OPERATING INSTRUCTIONS

OD200

Displacement sensor

SICK
Sensor Intelligence.

Described product

OD200

Manufacturer

SICK AG
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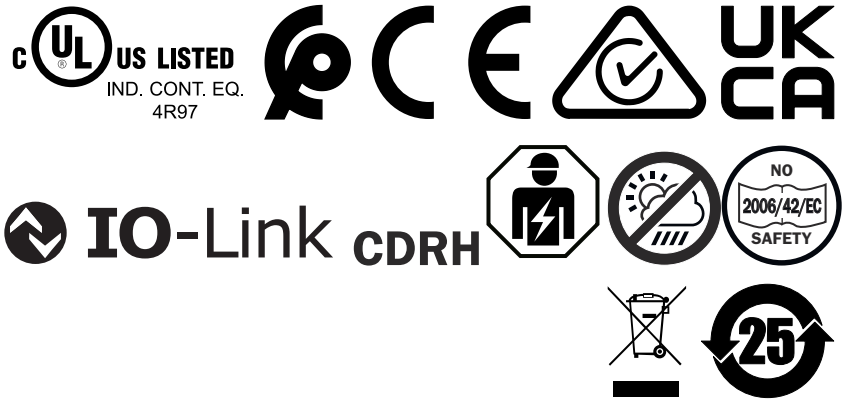
Germany

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

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 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.

1.3 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

2 Safety information

2.1 Intended use

The OD200 displacement measurement sensor is a opto-electronic sensor and is used for optical, non-contact distance measurement of objects.

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.

2.2 Improper use

Any use outside of the stated areas, in particular use outside of the technical specifications and the requirements for intended use, will be deemed to be incorrect use.

- The device does not constitute a safety component in accordance with the respective applicable safety standards for machines.
- The device must not be used in explosion-hazardous or corrosive areas or under extreme ambient conditions.
- Any use of accessories not specifically approved by SICK AG is at your own risk.
- The sensor must not be used for the non-safety-oriented detection of persons or parts of persons.

WARNING
Danger due to improper use!

Any improper use can result in dangerous situations.

Therefore, observe the following information:

- Product should be used only in accordance with its intended use.
- All information in the documentation must be strictly observed.
- Shut down the product immediately in case of damage.

2.3 Cybersecurity

Overview

To protect against cybersecurity threats, the operator must have a comprehensive cybersecurity concept, which must be continuously monitored and maintained. 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)

2.4 Limitation of liability

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

- Non-compliance with product documentation (e.g. operating instructions)
- Improper use

- Use of untrained staff.
- Unauthorized conversions or repair
- Technical modifications
- Use of unauthorized spare parts, wear and tear parts, and accessories

2.5 Modifications and conversions

NOTICE
Modifications and conversions to the device may result in unforeseeable dangers.

Interrupting or modifying the device or SICK software will invalidate any warranty claims against SICK AG. This applies in particular to opening the housing, even as part of mounting and electrical installation.

2.6 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

2.7 Operational safety and specific hazards

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.

Danger due to optical radiation is product-specific. See the technical data for more information.

CAUTION
Optical radiation: Class 1 Laser Product
The accessible radiation does not pose a danger when viewed directly for up to 100 seconds. It may pose a danger to the eyes and skin in the event of incorrect use.

- Do not open the housing. Opening the housing may increase the level of risk.
- Current national regulations regarding laser protection must be observed.

WARNING
Electrical voltage!
Electrical voltage can cause severe injury or death.

- Work on electrical systems must only be performed by qualified electricians.
- The power supply must be disconnected when attaching and detaching electrical connections.
- The product must only be connected to a voltage supply as set out in the requirements in the operating instructions.
- National and regional regulations must be complied with.
- Safety requirements relating to work on electrical systems must be complied with.

WARNING

Risk of injury and damage caused by potential equalization currents!

Improper grounding can lead to dangerous equipotential bonding currents, which may in turn lead to dangerous voltages on metallic surfaces, such as the housing. Electrical voltage can cause severe injury or death.

- Work on electrical systems must only be performed by qualified electricians.
- Follow the notes in the operating instructions.
- Install the grounding for the product and the system in accordance with national and regional regulations.

2.8 Laser notes

CAUTION

Interference, manipulation or incorrect use can lead to hazardous exposure due to laser radiation.

The emitted light beam must not be focused by means of additional optical devices.

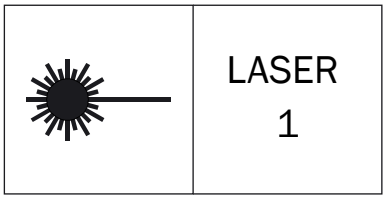


Figure 1: Laser class 1

The laser is eye-safe.

This device complies with the following standards:

- EN 60825-1:2014+A11:2021, 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.

3 Product description

3.1 Scope of delivery

Table 1: Scope of delivery

No. of units	Component	Note
1	Device in the version ordered	Depending on version
1	Y-distribution	
1	Protective cap	For connecting the Y-connector (female connector, M12, 5-pin, D-coded)
	Protective caps	For connections (on the device)
2	M4 screws x 50 mm	
2	M4 nuts with washers	
1	Printed safety notes, multilingual	Brief information and general safety notes

The actual scope of delivery may differ for special designs, additional orders or due to the latest technical changes.

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.

For many products, the SICK product ID is displayed as text and QR code on the type label and/or on the packaging.

Figure 2: SICK product ID

3.2.2 Type code

Type code structure

OD200 – a b c d e f

Placeholder	Description	Characteristic
a	Center of the measuring range	030: 25 mm ... 35 mm 050: 35 mm ... 65 mm 110: 60 mm ... 160 mm
b	Laser class	1: Laser class 1
c	Light spot geometry	W: Line, elliptical
d	Interface	1: Analog I/U [1], IO-Link
e	Connection type	5: Cable with M12 connection, 5-pin

Place-holder	Description	Characteristic
f	Device type	“Empty”: Default type S: Special device

1) Not available for devices without an analog output.

3.2.2.1 Device variants

Type	Measuring range	Interface	Connection type
OD200-0301T15	25 mm ... 35 mm	**2 outputs:** • 1 Digital output with IO-Link 1.2 • 1 analog output **1 input:** • 1 digital input	Cable with plug, M12, 5-pin, A-coded, 30 cm
OD200-0501T15	35 mm ... 65 mm		
OD200-1101T15	60 mm ... 160 mm		

3.3 Principle of operation

3.3.1 Measurement principle

The displacement measurement sensor determines the distance to an object using the triangulation principle.

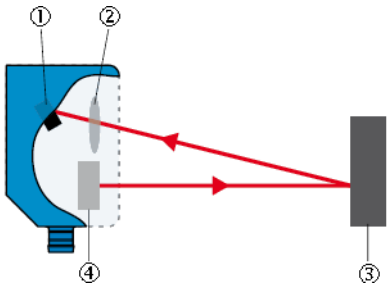


Figure 3: Triangulation principle

① Receiver
② Receiver optics
③ Object
④ Sender

The triangulation principle is based on distance measurement through angle calculation. The device emits a light beam. When the emitted light beam hits an object, the light beam is reflected on its surface. The light reflected from the object hits the light-sensitive receiver in the device at an angle that depends on the distance. Based on the angle between the sending and receiving beam direction, the distance to the object is determined via triangulation.

3.3.2 Output of measured values and parameterization

The distance determined is transmitted via the IO-Link interface. The analog signal output converts the distance value into an output signal proportional to the distance. The device signals via the digital outputs whether parameterizable switching limits and distance values have been reached.

Measurement, diagnostic and device data can be queried and parameter settings can be made via the OLED display. The device can be parameterized via the display, the IO-Link interface and SOPAS ET.

3.4 Display and control elements

Overview

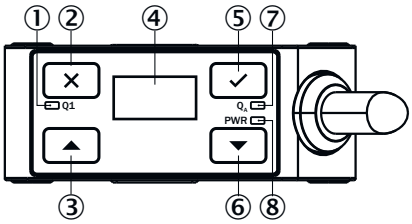


Figure 4: Display and control elements

① Q1 status LED (yellow)
② Cross pushbutton
③ UP pushbutton
④ Display
⑤ Tick pushbutton
⑥ DOWN pushbutton
⑦ Status LED Q_A (yellow)
⑧ PWR status LED (green)

Status LEDs

Status LED	Status (color)	Description
PWR (status indicator)	● (Green)	Voltage supply available, device ready for use
	○ (Green)	Voltage supply not available
	☼ (Green)	Voltage supply available, device ready for use, connection to an IO-Link Master available
Q1 (output display)	● (Yellow)	Digital output active
	○ (Yellow)	Digital output not active
	☼ (Red)	There is a device error.
Q_A (output display)	● (Yellow)	Measured value within the scaling range for the analog output
	☼ (Red)	The laser is switched off

● = Lights up; ☼ = Flashes; ○ = Does not light up.

Operating buttons

Push-button	Function	Description
☒	Back, cancel	
☑	Open menu, confirm input	
▲	Navigate, change values	
▼	Navigate, change values	

3.5 IO-Link communication interface

The product has the IO-Link communication interface. IO-Link communication is a **master-device** communication system.

The product can be operated in standard I/O mode (SIO) or IO-Link mode (IOL). All automation functions and other parameter settings are effective in IO-Link mode and in standard I/O mode.

The following functions are supported via the standard IO-Link communication interface:

- Flexible sensor settings
- Digital transmission of sensor signals to the **IO-Link Master**
- Visualization and parameterization of the sensor
- Diagnostics/**condition monitoring**
- Device identification
- Easy device replacement
- **Events**

A detailed description of the configurable functions and associated indices can be found in the “IO-Link description” technical information:

3.5.1 Documentation, software and accessories for IO-Link

Accessory components and additional information are available for integrating and setting the IO-Link device. You can find documentation and software, accessories and links using the **SICK Product ID**.

