OPERATING INSTRUCTIONS

OD2000

Displacement measurement sensor

SICK
Sensor Intelligence.

Described product

OD2000

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

These operating instructions provide important information on how to use devices 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 device applications

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

NOTE
Read these operating instructions carefully to familiarize yourself with the device and its functions before commencing any work.

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

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

1.2 Explanation of symbols

Warnings and important information in this document are labeled with symbols. Signal words introduce the instructions and indicate the extent of the hazard. To avoid accidents, damage, and personal injury, always comply with the instructions and act carefully.

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.

1.3 Further information

More information can be found on the product page.

The 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).

The following information is available depending on the product:

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

2 Safety information

2.1 Intended use

The OD2000 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 areas, in corrosive environments or under extreme environmental conditions.
- Any use of accessories not specifically approved by SICK AG is at your own risk.

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

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

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

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 data and information contained in these operating instructions. The manufacturer accepts no liability for damage caused by:

- Non-adherence to the product documentation (e.g., operating instructions)
- Incorrect use
- Use of untrained staff
- Unauthorized conversions or repair

- Technical modifications
- Use of unauthorized spare parts, consumables, 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 Requirements for skilled persons and operating personnel

WARNING

Risk of injury due to insufficient training.

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

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

The following qualifications are required for various activities:

Table 1: Activities and technical requirements

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 computer operating system used ■ Basic knowledge of the design and setup of the described connections and interfaces ■ Basic knowledge of data transmission
Operation of the device for the particular application	■ Knowledge of the operation and control of the devices in their particular application ■ Knowledge of the software and hardware environment for the particular application

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 visible 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.

CAUTION
Optical radiation: Class 2 Laser Product

The human eye is not at risk when briefly exposed to the radiation for up to 0.25 seconds. Exposure to the laser beam for longer periods of time may cause damage to the retina. The laser radiation is harmless to human skin.

- Do not look into the laser beam intentionally.
- Never point the laser beam at people's eyes.
- If it is not possible to avoid looking directly into the laser beam, e.g., during commissioning and maintenance work, suitable eye protection must be worn.
- Avoid laser beam reflections caused by reflective surfaces. Be particularly careful during mounting and alignment work.
- Do not open the housing. Opening the housing may increase the level of risk.
- Current national regulations regarding laser protection must be observed.

Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

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

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 Warning signs on the device

Depending on the device type, it has a laser of class 2 or class 1 installed. The housing is labeled with a corresponding warning sign.

If the warning label is obscured by the installation of the device in a machine or system, attach additional warning labels next to the laser output aperture on the machine or system so that they are clearly visible.

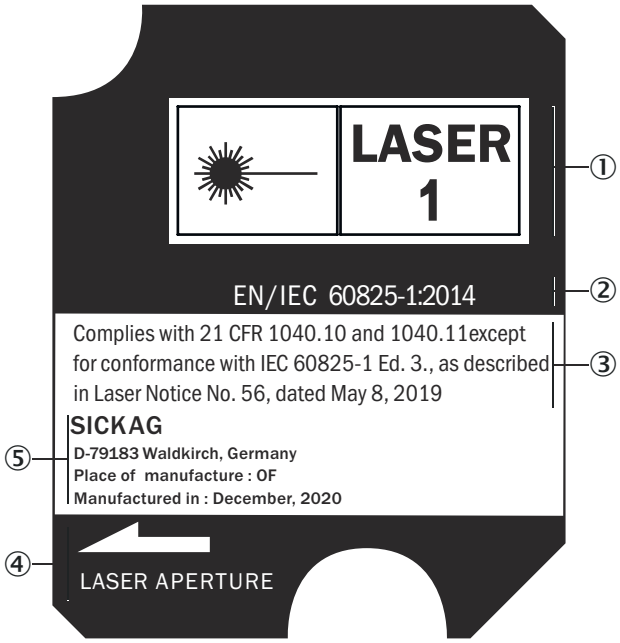


Figure 1: Laser warning sign laser class 1

① Warning sign laser class 1

② EN/IEC 60825-1:2014

③ Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3, as described in document Laser Notice No. 56 dated 8 May 2019.

④ Laser output aperture

⑤ Manufacturer, production site, date of manufacture

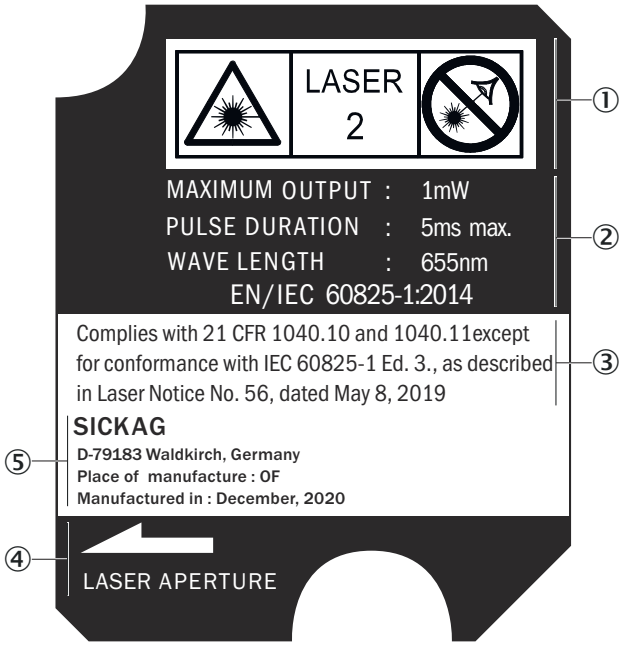


Figure 2: Laser warning sign laser class 2

① Warning sign laser class 2

② Maximum power: 1 mW

Pulse duration: 5ms max.

Wavelength: 655 nm

EN/IEC 60825-1:2014

③ Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3, as described in document Laser Notice No. 56 dated 8 May 2019.

④ Laser output aperture

⑤ Manufacturer, production site, date of manufacture

3 Product description

3.1 Scope of delivery

Table 2: Scope of delivery

No. of units	Component	Note
1	Device in the version ordered	Depending on version
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 ID

3.2.1 Type label

The type label gives information for identification of the device.

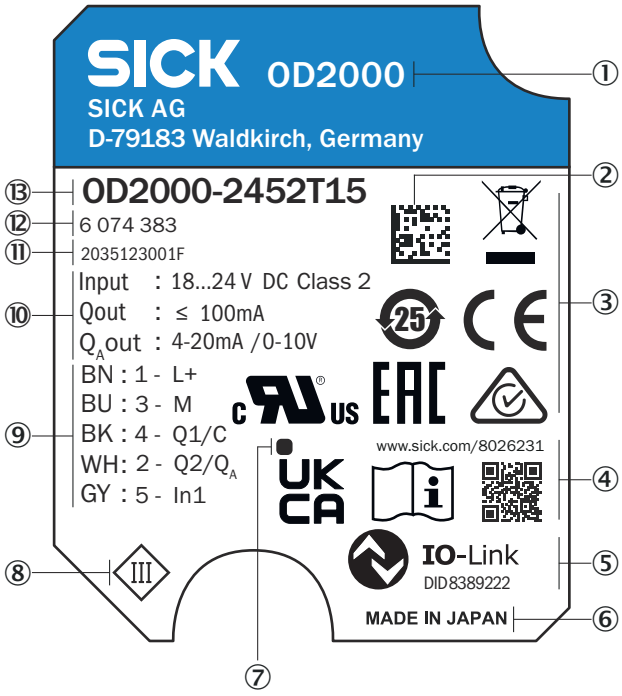


Figure 3: Type label OD2000 (example, device type laser class 2)

① Device family
② Data Matrix code with product data and link to product page
③ Approval marks and test symbols
④ Link to the operating instructions
⑤ IO-Link character and device ID number
⑥ Place of manufacture
⑦ Ventilation element
⑧ Protection class label
⑨ Pin assignment
⑩ Electrical data
⑪ Serial number
⑫ Part number
⑬ Type code

3.2.2 Type code

Type code structure

OD2000 – a b c d e f

Place-holder	Description	Characteristic
a	Center of the measuring range	030: 25 mm ... 35 mm 050: 40 mm ... 60 mm 130: 60 mm ... 200 mm 245: 70 mm ... 420 mm 350: 100 mm ... 600 mm 700: 200 mm ... 1,200 mm
b	Laser class	1: Laser class 1 2: Laser class 2
c	Light spot geometry	T: Dot, round
d	Interface	1: Analog I/U [1], IO-Link

Place-holder	Description	Characteristic
e	Connection type	5: Cable with M12 connection, 5-pin
f	Device type	“Empty”: Default type S: Special device

1) Not available for devices without an analog output, see "Device variants", page 14.

3.3 Device variants

Type	Measuring range	Interface	Connection type
OD2000-030xxxx	25 mm ... 35 mm	**2 outputs:** • 1 Digital output with IO-Link 1.1 • 1 Analog output or digital output (selectable) **1 input:** • 1 digital input	Cable with male connector, M12, 5-pin, A-coded, 30 cm
OD2000-050xxxx	40 mm ... 60 mm		
OD2000-130xxxx	60 mm ... 200 mm		
OD2000-245xxxx	70 mm ... 420 mm		
OD2000-350xxxx	100 mm ... 600 mm		
OD2000-700xxxx	200 mm ... 1,200 mm		
OD2000-030xxxx S01	25 mm ... 35 mm	**2 outputs:** • 1 Digital output with IO-Link 1.1 • 1 Digital output **1 input:** • 1 digital input	
OD2000-050xxxx S01	40 mm ... 60 mm		
OD2000-245xxxx S01	70 mm ... 420 mm		
OD2000-350xxxx S01	100 mm ... 600 mm		
OD2000-700xxxx S01	200 mm ... 1,200 mm		

The information about the analog output is not relevant for the OD2000-xxxxxxxS01 devices.

3.4 Principle of operation

3.4.1 Measurement principle

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

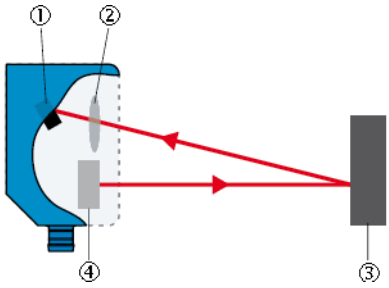


Figure 4: Triangulation principle

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.

3.4.2 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.

3.5 Display and control elements

Overview

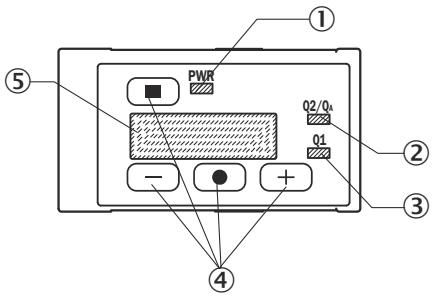


Figure 5: Display and control elements

① PWR status LED (green)
② Status LED Q2 / Q_A (orange)
③ Q1 status LED (orange)
④ Operating pushbuttons
⑤ Display

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)	● (Orange)	Digital output active
	○ (Orange)	Digital output not active
Q2 / Q_A (output display)	● (Orange)	Digital output active or measured value within the scaling range for the analog output
	○ (Orange)	Digital output not active or measured value outside the scaling range for the analog output

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

Operating pushbuttons

Button	Function	Description
●	Open menu, confirm input	• Starting from RUN mode, open the quick menu or main menu. • Confirm input. • Switch to the next menu level of a selected function. • Move the cursor to the right when entering numbers.
■	Cancel	• In the quick menu: Switch to RUN mode. • Switch to the previous menu level. • Move the cursor to the left when entering numbers.
+	Navigating	• Scroll between several displays of a menu level. • Choose between several options. • Increase the value of a numeric input.
−	Navigating	• Scroll between several displays of a menu level. • Choose between several options. • Decrease the value of a numeric input.

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 and protect it from mechanical damage.

4.3 Transport inspection

Immediately upon receipt in Goods-in, 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.

4.4 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.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see "Technical data", page 55.
- 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 (see "Type label", page 12) must not be sealed off during installation.

5.2 Mounting the device

Approach

1. Mount the device using the designated fixing holes. Note the permissible tightening torque of the screws (max. 0.8 Nm).
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
- Pin assignment

6 Electrical installation

6.1 Wiring instructions

NOTE

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

The call is made 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).

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 protective cap.

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 control.

6.2 Pin assignment

Overview

The connection diagram, and information on inputs and outputs, can be found on the side plate on the device.

Prerequisites

- Observe the wiring instructions, see "Wiring instructions", page 19.

Pin assignment

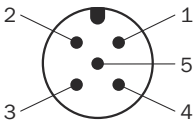


Figure 6: M12 male connector, 17-pin, A-coded

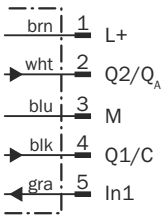


Figure 7: Connection diagram, 5-pin male connector

Contact	Signs	Wire color	Description
1	L+	Brown	Supply voltage, see "Technical data", page 55
2	Q2 / Q_A [1]	White	Output 2: Digital output 2 (push-pull stage), analog output [1]
3	M	Blue	Supply voltage: 0 V
4	Q1 / C	Black	Output 1: Digital output 1 (push-pull stage), IO-Link
5	In1	Gray	Input 1

[1] Q_A is not available for devices without an analog output, see "Device variants", page 14.

The connection diagram, and information on inputs and outputs, can be found on the side plate on the device.

6.3 Connecting the device electrically

Prerequisites

- Observe the wiring instructions.

Approach

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

Further topics

- Wiring instructions
- Pin assignment

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. To return to the RUN mode, press the ■ operating button until the display shows the current measured value.

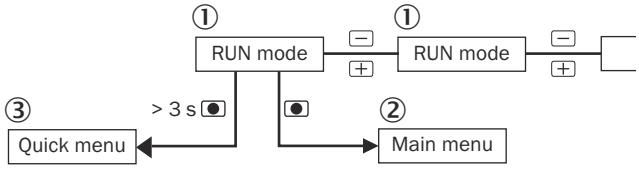


Figure 8: Menu structure

① RUN mode
② Main menu
③ Quick menu

Table 3: Displays in RUN mode

Display	Description
Distance	Display distance without measured value offset.
Distance(rel.)	Display distance with measured value offset.
Distance(bar)	Display current distance and limit values for Q1 and Q2 / Q_A as a bar graph.
Analog value [1]	Display analog value. The current output value is only displayed when the analog output is activated.
Mode	Display set mode.
Recording	Start data recording and data analysis.

[1] Not available for devices without an analog output, see "Device variants", page 14.

