OPERATING INSTRUCTIONS

OD1000

Displacement measurement sensor

SICK
Sensor Intelligence.

Product described

OD1000

Manufacturer

SICK AG
Erwin-Sick-Str. 1
79183 Waldkirch
Germany

Legal information

Original document

This document is an original document of SICK AG.

Contents

1 About this document

1.1 Information on the operating instructions

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

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

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

1.2 Symbols and document conventions

Warnings and other notes

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

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

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

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

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

Instructions to action

► The arrow denotes instructions to action.

1. The sequence of instructions is numbered.
2. Follow the order in which the numbered instructions are given.

✓ The tick denotes the results of an action.

1.3 Further information

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 displacement measurement sensor is an opto-electronic measuring device and is used for optical, non-contact distance measurement of objects.

The required optical properties of the object that will be detected are specified in the technical data section of this document.

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.

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 – 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

A visible red laser is installed in the device. The laser corresponds to laser class 1. The housing is labeled with a warning sign.

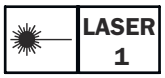


Figure 1: Warning sign on the device: LASER RADIATION: Class 1 Laser Product

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

Type label

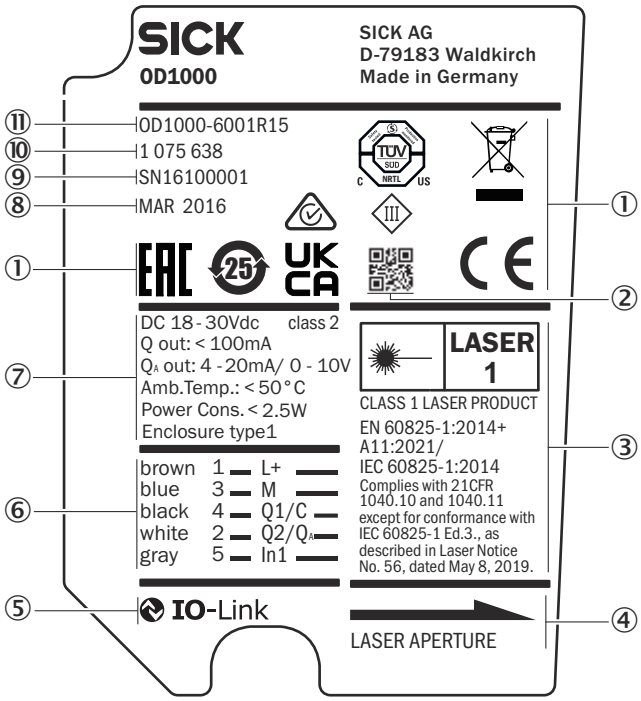


Figure 2: OD1000 type label

① Approval marks and test symbols
② Data Matrix code with part number and serial number
③ Laser information
④ Laser radiation direction
⑤ IO-Link symbol
⑥ Pin assignment
⑦ Electrical data and environmental data
⑧ Month and year of manufacture
⑨ Serial number
⑩ Part number
⑪ Product type

Display

The following information can be accessed via the Info menu on the display:

- **Firmware verification**
- **Serial number**
- **Sensor operating hours**
- **Laser operating hours**
- **Sensor status** (error history)

3.3 Product overview

Product overview

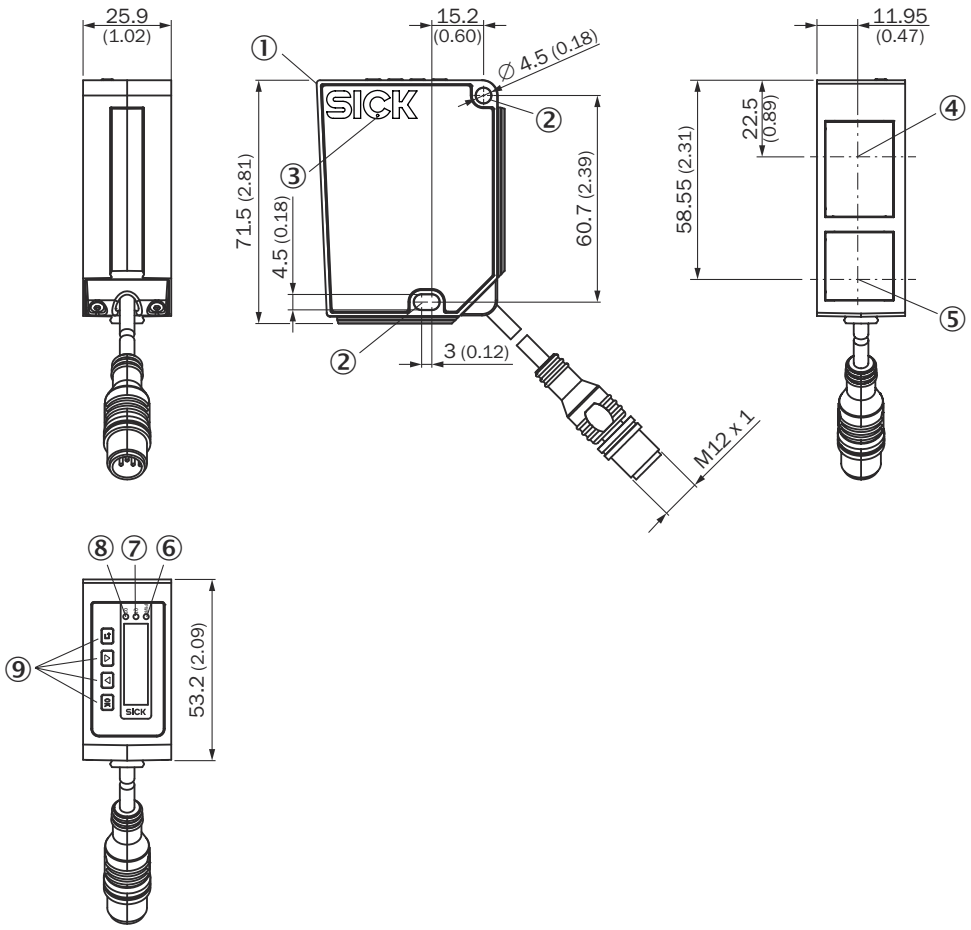


Figure 3: Product overview for OD1000

① Device zero point (distance = 0 mm)
② Ventilation opening, do not cover
③ Fixing holes (M4)
④ Center of optical axis, receiver
⑤ Center of optical axis, sender
⑥ M12 male connector, 5-pin, A-coded
⑦ **PWR** LED, green
⑧ **Q1** LED, yellow
⑨ **Q2** LED, yellow
⑩ Control elements on the display

Further topics

- Dimensional drawing

3.4 Principle of operation

3.4.1 Measurement principle

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

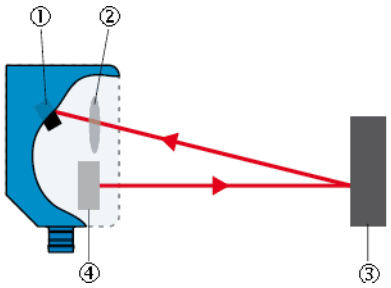


Figure 4: Triangulation principle

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.

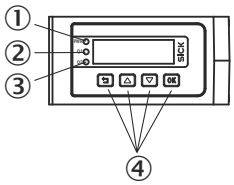
3.4.2 Output of measured values and parameterization

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



① Status-LED PWR (grün)
② Status-LED Q1 (orange)
③ Status-LED Q2 (orange)
④ Bedientasten

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
Q1 (output displays)	☼ ☼ Simultaneous (orange)	Teach-in operation is carried out
	☼ ☼ 5 seconds alternating (orange)	Teach-in operation has failed
	☼ ☼ Permanently alternating (orange)	There is a fault

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

Operating pushbuttons

Button	Function	Description
OK	Open menu, confirm input	• Open menu. • Confirm input. • Switch to the next menu level of a selected function. • Move the cursor to the right when entering numbers.
↰	Cancel	• 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 62.
- 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.

5.2 Mounting device

Approach

1. Mount the device using the designated fixing holes.
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 Prerequisites for safe operation of the device

WARNING
Risk of injury and damage caused by electrical current!

As a result of equipotential bonding currents between the device and other grounded devices in the system, faulty grounding of the device can give rise to the following dangers and faults:

- Dangerous voltages are applied to the metal housings.
- Devices will behave incorrectly or be destroyed.
- Cable shielding will be damaged by overheating and cause cable fires.

Remedial measures

- Only skilled electricians should be permitted to carry out work on the electrical system.
- If the cable insulation is damaged, disconnect the voltage supply immediately and have the damage repaired.
- Ensure that the ground potential is the same at all grounding points.
- Where local conditions do not meet the requirements for a safe earthing method, take appropriate measures. For example, ensure low-impedance and current-carrying equipotential bonding.

The device is connected to the peripheral devices (any local trigger sensor(s), system controller) via shielded cables. The cable shield – for the data cable, for example – rests against the metal housing of the device.

The device can be grounded through the cable shield or through a blind tapped hole in the housing, for example.

If the peripheral devices have metal housings and the cable shields are also in contact with their housings, it is assumed that all devices involved in the installation have the **same ground potential**.

This is achieved by complying with the following conditions:

- Mounting the devices on conductive metal surfaces
- Correctly grounding the devices and metal surfaces in the system
- If necessary: low-impedance and current-carrying equipotential bonding between areas with different ground potentials

If these conditions are not fulfilled, equipotential bonding currents can flow along the cable shielding between the devices due to differing ground potentials and cause the hazards specified. This is, for example, possible in cases where there are devices within a widely distributed system covering several buildings.

Remedial measures

The most common solution to prevent equipotential bonding currents on cable shields is to ensure low-impedance and current-carrying equipotential bonding. If this equipotential bonding is not possible, the following solution approaches serve as a suggestion.

NOTICE
We expressly advise against opening up the cable shields. This would mean that the EMC limit values can no longer be complied with and that the safe operation of the device data interfaces can no longer be guaranteed.

Measures for widely distributed system installations

On widely distributed system installations with correspondingly large potential differences, the setting up of local islands and connecting them using commercially available **electro-optical signal isolators** is recommended. This measure achieves a high degree of resistance to electromagnetic interference.

The use of electro-optical signal isolators between the islands isolates the ground loop. Within the islands, a stable equipotential bonding prevents equalizing currents on the cable shields.

Measures for small system installations

For smaller installations with only slight potential differences, insulated mounting of the device and peripheral devices may be an adequate solution.

Even in the event of large differences in the ground potential, ground loops are effectively prevented. As a result, equalizing currents can no longer flow via the cable shields and metal housing.

NOTICE

The voltage supply for the device and the connected peripheral devices must also guarantee the required level of insulation.

Under certain circumstances, a tangible potential can develop between the insulated metal housings and the local ground potential.

6.2 Wiring instructions

NOTE

Pre-assembled cables 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).

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.

All circuits connected to the device must be configured as SELV or PELV circuits. SELV = safety extra-low voltage, PELV = protective extra-low voltage.

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.

Shielding requirements

- To ensure a fault-free data transmission, an effective and comprehensive shielding solution must be implemented.
- Apply a cable shield at each end, i.e. in the control cabinet and at the device. The cable shield of the pre-assembled cables is connected to the knurled nut and thus also to a large area of the device housing.
- The cable shield in the control cabinet must be connected to a large area of the signal ground.

- Take appropriate measures to prevent equipotential bonding currents flowing through the cable shield.
- During installation, pay attention to the different cable groups. The cables are grouped into the following four groups according to their sensitivity to interference or radiated emissions:
  - Group 1: cables very sensitive to interference, such as analog measuring cables
  - Group 2: cables sensitive to interference, such as device cables, communication signals, bus signals
  - Group 3: cables that are a source of interference, such as control cables for inductive loads and motor brakes
  - Group 4: cables that are a powerful source of interference, such as output cables from frequency inverters, welding system power supplies, power cables
  - ► Cables in groups 1, 2 and 3, 4 must be crossed at right angles (see figure 5).
  - ► Route the cables in groups 1, 2 and 3, 4 in different cable channels or use metallic separators (see figure 6 and see figure 7). This applies particularly if cables of devices with a high level of radiated emission, such as frequency converters, are laid parallel to device cables.

