OPERATING INSTRUCTIONS

WLL80

Fiber-optic sensor

SICK
Sensor Intelligence.

Described product

WLL80

Standalone variant

Bus variant (base / expansion units)

Manufacturer

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

Legal information

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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 Further information

You can find the product page with further information via the SICK Product ID:
pid.sick.com/{P/N}/{S/N}
(see "Product identification via the SICK product ID", page 8).

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

1.3 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.

2 Safety information

- Read these operating instructions before commissioning the device.
-  Connection, mounting and configuration of the device must only be carried out by qualified personnel.
-  This device does not constitute a safety component as defined in the Machinery Directive.
-  Do not install the sensor in places exposed to direct UV radiation (sunlight) or other weather conditions unless this is expressly permitted in the operating instructions.
- When commissioning the device, ensure adequate protection against moisture and contamination.
- These operating instructions contain information required during the life cycle of the photoelectric sensor.

2.1 Qualification of personnel

Any work on the product may only be carried out by personnel qualified and authorized to do so.

Qualified personnel are able to perform tasks assigned to them and can independently recognize and avoid any potential hazards. This requires, for example:

- technical training
- experience
- knowledge of the applicable regulations and standards

2.2 Intended use

The WLL80 fiber-optic sensor is an opto-electronic sensor which – in combination with fibers – is used for optical, non-contact detection of objects.

A fiber-optic sensor is designed for mounting and may only be operated according to its intended function. For this reason, the fiber-optic sensor 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.

If the product is used for any other purpose or modified in any way, any warranty claim against SICK AG shall become void.

3 Product description

3.1 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

3.2 Device overview

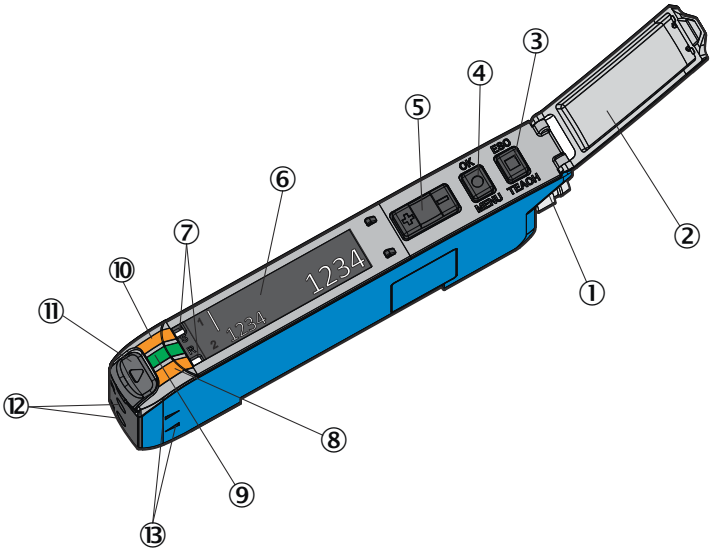


Figure 2: Device overview

1	Connection
2	Hinged cover for the pushbuttons
3	Teach-in / escape pushbutton
4	Menu / OK pushbutton
5	Plus / minus selection pushbuttons
6	Display
7	Indicator for correctly inserted fibers
8	Yellow LED: Status channel 2
9	Green LED: Supply voltage active/IO-Link communication active
10	Yellow LED: Status channel 1
11	Fiber optic interlock
12	Fiber optic connection openings
13	Sender/receiver indicator

3.3 IO-Link communication interface

The product comes with the IO-Link communication interface.

IO-Link communication is a **master-device** communication system.

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

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

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

A detailed description of the configurable functions and associated indices can be found in the “IO-Link description” technical Information: **Technical Information: Photoelectric sensors, SICK Smart Sensors / IO-Link**.

3.4 Smart Task

The following automation functions are available:

A71 Debouncing and Counter

Debouncing = Signal debouncing (ON and OFF) via debounce time, Δt ON and Δt OFF

Counter = Counter value increases or decreases by 1 each time an object is detected / switching signal output when the parameterized references values are reached/output of the absolute counter value

The sensor can be used 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. Output of binary switching signals in standard I/O mode via pin 4 / black wire or via pin 2 / white wire.

Information on the IO-Link functions can be found in the enclosed IO-Link photoelectric sensor operating instructions or downloaded from **www.sick.com** under the device part number.

4 Mounting

4.1 Scope of delivery

- Device in the version ordered (including mounting bracket, if applicable)
- Quick start guide
- Safety notes

The fibers are not included with delivery.

4.2 Mounting requirements

- Typical space requirement for the device, see type-specific dimensional drawing, see "Technical data", page 85.
- Comply with technical data, such as the permitted ambient conditions for operation of the device (e.g., temperature range, EMC interference emissions, ground potential),
- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- Protect the device from direct sunlight.
- shock and vibration-free mounting

4.3 Connecting fibers

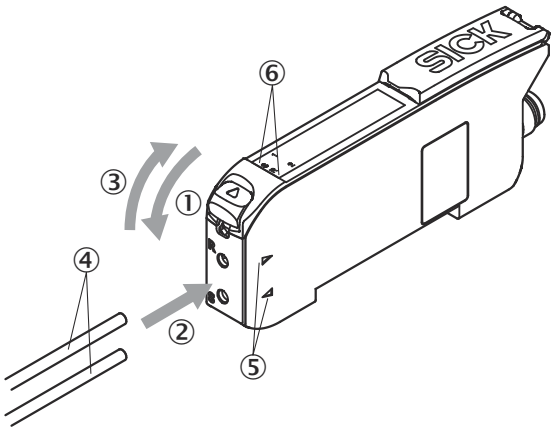


Figure 3: Connecting fibers

1. Open the fiber locking mechanism ①.
2. Insert the fibers ④ into the openings provided (see receiver and sender symbol on the housing) ②+⑤ as far as they will go (check the indicator for correctly inserted fibers ⑥).
3. Close the fiber locking mechanism ③.

NOTICE
When using a fiber optic proximity variant with a coaxial fiber arrangement, connect the single-core optical fiber to the sender. Connect the multi-core optical fiber (fiber bundle) to the receiver.

NOTICE
For WLL80I variants with infrared emitted light (wavelength 880 nm or 1,450 nm), an optical fiber with core material made of glass must be used.

4.3.1 Use fibers with thin end sleeves

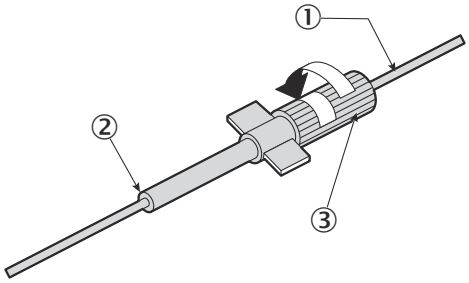


Figure 4: Fiber with thin end sleeve

① Fiber with thin end sleeve
② Separation position
③ Adjustment cap

1. Turn the adjustment cap ③ fully counterclockwise. Insert the optical fiber ①.
2. Turn the adjustment cap ③ clockwise to lock it.
3. Cut off any excess optical fiber.

4.4 Mounting/removing the sensor

Mounting

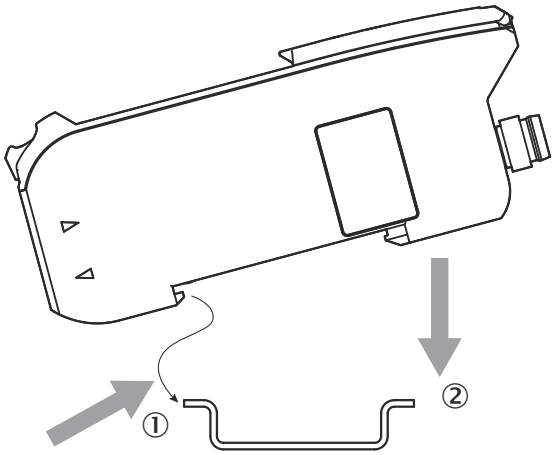


Figure 5: Mount the WLL80 on the DIN rail

1. Hook the lug of the sensor into the DIN rail/mounting bracket
2. Press the sensor in the direction of arrow 2 until the spring clip locks onto the DIN rail/mounting bracket.

Removing

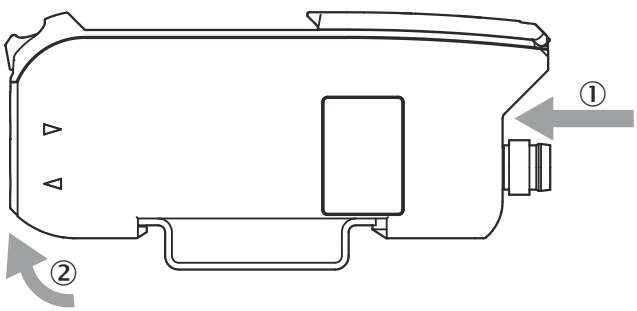


Figure 6: Remove the WLL80 from the DIN rail

1. Push the sensor in direction of the arrow ①
2. On the side where the fibers are connected, lift the sensor in the direction of the arrow ② and remove it.

4.5 Expanding the bus modules

Mutual interference of individual fibers can be avoided with the help of bus modules with anti-interference function.

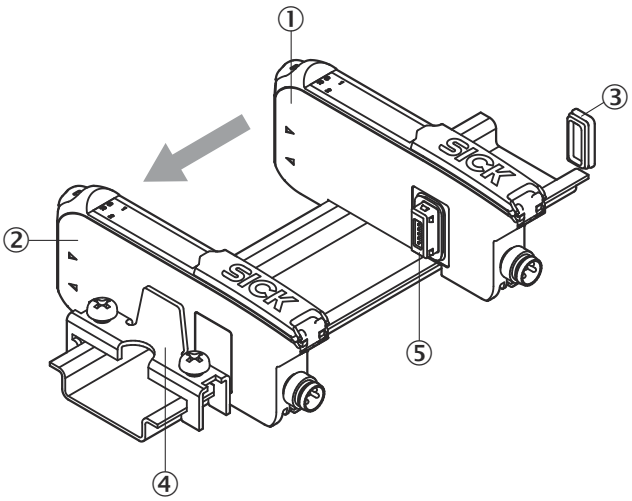


Figure 7: Expanding the base unit

1 Bus expansion unit
2 Bus base unit
3 Protective cover for bus female connector
4 End piece (accessory BEF-EB01-W190)
5 Bus connector

1. Mount the ② base unit on the mounting rail.
2. Mount the ④ end piece on the mounting rail directly behind the base unit to prevent slipping. (Optional)
3. Close off the female connector of the (final) expansion unit using the protective cover ③.
4. Mount the expansion unit ① on the mounting rail.
5. Push the expansion unit against the base unit ② until the female connector of the base unit and the bus male connector ⑤ of the expansion unit make firm contact.

The maximum number of units that can be synchronized is shown in the following table:

Table 1: Number of synchronizable units

WLL80	Response time	Max. synchronizable units
1	22 µs	2
2	70 µs	3
3	250 µs	4
4	500 µs	9
5	1 ms	9
6	2 ms	12
7	8 ms	14

NOTE
The number of anti-interference units has no effect on the response times.