7.1.2 Quick menu

7.1.2.1 Quick menu functions

Overview of functions

Starting from the displays in RUN mode, individual functions of the main menu can be accessed quickly via the quick menu. While all functions are available in the main menu, only selected functions can be set via the quick menu.

Function	RUN mode starting point	Description
Teach-in switching points	**Distance**	Select output mode. Teach-in switching point SP1 and SP2 [1] .
Zero point teach-in	**Distance(rel.)**	Teach in distance as zero point (reference point).

Function	RUN mode starting point	Description
Display light distribution curve	**Distance(bar)**	Display qualitative light intensity distribution on the receiver element. The light distribution curve is divided into four areas on the display. The device automatically changes to the area where the maximum is located.
Teach in analog values, scale analog characteristic curve [2]	**Analog value**	Teach in the upper and lower limit values of the analog characteristic curve. Creates a scaling of the analog characteristic curve.
Set mode	**Mode**	Choose between **Precision**, **Speed** and **Customized** modes. Make suitable default settings depending on the application.
Recording data	**Recording**	To start recording data, briefly press the ● pushbutton. To stop the recording, briefly press the ● pushbutton again. When starting a recording, the previously made recording is automatically deleted.
Analyze data	**Recording**	To display the results of the recording, press the ● pushbutton for > 3 seconds.

1) SP2 is only available in the output mode window.
2) The function is only available if the output is set as an analog output in the main menu.
Not available for product types without an analog output, see "Device variants", page 14.

Set mode function

Mode	Parameter	Factory setting
Precision	**Cycle time**	**Auto**
	Average filter	**512**
	Median filter	**31**
Speed	**Cycle time**	**133 µs**
	Average filter	**Off**
	Median filter	**Off**
Customized [1]	**Cycle time**	**Auto**
	Average filter	**128**
	Median filter	**31**

1) If you edit parameters manually, the device automatically switches to **Customized** mode.
If you set the **Customized** mode, the factory settings will correspond to the delivery state.

Further topics

- Quick menu structure

7.1.2.2 Opening quick menu

1. Open required display in RUN mode as the starting point.
2. Press the ● pushbutton for > 3 seconds.

✓ The display shows the corresponding function.

7.1.3 Main menu

7.1.3.1 Functions in the main menu

Overview of functions

Menu groups

- Measurement
- Q1 Output
- Q2 / Qa Output
- IN Input
- Device
- Info
- Back to Run

Further topics

- Description of operation (information about the individual menu groups)
- Menu structure in the main menu

7.1.3.2 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.

7.1.4 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 ⊟ pushbuttons 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 ■ pushbutton.
4. To return to the measured value display, press the ■ 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

1. Select parameters.

✓ The current value of the parameter is displayed. First digit on the left flashing.

2. Set the flashing digit with the ⊞ and ⊟ pushbuttons.

3. To confirm the digit and move to the next digit, press the ● pushbutton.
✓ Next digit flashing.
4. Set the other digits as described.
5. To return to the previous digit, press the ■ pushbutton.
6. Set the last digit. Confirm the entry with the ● pushbutton.
✓ The value for the parameter is set.
7. To return to the measured value display, press the ■ pushbutton until the measured value is displayed.

Further topics

- Display and control elements

7.1.5 Activating and deactivating the operating button lock

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

► Press and hold the + 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.

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 4: Properties of the IO-Link interface

IO-Link specification	V 1.1
Minimum cycle time	0.7 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
Profile type	SSP 3.2, 0x000B, Measuring Sensor high resolution (DMS) 0x4000, Identification and Diagnosis
Function class	0x800B, Measurement Data Channel, (high resolution) 0x8000, DeviceIdentification 0x8002, ProcessDataMapping 0x8003, DeviceDiagnosis 0x8100, ExtendedIdentification

7.2.1 Process data

Data of the process data telegram (factory setting)

- Measured distance value (unit: nanometer, 32 bit with sign)
- Status Q1 (1 bit)
- Status Q2 / Q_A (1 bit)

The process data format and the offset for the distance value can be changed by parameterizing the device.

Table 5: Process data formats

No.	Description
Process data structure 1 [1]	PDI48.INT32_INT8 Bit 0 = Q1 Bit 1 = Q2 Bit 2 ... 7 = empty Bit 8 ... 15 = Scale Bit 16 ... 47 = distance [2]
Process data structure 2	Bit 0 = Q1 Bit 1 = Q2 Bit 2 ... 15 = empty Bit 16 ... 47 = Signal level
Process data structure 3	Bit 0 = Q1 Bit 1 = Q2 Bit 2 ... 15 = empty Bit 16 ... 47 = Timer
Process data structure 4	Bit 0 = Q1 Bit 1 = Q2 Bit 2 ... 15 = empty Bit 16 ... 47 = Edge height
Process data structure 5	Bit 0 = Q1 Bit 1 = Q2 Bit 2 ... 7 = peak width Bit 8 ... 15 = Scale Bit 16 ... 47 = distance [2]
Process data structure 6	Bit 0 = Q1 Bit 1 = Q2 Bit 2 ... 7 = peak width Bit 8 ... 15 = Scale Bit 16 ... 47 = distance (absolute) [3]

1) Factory setting
2) Relative distance value
3) Absolute distance value

7.2.2 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.

The 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).

7.3 Operation via SOPAS ET

Version 2021.2 and higher of the SOPAS Engineering Tool (SOPAS ET) software can be used to parameterization of 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.

SOPAS ET is particularly suitable for parameterizing the region of interest (ROI) and edge height jump functions.

Requirements

- 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 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 male connector 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 Measurement menu group

7.4.1.1 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 so 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 reflectance 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 33.

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

Setting the cycle time

● > **Measurement** > ● > **Cycle time** > ● > Select option > ●

Parameter	Value	Factory setting
Cycle time	Auto, 133 µs, 150 µs, 200 µs, 300 µs, 500 µs, 1 ms, 2 ms, 5 ms	Auto

7.4.1.2 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.

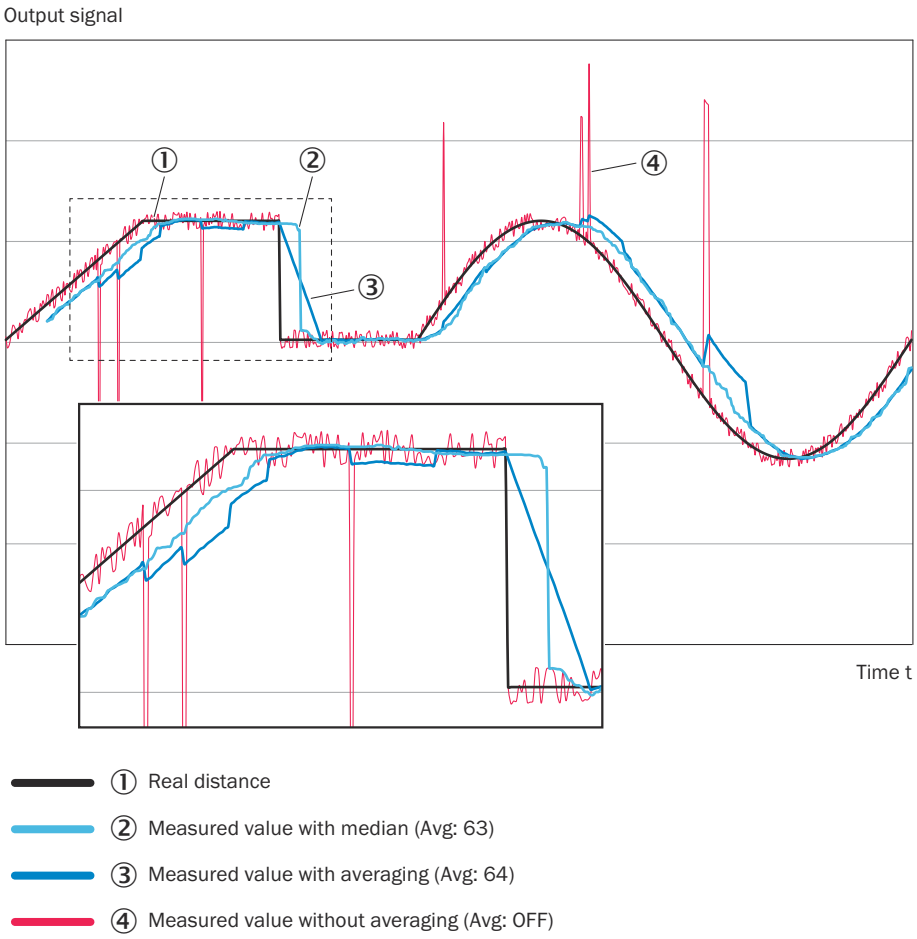


Figure 9: Effect of measured value filters on the output signal based on a distance value curve over time

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 Average filter

● > **Measurement** > ● > **Average filter** > ● > Select option > ●

Parameter	Value	Factory setting
Average filter	**Off, 4, 8, 16, 32, 64, 128, 256, 512**	**128**

Setting Median filter

● > **Measurement** > ● > **Median filter** > ● > Select option > ●

Parameter	Value	Factory setting
Median filter	**Off, 3, 7, 15, 31**	**31**

7.4.1.3 Measurement direction menu

The measurement direction changes the sign of the relative distance value. The change of the sign depends on the distance direction from the center of the measuring range (zero position).

- **Positive:** Distances which are larger than the set zero position of the device are assigned a plus sign. Smaller distances are assigned a negative sign.
- **Negative:** Distances which are larger than the set zero position of the device are assigned a minus sign. Smaller distances are assigned a positive sign.

Setting the Measurement direction

> ● > **Measurement** > ● > **Measurement direction** > ● > Select option > ●

Parameter	Value	Factory setting
Measurement direction	Positive Negative	Positive

7.4.1.4 Setting Measured value offset

The measured value offset shifts the zero point of the relative distance value. The analog output value at this distance is in the middle of the analog value range. 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 main menu, the measured value offset can be set manually.

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 "Quick menu structure", page 73.

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

Table 6: Measured value offset (example, device type OD2000-700)

	Distance (absolute)	Distance (relative)	Analog output	Set offset
In factory setting	0700.0 mm	0000.0 mm	12.00 mA	0000.0 mm
With measured value offset +100.0 mm	0700.0 mm	-0100.0 mm	10.40 mA	0100.0 mm

Table 7: Change of the analog current signal due to distance change (example, device type OD2000-700)

Measuring range	200 mm ... 1,200 mm
Analog current output	4 mA ... 20 mA
Distance change	100.0 mm
Change to analog current output due to distance change	1.6 mA

Setting Measured value offset

● > > ● > **Measured value offset** > ● > Set value > ●

Parameter	Value	Factory setting
Measured value offset	-1,000.0 mm ... +1,000.0 mm	0.000 mm

7.4.1.5 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 calibration can be taught-in or set manually. 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.

Teachable parameters

- **1st point**
- **2nd point**

Teaching in the calibration

1. Open the menu: ● > **Measurement** > ● > **Calibration (auto)**> ●
✓ The display shows the current measured value.
2. Set the **1st point** calibration point to the current distance, see "Teaching value", page 23.
3. Manually adjust the **1st point** calibration point to the set value (target value), see "Adjust the value", page 23.
4. Repeat the procedure for the **2nd point** calibration point.

Adjusting the calibration

Adjustable parameters

- **1st point current value**
- **1st point set value**
- **2nd point current value**
- **2nd point set value**

Adjusting the calibration

1. Open the menu: ● > **Measurement** > ● > **Calibration (manual)**> ●
2. Set the **1st point current value** to the current distance value, see "Adjust the value", page 23.
3. Set the **1st point set value** to the set value (target value), see "Adjust the value", page 23.
4. Repeat the procedure for the second calibration point using **2nd point current value** and **2nd point set value**.

7.4.1.6 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. During configuration, note that a tolerance range of 15 mm outside the set limits of the distance range must be taken into consideration in the application. Reliable blanking and detection of objects cannot be guaranteed within this tolerance range.

Example applications

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

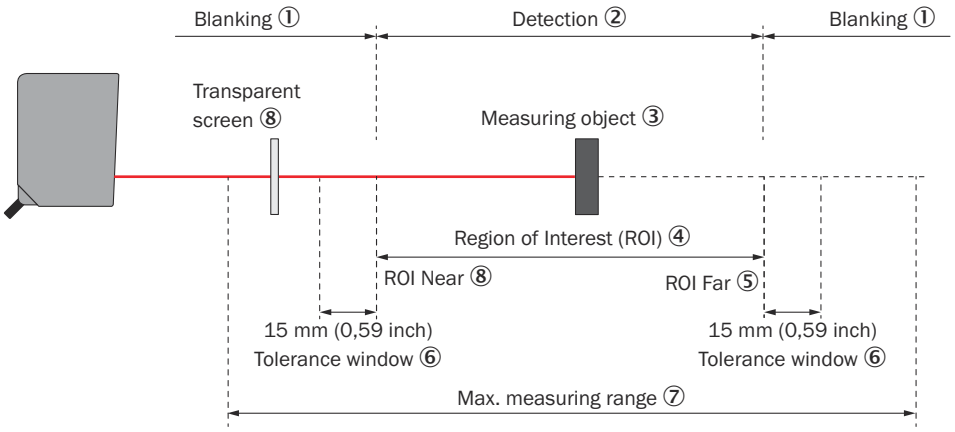


Figure 10: Blanking of a transparent protective pane

① Blanking
② Detection
③ Measuring object
④ Region of interest (ROI)
⑤ ROI near
⑥ ROI far
⑦ Tolerance window
⑧ Maximum measuring range
⑨ Transparent screen

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 25.

Setting ROI near and ROI far

● > **Measurement** > ● > **ROI near** > ● > Set value > ●
● > **Measurement** > ● > **ROI far** > ●> Set value > ●

Parameter	Value	Factory setting
ROI near	Setting the switching point OD2000-**030**: -5.04 mm ... +5.75 mm OD2000-**050**: -10.10 mm ... +11.50 mm OD2000-**130**: -70.70 mm ... +76.00 mm OD2000-**245**: -176.75 mm ... +189.00 mm OD2000-**350**: -252.50 mm ... +271.00 mm OD2000-**700**: -505.00 mm ... +550.00 mm	**ROI near:** OD2000-**030**: -5.04 mm OD2000-**050**: -10.10 mm OD2000-**130**: -70.70 mm OD2000-**245**: -176.75 mm OD2000-**350**: -252.50 mm OD2000-**700**: -505.00 mm
ROI far		**ROI far:** OD2000-**030**: +5.75 mm OD2000-**050**: +11.50 mm OD2000-**130**: +76.00 mm OD2000-**245**: +189.00 mm OD2000-**350**: +271.00 mm OD2000-**700**: +550.00 mm

7.4.1.7 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.