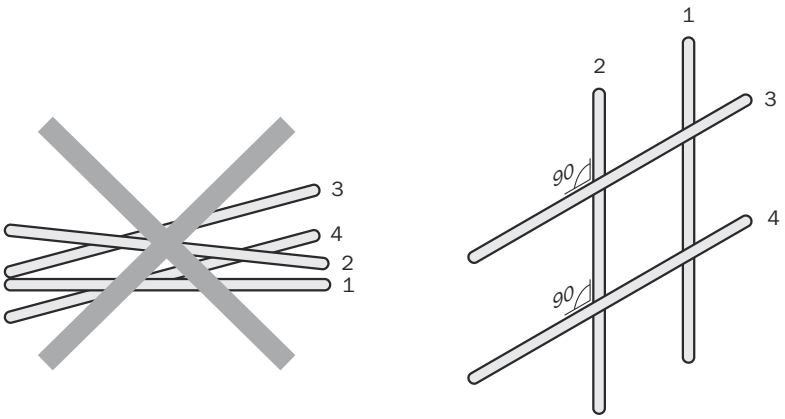


Figure 5: Cross cables at right angles

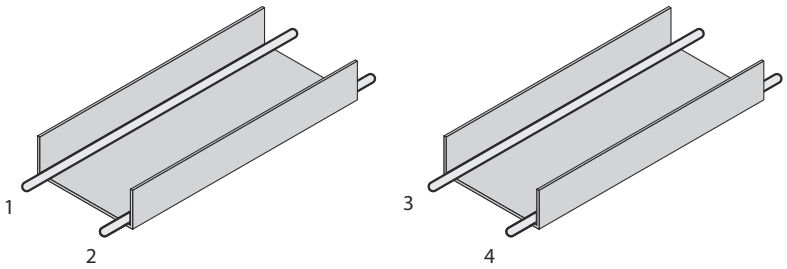


Figure 6: Ideal laying – Place cables in different cable channels

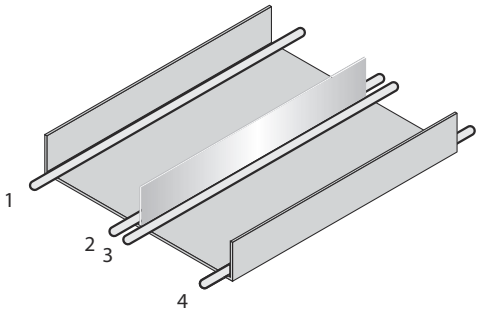


Figure 7: Alternative laying – Separate cables with metallic separators

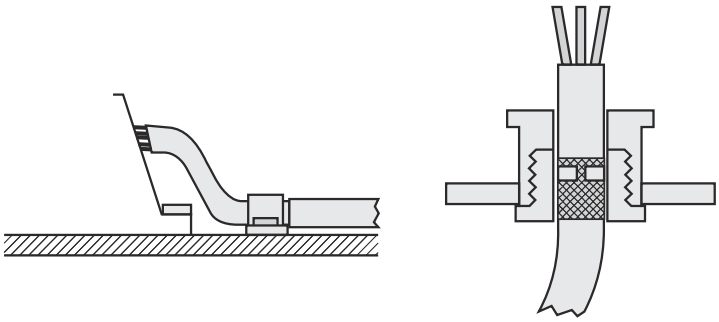


Figure 8: Shield connection in plastic housings

NOTE
Use an appropriate earthing method to prevent equipotential bonding currents flowing through the cable shield.

6.3 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 17.

Pin assignment

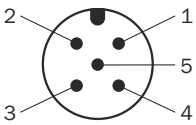


Figure 9: M12 male connector, 17-pin, A-coded

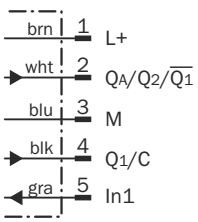


Figure 10: Connection diagram, 5-pin male connector

Contact	Signs	Wire color	Description
1	L+	Brown	Supply voltage, see "Technical data", page 62
2	QA/Q2 / $\overline{Q1}$	White	Output 2: Analog output, digital output 2 (push-pull stage)
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

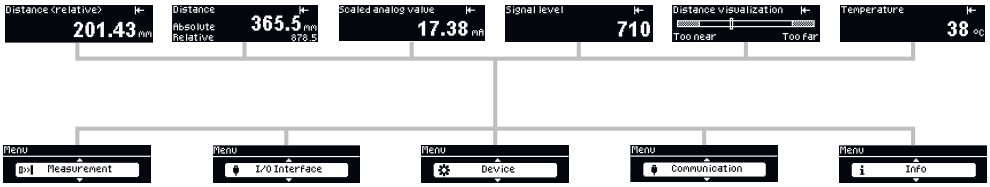
The connection diagram, and information on inputs and outputs, can be found on the side plate on the device.

7 Operation

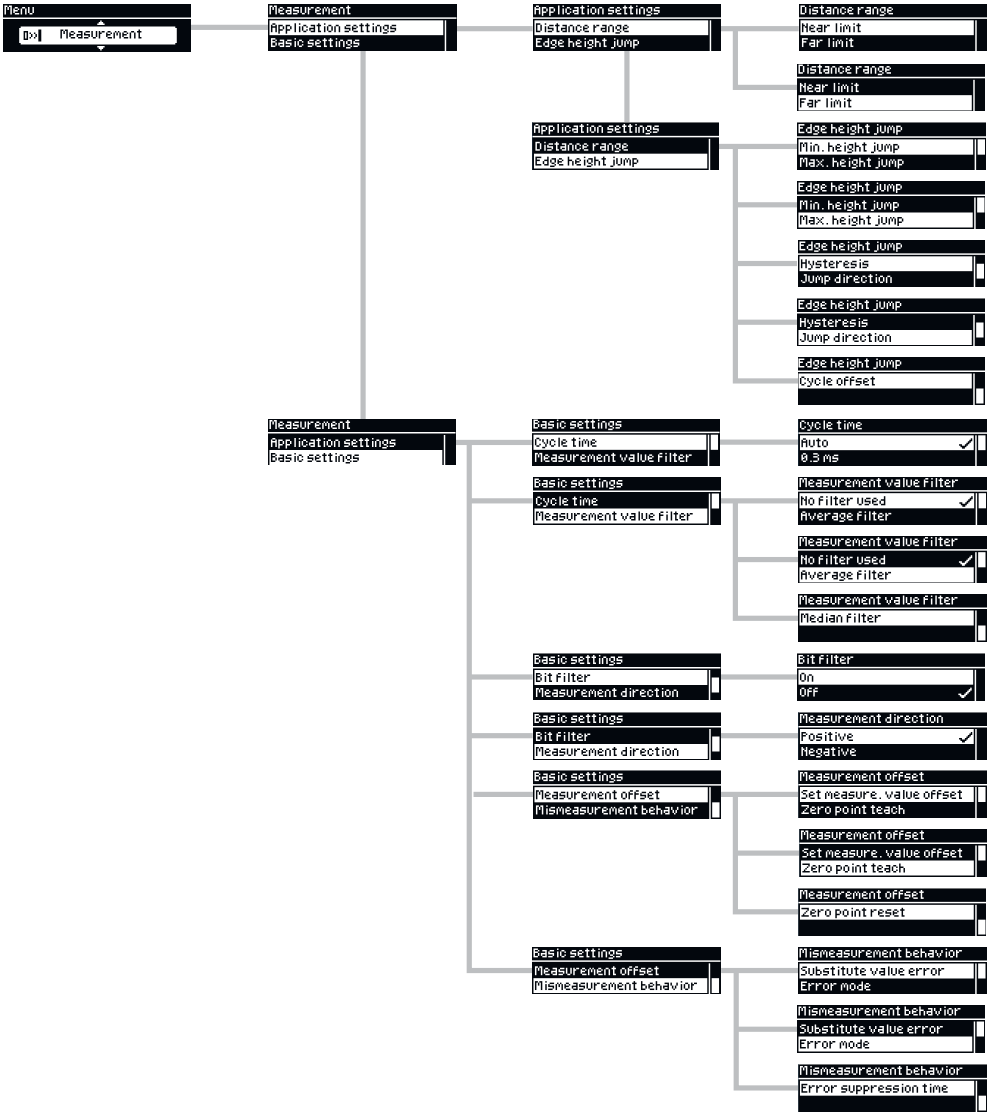
7.1 Operation via pushbuttons and display

7.1.1 Menu structure

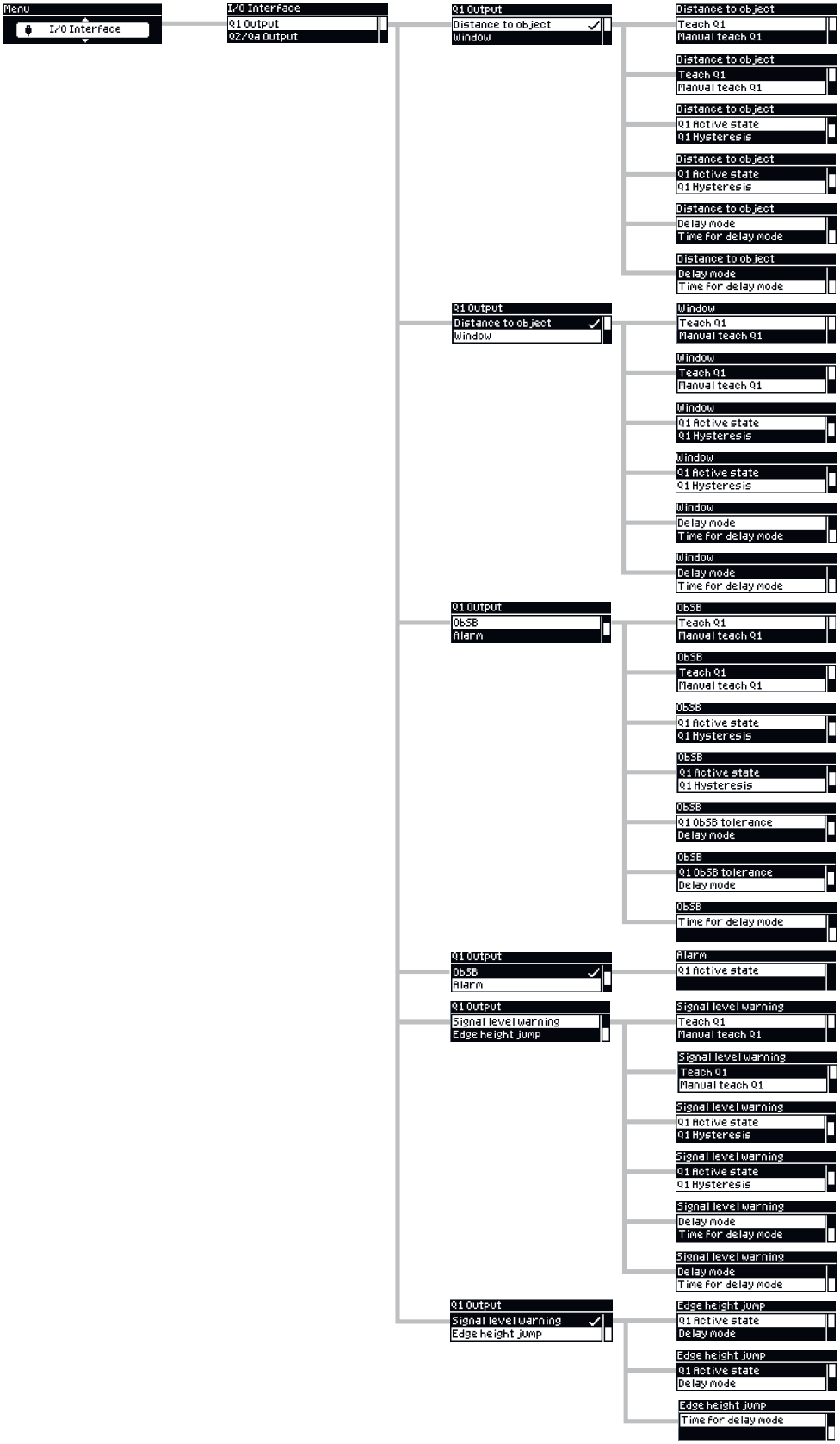
7.1.1.1 Main display level and main menu