4.5.1 Combination with other sensors

The WLL80 can be combined with other sensors on the same bus. The following table lists other suitable products:

Product family	Sensor type
KTL180	Fiber-optic contrast sensor
AOD1	Control unit for OD1, OD5000, OL1 distance sensors
WLL180T	Fiber-optic sensor
WI180C	Communication gateway (IO-Link Device, fieldbus modules)

The following restrictions must be considered for the combination:

- When using a communication gateway, it must be mounted on the rightmost bus.
- When using AOD1, all AOD1s used must be mounted on the bus to the left of the WI180C communication gateway.
- When using WLL80, all WLL80s used must be mounted on the bus to the left of the AOD1s used, and the WI180C communication gateway if used.
- When using KTL180, all KTL180s used must be mounted on the bus to the left of the WLL80 if used, AOD1 if used, and WI180C communication gateway if used.
- When using WLL180, all WLL180s used must be mounted on the bus to the left of the KTL180 if used, WLL80 if used, AOD1 if used, and the WI180C communication gateway if used.

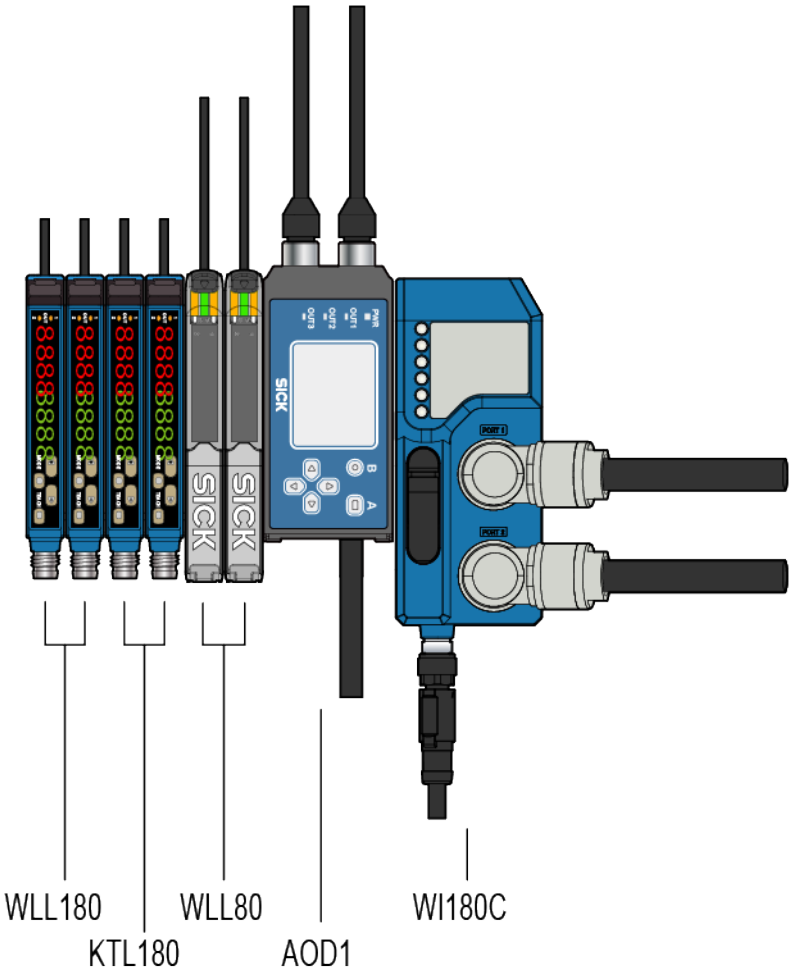


Figure 8: Bus module with different sensors

NOTE
If these combination sequences are not followed, the temporal behavior of the measured value acquisition may not meet the specifications.

NOTE
When combining sensors on the bus, there are additional restrictions regarding usable functions, see "Expanding the bus modules", page 12.

4.6 Ambient temperature

Ambient temperature during operation:

-25 °C ... +55 °C[1]
-13 °F ... +131 °F[1]

1 Different values apply when using the sensors in bus mode, see "UL Satisfaction Ratings Listed", page 18.

4.7 Alignment

WLL80P with visible red light:

Through-beam fiber:

When using the WLL80 fiber-optic sensor with a through-beam fiber, align the sender fiber with the receiving fiber. Select the position so that the emitted light beam hits the receiver. Tip: Use white paper or a reflector as an alignment aid. The sender must have a clear view of the receiver. There must be no object in the path of the beam [see figure 9]. You must ensure that the optical openings (fiber surfaces) of the fibers are completely clear.

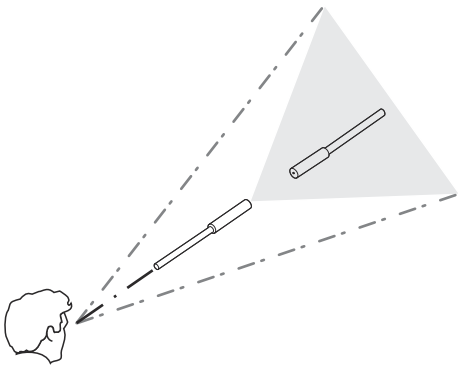


Figure 9: Alignment of through-beam fibers

Proximity fiber:

When using the WLL80 fiber-optic sensor with a proximity fiber, align the fiber to the object. Select the position so that the emitted light beam hits the center of the object. You must ensure that the optical openings (fiber surfaces) of the fibers are completely clear [see figure 10].

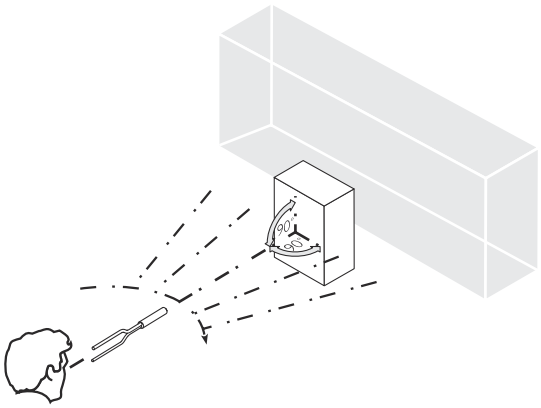


Figure 10: Alignment of proximity fiber

NOTE

When mounting several through-beam and/or proximity fibers close to each other, it is recommended to use the bus variants (base unit combined with expansion units) to minimize the risk of mutual interference, see "Expanding the bus modules", page 12.

WLL80I with non-visible infared light:

Through-beam fiber:

Align the sender with the receiver. Select the position so that the infrared light (not visible) hits the receiver. The correct alignment can be determined via the LEDs and/or the display values. For more information, see alignment and see figure 2, page 8. The sender must have a clear view of the receiver. There must be no object in the path of the beam [see figure 9]. You must ensure that the optical openings (fiber surfaces) of the fibers are completely clear.

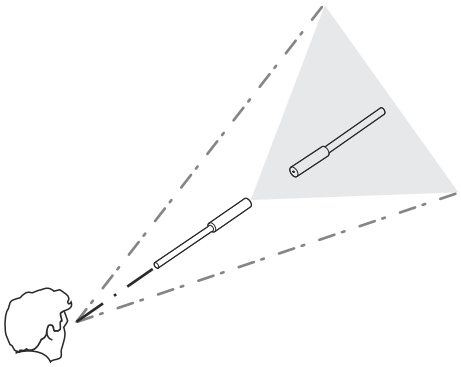


Figure 11: Alignment of through-beam fibers

Proximity fiber:

When using the WLL80 fiber-optic sensor with a proximity fiber, align the fiber to the object. Select the position so that the infrared light (non-visible) hits the center of the object. The correct alignment can be determined via the LEDs and/or the display values. You must ensure that the optical openings (fiber surfaces) of the fibers are completely clear [see figure 10].

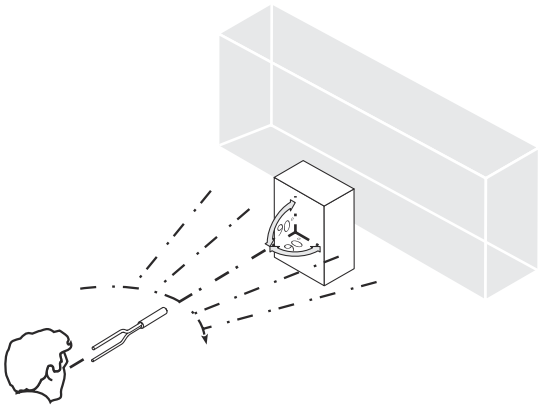


Figure 12: Alignment of proximity fiber

NOTE

When mounting several through-beam and/or proximity fibers close to each other, it is recommended to use the bus variants (base unit combined with expansion units) to minimize the risk of mutual interference, see "Expanding the bus modules", page 12.

5 Electrical installation

Operation in standard I/O mode:

The sensors must be connected in a voltage-free state. The following information must be observed, depending on the connection type:

- Male connector connection: pin assignment
- Cable: Wire color

Only apply voltage and switch on the voltage supply once all electrical connections have been established.

Operation in IO-Link mode: Connect the device to a suitable IO-Link master. Integrate into the IO-Link Master or into the controller using IODD/function block. The green LED flashes on the sensor. IODD and function block are available to download from www.sick.com under the part number.

Explanation of the connection terminology used in the following tables:

BN = brown

WH = white

BU = blue

BK = black

GY = gray

n.c. = not connected

MFIO = multifunctional input/output

MFIn = multifunctional input

MFOut = multifunctional output

Q1 = channel 1 output signal

Q2 = channel 2 output signal

QL1= output signal; switching signal generated from Smart Task

QL2= output signal; switching signal generated from Smart Task

C = communication (IO-Link)

L+ = supply voltage (U_V)

M = ground

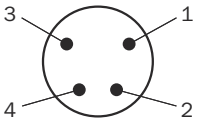
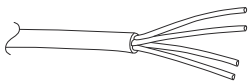
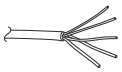
5.1 Connections

U_B: 12 ... 30 V DC (in IO-Link operation: 18 ... 30 V DC),
Base and expansion units: U_B: 12 ... V DC,

see "Technical specifications", page 85

Table 2: Pin assignment

WLL80x-	x2xxxxxZxx xxxxx	x2xxxxxMx xxxxxx	x2xxxxxExx xxxxx	xFxxxxxExx xxxxx	xGxxxxxEx xxxxxx	xHxxxxxMx xxxxxx	xHxxxxxZx xxxx	xIxxxxxMxx xxxxx / xIxxxxxZxx xxxxx	xZxxxxxMx xxxxxx/ xZxxxxxExx xxxxx
1 = BN	+ (L+)	+ (L+)	N. C.	-	-	+ (L+)	+ (L+)	+ (L+)	-

WLL80x-	x2xxxxxZxx xxxxx	x2xxxxxMx xxxxxx	x2xxxxxExx xxxxx	xFxxxxxExx xxxxx	xGxxxxxEx xxxxxx	xHxxxxxMx xxxxxx	xHxxxxxZx xxxx	xIxxxxxMxx xxxxx / xIxxxxxZxx xxxxx	xZxxxxxMx xxxxxx/ xZxxxxxExx xxxxx
2 = WH	MFIO (Default: Q2 QL2 (IO-Link devices))	MFIO (Default: Q2)	MFIO (Default: Q2)	MFIO (Default: Q2)	MFIn (Default: Teach-in)	MFIO (Default: Q2)	MFIO (Default: Q2 QL2 (IO-Link))	MFIn (Default: Teach-in)	-
3 = BU	- (M)	- (M)	N. C.	-	-	- (M)	- (M)	- (M)	-
4 = BK	Q1 QL1/C (IO-Link devices)	Q1	Q1	Q1	Q1	Q1	Q1 QL1/C (IO-Link devices)	Q1	-
5 = GY	-	-	-	-	MFOut (Default: Q2)	-	-	MFOut (Default: Q2)	-
Default: Digital output	Push-pull: PNP/NPN (push-pull)	Push-pull: PNP/NPN (push-pull)	Push-pull: PNP/NPN (push-pull)	Push-pull: PNP/NPN (push-pull)	Push-pull: PNP/NPN (push-pull)	Push-pull: PNP/NPN (push-pull)	Push-pull: PNP/NPN (push-pull)	Push-pull: PNP/NPN (push-pull)	-
	M8, 4-pin 			Cable, 2-wire 0.18 mm² 	Cable, 3-wire 0.18 mm² 	Cable, 4-wire 0.18 mm² 		Cable, 5-wire 0.18 mm² 	Without connection, only bus connection

