comment
no	no	no	0	Special case: No track detected
no	yes	no	2	Only one track detected
yes	yes	no	3	Single diverter on the minus side detected (factory setting)
no	yes	yes	6	Single diverter on the plus side detected (factory setting)
yes	yes	yes	7	Double diverter detected

The principle of LCP1 < LCP2 < LCP3 always applies to the LCPs.

8.4.2 Inversion of the relative position

This function enables the user to invert the convention that the positive range is at the cable outlet. This makes it easier to install the sensor when rotated by 180°.

The position can be inverted via CANopen or Ethernet.

The inversion of the position signal (sensor flipped) does not affect the LED behavior.

8.4.3 Bar code detection

The OLS10 has the option of detecting 1D bar codes in the interleaved 2/5 format. Up to 4-digit bar codes are detected and read out in this case.

The OLS10 outputs the number value of the bar code via CANopen or Ethernet.

In addition to track tape, SICK also offers a set of numbered bar codes as accessories see "Accessories", page 39. The assignment of the bar code value to a certain drive command or piece of position information must be done on the control side.

9 Maintenance

9.1 Cleaning

CAUTION DEVICE DAMAGE DUE TO IMPROPER CLEANING!
Improper cleaning may result in device damage.

For this reason:

- Never use cleaning agents containing aggressive substances.
- Never use sharp objects for cleaning.

Clean the front screen at regular intervals with a lint-free cloth and plastic cleaning agent. Cleaning agents containing solvents are not allowed.

The cleaning interval essentially depends on the ambient conditions.

9.2 Maintenance

The sensor requires the following maintenance work at regular intervals:

Table 17: Maintenance schedule

Interval	Maintenance work	To be performed by
Cleaning interval depends on ambient conditions and climate	Clean housing, particularly the front screen.	Specialist
Every 6 months	Check the screw connections and plug connectors.	Specialist

9.3 Repairs

Repairs on the sensor may only be carried out by the manufacturer. Any interruption or modification of the sensor will invalidate the manufacturer warranty.

10 Decommissioning

10.1 Decommissioning

Removing the sensor

1. Switch off the supply voltage to the sensor.
2. Detach all connecting cables from the sensor.
3. If the sensor is being replaced, mark its position and alignment on the bracket or surroundings.
4. Remove the sensor from the slot.

Disposing of the sensor

Any sensor which can no longer be used must be disposed of in an environmentally friendly manner in accordance with the applicable country-specific waste disposal regulations. The sensor is electronic waste and must under no circumstances be disposed of with general waste.

11 Troubleshooting

Potential faults and rectification measures are described in the table below and in the next chapter.

In the case of faults that cannot be rectified using the information below, please contact the manufacturer. See the back page for your agency.

11.1 Possible error indicators

Table 18: Possible error indicators

Error code indicator on the display	Possible causes	Troubleshooting
Err001	There is a short circuit at output Q1 or Q2.	Resolve short circuit.

NOTE
Please check the supply voltage, perform a power cycle or contact the manufacturer for other error codes.

11.2 Faults caused by the network connection

NOTE
We recommend having the network connection of the OLS10 established by your network administrator.

Check the individual items according to the following table.

Table 19: Faults caused by the network connection

Cause/Item to be checked	Check	Troubleshooting
The sensor is connected to a network using a network cable.	• The “Link” LED on the sensor must light up (Ethernet connection OK). • The “Act” LED on the sensor must light up (data transfer).	
The sensor IP configuration is not correct.	Check IP configuration on the sensor. → See "Ethernet configuration (Ethern) parameter", page 24.	
After entering the new IP address, the supply voltage of the sensor was not switched off, then back on (restart). The sensor does not adopt the new IP address until the sensor is restarted.	Check IP configuration on the sensor. → See "Ethernet configuration (Ethern) parameter", page 24.	Switch the supply voltage off and back on after checking the IP configuration.

Cause/Item to be checked	Check	Troubleshooting
The IP configuration for the existing network is not compatible.	• Check IP configuration, IP address, subnet mask and gateway. → See "Ethernet configuration (Ethern) parameter", page 24 • Use the “ping” diagnostics tool to check whether the sensor is correctly integrated in your IP network. The sensor must answer with an echo ICMP package (echo request). The “Activity” LED on the sensor must light up.	Contact your network administrator.

12 Technical data

NOTE

The relevant online data sheet for the OLS10, including technical data, dimensions, and connection diagrams, can be downloaded, saved, and printed at www.sick.com/ols10.

12.1 Optics / Features

Table 20: Optics / Features

Light sender[1]	Blue LED
Wavelength	450 nm
Light spot size	180 mm x 11 mm Track field of view +/-90 mm Code field of view +/-50 mm
Sensing distance	100 mm
Sensing distance tolerance	± 10 mm
Sensing rate	10 ms (CAN), 20 ms (Ethernet)
Bar code types	2/5 interleaved
Module width (min.)	≥ 1.5 mm
Track radius (min.)	≥ 0.5 m
Initialization time	< 10 s

1 Average service life 100,000 h at TU = +25 °C.

12.2 Supply

Table 21: Supply

Supply voltage U_V[1]	12 V DC ... 30 V DC
Power consumption (without load)	< 6 W
Residual ripple	< 5 V_{ss} within permitted supply voltage U_V (must not exceed or be less than the U_V tolerances.)