Documentation and software

- IODD: Device description file
- IODD overview: List of IODD contents
- IO-Link description: Detailed description of the process, service data and events of the IO-Link device
- SOPAS ET: Configuration software as a free download
- The documentation for SOPAS ET is stored in the system folder on your computer with the download:
  C:\Program Files (x86)\SOPAS ET\help
- Visualization file (SDD = **SOPAS Device Description**) for operation via SOPAS ET.
- **Function Block Factory**

IO-Link products can be easily connected to a computer via USB using the **SiLink master**. You can quickly and easily test or parameterize the connected products using the **SOPAS ET (SICK Engineering Tool** with graphic user navigation and convenient visualization).

Accessories

- **IO-Link-Master**
- **SiLink master**
- Connecting cables

4 Transport and storage

4.1 Transport

NOTICE
Damage due to improper transport!

- The product must be packaged with protection against shock and damp.
- Recommendation: Use the original packaging.
- Note the symbols on the packaging.
- Do not remove packaging until immediately before you start mounting.

4.2 Unpacking

- To protect the device against condensation, allow it to equilibrate with the ambient temperature before unpacking if necessary.
- Handle the device with care. Protect against mechanical damage.
- To avoid ingress of dust and water, only remove the protective elements, for example the protective caps of the electrical connections, just before attaching the connecting cable.

NOTE
Connection 3 is not used, the protective cap is glued in place. To preserve the tightness of the housing, do not loosen or remove the cap.

- Always place the device down on its bottom.

4.3 Transport inspection

Immediately upon receipt in incoming goods, 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 extent 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.

4.4 Storage

- Electrical connections are provided with a protective cap.
- Do not store outdoors.
- Store in a place protected from moisture and dust.
- Recommendation: Use the original packaging.
- To allow any residual dampness to evaporate, do not package in airtight containers.
- Do not expose to any aggressive substances.
- Do not store in or near strong magnet fields (e.g. permanent magnet or strong alternating field).
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see "Technical data", page 45.

- Relative humidity see "Technical data", page 45.
- 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 Mounting instructions

- Observe the technical data.
- Protect the sensor from direct sunlight.
- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- The mounting site has to be designed for the weight of the device.
- To avoid inaccurate measurements when installing multiple devices: Make sure that the light spot of one device is not in the interference range of another device.
- The ventilation element must not be sealed off during installation.

5.2 Mounting the device

Procedure

1. Mount the device using the designated fixing holes. Note the permissible tightening torque of the screws.
2. Make the electrical connection. Attach and tighten a voltage-free cable.
3. Switch on the supply voltage.

✓ The **PWR** status LED lights up green.

4. Align the light spot so that the device measures on the desired object.

Further topics

- Dimensional drawing
- Pinouts

6 Electrical installation

6.1 Wiring instructions

NOTE

Pre-assembled cables can be found on the product page.

It can be accessed via the **SICK Product ID: pid.sick.com/{P/N}/{S/N}**

{P/N} corresponds to the part number of the product, see type label.

{S/N} corresponds to the serial number of the product, see type label (if specified).

NOTICE

Faults during operation and defects in the device or the system

Incorrect wiring may result in operational faults and defects.

- Follow the wiring notes precisely.

The enclosure rating stated in the technical data is achieved only with a screwed plug connector or blind plug.

Configure the circuits connected to the device as ES1 circuits or as SELV circuits (SELV = **Safety Extra Low Voltage**). The voltage source must meet the requirements of ES1 and PS2 (EN 62368-1) or SELV and LPS (EN 60950-1).

Connect the connecting cables in a de-energized state. Do not switch on the supply voltage until installation is complete and all connecting cables are connected to the device and controller.

Wiring concept

- During installation, pay attention to the different cable groups. The cables are grouped into the following 4 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 device cables, communication signals, bus signals
  - Group 3: cables that are a source of interference, such as control cables for inductive loads and motor brakes
  - Group 4: cables that are a powerful source 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).
  - ► Route the cables in groups 1, 2 and 3, 4 in different cable ducts or use metallic separators (see figure 6 and see figure 7). This applies particularly if cables of devices with a high level of radiated emission, such as frequency converters, are laid parallel to device cables.

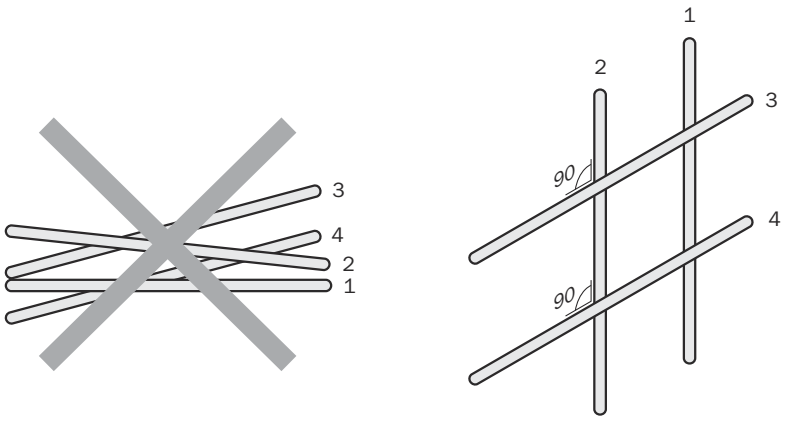


Figure 5: Cross cables at right angles

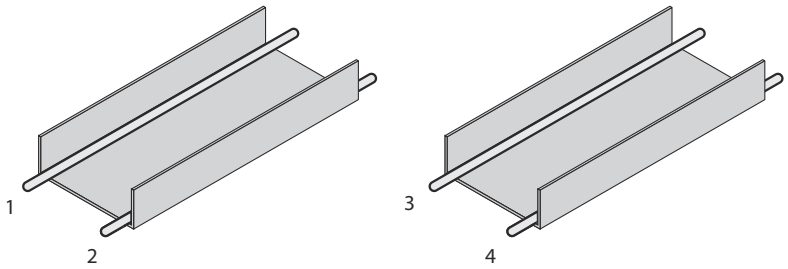


Figure 6: Ideal laying – Place cables in different cable ducts

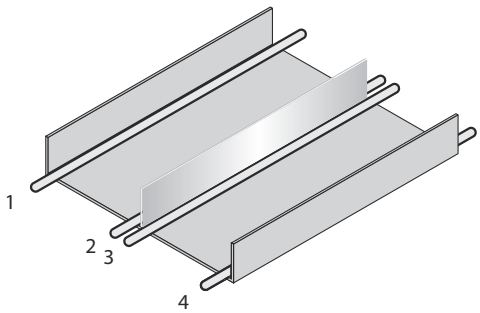


Figure 7: Alternative laying – Separate cables with metallic separators

6.2 Pinouts

Prerequisites

- Observe the wiring instructions, see "Wiring instructions", page 17.

Pinouts

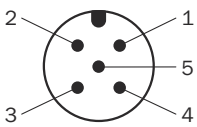


Figure 8: Male connector M12, 5-pin, A-coded

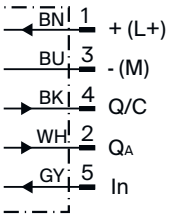


Figure 9: Connection diagram, plug, 5-pin

Contact	Designation	Wire color	Description
1	L+	BN	Supply voltage, see "Technical data", page 45
2	Q_A	WH	Output 2: Analog output
3	M	BU	Supply voltage: 0 V
4	Q/C	BK	Output 1: Digital output (push-pull stage), IO-Link Data cable
5	In1	GY	Input 1

6.3 Connecting the device electrically

Prerequisites

- Observe the wiring instructions.

Procedure

1. Ensure the voltage supply is not connected.
2. Connect the device according to the connection diagram.
3. Connect the supply voltage.

Further topics

- Wiring instructions
- Pinouts

6.4 Integration of the sensor in IO-Link mode

To operate the product in IO-Link mode, it must be connected to a suitable **IO-Link Master**. This is used for further integration into the control system.

NOTE
The cable length between the **IO-Link Master** and **IO-Link device**: maximum 20 m.

Details on integration can be found in the detailed IO-Link description.

NOTE
After successful connection of the product to the **IO-Link Master**, the green LNK LED flashes to indicate a functioning IO-Link communication between the **master** and **device**.

7 Operation

7.1 Operation via pushbuttons and display

7.1.1 RUN mode

As soon as the device is supplied with voltage, the display shows the current measured value. The device is in RUN mode.

Use the operating buttons on the device to switch between displays in RUN mode and open the quick menu or main menu of the device.

Table 2: Displays in RUN mode

Display	Description
Distance	Display distance.
Analog value	Display analog value.
Light distribution curve	Display qualitative light intensity distribution on the receiver element.

7.1.2 Main menu

7.1.2.1 Functions in the main menu

Overview of functions

Menu groups

- **Fast setting**
- **Measurement**
- **Digital output**
- **Analog output**
- **Input**
- **Device**
- **Info**

7.1.2.2 Opening main menu

Opening the menu group

1. To open the main menu, briefly press the ✔ pushbutton in RUN mode.
2. Use the ▲ and ▼ pushbutton to select a menu group.
3. Confirm the selection with the ✔ pushbutton.

✓ The display shows the corresponding menu group.

7.1.3 Setting parameters

Selecting parameters

1. Within a menu group, use the ▲ and ▼ pushbuttons to select the desired parameter.
2. Confirm selection with the ✔ pushbutton.

