SICK.COM

OPERATING INSTRUCTIONS

LUTS/LUTX

Luminescence sensors

SICK

Sensor Intelligence

Described product

LUTS/LUTX luminescence sensors

Manufacturer

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

Legal information

Original document

This document is an original document of SICK AG.

Variant-dependent:

IO-Link

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 Scope

These operating instructions serve to incorporate the device into a customer system. Step-by-step instructions are given for all required actions.

These instructions apply to all listed device variants of the product.

Available device variants are listed on the online product page.

http://www.sick.com/LUTS_LUTX

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

Simplified device designation in the document

In the following, the sensor is referred to simply as “LUTS/LUTX” or “device”.

1.3 Further information

You can find the product page with further information via the SICK Product ID: pid.sick.com/{P/N}/{S/N}.

The following information is available depending on the product:

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

1.4 Explanation of symbols

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

DANGER

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

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

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

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

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

2 Safety information

2.1 General safety notes

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

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

LED notes

CAUTION
LUTS/X-Uxxxx:
Optical radiation: LED light beam risk group 1 according to IEC 62471-6:2022, non-visible UV radiation, 365 nm.

The LEDs may pose a danger to the eyes in the event of incorrect use.

→ Do not look into the light source intentionally.
→ Do not open the housing. Opening the housing will not switch off the light source. Opening the housing may increase the level of risk.
→ Comply with the current national regulations on photobiological security of lamps and lamp systems.

CAUTION
LUTS/X-Bxxx:
Warning! Optical radiation: LED risk group 2 according to IEC 62471:2006, non-visible UV radiation, 465 nm.

Potentially dangerous optical radiation. Can be damaging to the eyes.

→ Do not look into the light source for extended periods of time.
→ Never point the light source at people.
→ Avoid any reflections on people from reflective surfaces. Be particularly careful during mounting and alignment work.
→ Do not open the housing. Opening the housing will not switch off the light source. Opening the housing may increase the level of risk.
→ Comply with the current national regulations on photobiological security of lamps and lamp systems.

Repairs and modifications

DANGER
Improper work on the product

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

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

2.2 Intendend use

The LUTS/LUTX luminescence sensor is an opto-electronic sensor and is used for the non-contact detection of visible and non-visible luminescent marks.

A LUTS/LUTX is designed for mounting and may only be operated according to its intended function. For this reason, a LUTS/LUTX is not equipped with direct safety devices.

The system designer must provide measures to ensure the safety of persons and systems in accordance with the legal guidelines.

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.

2.3 Improper use

Impermissible use

- As a physical guard. The product works as an indirect protective measure and cannot provide protection from parts thrown from the application nor from emitted radiation.
- As a safety component as defined in the relevant applicable safety standards for machines, e.g. Machinery Directive.
- Detection of persons and animals
- Access control or authorization
- Detection of transparent items

Impermissible ambient conditions

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

2.4 Limitation of liability

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

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

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

2.5 Requirements for skilled persons and operating personnel

WARNING
Risk of injury due to insufficient training!

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

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

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

- **Instructed personnel** have been briefed by the operating entity about the tasks assigned to them and about potential dangers arising from improper action.
- **Skilled personnel** have the specialist training, skills, and experience, as well as knowledge of the relevant regulations, to be able to perform tasks assigned to them and to detect and avoid any potential dangers independently.
- **Electricians** have the specialist training, skills, and experience, as well as knowledge of the relevant standards and provisions to be able to carry out work on electrical systems and to detect and avoid any potential dangers independently. In Germany, electricians must meet the specifications of the DGUV V3 Work Safety Regulations (e.g., Master Electrician). Other relevant regulations applicable in other countries must be observed.

The following qualifications are required for various activities:

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

3 Transport and storage

3.1 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.

3.2 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.

3.3 Transport inspection

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

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

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

3.4 Storage

- 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 54.
- Relative humidity see "Technical data", page 54.

4 Initial commissioning

NOTE

Below you will find brief instructions for the initial commissioning of the product. Detailed explanations of the points mentioned can be found in the other sections of the operating instructions.

1. Mounting, see "Mounting", page 18
2. Electrical installation, see "Electrical installation", page 20
3. Commissioning, see "Commissioning", page 26

5 Cybersecurity

5.1 Comprehensive cybersecurity concept

Overview

To protect against cybersecurity threats, the operator must have a comprehensive cybersecurity concept, which must be continuously monitored and maintained. A suitable concept consists of organizational, technical, procedural, electronic, and physical levels of defense and considers suitable measures for different types of risks. The measures implemented in this product can only support protection against cybersecurity threats if the product is used as part of such a concept.

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

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

Further topics

- "Product identification via the SICK product ID", page 14
- "Logging", page 13
- "Software from trustworthy sources", page 13
- "Improper use", page 9

5.2 Software from trustworthy sources

When installing software (e.g. firmware, application software), the operating entity must ensure the relevant sources are known and trustworthy.

For information on verifying downloads from the SICK website, visit **www.sick.com/verify-downloads**.

5.3 Logging

Logging

The product does not have a logging function. If it is necessary to record events, this must be done for example by a connected controller.

6 Product description

6.1 Product ID

6.1.1 Product identification via the SICK product ID

SICK product ID

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

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

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

Figure 1: SICK product ID

6.1.2 Type code

1	2	-	3	4	5	6	7	8	9	10	11	12	13
LUT	X		U	S	F	1	E	1	1	2	5	2	Z

Position	Meaning	
1	Basic type	LUT = Luminescence sensor
2	Form factor / housing size	S = Small X = Large
3	Light sender	B = LED / visible blue light U = LED / ultraviolet light
4	Switching output	B = Push-pull: PNP/NPN S = PNP, NPN
5	Function	F = High Speed
6	Light spot direction	1 = Longitudinal 4 = Round A = Round, large
7	Sensing distance	E = Sensing distance 10 mm ... 20 mm F = Sensing distance 50 mm G = Sensing distance 90 mm ... 150 mm
8	Filtering/receiving filters	1 = LP420 / ≤ 420 nm 2 = RG610 / ≤ 610 nm
9	Light emission	1 = Long side
10	Operation	1 = Long side 2 = Short side
11	Connection type	4 = M12, plug, 4 pin 5 = M12, 5-pin plug
12	Communication	2 = No communication A = IO-Link I = analog output (current) U = analog output (voltage)

Position	Meaning	
13	Device type	M = sample device S = special device A = Smart Task B = Special device with Smart Task C = Preconfigured Z = Standard

6.2 Product features and functions

6.2.1 Device view

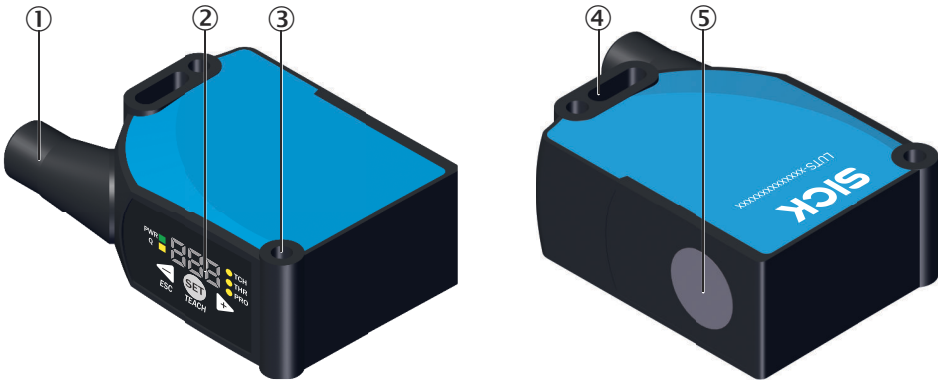


Figure 2: LUTS

① Connection
② Display and control panel
③ Fixing hole
④ Fixing hole
⑤ Light emission

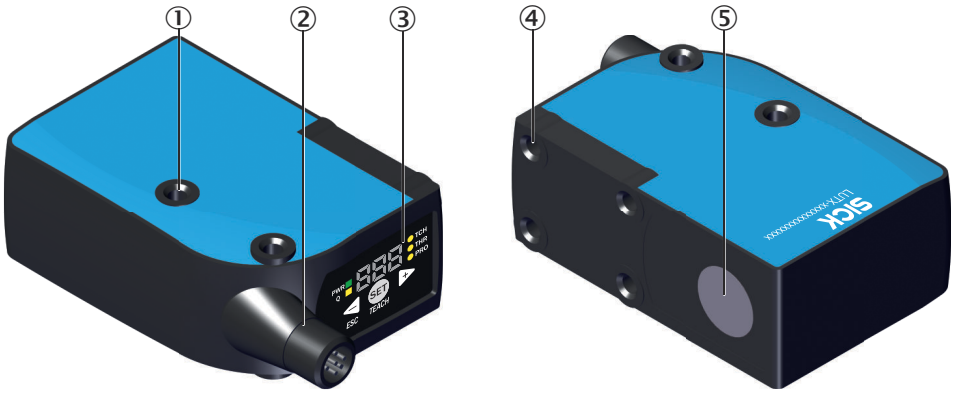


Figure 3: LUTX

① M5 threaded mounting hole
② Connection
③ Display and control panel
④ M5 threaded mounting hole
⑤ Light emission

6.2.2 Product characteristics

Luminescence sensors are used for the non-contact detection of luminous test objects. They detect materials that light up under UV light – regardless of pattern, color or surface properties. Typical applications include the detection of wood, paper, adhesives or marks made with luminescent ink or chalk.

Features

- Display of the luminescence intensity value (0–999) for easy process monitoring
- 7-segment display for intuitive sensor adjustment
- Switching frequency up to 16 kHz
- Scalable output of the luminescence value possible
- IO-Link and Smart Tasks
- Flexible parameterization thanks to extensive sensor parameters

Fields of application

- Applications where luminescence is a key distinguishing feature
- Checking the application of adhesives (e.g. in the packaging, wood or furniture industry)
- Detection of marks made with luminescent ink or chalk
- Detection of paper or wood surfaces
- Process monitoring of coatings or lacquers with UV-active components

6.3 IO-Link communication interface

Some variants have the IO-Link communication interface, details on this see "Type code", page 14.

IO-Link communication is a **Master-Device** communication system.

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

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

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

A detailed description of the configurable functions and associated indices can be found in the “IO-Link description” technical Information: **Technical Information: LUTS/LUTX**.

6.3.1 Documentation and accessories

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

Documentation and software

- IODD: Device description file
- IODD overview: List of IODD contents

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

IO-Link products can be easily connected to a computer via USB using the **SiLink Master**. The connected products can be tested or parameterized quickly and easily using the program **SOPAS ET (SICK Engineering Tool** with graphical user guidance and convenient visualization).

Accessories

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

7 Mounting

7.1 Scope of delivery

- Luminescence sensors in the version ordered
- Safety notes

7.2 Mounting requirements

- For the typical space requirements for the device, see the type-specific dimensional drawing, see "Dimensional drawing", page 57.
- Comply with technical data, such as the permitted ambient conditions for operation of the device (e.g., temperature range, EMC interference emissions, ground potential) see "General data", page 54
- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- Protect the device from direct sunlight, spotlights, or flashlights.
- The device must only be mounted using the pairs of fixing holes or threaded mounting holes provided for this purpose.
- Shock and vibration resistant mounting.

7.3 Mounting the device

The device is equipped with an elongated or round light spot, depending on the variant.

For variants with an elongated light spot, the object should be moved sideways into the light spot (see figure 4, page 18). There is no preferred direction for variants with a round light spot. The sensor must be mounted at the nominal sensing distance.

table 1 and table 2 provides an overview of the sensing distances and light spot sizes.

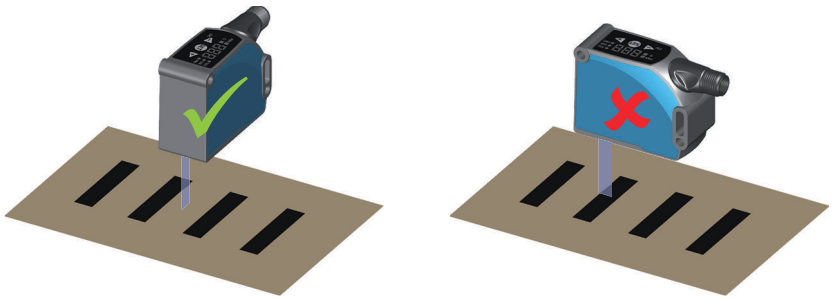


Figure 4: Preferred direction for variants with elongated light spot

Table 1: UV variant - sensing distance / light spot size

LUTx-	Light spot	Sensing distance	Light spot size
Uxx1Exxxxxxxx	Square	10 mm	3.6 mm x 5.7 mm
		20 mm	2.4 mm x 6.5 mm
Uxx4Exxxxxxxx	small round	10 mm	Ø 3.7 mm
		20 mm	Ø 3.1 mm
Uxx1Fxxxxxxxx	Square	50 mm	5.1 mm x 15.6 mm
Uxx4Fxxxxxxxx	small round	50 mm	Ø 7 mm
UxxAFxxxxxxxx	large round	50 mm	Ø 15.1 mm
Uxx1Gxxxxxxxx	Square	90 mm	10 mm x 14 mm
		150 mm	5.8 mm x 15.3 mm
UxxAGxxxxxxxxxx	large round	90 mm	Ø 13.5 mm
		150 mm	14.5 mm

Table 2: Blue variant - sensing distance / light spot size

LUTx-	Light spot	Sensing distance	Light spot size
Bxx1Fxxxxxxxx	Square	50 mm	4.5 mm x 13.7 mm
Bxx1Gxxxxxxxx	Square	90 mm	4.7 mm x 11.2 m
		150 mm	4.6 mm x 13.6 mm

8 Electrical installation

8.1 Notes on electrical installation

NOTICE
Equipment damage due to incorrect supply voltage!