1 Limit values: Max. 8 A for operation in a short-circuit protected network

12.3 Interfaces

Table 22: Interfaces

CANopen Ethernet	Configuration and process interfaces

12.4 Outputs

Table 23: Outputs

Q1, Q2 switching outputs	PNP • HIGH = U_V – ≤ 2 V • LOW < 0.5 V
Circuit protection	Output Q1 + Q2 overcurrent and short-circuit protection (see Table 1)
Maximum output current	< 100 mA (total I_{OUT}= Q1 + Q2)

12.5 Ambient conditions

Table 24: Ambient conditions

Protection class	III, for operation with safety/protective extra-low voltage (SELV/ PELV)
Electromagnetic compatibility	EN 61000-6-2, EN 55011, Class A
Ambient temperature range	–10 °C ... +55 °C
Storage temperature range	–20 °C ... +75 °C
Ambient light immunity	50,000 lx
Enclosure rating	IP64
Vibration resistance (sine)	EN60068-2-6
Noise	EN60068-2-64
Shock resistance/Impact load	EN 60086-2-27

12.6 Structural design

Table 25: Structural design

Dimensions (W x H x D)	46 mm x 77 mm x 46 mm
Weight	325 g
Materials	Housing: metal, discharge plate: glass
Connections[1]	• M12 male connector, 12-pin • M12 Ethernet connection, 4-pin
Control panel	OLED

1 Use twisted and shielded cables.

13 Accessories

13.1 Connectivity

13.1.1 Female cable connectors with cables

Description	M12 female cable connector, 12-pin, straight, 5 m, shielded, twisted-pair wires
Type	DOL-1212-G05MAS02
Part no.	6042754

Description	M12 female cable connector, 12-pin, angled, 5 m, shielded, twisted-pair wires
Type	DOL-1212-W05MAS02
Part no.	6044109

13.1.2 Connection cable

Description	M12 connection cable. 12-pin, straight male connector/straight female connector, 5 m, shielded, twisted-pair wires
Type	DSL-1212-G05MAS02
Part no.	6045234

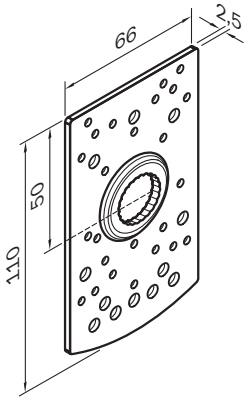
13.1.3 Ethernet cable

Description	Ethernet cable, 4-wire, shielded, M12 male connector, straight, 4-pin (D-coded), RJ-45 male connector, 8-pin, 5 m
Type	Connection cable (male connector-male connector)
Part no.	6034415

Description	Ethernet cable, 4-wire, shielded, M12 male connector, angled, 4-pin (D-coded), RJ-45 male connector, 8-pin, 5 m
Type	Connection cable (male connector-male connector)
Part no.	6039488

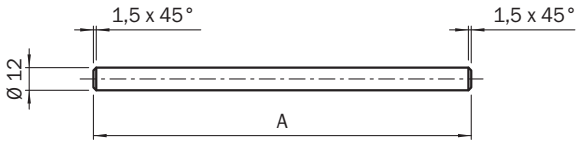
13.2 Mounting systems

13.2.1 Universal clamp plate



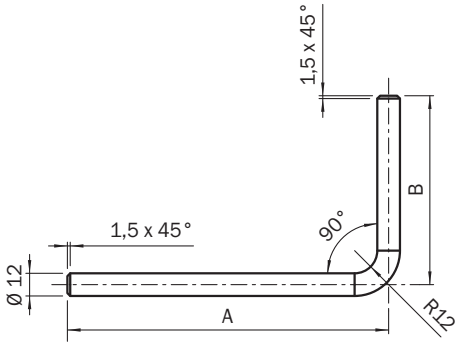
Alle Maße in mm

Description	Plate N04 for universal clamp, steel, zinc-coated, incl. universal clamp and mounting hardware
Type	BEF-KHS-N04
Part no.	2051610



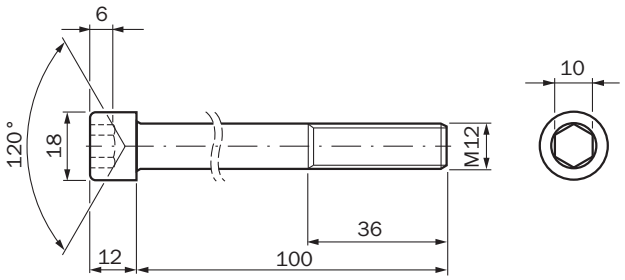
Alle Maße in mm

Description	Mounting rod, straight, 200 mm, steel, zinc-coated, without mounting hardware, plate N04 for universal clamp, steel, zinc-coated, including universal clamp and mounting hardware
Type	BEF-MS12G-A
Part no.	4056054