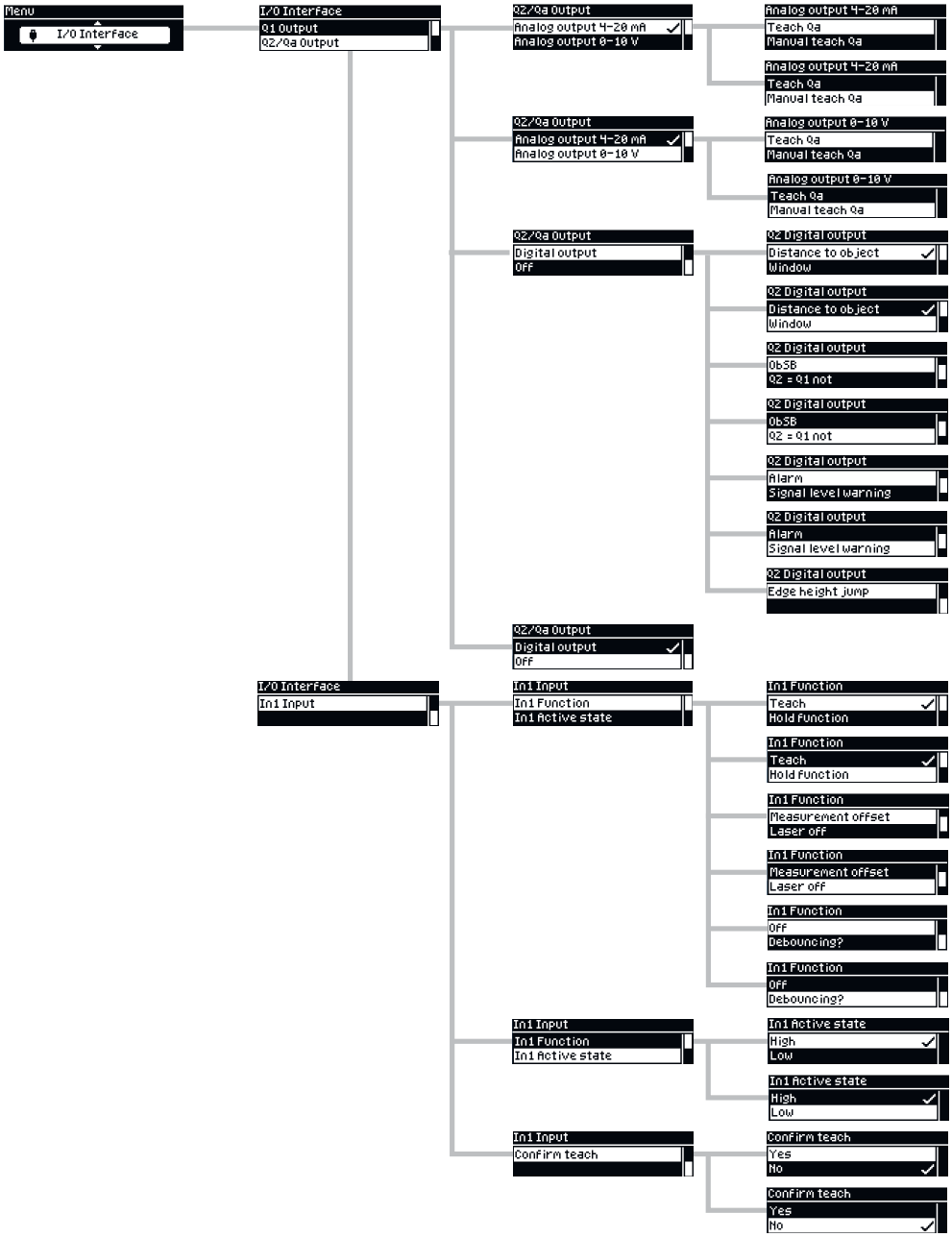
7.1.1.2 Measurement menu group



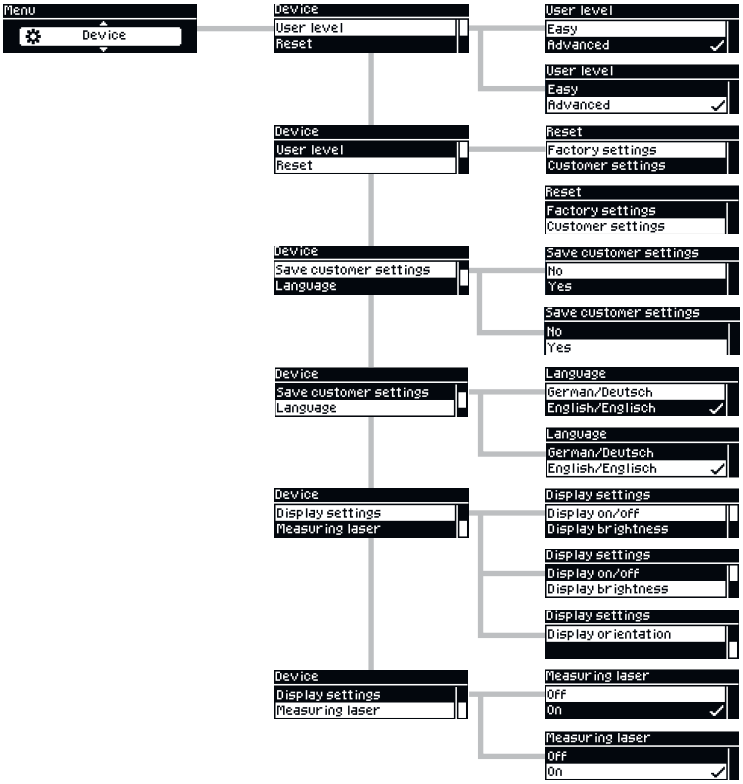
7.1.1.3 I/O interface menu group: Q1 output



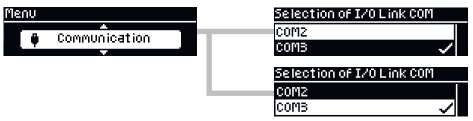
7.1.1.4 I/O interface menu group: Q2/Qa output, In1 input



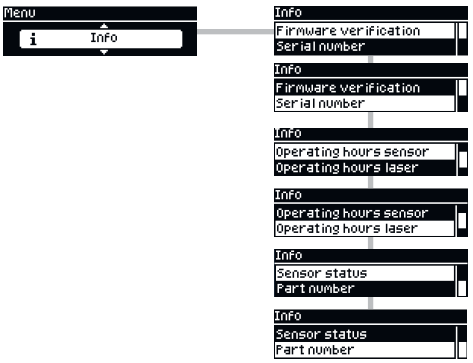
7.1.1.5 Device menu group



7.1.1.6 Communication menu group



7.1.1.7 Info menu group

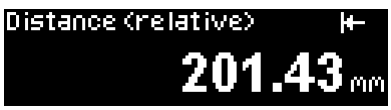


7.1.2 Main display level

As soon as voltage is supplied to the device, the display shows the main display level and a measured value is displayed.

The ▲ / ▼ pushbuttons can be used to switch between the following displays:

- Relative distance measured value:



The (relative) distance value always takes into account the set measured value offset.

- Absolute and relative distance measured value:

Simultaneous display of the distance without (absolute) and with (relative) the set measured value offset.

- Scaled analog value:

The current output value is only displayed when the analog output is activated.

- Signal level:

NOTE

The signal level corresponds to the amount of light received by the device's receiver optics. This is a dimensionless value. It essentially depends on the distance from the measuring object, the surface of the measuring object (color, roughness/gloss, angle to the optical axis), and the cycle time set on the device.

To enable the device to measure the distance correctly, the signal level must not drop below a lower limit value. The dynamics of the device normally regulate the level to ensure an optimized value. Depending on the set cycle time, object properties, and object distance, the signal level may drop below the lower limit value and make it impossible to carry out a measurement. It may be possible to improve the measuring behavior by increasing the cycle time, optimizing the alignment of the device with the object, or reducing the distance to the measuring object.

- Distance visualization:

The cursor gives a qualitative indication of the position within the maximum measuring range.

- Temperature:

The value displays the temperature inside the device and is not relevant for the specified operating temperature range.

7.1.3 Setting parameters

Selecting parameters

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

✓ Next digit flashing.

4. Set the other digits as described.
5. To return to the previous digit, press the OK pushbutton.
6. Set the last digit. Confirm the entry with the OK pushbutton.

✓ The value for the parameter is set.

7. To return to the measured value display, press the OK pushbutton until the measured value is displayed.

Further topics
- Display and control elements

7.1.4 Activating and deactivating the operating button lock

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

► Press and hold the ▲ and ▼ pushbuttons simultaneously for > 3 seconds.

✓ When the pushbutton lock is activated, the padlock symbol appears in the display. When the pushbutton lock is deactivated, the padlock symbol appears in the display.

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

7.2 Operation via SOPAS ET

Version 3.3 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 distance range and edge height jump functions. These functions are only available in the **Advanced** user level.

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).

7.3 Operation via IO-Link

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

Table 3: Properties of the IO-Link interface

IO-Link specification	V 1.1 V 1.0
Minimum cycle time	2.3 ms (COM2) 0.46 ms (COM3)
Transmission rate	Configurable transmission speeds: • COM2 (38.4 kBaud) • COM3 (230.4 kBaud)
Process data width	16-bit outgoing (from the device to the IO-Link master)
Process data type	INT (signed integer)
Parameter configuration server function (data storage)	Yes

7.3.1 Process data

In the factory settings, the process data telegram displays the distance value measured by the device in millimeters (16-bit width unsigned).

By configuring the parameters of the device you can change the process data format as well as resolution and offset for the distance value.

Table 4: Process data formats

No.	Description	Comments
1	Distance (16-bit)	Factory setting
2	Level (16-bit)	-
3	Timer (16-bit)	-
4	Edge height jump (16-bit)	-
5	Distance (14-bit) + Status Q_1 + Status Q_2	-
6	Level (14-bit) + Status Q_1 + Status Q_2	-
7	Timer (14-bit) + Status Q_1 + Status Q_2	-
8	Edge height jump (14 Bit) + Status Q_1 + Status Q_2	-

7.3.2 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).

7.4 Description of operation

7.4.1 Measurement menu group

7.4.1.1 Application settings

The functions are only available in the **Advanced** user level, see "Device menu group", page 54.

7.4.1.1.1 Distance range menu

The **Distance range** function can be used to define an evaluation range in which the device measures object distances. All surrounding ranges are blanked. A typical application is the blanking of a transparent protective screen fitted between the object and the device.

During configuration, note that there is a tolerance range of 15 mm outside the set limits of the distance range. Reliable blanking and detection of objects cannot be ensured within this tolerance range.

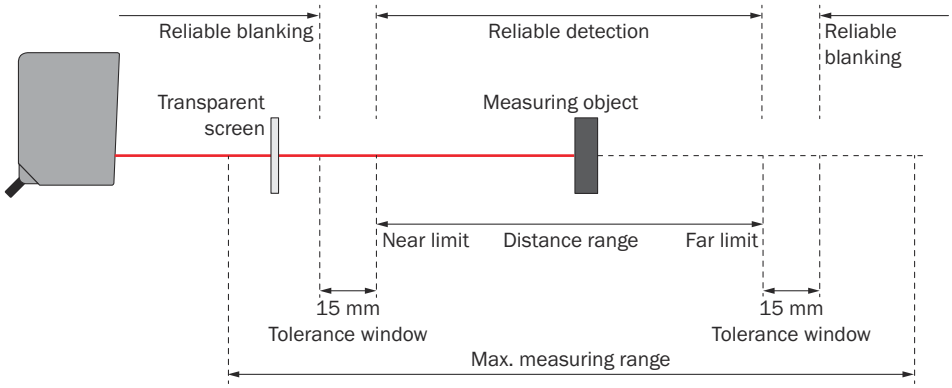


Figure 11: Blanking of a transparent protective screen by establishing the near limit and far limit of the distance range, taking into account the tolerance ranges

① Reliable blanking
② Reliable detection
③ Measuring object
④ Distance range
⑤ Far limit
⑥ Tolerance window
⑦ Maximum measuring range
⑧ Near limit
⑨ Transparent screen

Limits of the distance range

The **near limit** and **far limit** values are the distances in mm which define the limits of the evaluation range.