An incorrect supply voltage may result in damage to the equipment.

- Only operate the device with safety/protective extra-low voltage (SELV/PELV).
- The sensor is a device of protection class III.

NOTICE
Equipment damage due to incorrect supply voltage!

An incorrect supply voltage may result in damage to the equipment.

- Only operate the device with an LPS (limited power source) in accordance with IEC 62368-1 or an NEC Class 2 power supply unit.

NOTICE
Equipment damage or unpredictable operation due to working with live parts!

Working with live parts may result in unpredictable operation.

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

- **The electrical installation must only be performed by electrically qualified personnel.**
- **Standard safety requirements must be observed when working on electrical systems!**
- Only switch on the supply voltage for the device when the connection tasks have been completed and the wiring has been thoroughly checked.
- When using extension cables with open ends, ensure that bare wire ends do not come into contact with each other (risk of short-circuit when supply voltage is switched on!). Wires must be appropriately insulated from each other.
- Wire cross-sections in the supply cable from the user's power system must be selected in accordance with the applicable standards.
- The sensor must be protected with a fuse suitable for the cross-circuit of the connecting cable.
- Only operate the device with an LPS (limited power source) in accordance with IEC 62368-1 or an NEC Class 2 power supply unit.
- All circuits connected to the device must be designed as SELV/PELV circuits.

NOTE
Layout of data cables

- Implement the shielding design correctly and completely.
- To avoid interference, e.g., from switching power supplies, motors, clocked drives, and contactors, always use cables and layouts that are suitable for EMC.
- Do not lay cables over long distances in parallel with voltage supply cables and motor cables in cable channels.

The IP enclosure rating for the device is only achieved under the following conditions:

- The cables plugged into the connections are screwed tight.

If these instructions are not complied with, the IP enclosure rating for the device is not guaranteed!

8.2 Notes on UL approval

The device shall be supplied from an isolating transformer having a secondary overcurrent protective device that complies with UL 248 to be installed in the field rated either:

a) max 5 amps for voltages 0 ~ 20 V (0 ~ 28.3 V peak), or

b) 100 / Vp for voltages of 20 ~ 30 V (28.3 ~ 42.4 V peak).

Alternatively, they can be supplied from a Class 2 power supply.

UL Environmental Rating: Enclosure type 1

Supply voltage = 10.8 V DC ... 28.8 V DC

Ambient temperature (operation)

- LUTS/LUTX - xSxxxxxx5I* = –20°C ... +55°C
- LUTS/LUTX - xSxxxxxx5U* = –20°C ... +60°C
- LUTS/LUTX - xSxxxxxx42* = –20°C ... +60°C
- LUTS/LUTX - xSxxxxxx5A* = –20°C ... +60°C

8.3 Note on the swivel connector

NOTICE

Damage to the connector unit from over-tightening!

The connector unit on the device has two opposite end positions.

- Do not rotate the connector unit from either of the two end positions by more than 270°.

8.4 Pinouts

The pin assignment varies depending on the device variant.

I_N = 2 A

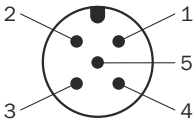


Figure 5: Connection M12, 5-pin, A-coded

Table 3: Pinouts

Contact	Wire color	-xSxxxxxx42	-xSxxxxxx5I	-xBxxxxxx5A	-xSxxxxxx5U	Description
1	BN (brown)	L+	L+	L+	L+	Supply voltage
2	WH (white)	Q NPN[1)]	Q NPN[1)]	Q PP[1)]	QA U	Output
3	BU (blue)	M	M	M	M	Ground
4	BK (black)	Q PNP[2)]	Q PNP[2)]	Q/C[3)]	Q PNP[2)]	Output Q/C (can be used for communication via IO-Link, factory settings are digital output)

Con-tact	Wire color	-xSxxxxxx42	-xSxxxxxx5I	-xBxxxxxx5A	-xSxxxxxx5U	Description
5	GR (gray)	-	QA I	IN	Q NPN[1)]	Depending on variant: Input IN (factory settings: external teach-in) or Output Q

1) Output Q1 or Q2. Q1 is factory settings.

2) Q1

3) Q1 / C

Table 4: Pin settings

Pin	-xSxxxxxx42	-xSxxxxxx5I	-xBxxxxxx5A	-xSxxxxxx5U
2	Output	Output	Output	Analog output voltage
4	Output	Output	Output/communication	Output
5	-	Analog output current	Input	Output

Explanation of the connection terminology used in the following tables:

- Q = digital output
- QA I = Analog output current
- QA U = Analog output voltage
- Q PP = Digital output push-pull
- Q NPN = Digital output NPN
- Q PNP = Digital output PNP
- C = IO-Link
- L+ = supply voltage (U_B)
- M = ground
- IN = Input

8.5 Connecting the supply voltage

NOTICE
Risk of damage to the device!

The device can become damaged if it is connected to a power supply that is already switched on.

- Only connect the device when the supply cable is de-energized.

The device must be connected to a power supply unit with the following properties:

- Supply voltage 10.8 V DC – 30 V DC (SELV/PELV according to the currently applicable standards)
- Power consumption (without load on the outputs) = max. 1.2 W

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

8.6 Wiring the interfaces

8.6.1 Wiring the digital inputs

Voltage level at the input starts the corresponding function of the device.

Input, teach-in (ET)

- $U_V \geq 18$ V
  - Teach-in: 15 V ≤ $U_{IN} \leq U_V$
  - Run: $U_{IN} \leq 5$ V
- UV < 18 V
  - Teach-in: $U_{IN} \geq 0.83*U_V$
  - Run: $U_{IN} \leq 0.28*U_V$

Input, blanking input (AT)

- $U_V \geq 18$ V
  - Blanked: 15 V ≤ $U_{IN} \leq U_V$
  - Free: $U_{IN} \leq 5$ V
- UV < 18 V
  - Blanked: $U_{IN} \geq 0.83*U_V$
  - Free: $U_{IN} \leq 0.28*U_V$

8.6.2 Wiring the digital outputs

In each case, the digital outputs are short-circuit proof and overcurrent protected.

Push-pull switching behavior.

Electrical values

The total current (100 mA) must be observed for all digital outputs.

PNP

Level high: U_v - 3 V

Level low: 0 V

NPN

Level high: U_V

Level low: ≤ 3 V

Push-pull

High: U_V – 3 V

Low: ≤ 3 V

In the case of a push/pull sensor with PNP switching behavior, the signal must be inverted in order to obtain the same result as a sensor with NPN switching behavior.

Table 5: Push-pull

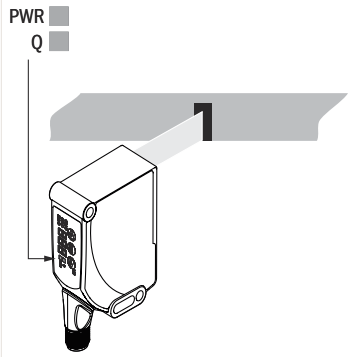
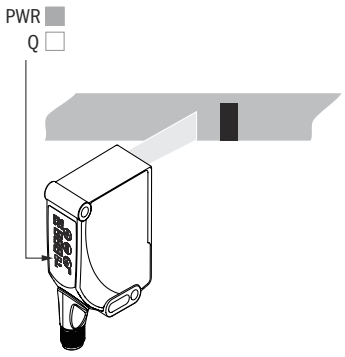
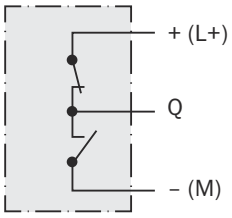
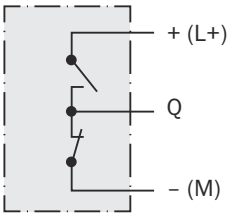
		
Q Push-pull (≤ 100 mA)		

Table 6: PNP

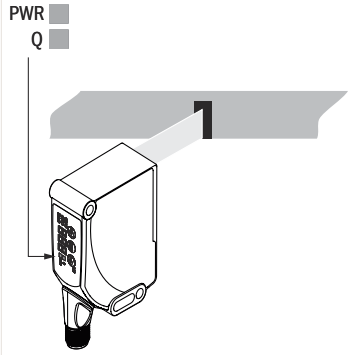
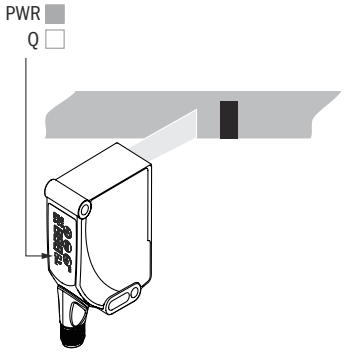
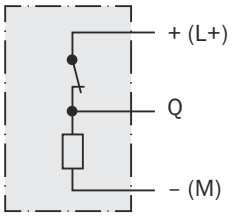
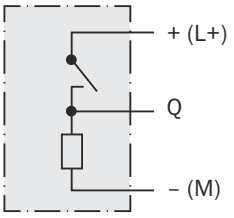
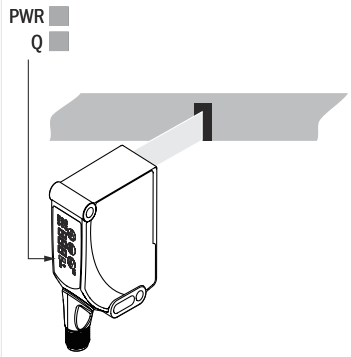
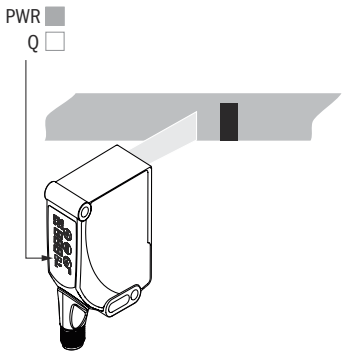
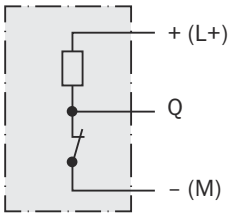
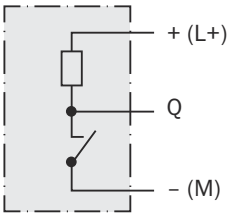
		
Q PNP (≤ 100 mA)		

Table 7: NPN

		
Q NPN (≤ 100 mA)		

8.7 Integration of the sensor in IO-Link mode

To operate the xxxxxxxxxA variants in IO-Link mode, they need to be connected to a suitable **IO-Link Master**. This is used for further integration into the control system.

NOTE
The lengths of cable between the IO-Link Master and IO-Link Device: max. 20 m with suitable cable.

Details on integration can be found in the detailed IO-Link description: **Technical Information: LUTS/LUTX**.

NOTE
Once the product has been successfully connected to the IO-Link Master , the green (power) LED flashes, signaling that IO-Link communication between the Master and Deviceis functioning.

9 Commissioning

Teach-in method

- **Single Value Teach-in**
  For Single Value Teach-in, only the luminous object to be detected (the mark that lights up under UV light) is taught-in. Recommended if the background (e.g. conveyor belt / continuous material) has no relevant luminescent components.
- **Two Value Teach-in**
  For Two Value Teach-in, the mark/object and background are taught-in in two steps (in any order). This method is particularly suitable if the background also contains luminescent elements (e.g. chalk on wood). By teaching in both values, the switching threshold between the mark and background is set optimally. This ensures stable differentiation.
- **Teach-in** quick access
  In the **RUN** view, press and hold the **SET** pushbutton > 1 s = sensor switches to **Single Value Teach-in** (factory settings).
  If a **Two Value Teach-in** is performed via the display, the sensor also applies this teach-in method for teach-in quick access.

Other settings can be set on the THR and PRO menu level.

NOTE
If no settings are made on the sensor for 5 minutes, standby mode (display off) is activated to save electricity. The settings made – and not confirmed via the SET pushbutton – are not saved. To quit standby mode, one of the operating keys must be pushed.

The following menu sequence indicates how the teach-in can be performed:

Position the object / mark in the light spot.