5.2 Notes on UL approval

5.2.1 UL Satisfaction Ratings Listed

The total control output current and ambient temperature will be restricted as follows depends on the number of the sensors.

c UL us LISTED IND. CONT. EQ. E300503

1 control output setting
Stand-alone:
Input: 12 - 30 Vdc, Class 2, Max. 0.152 A
Output: 12 - 30 Vdc, Class 2, Max. 0.1 A
Maximum Ambient Temperature: +55 °C

Base unit stand-alone use:
Input: 12 - 24 Vdc, Class 2, Max. 0.152 A
Output: 12 - 30 Vdc, Class 2, Max. 0.1 A
Maximum Ambient Temperature: +55 °C

2 control outputs setting
Stand-alone:
Input: 12 - 30 Vdc, Class 2, Max. 0.152 A
Output: 12 - 30 Vdc, Class 2, Max. 0.05 A (each)
Maximum Ambient Temperature: +55 °C

Base unit stand-alone use:
Input: 12 - 24 Vdc, Class 2, Max. 0.152 A
Output: 12 - 30 Vdc, Class 2, Max. 0.05 A (each)
Maximum Ambient Temperature: +55 °C

Up to 2 units:
Base unit
Input: 12 - 24 Vdc, Class 2, Max. 0.144 A
Output: 12 - 30 Vdc, Class 2, Max. 0.02 A
Expansion unit
Output: 12 - 30 Vdc, Class 2, Max. 0.02 A
Maximum Ambient Temperature: +55 °C

Up to 2 units:
Base unit
Input: 12 - 24 Vdc, Class 2, Max. 0.144 A
Output: 12 - 30 Vdc, Class 2, Max. 0.01 A (each)
Expansion unit
Output: 12 - 30 Vdc, Class 2, Max. 0.01 A (each)
Maximum Ambient Temperature: +55 °C

Up to 5 units:
Base unit
Input: 12 - 24 Vdc, Class 2, Max. 0.36 A
Output: 12 - 30 Vdc, Class 2, Max. 0.02 A
Expansion unit
Output: 12 - 30 Vdc, Class 2, Max. 0.02 A
Maximum Ambient Temperature: +50 °C

Up to 5 units:
Base unit
Input: 12 - 24 Vdc, Class 2, Max. 0.36 A
Output: 12 - 30 Vdc, Class 2, Max. 0.01 A (each)
Expansion unit
Output: 12 - 30 Vdc, Class 2, Max. 0.01 A (each)
Maximum Ambient Temperature: +50 °C

Up to 8 units:
Base unit
Input: 12 - 24 Vdc, Class 2, Max. 0.576 A
Output: 12 - 30 Vdc, Class 2, Max. 0.02 A
Expansion unit
Output: 12 - 30 Vdc, Class 2, Max. 0.02 A
Maximum Ambient Temperature: +45 °C

Up to 8 units:
Base unit
Input: 12 - 24 Vdc, Class 2, Max. 0.576 A
Output: 12 - 30 Vdc, Class 2, Max. 0.01 A (each)
Expansion unit
Output: 12 - 30 Vdc, Class 2, Max. 0.01 A (each)
Maximum Ambient Temperature: +45 °C

Up to 16 units:
Base unit
Input: 12 - 24 Vdc, Class 2, Max. 1.152 A
Output: 12 - 30 Vdc, Class 2, Max. 0.02 A
Expansion unit
Output: 12 - 30 Vdc, Class 2, Max. 0.02 A
Maximum Ambient Temperature: +40 °C

Up to 16 units:
Base unit
Input: 12 - 24 Vdc, Class 2, Max. 1.152 A
Output: 12 - 30 Vdc, Class 2, Max. 0.01 A (each)
Expansion unit
Output: 12 - 30 Vdc, Class 2, Max. 0.01 A (each)
Maximum Ambient Temperature: +40 °C

Environmental
Enclosure Tye Rating: Type 1

NOTE
Special devices may be excluded from UL listing (WLL80x-xxxxxxxxSxxxxxx or WLL80x-xxxxxxxxBxxxxxx). Please refer to data sheet.

5.3 Integration of the sensor in IO-Link mode

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

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

Details on integration can be found in the detailed IO-Link description: **Technical Information: Photoelectric sensors, SICK Smart Sensors / IO-Link**.

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

5.4 Multifunction input/output

The MF multifunction input/output can optionally be deactivated, or configured as an input or output.

MFIO/MFIn input functions:

- Teach-in
- Switching off the send LED (test)
- External input signal (Smart Task)
- Reset counter value (Smart Task)

MFIO/MFOut output functions:

- Operational safety alarm (**Quality of Run Alarm**)
- Channel 2 digital output (or QL2 for IO-Link device)
- Response signal for successfully performed teach-in**(feedback**)

5.5 Wiring the digital input

The digital input can be used to start a teach-in, to switch off the sender as a test input, for an external input signal (Smart Task), or to reset the counter value (Smart Task). Voltage level at the input starts the corresponding function of the sensor.

Table 3: Electrical values

Signal voltage HIGH	V_{CC}: 24 V	13.5 V
	V_{CC}: 12 V	9.0 V
Signal voltage LOW	V_{CC}: 24 V	8.0 V
	V_{CC}: 23 V	4.0 V
Input impedance	100 kΩ	

5.6 Wiring the digital outputs

The number of digital inputs available at the connections will vary depending on the sensor, see "Connections", page 17. If the allocated event occurs in the read process, then the corresponding digital output is live.

In each case, the digital outputs are short-circuit protected and overcurrent protected. The switching behavior is selectable: push-pull, PNP or NPN (**open collector**).

Electrical values:

- The output current (100 mA) per sensor is identical for all digital outputs.
- PNP/NPN residual voltage ≤ 1.8 V
- Dielectric strength max 30 V
- Output impedance 10 Ω

NOTE
When using sensors in bus mode, the output current per sensor is reduced as follows:

- From 2 sensors = max. 20 mA

6 Commissioning

6.1 YouTube videos

The individual steps for commissioning are also shown in videos:

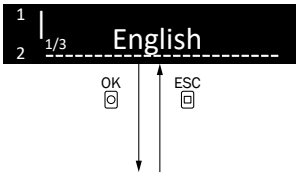
Table 4: Video overview

Commissioning and initial menu settings	https://youtu.be/Ibny_4aauYQ
Analog channel basic settings	https://youtu.be/gQCba58PzGE
Teach-in	https://youtu.be/e75xsxQ8rd8
Counter function	https://www.youtube.com/watch?v=Jp_adG29ha0

6.2 Initial menu settings

Some initial settings need to be configured (during initial commissioning or after an initialization) to make the sensor ready for operation. These defaults specify the parameters required for operating the device. It is often the case that only these parameters need to be set in order to use the device.

Table 5: Initial menu setting



Display language

Select language using ± and confirm using ⊙ OK.

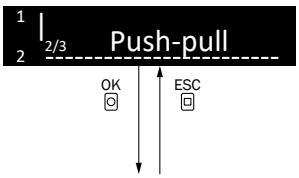
English: English

Deutsch: German

日本語 : Japanese

中文 : Chinese

한국어 : Korean

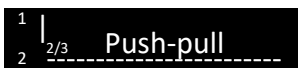


Digital output

Select digital output using ± and confirm using ⊙ OK.

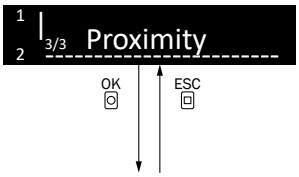
PNP digital output

NPN digital output



Push-pull digital output (push-pull PNP/NPN)

Set PNP for IO-Link communication.



Detection mode
Select Detection mode (according to the principle of operation of the fibers used) using ± and confirm using OK.

Proximity
Received light value above the switching point is detected as an object (“light switching”). Switch-on point > switch-off point (negative hysteresis).

Through-beam
Received light value below the switching point is detected as an object (“dark switching”). Switch-on point < switch-off point (positive hysteresis).

The device is now in Run mode and ready to use.

Left value: Switching point (digits)
Right value: Current received light value (digits)

NOTE
The initial menu settings are also shown in a video:

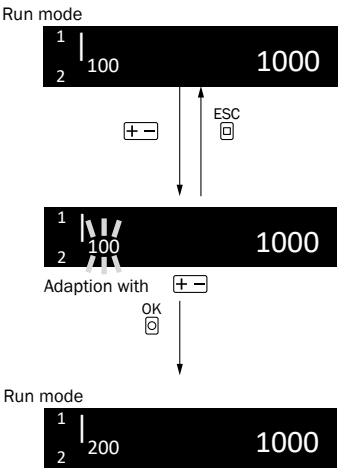
6.3 Setting the sensing range/switching threshold/teach-in

Setting the sensing range or specifying the switching point can be done manually or with the help of various teach-in modes that can be selected in the teach-in menu.

Manual setting the switching points:

The switching point or switchings points can be set manually.

Table 6: Manually setting the switching points



Manually setting the switching point/switching points

Activate manual setting of the switching point using ± (switching point flashes). Adjust the switching point using + (increase) and − (decrease).

In modes (zone teach-in, window teach-in) with two switching points – SP1 and SP2 – after confirming SP1 using OK, the display changes to the setting of SP2. Adjust SP2 also using ±. Confirm using OK.

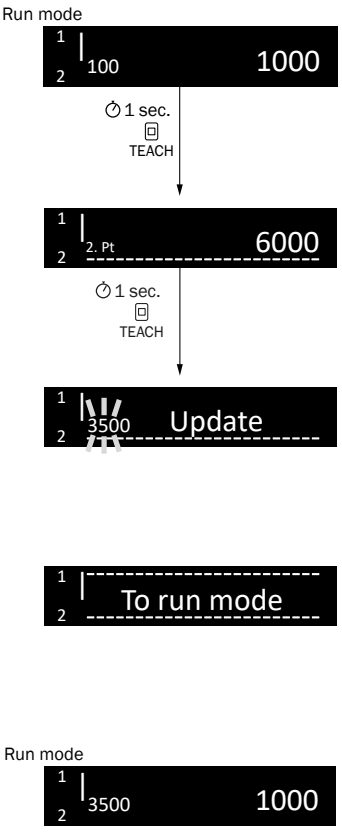
After confirmation (or after 30 seconds without button operation), the display returns to run mode.

2-point teach-in:

The 2-point teach-in sets the switching point SP1 to the average value between the received light values of two teach-in points TP1 and TP2. You can teach in the teach-in point with object or without object first.