Select option

1. Select parameters.
2. Use the ▲ and ▼ pushbutton to select the desired option.
3. Perform one of the following steps:
   - To save the setting, press the ✔ pushbutton.
   - To cancel the process, press the X pushbutton.

4. To return to the measured value display, press the [X] pushbutton until the measured value is displayed.

Teaching value

1. Select parameters.
✓ The display shows the current measured value.
2. Align the device at the desired distance.
3. To teach in the value, press the [✔] pushbutton.
✓ The value is set to the current distance at the time the pushbutton is pressed. The value is taught in.

Adjust the value

4. Select parameters.
✓ The current value of the parameter is displayed.
5. Set the value with the pushbuttons [▲] and [▼]. A long press of the button activates fast setting.
6. Confirm the entry with the [✔] pushbutton.
✓ The value for the parameter is set.
7. To return to the measured value display, press the [X] pushbutton until the measured value is displayed.

7.1.4 Activating and deactivating the operating button lock

To prevent accidental operation, lock and unlock the operating pushbutton using a shortcut.

► Press and hold the [X] and [✔] pushbuttons simultaneously for > 3 seconds.
✓ When the pushbutton lock is activated, **Lock** appears in the display. When the pushbutton lock is deactivated, **Unlock**appears in the display.

NOTE
The operating button lock can also be activated and deactivated via SOPAS ET or IO-Link.

7.2 Operation via IO-Link

The device can exchange process data and parameters via IO-Link. To do this, connect the device to a suitable IO-Link Master.

Table 3: Properties of the IO-Link interface

IO-Link specification	V 1.1
Minimum cycle time	0.8 ms (COM3)
Transmission rate	COM3 (230.4 kBaud)
Process data width	48-bit outgoing (from the device to the IO-Link Master)
Process data type	Record
Parameter configuration server function (data storage)	Yes

7.2.1 Configuration via IO-Link

In addition to the manual settings on the device,, it can also be configured via IO-Link.

Configuration via IO-Link can be performed in two ways:

- Configuration via the **SiLink Master** (required software: SOPAS ET from SICK)
  To do this, connect the device to a computer via USB using the **SiLink Master**.
- Configuration via an **IO-Link Master** (PLC), e.g. SIG350

You can quickly and easily test and parameterize the connected products using the SOPAS ET program (SICK Engineering Tool with graphic user navigation and convenient visualization).

Details on configuration can be found in the detailed IO-Link description.

7.2.2 Process data

The process data format can be changed by parameterizing the device.

Table 4: Process data formats

No.	Description
1[1)]	Bit 0 = SSC.1 Bit 1 = SSC.2 Bit 2 = Peak detection error Bit 3 = Signal level warning Bit 4 = Signal peak height warning Bit 5 = Signal peak shape warning Bit 6 = Interference peak warning Bit 7 = Exposure time warning Bit 8 ... 15 = Scale Bit 16 ... 47 = Distance
2	Bit 0 = SSC.1 Bit 1 = SSC.2 Bit 2 ... 15 = Signal level Bit 16 ... 47 = Distance
3	Bit 0 = SSC.1 Bit 1 = SSC.2 Bit 2 ... 7 = Exposure time Bit 16 ... 47 = Distance
4	Bit 0 = SSC.1 Bit 1 = SSC.2 Bit 2 ... 7 = Peak width Bit 8 ... 15 = reserved Bit 16 ... 47 = SSC.1 on-timer

1) Factory setting

7.2.3 Device data

Device data (parameters, identification data, and diagnostic information) can be transmitted to and from the device. A product-specific device description file (IODD file) is required in the IO-Link master for this purpose.

Supplementary documentation and a download package with the IODD file are available on the online product page.

7.3 Operation via SOPAS ET

Version 2024.1 and higher of the SOPAS Engineering Tool (SOPAS ET) software can be used to parameterize the device and for service and diagnostic purposes. Measured values can be visualized and all device functions can be set and checked in SOPAS ET. The device immediately applies parameters that have been modified using SOPAS ET and permanently saves them. A separate function does not have to be called up for this purpose.

Prerequisites

- A computer with the SOPAS ET software installed on it, and a free USB 2.0 compatible port
  The most up-to-date version of the SOPAS ET software can be downloaded from www.sick.com/SOPAS_ET. The respective system requirements for installing SOPAS ET are also specified there.
- SICK SiLink2 Master (available as accessory)
- Connection cable with M12 male and female connectors, 5-pin (available as accessory)
- Device description file (SDD file)
  The current version of the SDD file is available for download on the online product page.
  The product page can be accessed via the **SICK Product ID**:
  pid.sick.com/{P/N}/{S/N}
  {P/N} corresponds to the part number of the product, see type label.
  {S/N} corresponds to the serial number of the product, see type label (if indicated).

Establishing a connection

1. Connect the device to the SiLink2 Master via the plug or an additional connection cable.
2. Connect the SiLink2 Master to the computer using the supplied USB cable.
3. Switch on and start the computer.
4. To ensure an adequate voltage supply to the device, also connect the enclosed wall plug to the SiLink2 Master.

✓ After successful initialization, the PWR status LED flashes green. The device is ready for operation and the connection to the SiLink2 Master is available.

Install the SDD file via the device catalog in SOPAS ET. Following installation, the device can be selected from the device catalog and added to a project. A connection to the device is established via the communication interface. The connection must be activated for data transmission (online).

7.4 Description of operation

7.4.1 Fast setting

7.4.1.1 Functions of the fast setting

Overview of functions

The quick setting provides quick access to two functions in the main menu. While all functions are available in the main menu, only selected functions can be set via the quick menu.

Function	Description
Zero point teach-in	Teach in distance as zero point (reference point).
Teach in analog values, scale analog characteristic curve	Teach in the upper and lower limit values of the analog characteristic curve. Creates a scaling of the analog characteristic curve.

7.4.1.2 Opening the fast setting

1. Open required display in RUN mode as the starting point.
2. Press the ✔ pushbutton.

✓ The display shows the corresponding function.

7.4.2 Measurement menu group

7.4.2.1 Cycle time menu

The cycle time defines the interval in which the device performs a measurement. The cycle time corresponds to the output rate of the measured values.

- **Auto** mode: The device adjusts itself to the maximum speed at which the device achieves a stable measurement, depending on the object surface. In the **Auto** operating mode, the cycle time is adjusted dynamically in the range between 0.5 ms and 4 ms, so that the output rate of the measured values can vary over time.
- Fixed setting: The device uses the set cycle time as a maximum, regardless of the object surface. The output rate of the measured values corresponds to the set value and remains constant.

NOTE

If the remission properties of the object are not sufficient to perform a valid measurement, the device outputs the value of an incorrect measurement, see "Error mode menu", page 27.

The cycle time can be increased to display a valid measured value for dark objects.

Setting the cycle time

Parameter	Value	Factory setting
Cycle time	**Auto**, 333 µs, 500 µs, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms	**Auto**

7.4.2.2 Measurement value filter menu

The measured value filters optimize the signal curve. The filters facilitate the evaluation by the controller, e.g. for control tasks.

Average Filter

- **Average filter**: The average filter carries out a moving averaging of the measured values. This improves the temporal repeatability of the measurement. The average filter is suitable for smoothing a temporarily noisy signal diagram.
- **Median filter**: The moving median filter sorts the measured values according to their size. Then the filter selects the middle value. The median filter is suitable for excluding individual outliers from the calculation of an average value.

Both types of filter affect the response time of the distance sensor.

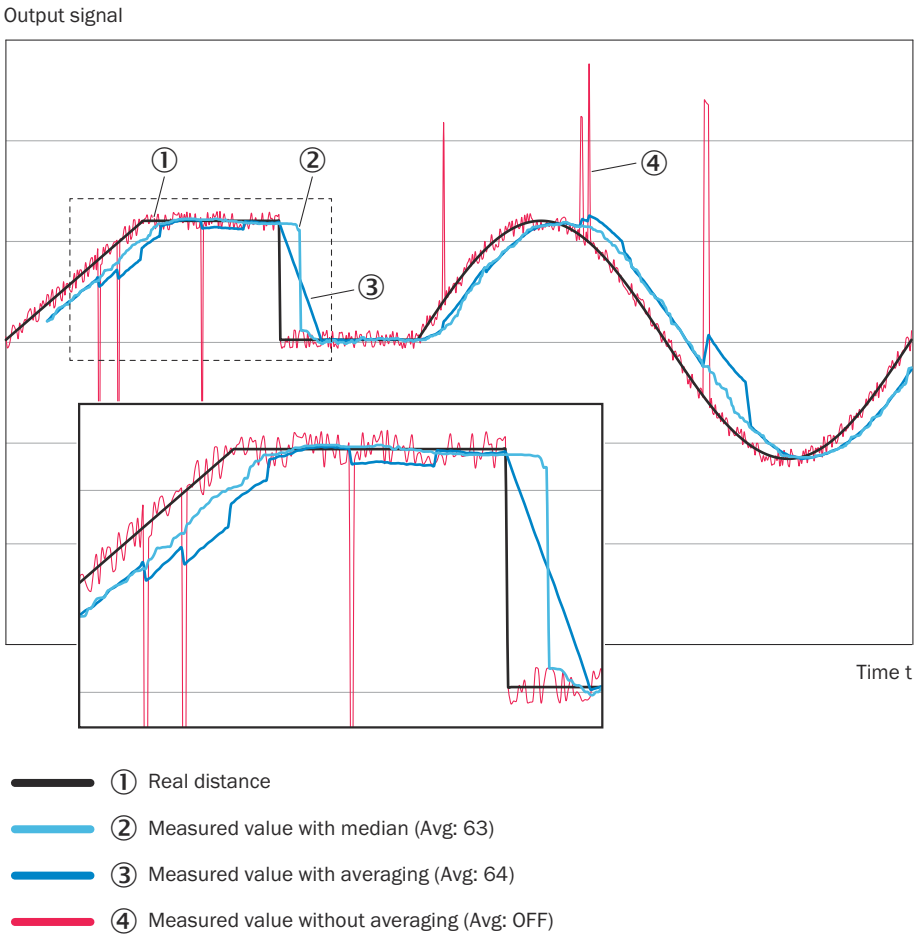


Figure 10: Effect of measured value filters on the output signal based on a distance value curve over time