Auto

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.

1st peak far to near

Evaluation method for determining the evaluated peak when more than one valid signal peak is present in the light distribution curve. The first valid signal peak from the end of the measuring range is evaluated.

2nd peak far to near

Evaluation method for determining the evaluated peak when more than one valid signal peak is present in the light distribution curve. The second valid signal peak from the end of the measuring range is evaluated.

1st peak near to far

Evaluation method for determining the evaluated peak when more than one valid signal peak is present in the light distribution curve. The first valid signal peak from the start of the measuring range is evaluated.

2nd peak near to far

Evaluation method for determining the evaluated peak when more than one valid signal peak is present in the light distribution curve. The second valid signal peak from the start of the measuring range is evaluated.

Peak width

Evaluation method for determining the evaluated peak in case of unfavorable peak geometries or interfering surrounding intensities. Interfering surrounding intensities can be suppressed by defining the **min. peak width** and **max. peak width**. The **Min. peak width** and **Max. peak width** parameters appear in the menu when **Peak width** is activated.

Setting the peak selection

Parameter	Value	Factory setting
Peak selection	Auto 1st peak far to near 2nd peak far to near 1st peak near to far 2nd peak near to far Peak width	Auto

Setting the min. peak width and max. peak width

> Measurement > > Min. peak width/Max. peak width > > Set value >

Parameter	Value	Factory setting
Min. peak width	0 Pixel ... 100 Pixel	4 Pixel
Max. peak width	0 Pixel ... 100 Pixel	30 Pixel

7.4.1.8 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 Error mode

> Measurement > > Error mode > > Select option >

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

Setting Substitute value

> Measurement > > Substitute value > > Set value >

Parameter	Value	Factory setting
Substitute value	-2,000.00 mm ... +2,000.00 mm	+2,000.00 mm

Setting Error suppression time

> Measurement > > Error suppression time > > Set value >

Parameter	Value	Factory setting
Error suppression time	1 ms ... 100,000 ms	1 ms

7.4.2 Q1 and Q2 / Qa settings

7.4.2.1 Q1 / Q2 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.

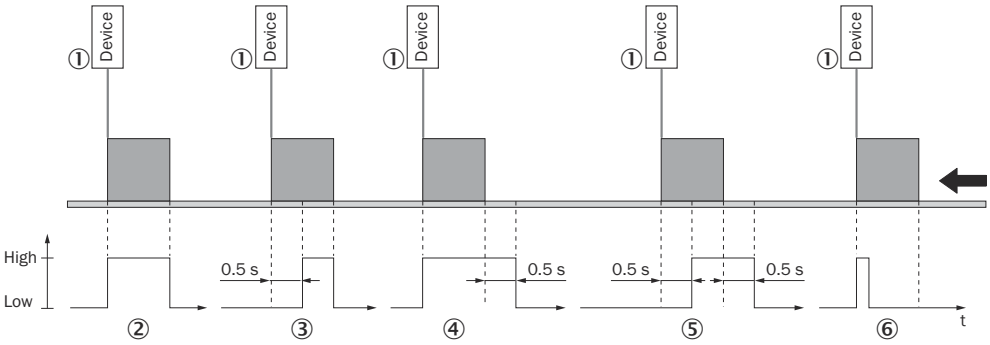
Setting Q1 Switch point logic

● > **Q1 output** > ● > **Q1 Switch point logic** > ● > Select option > ●

Parameter	Value	Factory setting
Q1 Switch point logic	High-active Low-active	High-active

7.4.2.2 Q1 / Q2 Timer mode menu

Timer mode is used to output the output state change with a time delay or as a short switching pulse (**Impulse (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 **Impulse (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. It does not switch back to an inactive state until this time has elapsed. Any additional changes made to the switching condition during this period are still not taken into account.

Setting Q1 Timer mode

NOTE

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

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

● > **Q1 output** > ● > **Q1 Timer mode** > ● > Select option > ●

Parameter	Value	Factory setting
Q1 Timer mode	Off Switch-on delay Switch-off delay Switch-on/off delay Impulse (one shot)	Off

7.4.2.3 Q1 / Q2 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.

Setting Q1 Hysteresis

● > Q1 output > ● > Q1 Hysteresis > ● > Set value > ●

Parameter	Value	Factory setting
Q1 Hysteresis	0 mm ... 2,147.48 mm	OD2000-**030**: 0.1 mm OD2000-**050**: 0.2 mm OD2000-**130**: 0.3 mm OD2000-**245**: 0.5 mm OD2000-**350**: 1 mm OD2000-**700**: 1.5 mm

7.4.3 Q1 Output menu group

The Q1 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 Q1 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.

7.4.3.1 Setting the switching point

A switching point can be taught-in or set manually.

The SP2 switching point is only available in the window output mode. 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.

Teaching in the switching point

Set the switching point to the current distance at the time the pushbutton is pressed, see "Teaching value", page 23.

Teachable parameters

- Q1 SP1 teach-in (auto)
- Q1 SP2 teach-in (auto)

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.

Setting switching point manually

Set the distance of the switching point manually, see "Adjust the value", page 23. The value of the switching point can be set depending on the set number of decimal places.

Adjustable parameters

- **Q1 SP1 teach-in (manual)**
- **Q1 SP2 teach-in (manual)**

7.4.3.2 Q1 Single point (SP1:DtO) menu

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

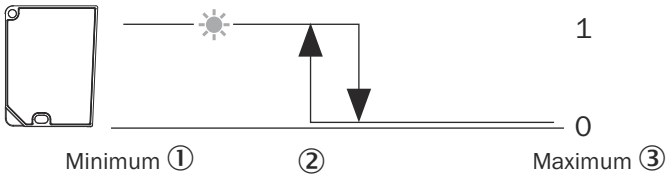


Figure 11: Distance to object, single switching point (N/O contact: High-active, PNP)

① Minimum
② Switching point
③ Maximum

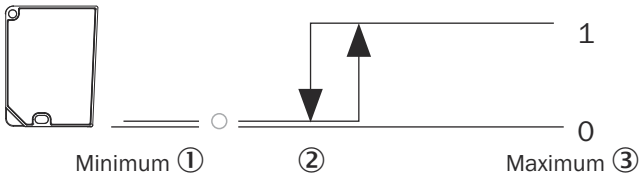


Figure 12: Distance to object, inverted simple switching point (N/C contact: Low-active, PNP)

① Minimum
② Switching point
③ Maximum

Selecting output mode and setting parameters

● > **Q1 Output** > ● > **Q1 Mode** > ● > **Q1 Single point (SP1:DtO)** > ●

● > **Q1 Output** > ● > Parameter > ● > Select option, teach-in or set value > ●

Parameter	Value	Factory setting
Q1 SP1 teach-in (auto)	Setting the switching point OD2000-**030**: -5.04 mm ... +5.75 mm OD2000-**050**: -10.10 mm ... +11.50 mm OD2000-**130**: -70.70 mm ... +76.00 mm OD2000-**245**: -176.75 mm ... +189.00 mm OD2000-**350**: -252.50 mm ... +271.00 mm OD2000-**700**: -505.00 mm ... +550.00 mm	0.00 mm
Q1 SP1 teach-in (manual)		
Q1 Switch point logic	**High-active** **Low-active**	**High-active**

Parameter	Value	Factory setting
Q1 Timer mode	**Off** **Switch-on delay** **Switch-on/off delay** **Switch-off delay** **Impulse (one shot)**	**Off**
Q1 Timer setup	1 ms ... 30,000 ms	1 ms
Q1 Hysteresis	0 mm ... 2,147.48 mm	OD2000-**030**: 0.1 mm OD2000-**050**: 0.2 mm OD2000-**130**: 0.3 mm OD2000-**245**: 0.5 mm OD2000-**350**: 1 mm OD2000-**700**: 1.5 mm

7.4.3.3 Q1 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).

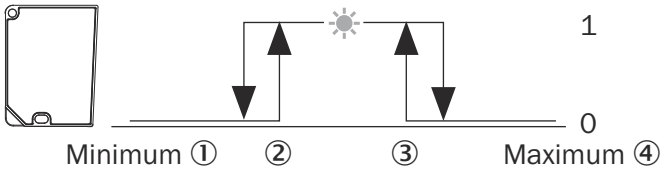


Figure 13: Switching window (N/O contact: High-active, PNP)

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

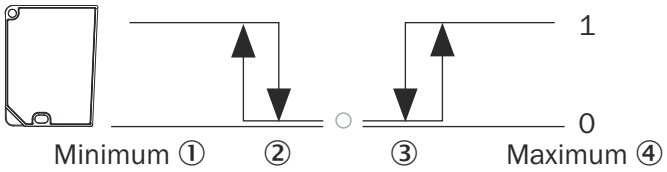


Figure 14: Switching window (N/C contact: Low-active, PNP)

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

Selecting output mode and setting parameters

[●] > **Q1 Output** > [●] > **Q1 Mode** > [●] > **Q1 Window (SP1,SP2:Window)** > [●]

[●] > **Q1 Output** > [●] > Parameter > [●] > Select option, teach-in or set value > [●]

Parameter	Value	Factory settings
Q1 SP1 teach-in (auto)	Setting the switching point OD2000-**030**: -5.04 mm ... +5.75 mm OD2000-**050**: -10.10 mm ... +11.50 mm OD2000-**130**: -70.70 mm ... +76.00 mm OD2000-**245**: -176.75 mm ... +189.00 mm OD2000-**350**: -252.50 mm ... +271.00 mm OD2000-**700**: -505.00 mm ... +550.00 mm	SP1: 0.00 mm
Q1 SP1 teach-in (manual)		
Q1 SP2 teach-in (auto)		SP2: OD2000-**030**: +5 mm OD2000-**050**: +10 mm OD2000-**130**: +70 mm OD2000-**245**: +175 mm OD2000-**350**: +250 mm OD2000-**700**: +500 mm
Q1 SP2 teach-in (manual)		
Q1 Switch point logic	**High-active** **Low-active**	**High-active**
Q1 Timer mode	**Off** **Switch-on delay** **Switch-off delay** **Switch-on/off delay** **Impulse (one shot)**	**Off**
Q1 Timer setup	1 ms ... 30,000 ms	1 ms
Q1 Hysteresis	0 mm ... 2,147.48 mm	OD2000-**030**: 0.1 mm OD2000-**050**: 0.2 mm OD2000-**130**: 0.3 mm OD2000-**245**: 0.5 mm OD2000-**350**: 1 mm OD2000-**700**: 1.5 mm

7.4.3.4 Q1 Window (SP1:ObSB) menu

Set a background as a reference. If the reference background is not detected (normally open contact: **High-active** switching point logic) or if the reference background is detected (normally closed contact: **Low-active** switching point logic), a signal is output. In **ObSB** output mode, all objects differing from the background are detected. Objects that are reflective or black are also detected.

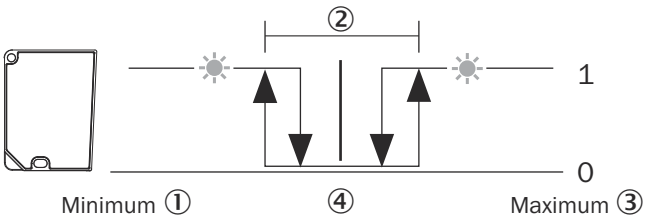


Figure 15: Object between device and background (N/O contact: High-active, PNP)

① Minimum
② Tolerance around switching point
③ Maximum
④ Switching point (reference background)

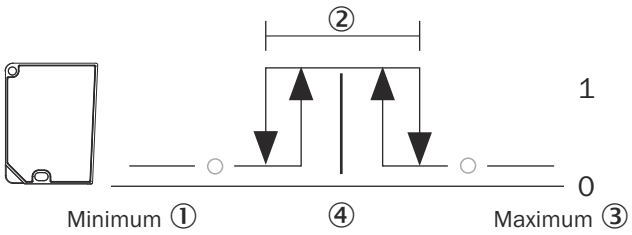


Figure 16: Object between device and background (N/C contact: Low-active, PNP)

① Minimum
② Tolerance around switching point
③ Maximum
④ Switching point (reference background)

Selecting output mode and setting parameters

[●] > **Q1 Output** > [●] > **Q1 Mode** > [●] > **Q1 Window (SP1:ObSB)** > [●]

[●] > **Q1 Output** > [●] > Parameter > [●] > Select option, teach-in or set value > [●]

Parameter	Value	Factory setting
Q1 SP1 teach-in (auto)	Setting the switching point OD2000-**030**: -5.04 mm ... +5.75 mm OD2000-**050**: -10.10 mm ... +11.50 mm OD2000-**130**: -70.70 mm ... +76.00 mm OD2000-**245**: -176.75 mm ... +189.00 mm OD2000-**350**: -252.50 mm ... +271.00 mm OD2000-**700**: -505.00 mm ... +550.00 mm	0.00 mm
Q1 SP1 teach-in (manual)		
Q1 Switch point logic	**High-active** **Low-active**	**High-active**
Q1 Timer mode	**Off** **Switch-on delay** **Switch-off delay** **Switch-on/off delay** **Impulse (one shot)**	**Off**
Q1 Timer setup	1 ms ... 30,000 ms	1 ms
Q1 Hysteresis	0 mm ... 2,147.48 mm	OD2000-**030**: 0.1 mm OD2000-**050**: 0.2 mm OD2000-**130**: 0.3 mm OD2000-**245**: 0.5 mm OD2000-**350**: 1 mm OD2000-**700**: 1.5 mm
Q1 Tolerance	0 mm ... 2,147.48 mm	OD2000-**030**: 1 mm OD2000-**050**: 1 mm OD2000-**130**: 2 mm OD2000-**245**: 4 mm OD2000-**350**: 4 mm OD2000-**700**: 4 mm

7.4.3.5 Q1 Alarm menu

As long as no measurement is possible, a constant switching signal is issued at the output. This function can be used, for example, to evaluate the measured value at the analog output.

Selecting output mode and setting parameters

● > **Q1 output** > ● > **Q1 mode** > ● > **Q1 Alarm** > ●

● > **Q1 Output** > ● > Parameter > ● > Select option > ●

Parameter	Value	Factory settings
Q1 Switch point logic	**High-active** **Low-active**	**High-active**

7.4.3.6 Q1 Signal level warning menu

If the signal level falls below a threshold, a warning is issued via digital outputs Q1 and Q2. 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.