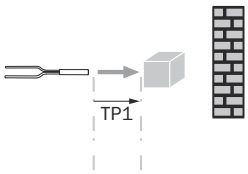
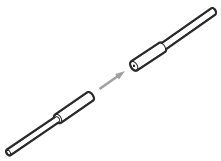
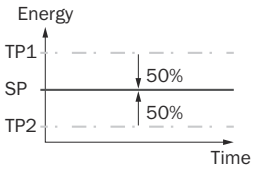
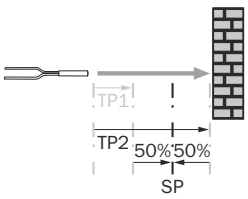
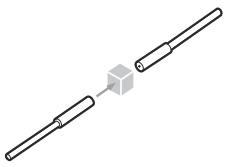
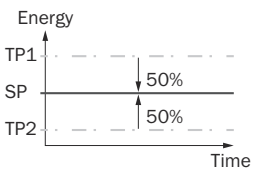
Table 7: 2-point teach-in

Run mode



Perform a fast two-point teach-in by pressing and holding (1 second) TEACH (confirmation of teach-in point TP1) and then by holding down (1 second) TEACH (confirmation of teach-in point TP2).

The switching point (SP) is updated according to the taught-in teach-in points (TP1, TP2) and the display returns to run mode.

	Proximity	Through-beam	Energy consideration
Step 1	with object 	without object 	 SP = (TP1 + TP2) x 50%
Step 2	without object/on background 	with object 	 SP = (TP1 + TP2) x 50%

6.4 Configuration via IO-Link

In addition to manual setting the parameters on the device, the sensor 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.
- Configuration via an **IO-Link Master** (PLC), e.g. SIG350

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

Details on configuration can be found in the detailed IO-Link description: **Technical Information: Photoelectric sensors, SICK Smart Sensors / IO-Link**.

7 Operation

7.1 Control elements

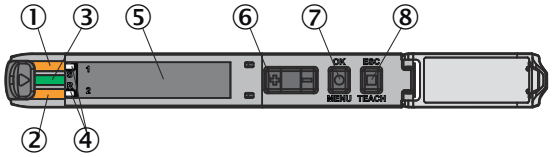


Figure 13: Display and control elements - version with display and operating buttons

1 Yellow LED: Light reception status for channel 1
2 Yellow LED: Light reception status for channel 2
3 Green LED: Supply voltage active/IO-Link communication active
4 Indicator for correctly inserted fibers
5 Display
6 Selection pushbuttons
7 Menu / OK pushbutton
8 Teach-in / escape pushbutton
9 Display bar: Selected channel (channel 1 / channel 2)

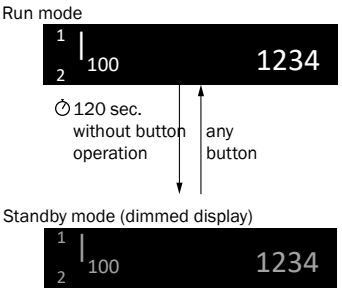
Table 8: Description of control elements

No.	Description	Function
1	Channel 1	Devices with IO-Link: Lights up when received light ≥ switching point on channel 1 (Qint.1 active) Devices without IO-Link: Lights up when digital output is active on channel 1
2	Channel 2	Devices with IO-Link: Lights up when received light ≥ switching point on channel 2 (Qint.2 active) Devices without IO-Link: Lights up when digital output is active on channel 2
3	Green LED	Lights up when supply voltage is applied/flashes when IO-Link communication is active
4	Indicator for correctly inserted fibers	White indicator areas are completely covered by a black area when the fibers are inserted correctly.
5	Display	Shows menu item or values.
6	Selection pushbuttons (+ -)	Scrolls through menu items, changes values, or locks the pushbuttons.
7	**MENU** / **OK** pushbutton	Opens the menu, confirms entries, switches to lower-level menu items, or changes the channel.
8	**TEACH** / **ESCAPE key** pushbutton	Selects the teach-in menu (from run mode), performs a teach-in, or changes to a higher-level menu item (from menu).
9	Display bar	Shows the currently selected channel.

7.2 General sensor functions

Standby mode

Table 9: Standby mode

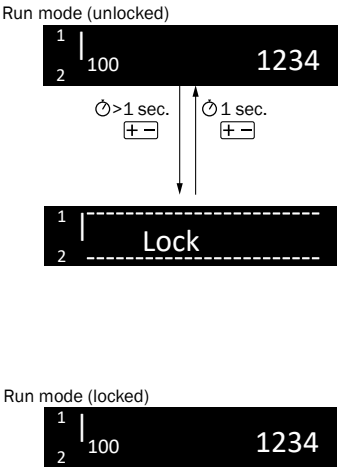


Standby mode

After 120 seconds without button operation, the sensor switches to standby mode and dims the display to 20% brightness (the display is turned off completely when energy-saving mode is activated). Pressing any button wakes up the display from standby mode and returns the device to run mode.

Locking the sensor

Table 10: Sensor lock



Sensor lock

Lock and unlock the sensor by pressing and holding ± (center of the button for > 1 second).

Sensor locked

Sensor unlocked

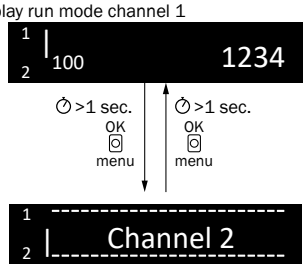
NOTE

Under the Input/Output settings, it is possible to configure lock options that are activated when the sensor is locked (lock operating buttons and lock external input).

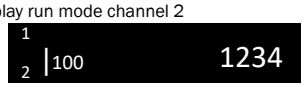
Changing the channel

Table 11: Channel change

Display run mode channel 1



Display run mode channel 2



Channel change

Change the channel by pressing and holding OK (for > 1 second).

Display channel 1

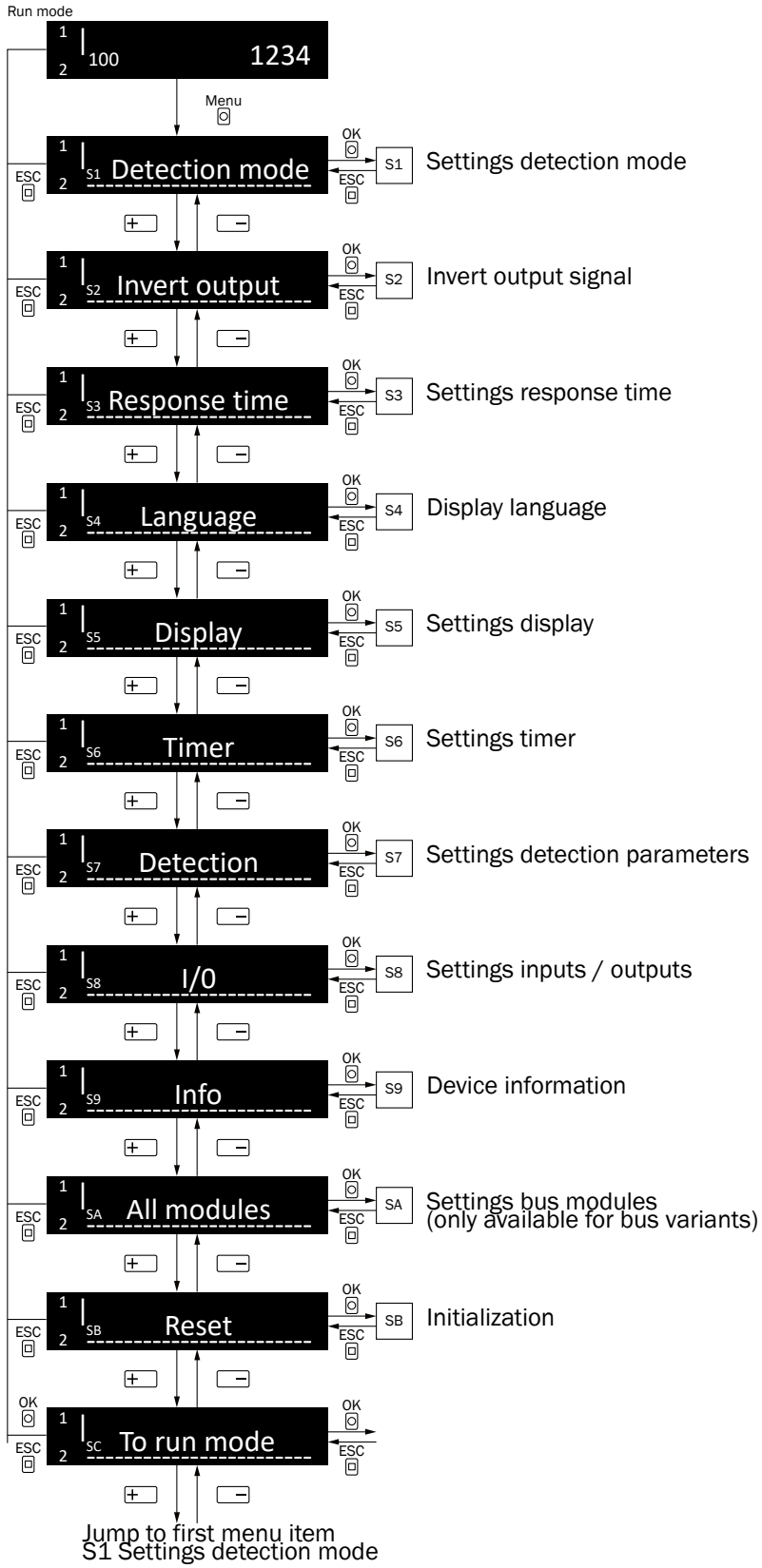
Display channel 2

NOTE

The device has 2 channels with settings that can be configured separately. A channel change can be performed both in run mode and in the Settings menu.

The indicator bar on the display (next to the respective channel number) shows the currently selected channel.

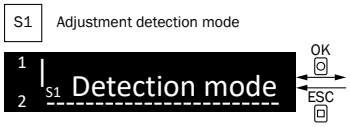
7.3 Main menu navigation tree (1st menu level)



7.4 Default settings (1st menu level)

7.4.1 Setting the detection mode

Table 12: Detection mode



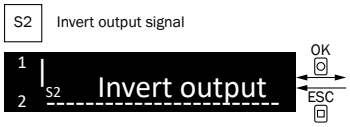
Select detection mode (according to the principle of operation of the fibers used) using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Proximity
Received light value above the switching point is detected as an object (“light switching”). Switching point for object moving into the beam greater than switching point for object moving out of the beam (negative hysteresis).

Through-beam
Received light value below the switching point is detected as an object (“dark switching”). Switching point for object moving into the beam less than switching point for object moving out of the beam (positive hysteresis).

7.4.2 Invert output signal

Table 13: Invert output signal



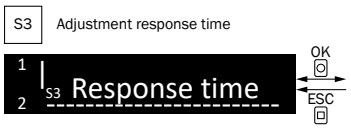
Select invert output signal (normally closed contact vs. normally open contact) using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Not inverted
Output is defined as an N/O (**normally open**) contact.

Inverted
Output is defined as an N/C (**normally closed**) contact.

7.4.3 Setting the response time

Table 14: Setting the response time



Select response time using ± and confirm using OK. After confirmation, the display returns to the higher-level menu.