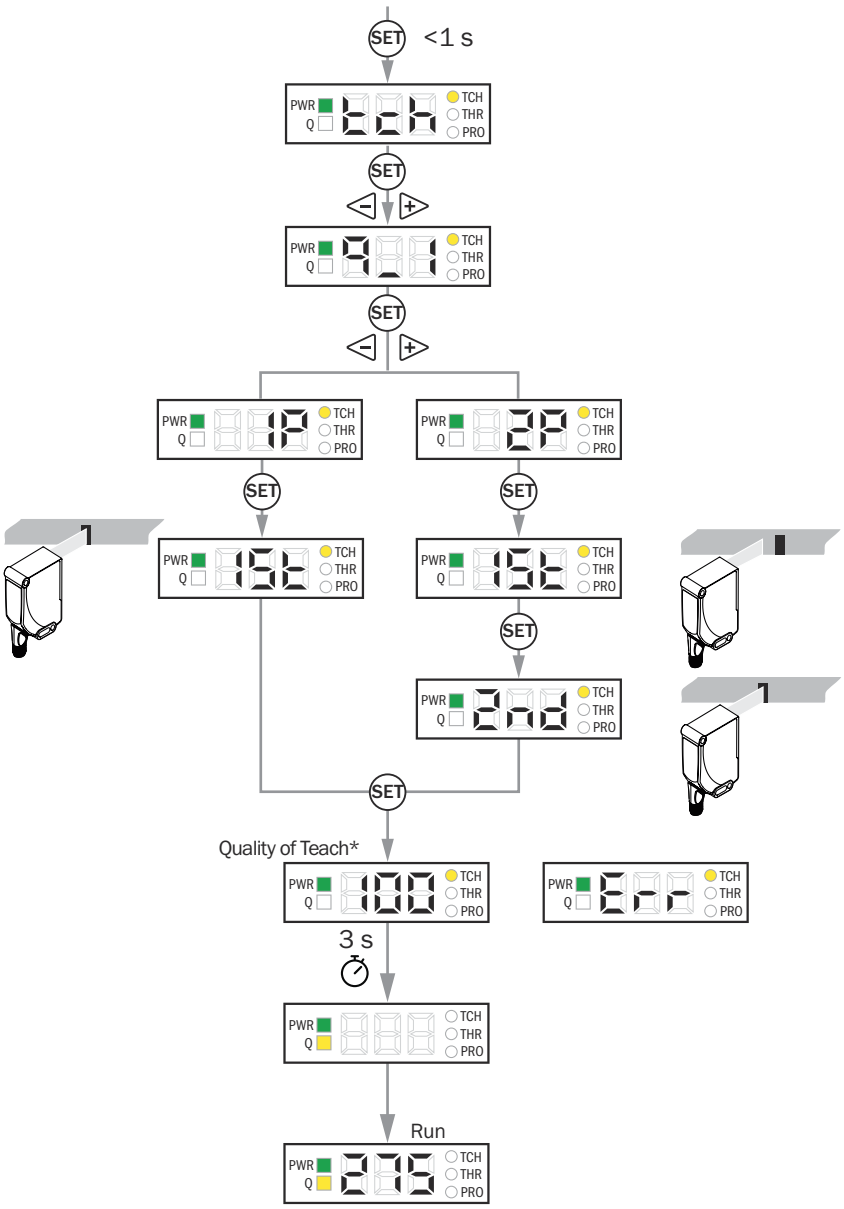


Figure 6: LUTS/LUTX commissioning

9.1 Configuration via IO-Link

In addition to the manual setting on the device, the xxxxxxxxxA variants can also be configured via IO-Link.

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

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

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

Details on configuration can be found in the detailed IO-Link description: **Technical Information: LUTS/LUTX**.

10 Operation

10.1 Operation via the control panel

Simultaneous operation via IO-Link and the control panel is not possible.

NOTE
If no settings are made on the sensor for 5 minutes, standby mode (display off) is activated to save electricity. The settings made – and not confirmed via the SET pushbutton – are not saved. To quit standby mode, one of the operating keys must be pushed.

10.1.1 Control elements

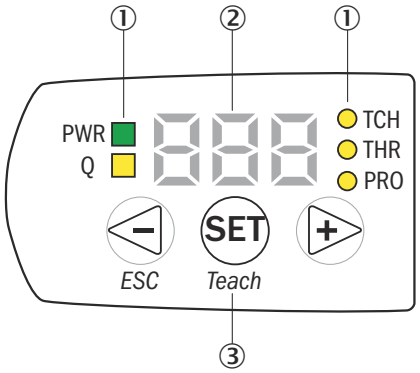


Figure 7: Display and setting elements

Table 8: Display and setting elements and functions

Number	Name	Function
1	PWR	Lights up when the power supply is connected. Flashes when IO-Link communication is active.
	Q	Lights up when a mark / taught-in object is in the field of view.
	TCH	Illuminates when the “teach-in” menu is selected.
	THR	Illuminates when the “threshold” menu is selected.
	PRO	Illuminates when the “advanced settings” menu is selected.
2	Segment display	Shows menu item, values, or qualities.
3	Plus	Scrolls through menu items or increases values.
	SET/Teach	Press < 1 s: Opens the menu, confirms entries, or switches to lower-level menus. Press > 1 s: Triggers teach-in quick access. The last selected teach-in mode (**Single Value** or **Two Value**) is run.
	Minus/ESC	Switches to the previous menu item, decreases values, or cancels the current operation (press for > 3 s).

10.1.2 List of abbreviations for display menu

Using the example of LUTS/LUTX with M12 / 5-pin plug.

Table 9: List of abbreviations

Display	Meaning
1P	Single Value Teach-in
At	Blanking
dlY	Delay
dSP	Display switch
Err	Error
In	Inverted
LoC	Locked
LOG	Input function for Smart Task
nF	Deactivate pin
nIn	Not inverted
oFF	Off
PI2	Pin 2 configuration
PI5	Pin 5 configuration
PIL	Pin logic inversion
Pro	Pro level (advanced settings)
q_1	Switching output 1
q_2	Switching output 2
ScL	Scaling (Scale)
rES	Reset
rSP	Response time
tch	Teach-in
thr	Threshold (switching threshold)
1st	1st First Point (first point)
2nd	2nd Second point (second point)
toF	Timer - OFF delay
ton	Timer - ON delay
tP	Pulse generator
tq1	External Teach-in for switching output 1 (via pin signal)
tq2	External Teach-in for switching output 2 (via pin signal)
tSh	Switch-on/switch-off delay (on/off delay)
tur	Turn (display)

10.1.3 Live measured value (Run mode)

In Run mode, the device displays the current value of the luminescence intensity, which enables process deviations to be quickly detected.

Figure 8: Run

Display standby

NOTE
Control panel standby mode is not activated when a teach-in process is ongoing or while an error message is displayed.

If no settings are made on the device for 5 minutes, standby mode is activated to save electricity. Any settings made which have not been confirmed are not adopted.

To quit standby mode, one of the operating keys must be pushed.

10.1.4 Activating or deactivating the pushbutton lock

1. Press and hold the plus button for 10 seconds.

2. The pushbutton lock is active or deactivated.

10.1.5 Resetting the device to factory settings (Factory Reset)

Resetting to factory settings deletes all saved settings.

Using the plus/minus buttons

1. Press and hold the plus/minus buttons for 10 s.
2. The set parameters are reset to the factory settings.

In the Settings menu

1. Open the menu with the **SET** pushbutton
2. Select with the +/- **Pro** pushbutton
3. Confirm the selection with the **SET** pushbutton
4. Select the **rES** menu with the +/- pushbutton
5. Open the Factory Reset menu with the **SET** pushbutton
6. Select Factory Reset **YES** with the +/- pushbutton
7. Confirm the selection with the **SET** pushbutton

✔ The display shows Factory Reset. The factory settings are active.

10.1.6 Teach-in

10.1.6.1 Teach-In modes

The LUTS/LUTX luminescence sensor offers two different Teach-in modes:

Single Value Teach-in
For Single Value Teach-in, only the luminous object to be detected (the mark that lights up under UV light) is taught-in. Recommended if the background (e.g. conveyor belt / continuous material) has no relevant luminescent components.

Two Value Teach-in
For Two Value Teach-in, the mark/object and background are taught-in in two steps (in any order). This method is particularly suitable if the background also contains luminescent elements (e.g. chalk on wood). By teaching in both values, the switching threshold between the mark and background is set optimally. This ensures stable differentiation.

10.1.6.2 Teach-in via control panel

10.1.6.2.1 Single Value Teach-in

The object or mark to be detected is taught-in using Single Value Teach-in. To do so, the object or mark must be in the field of view, i.e., within the light spot. When teaching in, the switching threshold between the mark and background is set to 25%.

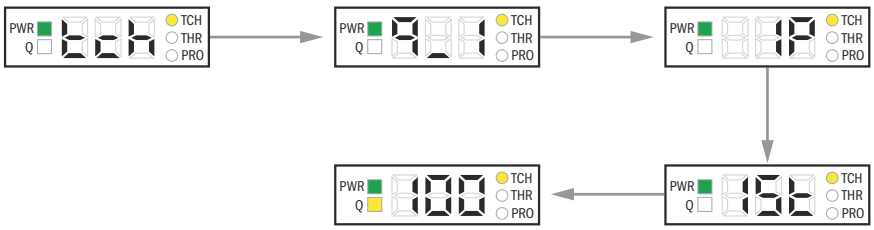


Figure 9: Single Value Teach-in

Coming from the RUN menu:

1. Open the menu with the **SET** pushbutton
2. Select the **tch** menu with the **+/-** pushbutton
3. Confirm the selection with the **SET** pushbutton
4. Select the desired digital output, e.g., **q_1** with the **+/-** pushbutton
5. Confirm the selection with the **SET** pushbutton
6. Select **1P** with the **+/-** pushbutton.

✔ The display shows **1St**.

7. Position the mark or object under the light spot.
8. Press the **SET** pushbutton.

✔ A value between 0 and 100 indicates the quality of the Teach-in process.

A low quality value indicates that the luminescence is very low. The switching range of the sensor should be checked.

10.1.6.2.2 Two Value Teach-in

For a Two Value Teach-in, both the object or mark (e.g. a fluorescent chalk line) and the background (e.g. a wooden board) are taught-in. The order in which this is done is not crucial. When teaching in, the switching threshold between the mark and background is set to 25%.

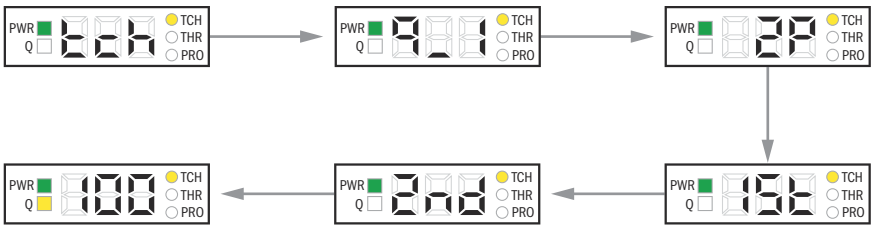


Figure 10: Two Value Teach-in

Coming from the RUN menu:

1. Open the menu with the **SET** pushbutton.
2. Select the **tch** menu with the **+/-** pushbutton.
3. Confirm the selection with the **SET** pushbutton.
4. Select the desired digital output, e.g., **q_1** with the **+/-** pushbutton.
5. Confirm the selection with the **SET** pushbutton.
6. Select **2 P** with the **+/-** pushbutton.
7. Confirm the selection with the **SET** pushbutton.
8. Select **1St** with the **+/-** pushbutton.

✔ The display shows **1St**.

9. Position the mark or object under the light spot.
10. Confirm the Teach-in value with the **SET** pushbutton.

✔ The display shows **2nd**.

11. Position the background under the light spot.
12. Press the **SET** pushbutton.

✔ A value between 0 and 100 indicates the quality of the Teach-in process.

A low quality value indicates that the luminescence is very low. The switching range of the sensor should be checked.

10.1.6.3 External Teach-in

To perform the Teach-in via an external input, an IO pin must be suitably configured. The external Teach-in is always a Single Value Teach-in.

Pin 5 can be used for an internal Teach-in:

External Teach-in - pin 5

- Teach-in QL1 (tq1): External Teach-in for QL1 Teach-in
- Teach-in QL2 (tq2): External Teach-in for QL2

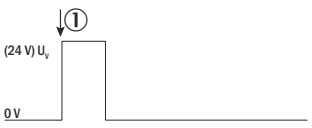
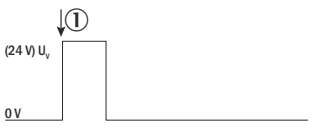
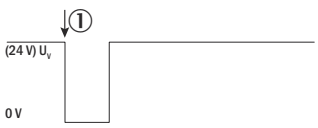
Figure 11: External Teach-in

Coming from the RUN menu:

1. Open the menu with the **SET** pushbutton.
2. Select **Pro** with the **+/-** pushbutton.
3. Confirm the selection with the **SET** pushbutton.
4. Select **PI 5** with the **+/-** pushbutton.
5. Confirm the selection with the **SET** pushbutton.
6. Select **tq1** (External teach-in for QL1) or **tq2** (External teach-in for QL2) with the **+/-** pushbutton
7. Confirm the selection with the **SET** pushbutton.
8. Position the object in the light spot.
9. Activate Teach-in via the control cable (ET). (Level active, see table 10, page 32)

✔ The Teach-in process is complete.

Table 10: External Teach-in

Push Pull	PNP	NPN
		

① Teach-in point

10.1.7 Additional settings (Settings menu)

10.1.7.1 Adjusting the switching threshold

When teaching in, the switching threshold between the mark and background is set to 25%. If the switching events do not correspond to the expected results, the switching threshold can be adjusted independently of the teach-in process.
The preset value depends on the variant and is between 4 - 30. (Delivery state as well as state after resetting the device (factory settings)).

Selecting the switching threshold via the control panel

Figure 12: Switching threshold

Coming from the RUN menu:

1. Open the menu with the **SET** pushbutton.
2. Select the **thr** menu with the **+/-** pushbutton.
3. Confirm the selection with the **SET** pushbutton.
4. Select the desired switching output, e.g. **q_1**, with the **+/-** pushbutton.
5. Confirm the selection with the **SET** pushbutton.
6. Select the desired switching threshold with the **+/-** pushbutton.
7. Confirm the selection with the **SET** pushbutton.

NOTE
The Q LED lights up when the luminescence intensity is higher than the switching threshold. With inverted pin logic, the Q LED lights up when the luminescence intensity is below the switching threshold.

NOTE
The sensor prevents a value from being applied that could lead to an unstable switching function. In this case, the display flashes and the selected value is not saved. A different value must be selected.

10.1.7.2 Response time

The sensor offers the following response times for selection:

- 31 µs
- 62 µs
- 200 µs
- 1t0 µs (1,000 µs)
- 2t0 µs (2,000 µs)

The preset value is 62 µs (delivery state as well as state after resetting the device (factory settings).