Selecting output mode and setting parameters

● > **Q1 output** > ● > **Q1 mode** > ● > **Q1 Signal level warning** > ●

● > **Q1 Output** > ● > Parameter > ● > Select option, teach-in or set value > ●

Parameter	Value	Factory settings
Q1 Signal threshold (auto)	Setting the switching point 0 ... 5,000	1700
Q1 Signal threshold (manual)		
Q1 Switch point logic	**High-active** **Low-active**	**High-active**
Q1 Timer mode	**Off** **Switch-on delay** **Switch-off delay** **Switch-on/off delay** **Impulse (one shot)**	**Off**
Q1 Timer setup	1 ms ... 30,000 ms	1 ms

7.4.3.7 Q1 Edge height jump menu

If a measured value jump occurs between two measured values, a signal is output. A typical application is copy or scale counting in print applications. The device takes on the complex evaluation tasks carried out by the control system.

Settings for using the function

- Q1 Min./Max. menu Height jump
- Fixed Cycle time menu (recommended)

NOTE

In **Auto** mode, fluctuating remission values of the object surface can change the cycle time of the device. This means that reliable detection is not guaranteed at high detection speeds or with small structures.

- Average filter off (recommended)
- Q1 / Q2 Hysteresis menu (if required)

- Q1 Jump direction menu (if required)
- Q1 Cycle offset menu (if required)

Selecting output mode and setting parameters

● > **Q1 output** > ● > **Q1 mode** > ● > **Q1 Edge height jump** > ●

● > **Q1 Output** > ● > Parameter > ● > Select option, teach-in or set value > ●

Parameter	Value	Factory settings
Q1 Minimum height jump	0 mm ... 2,147.48 mm	OD2000-**030**/**050**: 0.50 mm OD2000-**130**: 5.00 mm OD2000-**245**/**350**/**700**: 10.00 mm
Q1 Maximum height jump	0 mm ... 2,147.48 mm	OD2000-**030**/**050**: 2.00 mm OD2000-**130**: 30.00 mm OD2000-**245**/**350**/**700**: 100.00 mm
Q1 Jump direction	**Positive** **Negative** **Both**	**Both**
Q1 Cycle offset	1 ... 10,000	50
Q1 Switch point logic	**High-active** **Low-active**	**High-active**
Q1 Timer mode	**Off** **Switch-on delay** **Switch-off delay** **Switch-on/off delay** **Impulse (one shot)**	**Off**
Q1 Timer setup	1 ms ... 30,000 ms	1 ms
Q1 Hysteresis	0 mm ... 2,147.48 mm	OD2000-**030**: 0.1 mm OD2000-**050**: 0.2 mm OD2000-**130**: 0.3 mm OD2000-**245**: 0.5 mm OD2000-**350**: 1 mm OD2000-**700**: 1.5 mm

7.4.3.7.1 Q1 Min./Max. menu Height jump

Q1 Minimum height jump and **Q1 Maximum height jump** define the smallest and largest difference between the current measured value and the comparison value in millimeters. The two measured values must differ by this amount for there to be an edge height change. The function only takes into account the difference between two measured values and is independent of the absolute distance of the object.

7.4.3.7.2 Q1 Jump direction menu

The Jump direction defines the direction in which measured value jumps are detected.

- **Positive**: Only changes in measured values within the set limits which result in larger distances are detected (description applies to factory setting).
- **Negative**: Only changes in measured values within the set limits which result in smaller distances are detected (description applies to factory setting).
- **Both**: All changes in measured values within the set limits are detected.

7.4.3.7.3 Q1 Cycle offset menu

The cycle offset specifies which previous measured value is compared with the value currently measured.

7.4.3.7.4 Examples: Output of the digital output in the edge height jump output mode

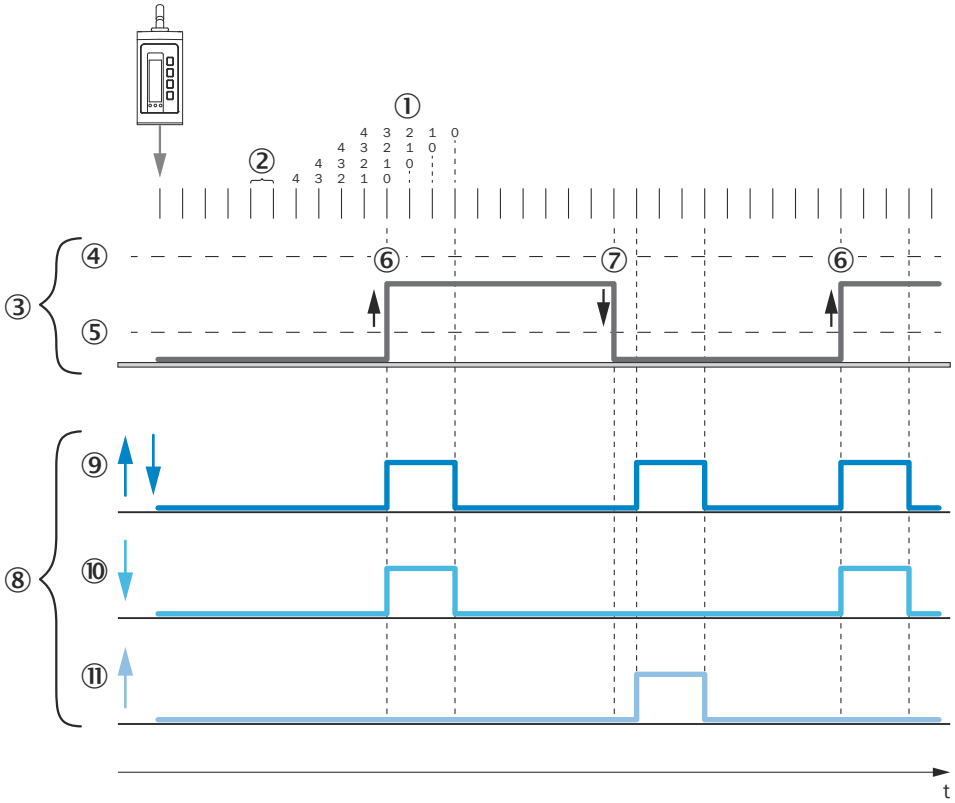


*Figure 17: Edge height jump: Duration of the change in measured value is **longer** than the time span of the cycle offset.*

① Cycle offset: 4, without measured value filter
② Fixed cycle time, e.g. 1 ms
③ Signal diagram for real distance
④ Max. limit value for edge height change (mm)
⑤ Min. limit value for edge height change (mm)
⑥ Change in measured value, from large to small distance
⑦ Change in measured value, from small to large distance
⑧ Signal diagram for digital output
⑨ **Jump direction** parameter > **Both**
⑩ **Jump direction** parameter > **Negative**
⑪ **Jump direction** parameter > **Positive**

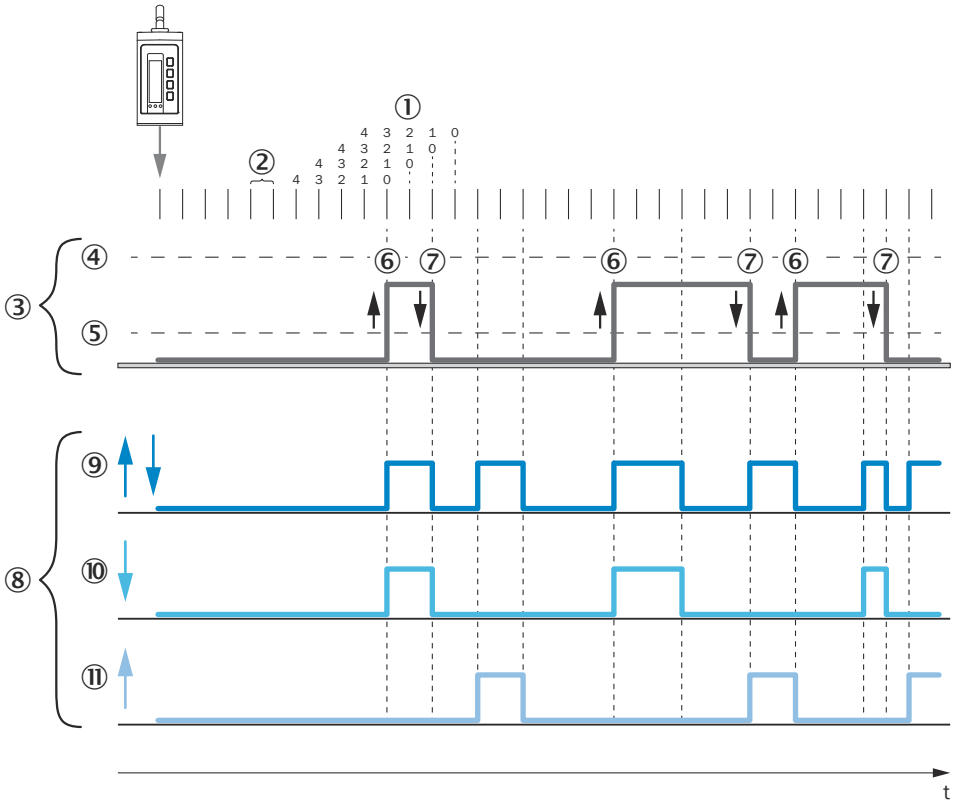


*Figure 18: Edge height jump: Duration of the change in measured value is **shorter** than the time span of the cycle offset.*

① Cycle offset: 4, without measured value filter
② Fixed cycle time, e.g. 1 ms
③ Signal diagram for real distance
④ Max. limit value for edge height change (mm)
⑤ Min. limit value for edge height change (mm)
⑥ Change in measured value, from large to small distance
⑦ Change in measured value, from small to large distance
⑧ Signal diagram for digital output
⑨ **Jump direction** parameter > **Both**
⑩ **Jump direction** parameter > **Negative**
⑪ **Jump direction** parameter > **Positive**

7.4.3.8 Q1 Off menu

If the **Q1 Off** output mode is activated, the Q1 output has no function and is deactivated.

7.4.4 Q2 / Qa Output menu group

The Q2/Qa output can be configured either as an analog output or as a digital output.

Devices without an analog output have a second digital output, see "Device variants", page 14. The information about the analog output is not relevant for these devices.

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.

7.4.4.1 Setting analog value

An analog value can be taught-in or set manually. Do not teach in the same distance value 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 23.

Teachable parameters

- Qa 4 mA teach-in (auto)
- Qa 20 mA teach-in (auto)
- Qa 0 V teach-in (auto)
- Qa 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 23.

Adjustable parameters

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

7.4.4.2 Qa 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.

Selecting output mode and setting parameters

● > Q2 / Qa output > ● > Q2 mode > ● > Qa Analog 4 mA ... 20 mA > ●

● > Q2 / Qa Output > ● > Parameter > ● > Teach-in or set value> ●

Parameter	Value	Factory setting
Qa 4 mA teach-in (auto)	Setting analog value OD2000-**030**: -5.04 mm ... +5.75 mm OD2000-**050**: -10.10 mm ... +11.50 mm OD2000-**130**: -70.70 mm ... +76.00 mm OD2000-**245**: -176.75 mm ... +189.00 mm OD2000-**350**: -252.50 mm ... +271.00 mm OD2000-**700**: -505.00 mm ... +550.00 mm	OD2000-**030**: -5.00 mm OD2000-**050**: -10.00 mm OD2000-**130**: -70.70 mm OD2000-**245**: -175.00 mm OD2000-**350**: -250.00 mm OD2000-**700**: -500.00 mm
Qa 4 mA teach-in (manual)		
Qa 20 mA teach-in (auto)		OD2000-**030**: +5.00 mm OD2000-**050**: +10.00 mm OD2000-**130**: +76.00 mm OD2000-**245**: +175.00 mm OD2000-**350**: +250.00 mm OD2000-**700**: +500.00 mm
Qa 20 mA teach-in (manual)		

7.4.4.3 Qa Analog 0 V ... 10 V menu

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

Selecting output mode and setting parameters

● > Q2 / Qa output > ● > Q2 mode > ● > Qa Analog 0 V ... 10 V > ●

● > Q2 / Qa Output > ● > Parameter > ● > Teach-in or set value > ●

Parameter	Value	Factory setting
Qa 0 V teach-in (auto)	Setting analog value OD2000-**030**: -5.04 mm ... +5.75 mm OD2000-**050**: -10.10 mm ... +11.50 mm OD2000-**130**: -70.70 mm ... +76.00 mm OD2000-**245**: -176.75 mm ... +189.00 mm OD2000-**350**: -252.50 mm ... +271.00 mm OD2000-**700**: -505.00 mm ... +550.00 mm	OD2000-**030**: -5.00 mm OD2000-**050**: -10.00 mm OD2000-**130**: -70.70 mm OD2000-**245**: -175.00 mm OD2000-**350**: -250.00 mm OD2000-**700**: -500.00 mm
Qa 0 V teach-in (manual)		
Qa 10 V teach-in (auto)		OD2000-**030**: +5.00 mm OD2000-**050**: +10.00 mm OD2000-**130**: +76.00 mm OD2000-**245**: +175.00 mm OD2000-**350**: +250.00 mm OD2000-**700**: +500.00 mm
Qa 10 V teach-in (manual)		

7.4.4.4 Q2 output mode

Digital output functions can also be set instead of analog output modes. The operation and setting options are identical to output Q1, see "Q1 Output menu group", page 35.

Additionally, at Q2 the **Q2 Q2=Q1 not** function is not available (inversion of Q1). With this function, the inverted switching signal of Q1 is output via Q2. For example, if the High signal is output at Q1, Low is output via Q2.

Setting digital output

● > **Q2 / Qa Output** > ● > **Q2 Mode** > ● > Select output mode (switching) > ●

7.4.5 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.

7.4.5.1 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

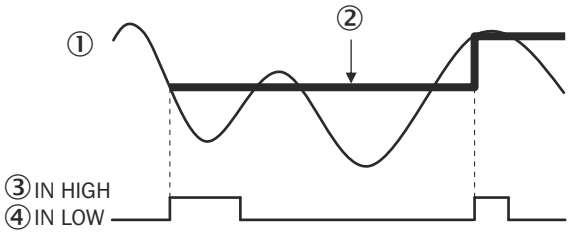
● > **In1 Input** > ● > **IN Function** > ● > Select option > ●

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

7.4.5.2 IN Hold function menu

Measured value menu

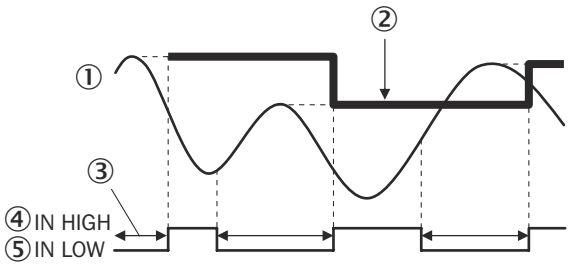
Hold the measured value that is present at the HIGH input status (rising edge).