16 µs (current received light value)

70 µs (current received light value)

250 µs (current received light value)

500 µs (current received light value)

1 ms (current received light value)

2 ms (current received light value)

8 ms (current received light value)

NOTE SELECTING THE APPROPRIATE RESPONSE TIME

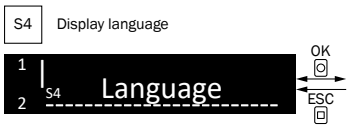
- Select a suitable response time based on the application and the process speed (as fast as necessary, as slow as possible).
- For high sensing ranges or high robustness against contamination, we recommend selecting the slowest possible response time.
- To avoid saturation of the received light, we recommend, amongst other things, selecting a fast response time.

NOTE

In bus mode, the fastest selectable response time is 22 µs.

7.4.4 Setting the display language

Table 15: Display language



Select language using ± and confirm using OK. After confirmation, the display returns to the higher-level menu.

English: English

Deutsch: German

日本語 : Japanese

中文 : Chinese

한국어 : Korean

7.4.5 Initializing the sensor

Table 16: Initializing the sensor

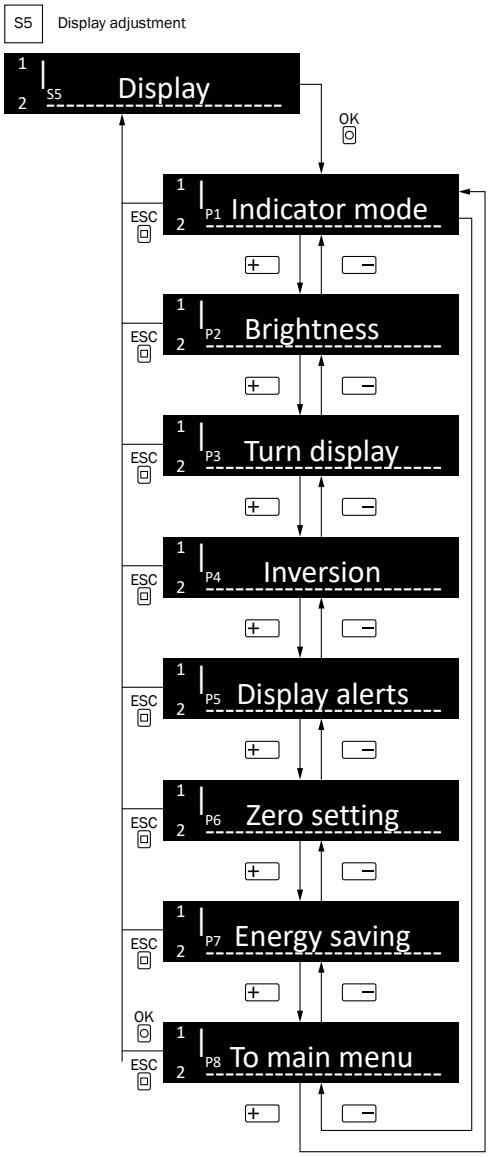
Select initialization using ± and confirm using OK. After confirmation, the display returns to the higher-level menu.

Application reset
Resets all parameters except the stored job parameter sets

Factory settings reset
Completely resets the device incl. job parameter sets to the factory settings

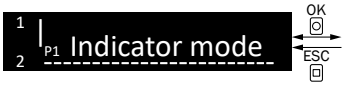
7.5 Display settings

7.5.1 Navigation tree for display settings (S5)



7.5.2 Indicator mode

Table 17: Indicator mode



Select indicator mode using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Digits
Displays the absolute value of the received light in the unit of digits (“digital analog value”)

Bar graph
Displays the received light value as a normalized bar

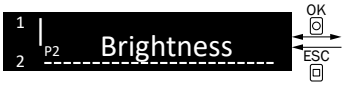
Percent
Displays the received light value in the unit of percent. The teach-in point corresponds to 100%.

Counter (only displayed when D6 Counter mode is active)
Displays the counter values (current actual and target counter value).

Edge (only displayed when D2 Edge mode is active)
Displays the edge values (current actual and target edge values).

7.5.3 Display brightness

Table 18: Display brightness



Select display brightness using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Percentage brightness level of the display (in 10% steps between 10% and 100%)

NOTE
Lowering the display brightness increases the service life of the display.

7.5.4 Rotating the display

Table 19: Rotating the display

Select display rotation by 180° using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Off
Normal display orientation

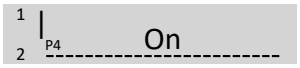
On
Display orientation rotated by 180°

7.5.5 Inverting the display colors

Table 20: Inverting the display colors

Select invert the monochrome display colors using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Off
Light characters on a dark background



On
Dark characters on a light background

7.5.6 Displaying alerts

Table 21: Displaying alerts

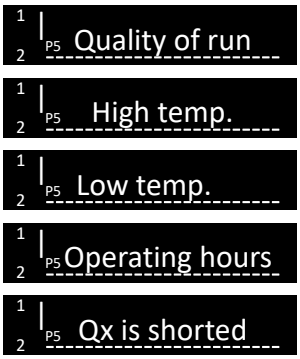
Select the display alerts using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Off
Do not show alerts on the display

On
Show alerts on the display

NOTE

When display alerts is activated, alerts for the following events are displayed:



7.5.7 Zeroing the displayed value

Table 22: Zeroing the displayed value

Select zero the actual received light value shown on the display using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

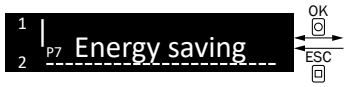
Activate
Current actual value of the received light is set to the value zero.

Deactivate
Absolute actual value of the received light is displayed (resetting the zeroing).

NOTE
The switching point set at the time of zeroing is reduced by the same amount (in digits) as the current received light value and can therefore also assume a negative value.

7.5.8 Energy saving mode

Table 23: Energy saving mode



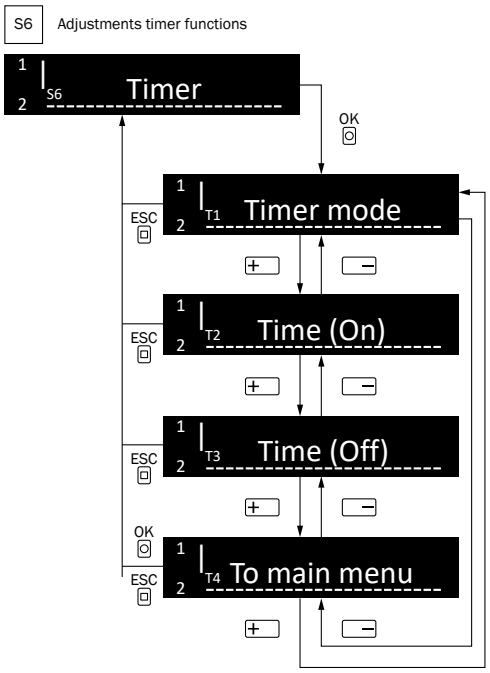
Select energy saving mode using ± and confirm using OK. After confirmation, the display returns to the higher-level menu.

Off
Normal energy consumption with permanent display (display brightness reduced to 20% after 60 seconds if no button pressed)

On
Reduced energy consumption by switching off the display after 60 seconds if not button pressed (display reactivation by pressing any button)

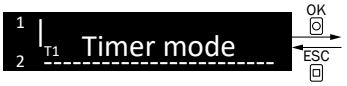
7.6 Time functions

7.6.1 Navigation tree for time functions (S6)



7.6.2 Selecting the time function

Table 24: Selecting the time function



Select time function using ± and confirm using OK.

	Deactivate No time function active
	Switch-on delay High signal at the output is only applied when the (on) switching point is exceeded for the configured time.
	Switch-off delay High signal at the output remains after falling below the (off) switching point for the configured time.
	Switch-on/switch-off delay (combined) High signal at the output is only applied when the (on) switching point is exceeded for the configured time. High signal at the output remains after falling below the (off) switching point for the configured time.
	Impulse (one shot) High signal at the output is applied for the configured time as soon as the (on) switching point is exceeded.
	Switch-on delay/impulse (combined) High signal at the output is applied for the configured (pulse) time when the (on) switching point is exceeded for the configured (switch-on delay) time.

NOTE

After confirming the time function, the display jumps directly to the setting of the time(s).

After confirming the time(s), the display returns to the higher-level menu.

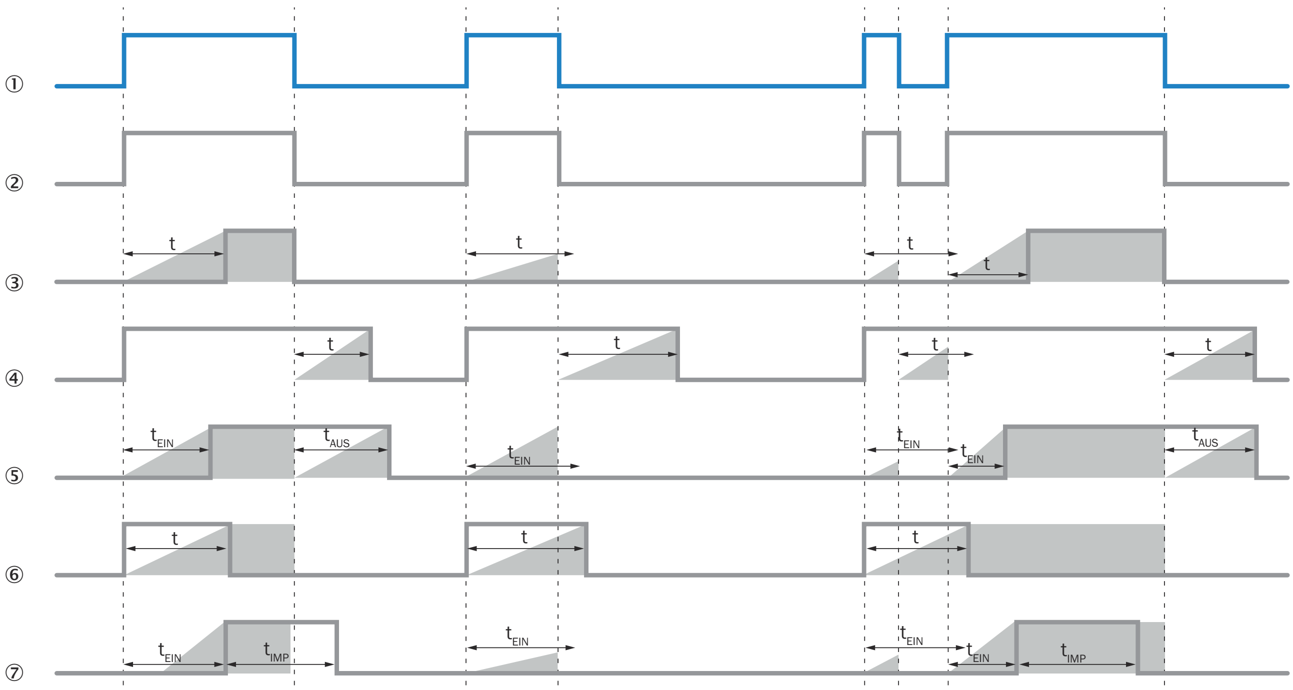
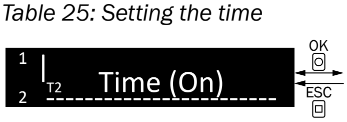


Figure 14: Time functions

①	Input signal
②	No time function
③	Switch-on delay
④	Switch-off delay
⑤	Switch-on/switch-off delay
⑥	Impulse
⑦	Switch-on delay/impulse

7.6.3 Setting the time of the time function

Table 25: Setting the time

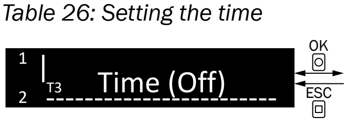


Select time setting using + − and confirm using OK. After confirmation, the display returns to the higher-level menu.