The resolution of the sensor is most precise at high response times. The response time should therefore be set as high as possible and only as low as necessary.

NOTE
After reducing the response time, a new teach-in or adjustment of the threshold value is recommended.

Selecting the response time via the control panel

Figure 13: Response time

Coming from the RUN menu:

1. Open the menu with the **SET** pushbutton.
2. Select **Pro** with the **+/-** pushbutton.
3. Confirm the selection with the **SET** pushbutton.
4. Select **rSP** with the **+/-** pushbutton.

5. Confirm with the **SET** pushbutton.
6. Select the desired response time with the **+/-** pushbutton.
7. Confirm with the **SET** pushbutton.

NOTE
The display flashes if the selected value would not lead to a stable process. To ensure a high process reliability, this value is not applied. Adjust the switching threshold before changing the response time to ensure a reliable and stable switching function.

10.1.7.3 Output scaling of the luminescence value

The luminescence value is displayed in the range from 0 to 999. This value can be scaled in the Pro menu.

Table 11: Scaling factor

Scaling factor	Function
0.5	Reduces the output value. Suitable when very high intensities are present in order to avoid signal saturation.
1	Preset (delivery state and state after resetting the device (factory setting))
2	Increases the output value and is suitable when the luminescence is low to show differences more clearly
4	Increases the output value and is suitable when the luminescence is low to show differences more clearly

Figure 14: Scaling

Coming from the RUN menu:

1. Open the menu with the **SET** pushbutton.
2. Select the **Pro** menu with the **+/-** pushbutton.
3. Confirm the selection with the **SET** pushbutton.
4. Select **ScL** with the **+/-** pushbutton.
5. Confirm the selection with the **SET** pushbutton.
6. Select the desired factor with the **+/-** pushbutton.
7. Confirm the selection with the **SET** pushbutton.

NOTE
After changing the scaling, a new Teach-in or adjustment of the threshold value is recommended.

NOTE
The sensor prevents a value from being applied that could lead to an unstable switching function (for example, if the switching threshold would be outside the valid range due to the selected scaling factor). In this case, the display flashes and the selected value is not saved. Another factor must be selected.

10.1.7.4 Time-delayed output

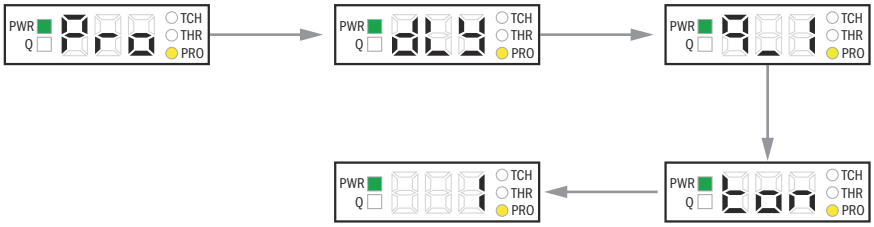


Figure 15: Time-delayed output

Table 12: List of abbreviations

Display	Meaning
oFF	Off
toF	Timer - OFF delay
ton	Timer - ON delay
tP	Pulse generator
tSh	Switch-on/switch-off delay (on/off delay)

Coming from the RUN menu:

1. Open the menu with the **SET** pushbutton.
2. Select **Pro** with the **+/-** pushbutton.
3. Confirm the selection with the **SET** pushbutton.
4. Select the **dLY** menu with the **+/-** pushbutton.
5. Confirm the selection with the **SET** pushbutton.
6. Select the desired switching output, e.g. **q_1**, with the **+/-** pushbutton.
7. Confirm the selection with the **SET** pushbutton.
8. Select the desired type of delay, e.g. **ton**, with the **+/-** pushbutton.
9. Set the delay time in ms with the **+/-** pushbutton.
10. Confirm the selection with the **SET** pushbutton.

NOTE

The maximum value that can be set is 999 ms via the control panel, and 30,000 ms via IO-Link.

10.1.7.5 Pin assignment

Multifunctional pins are available to which different functions can be assigned.

Available configurations are:

Pin 2 (All variants except xSxxxxxx5U)

- Output QL1 : digital output QL1
- Output QL2: digital output QL2
- Deactivated (nF)

The pin 2 is preset to the **Output QL1** function (delivery state and state after resetting the device (factory settings).

Pin 5 (for xSxxxxxx5U only)

- Output QL1: Digital output QL1
- Output QL2: Digital output QL2
- Deactivated (nF)

The pin 5 is preset to the Output QL1 function (delivery state and state after resetting the device (factory settings)).

Pin 5 (Only available for - xxxxxxxx5A)

- **Ext. Input Smart Task** (LOG): Input function for the **Smart Task A10**
- **Blanking** (At): If the pin is HIGH (tq1), no digital outputs are active.
- Teach-in QL1 (tq1): External Teach-in for QL1
- Teach-in QL2 (tq2): External Teach-in for QL2
- Deactivated (nF)

The pin 5 is preset to the **Teach-in QL1** function (delivery state and state after resetting the device (factory settings)).

Selecting the Pin Setting via the control panel

Figure 16: Pin 2 Setting

Figure 17: Pin 5 Setting

Coming from the RUN menu:

1. Open the menu with the **SET** pushbutton.
2. Select **Pro** with the **+/-** pushbutton.
3. Confirm with the **SET** pushbutton.
4. Select **PI 2** or **PI 5** with the **+/-** pushbutton.
5. Confirm with the **SET** pushbutton.
6. Select the desired function with the **+/-** pushbutton.
7. Confirm with the **SET** pushbutton.

10.1.7.6 Pin logic inversion

In the factory settings, the sensor switches when the measured intensity value exceeds the switching threshold. The switching behavior can be inverted so that the sensor switches when the intensity value falls below the switching threshold.

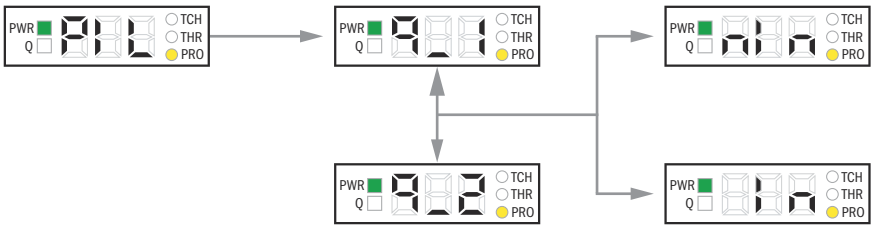


Figure 18: Pin logic inversion menu

In the Settings menu

1. Open the menu with the **SET** pushbutton.
2. Select **Pro** with the **+/-** pushbutton.
3. Confirm the selection with the **SET** pushbutton.
4. Select **PIL** with the **+/-** pushbutton.
5. Confirm the selection with the **SET** pushbutton.
6. Select **q_1** or **q_2** with the **+/-** pushbutton.
7. Confirm the selection with the **SET** pushbutton.
8. Select **nln** or **ln** with the **+/-** pushbutton.
9. Confirm the selection with the **SET** pushbutton.

✔ The display shows the corresponding pin logic.

10.1.7.7 Aligning display

If the sensor is mounted at a 180° rotated position, the display can be rotated accordingly.

The available options are

- 

- 

Figure 19: Align display menu

In the Settings menu

1. Open the menu with the **SET** pushbutton.
2. Select **Pro** with the **+/-** pushbutton.
3. Confirm the selection with the **SET** pushbutton.
4. Select **dSP** with the **+/-** pushbutton.
5. Confirm the selection with the **SET** pushbutton.
6. Select the desired direction with the **+/-** pushbutton.
7. Confirm the selection with the **SET** pushbutton.

✔ The display shows **tur** in the corresponding direction

10.1.7.8 Other displays and functions

Short-circuit and overcurrent detection

Figure 20: Error

In the event of a short-circuit, Err appears on the display and the Q LED flashes.

Display standby

NOTE
Control panel standby mode is not activated when a teach-in process is ongoing or while an error message is displayed.

If no settings are made on the device for 5 minutes, standby mode is activated to save electricity. Any settings made which have not been confirmed are not adopted.

To quit standby mode, one of the operating keys must be pushed.

10.2 Operation via SOPAS

NOTE
SOPAS is only available for IO-Link devices -xxxxxxxxxA.

The SDD drivers for the SOPAS ET configuration software are provided by SICK at **www.sick.com/CSS_High_Resolution** (also available at www.sick.com).
SOPAS ET can be used to configure and analyze the sensor.

10.2.1 Home

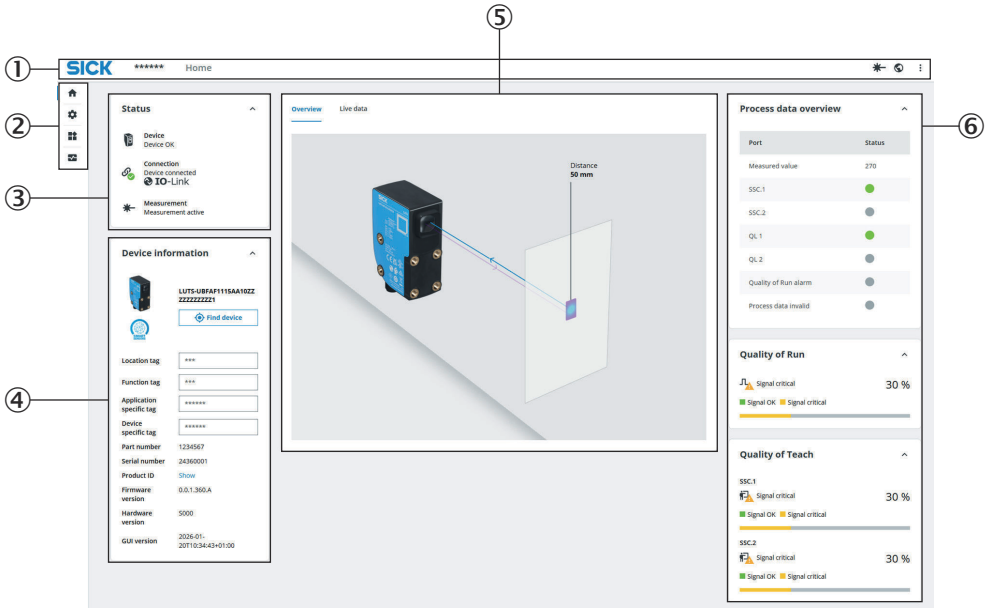


Figure 21: Home - Overview

① Header
② Navigation area
③ Status
④ Device information
⑤ Overview / live data
⑥ Process data overview

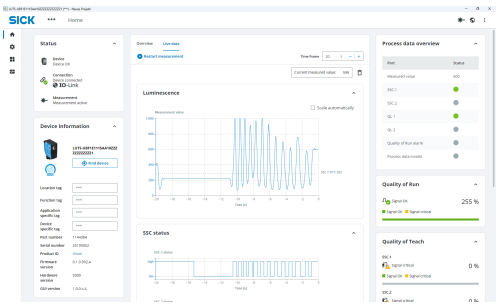


Figure 22: Home - Overview - Live data

Table 13: Overview

Status	Description
Header	• Status of the sender • Language selection • Quick access to device configuration and license information
Navigation menu	• Home • Device settings • Applications • Diagnostics
Status	• Device • Connection • Measurement
Device information	• Device name • Find me function A connected sensor can be uniquely identified using **Find me** (IO-Link). In applications using several identical sensors, it is possible to clearly determine which of the devices is currently communicating. • Location tag • Function tag • Application specific tag • Part number • Serial number • Product ID • Firmware version • Hardware version • GUI version (in the service level)
Overview / live data	The current measured values, SSC status and QL status are displayed in the live data window
Process data overview	Displays current measured values and status information, as well as the Quality of Teach and Quality of Run

10.2.2 Configuration

10.2.2.1 Basic settings

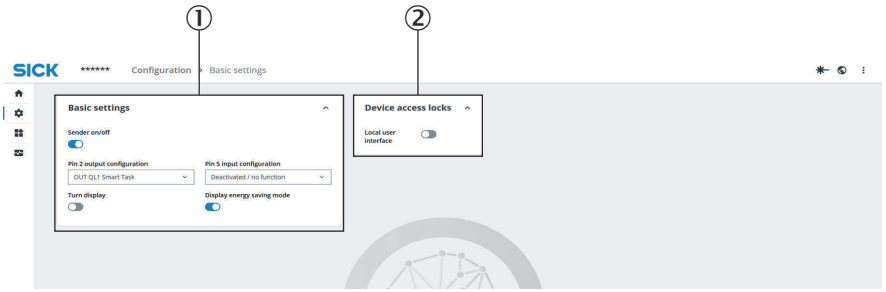


Figure 23: Configuration - Basic Settings

① Basic settings

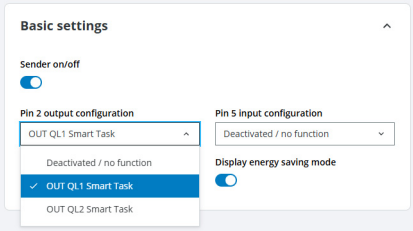
② Device Access Locks

Table 14: Confguration - Basic Settings

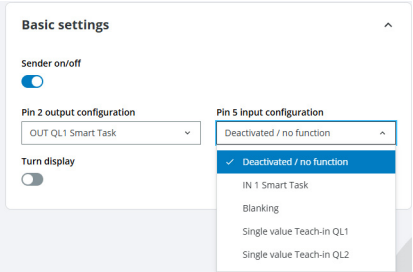
Designation	Description
Basic settings	• Sender on/off • Pin 2 output configuration • Pin 5 input configuration • Turn display • Energy saving mode
Device Access Locks	Local user interface can be locked.