① Output signal
② True distance
③ Measured value without measured value filter
④ Measured value with average filter
⑤ Measured value with median filter
⑥ Time t

Setting the measurement filter

Parameter	Value	Factory setting
Average filter	**0ff**, 4, 16, 64, 128	16
Median filter	**0ff**, 3, 7, 15	7

Average filter example (value 4)

Measurement	Measured value	Average value 1	Average value 2
1	25	25 + 21 + 19 + 23 = 88 88: 4 = **22**	–
2	21		21 + 19 + 23 + 21 = 84 84: 4 = **21**
3	19		
4	23		
5	21	–	
6	...	–	

Median filter example (value 7)

Measurement	Measured value	Median 1	Median 2
1	23	21 22 22 **23** 23 24 85	–
2	85		4 21 22 **22** 23 24 85
3	21		
4	22		
5	23		
6	24		
7	22		
8	4	–	
9	...	–	–

7.4.2.3 Measurement direction menu

The measurement direction changes the sign of the distance value.

Setting the measuring direction

Parameter	Value	Factory setting
Measurement direction	**Positive** **Negative**	**Positive**

7.4.2.4 Measured value offset menu

The measured value offset shifts the zero point of the distance value. The analog output value changes according to the new distance value. With the help of the measured value offset, distance changes to an individual reference distance can be measured.

NOTE
When setting the measured value offset, the current gradient of the analog characteristic curve remains unchanged.

In the quick menu, the zero point can be taught and reset. The current distance is taught in as a new zero point (reference point). Menu path information, see "Menu structure in the main menu", page 50. The analog output value is changed. The middle of the analog value range is now located at the new zero point (reference point).

The distance value that the device outputs and that is evaluated in the switching functions takes into account the set measured value offset. The distance values that indicate the measured value including the measured value offset are transmitted via the IO-Link communication.

Table 5: Change of the analog current signal due to distance change (example, device type OD200-050xxx)

Measuring range	35 mm ... 65 mm
Analog current output	4 mA ... 20 mA
Distance change	3.0 mm
Change to analog current output due to distance change	1.6 mA

Setting the measured value offset

Parameter	Value	Factory setting
Measured value offset	OD200-**030**: -20.0 mm ... +20.0 mm OD200-**050**: -30.0 mm ... +30.0 mm OD200-**110**: -100.0 mm ... +100.0 mm	0.000 mm

7.4.2.5 Region of Interest (ROI) menu

The **region of interest (ROI)** function can be used to define an evaluation range in which the device measures object distances. All surrounding ranges are blanked.

Application examples

- Blank transparent protective pane between object and device.
- Second intensity peak unintentionally shifts the measured value.

Limits of the Region of Interest (ROI)

The **ROI near** and **ROI far** values are the distances in millimeters that define the limits of the evaluation range. The limits may be outside the specified measuring range.

The ROI can also be set via SOPAS ET, see "Operation via SOPAS ET", page 22.

Setting the ROI near and ROI far

Parameter	Value	Factory setting
ROI near	Setting the switching point OD200-**030**: 24.50 mm ... 35.50 mm OD200-**050**: 33.50 mm ... 66.50 mm OD200-**110**: 57.00 mm ... 163.00 mm	**ROI near**: OD200-**030**: 24.50 mm OD200-**050**: 33.50 mm OD200-**110**: 57.00 mm
ROI far		**ROI far**: OD200-**030**: 35.50 mm OD200-**050**: 66.50 mm OD200-**110**: 163.00 mm

7.4.2.6 Error mode menu

If the device cannot measure the distance, a substitute value is output. The behavior of the device in the event of faulty measurements can be set via several parameters.

Possible causes of faults

- Measuring object outside the measuring range
- Received light signal not strong enough
- Sender switched off

Parameter

- **Error mode** > **User-defined value**: If no measurement is possible, the set **Substitute value** is displayed and held until a valid measured value is available again.
- **Error mode** > **Hold last value**: If no measurement is possible, the last valid measured value is displayed and held until a valid measured value is available again.
- **Error mode** > **Hold last value + timer**: If no measurement is possible, the last valid measured value is displayed and held for the time set under **Error suppression time** . Once this time has elapsed, the set **Substitute value** is displayed and held until a valid measured value is available again.
- **Substitute value**: Set a numerical value as a substitute value. If no measurement is possible, the substitute value is output.
- **Error suppression time**: Set a time for which the last valid measured value is displayed and held. With this function, the **Hold last value + timer** error mode must be activated.

Setting the error mode

Parameter	Value	Factory setting
Error mode	**User-defined value** **Hold last value** **Hold last value + timer**	**User-defined value**

Setting the substitute value

Parameter	Value	Factory setting
Substitute value	-999.999 mm ... +999.999 mm	+999.999 mm

Setting the error suppression time

Parameter	Value	Factory setting
Error suppression time	1 ms ... 9999 ms	100 ms

7.4.2.7 Calibration menu

Measurement value deviations can arise during measurement due, for example, to different surface characteristics of the reference and measuring object, or angle or alignment errors during mounting. The calibration corrects the measurement value deviations. This does not affect the linearity deviation specified in the technical data.

The 2-point calibration can be taught in or set by manually entering the range value. The calibration is a two-step process for both calibration points. The current value is first taught-in or set. The set value is then set as the target value.

Teaching in the calibration

To teach in the calibration, the device must be able to measure. The distance to the object must not change during teach-in. The object must be in the measuring range.

Calibration is performed using a reference object with known dimensions. The teach-in of the two calibration points is performed in three steps.

1. Teach-in of the first calibration point - this zeros the current measured value.
2. Inserting the reference object - the dimensions of the reference object are displayed.
3. Correction of the displayed measured value to the true dimensions of the reference object.

Teachable parameters

- **1st point**
- **Reference thickness**

Calibration range value

As an alternative to two-point calibration, the range value can be entered. The resulting measured value is obtained by multiplying the initial measured value by the range value.

7.4.2.8 Peak selection menu

When performing distance measurements, a light beam hits the receiver in the device. This produces a signal peak on the receiver. The position of the signal peak is used to determine the distance.

Under unfavorable application conditions, interactions of the light beam with the object surface as well as specular or interfering effects can arise. This affects the shape of the signal peak, or can create double signal peaks.

Off

Signal peak evaluation method for most applications. The light distribution curve on the receiver shows a well-defined signal peak, the intensity of which differs significantly from the adjacent receiver areas.

Near peak

The first (near) valid signal peak is used for the evaluation when more than one valid signal peak is present in the light distribution curve.

Far peak

The last (far) valid signal peak is used for the evaluation when more than one valid signal peak is present in the light distribution curve.

Setting the peak selection

Parameter	Value	Factory setting
Peak selection	**Off** **Near peak** **Far peak**	**Off**

Detection threshold peak

The peak detection threshold sets the lower intensity limit for a valid peak.

In addition to the intensity, a valid peak must have a minimum peak width. It may be the case that a peak is not recognized as valid despite sufficient intensity due to a peak width that is too small or too large.

Table 6: Detection threshold peak

Parameter	Value	Factory setting
Detection threshold peak	0 ... 4095	250

7.4.3 Settings Digital Output Q (SSCx)

7.4.3.1 Switch point logic menu

The switching point logic describes the relationship between the output state (active or inactive) and the potential applied to the digital output (high or low).

Settings (depending on output mode)

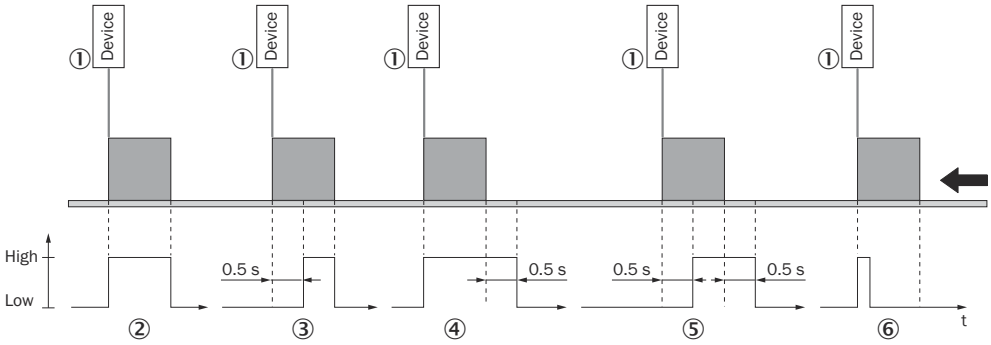
- **High-active**: The digital output acts as a normally open contact. If the switching point that has been taught in is undershot, a signal is output.
- **Low-active**: The digital output acts as a normally closed contact. If the switching point that has been taught in is exceeded, a signal is output.

Setting the switch point logic

Parameter	Value	Factory setting
Switch point logic	**High-active** **Low-active**	**High-active**

7.4.3.2 Timer mode menu

Timer mode is used to issue output state changes with a time delay or as a short switching pulse (**Pulse (one shot)**). The delay time is adjustable.