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

Peak value menu

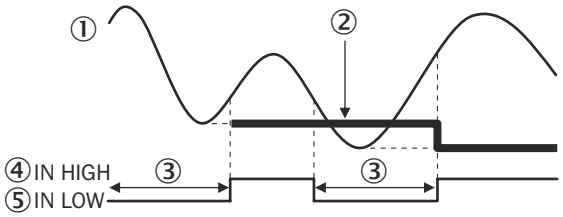
Hold the largest measured value that is present in the time interval between the last falling edge and the HIGH input status (next rising edge).



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

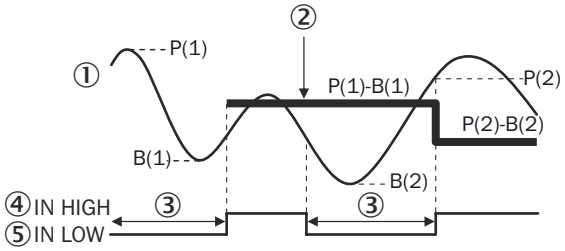
Hold the smallest measured value that is present in the time interval between the last falling edge and the HIGH input status (next rising edge).



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

Peak-to-peak value menu

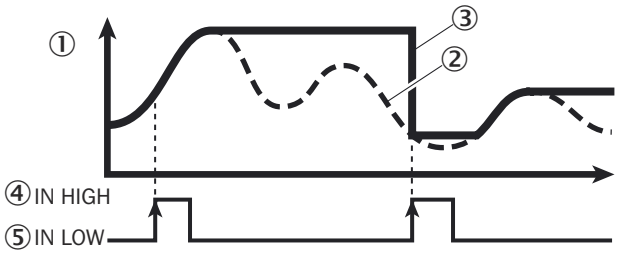
Hold the differential value between the smallest and the largest measured value present in the interval between the last falling edge and the HIGH input status (next rising edge).



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

Auto peak value menu

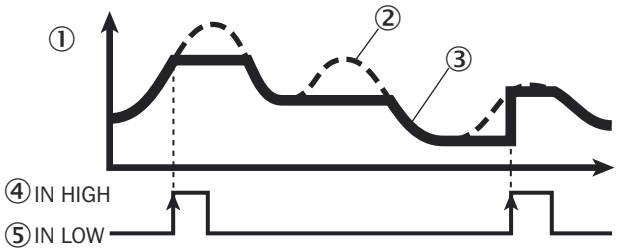
When the HIGH input status (next rising edge) is present, hold the largest measured value.



① Measured value
② Internal measured value
③ Output hold value
④ HIGH input status
⑤ LOW input status

Auto lowest value menu

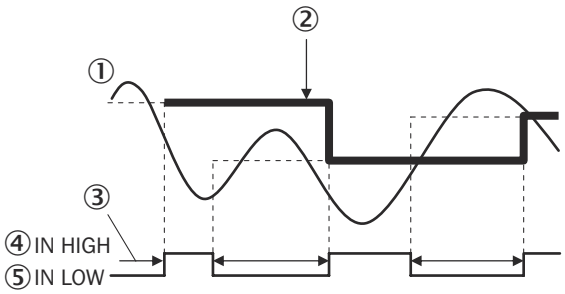
When the HIGH input status (next rising edge) is present, hold the smallest measured value.



① Measured value
② Internal measured value
③ Output hold value
④ HIGH input status
⑤ LOW input status

Average value menu

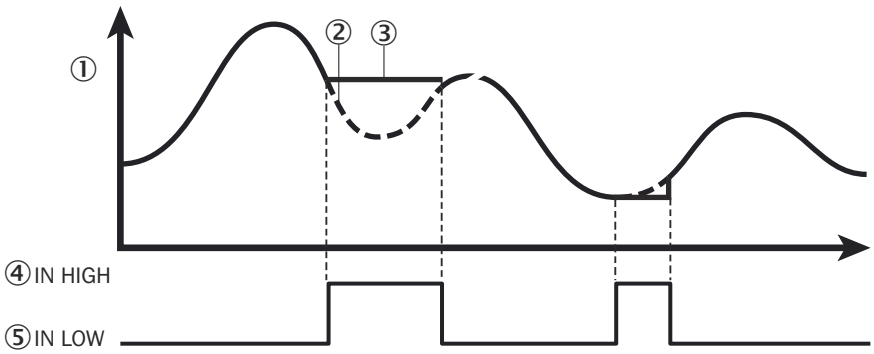
Hold the arithmetic average value of all measured values that are present in the time interval between the last falling edge and the HIGH input status (next rising edge).



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

Normal menu

Hold the measured value until the next falling edge.



① Measured value
② Internal measured value
③ Output hold value
④ HIGH input status
⑤ LOW input status

Setting the IN Hold function

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

[●] > **IN input** > [●] > **IN function** > [●] > **Hold** > [●]

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

[●] > **IN Input** > [●] > **IN Function** > [●] > **IN Hold function** > [●] > Select option > [●]

Parameter	Value	Factory settings
IN Hold function	Measured value Peak value Lowest value Peak-to-peak value Auto peak value Auto lowest value Average value Normal	Measured value

7.4.5.3 IN Debouncing menu

When debouncing is activated, the input signal must be constantly present at the IN Input for 100 ms. The timing tolerances of the external teach functions take into account activation and deactivation of the debounce function. It is not necessary to adjust the timings.

Setting the IN Debouncing

● > IN Input > ● > IN Debouncing> ● > Select option > ●

Parameter	Value	Factory setting
IN Debouncing	No Yes	Yes

7.4.5.4 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 In Input logic

● > IN Input > ● > IN Input logic > ● > Select option > ●

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

7.4.6 Device menu group

7.4.6.1 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.

This function does not reset a calibration that has been performed, see "Reset calibration menu", page 50.

Reset the device to factory settings

● > Device > ● > Reset Factory settings > ● > Select option > ●

Parameter	Value	Factory setting
Reset Factory settings	No Yes	-

Resetting device to customer settings

[●] > Device > [●] > Reset Customer settings > [●] > Select option [●]

Parameter	Value	Factory setting
Reset Customer settings	No Yes	-

7.4.6.2 Reset calibration menu

Overview

The calibration can be reset to the factory settings. The **Reset device** function does not reset a calibration that has been performed.

Reset calibration

[●] > Device > [●] > Reset calibration > [●] > Select option > [●]

Parameter	Value	Factory setting
Reset calibration	No Yes	-

7.4.6.3 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 49.

[●] > Device > [●] > Save customer settings > [●] > Select option > [●]

Parameter	Value	Factory setting
Save customer settings	No Yes	-

7.4.6.4 Language menu

The language of the display texts can be set.

[●] > Device > [●] > Language > [●]

Parameter	Value	Factory setting
Language	English German Spanish Japanese Chinese	English

7.4.6.5 Display settings

Various settings for the display behavior are available.

[●] > Device > [●] > Display setting > [●]

Parameter	Value	Factory setting
Display decimal digits	0, 0.1, 0.01	0.1
Eco mode	Off, 10 sec, 20 sec, 60 sec, 300 sec, 1,200 sec, 3,600 sec	300sec
Display brightness	10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%	30%

Parameter	Value	Factory setting
Turn display	0°, 180°	0°

7.4.6.6 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.

● > Device > ● > Sender > ● > Select option > ●

Parameter	Value	Factory setting
Sender	Off To	To

7.4.6.7 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.

● > Device > ● > Output PNP/NPN/PP > ● > Select option > ●

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

7.4.6.8 Device ID setup menu

The device supports multiple device IDs for firmware version 0100_0042 and above.

The device ID can be set to ensure the compatibility of the device when integrating it into a existing application.

● > Device > ● > Device ID setup > ● > Select option > ●

Parameter	Value	Factory setting
Device ID setup	8389374 8389425	Depends on the firmware version

7.4.7 Info menu group

Status information

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

● > Info > ● > Status information

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.

8.2 Maintenance plan

During operation, the device works maintenance-free.

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

Table 8: Maintenance plan

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
Check the screw connections and plug connectors.	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. In the case of faults that cannot be rectified using the information below, please contact SICK Service. To find your agency, see the final page of this document.

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

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 questions and replies

Question / status	Response / remedial actions
The device does not display a measurement or measurement is not possible.	• Sender not activated: Switch on sender, see "Sender menu", page 51. • Laser light spot is not aimed at object: Check alignment of the device and 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 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.

9.3 Returns

► 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 fault that occurred

9.4 Repairs

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

9.5 Disposal

CAUTION

Risk of injury due to hot device surface.

The surface of the device can become hot.

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

NOTE

The relevant online product page for your product, including technical data, dimensional drawing, and connection diagrams, can be downloaded, saved, and printed from the Internet.

The 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).

Please note: This documentation may contain further technical data.

10.1 Mechanics/Electronics

Supply voltage U_V	DC 18 V ... 24 V, ± 10%, including residual ripple [1]
Power consumption	< 1.5 W (at 24 V DC) [2]
Power-up time	Max. 300 ms
Warm-up time	< 30 minutes [3]
Housing material	Plastic (PBT)
Viewing window material	Plastic (PMMA)
Connection type	Cable with male connector, M12, 5-pin, A-coded, 30 cm
Tightening torque of fixing screws	Max. 0.8 Nm
Display	OLED display, status LEDs
Control elements	4 pushbuttons
Weight	90 g
Dimensions (W x H x D)	27 mm x 60 mm x 50 mm
Enclosure rating	IP67
Protection class	III (EN 50178)
Electrical safety	IEC 61010-1 AMD 1:2016-12

1) Limit values, reverse-polarity protected.
2) 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 Dimensional drawing

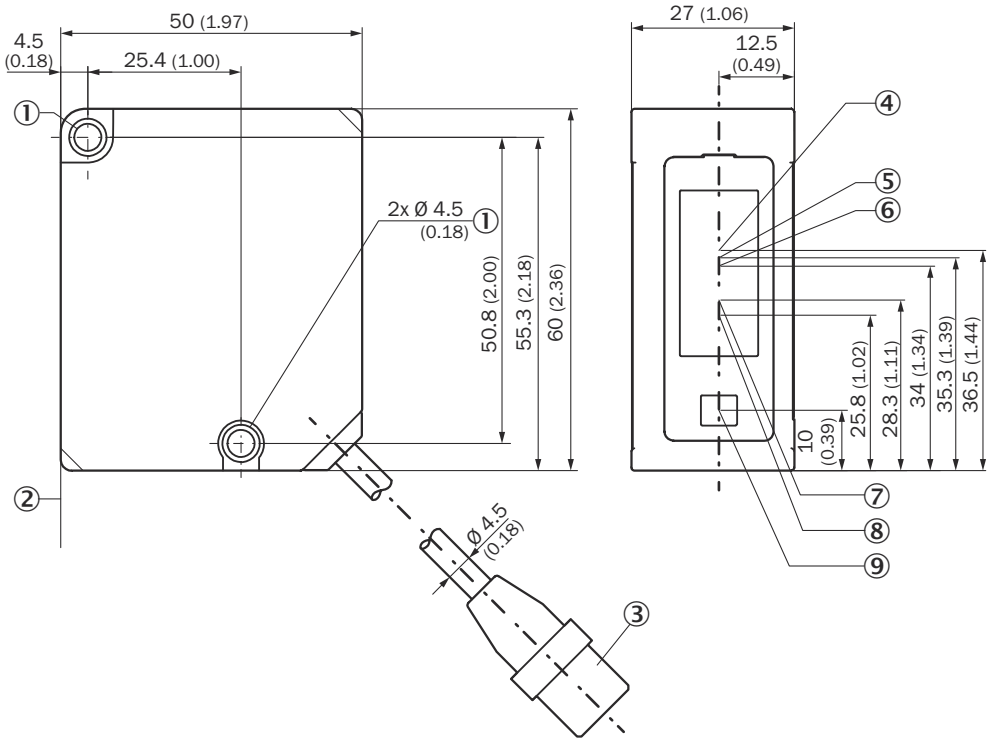


Figure 19: structure and device dimensions, unit: mm (inch), decimal separator: period

① Fixing holes (M4)
② Device zero point (distance = 0 mm)
③ Device cable (length: 300 mm) with male connector, M12, 5-pin, A-coded
④ Center of optical axis, receiver (device type OD2000-350, OD2000-700)
⑤ Center of optical axis, receiver (device type OD2000-245)
⑥ Center of optical axis, receiver (device type OD2000-130)
⑦ Center of optical axis, receiver (device type OD2000-050)
⑧ Center of optical axis, receiver (device type OD2000-030)
⑨ Center of optical axis, sender

10.3 Performance

Measuring range [1]	OD2000-**030**xxxx: 25 mm ... 35 mm OD2000-**050**xxxx: 40 mm ... 60 mm OD2000-**130**xxxx: 60 mm ... 200 mm OD2000-**245**xxxx: 70 mm ... 420 mm OD2000-**350**xxxx: 100 mm ... 600 mm OD2000-**700**xxxx: 200 mm ... 1,200 mm
Measuring object	Natural objects
Repeatability [2] [3] [4]	OD2000-**030**xxxx: 0.1 µm OD2000-**050**xxxx: 0.2 µm OD2000-**130**xxxx: 4 µm OD2000-**245**xxxx: 10 µm OD2000-**350**xxxx: 20 µm OD2000-**700**xxxx: 100 µm

Linearity [2] [4] [5]	OD2000-**030**xxxx: ± 10 µm OD2000-**050**xxxx: ± 20 µm OD2000-**130**xxxx: ± 140 µm OD2000-**245**xxxx: ± 350 µm OD2000-**350**xxxx: ± 500 µm OD2000-**700**xxxx: ± 1 mm (200 mm ... 700 mm), ± 3 mm (700 mm ... 1,200 mm)
Measuring frequency	≤ 7.5 kHz
Output time	≥ 0.133 ms
Response time	≥ 0.533 ms [6]
Light sender	Laser, red Visible red light
Laser class	OD2000-**030**, OD2000-**050**xxxx, OD2000-**130**xxxx: Laser class 1 (IEC 60825-1:2014, EN 60825-1:2014) [7] OD2000-**245**xxxx, OD2000-**350**xxxx, OD2000-**700**xxxx: Laser class 2 (IEC 60825-1:2014, EN 60825-1:2014) [8]
	Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3, as described in document Laser Notice No. 56 dated 8 May 2019.
Typical light spot size	OD2000-**030**xxxx: Ø 50 µm (30 mm) OD2000-**050**xxxx: Ø 70 µm (50 mm) OD2000-**130**xxxx: Ø 300 µm (130 mm) OD2000-**245**xxxx: Ø 500 µm (245 mm) OD2000-**350**xxxx: Ø 600 µm (350 mm) OD2000-**700**xxxx: Ø 1 mm (700 mm)
Additional function	Measured value recording functions and evaluation functions, adjustable average filter and median filter, switching point modes: Single point SP1 (DtO) / window SP1, SP2 (window or ObSB) / teachable digital output, invertible digital output, teachable analog output [9], invertible analog output [9], switchable analog output (mA/V) [9], multifunction input: Sender off/hold functions/deactivated, switch off display, operating button lock, display can be rotated 180°, alarm function, edge height jump, 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 value setting: 512
Median: 31
Measuring frequency: 5 kHz
In the middle of the measuring range
For static measurement.
4) At T = 25 °C, under constant general conditions.
5) Observe min. warm-up time of 30 minutes.
6) Dependent on the set averaging or sensitivity.
7) Visible, wavelength: 655 nm, maximum power: 0.39 mW, maximum pulse power: 0.39 mW, maximum pulse duration: 5 ms.
8) Visible, wavelength: 655 nm, maximum power: 1 mW, maximum pulse power: 1 mW, maximum pulse duration: 5 ms.
9) Not available for devices without an analog output, see "Device variants", page 14.