Basic settings

- **Sender on/off**
  The sender can be switched on or off.
- **Pin 2 output configuration**



  - **Deactivated / no function**
    deactivated, no function
  - **Out QL1 Smart Task (default)**
    Digital output QL1
  - **Out QL2 Smart Task**
    Digital output QL2
- **Pin 5 input configuration**



  - **Deactivated / no function**
    deactivated, no function
  - **IN 1 Smart Task**
    Input function for Smart Task
  - **Blanking**
    With a HIGH signal, no digital outputs are active
  - **Single Value Teach-in QL1 (default)**
    External Single Value Teach-in for QL1
  - **Single Value Teach-in QL2**
    External Single Value Teach-in for QL2
- **Turn display**
  If the sensor is mounted at a 180° rotated position, the display can be rotated accordingly.
- **Display energy saving mode**
  Activate/deactivate energy-saving mode via toggle switch.

10.2.2.2 Connection Options

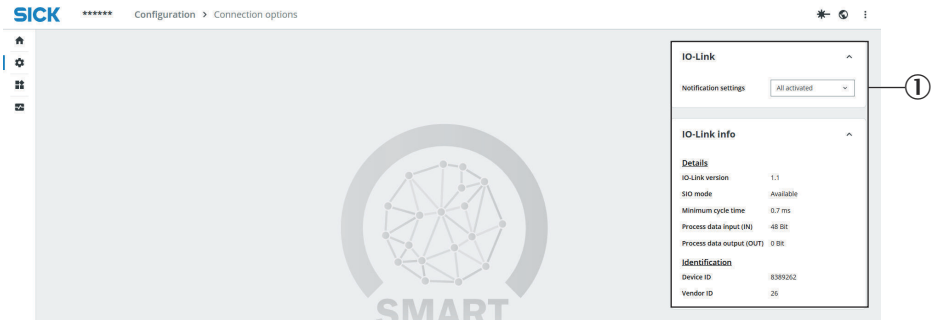


Figure 24: Configuration - Connection Options

① Connection options

Table 15: Connection options

Designation	Description
IO-Link	**Notification settings** • **All activated** Fully activated • **All deactivated** Fully deactivated • **Events active, PD invalid deactivated** Notification activated for events and deactivated for process data status. • **Events deactivated, PD invalid active** Notification deactivated for events and activated for process data status.
IO-Link info	**Details** • IO-Link version • SIO mode • Minimum cycle time • Process data input (IN) • Process data output (OUT) **Identification** • Device ID • Manufacturer ID

10.2.3 Application

10.2.3.1 Enhanced sensing

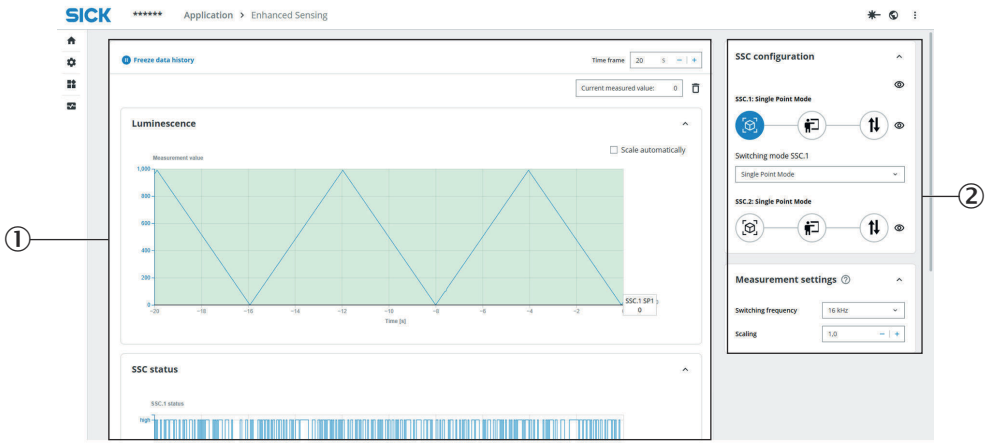


Figure 25: Application - Enhanced Sensing

① current values

② Configurations

Table 16: Application - Enhanced Sensing

current values	Display of the current measured values for • Luminescence • SSC status SSC.1 and SSC.2 (**S**witching **S**ignal **C**hannel) are the detection outputs before Smart Task. • QL status (QL1 and QL2) QL outputs show the resulting switching event if more complex logic is defined in the Smart Task area. This switching event is then assigned to one of the two switching outputs of the sensor: QL1 (pin 4 in SIO mode) or QL2 (configurable on pin 2). If the Smart Task is not used, SSC and QL have the same value.
Configurations	**SSC configuration** • SSC.1 Mode ○ Deactivated ○ Single Point Mode ○ Window Mode ○ Two Point Mode • SSC.2 Mode ○ Deactivated ○ Single Point Mode ○ Window Mode ○ Two Point Mode **Measurement settings** • Switching frequency 0.25 kHz, 0.5 kHz, 2.5 kHz, 8 kHz, 16 kHz) • Scalable

10.2.3.1.1 SSC configuration

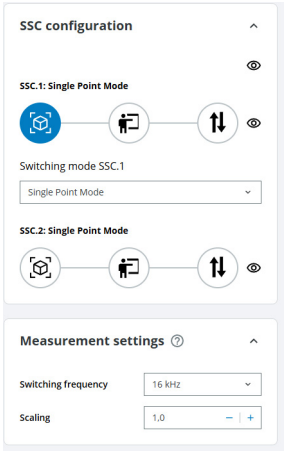


Figure 26: Enhanced Sensing - SSC configuration

The **Switching mode** (switching mode selected) can be set or deactivated via the **SSC configuration** (Switching Signal Channel). The setpoint can be set using the **Settings** and the switch point logic can be set via the **SSC-Properties**.

Switching mode SSC

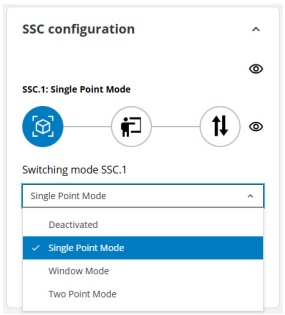


Figure 27: SSC configuration - Switching mode SSC

Switching mode SSC

- **Deactivated**
- **Single Point Modus**
  The sensor evaluates a single threshold value to determine the presence of a luminescent mark. The sensor switches as soon as the measured luminescence value exceeds the defined threshold value. This is the main application of luminescence sensors where a clear binary decision is required (luminescence / no luminescence).
- **Window Modus**
  The sensor checks whether the measured value is within a defined range (window). Switching occurs when the signal is inside or outside the window, depending on the configuration.
- **Two Point Modus**
  Uses two hysteresis thresholds to avoid switching errors in the event of high signal noise. The sensor switches on when the signal exceeds the upper threshold and switches off when it falls below the lower threshold.

Settings

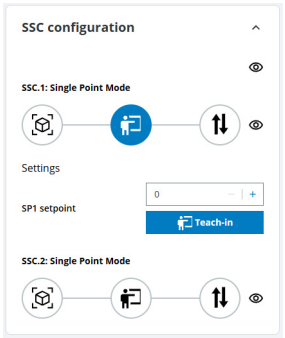


Figure 28: SSC configuration - Settings

The threshold value can be entered numerically or a Teach-in method can be selected in the **Settings** area.

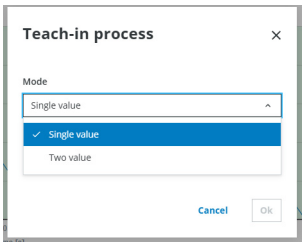


Figure 29: SSC configuration - Settings Teach-in

Teach-in method

- Single Value Teach-In
  For Single Value Teach-in, only the luminous object to be detected (the mark that lights up under UV light) is taught-in. Recommended if the background (e.g. conveyor belt / continuous material) has no relevant luminescent components.
- Two Value Teach-In
  For Two Value Teach-in, the mark/object and background are taught-in in two steps (in any order). This method is particularly suitable if the background also contains luminescent elements (e.g. chalk on wood). By teaching in both values, the switching threshold between the mark and background is set optimally. This ensures stable differentiation.

SSC properties

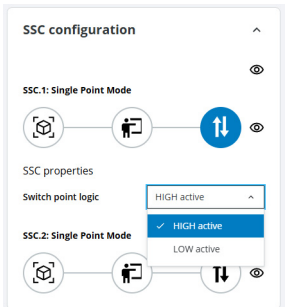


Figure 30: SSC configuration - SSC properties

The **Switch point logic** can be set in the SSC properties area. The switch point logic can be defined as **High active** or **Low Active**.

- **High Active**

- Single Point Mode: SSC is active if the measured value is greater than the threshold value.
- Two Point Mode: SSC is active when the measured value is above the upper threshold (and remains active until it falls below the lower threshold).
- Window Mode: SSC is active if the measured value is within the defined window.

- **Low Active**
  - Single Point Mode: SSC is active if the measured value is less than the threshold value.
  - Two Point Mode: SSC is active when the measured value is below the lower threshold (and remains active until it rises above the upper threshold).
  - Windows Mode: SSC is active if the measured value is outside the defined window.

10.2.3.1.2 Measurement settings

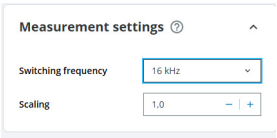


Figure 31: Enhanced sensing measurement settings

The **Switching frequency** and the **Scaling** can be set in the **Measurement settings** section.

- **Switching frequency**
  The switching frequency can be set to 0.25 kHz, 0.5 kHz, 2.5 kHz, 8 kHz, 16 kHz. The resolution of the sensor is most precise at low switching frequencies. The switching frequency should therefore be set as low as possible and only as high as necessary.
- **Scaling**
  The luminescence value is displayed in the range from 0 to 999. This value can be scaled with a factor between 0.5 and 4.

NOTE
After increasing the switching frequency or changing the scaling, a new Teach-in or adjustment of the threshold value is recommended.

10.2.3.2 Smart Task

Overview

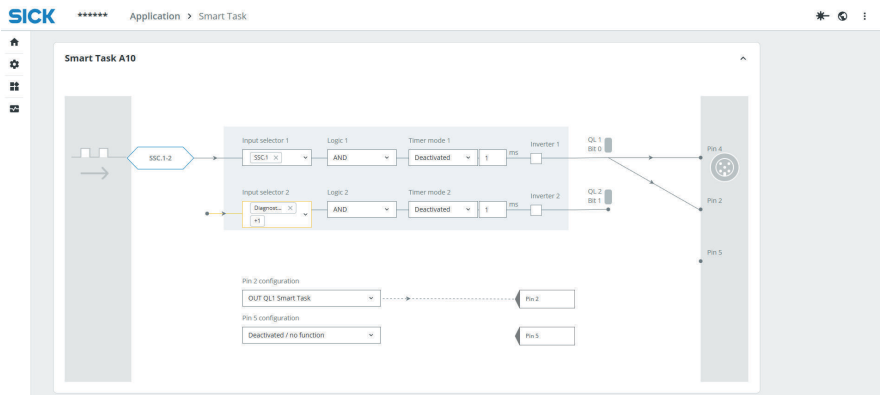


Figure 32: Application - Smart Task

Various switching output logics (e.g. AND, OR) and switching output configurations such as delays (Delay) can be defined in the **Smart Task** area.

The switching output logics link internal switching events, which are defined in the **Enhanced Sensing** area, or external inputs. The resulting switching event is then assigned to one of the two switching outputs of the sensor:

- QL1 (Pin 4)
- QL2 (configurable on pin 2)

Input selector

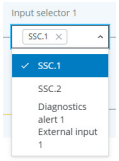


Figure 33: Smart Tasks - Input selector

The following selectors are available when selecting the **Input selector**:

- **SSC.1**
- **SSC.2**
- **Diagnostics alert 1**
- **External input 1**

Logic

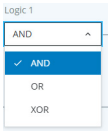


Figure 34: Smart Tasks - Logic

- **AND**
  For the ANDlogic, the QL signal is only activated if all defined conditions are met at the same time.
- **OR**
  For the ORlogic, the QL signal is activated as soon as at least one of the defined conditions is met.
- **XOR**
  For the XORlogic, the QL signal is activated if exactly one of the defined conditions is met, but not both at the same time.

Timer mode

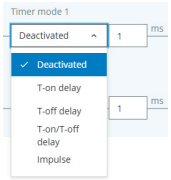


Figure 35: Smart Tasks - Timer mode

Different switch-on or switch-off delays of the QL can be configured. The various delays have the following effect:

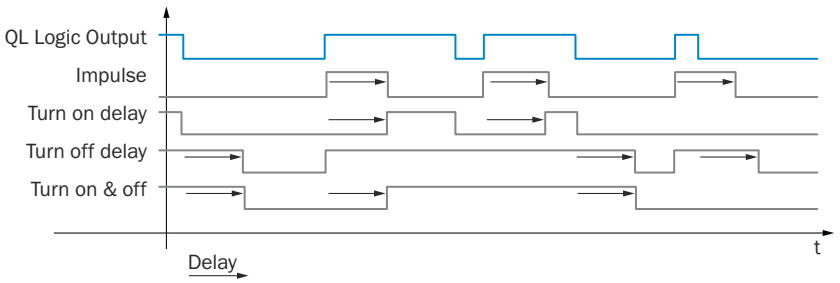


Figure 36: Smart Tasks - Timer mode

The following functions are available:

- **Deactivated**
- **T-on delay**
- **T-off delay**
- **T-on/T-off delay**
- **Impulse**

Inverter

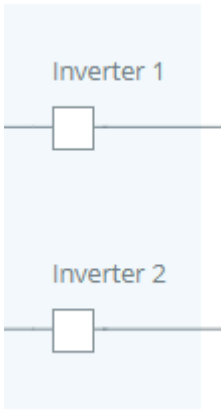


Figure 37: Smart Tasks - Inverter

Inverting the QL reverses the switching behavior of the switching output (Active / Inactive).