The **near limit** and **far limit** parameters are product-dependent and are set to the physical limit in the factory settings. The functionality and linear behavior are available in the valid measuring range of 200 mm to 1,000 mm.

As there are limited discretization steps, the device transfers the limit values entered to the next possible distance values (mm). The recalculated value is adopted by the device and is also shown on the display.

The distance range can also be set using the SOPAS ET software, see "Operation via SOPAS ET", page 26.

Setting the near limit and far limit

OK > **Measurement** > OK > **Application settings** > OK > **Distance range** > OK > **Near limit** > OK

OK > **Measurement** > OK > **Application settings** > OK > **Distance range** > OK > **Far limit** > OK

7.4.1.1.2 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

- Select the edge height jump function on the digital output, see "Edge height jump menu", page 45
- Fixed cycle time (recommended), see "Cycle time menu", page 33
- Set the minimum and maximum height jump, see "Edge height jump menu", page 30
- Set the hysteresis (if necessary), see "Edge height jump menu", page 30
- Set the jump direction (if necessary), see "Edge height jump menu", page 30
- Set the cycle offset (if necessary), see "Cycle time menu", page 33

Setting the min. height jump and max. height jump

Min. height jump and **max. 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 jump. The function only takes into account the difference between two measured values and is independent of the absolute distance of the object.

OK > Measurement > OK > Application settings > OK > Edge height change > OK > Min. height change > OK

OK > Measurement > OK > Application settings > OK > Edge height change > OK > Max. height change > OK

Parameter	Value	Factory setting
Min. height jump	-9,999.9 mm ... +9,999.9 mm	10 mm
Max. height jump	-9,999.9 mm ... +9,999.9 mm	100 mm

Setting the hysteresis

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.

OK > Measurement > OK > Application settings > OK > Edge height change > OK > Hysteresis > OK

Parameter	Value	Factory setting
Hysteresis	0 mm ... +100 mm	0.5 mm

Setting the jump direction

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

- **Both**: All changes in measured values within the set limits 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).

OK > Measurement > OK > Application settings > OK > Edge height change > OK > Change direction > OK

Parameter	Value	Factory setting
Jump direction	Both, Positive, Negative	Both

Setting the cycle offset

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

OK > Measurement > OK > Application settings > OK > Edge height change > OK > Cycle offset > OK

Parameter	Value	Factory setting
Cycle offset	1 ... 256	8

Examples of the digital output for the edge height change function

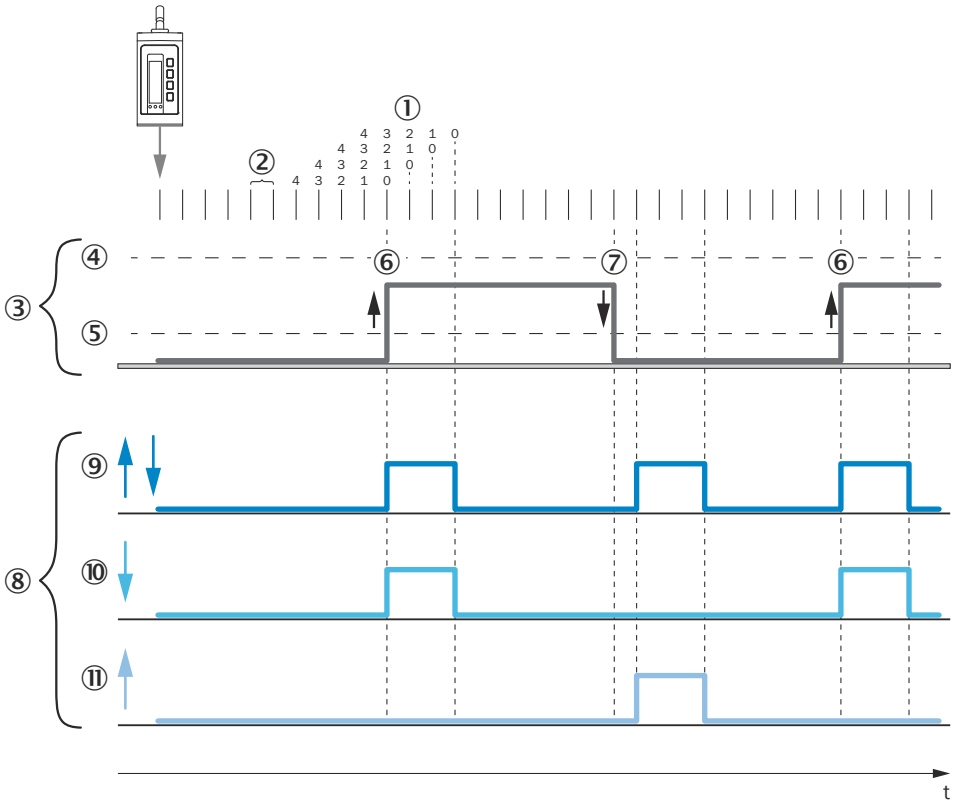


Figure 12: Edge height change - duration of the change in measured value is longer than the time span of the cycle offset

① Cycle offset: 4, without measured value filter
② Cycle time fixed, 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 “Change direction: both” parameter
⑩ “Change direction: negative” parameter
⑪ “Change direction: positive” parameter

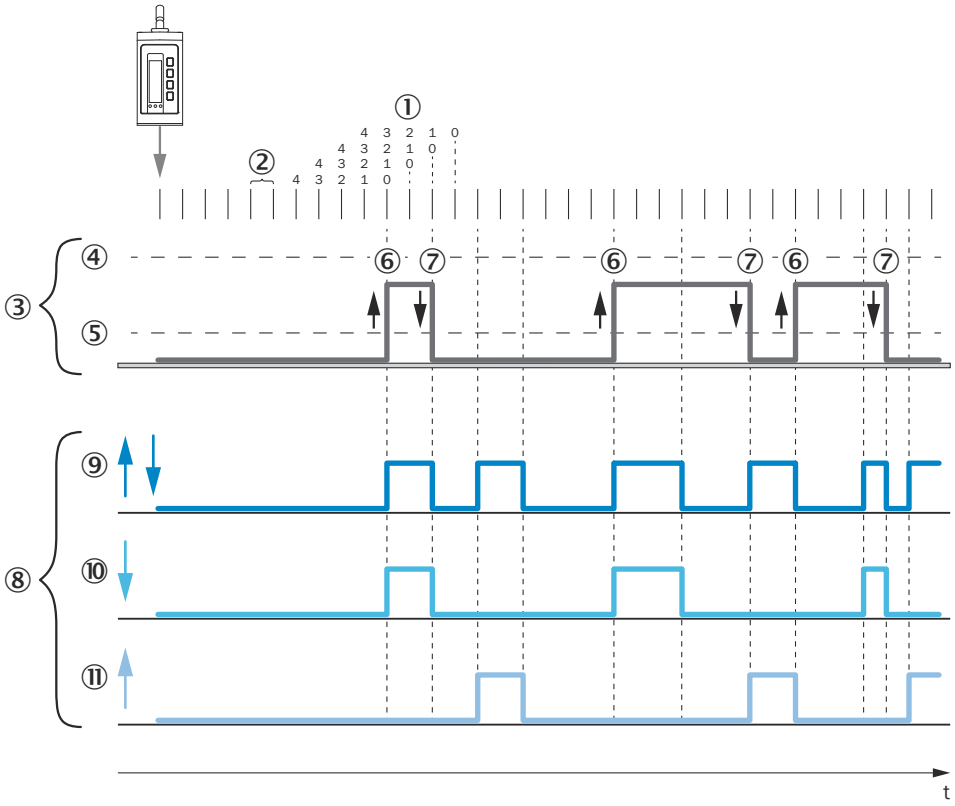


Figure 13: Edge height change - duration of the change in measured value is shorter than the time span of the cycle offset

① Cycle offset: 4, without measured value filter
② Cycle time fixed, 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 “Change direction: both” parameter
⑩ “Change direction: negative” parameter
⑪ “Change direction: positive” parameter

7.4.1.2 Basic settings

7.4.1.2.1 Cycle time menu

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

- **Auto** mode: The device adjusts itself to the maximum speed at which the device achieves a stable measurement, depending on the object surface. In the **Auto** operating mode, the cycle time is adjusted dynamically 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 "Mismeasurement behavior menu", page 38.

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

Setting the cycle time

OK > **Measurement** > OK > **Defaults** > OK > **Cycle time** > OK

Parameter	Value	Factory setting
Cycle time	Auto, 0.3 ms, 0.5 ms, 1 ms, 5 ms, 10 ms	Auto

7.4.1.2.2 Measurement value filter menu

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

Average filter

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

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

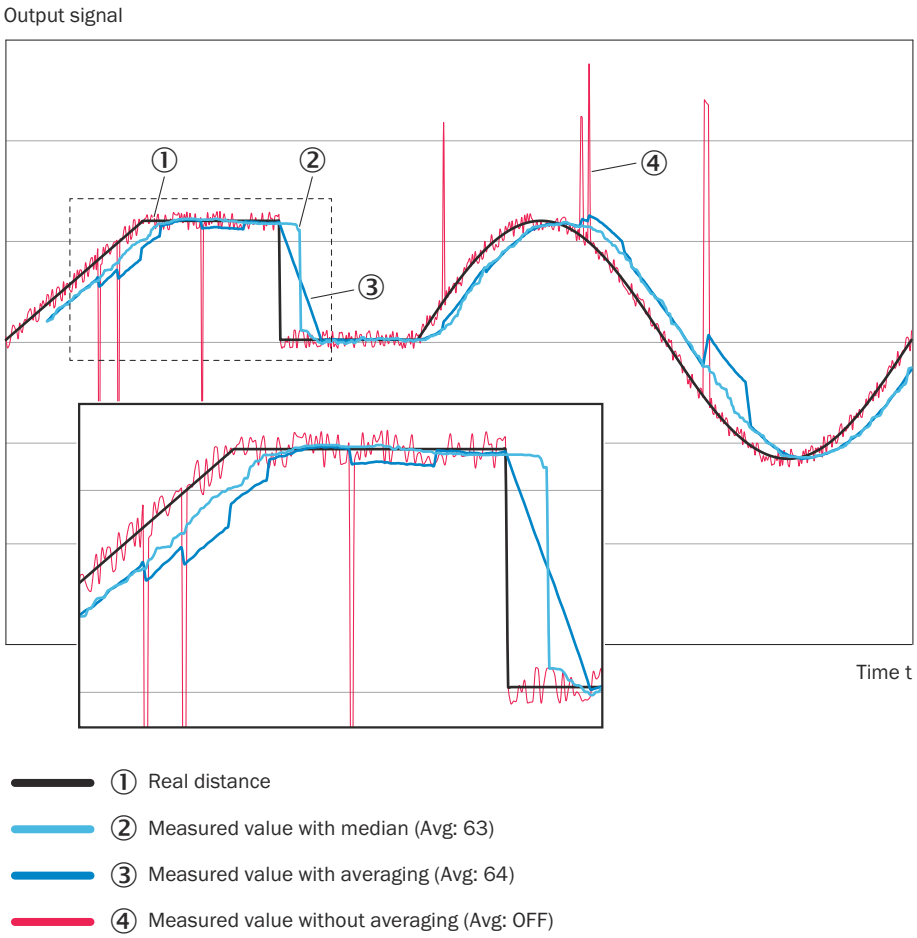
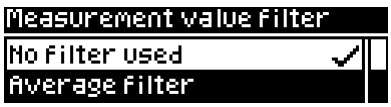


Figure 14: Effect of measured value filters on the output signal based on a distance value curve over time

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

Setting the measured value filter

OK > **Measurement** > OK > **Defaults** > OK > **Measured value filter** > OK



Parameter	Value	Factory setting
Do not use a filter	x	x
Average filter	**4, 8, 16, 32, 64, 512**	-
Median filter	**3, 7, 15, 31, 63, 511**	-

Example Average filter

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

Example Median filter

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

7.4.1.2.3 Bit filter menu

The **bit filter** for digital outputs determines how often an identical output state has to recur consecutively before the signal at the digital output changes accordingly.