① Device

② **Off**: Right after the measured distance has exceeded the specified switching point, the state of the digital output changes (factory setting).

③ **Switch-on delay**: The changeover of the digital output from an inactive to an active state is time-delayed. The changeover from an active to an inactive state is not delayed.

④ **Switch-off delay**: The changeover of the digital output from an active to an inactive state is time-delayed. The changeover from an inactive to an active state is not delayed.

⑤ **Switch-on/off delay**: Both transitions are time-delayed.

⑥ **Pulse (one shot)**: Once the switching condition has been met, the digital output changes from an inactive to an active state. The output state remains in an active state for a specified period regardless of how long the switching condition is met. The output state only switches back to the inactive state once this time has elapsed. Any additional changes made to the switching condition during this period are still not taken into account.

Setting the timer mode

NOTE

If you are using the Timer mode, set a fixed cycle time (not **Auto**).

Set the **Timer setup** for at least as long as the cycle time. If you are using the **Switch-on/-off delay** timer mode, set the **Timer setup** for at least twice as long as the cycle time.

Parameter	Value	Factory setting
Timer mode	**Off** **Switch-off delay** **Switch-on delay** **Switch-on/off delay** **Impulse (one shot)**	**Off**

7.4.3.3 Hysteresis menu

The hysteresis is the distance difference between the switch-on and switch-off point. If the measured distance fluctuates around the set switching point, the hysteresis is necessary for stable switching behavior. To achieve a more precise switching behavior, set a smaller value for the hysteresis. To achieve more stable switching, set a larger value for the hysteresis.

Table 7: Hysteresis

Parameter	Value	Factory setting
Hysteresis	0 mm ... +999.999 mm	OD200-030: 0.05 mm OD200-050: 0.15 mm OD200-110: 0.5 mm

7.4.4 Digital output Q (SSCx) menu group

The Q (SSCx) output is a digital output. In addition, the output serves as a communication line for bidirectional data transmission when using the IO-Link interface.

The Q (SSCx) output offers different output modes. If an output mode is selected, the required settings can be taught in or set manually. Depending on the selected output mode, different parameters are available.

NOTE
When using IO-Link communication, a second digital output SSC.2 is available.

7.4.4.1 Setting the switching point

A switching point can be taught-in or set manually. To teach in a switching point, the device must be able to measure. The distance to the object must not change during teach-in. The object must be in the measuring range.

The SP2 switching point is only available in the **window** and **two point** output modes. In the case of a switching window, do not teach in the same distance value for the near-sensor distance and the far-sensor distance.

Teach-in mode:

Single point teach-in

Set the switching point to the current distance at the time the pushbutton is pressed, see "Teaching value", page 21.

Two point setting

Set the switching point in the middle of the two points that have been taught in. The taught-in values for both taught-in points are set to the current distance at the time the button is pressed, see "Teaching value", page 21.

NOTE
The "two point teach-in" mode is only available for the "single point" switching point mode.

7.4.4.2 Single point menu

Set a switching point. If the measured distance value falls below (N/O contact: **High-active** switching point logic) or exceeds (N/C contact: **Low-active** switching point logic) the switching point, a signal is output (change of output level).

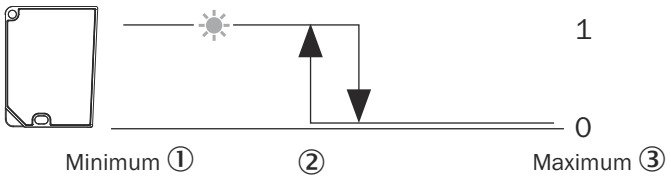


*Figure 11: **Single point**, single switching point (N/O contact: HIGH active, PNP)*

① Minimum
② Switching point
③ Maximum

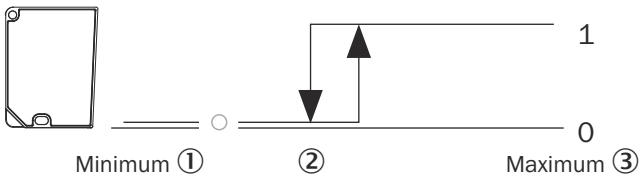


*Figure 12: **Single point**, inverted single switching point (N/C contact: LOW active, PNP)*

① Minimum
② Switching point
③ Maximum

Select output mode. Setting parameters

Parameter	Value	Factory setting
SP1 teach-in (auto)	Setting the switching point OD200-**030**: 25.00 mm ... 35.00 mm OD200-**050**: 35.00 mm ... 65.00 mm OD200-**110**: 60.00 mm ... 160.00 mm	OD200-**030**: 30.00 mm OD200-**050**: 50.00 mm OD200-**110**: 110.00 mm
SP1 teach-in (manual)		
Switch point logic	**High-active** **Low-active**	**High-active**
Timer mode	**Off** **Switch-off delay** **Switch-on/off delay** **Switch-on delay** **Impulse (one shot)**	**Off**
Timer setting	1 ms ... 10000 ms	100 ms
Hysteresis	0 mm ... +524.287 mm	OD200-**030**: 0.05 mm OD200-**050**: 0.15 mm OD200-**110**: 0.5 mm

7.4.4.3 Window (SP1,SP2:window) menu

Set an upper and a lower switching threshold (two switching points). If the measured distance is inside (normally open contact: **High-active** switching point logic) or outside (normally closed contact: **Low-active** switching point logic) the switching window, a signal is output (change of output level).

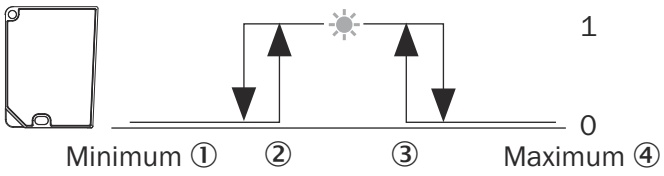


*Figure 13: **Window** (N/O contact: HIGH active, PNP)*

① Minimum
② Switching point near
③ Switching point far
④ Maximum

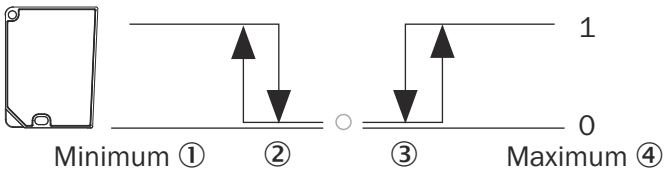


*Figure 14: **Window** (N/C contact: LOW active, PNP)*

① Minimum
② Switching point near
③ Switching point far
④ Maximum

Selecting output mode and setting parameters

Parameter	Value	Factory settings
SP1 teach-in (auto)	Setting the switching point OD200-**030**: 25.00 mm ... 35.00 mm OD200-**050**: 35.00 mm ... 65.00 mm OD200-**110**: 60.00 mm ... 160.00 mm	OD200-**030**: 30.00 mm OD200-**050**: 50.00 mm OD200-**110**: 110.00 mm
SP1 teach-in (manual)		
SP2 teach-in (auto)		SP2: OD200-**030**: 35.00 mm OD200-**050**: 65.00 mm OD200-**0110**: 160.00 mm
SP2 teach-in (manual)		
Switch point logic	**High-active** **Low-active**	**High-active**
Timer mode	**Off** **Switch-off delay** **Switch-on/off delay** **Switch-on delay** **Impulse (one shot)**	**Off**
Timer setting	1 ms ... 10000 ms	100 ms
Hysteresis	0 mm ... +524.287 mm	OD200-**030**: 0.05 mm OD200-**050**: 0.15 mm OD200-**110**: 0.5 mm

7.4.4.4 Two point mode

Set two switching points. If the measured distance value exceeds the SP2 switching point (normally closed contact: switching point logic **Low-active**) or falls below the SP1 switching point (normally open contact: switching point logic **High-active**), a signal is output (change of output level).

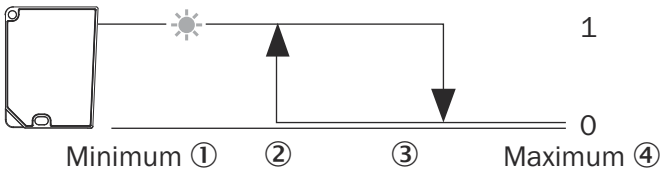


*Figure 15: Two point, double switching point (normally open contact: **High-active**, PNP*

① Minimum
② Switching point near (SP1)
③ Switching point far (SP2)
④ Maximum

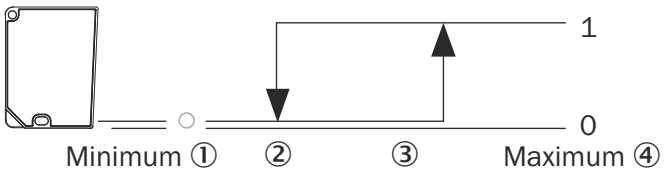


*Figure 16: Two point, double switching point (normally closed contact: **Low-active**, PNP*

① Minimum
② Switching point near (SP1)
③ Switching point far (SP2)
④ Maximum

Selecting output mode and setting parameters

Parameter	Value	Factory settings
SP1 teach-in (auto)	Setting the switching point OD200-**030**: 25.00 mm ... 35.00 mm OD200-**050**: 35.00 mm ... 65.00 mm OD200-**110**: 60.00 mm ... 160.00 mm	OD200-**030**: 30.00 mm OD200-**050**: 50.00 mm OD200-**110**: 110.00 mm
SP1 teach-in (manual)		
SP2 teach-in (auto)		SP2: OD200-**030**: 35.00 mm OD200-**050**: 65.00 mm OD200-**0110**: 160.00 mm
SP2 teach-in (manual)		
Switch point logic	**High-active** **Low-active**	**High-active**
Timer mode	**Off** **Switch-off delay** **Switch-on/off delay** **Switch-on delay** **Impulse (one shot)**	**Off**
Timer setting	1 ms ... 10000 ms	100 ms

7.4.4.5 Signal level warning menu

If the signal level falls below a threshold, a warning is issued via digital output Q/SSCx. The signal threshold can be taught-in or set manually as a numerical value. The signal level is a sensor-specific, unitless value. Adjusting the signal level using application-specific test measurements is recommended.