Time setting for the corresponding time function in milliseconds (1 ms ... 30,000 ms).

NOTE
Time setting is only available if a time function is activated.

Table 26: Setting the time



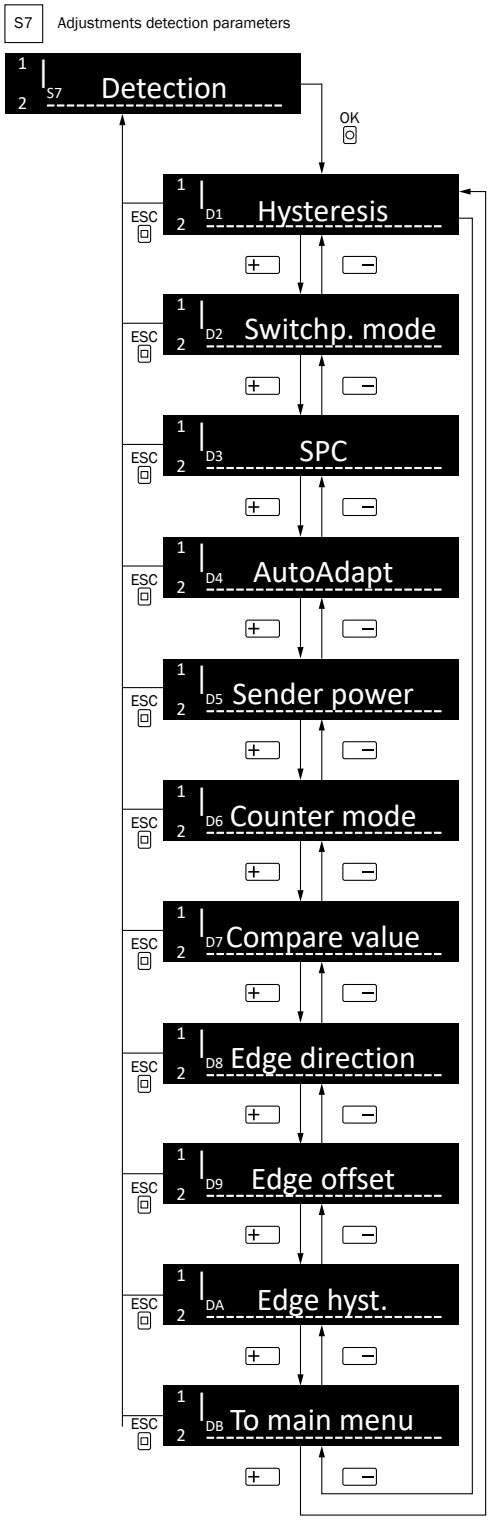
Select time setting using + − and confirm using OK. After confirmation, the display returns to the higher-level menu.

Time setting for the corresponding time function in milliseconds (1 ms ... 30,000 ms).

NOTE
Second time setting is only available if a combined time function (switch-on/switch-off delay or switch-on delay/impulse) is activated.

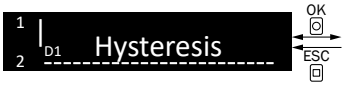
7.7 Detection parameters

7.7.1 Navigation tree for detection parameters (S7)

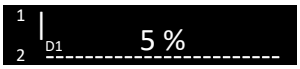


7.7.2 Hysteresis

Table 27: Hysteresis



Select hysteresis using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.



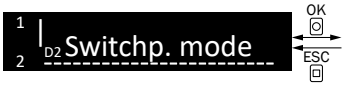
Hysteresis value in percent (1% ... 90%).

NOTE

The hysteresis is the difference between the switching points for a signal change when an object moves into and out of the beam, see "Setting the switching logic", page 64.

7.7.3 Switch point mode

Table 28: Switch point mode



Select switching point mode using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Single / window mode
Mode for detecting received light values using one switching point (single mode) or received light value ranges using two switching points (window mode)

Edge mode
Defines the edges to be detected (increase/decrease of the received light value per time unit)

Deactivated
No detection function

NOTE

After confirming the edge mode, the display jumps directly to the setting of the edge direction and edge offset. After confirming the values, the display returns to the higher-level menu.

When edge mode is selected, the indicator mode changes to edge (display of current actual and target value of the edge).

7.7.4 Sender power control (SPC)

*Table 29: SPC (**Sender Power Control**)*

Select SPC function using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Off
No control or automatic regulation of the sender power activated

On
To ensure a consistent sender power, the sender power is monitored and regulated.

NOTE

The SPC function can only be switched on and off for both channels together.

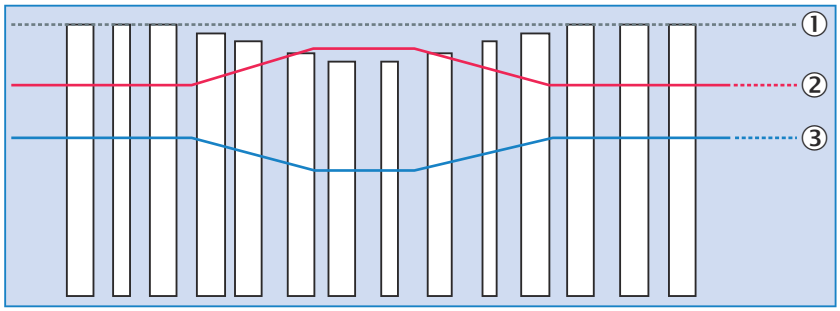


Figure 15: SPC off

① Light reception
② Temperature
③ Sender power

The received light level and sender power change due to temperature fluctuations.

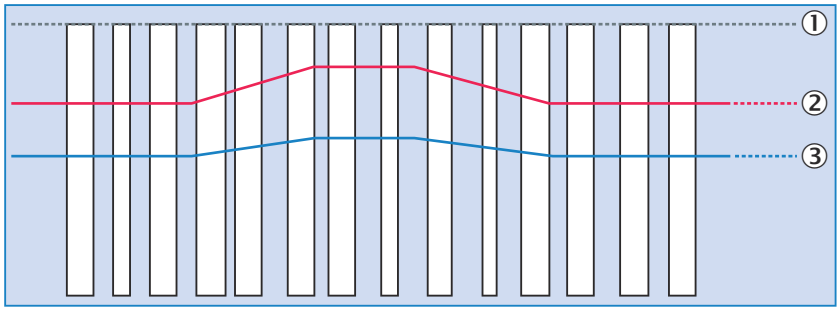


Figure 16: SPC on

① Light reception
② Temperature
③ Sender power

The sender power adjusts and the received light level remains constant as the temperature changes.

7.7.5 Switching point adjustment (AutoAdapt)

When automatic switching point adjustment is enabled, slow changes of the signal level are monitored. When such changes occur (⑦), the threshold is adjusted accordingly (①). This function can help to ensure reliable switching even in environments with increased contamination.

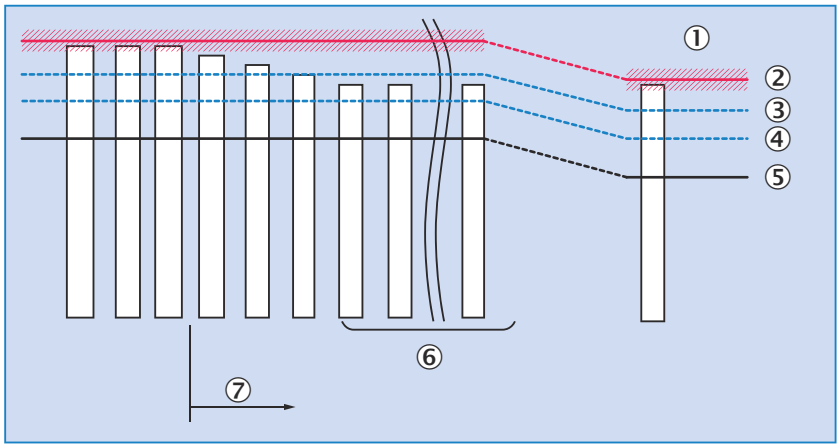


*Figure 17: **AutoAdapt** switching point adjustment*

① Default value (100%)
② Received light level is corrected
③ Low switching threshold H
④ Low switching threshold L
⑤ Switching threshold of the controller output
⑥ Change of the switching threshold when it falls between switching thresholds ③ and ④ over the duration of the update cycle.
⑦ Received light level falls due to contamination

*Table 30: Switching point adjustment (**AutoAdapt**)*

Select **AutoAdapt** function using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Off
No switching point adjustment activated

On with standard response time (Update cycle of switching threshold: 3,000 ms)

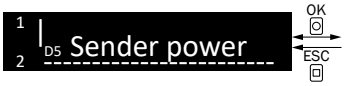
On with fast response time (Update cycle of switching threshold: 1,000 ms)

On with high speed response time (Update cycle of switching threshold: 250 ms)

NOTE
The **AutoAdapt** function can only be set for both channels together.

7.7.6 Sender power

Table 31: Sender power



Select set sender power using ± and confirm using OK. After confirmation, the display returns to the higher-level menu.

Maximum sender power (current received light value)

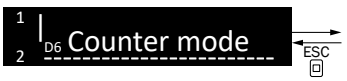
Median sender power (current received light value)

Minimum sender power (current received light value)

Sender power is regulated, if possible, so that the received light value is 5000 digits (optimal working range for many applications and to avoid saturation of the received light).

7.7.7 Counter mode

Table 32: Counter mode



Select counter mode using ± and confirm using OK. After confirming the count compare value, the display returns to the higher-level menu.

Off
No counting function activated

On
Counting function activated

NOTE

After confirming the counter mode, the display jumps directly to the setting of the count compare value. After confirming the count compare value, the display returns to the higher-level menu.

When the counter mode is enabled, the display mode automatically changes to counter (display of current counter value and count compare value) and a signal change occurs at the digital output when the configured count compare value is reached.

NOTE

The counter function is also shown in a video:

7.7.8 Count compare value

Table 33: Count compare value

Select count compare value using ± and confirm using OK. After confirming the count compare value, the display returns to the higher-level menu.

Count compare value (1 ... 16,383)

NOTE
Setting the count compare value is only available if counter mode is activated.

7.7.9 Edge direction

Table 34: Edge direction

Select edge direction using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Both edge directions
Both positive and negative edges (increase and decrease of the received light value) are detected.

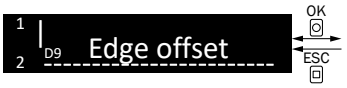
Positive edge direction
Positive edges (increase of the received light value) are detected.

Negative edge direction
Negative edges (decrease in received light value) are detected.

NOTE
Setting the edge direction is only available if edge mode is activated under switching point mode.

7.7.10 Edge offset

Table 35: Edge offset



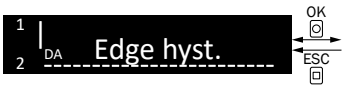
Select edge offset using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Value of the edge offset in microseconds or milliseconds (depending on the configured response time). The value is a multiple (factor 1 ... 255) of the configured response time.

NOTE
The edge offset specifies the time span of received light values to be compared to determine the edge slope. Setting the edge offset is only available if edge mode is activated.