If the defined number is not reached, the digital output remains unchanged. This may, for example, increase the reliability in the application if the distance value fluctuates around the selected switching point. This will not affect the cycle time or the output rate.

Setting the bit filter

OK > **Measurement** > OK > **Basic settings** > OK > **Bit filter** > OK

Parameter	Value	Factory setting
Bit filter	**On**: 1 ... 32, **Off**	2

7.4.1.2.4 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

[OK] > Measurement > [OK] > Defaults > [OK] > Measurement direction > [OK]

Parameter	Value	Factory setting
Measurement direction	Positive Negative	Positive

7.4.1.2.5 Measurement offset menu

The measured value offset moves the zero point of the device within the maximum measuring range. This makes it possible to measure absolute distance changes in relation to an individual reference distance.

NOTE
In the case of all offset settings, the current gradient of the analog characteristic curve remains unchanged.

Setting the measured value offset

A manual measured value offset may be set. The distance value that the distance sensor outputs and that is evaluated in the switching functions takes into account the set offset. Only absolute measured values are transferred via IO-Link communication.

Table 5: Example of measured value offset

	Distance (absolute)	Analog output	Set offset
In factory setting	600.0 mm	12.00 mA	-600.0 mm
With offset input +100.0 mm	600.0 mm	14.00 mA	-500.0 mm

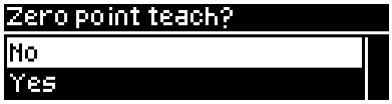
[OK] > Measurement > [OK] > Default settings > [OK] > Measured value offset > [OK] > Set measured value offset > [OK]

Parameter	Factory setting
-1,000.0 m ... +1,000.0 m	-600.0 m

Teaching in the zero point

The current distance is taught in as a new zero point (reference point). When the analog output is activated, the analog value is set to the center of the measuring range at this distance (12 mA / 5 V).

[OK] > Measurement > [OK] > Default settings > [OK] > Measured value offset > [OK] > Teach in zero point > [OK]



NOTE
This function can also be executed using a shortcut:

► In the main display level, press and hold the ⮌ pushbutton for > 3 seconds until the relative distance value is set to 0.0 mm

Resetting the zero point

This resets the zero point to the center of the measuring range according to the factory setting.

OK > **Measurement** > OK > **Default settings** > OK > **Measured value offset** > OK > **Reset zero point** > OK

NOTE
This function can also be executed using a shortcut:

► In the main display level, press and hold the ⮌ pushbutton for > 6 seconds until the relative distance value is set to the factory setting.

7.4.1.2.6 Mismeasurement behavior menu

If a distance measurement cannot be run, an error is output.

Possible causes of faults

- The measuring object is outside of the measuring range.
- The light signal received by the device is not strong enough.
- The laser is switched off.

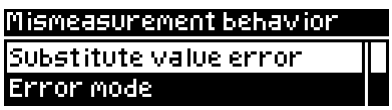
The behavior of the device in the event of faulty measurements is configured via several parameters.

Parameter

- **Substitute value error**: Set a numerical value as a substitute value. The substitute value is output if no measurement is possible.
- **Error mode** > **User-defined values**: If no measurement is possible, the configured **Substitute value error** 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 for defined time**: 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 configured **Substitute value in the event of an error** is displayed and held until a valid measured value is available again.
- **Error suppression time**: Set a time for which the last valid measured value is displayed and held. To use this function, the **Hold last value for defined time** error mode must be activated.

Setting the mismeasurement behavior

OK > **Measurement** > OK > **Basic settings** > OK > **Mismeasurement behavior** > OK



Parameter	Value	Factory setting
Substitute value error	-3,276.8 m ... +3,276.7 m	+3276.7 m
Error mode	User-defined values Hold last value Hold last value for defined time	✓ - -
Error suppression time:	0001 ms ... 9,999 ms	1 ms

7.4.2 I/O interface menu group

7.4.2.1 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.

Available switching modes of the Q1 output:

- **Distance to object**, one switching point
- **Window**, two switching points
- **ObSB** (object between sensor and background), one switching point
- **Alarm** (only in **Advanced** user level)
- **Signal level warning** (only in **Advanced** user level)
- **Edge height jump** (only in **Advanced** user level)

7.4.2.1.1 Setting the switching point

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

The SP2 switching point is only available in the **Window** 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 26.

Teachable parameters

- One switching point (**Distance to object**, **ObSB**): **Teach Q1** > **Q1** or **Q1 Not**
- Two switching points (**Window**, **Signal level warning**): **Teach Q1** > **Switching point 1** or **Switching point 2**

Setting switching point manually

Set the distance of the switching point manually, see "Adjust the value", page 26. The value of the switching point can be set depending on the set number of decimal places.

Adjustable parameters

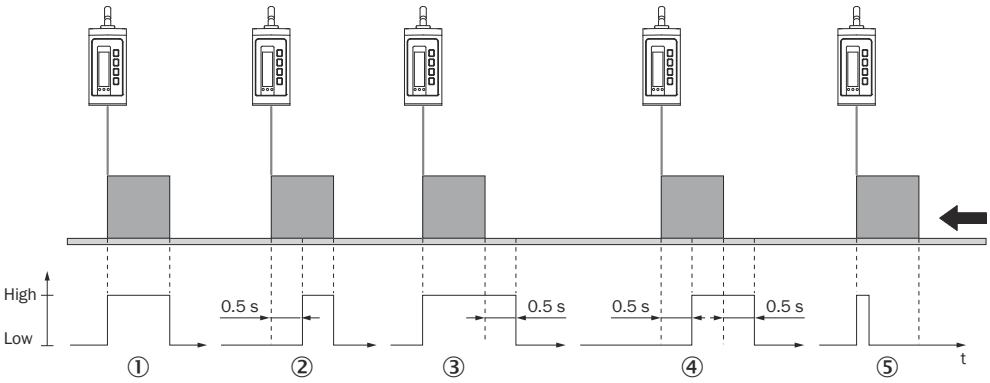
- One switching point (**Distance to object**, **ObSB**): **Manual teach Q1**
- Two switching points (**Window**, **Signal level warning**): **Manual teach Q1** > **Switching point 1** or **Switching point 2**

7.4.2.1.2 Notes on the measuring and setting functions

The following functions can be set independently from each other on both outputs depending on the selected output function.

Delay mode

Delay mode is used to output the output state change with a time delay or as a short switching pulse (**1 shot**).



① **Off**: Right after the measured distance has exceeded the specified switching point, the state of the digital output changes (factory setting).

② **Switch-on delay**: The changeover of the digital output from an inactive to an active state is time-delayed. The delay time is adjustable. The changeover from an active to an inactive state is not delayed.

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

④ **Switch-on/switch-off delay**: The changeover from an inactive to an active state and vice versa is time-delayed. The delay time is adjustable.

⑤ **1 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.

NOTE

For a combination of switch-on delay and switch-off delay, the following conditions must be met:

- Equidistant measuring frequency
- Min. 2x measuring frequency
- Cycle time must not be set to **AUTO**.

Active state

The active status describes the relationship between the output state (active or inactive) and the potential present on the digital output (high or low).

OK > **I/O interface** > OK > **Q1 output** > OK > **Distance to object** > OK

If the **Distance to object** switching mode is selected, the required settings can be taught in or set manually. These are described in the following.

7.4.2.1.3 Distance to object menu (single switching point)

If the measured distance value is below the switching point (N/O contact - “HIGH Active”) or above (N/C contact - “LOW Active”) the switching point, a signal is output.

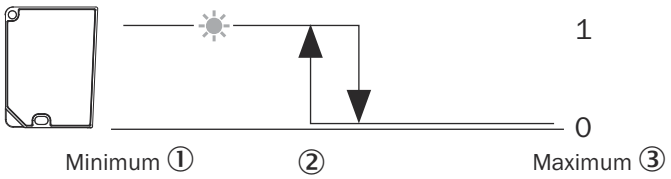


*Figure 15: **Distance to object**, single switching point (N/O contact: HIGH active, PNP)*

① Minimum
② Switching point
③ Maximum

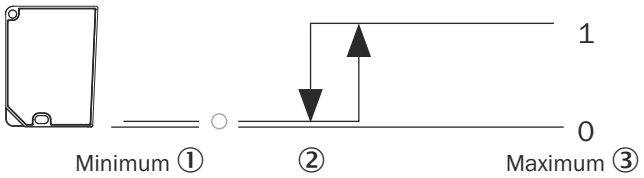


*Figure 16: **Distance to object**, inverted single switching point (N/C contact: LOW active, PNP)*

① Minimum
② Switching point
③ Maximum

If the **Distance to object** switching mode is selected, the required settings can be taught in or set manually.

In Distance to object operating mode, the following settings can be configured:

- **Teach Q1**
- **Manual teach Q1**
- **Q1 active state**
- **Hysteresis**
- **Delay mode**
- **Time for delay mode**

The possible settings are described below.

Teach Q1: A single switching point can be taught in. The switching point is set to the current distance at the time the button is pressed.

- Q1: If the switching point that has been taught in is undershot, a signal is output. Thus the output acts as a normally open contact (“High” active status).
- Q1not: If the switching point that has been taught in is exceeded, a signal is output. Thus the output acts as a normally closed contact (“Low” active status).

Manual teach Q1: The distance of the switching point can be set manually in 1/10 mm.

Q1 active status: The active status specifies the functionality of the digital output, see "Notes on the measuring and setting functions", page 39.

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

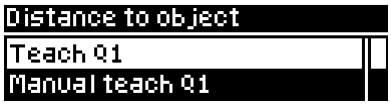
Delay mode

- see "Notes on the measuring and setting functions", page 39 .

Time for delay mode

- The time for the delay mode can be set manually in ms.

OK > **I/O interface** > OK > **Q1 output** > OK > **Distance to object** > OK



Parameter	Factory setting
Teach Q1: **Q1**, **Q1 Not**	-
Manual teach Q1: -1,000.0 mm ... +1,000.0 mm	+400 mm
Q1 active state: **High**, **Low**	**High**
Q1 hysteresis: 0000.0 mm ... +0100.0 mm	+1.0 mm
Delay mode: **Off** **Switch-on delay** **Switch-off delay** **switch-off delay** **1 shot**	 ✓ - - - -
Time for delay mode: 0000 ms ... 9,999 ms	100 ms

7.4.2.1.4 Window menu

Window mode: An upper and a lower switching threshold are set for the digital output. If the measured value is between the two switching thresholds (within the window), a switching signal is output.

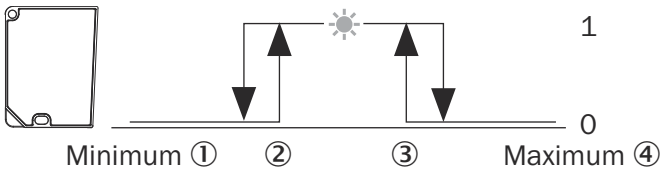


*Figure 17: **Window** (N/O contact: HIGH active, PNP)*

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

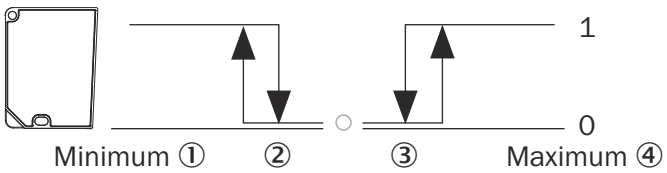


*Figure 18: **Window** (N/C contact: LOW active, PNP)*

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

OK > **I/O interface** > OK > **Q1 output** > OK > **Window** > OK

Parameter	Factory settings
Teach Q1: **Switching point 1**, **Switching point 2**	-
Manual teach Q1: **Switching point 1**: -1,000.0 mm ... +1,000.0 mm **Switching point 2**: -1,000.0 mm ... +1,000.0 mm	 +400.0 mm -400.0 mm
Q1 active state: **High**, **Low**	**High**
Q1 hysteresis: 0000.0 mm ... +0100.0 mm	 +1.0 mm
Delay mode: **Off** **Switch-on delay** **Switch-off delay** **switch-off delay** **1 shot**	 ✓ - - - -
Time for delay mode: 0 ms ... 9,999 ms	100 ms

7.4.2.1.5 ObSB menu (object between sensor and background)

Object between device and background: In this switching mode, any background can be taught in as a reference. If an object obscures the background or the distance to the background changes significantly, this causes the device to switch. This switching mode is primarily suited to the reliable detection of high-gloss or extremely dark materials. This makes it possible, for example, to also detect painted vehicle parts with large approach angles.