Select output mode. Setting parameters

Parameter	Value	Factory settings
Signal threshold (auto)	Setting the switching point 0 ... 4095	2048
Signal threshold (manual)		
Switch point logic	**High-active** **Low-active**	**High-active**
Timer mode	**Off** **Switch-off delay** **Switch-on delay** **Switch-on/off delay** **Impulse (one shot)**	**Off**
Timer setting	1 ms ... 10,000 ms	100 ms

7.4.5 Analog output Q_A (ASC) menu group

If an analog output mode is selected, the required settings can be taught in or set manually. Depending on the selected output mode, different parameters are available.

7.4.5.1 Setting analog value

An analog value can be taught-in or set manually. The same distance value cannot be taught in for the near-sensor and far-sensor distances.

Teaching analog value

Set the analog value to the current distance at the time the button is pressed, see "Teaching value", page 21.

Teachable parameters

- **Q_A 4 mA teach-in (auto)**
- **Q_A 20 mA teach-in (auto)**
- **Q_A 0 V teach-in (auto)**
- **Q_A 10 V teach-in (auto)**

To teach in an analog value, the device must be able to measure. The distance to the object must not change during teach-in. The object must be in the measuring range.

Setting analog value manually

Set the analog value manually, see "Adjust the value", page 21.

Adjustable parameters

- **Q_A 4 mA teach-in (manual)**
- **Q_A 20 mA teach-in (manual)**
- **Q_A 0 V teach-in (manual)**
- **Q_A 10 V teach-in (manual)**

7.4.5.2 Q_A Analog 4 mA ... 20 mA menu

Output Q2 is an analog current output. The measured value is output in the form of a linearly proportional current value.

Select output mode. Setting parameters

Parameter	Value	Factory setting
Q_A 4mA teach-in (auto)	Setting analog value OD200-**030**: 25.00 mm ... 35.00 mm OD200-**050**: 35.00 mm ... 65.00 mm OD200-**110**: 60.00 mm ... 160.00 mm	OD200-**030**: 25.00 mm OD200-**050**: 35.00 mm OD200-**110**: 60.00 mm
Q_A 4mA teach-in (manual)		
Q_A 20mA teach-in (auto)		OD200-**030**: 35.00 mm OD200-**050**: 65.00 mm OD200-**110**: 160.00 mm
Q_A 20mA teach-in (manual)		

7.4.5.3 Qa Analog 0 V ... 10 V menu

The Q_A output is an analog voltage output. The measured value is output in the form of a linearly proportional voltage value.

Select output mode. Setting parameters

Parameter	Value	Factory setting
Q_A 0 V teach-in (auto)	Setting analog value OD200-**030**: 25.00 mm ... 35.00 mm OD200-**050**: 35.00 mm ... 65.00 mm OD200-**110**: 60.00 mm ... 160.00 mm	OD200-**030**: 25.00 mm OD200-**050**: 35.00 mm OD200-**110**: 60.00 mm
Q_A 0V teach-in (manual)		
Q_A 10V teach-in (auto)		OD200-**030**: 35.00 mm OD200-**050**: 65.00 mm OD200-**110**: 160.00 mm
Q_A 10 V teach-in (manual)		

7.4.5.4 Analog limit (value) menu

If no measurement is possible or the sensor is outside its detection range, two different analog output values can be set.

Select output mode. Setting parameters

Parameter	Value	Factory setting
Analog limit (value)	Setting analog value 3.6 mA / 21.5 mA	21.5 mA

7.4.6 In input menu group

To use the functions at the **In Input**, the input must be active (any setting except **Off**). The **Off** setting deactivates the input and, therefore, all functions.

NOTE
Deactivating the input is possible only via the display, SOPAS ET, or IO-Link, but not via the input itself.

The behavior of the input can be selected as normally open contact (**High-active**, factory setting) or normally closed contact (**Low-active**). When **Sender off** is used, the logic also determines whether the creation of a signal at the input causes the sender to switch off (factory setting) or on.

7.4.6.1 In Function menu

Functions

- Switch the sender on and off at defined times.
- Activate device functions.

Sender off: The sender is switched off for the duration of the applied signal.

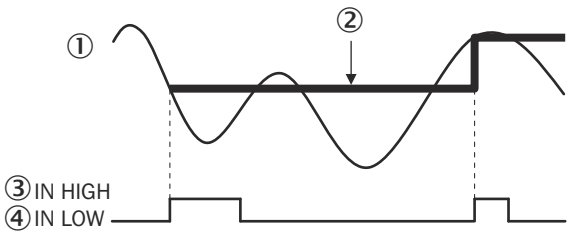
Setting the IN Function

Parameter	Value	Factory setting
In Function	**Off** **Hold** **Zero point teach-in** **Sender off**	**Off**

7.4.6.2 In Hold function menu

Measured value menu

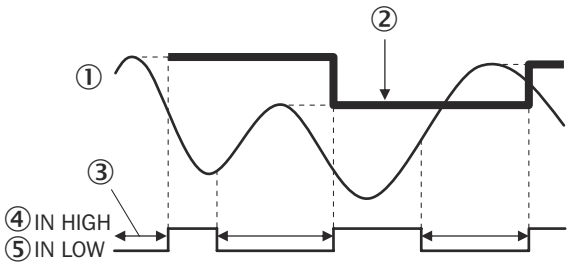
Hold the measured value that is present at the HIGH input status (rising edge).



① Measured value
② Output hold value
③ HIGH input status
④ LOW input status

Peak value menu

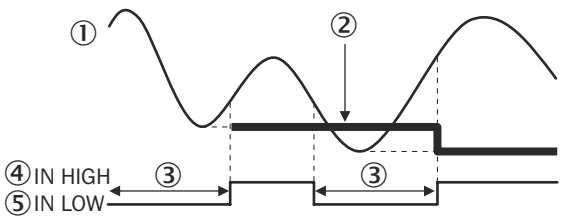
Hold the largest measured value that is present in the time interval between the last falling edge and the HIGH input status (next rising edge).



① Measured value
② Output hold value
③ Interval in which an analysis is carried out.
④ HIGH input status
⑤ LOW input status

Lowest value menu

Hold the smallest measured value that is present in the time interval between the last falling edge and the HIGH input status (next rising edge).



① Measured value
② Output hold value
③ Interval in which an analysis is carried out.
④ HIGH input status
⑤ LOW input status

Setting the In Hold function

To use the hold function, set **In function Hold** .

Set a hold function via the **In Hold function** parameter.

Parameter	Value	Factory settings
In hold function	Measured value Peak value Lowest value	Measured value

7.4.6.3 In Debouncing menu

When debouncing is activated, the input signal must be constantly present at the In Input for 100 ms.

Setting the In Debouncing

Parameter	Value	Factory setting
In Debouncing	No Yes	No

7.4.6.4 In Input logic menu

The behavior of the input can be selected as normally open contact (High-active, factory setting) or normally closed contact (Low-active).

Setting the In Input logic

Parameter	Value	Factory setting
In Input logic	High-active Low-active	High-active

7.4.7 Device menu group

7.4.7.1 Reset the device

Overview

The device can be reset to the factory settings or to saved customer settings. While the device is being reset, the device and its functions are briefly unavailable.

Reset the device to factory settings

Parameter	Value	Factory setting
Reset Factory settings	No Yes	-

Resetting device to customer settings

Parameter	Value	Factory setting
Reset Customer settings	No Yes	-

7.4.7.2 Save customer settings menu

Once settings have been made, they can be saved as customer settings. These settings can be restored at any time, see "Reset the device", page 38.

Parameter	Value	Factory setting
Save customer settings	No Yes	-

7.4.7.3 Reset customer settings menu

Saved customer settings will be deleted.

Parameter	Value	Factory setting
Reset customer settings	**Yes** **No**	-

7.4.7.4 Reset calibration menu

Overview

The calibration can be reset to the factory settings.

Reset calibration

Parameter	Value	Factory setting
Reset calibration	**No** **Yes**	-

7.4.7.5 Language menu

The language of the display texts can be set.

Parameter	Value	Factory setting
Language	**English** **English** **Spanish** **Chinese** **Japanese**	**English**

7.4.7.6 Display settings

Various settings for the display behavior are available.

Parameter	Value	Factory setting
Eco mode	**Off**, 10sec, 20sec, 60sec, 300sec, 1200sec, 3600sec	300sec
Display brightness	10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%	30%
Rotate display	0°, 180°	0°
Display decimal digits	OD200-**030**: 0, 0.1, 0.01, 0.001 OD200-**050**: 0, 0.1, 0.01, 0.001 OD200-**100**: 0, 0.1, 0.01	OD200-**030**: 0.1 OD200-**050**: 0.1 OD200-**110**: 0.1

7.4.7.7 Sender menu

The sender (measuring laser) can be switched off. No measurement is possible with the sender switched off.

The sender can also be switched on and off via the IN Input.