7.7.11 Edge hysteresis

Table 36: Edge hysteresis



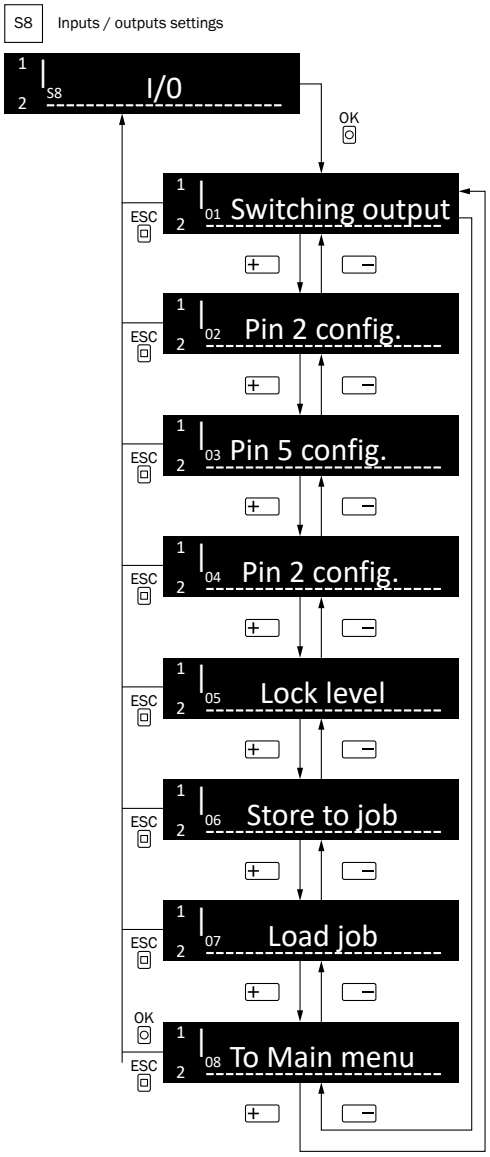
Select edge hysteresis using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Value of the edge hysteresis in digits (0 ... 9999 digits)

NOTE
The edge hysteresis specifies the difference between two edge measuring points below which a switching signal change does not occur. Setting the edge hysteresis is only available if edge mode is activated.

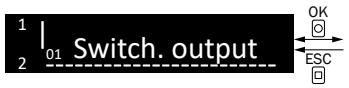
7.8 I/O settings

7.8.1 Navigation tree for setting inputs and outputs (S8)



7.8.2 Digital output

Table 37: Digital output



Select digital output using ± and confirm using OK. After confirmation, the display returns to the higher-level menu.

PNP switching output

NPN switching output

Push-pull digital output (push-pull PNP/NPN)

NOTE
Set PNP for IO-Link communication.

7.8.3 Pin 2 configuration

Test input

Test input: The WLL80 has a test input that can be used to switch off the sender and thereby check that the sensor is functioning correctly: If female cable connectors with LED indicators are used, you must ensure that the test input is assigned accordingly.

Proximity mode: If an object is detected, activate the test input (see the connection diagram [see table 38, page 44], PNP: TE → M).

Sender LED is switched off. No object being detected is simulated.

Through-beam mode: There must be no object between the sender and receiver; activate the test input (see the connection diagram, TI at 0 V).

Sender LED is switched off. The detection of an object is simulated.

Use the following table to check the function. If the digital output fails to behave in accordance with the following table, check the application conditions. See section Fault diagnosis.

Table 38: Test function for proximity

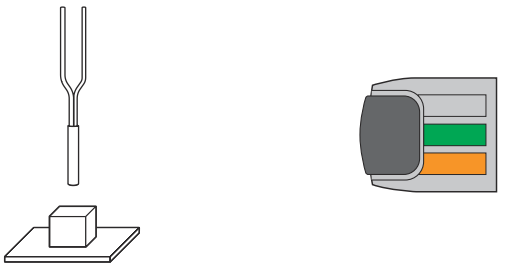
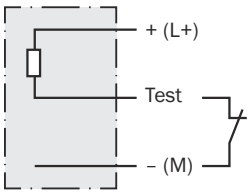
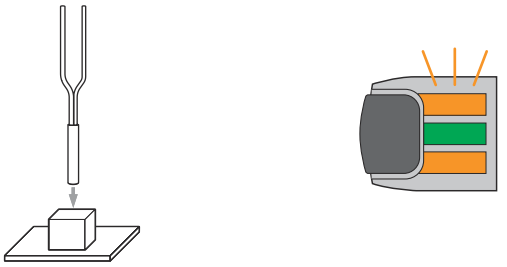
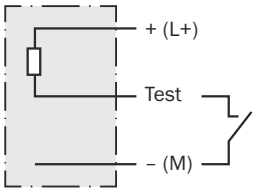
	Test
	
	

Table 39: Test function for through-beam

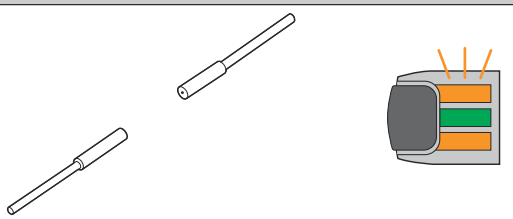
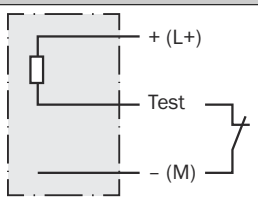
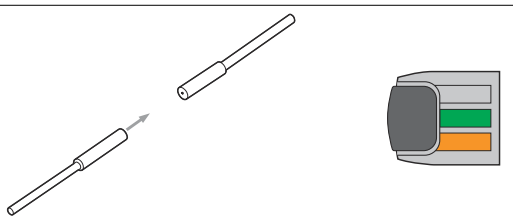
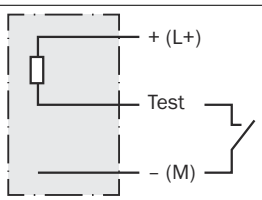
	Test
	
	

Table 40: Pin 2 configuration

Select function of pin 2 or the white wire using ± and confirm using OK. After confirmation, the display returns to the higher-level menu.

	Switching output signal channel 2 (devices without IO-Link) Switching output signal QL2 (devices with IO-Link)
	Operational safety alarm (**Quality of Run Alarm**)
	Teach-in by external input signal
	Switches off the sender LED by external input signal
	Zeroes the counter
	No function
	Other functions (devices with IO-Link only)

NOTE
The configuration relates to pin 2 for plug-in devices, and to the white wire for cabled devices.

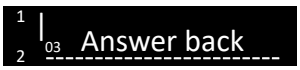
NOTE
The counter reset function is only available when counter mode is activated

7.8.4 Pin 5 configuration (output)

NOTE
For devices with 5-wire cable or 5 pins, the gray wire or pin 5 can be configured with different output functions.
This function is not available for devices with other connections. The menu is not visible.

Table 41: Pin 5 configuration (output)

Select function of pin 5 or the gray wire using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

	Switching output signal channel 2 (devices without IO-Link) Switching output signal QL2 (devices with IO-Link)
	Operational safety alarm (**Quality of Run Alarm**)
	Output signal when teach-in is successful.
	No function
	Other functions (devices with IO-Link only)

7.8.5 Pin 2 configuration (input)

NOTE

For devices with 3-wire cable, 5-wire cable or 5 pins, the white wire or pin 2 can be configured with different input functions.

This function is not available for devices with other connections. The menu is not visible.

Table 42: Pin 2 configuration (input)

Select function of pin 2 or the white wire using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

	Teach-in by external input signal
	Switches off the sender LED by external input signal
	Reset counter value.
	No function
	Other functions (devices with IO-Link only)

7.8.6 Lock option

This function can be used to define the extent to which the device is locked when the button lock is triggered.

Table 43: Lock option

Select lock option using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

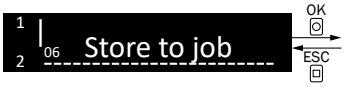
When the device is locked, the operating buttons and the external input are locked.

When the device is locked, the operating buttons are locked (external input remains accessible).

7.8.7 Save job

Stored parameter sets (jobs) allow specific application parameters (e.g., teach-in procedure, etc.) for certain applications or format-specific to be permanently stored in the device and used flexibly.

Table 44: Save job



Select the job number to save using ± and click ⊙ OK to confirm. After confirmation, the display returns to the higher-level menu.

Saves the current device settings under job number 1.

Saves the current device settings under job number 2.

Saves the current device settings under job number 3.

Saves the current device settings under job number 4.

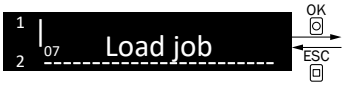
Saves the current device settings under job number 5.

NOTE

Jobs can be saved directly on the device or via IO-Link communication.

7.8.8 Load job

Table 45: Load job



Select the job number to load using ± and click OK to confirm. After confirmation and the loading process has completed, the display returns to run mode (with settings according to the loaded job number).

Loads the device settings saved under job number 1

Loads the device settings saved under job number 2

Loads the device settings saved under job number 3

Loads the device settings saved under job number 4

Loads the device settings saved under job number 5

NOTE

Jobs can be loaded directly on the device or via IO-Link communication.

In the delivery state and after a reset to factory settings, the job numbers are assigned with different settings for solving typical applications.

Table 46: Job numbers

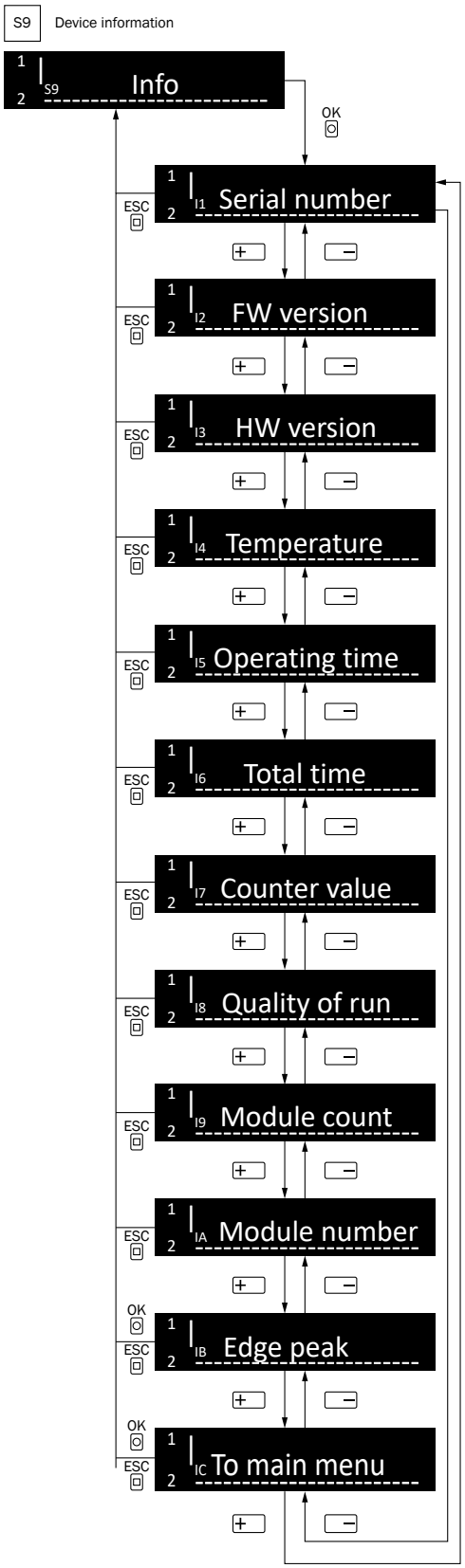
Job number	Preset parameters	Description of the application
Job 1	Detection mode: Proximity Response time: 8 ms Teach-in mode: 1-point teach-in Teach-in offset: +10%	Implementing a large scanning range/ high sensitivity when using a proximity fiber Perform teach-in without object.
Job 2	Detection mode: Proximity Response time: 16 µs Teach-in mode: Dynamic teach-in	Detecting fast objects when using a proximity fiber Perform teach-in while process is running.
Job 3	Detection mode: Through-beam Response time: 8 ms Teach-in mode: 1-point teach-in Teach-in offset: -90%	Implementing a large scanning range/ high robustness against contamination when using through-beam fibers Perform teach-in without object.
Job 4	Detection mode: Through-beam Response time: 1 ms Hysteresis: 10% AutoAdapt: On - normal Sender power: Auto Teach-in mode: 1-point teach-in Teach-in offset: -10%	Detection of transparent/small objects when using through-beam fibers Operation of the sensor in the saturation range is avoided by setting “Sender power: Auto” Avoidance of switching errors due to contamination by setting “AutoAdapt: On - normal”. Perform teach-in without object.
Job 5	Detection mode: Proximity Switching point mode: Edge mode Edge direction: Both (positive and negative) Edge offset: 12,500 µs (50 x 250 µs) Indicator mode: Edge	Detecting rising and falling edges (caused, for example, by edge jumps of the object) when using a proximity fiber.