Pin 2 configuration

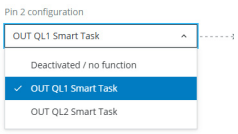


Figure 38: Pin 2 configuration

Setting of pin 2

- **Deactivated / no function**
  deactivated, no function
- **Out QL1 Smart Task (default)**
  Digital output QL1
- **Out QL2 Smart Task**
  Digital output QL2

Pin 5 configuration

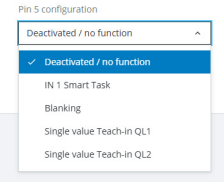


Figure 39: Pin 5 configuration

Setting of pin 2

- **Deactivated / no function**
  deactivated, no function
- **IN 1 Smart Task**
  Input function for Smart Task
- **Blanking**
  With a HIGH signal, no digital outputs are active
- **Single Value Teach-in QL1 (default)**
  External Single Value Teach-in for QL1
- **Single Value Teach-in QL2**
  External Single Value Teach-in for QL2

10.2.4 Diagnostics

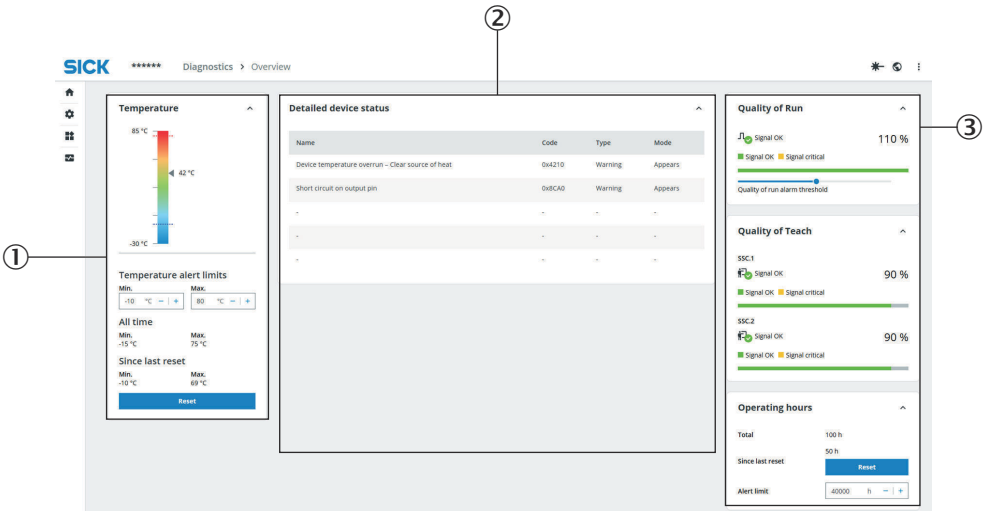


Figure 40: Diagnostics

Table 17: Diagnostics

Designation	Description
Temperature	• Display Internal temperature • Set warning thresholds for minimum and maximum temperature. • Reset temperature
Detailed device status	Lists all error and warning messages from the sensor.

Designation	Description
Process data	• **Quality of Run** Shows the process quality in %. A threshold value (**Quality of Run Threshold)** can be set in %. If the value falls below the set switching threshold, a warning appears. • **Quality of Teach** Quality of Teach is the teach-in quality in %. • **Operating hours** Shows the uptime of the sensor to date. The operating hours counter can be reset to 0.

10.3 Resetting to factory settings (Factory Reset)

NOTE
Resetting to factory settings deletes all saved settings.

There are different ways of resetting the device to the factory settings:

- Control panel on the device ("Resetting the device to factory settings (Factory Reset)", page 30)
- SOPAS / User Interface (see figure 41, page 49)
- Read out IODD index 2 (see table 18, page 49)

Procedure SOPAS

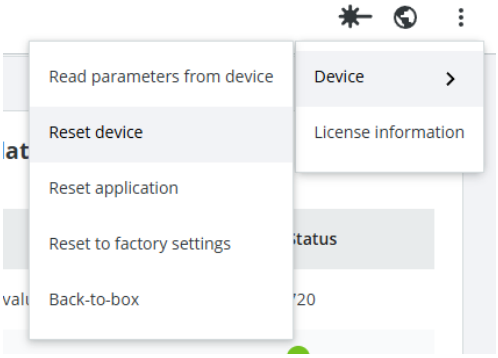


Figure 41: Resetting to factory settings (Factory Reset)

1. ⋮ on the right in the header.
2. Select the **Device**
3. Select **Reset device**.

✔ The device is reset to the factory settings (Factory Reset).

Procedure Read out IODD index 2

Table 18: Firmware version IODD Index 2 - Factory reset

ISDU index		Name	Access	Value	Length
DEC	HEX				
2	0x02	Device reset	wo	128	-
		Application Reset		129	-
		Restore factory settings		130	-
		Back-to-box		131	-

11 Maintenance

11.1 Maintenance

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 19: Maintenance schedule

Maintenance work	Interval	Implementation
Clean housing and front screen	Cleaning interval depends on ambient conditions and climate	Specialist
Check screw connections and plug connectorswire connection	Every 6 months	Specialist

11.2 Cleaning the device

At regular intervals (e.g., weekly), check the light emission window and the housing of the device for dirt. This is especially relevant in harsh operating environments (dust, abrasion, damp, fingerprints, etc.). The lens of the light emission window must be kept clean and dry during operation.

NOTICE
Device damage due to improper cleaning!

Improper cleaning may result in device damage.

- Only use suitable cleaning agents.
- Never use sharp objects for cleaning.

Cleaning the light emission window

NOTICE
Damage to the light emission window!

Reduced reading performance due to scratches or streaks on the light emission window!

→ Clean the light emission window only when wet.
→ Use a mild cleaning agent that does not contain powder additives. Do not use aggressive cleaning agents, such as acetone, etc.
→ Avoid any movements that could cause scratches or abrasions on the light emission window.
→ Only use cleaning agents suitable for the lens material.

NOTE
Static charge may cause dust particles to stick to the light emission window. This effect can be avoided by using an anti-static glass cleaner in combination with the SICK lens cloth (can be obtained from www.sick.com).

NOTE
If the light emission window is scratched or damaged (cracked or broken), the device must be replaced. Contact SICK Service to arrange this.

Cleaning the housing

In order to ensure that the heat produced by the internal power loss is adequately dissipated, the housing surface must be kept clean.

11.3 Repair

The product is replaced if defective. The device is not intended to be repaired. Interference with or modifications to the device on the part of the customer will invalidate any warranty claims against SICK AG.

12 Troubleshooting

12.1 Possible errors during commissioning

LED/fault pattern	Cause	Measures
- Q-LED flashes - Indicator on display “Err”	- Short-circuit / Overcurrent - Sensor is not connected properly	- Disconnect sensor from the power network - Check pin assignment - Reconnect sensor - Check the current at the switching output
Low quality of teach after teach-in	Taught-in luminescence or luminescence difference is not sufficient for stable luminescence detection.	Teach in object again Note the luminescence quality and sensing distance. Reduce the response time and teach-in the object again
Display value for THR, SCL or rSP flashes during selection and cannot be accepted.	The sensor prevents a value from being applied that could lead to an unstable switching function.	A different value must be selected.

12.2 Troubleshooting

Table 20: Troubleshooting

Display, error situation	Cause	Measure
Sensor does not switch for a fluorescent object or fluorescent mark.	Switching threshold not set appropriately for the application	Note the luminescence quality and sensing distance. Perform teach process again Check switching threshold
Sensor cannot distinguish the object from the background	Luminescence difference is not sufficient for stable luminescence detection	Perform a Two Value Teach-in instead of a Single Value Teach-in procedure
Unstable switching	The luminescence intensity value is within the switching threshold range.	Check switching threshold Adjust the response time on the display Adjust the switching frequency via IO-Link
Quality of Run decreases over time	Contamination of front screen	Check front screen, clean if necessary

12.3 Troubleshooting integrated IO-Link devices

Notes on malfunctions can be found in the service data.

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

13 Decommissioning

13.1 Disassembly and disposal

Disassembling the device

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

Disposing of the device

Any device which can no longer be used must be disposed off in an environmentally friendly manner in accordance with the applicable country-specific waste disposal regulations.

NOTE

Disposal of batteries, electric and electronic devices

- According to international directives, batteries, accumulators and electrical or electronic devices must not be disposed of in general waste.
- The owner is obliged by law to return this devices at the end of their life to the respective public collection points.
-  This symbol on the product, its package or in this document, indicates that a product is subject to these regulations.

13.2 Returning devices

→ Do not dispatch devices to the SICK Service department without consultation.

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

14 Technical data

14.1 General data

Features

Table 21: Technical data features

Attribute	Value		
Housing design			
LUTS-xxxxxxxxxxxx	Medium		
LUTX-xxxxxxxxxxxx	Large		
Dimensions (W x H x D)			
LUTS-xxxxExxxxxxxx	26 mm x 62 mm x 47.5 mm		
LUTS-xxxxFxxxxxxxx	26 mm x 62 mm x 52.4 mm		
LUTS-xxxxGxxxxxxxx	26 mm x 62 mm x 67 mm		
LUTX-xxxxExxxxxxxx	30 mm x 78.5 mm x 53 mm		
LUTX-xxxxFxxxxxxxx	30 mm x 78.5 mm x 57.9 mm		
LUTX-xxxxGxxxxxxxx	30 mm x 78.5 mm x 72.5 mm		
Light sender[1]			
LUTx-Uxxxxxxxxxxxx	LED, ultraviolet light		
LUTx-Bxxxxxxxxxxxx	LED, visible blue light		
Light spot size[2]			
	Light spot	Sensing distance	Light spot size
LUTx-Uxx1Exxxxxxxx	Square	10 mm	3.6 mm x 5.7 mm
		20 mm	2.4 mm x 6.5 mm
LUTx-Bxx1Fxxxxxxxx	Square	50 mm	4.5 x 13.7 mm
LUTx-Uxx1Fxxxxxxxx	Square	50 mm	5.1 mm x 15.6 mm
LUTx-Bxx1Gxxxxxxxx	Square	90 mm	4.7 mm x 11.2 mm
		150 mm	4.6 mm x 13.6 mm
LUTx-Uxx1Gxxxxxxxx	Square	90 mm	10 mm x 14 mm
		150 mm	5.8 mm x 15.3 mm
LUTx-Uxx4Exxxxxxxx	small round	10 mm	Ø 3.7 mm
		20 mm	Ø 3.1 mm
LUTx-Uxx4Fxxxxxxxx	small round	50 mm	Ø 7 mm
LUTx-Uxx4Fxxxxxxxx	large round	50 mm	Ø15.1 mm
LUTx-UxxAGxxxxxxxx	large round	90 mm	Ø 13.5 mm ... 14.5 mm
		150 mm	14.5 mm
Light spot position[3]			
LUTx-xxx1xxxxxxxx	Lengthwise		
LUTx-xxx4xxxxxxxx	Round		
LUTx-xxxAxxxxxxxx	Round, large		
Receiving filters[4]			
LUTx-xxxxx1xxxxxx	≤420 nm		
LUTx-xxxxx2xxxxxx	≤610 nm		
Wavelength			
LUTx-Uxxxxxxxxxxxx	365 nm		
LUTx-Bxxxxxxxxxxxx	460 nm		
LED risk group marking			
LUTx-Uxxxxxxxxxxxx	1		
LUTx-Bxxxxxxxxxxxx	2		
Working range			
LUTx-xxxxExxxxxxxx	5 mm ... 30 mm		

Attribute	Value
LUTx-xxxxFxxxxxxxx	25 mm ... 100 mm
LUTx-xxxxGxxxxxxxx	75 mm ... 250 mm
Sensing distance	
LUTx-xxxxExxxxxxxx	10 mm ... 20 mm
LUTx-xxxxFxxxxxxxx	50 mm
LUTx-xxxxGxxxxxxxx	90 mm ... 150 mm
Setting	
LUTx-xxxxxxxx5Axxx	Teach-in button, external teach-in, IO-Link
LUTx-xxxxxxxx42xxx	Teach-in button
LUTx-xxxxxxxx5Uxxx / LUTx-xxxxxxxx5Ixxx	Teach-in button
Teach-in method	Single Value Teach-in Two Value Teach-in
Scalable	0.5 1 2 4
Switching function	Light switching
Threshold	Continuous: 1 ... 999

1) Average service life: 100,000 h at T_U = +25 °C.

2) Depending on the sensing distance.

3) In relation to the long side of the device.

4) Filter blocks shorter wavelengths to blank out background luminescence.