Parameter	Value	Factory setting
Sender	**Off** **On**	**On**

7.4.7.8 Output PNP/NPN/PP menu

The output logic can only be set via the display. The **NPN** setting is incompatible with most commercially available IO-Link Master components.

Parameter	Value	Factory setting
Output PNP/NPN/PP	PNP NPN PP	PP

7.4.8 Info menu group

Status information

- Part number
- Serial number
- Firmware version
- Sensor operating hours
- Sender operating hours
- Temperature
- Error count
- Error history

8 Maintenance

8.1 Cleaning

NOTICE
Equipment damage due to improper cleaning.

Improper cleaning may result in equipment damage.

- Only use recommended cleaning agents and tools.
- Never use sharp objects for cleaning.

- ► Clean the front screen at regular intervals and in the event of contamination with a lint-free lens cloth and plastic cleaning agent. The cleaning interval essentially depends on the ambient conditions.
- ► Clean the viewing window at regular intervals and in the event of contamination. First, remove any solid deposits with oil-free compressed air or, if necessary, with a mixture of water and a few drops of a commercially available rinsing agent and a soft brush, and then rinse. If required, remove the drying residue with cleaning cloths that are suitable for optics and plastic cleaning agent.
- ► Clean the viewing window at regular intervals and in the event of contamination. First, remove any solid deposits with oil-free compressed air or, if necessary, with a mixture of water and a few drops of a commercially available rinsing agent and a soft brush, and then rinse. If required, remove the drying residue with cleaning cloths that are suitable for optics and a commercially available glass cleaning spray.
- ► If the usual measuring sensitivity is not achieved with known measuring objects or if incorrect measurements occur, check the front lens on the measuring head and the optical fiber ends and clean them if necessary.

8.2 Maintenance schedule

During operation, the device is maintenance-free.

NOTE
No maintenance is required to ensure compliance with the laser class.

Depending on the assignment location, the following preventive maintenance tasks may be required for the device at regular intervals:

Table 8: Maintenance schedule

Maintenance work	Interval	To be carried out by
Check device and connecting cables for damage at regular intervals.	Depends on ambient conditions and climate.	Specialist
Clean housing and viewing window.	Depends on ambient conditions and climate.	Specialist
Clean the reflector and check it for damage.	Depends on the ambient conditions and company requirements.	Specialist
Check that the laser beam is directed at the center of the reflector.	Depends on the ambient conditions and company requirements. Recommended: At least every 6 months.	Specialist
Clean the optical fiber and measuring head.	Depends on ambient conditions and climate.	Specialist

Maintenance work	Interval	To be carried out by
Check the screw connections and plug connections.	Depends on the place of use, ambient conditions or operating requirements. Recommended: At least every 6 months.	Specialist
Check that all unused connections are sealed with protective caps.	Depends on ambient conditions and climate. Recommended: At least every 6 months.	Specialist

9 Troubleshooting

9.1 Faults

The following table describes possible faults and troubleshooting measures. For faults that cannot be resolved using the information below, please contact SICK Service. To find your agency, see the final page of this document.

NOTE
To help us to resolve the matter quickly, please note down the details on the type label.

General faults are subdivided into warnings and errors. Current measured values continue being output when there are warnings; measurement is no longer possible when there are faults.

Table 9: Troubleshooting Q&A

Question/status	Answer/remedial actions
The device does not display a measurement or measurement is not possible.	• Sender not activated: Switch on sender, see "Sender menu", page 39. • Laser light spot is not aimed at object: Check alignment of the device. Correct if necessary. • Make sure that the light path is clear. • Ensure that the object is within the measuring range. • Ensure that the receiver element of the device is receiving enough light. • Reflective surfaces: Check surface condition.
EMC disturbed environment	Recommendation: Use data output via IO-Link. If measured values must be output via the analog output, use an analog current output. The analog current output is significantly less susceptible to electromagnetic interference than a voltage output.

9.2 Troubleshooting integrated IO-Link devices

Notes on malfunctions can be found in the service data.

Details of the available service data can be found in the detailed IO-Link description.

9.3 Sensor replacement with data storage

All IO-Link devices have a backup and restore functionality - **Data Storage** (DS). The IO-Link **Data Storage** function can be used to save the current parameters and transfer them to the replacement device.

The prerequisite for this is connection of the device to an **IO-Link Master**, and activation of the **Storage** function in the **IO-Link Master**.

Details on sensor replacement can be found in the detailed IO-Link description.

9.4 Information for service cases

You should collect and write down the following device information ahead of time if you need to contact SICK Service:

- Information about the firmware version
- Information about the hardware
- Information about operating hours

This information can be called up via the display.

This information can be called up via the display or the software.

9.5 Return

- ► Only send in devices after consulting with SICK Service.
- ► The device must be sent in the original packaging or an equivalent padded packaging.

NOTE

To enable efficient processing and allow us to determine the cause quickly, please include the following when making a return:

- Details of the contact person
- Description of the application
- Description of the error that occurred

9.6 Repair

Repairs on the device may only be performed by qualified and authorized personnel from SICK AG. Interference with or modifications to the device on the part of the customer will invalidate any warranty claims against SICK AG.

9.7 Disposal

CAUTION

Risk of injury due to hot device surface!

The surface of the product can become hot.

- Before performing work on the product (e.g. mounting, cleaning, disassembly), switch off the product and allow it to cool down.
- Ensure good dissipation of excess heat from the product to the surroundings.

If a device can no longer be used, dispose of it in an environmentally friendly manner in accordance with the applicable country-specific waste disposal regulations. Do not dispose of the product along with household waste.

NOTICE

Danger to the environment due to improper disposal of the device.

Disposing of devices improperly may cause damage to the environment.

Therefore, observe the following information:

- Always observe the national regulations on environmental protection.
- Separate the recyclable materials by type and place them in recycling containers.

10 Technical data

10.1 Mechanics/Electronics

Supply voltage U_V	DC 18 V ... 24 V, ± 10 %, including residual ripple [1]
Current consumption	1.5 W (24 V DC)[2]
Power-up time	Max. 300 ms
Warm-up time	< 15 minutes [3]
Housing material	Metal (aluminum)
Viewing window material	Plastic (PMMA)
Connection type	Cable with plug, M12, 5-pin, A-coded, 345 mm
Display	OLED display, status LEDs
Control elements	4 pushbuttons
Enclosure rating	IP67
Protection class	III (EN 50178)
Electrical safety	IEC 60947-5-2 / CSA C22.2 No.60947-5-2

1) Limit values, reverse-polarity protected.
2) Footnote without load, at +20 °C.
3) During the device warm-up phase, the measured values are subject to an increased variance (temperature drift).

10.2 Performance

Measuring range [1]	OD200-**030**xxxx: 25 mm ... 35 mm OD200-**050**xxxx: 35 mm ... 65 mm OD200-**110**xxxx: 60 mm ... 160 mm
Measuring object	Natural objects
Repeatability [2] [3] [4]	OD200-**030**xxxx: 2 µm OD200-**050**xxxx: 5 µm OD200-**110**xxxx: 20 µm
Linearity [2] [4] [5]	OD200-**030**xxxx: ± 10 µm (± 0.1 % F.S.) OD200-**050**xxxx: ± 30 µm (± 0.1 % F.S.) OD200-**110**xxxx: ± 100 µm (± 0.1 % F.S.)
Measuring frequency	≤ 3 kHz
Output time	≥ 333 µs
Light sender	Laser, red Visible red light
Laser class	Laser class 1[6]
Typical light spot size	OD200-**030**xxxx: 200 µm x 500 µm (30 mm) OD200-**050**xxxx: 300 µm x 700 µm (50 mm) OD200-**110**xxxx: 500 µm x 1600 µm (110 mm)

Additional function	Adjustable average filter and median filter, teachable digital output, switching point modes: single point SP1 / window SP1, SP2 (window) - two point SP1, SP2 / signal level warning, invertible digital output, teachable analog output, invertible analog output, switchable analog output (mA/V), multifunction input: Sender off/hold function/set zero point/deactivated, switch off display, operating button lock, display can be rotated 180°, timer mode (switch-on and switch-off delay, pulse)

1) 6 % ... 90 % reflectance; with standard settings.
2) Measurement to 60 % reflectance (ceramic, white).
3) Average setting: 128, Median: Off
Measuring frequency: 1 kHz
For static measurement.
4) At T = 25 °C, under constant general conditions.
5) Observe min. warm-up time of 15 minutes.
6) Visible, wavelength: 655 nm, maximum average power: 0.31 mW, maximum pulse power: 0.62 mW, maximum pulse duration: 2 ms.

10.3 Interfaces

IO-Link	IO-Link V1.1.3 Function: Process data, parameterization, diagnostics, data storage Data transmission rate: 230.4 kBit/s (COM3), process data length 6 bytes, minimum cycle time 0.8 ms
Digital input	In_1 1)
Digital output	Quantity: 1 Type: Push-pull / PNP/NPN, selectable Max. output current I_A: ≤ 100 mA
Analog output	Quantity: 1 Type: Current output / voltage output Function: Selectable Current: 4 mA ... 20 mA, ≤ 300 Ω Voltage: 0 V ... 10 V, > 20 kΩ Resolution: 16 bit

1) Can be used as Sender off, trigger for hold functions or deactivated.