10.4 Interfaces

IO-Link	IO-Link V1.1 Function: Process data, configuration, diagnostics, data storage Data transmission rate: 230.4 kBit/s (COM3), process data length 6 bytes, minimum cycle time 1 ms
Digital input	In_1 [1]
Digital output	Number: 2 [2] Type: Push-pull / PNP/NPN, selectable Max. output current I_A: ≤ 100 mA

Analog output [3]	Quantity: 1 Type: Current output / voltage output Function: Selectable Current: 4 mA ... 20 mA, ≤ 300 Ω Voltage: 0 V ... 10 V, > 10 kΩ Resolution: 16 bit

1) Can be used as Sender off, trigger for hold functions or deactivated.
2) PNP/PP: HIGH = U_V > 13.5 V / LOW = U_V < 8 V.
NPN: HIGH = U_V < 8 V / LOW = U_V > 13.5 V.
3) Not available for devices without an analog output, see "Device variants", page 14.

10.5 Ambient data

Ambient operating temperature	-10 °C ... +50 °C [1]
Storage temperature	-20 °C ... +60 °C
Relative humidity (non-condensing)	35% ... 85%
Temperature drift	OD2000-**030**xxxx: 6 µm/K OD2000-**050**xxxx: 12 µm/K OD2000-**130**xxxx: 84 µm/K OD2000-**245**xxxx: 210 µm/K OD2000-**350**xxxx: 300 µm/K OD2000-**700**xxxx: 600 µm/K
Typical ambient light immunity	Artificial light: ≤ 3,000 lx [2] Sunlight: ≤ 10,000 lx
Vibration resistance	EN 60068-2-6, EN 60068-2-64
Shock resistance	EN 60068-2-27

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

10.6 Interference range

OD2000-030xxxx

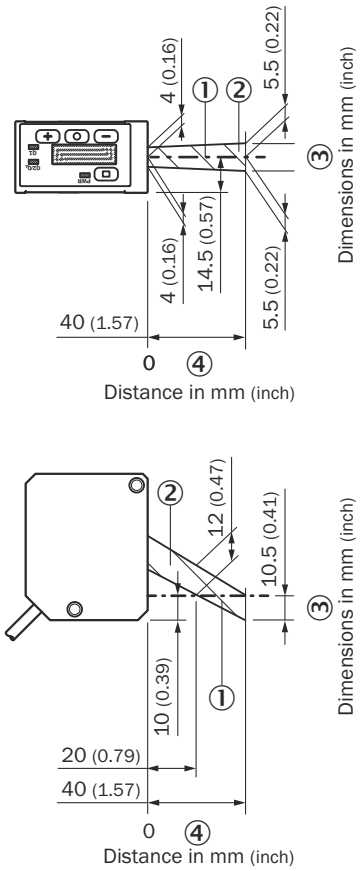


Figure 20: Interference range for OD2000-030xxxx, unit for distance values: mm (inch), decimal separator: period

① Optical axis sender and receiver
② Interference range
③ Dimensions in mm (inch)
④ Distance in mm (inch)

OD2000-050xxxx

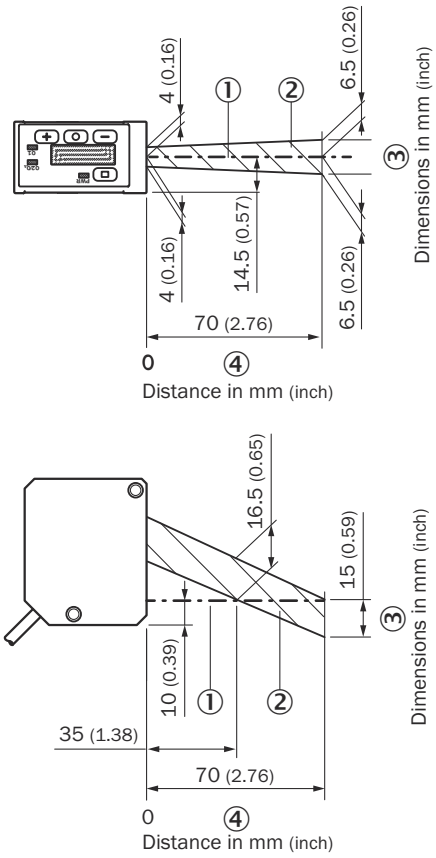


Figure 21: Interference range for OD2000-050xxxx, unit for distance values: mm (inch), decimal separator: period

① Optical axis sender and receiver
② Interference range
③ Dimensions in mm (inch)
④ Distance in mm (inch)

OD2000-130xxxx

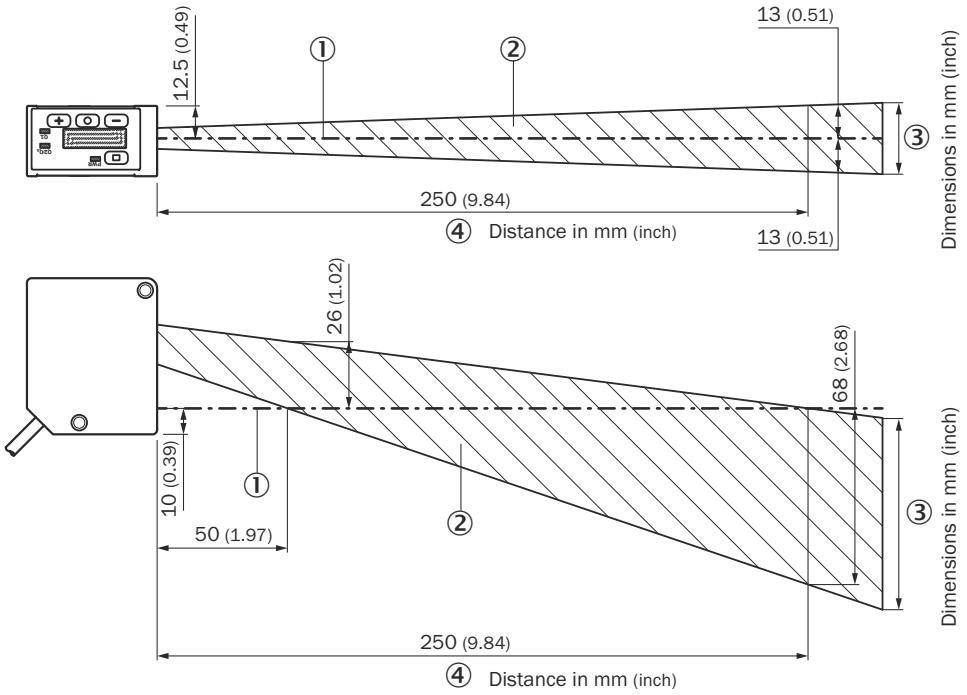


Figure 22: Interference range for OD2000-130xxxx, unit for distance values: mm (inch), decimal separator: period

① Optical axis sender and receiver
② Interference range
③ Dimensions in mm (inch)
④ Distance in mm (inch)

OD2000-245xxxx

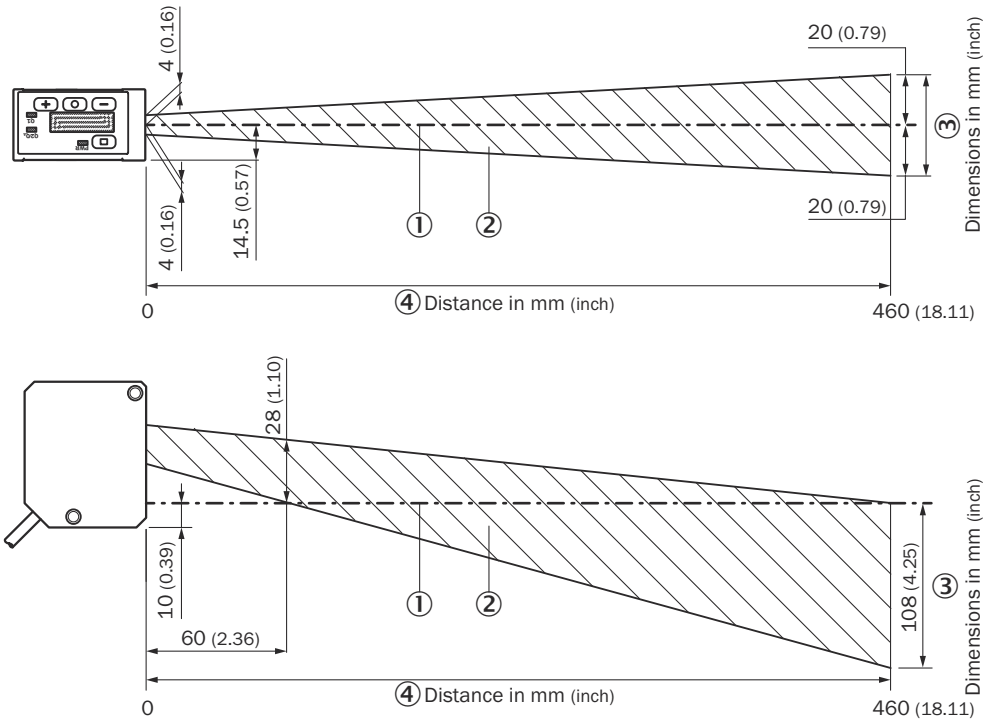


Figure 23: Interference range for OD2000-245xxxx, unit for distance values: mm (inch), decimal separator: period

① Optical axis sender and receiver
② Interference range
③ Dimensions in mm (inch)
④ Distance in mm (inch)

OD2000-350xxxx

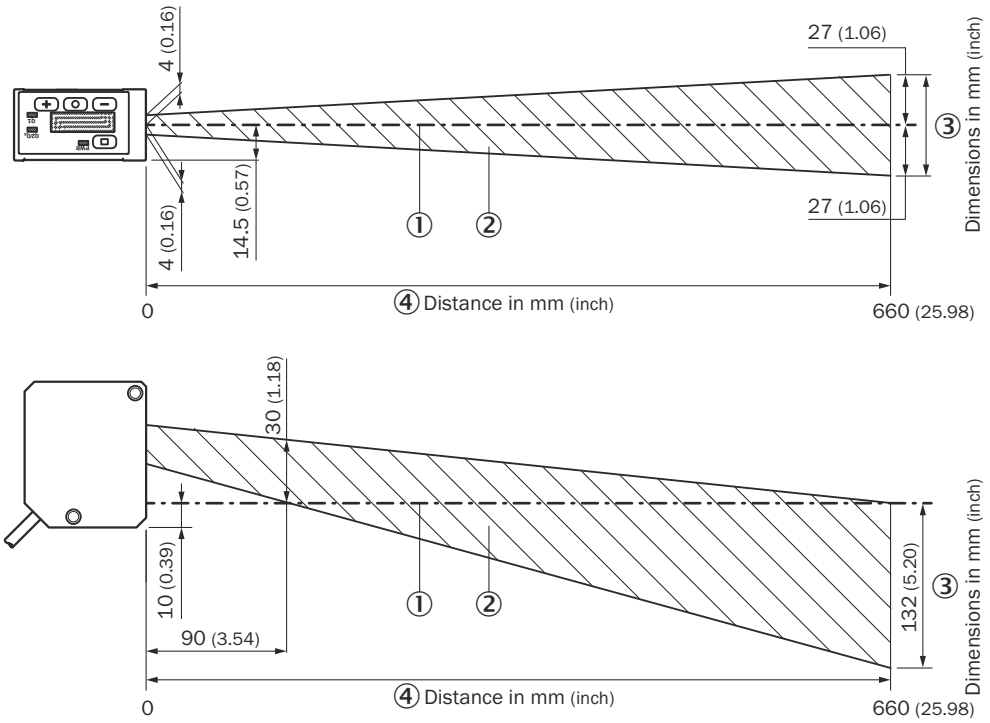


Figure 24: Interference range for OD2000-350xxxx, unit for distance values: mm (inch), decimal separator: period

① Optical axis sender and receiver
② Interference range
③ Dimensions in mm (inch)
④ Distance in mm (inch)