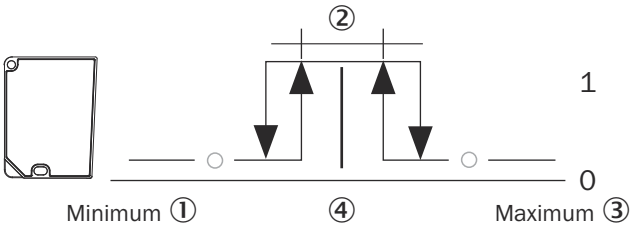


Figure 19: Object between device and background (N/C contact: LOW active, PNP)

① Minimum
② Tolerance around teach point: ± 4.0 mm
③ Maximum
④ Switching point (reference background)

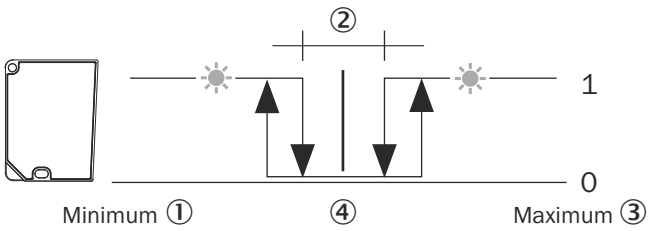


Figure 20: Object between device and background (N/O contact: HIGH active, PNP)

① Minimum
② Tolerance around switching point: ± 4.0 mm
③ Maximum
④ Switching point (reference background)

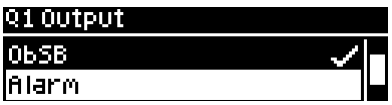
OK > I/O interface > OK > Q1 output > OK > ObSB > OK

Parameter	Factory setting
Teach Q1: **Q1, Q1 Not**	-
Manual teach Q1: -1,000.0 mm ... +1,000.0 mm	+400 mm
Q1 active state: **High, Low**	**High**
Q1 hysteresis: 0000.0 mm ... +0100.0 mm	+1.0 mm
Q1 ObSB tolerance: -1,000.0 mm ... +1,000.0 mm	+4.0 mm
Delay mode: **Off, Switch-on delay, Switch-off delay, switch-on delay, 1 shot**	**Off**
Time for delay mode: 0000 ms ... 9,999 ms	100 ms

7.4.2.1.6 Alarm menu

The **Alarm** function is only available in the **Advanced** user level. A constant switching signal is output at the output of the device while no measurement is possible. This function can be used to evaluate the measured value at the analog output, for example.

OK > I/O interface > OK > Q1 output > OK > Alarm > OK



Parameter	Factory settings
Alarm	**Off**

7.4.2.1.7 Signal level warning menu

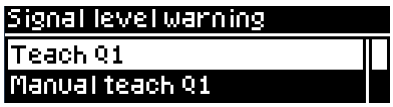
The **Signal level warning** function is only available in the **Advanced** user level.

A warning can be output via the Q1 and Q2 digital outputs if the signal level drops below a certain value. This value can either be specified as a number value or determined by the **Teach-in** function. When the **Teach-in** function is used, the threshold value for outputting the warning is calculated by reducing the measured signal level value by about 12%. Then the warning will not be output until the signal level is about 12% lower than it was at the time it was taught in.

The level warning threshold or signal level switching point can be set manually using a signal level within the value range of 0 to 5,000. The signal level is a sensor-specific, unitless value. We recommend configuring the setting using application-specific test measurements.

In automated mode, the device automatically regulates the reception level to around 1,000. In the case of very critical object surfaces, an abrupt loss of signal can therefore occur as soon as a readjustment is no longer possible. In settings other than **Auto**, there is no automatic adjustment, which makes it easier to define thresholds for the signal level warning.

OK > **I/O interface** > OK > **Q1 output** > OK > **Signal level warning** > OK



Parameter	Factory settings
Teach Q1: **Switching point 1**, **Switching point 2**	-
Manual teach Q1: -0 mm ... 5,000 mm	112 mm
Q1 active state: **High**, **Low**	**High**
Q1 hysteresis: 0 mm ... 10,000 mm	10 mm
Delay mode: **Off**, **Switch-on delay**, **Switch-off delay**, **switch-on delay**, **1 shot**	Off
Time for delay mode: 0000 ms ... 9,999 ms	100 ms

7.4.2.1.8 Edge height jump menu

The edge height jump function is only available in the **Advanced** user level, see "Device menu group", page 54.

OK > **I/O interface** > OK > **Q1 output** > OK > **Edge height change** > OK

Parameter	Factory settings
Q1 active state: **High**, **Low**	**High**
Delay mode: **Off**, **Switch-on delay**, **Switch-off delay**, **ON/OFF delay**, **1 shot**	**Off**
Time for delay mode: 0000 ms ... 9,999 ms	100 ms

7.4.2.2 Q2 / Qa Output menu group

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

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.

7.4.2.2.1 Notes on the output functions

7.4.2.2.1.1 4-20 mA output function

If the 4-20 mA setting is selected, output 2 functions as an analog current output. The measured value of the device is output as a proportional-linear current value that corresponds to the other device settings.

7.4.2.2.1.2 0-10 V output function

If the 0 - 10 V setting is selected, output 2 functions as an analog voltage output. The measured value of the device is output as a proportional-linear voltage value that corresponds to the other device settings.

7.4.2.2.1.3 Digital output function

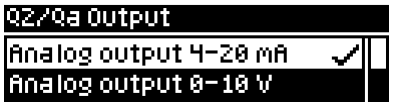
In the case of the digital output function, output 2 functions as a digital output. Since output 1 is used exclusively for switching, this setting corresponds to the behavior of output 1. A switching signal that corresponds to the other device settings is output based on the current measured value.

7.4.2.2.1.4 Off output function

When the **Off** output function is activated, output 2 does not have any function and is therefore deactivated.

7.4.2.2.2 Analog output 4-20 mA menu

OK > I/O interface > OK > Q2/Qa output > OK > 4-20 mA analog output > OK



Parameter	Factory setting
Teach Qa: Distance (4 mA) Distance (20 mA)	 - -
Manual teach Qa: Distance (4 mA): -1,000.0 mm ... +1,000.0 mm Distance (20 mA): -1,000.0 mm ... +1,000.0 mm	 -400.0 mm +400.0 mm

7.4.2.2.3 Analog output 0-10 V menu

OK > I/O interface > OK > Q2/Qa output > OK > 0-10 V analog output > OK

Parameter	Factory setting
Teach Qa: **Distance (0 V)** **Distance (10 V)**	 - -
Manual teach Qa: **Distance (0 V)**: -1,000.0 mm ... +1,000.0 mm **Distance (10 V)**: -1,000.0 mm ... +1,000.0 mm	 -400.0 mm +400.0 mm

7.4.2.2.4 Digital output menu

The Q2 digital output provides the following switching modes:

- **Distance to object**, one switching point
- **Window**, two switching points
- **ObSB** (object between sensor and background), one switching point
- **Q2 = Q1 Not**
- **Alarm** (only in **Advanced** user level)
- **Signal level warning** (only in **Advanced** user level)
- **Edge height jump** (only in **Advanced** user level)

OK > **I/O interface** > OK > **Q2/Qa output** > OK > **Digital output** > OK

Parameter	Factory setting
Distance to object > **Teach Q2:** **Q2**, **Q2 Not**	-
Distance to object > **Manual teach Q2:** -1,000.0 mm ... +1,000.0 mm	+400.0 mm
Distance to object > **Q2 Active state:** **High**, **Low**	**High**
Distance to object > **Q2 Hysteresis:** 0000.0 mm ... +0100.0 mm	+1.0 mm
Distance to object > **Delay mode:** **Off**, **Switch-on delay**, **Switch-off delay**, **switch-on delay**, **1 shot**	**Off**
Distance to object > **Time for delay mode:** 0000 ms ... 9,999 ms	100 ms
Window > **Teach Q2:** **Switching point 1**, **Switching point 2**	-
Window > **Manual teach Q2:** **Switching point 1**, **Switching point 2**	-
Window > **Q2 Active state:** **High**, **Low**	**High**
Window > **Q2 Hysteresis:** 0000.0 mm ... +0100.0 mm	+1.0 mm
Window > **Delay mode:** **Off**, **Switch-on delay**, **Switch-off delay**, **switch-on delay**, **1 shot**	**Off**
Window > **Time for delay mode:** 0000 ms ... 9,999 ms	100 ms
ObSB > **Teach Q2:** **Q2**, **Q2 Not**	-

Parameter	Factory setting
ObSB > Manual teach Q2: -1,000.0 mm ... +1,000.0 mm	+400.0 mm
ObSB > Q2 Active state: **High, Low**	High
ObSB > Q2 Hysteresis: 0000.0 mm ... +0100.0 mm	+1.0 mm
ObSB > Q2 ObSB tolerance: -1,000.0 mm ... +1,000.0 mm	+4.0 mm
ObSB > Delay mode: **Off, Switch-on delay, Switch-off delay, switch-on delay, 1 shot**	**Off**
ObSB > Time for delay mode: 0000 ms ... 9,999 ms	100 ms

7.4.2.2.5 Off menu

If the **Off** output mode is activated, the Q2 output has no function and is deactivated.

7.4.2.3 In1 Input menu group

7.4.2.3.1 Notes on the input functions

7.4.2.3.1.1 Description

The IN1 Input input is used for the following tasks:

- Configuration of various device parameters, see "Teach-in", page 50
- Switching the laser on or off at defined times

If the function is set to **Teach** (factory setting), the specific parameters or different measured value hold functions can be configured by creating signal levels of different lengths at pin 5. If the function is set to **Laser off**, when a signal is created the laser is switched off for the duration of the created signal.

The **In1 Input** must be active in order to be used accordingly (every setting apart from **Off**). The **Off** setting deactivates the input and, therefore, all functions.

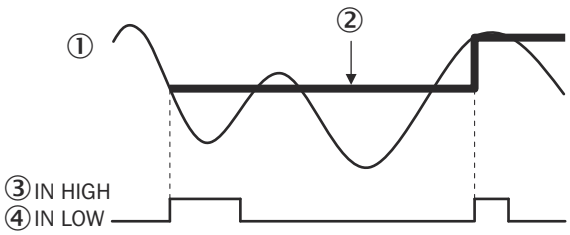
NOTE
Deactivating the input is possible only via the display, SOPAS ET, or IO-Link, but not via the input itself.

The input behavior can be selected as normally open (“HIGH active”, factory setting) or normally closed (“LOW active”). When **Laser off** is used, the logic also determines whether the creation of a signal at the input causes the laser to switch off (factory setting) or on.

7.4.2.3.1.2 IN Hold function menu

Measured value menu

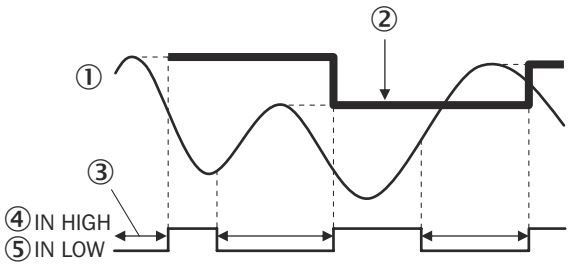
Hold the measured value that is present at the HIGH input status (rising edge).



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

Peak value menu

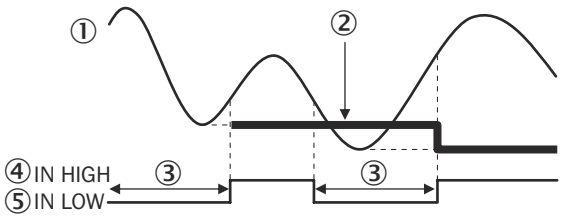
Hold the largest measured value that is present in the time interval between the last falling edge and the HIGH input status (next rising edge).