Interfaces

Table 22: Technical data for interfaces

Attribute	Value
IO-Link	
LUTx-xxxxxxxx5Axxx	IO-Link
LUTx-xxxxxxxx5Ixxx	Analog, current
LUTx-xxxxxxxx5Uxxx	Analog, voltage
LUTx-xxxxxxxx42xxx	-
Maximum length of cable	
LUTx-xxxxxxxx5Axxx	20 m
Analog output (current)	
LUTx-xxxxxxxx5Ixxx[1] Max. resistance	0 mA ... 20 mA 400 Ω
Analog output (voltage)	
LUTx-xxxxxxxx5Uxxx[2] Min. resistance	0 V ... 10 V 1,000 Ω
Digital output	
LUTx-xxxxxxxx5Axxx	Q1, Q2
LUTx-xxxxxxxx5Ixxx	Q1, Q2
LUTx-xxxxxxxx5Uxxx	Q1, Q2
LUTx-xxxxxxxx42xxx	Q1, Q2
Digital input	
LUTx-xxxxxxxx5Axxx	In
LUTx-xxxxxxxx5Ixxx	-
LUTx-xxxxxxxx5Uxxx	-

Attribute	Value
LUTx-xxxxxxxx42xxx	-

1) The analog output (0 mA - 20 mA) is linear to the measured value (0-999).
2) The analog output (0 V - 10 V) is linear to the measured value (0-999).

Electrical system

Table 23: Technical data: electrics

Attribute	Value
Supply voltage V_S	10.8 V DC ... 30 V DC[1]
Residual ripple	≤ 5 V_{SS}[2]
Current consumption	< 110 mA[3]
Power consumption	< 1.2 W
Switching frequency	16 kHz / 8 kHz / 2.5 kHz / 0.5 kHz / 0.25 kHz / adjustable (IO-Link)
Response time	31 µs / 62 µs / 200 µs / 1,000 µs / 2,000 µs / adjustable (display)
Jitter	15 µs / 31 µs / 100 µs / 500 µs / 1,000 µs
Switching output	
LUTx-xBxxxxxxxxxx	Push-pull: PNP/NPN
LUTx-xSxxxxxxxxxx	PNP, NPN
Switching output (voltage)	
LUTx-xBxxxxxxxxxx	Push-pull: PNP/NPN HIGH = UV - 3 V / LOW ≤3 V
LUTx-xSxxxxxxxxxx	PNP: HIGH = U_V - 3 V / LOW = 0 V NPN: HIGH = U_V / LOW ≤3 V
Output current I_{max}	100 mA[4]
Input, teach-in (ET)	U_V ≥ 18 V Teach-in: 15 V ≤ U_{IN} ≤ U_V Run: U_{IN} ≤ 5 V U_V < 18 V Teach-in: U_{IN} > 0.83*U_V Run: U_{IN} ≤ 0.28*U_V
Input; blanking input (AT)	U_V ≥ 18 V Blanked: 15 V ≤ U_{IN} ≤ U_V Free: U_{IN} ≤ 5 V U_V < 18 V Blanked: U_{IN} > 0.83*U_V Free: U_{IN} ≤ 0.28*U_V
Time delay	Switch-off delay, 0 ms ... 999 ms Switch-off delay, 0 ms ... 30,000 ms via IO-link (0 ms = default)
Protection class	III
Circuit protection	U_V connections reverse polarity protected Output Q short-circuit protected Interference pulse suppression

1) Limit values, reverse-polarity protected. Operation in short-circuit protected network, max. 8 A
2) Must not exceed or fall below U_v tolerances.
3) Without load
4) Total current of all outputs.

Mechanics

Table 24: Technical data: mechanics

Attribute	Value
Housing material	VISTAL®
Optics material	Glass

Attribute	Value
Weight	Approx. 68 g

Ambient data

Table 25: Technical specifications Ambient data

Attribut	Value
Ambient temperature, operation	
LUTx-xxxxxxxx5Axxx	–20 °C ... +60 °C
LUTx-xxxxxxxx5Ixxx	–20 °C ... +55 °C
LUTx-xxxxxxxx5Uxxx	–20 °C ... +60 °C
LUTx-xxxxxxxx42xxx	–20 °C ... +60 °C
Ambient temperature, storage	–25 °C ... +75 °C
Impact load	According to IEC 60068-2-27 (30 g/11 ms)
Enclosure rating	IP67
UL file no	E181493

Connection type/pinouts

Table 26: Technical data: connection type/pinouts

Attribute	Value	
Connection type		
LUTx-xxxxxxxx4xxx	Connector M12 4-Pin	
LUTx-xxxxxxxx5xxx	M12 plug, 5-pin	
Pinouts for supply voltage & I/O		
LUTx-xxxxxxxx42xxx	BN 1 (brown) WH 2 (white) BU 3 (blue) BK 4 (black)	L+ Q NPN[1)] M Q PNP[2)]
LUTx-xxxxxxxx5Ixxx	BN 1 (brown) WH 2 (white) BU 3 (blue) BK 4 (black) GY 5 (gray)	L+ Q NPN[1)] M Q PNP[2)] QA (current)
LUTx-xxxxxxxx5Axxx	BN 1 (brown) WH 2 (white) BU 3 (blue) BK 4 (black) GY 5 (gray)	L+ Q PP[1)] M Q/C[3)] IN1
LUTx-xxxxxxxx5Uxxx	BN 1 (brown) WH 2 (white) BU 3 (blue) BK 4 (black) GY 5 (gray)	L+ QA (voltage) M Q PNP[2)] Q NPN[1)]

1) Output Q1 or Q2. Q1 is factory settings

2) Output Q1

3) Output Q1 / C can be used for communication via IO-Link, factory settings is digital output

14.2 Dimensional drawing

NOTE

All dimensions in mm (inch).

LUTS-xxxxExxxxxxxx

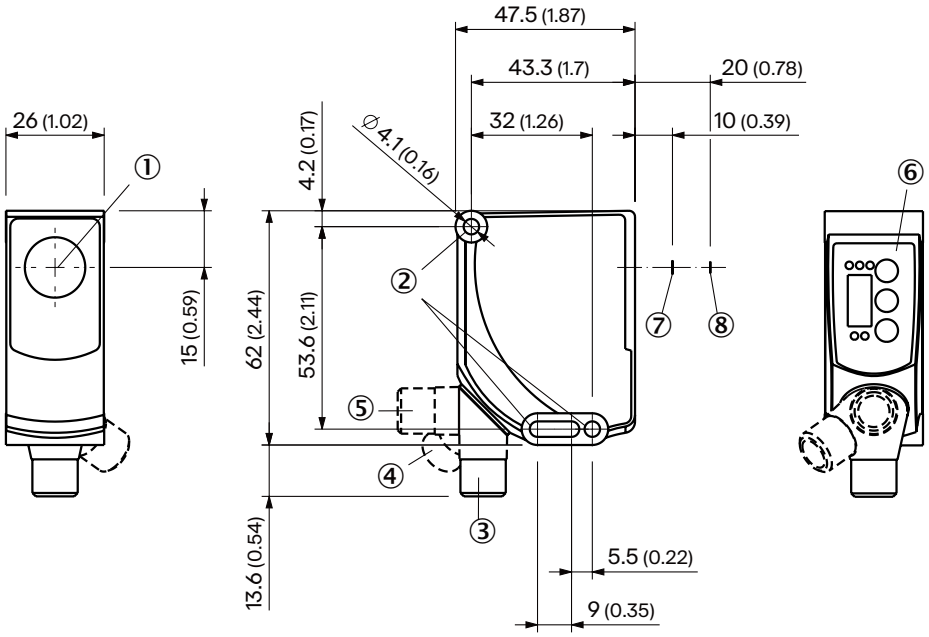


Figure 42: LUTS-xxxxExxxxxxxx

① Optical axis
② Fixing hole
③ M12 plug, delivery state
④ M12 plug, end stop right
⑤ M12 plug, end stop left
⑥ Display and setting elements
⑦ Light spot size at sensing distance 10 mm
⑧ Light spot size at sensing distance 20 mm

Table 27: Light spot size (sensing distance) LUTS-xxxxExxxxxxxx

Device variant	Values for ⑦	Values for ⑧
LUTx-Uxx1Exxxxxxxx	3.6 mm x 5.7 mm (10 mm)	2.4 mm x 6.5 mm (20 mm)
LUTx-Uxx4Exxxxxxxx	Ø 3.7 mm (10 mm)	Ø 3.1 mm (20 mm)

LUTS-xxxxFxxxxxxxx

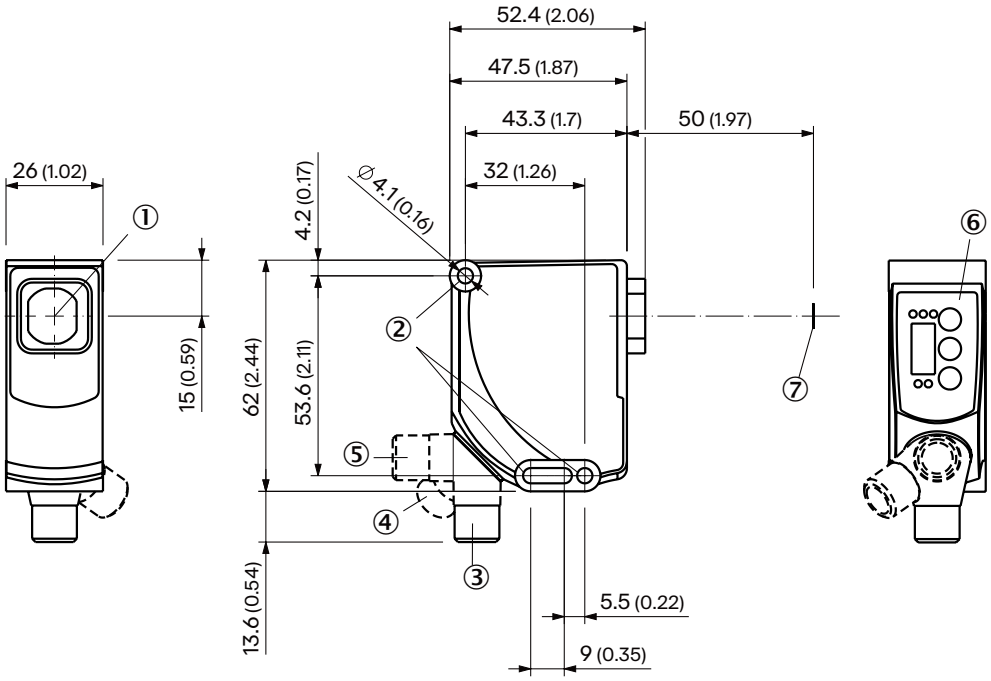


Figure 43: LUTS-xxxxFxxxxxxxx

① Optical axis
② Fixing hole
③ M12 plug, delivery state
④ M12 plug, end stop right
⑤ M12 plug, end stop left
⑥ Display and setting elements
⑦ Light spot size at sensing distance 50 mm

Table 28: Light spot size (sensing distance) LUTS-xxxxFxxxxxxxx

Device variant	Values for ⑦
LUTx-Bxx1Fxxxxxxxx	4.5 mm x 13.7 mm (50 mm)
LUTx-Uxx1Fxxxxxxxx	5.1 mm x 15.6 mm (50 mm)
LUTx-Uxx4Fxxxxxxxx	Ø 7 mm (50 mm)
LUTx-UxxAFxxxxxxxx	Ø 15.1 mm (50 mm)

LUTS-xxxxGxxxxxxxx

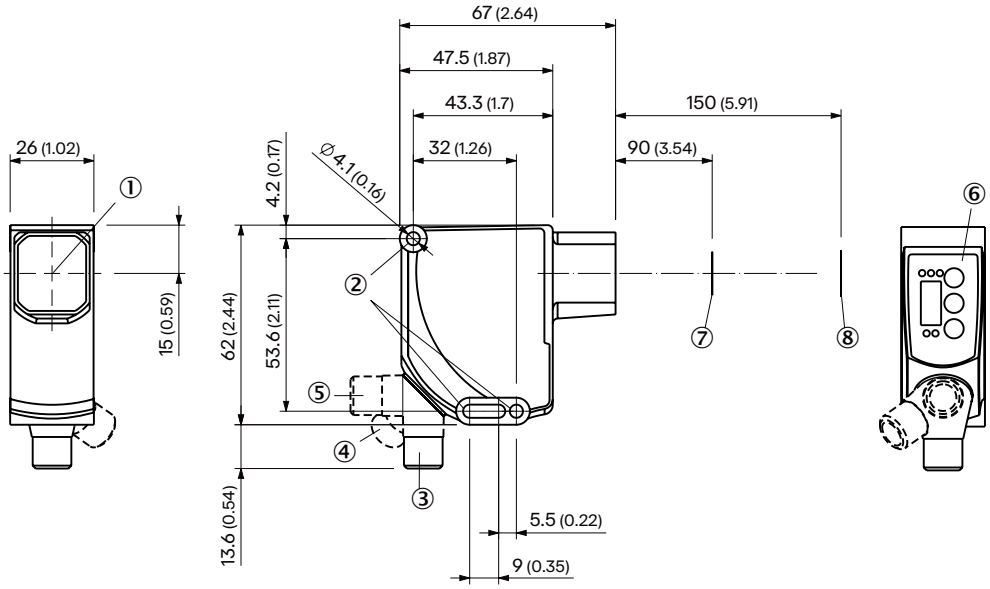


Figure 44: LUTS-xxxxGxxxxxxxx

① Optical axis
② Fixing hole
③ M12 plug
④ M12 plug
⑤ M12 plug
⑥ Display and setting elements
⑦ Light spot size (sensing distance): y,y mm (xx mm)
⑧ Light spot size (sensing distance): y,y mm (xx mm)