OD2000-700xxxx

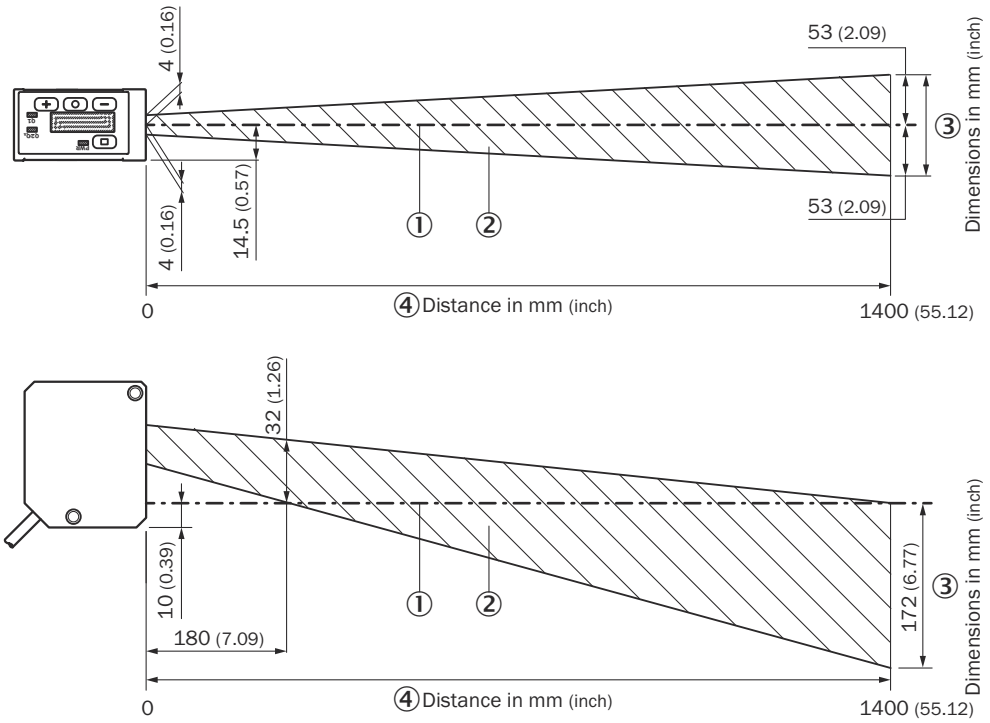


Figure 25: Interference range for OD2000-700xxxx, unit for distance values: mm (inch), decimal separator: period

① Optical axis sender and receiver
② Interference range
③ Dimensions in mm (inch)
④ Distance in mm (inch)

10.7 Light spot size

OD2000-030xxxx

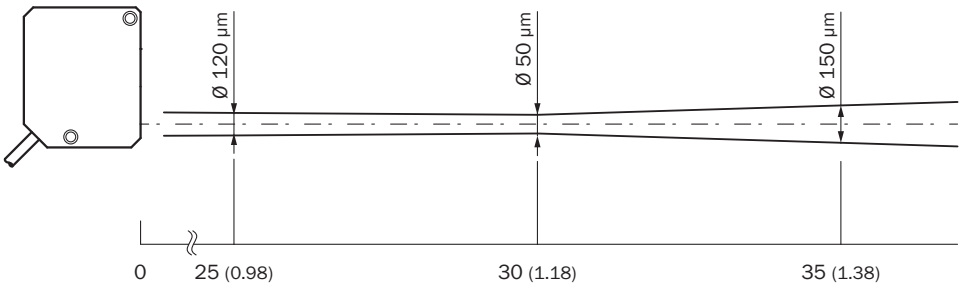


Figure 26: Typical light spot size for OD2000-030xxxx, unit for distance values: mm (inch), decimal separator: period

OD2000-050xxxx

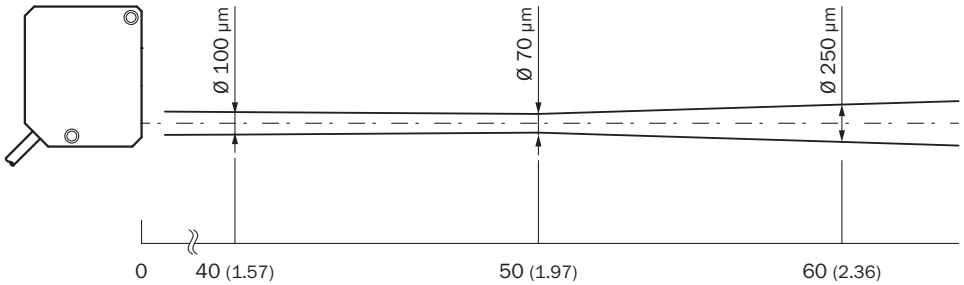


Figure 27: Typical light spot size for OD2000-050xxxx, unit for distance values: mm (inch), decimal separator: period

OD2000-130xxxx

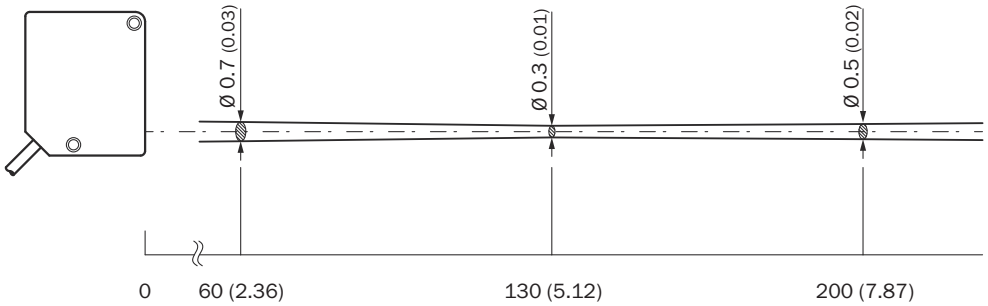


Figure 28: Typical light spot size for OD2000-130xxxx, unit for distance values: mm (inch), decimal separator: period

OD2000-245xxxx

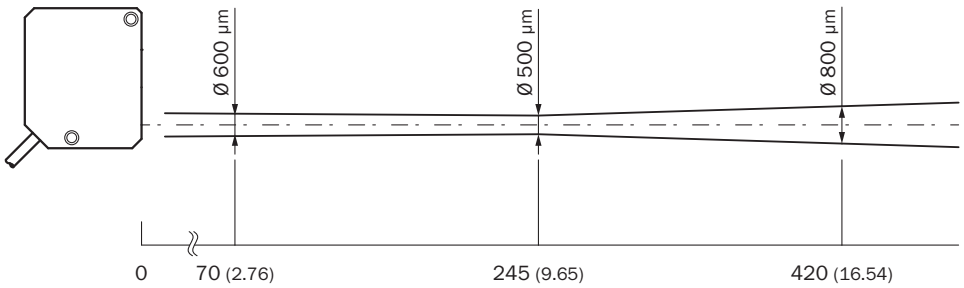


Figure 29: Typical light spot size for OD2000-245xxxx, unit for distance values: mm (inch), decimal separator: period

OD2000-350xxxx

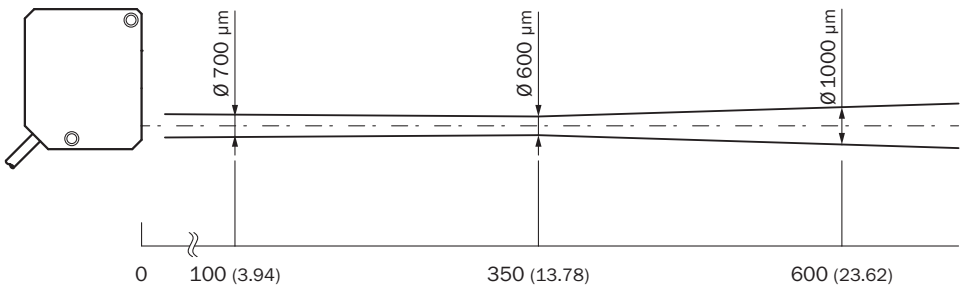


Figure 30: Typical light spot size for OD2000-350xxxx, unit for distance values: mm (inch), decimal separator: period

OD2000-700xxxx

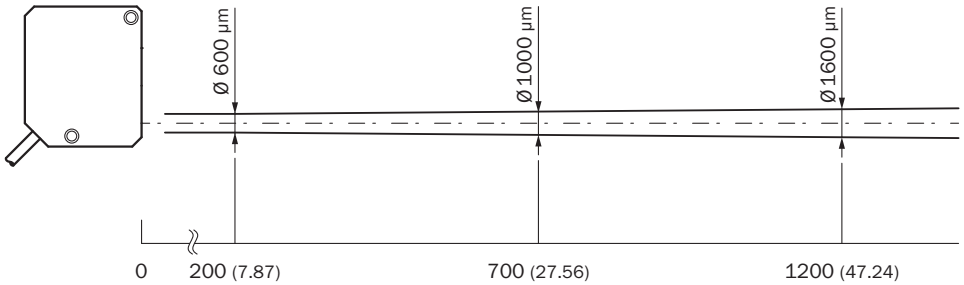
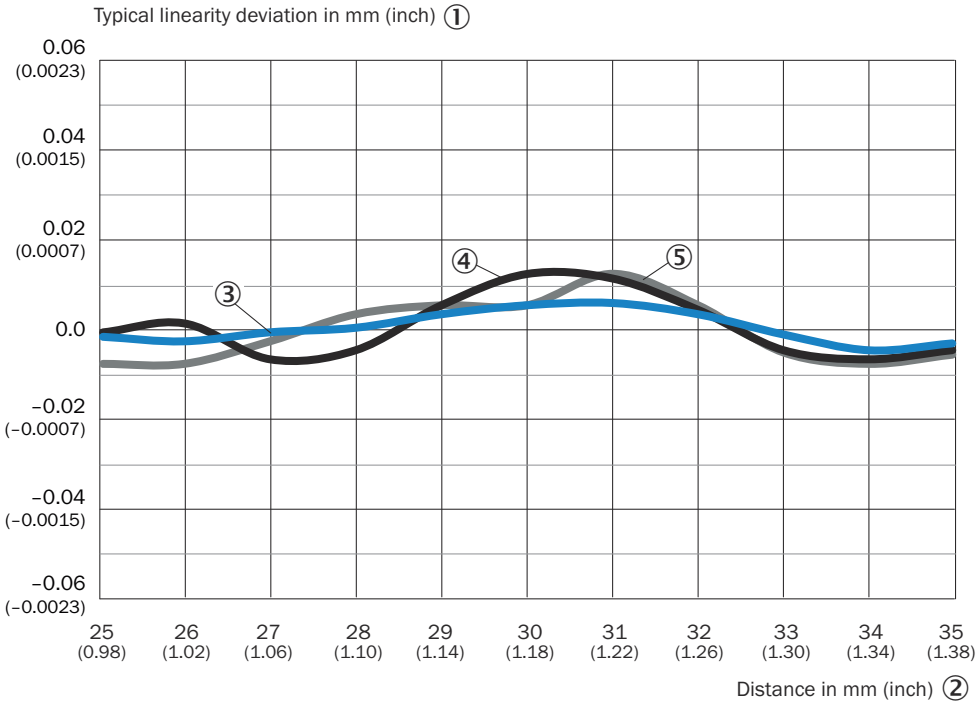


Figure 31: Typical light spot size for OD2000-700xxxx, unit for distance values: mm (inch), decimal separator: period

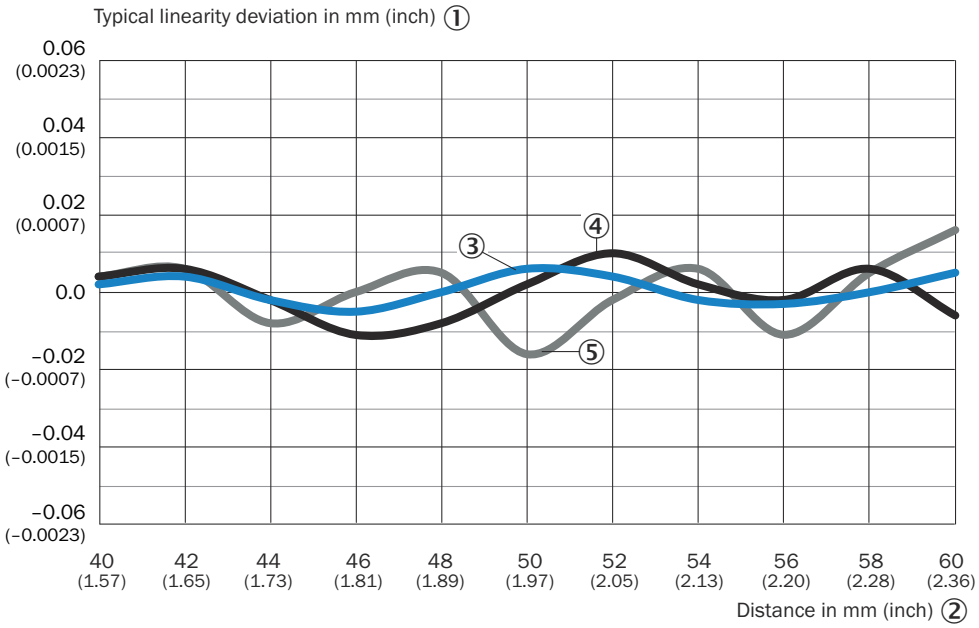
10.8 Linearity diagram

OD2000-030xxxx



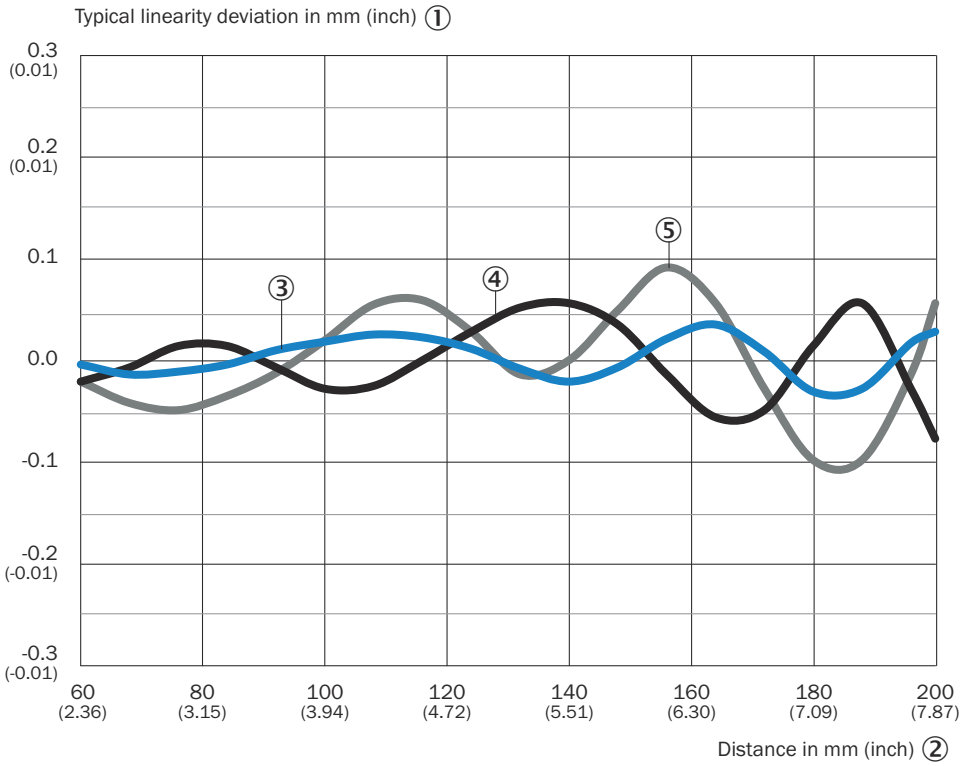
① Typical linearity deviation in mm (inch)
② Distance in mm (inch)
③ White 60% remission factor
④ Black 9.5% remission factor
⑤ Stainless steel