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

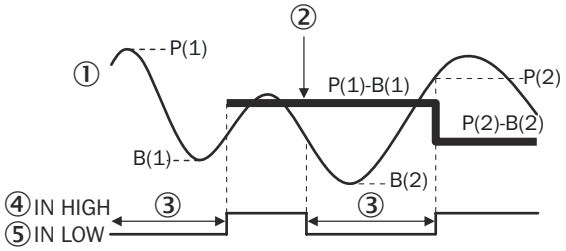
Hold the smallest measured value that is present in the time interval between the last falling edge and the HIGH input status (next rising edge).



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

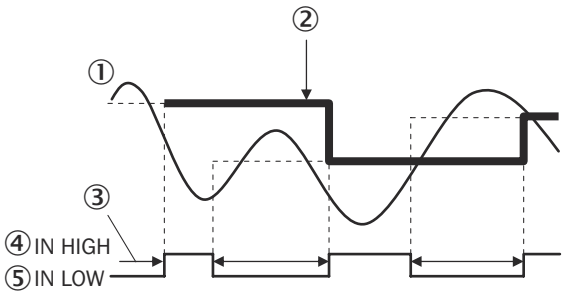
Hold the differential value between the smallest and the largest measured value present in the interval between the last falling edge and the HIGH input status (next rising edge).



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

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

7.4.2.3.1.3 Teach-in

In **Teach** operating mode, you can use various teach functions by creating signal levels of various lengths at the **In1 Input**.

The timing tolerance for all teach functions is +/- 20 ms.

Table 6: Available functions

Self-learning function	Time [ms]
Switching off laser	200
Switching on laser	300
Distance to object for Q_1: Teach Q	400
Distance to object for Q_1: Teach Q Not	500
Window for Q_1: Teach Q near	600
Window for Q_1: Teach Q far	700
ObSB (background) for Q_1: Teach Q	800
ObSB (background) for Q_1: Teach Q Not	900
Window for Q_1: Centering teach	1000
Distance to object for Q_2: Teach Q	1100

Self-learning function	Time [ms]
Distance to object for Q_2: Teach Q Not	1200
Window for Q_2: Teach Q near	1300
Window for Q_2: Teach Q far	1400
ObSB (background) for Q_2: Teach Q	1500
ObSB (background) for Q_2: Teach Q Not	1600
Window for Q_2: Centering teach [1]	1700
Q_A with 4-20 mA for Q_2: Teach 4 mA	1800
Q_A with 4-20 mA for Q_2: Teach 20 mA	1900
Q_A with 0-10 V for Q_2: Teach 0 V	2000
Q_A with 0-10 V for Q_2: Teach 10 V	2100
Q_A (4-20 mA or 0-10 V): Centering teach [1]	2200
Switching off teach confirmation	2300
Switching on teach confirmation	2400
Signal level warning Q_1: Teach Q	2500
Signal level warning Q_1: Teach Q not	2600
Signal level warning Q_2: Teach Q	2700
Signal level warning Q_2: Teach Q not	2800
Teaching in the zero point	2900
Laser off	> 5,000

[1] Centering limits; the near points and far points that have been moved via centering must always lie within the value range limits. Moved points must always be evaluated by the user.

7.4.2.3.2 In1 Function menu

Use the In1 Function for the following tasks:

- Configure various device parameters
- Switch the laser on and off at defined times
- Activate device functions
- Activate and deactivate the debounce function

> **I/O interface** > OK > **In1 input** > OK > **In1 function** > OK

Parameter	Factory setting
Teach	✓
Hold function	-
Measurement offset	-
Laser off	-
Off	-

Debouncing

The debounce function is only available in the **Advanced** user level.

When debouncing is activated, the input signal must be applied constantly to input In1 for 30 ms. The timing tolerances of the external teach-in functions take into account an activation or deactivation of the debounce function. It is not necessary to adjust the timings.

> I/O interface > OK > In1 input > OK > In1 function > OK > Debouncing> OK

Parameter	Factory setting
Debouncing?: Yes, No	Yes

7.4.2.3.3 In1 Active state menu

The input behavior can be selected as normally open (“HIGH active”, factory setting) or normally closed (“LOW active”).

OK > I/O interface > OK > In1 input > OK > In1 active status > OK

Parameter	Factory setting
High, Low	High

7.4.2.3.4 Confirm teach menu

If the **Teach-in confirmation** function is activated, a confirmation can be output via the digital output Q1 for each teach-in via the In1 input.

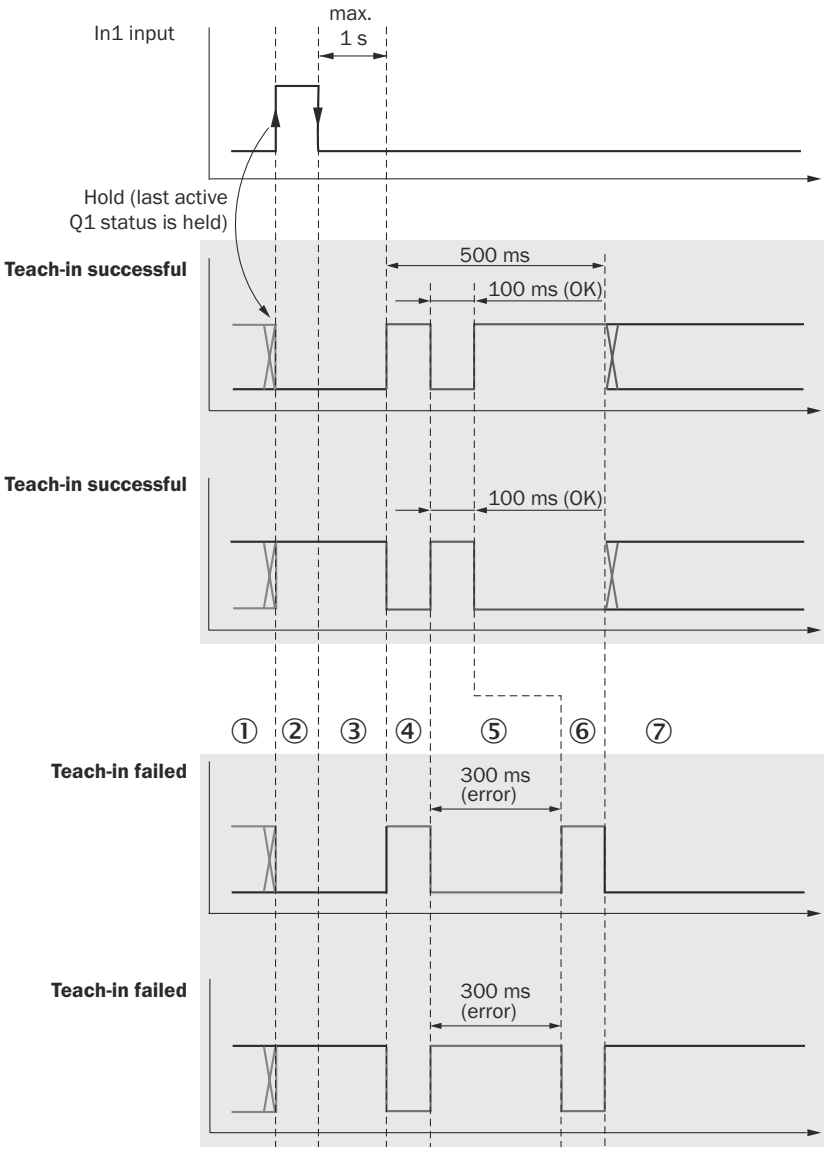


Figure 21: ***Confirm teach***

① Input In1
② Hold (last active Q1 status is held)
③ Teach-in successful
④ Digital output before teach-in
⑤ Teach-in request retains the last active Q_1 status in order, for example, to avoid toggling if hysteresis is too low.
⑥ Teach-in execution time, max. 1 s
⑦ First signal edge at Q_1 after starting the teach-in: Initiate confirmation by inverting for 100 ms.
⑧ Result: OK (100 ms), error (300 ms)
⑨ Quit confirmation after 500 ms.
⑩ Return to current digital output. The digital output can be modified via a new teach-in point.
⑪ Teach-in failed
⑫ Error

OK > **I/O interface** > OK > **In1 input** > OK > **Teach confirmation** > OK

Parameter	Factory setting
Yes, No	No

7.4.3 Device menu group

7.4.3.1 User level menu

Simple and **Advanced** user levels are available.

Only certain functions are available depending on the user level set:

- Easy: frequently required functions (factory setting)
- Advanced: virtually all available functions

Changing the user level only affects operation via the display and via SOPAS ET. All functions are available at all times for operation and configuration via IO-Link.

OK > Device > OK > User level > OK

Parameter	Factory setting
Easy, Advanced	Easy

7.4.3.2 Reset the device

The device can be reset to the factory settings or to saved customer settings.

NOTE
While the device is being reset, the device and its functions are briefly unavailable.

Reset the device to factory settings

OK > Device > OK > Reset > OK > Factory settings > OK

Parameter	Value	Factory setting
Reset factory settings	No Yes	-

Resetting device to customer settings

OK > Device > OK > Reset > OK > Customer settings > OK

Parameter	Value	Factory setting
Reset customer settings	No Yes	-

7.4.3.3 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 54.

OK > Device > OK > Save customer settings > OK

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

Parameter	Value	Factory setting
Save customer settings	No Yes	-

7.4.3.4 Language menu

The language of the display texts can be set.

OK > Device > OK > Language > OK

Parameter	Value	Factory setting
Language	English/English German/German Spanish/Spanish Japanese/Japanese Chinese/Chinese	English/English

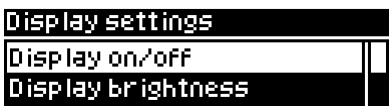
7.4.3.5 Display settings menu

Settings can be made for the alignment, brightness, and switch-on/switch-off behavior of the display.

Description of the parameters for the switch display on/off function:

- **Auto**: The display switches itself off if no buttons are pressed for 3 minutes. The display switches on again when a button is pressed.
- **Off**: The display switches itself off when the button lock is activated. If the button lock is not activated, the display switches itself off if no buttons are pressed for 3 minutes. The display switches on again when a button is pressed.
- **On**: The display remains permanently on. This setting is not recommended as it can reduce the service life of the OLED display.

OK > Device > OK > Display settings > OK



Parameter	Factory setting
Display on/off: Auto, Off, On	Auto
Display brightness: 0 % ... 100 %	50 %
Display alignment: 0°, 180°	0°

7.4.3.6 Measuring laser menu

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

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

OK > Device > OK > Measurement laser > OK

Parameter	Value	Factory setting
Measuring laser	Off To	To

7.4.4 Communication menu group

IO-Link COM selection

The IO-Link communication mode of the device can be set. Associated IODD device description files are available for download on the online product page.

OK > Communication

Parameter	Factory setting
COM2, COM3	COM3

7.4.5 Info menu group

Various types of status information are displayed for the device.

7.4.5.1 Firmware verification

The firmware version of the device is displayed.

OK > Info > OK > Firmware verification > OK

7.4.5.2 Serial number

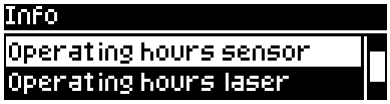
The serial number of the device is displayed.

OK > Info > OK > Serial number > OK

7.4.5.3 Sensor operating hours

The operating hours of the device are displayed.

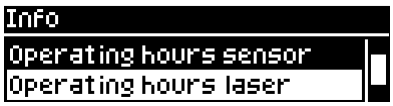
OK > Info > OK > Sensor operating hours > OK



7.4.5.4 Laser operating hours

The operating hours of the laser are displayed.

OK > Info > OK > Laser operating hours > OK



7.4.5.5 Sensor status

Information about the status of the device is displayed.

The following data can be accessed:

- Number of errors: States the number of errors that have occurred
- Number of warnings: States the number of active warnings
- Error history: Detailed information and history of the most recent errors (max. 10)

OK > Info > OK > Sensor status > OK

Parameter	Factory setting
Number of errors, number of warnings, error history	-

7.4.5.6 Part number

The part number of the device is displayed.

OK > Info > OK > Part number > OK

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 7: 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 Troubleshooting

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.