Alle Maße in mm

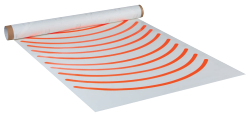
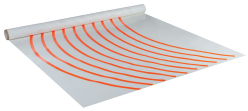
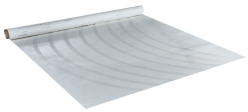
Description	Mounting rod, L-shape, 250 mm x 250 mm, steel, zinc-coated, without mounting hardware
Type	BEF-MS12L-B
Part no.	4056053



Description	Mounting rod with thread, straight, 100 mm, steel, zinc-coated, incl. mounting hardware
Type	BEF-MS12G-AG
Part no.	2062405

13.2.3 Track tape

	Part number	Description	Type
	5337868	Luminescent duct tape for easy application to all types of flooring	ADHESIVE TAPE, DUCT TAPE, 25.0*25M NEON ORANGE
	5338378	Luminescent rugged PVC adhesive tape for easy application to all types of flooring	ADHESIVE TAPE, PVC, 20.0*25M NEON ORANGE

	Part number	Description	Type
	5338386	Protective film for adhesive tape, slip resistance class R10, protection against abrasion and moisture	PROTECTIVE FILM, 35.0*50M NEON ORANGE
	5338387	Luminescent rugged PVC adhesive tape, prepared as 90° arc with a radius of 500 mm	ADHESIVE TAPE, PVC ARC, 500MM NEON ORANGE
	5338388	Luminescent rugged PVC adhesive tape, prepared as 90° arc with a radius of 1,000 mm	ADHESIVE TAPE, PVC ARC, 1000MM NEON ORANGE
	5338389	Protective film for adhesive tape, slip resistance class R10, protection against abrasion and moisture, prepared as 90° arc with a radius of 500 mm	PROTECTIVE FILM, ARC, 500MM NEON ORANGE
	5338390	Protective film for adhesive tape, slip resistance class R10, protection against abrasion and moisture, prepared as 90° arc with a radius of 1,000 mm	PROTECTIVE FILM, ARC, 1000MM NEON ORANGE
	5338408	1D bar codes in 2/5 interleaved format. Set of 108 bar codes on 9 A4 sheets. Luminescent PVC backing material with protective film.	SHEET, BAR CODE LINE TRACKING, A4

14 Licenses

14.1 lwIP

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Registration date: Thu17 Oct 2002 21:13:13 UTC

License: Modified BSD license

14.2 tinf

tinf 1.00 is used in the OLS10 in accordance with the zlib license:

tinf - tiny inflate library

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All files located in the node_modules and external directories are externally maintained libraries used by this software which have their own licenses; we recommend you read them, as their terms may differ from the terms above.

14.4 Flot

Flot 0.8.3 is used in the OLS10 in accordance with the MIT license:

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15 Menu structure

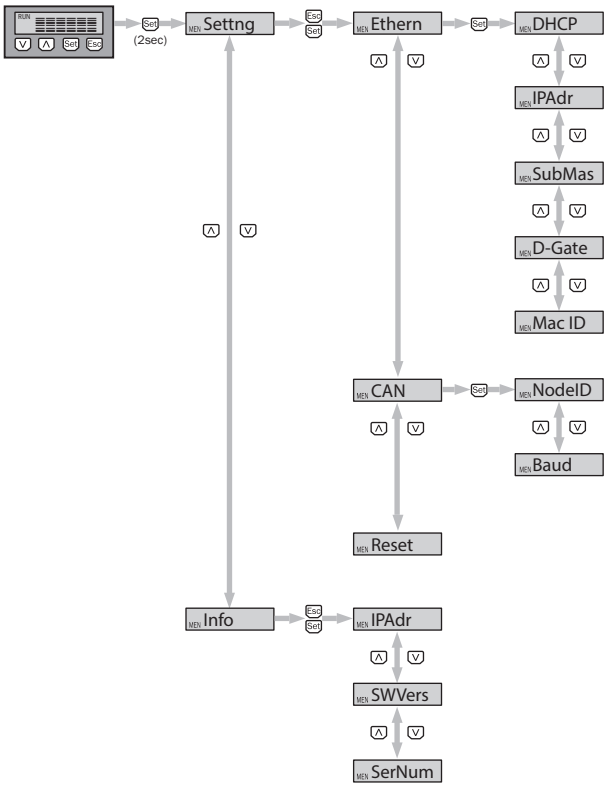

Figure 10: Menu structure

16 Annex

16.1 EU declaration of conformity

The EU declaration of conformity can be downloaded from the Internet at:

www.sick.com/ols10

8022017.11T1/2018-12-19/en

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