Table 29: Light spot size (sensing distance) LUTS-xxxxGxxxxxxxx

Device variant	Values for ⑦	Values for ⑧
LUTx-Bxx1Gxxxxxxxx	4.7 mm x 11.2 mm (90 mm)	4.6 mm x 13.6 mm (150 mm)
LUTx-Uxx1Gxxxxxxxx	10 mm x 14 mm (90 mm)	5.8 mm x 15.3 mm (150 mm)
LUTx-UxxAGxxxxxxxx	Ø 13.5 mm (90 mm)	Ø 14.5 mm (150 mm)

LUTX-xxxxExxxxxxxxxx

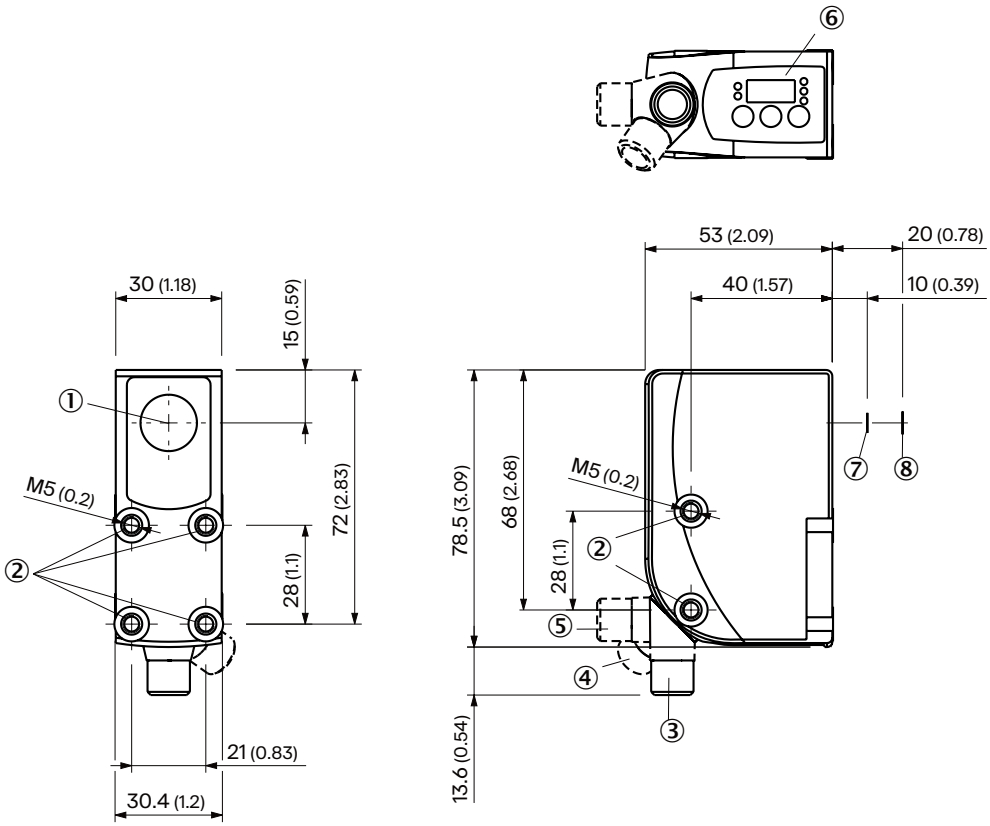


Figure 45: LUTX-xxxxExxxxxxxxxx

① Optical axis
② Fixing hole
③ M12 plug
④ M12 plug
⑤ M12 plug
⑥ Display and setting elements
⑦ Light spot size (sensing distance): y,y mm (xx mm)
⑧ Light spot size (sensing distance): y,y mm (xx mm)

Table 30: Light spot size (sensing distance) LUTS-xxxxExxxxxxxx

Device variant	Values for ⑦	Values for ⑧
LUTx-Uxx1Exxxxxxxx	3.6 mm x 5.7 mm (10 mm)	2.4 mm x 6.5 mm (20 mm)
LUTx-Uxx4Exxxxxxxx	Ø 3.7 mm (10 mm)	Ø 3.1 mm (20 mm)

LUTX-xxxxFxxxxxxxxxx

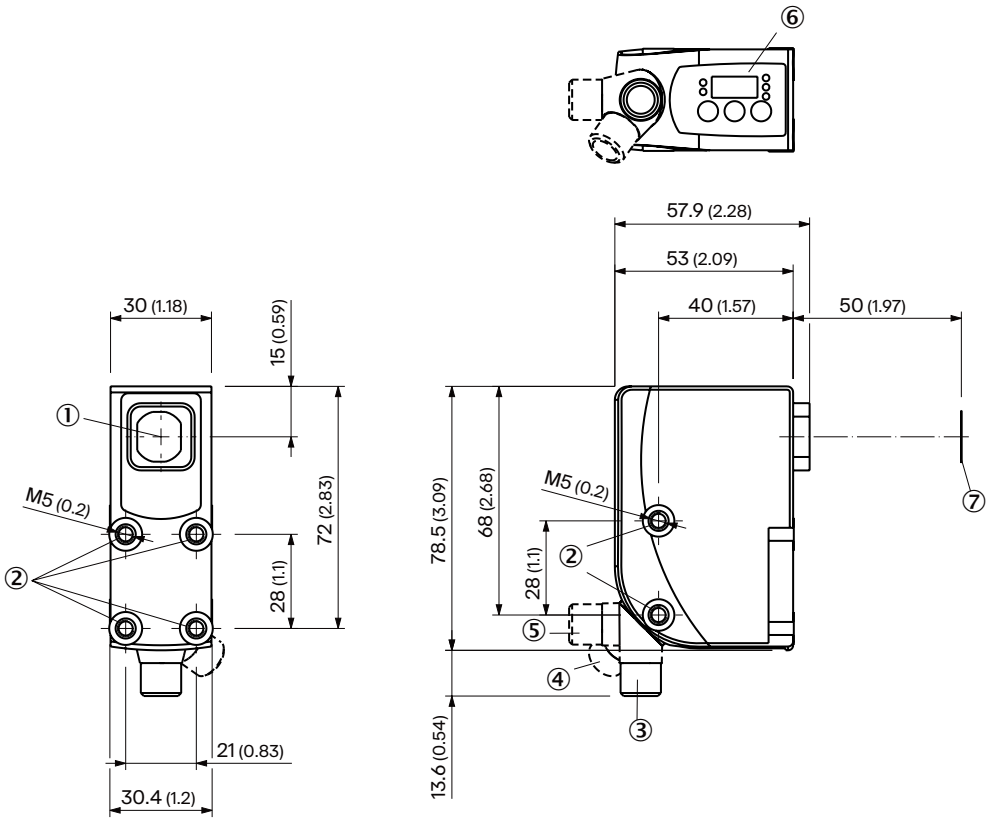


Figure 46: LUTX-xxxxFxxxxxxxx

① Optical axis

② Fixing hole

③ M12 plug, delivery state

④ M12 plug, end stop right

⑤ M12 plug, end stop left

⑥ Display and setting elements

⑦ Light spot size at sensing distance 50 mm

Table 31: Light spot size (sensing distance) LUTS-xxxxFxxxxxxxx

Device variant	Values for ⑦
LUTx-Bxx1Fxxxxxxxx	4.5 mm x 13.7 mm (50 mm)
LUTx-Uxx1Fxxxxxxxx	5.1 mm x 15.6 mm (50 mm)
LUTx-Uxx4Fxxxxxxxx	Ø 7 mm (50 mm)
LUTx-UxxAFxxxxxxxx	Ø 15.1 mm (50 mm)

LUTX-xxxxGxxxxxxxx

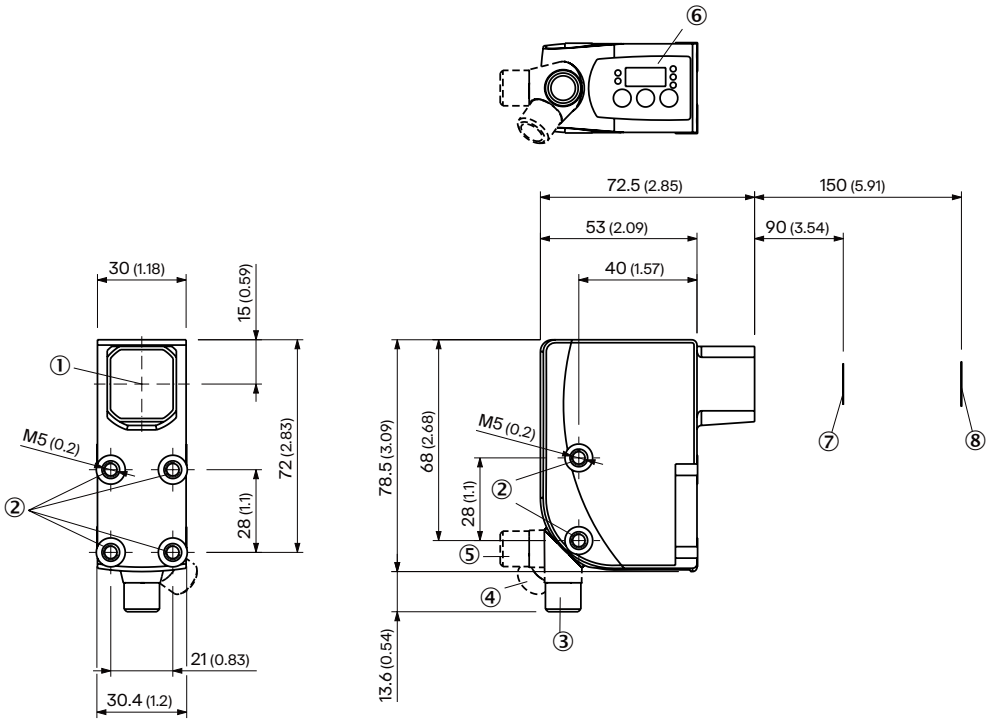


Figure 47: LUTX-xxxxGxxxxxxxx

① Optical axis
② Fixing hole
③ M12 plug
④ M12 plug
⑤ M12 plug
⑥ Display and setting elements
⑦ Light spot size (sensing distance): y,y mm (xx mm)
⑧ Light spot size (sensing distance): y,y mm (xx mm)

Table 32: Light spot size (sensing distance) LUTS-xxxxGxxxxxxxx

Device variant	Values for ⑦	Values for ⑧
LUTx-Bxx1Gxxxxxxxx	4.7 mm x 11.2 mm (90 mm)	4.6 mm x 13.6 mm (150 mm)
LUTx-Uxx1Gxxxxxxxx	10 mm x 14 mm (90 mm)	5.8 mm x 15.3 mm (150 mm)
LUTx-UxxAGxxxxxxxx	Ø 13.5 mm (90 mm)	Ø14.5 mm (150 mm)

14.3 Version

Procedure

To find out the version of the firmware, proceed as follows:

1. Read out **Index 23** in the IODD.
2. On the SOPAS user interface in the **Home Device Information** area.

Read out IODD index 23

Table 33: Firmware version IODD Index 23

ISDU index		Name	Access	Data type	Length
DEC	HEX				
23	0x17	Firmware version	ro	String	16 bytes

Home Firmware version

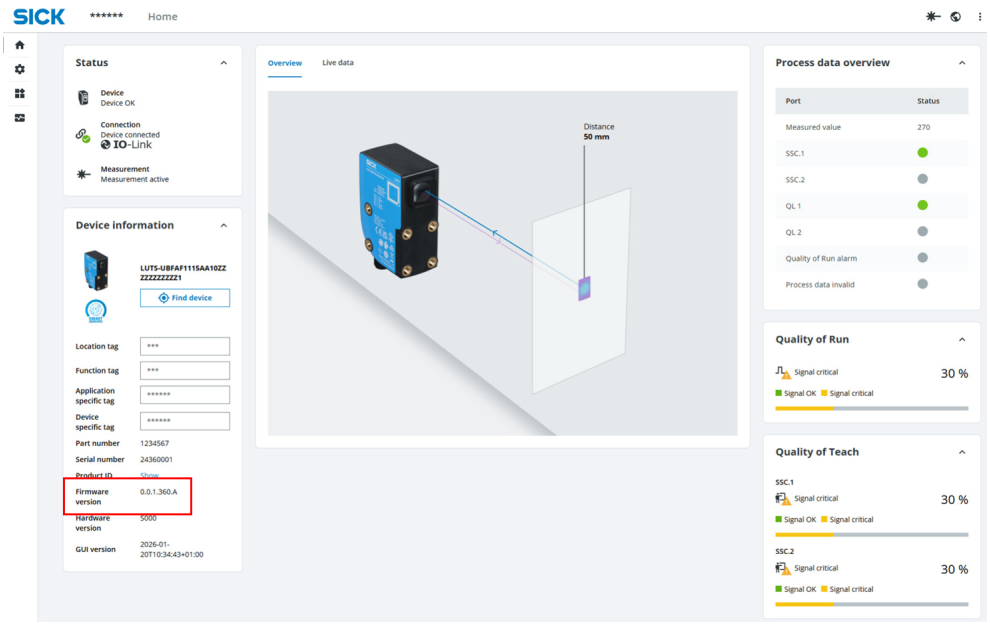


Figure 48: Home Firmware version

15 Accessories

NOTE
Accessories can be found on the online product page at:

→ **http://www.sick.com/LUTS_LUTX**

16 Annex

16.1 EU declaration of conformity

You can obtain declarations of conformity, certificates, and the current operating instructions for the product at **www.sick.com**. To do so, enter the product part number in the search field (part number: see the entry in the “P/N” or “Ident. no.” field on the type label).

16.2 Certification according to UL60947-5-2

The LUTS/LUTX series luminescence sensors are certified in accordance with UL60947-5-2 when supplied with power by LPS or Class 2 power supply units.

The certification is only valid with corresponding device identification on the type label of the respective device.

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