Problem	Possible causes	Troubleshooting
The device does not display a measurement or measurement is not possible.	• Laser of the device is not activated. • Laser spot not aimed at object. • Light path is obscured. • Object is outside the measuring range. • Receiver element of the device not receiving sufficient light. • Reflective surfaces are present.	The following functions are only available in the **Advanced** user level. • Check and, if necessary, correct the alignment of the device. • Check whether the laser of the device is activated. • Check whether the laser spot is aimed at the object. • Make sure that the light path is clear. • Make sure that the object is within the measuring range of the device. • Check the light distribution curve in SOPAS ET. This function is only available in the **Advanced** user level. The light distribution curve shows whether the receiver element of the device is receiving light. In this case, the light distribution curve normally displays a maximum within the area shown. This graphic visualizes the light reflectance on the receiver element. • Check the surface characteristics.
The display shows a warning triangle in the top right. Measurement not possible.	• Light path obscured • Object outside the measuring range • Specular surfaces	• Make sure that the light path is clear. • Make sure that the object is within the measuring range of the device. • Check the surface characteristics.

Problem	Possible causes	Troubleshooting
Electromagnetic fault	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 Detecting and displaying errors

In addition to measurement errors (see "Mismeasurement behavior menu", page 38), the device can also detect and display other errors. The errors are outputted via the display, SOPAS ET or IO-Link.

Error memory

The device has an error memory where its internal error states are recorded. The last error to have occurred is always saved. The content of the error memory is retained when the device is switched off and when the **Reset** > **Factory settings** function is used.

Possible errors

Table 8: Explanation of the error codes

Error code	SOPAS ET hexadecimal code / device status	Meaning	Troubleshooting
-	- / No signal	No measurement possible	• Check the measuring range. • Increase the cycle time setting. • Decrease the distance to the object. If the error cannot be rectified, contact SICK Service.
-	- / Laser switched off	Laser is deactivated	Turn laser on.
Temperature error	0x50 / Temperature error 0x10 / Temperature warning	Operating temperature undershot or exceeded	Check the ambient temperature. Increase or decrease, if necessary.
Laser error	0x11 / Laser warning 0x60 / Laser error 1 0x61 / Laser error 2 0x62 / Laser error 3	Laser error	Contact SICK Service.
Internal error	0x80 / Internal error 1 0x81 / Internal error 2 0x82 / Internal error 3 0x83 / Internal error 4	Operating fault	Check the electrical environment and improve it, if necessary (stability, voltage supply, EMC influences). If the error cannot be rectified, contact SICK Service.

If a different message is output, contact Sick Service.

9.3 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 or the software.

9.4 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

9.5 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.

9.6 Disposal

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

Table 9: Technical data for mechanics/electronics

Supply voltage U_V	DC 18 V ... 30 V [1]
Residual ripple	≤ 5 V_{ss} [2]
Power consumption	≤ 2.5 W [3]
Power-up time	10 seconds
Warm-up time	< 10 minutes [4]
Housing material	Zinc die cast acrylic glass (PMMA), with scratch-proof coating
Connection type	30 cm cable with M12 male connector, 5-pin
Status indicators	OLED display, 3 status LEDs
Operating elements	4 pushbuttons
Weight	280 g
Dimensions	see "Product overview", page 11
Enclosure rating	IP 65, IP 67
Protection class	III in accordance with EN 50178
Electrical safety	IEC 61010-1 AMD 1:2016-12 UL 61010-1:2012/R:2016-04

1) Limit values, reverse-polarity protected. Operation in short-circuit protected network: max. 8 A.
2) Must not fall short of or exceed U_V tolerances.
3) Without load, at +20 °C.
4) During the device warm-up phase, the measured values are subject to an increased variance (temperature drift).

10.2 Dimensional drawing

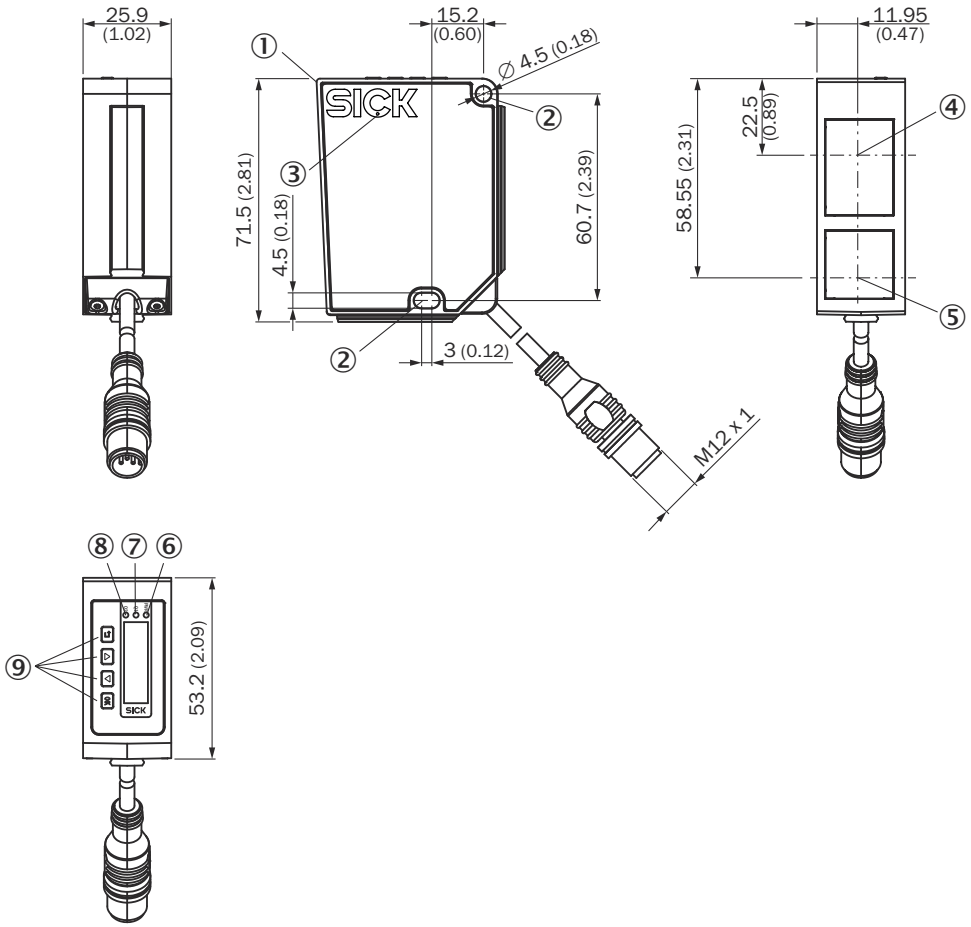


Figure 22: Structure and device dimensions, unit: mm (inch), decimal separator: period

① Fixing holes (M4)

10.3 Performance

Table 10: Technical data for performance

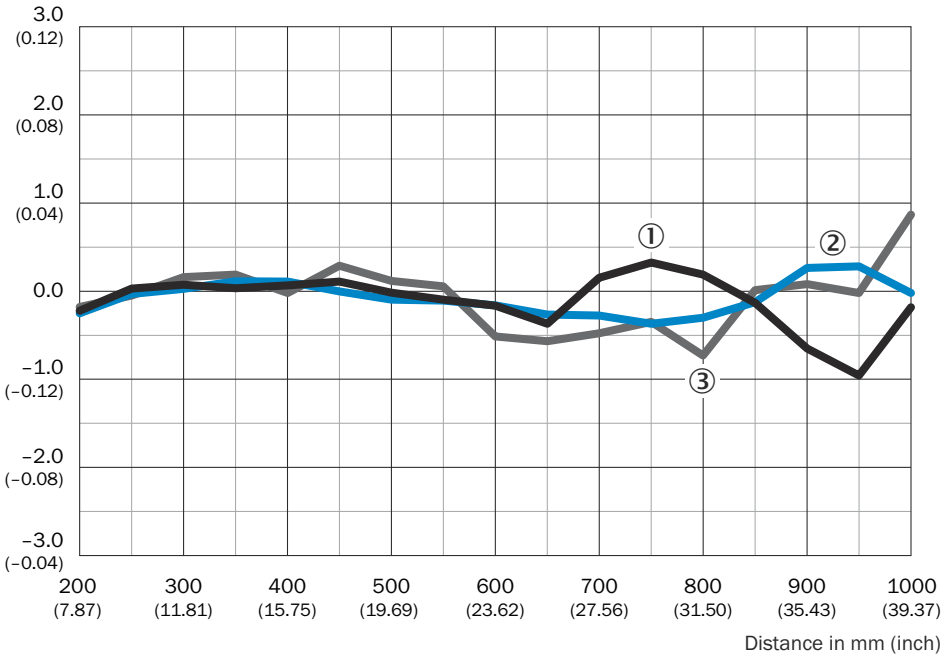
Measuring range	200 mm ... 1,000 mm [1]
Resolution	50 µm [2]
Repeatability	0.4 mm [2], [3]
Linearity	± 1.5 mm [2], [4]
Response time	1.5 ms [5]
Measuring frequency	≤ 3 kHz
Output time	≥ 0.33 ms
Light sender	Laser, visible red light Wavelength: 655 nm Maximum pulse power: 0.78 mW Maximum average power: 0.39 mW Maximum pulse duration: 1.8 ms
Laser class	Laser class 1 according to IEC 60825-1:2014 and EN 60825-1:2014+A11:2021. 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	1.5 mm x 1.5 mm
Additional function	Adjustable averaging or median filter, switching modes: **distance to object / window / object between sensor and background (ObSB)**, teachable digital output, invertible digital output, teachable analog output, invertible analog output, switchable analog output mA/V, multifunctional input: laser off / external teach-in / deactivated, display switch-off, user interface lock, display can be rotated by 180 °, alarm function, edge height jump, time functions (ON/OFF delay, 1-shot)

1) 6% ... 90% reflection factor, with standard settings.
2) 90% reflectance (white), at constant ambient conditions.
3) Statistical error 3 σ.
4) Observe min. warm-up time of 10 minutes.
5) With measuring frequency of 3 kHz, target change white 90%/white 90%.

Linearity

Typical linearity deviation in mm (inch)



① Black 6 % remission
② White 90 % remission
③ Stainless steel

Figure 23: Linearity diagram

① Typical linearity deviation in mm (inch)
② Black, 6% remission factor
③ White, 90% remission factor
④ Stainless steel
⑤ Distance in mm (inch)

10.4 Interfaces

Table 11: Technical data for interfaces

Analog output	Quantity: 1 Current: 4 mA ... 20 mA (< 600 Ω) Voltage: 0 V ... 10 V (> 20 kΩ) Resolution: 16-bit
digital output	Number: 2 Type: Current output, voltage output Function: Selectable Type: Push-pull PNP/NPN [1], IO-Link Max. output current I_A: ≤ 100 mA
Multifunctional input (In1 input)	Quantity: 1 [2]
IO-Link	Function: Process data, configuration, diagnostics, data storage Data transmission rate: 230.4 kBit/s (COM3) / 38.4 kBit/s (COM2) Protocol: V 1.1 / V 1.0

1) PNP: HIGH = U_V - (< 3 V) / LOW = < 3 V; NPN: HIGH = < 3 V / LOW = U_V.
2) Can be used as laser off, external teach-in, or deactivated.

10.5 Ambient data

Table 12: Ambient data

Ambient operating temperature	–10 °C ... +50 °C [1]
Storage temperature	–20 °C ... +60 °C
Temperature drift	0.15 mm/K
Typ. 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) At U_V = 24 V.
2) With constant object movement in the measuring range.

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 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.

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

12.2 Licenses

SICK uses open source software which is published by the rights holders under a free license. Among others, the following license types are used: GNU General Public License (GPL version 2, GPL version 3), GNU Lesser General Public License (LGPL), MIT license, zlib license and licenses derived from the BSD license.

This program is provided for general use without warranty of any kind. This warranty disclaimer also extends to the implicit assurance of marketability or suitability of the program for a particular purpose.

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

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

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

8019642/1111/2023-09-05/en

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Netherlands
Phone +31 (0) 30 204 40 00
E-Mail info@sick.nl

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SICK
Sensor Intelligence.