10.4 Ambient data

Ambient operating temperature	-10 °C ... +50 °C 1)
Storage temperature	–20 °C ... +60 °C
Relative humidity (non-condensing)	35 % ... 85 %
Temperature drift	OD200-**030**xxxx: ± 3 µm/K OD200-**050**xxxx: ± 9 µm/K OD200-**110**xxxx: ± 30 µm/K
Typical ambient light immunity	Artificial light: ≤ 10000 lx 2) Sunlight: ≤ 10,000 lx
Vibration resistance	EN 60068-2-6, EN 60068-2-64
Shock resistance	EN 60068-2-27
MTTFd	169 years

1) Operating temperature at U_V = 24 V.
2) With constant object movement in the measuring range

10.5 Dimensional drawing

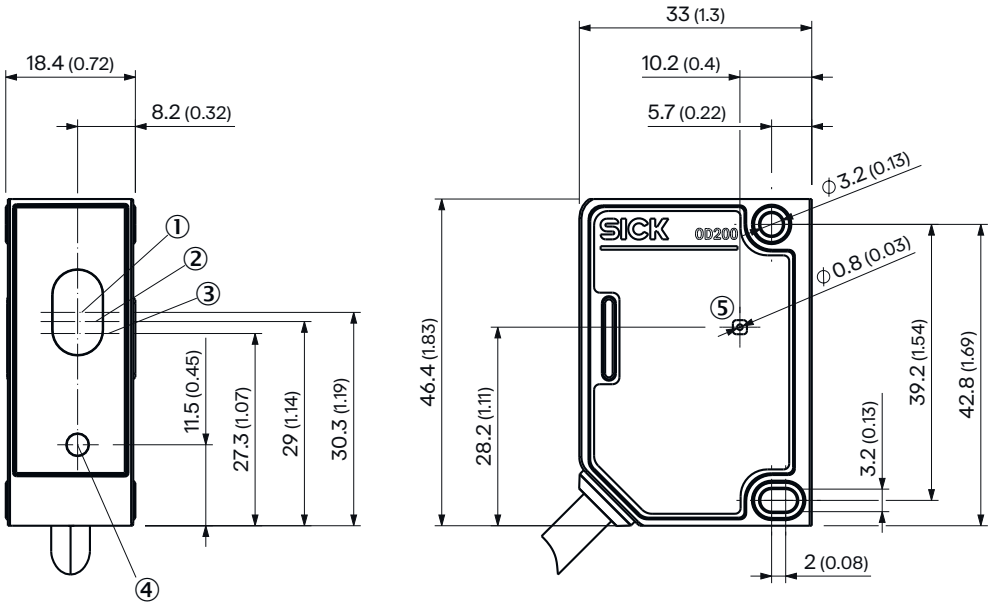


Figure 17: Dimensional drawing OD200

Table 10: Distance to the photoreceptor

Type	Distance to the photoreceptor
OD200-030xxxx	27.3 mm
OD200-050xxxx	29.0 mm
OD200-110xxxx	30.3 mm

10.6 Light spot size

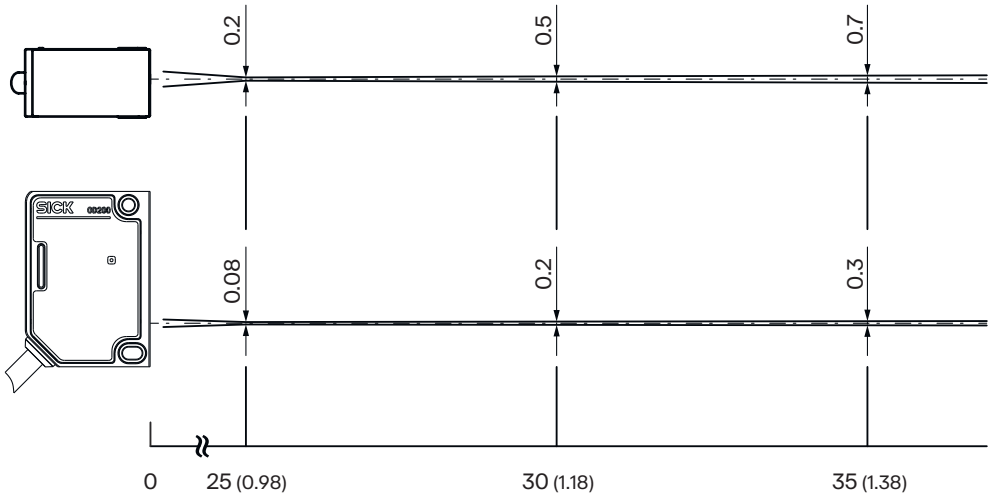


Figure 18: Light spot size OD200-030xxxx

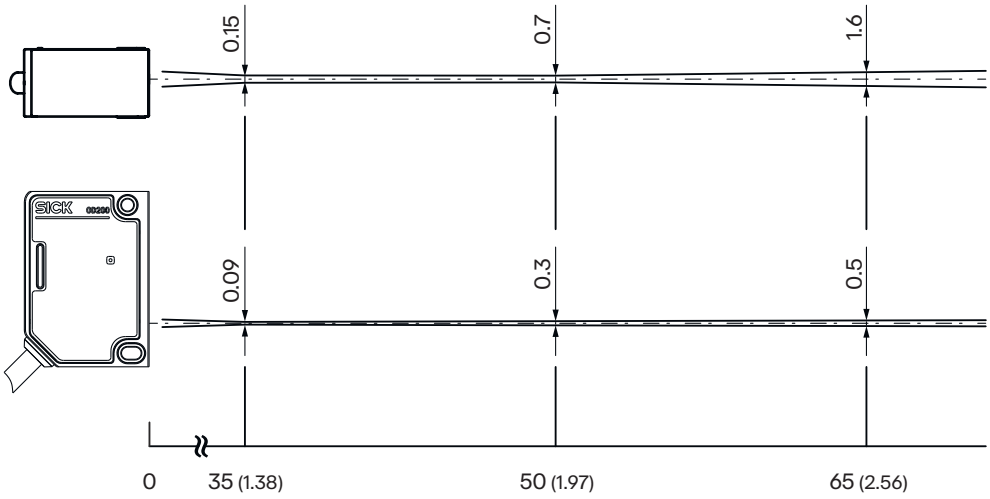


Figure 19: Light spot size OD200-050xxxx

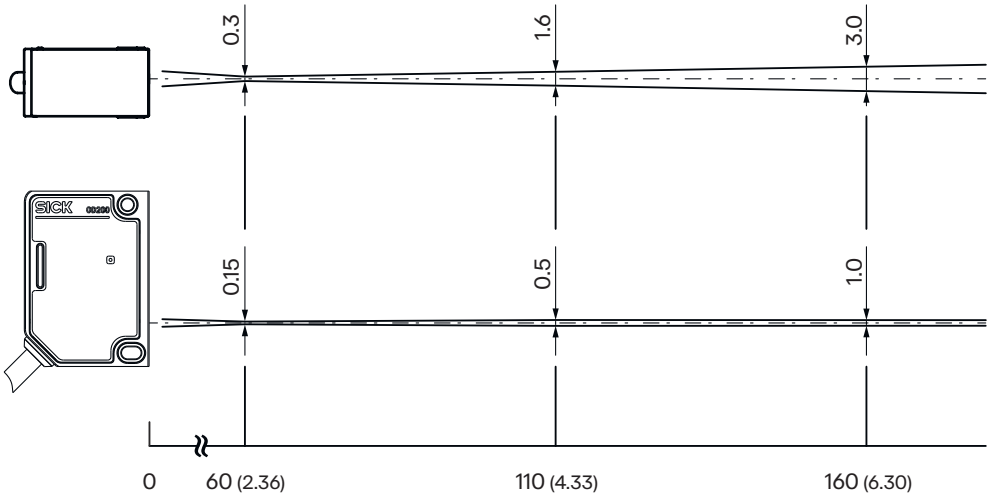


Figure 20: Light spot size OD200-110xxxx

11 Accessories

NOTE

On the product page you will find accessories and, if applicable, related installation information for your product.

The product page can be accessed via the **SICK Product ID**: **pid.sick.com/{P/N}/{S/N}**

{P/N} corresponds to the part number of the product, see type label.

{S/N} corresponds to the serial number of the product, see type label (if indicated).

12 Annex

12.1 Menu structure

12.1.1 Menu structure in the main menu

Measurement menu group

▲/▼	Cycle time menu	Mean filter	Median filter	Measurement direction menu	Measured value offset menu	**ROI near / ROI far** Region of Interest (ROI) menu	Error mode menu	Substitute value	Error suppression time	Calibration menu	Calibration range	Peak selection menu	Detection threshold peak

Digital output Q (SSCx) menu group

▲/▼	Switch point mode	Teach-in mode	Set SP1, SP2, signal threshold	Switch point logic	Timer mode	Timer setup	Hysteresis

Analog output Q_A menu group

▲/▼	Analog mode	Set 4 mA/0 V, 20 mA/10 V Q_A Analog 4 mA ... 20 mA menu, Qa Analog 0 V ... 10 V menu, Analog limit (value) menu

In input menu group

▲/▼	In Function menu	In Hold function menu	In Debouncing menu	In Input logic menu

Device menu group

▲/▼	Reset the device	Save customer settings menu	Reset customer settings menu	Reset calibration menu	Language menu	Display settings	Sender menu	Output PNP/NPN/PP menu	Display/ decimal digits

Info menu group

Status information (Info menu group)

12.2 Declarations of conformity and certificates

You can download declarations of conformity and certificates via the product page.

The product page can be accessed via the **SICK Product ID**: **pid.sick.com/{P/N}/{S/N}**

{P/N} corresponds to the part number of the product, see type label.

{S/N} corresponds to the serial number of the product, see type label (if indicated).

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More details can be found in the GNU General Public License.

For license texts see www.sick.com/licensetexts.

License texts can be read out from the device using a web browser via the following URL: **<device ip>/license/COPYING**

Printed copies of the license texts are also available on request.

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