OD2000-050xxxx



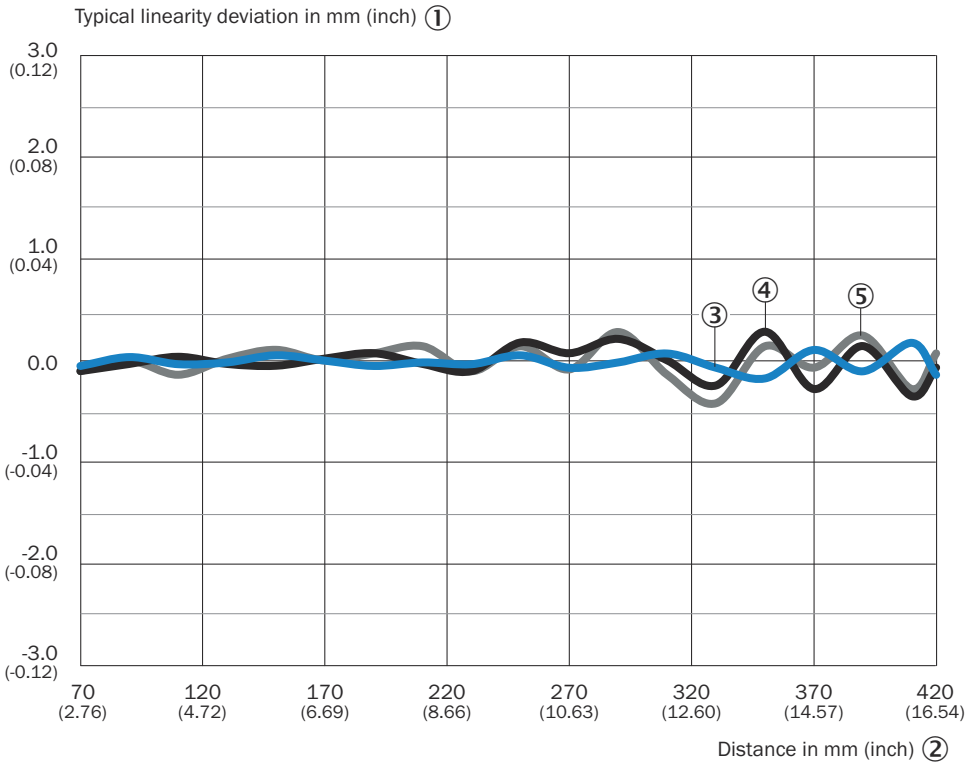
① Typical linearity deviation in mm (inch)
② Distance in mm (inch)
③ White 60% remission factor
④ Black 9.5% remission factor
⑤ Stainless steel

OD2000-130xxxx



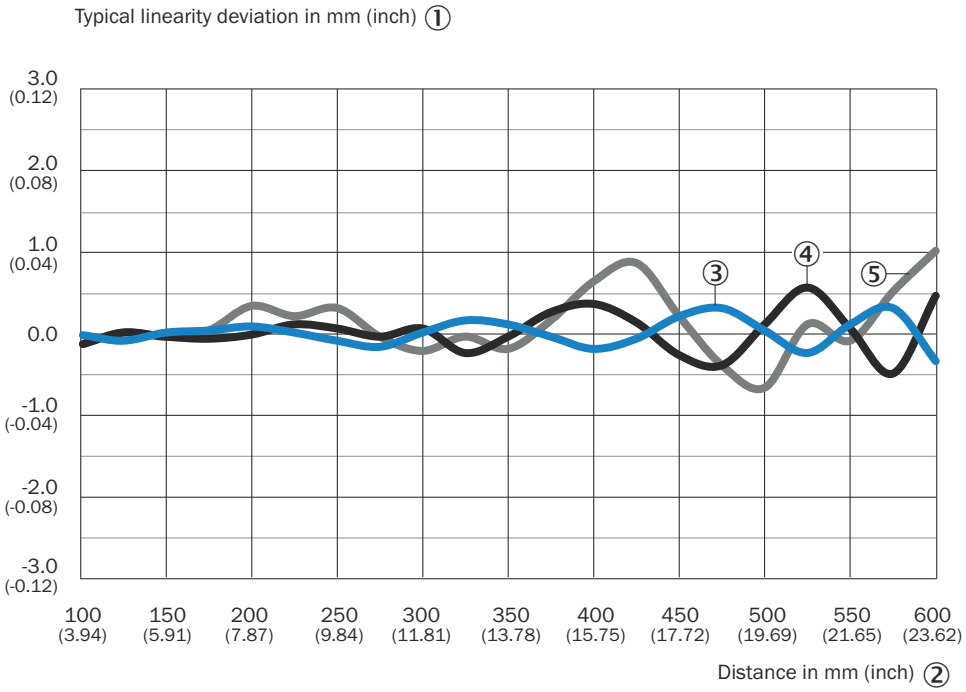
① Typical linearity deviation in mm (inch)
② Distance in mm (inch)
③ White 60% remission factor
④ Black 9.5% remission factor
⑤ Stainless steel

OD2000-245xxxx



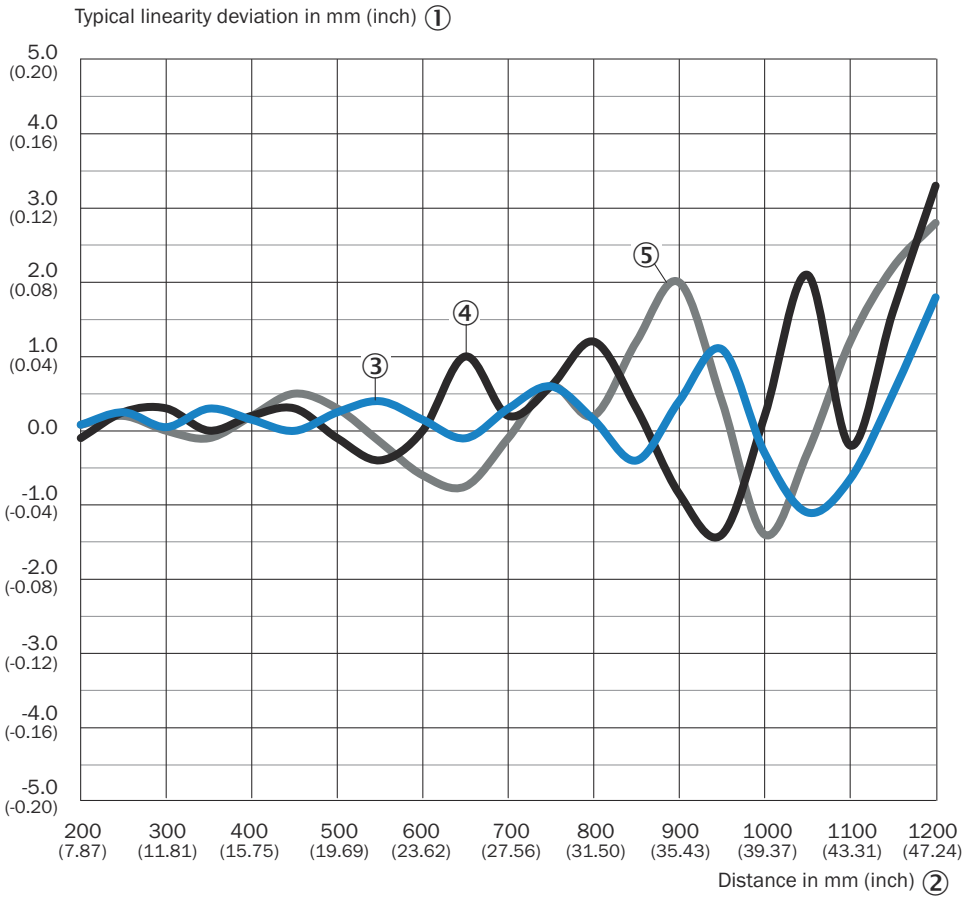
① Typical linearity deviation in mm (inch)
② Distance in mm (inch)
③ White 60% remission factor
④ Black 9.5% remission factor
⑤ Stainless steel

OD2000-350xxxx



① Typical linearity deviation in mm (inch)
② Distance in mm (inch)
③ White 60% remission factor
④ Black 9.5% remission factor
⑤ Stainless steel

OD2000-700xxxx



① Typical linearity deviation in mm (inch)
② Distance in mm (inch)
③ White 60% remission factor
④ Black 9.5% remission factor
⑤ Stainless steel

11 Accessories

NOTE

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

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

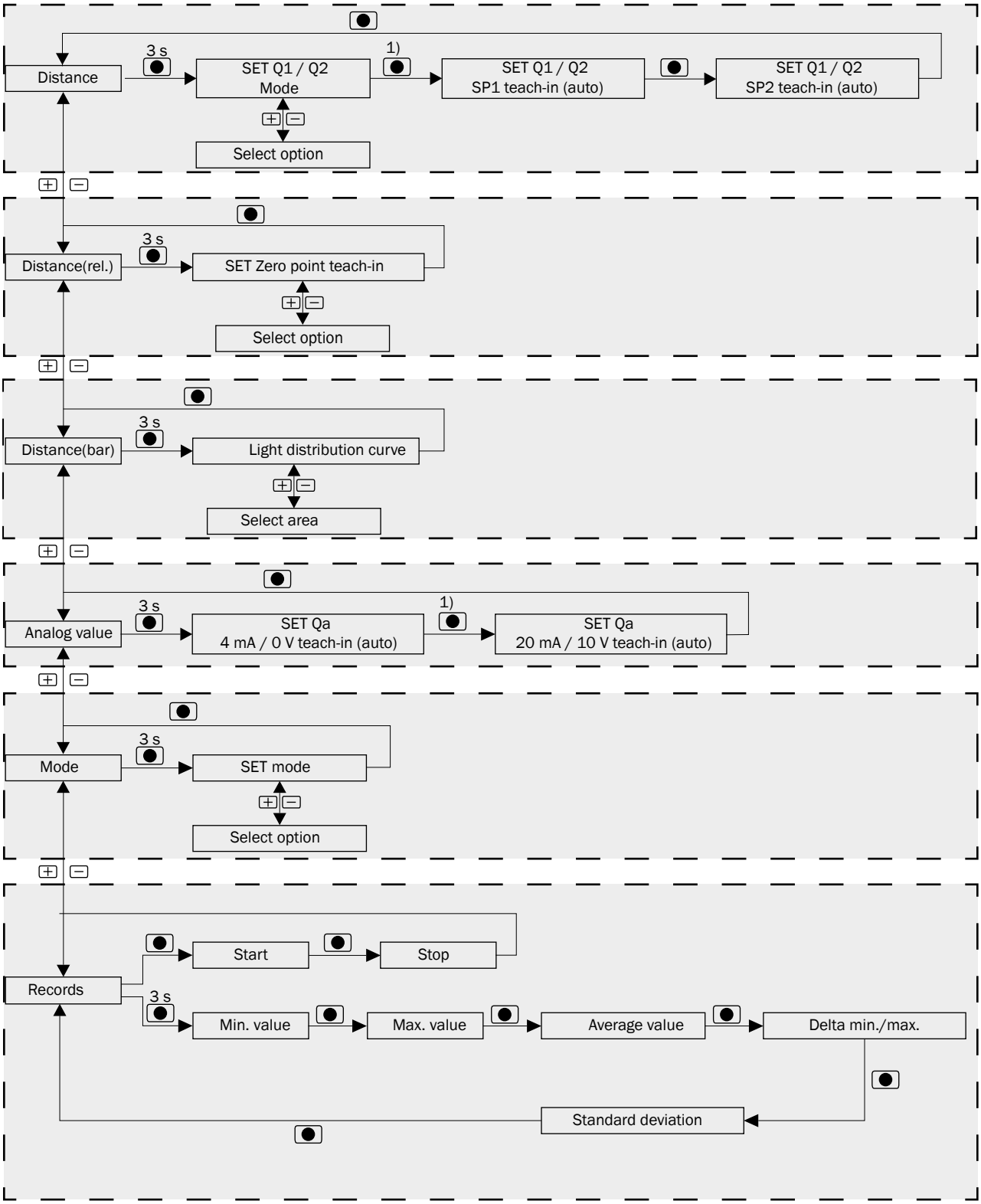
{P/N} corresponds to the part number of the product, see type label.

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

12 Annex

12.1 Menu structure

12.1.1 Quick menu structure



1) Alternative option for setting the switching point or analog value in the quick menu

1 Press the ⊕ or ⊖ pushbutton to record the current distance as a switching point or analog value.
2 Using the ⊕ and ⊖ pushbuttons, adjust the distance in 1/10-mm increments.
3 Press ● to confirm the input.

12.1.2 Menu structure in the main menu

Measurement menu group

⊕/⊖	Cycle time menu	Measurement value filter menu	Measurement direction menu	Setting Measured value offset	**ROI near / ROI far** (Region of interest (ROI) menu)	Error mode menu	**Substitute value** (Error mode menu)	**Error suppression time** (Error mode menu)

Q1 Output menu group

⊕/⊖	**Q1 Mode** (Q1 Output menu group)	SP1, SP2, set signal threshold (Setting the switching point) [1]	**Q1 Min./ Max. Height jump** (Q1 Min./ Max. menu Height jump)	Q1 Jump direction menu	Q1 Cycle offset menu	Q1 / Q2 Switch point logic menu	Q1 / Q2 Timer mode menu	**Q1 Timer setup**	Q1 / Q2 Hysteresis menu	**Q1 Tolerance**

1) SP2 only available in the **Q1 Window (SP1,SP2:Window)** output mode.

Q2 / Q_a output menu group

⊕/⊖	**Q2 Mode** (Q1 Output menu group)	SP1, SP2, set signal threshold (Setting the switching point) [1]	**Q2 Min./ Max. Height jump** (Q1 Min./ Max. menu Height jump)	Q1 Jump direction menu	Q1 Cycle offset menu	Q1 / Q2 Switch point logic menu	Q1 / Q2 Timer mode menu	**Q2 Timer setup**	Q1 / Q2 Hysteresis menu	**Q2 Tolerance**	Setting analog value

1) SP2 only available in the **Q2 Window (SP1,SP2:Window)** output mode.

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	Language menu	Display settings	Sender menu	Output PNP/NPN/PP menu

Info menu group

Status information (Info menu group)

RUN menu group

Open RUN menu.

12.2 Declarations of conformity and certificates

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

The 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.

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