NOTE
Parameters not listed in the table are set to their factory setting.

NOTE
Loading of jobs is also shown in a video:

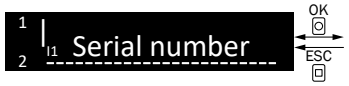
7.9 Device information

7.9.1 Navigation tree for device information (S9)



7.9.2 Serial number

Table 47: Serial number

		Serial number of the device (sensor)

7.9.3 Software version

Table 48: Software version

		Software version number

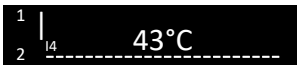
7.9.4 Hardware version

Table 49: Hardware version

		Hardware version number

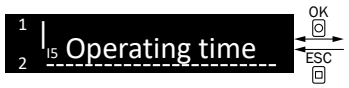
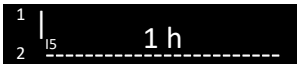
7.9.5 Device temperature

Table 50: Device temperature

		Current internal device temperature

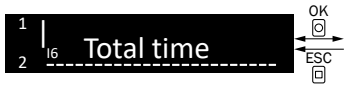
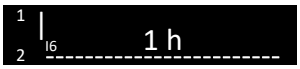
7.9.6 Operating time counter (uptime since last initialization)

Table 51: Operating time

		Operating time since last initialization

7.9.7 Operating time counter (total uptime since initial commissioning)

Table 52: Operating time (total)

		Operating time since initial commissioning

7.9.8 Counter value

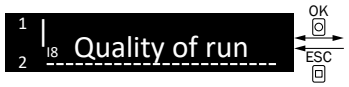
Table 53: Counter value

		Current counter value

NOTE
Setting the counter value is only available if counter mode is activated.

7.9.9 Operational safety

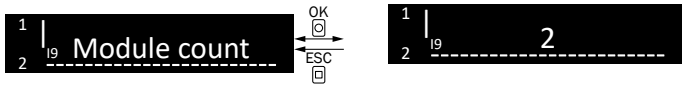
*Table 54: Operational safety(**Quality of Run**)*

		Value for operational safety in percent (0% ... 254%).

NOTE
The value for operational safety (**Quality of Run**) is only available if through-beam detection mode is set. For “Proximity” detection mode, the value is not available (value 255%).

7.9.10 Number of bus modules

Table 55: Number of bus modules

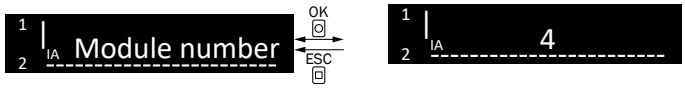


Number of connected bus modules (1 … 16)

NOTE
Available for bus modules only

7.9.11 Module number of bus module

Table 56: Module number

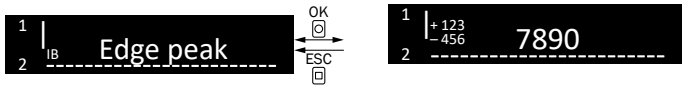


Module number in the bus network (1 … 16)

NOTE
Available for bus modules only; the base unit always has the module number 1 in the bus network. The modules of the connected extension units are numbered consecutively starting from the base unit.

7.9.12 Edge peak

Table 57: Edge peak



Maximum value of the positive edge direction (rising edge), maximum value of the negative edge direction (falling edge), current received light value (all values in digits)

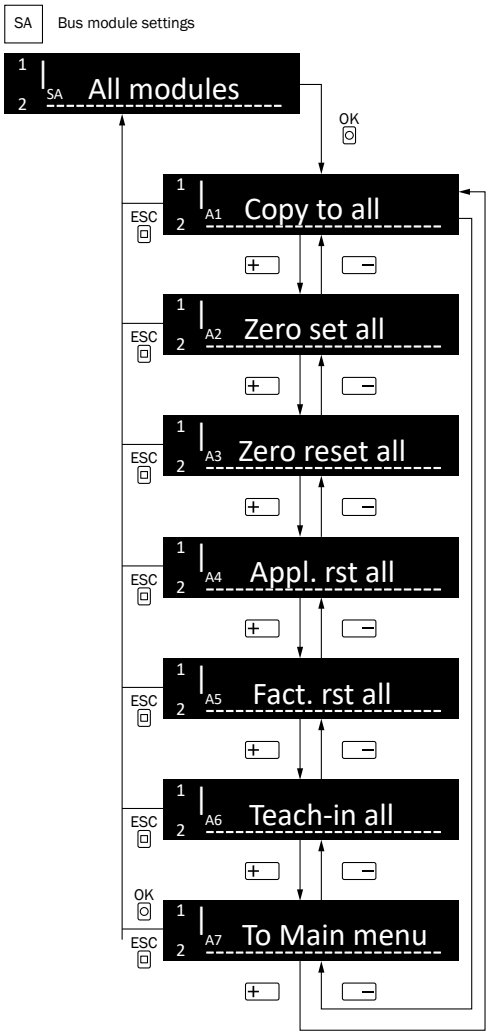
NOTE
Edge peak is only available if edge mode is activated under switching point mode.

The edge peak values serve as a guide for determining the values to set in edge mode.

7.10 Bus modules

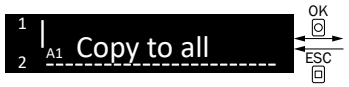
For notes on anti-interference and the number of units that can be synchronized, see section 4.5.

7.10.1 Navigation tree for bus modules (SA)



7.10.2 Copy function

Table 58: Copy function (bus modules)



Select copy function using ± and confirm using OK. After confirmation, the display returns to the higher-level menu.

	Copy process is not performed.
	All settings of the base unit are copied to the connected expansion units.

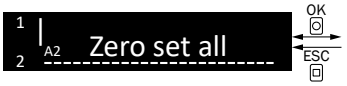
NOTE

The copy function is only available in bus mode. When the copy function is activated, all settings of the base unit are transferred to the connected expansion units. No data from the base unit are transferred to locked expansion units.

DANGER
If the WLL80 is combined with other sensors (WLL180, KTL180 or AOD1) on the bus (see "Combination with other sensors", page 13), then the copy function must not be used in either the WLL80 or the other sensors. Unplanned parameter changes can occur during use. If the copy function has been used inadvertently, then it may be necessary to reset every device on the bus to factory settings to ensure the specified function.

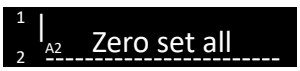
7.10.3 Zeroing the display value of bus modules

Table 59: Zeroing the display value of bus modules



Select zero the display value of all connected bus modules using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

The process of zeroing all bus modules is not performed.



The current actual values of the received light of the base unit and all connected (not locked) bus modules are set to 'zero'.

NOTE
The switching point set at the time of zeroing is reduced by the same amount (in digits) as the current received light value and can therefore also assume a negative value.

7.10.4 Resetting the zeroing of the display value of bus modules

Table 60: Resetting the zeroing of the display value of bus modules

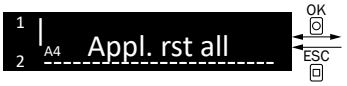
Displays the absolute display value (resets the zeroing for bus modules)
Select reset the zeroing of the display value of all connected bus modules using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Process of resetting the zeroing of all bus modules is not performed.

The absolute actual values of the received light of the base unit and all connected (not blocked) bus modules are displayed (resets a previously performed zeroing of a bus module).

7.10.5 Initializing bus modules (application reset)

Table 61: Initializing bus modules (application reset)



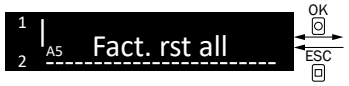
Select initialize all connected bus modules using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Application reset is not performed.

Application reset
Resets all parameters of the connected (not locked) bus modules to factory settings except the stored job parameter sets.

7.10.6 Initializing bus modules (factory settings reset)

Table 62: Initializing bus modules (factory settings reset)



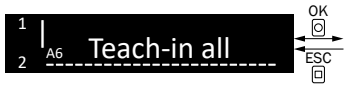
Select initialize all connected bus modules using ± and confirm using ⊙ OK. After confirmation, the display returns to the higher-level menu.

Factory settings reset is not performed.

Factory settings reset
Resets all parameters of the connected (not locked) bus modules to factory settings incl. job parameter sets.

7.10.7 Teach-in of bus modules(master teach-in)

Table 63: Teach-in of bus modules (master teach-in)



Select teach-in all connected bus modules using ± and confirm using ⊙ OK. After confirmation, a teach-in is performed for all bus modules, the switching points (SP) of all devices are updated according to the teach-in points (TP) and the display returns to run mode.

Teach-in of the bus modules is not performed.

Master teach-in
Performs a teach-in for all connected (not locked) bus modules.

WARNING
If the WLL80 is combined with other sensors (WLL180, KTL180 or AOD1) on the bus (see "Combination with other sensors", page 13), then the master teach-in must not be used in either the WLL80 or the other sensors. Unplanned parameter changes can occur during use. If the master teach-in has been used inadvertently, then it may be necessary to reset every device on the bus to factory settings to ensure the specified function.

NOTE
The master teach-in function is only available in bus mode. No master teach-in is performed for locked expansion units.

NOTE
When using a teach-in mode with two teach-in points (2-point teach-in, dynamic teach-in, or window teach-in) on at least one bus module, the second teach-in point must be set by pressing the OK button after confirming the first teach-in point. When combining units with different teach-in types (with one teach-in point and with two teach-in points), the first teach-in point is not affected by the confirmation of the second teach-in point.

NOTE
If **TEACH** is pressed for a long time on the master, only the master is taught.

7.11 Initializing the device

7.11.1 Navigation tree for initialization (SB)

Table 64: Navigation tree for initialization

Select initialization using ± and confirm using OK. After confirmation, the display in the menu returns to the initial settings.

Application reset
Resets all parameters to factory settings except the stored job parameter sets

Factory settings reset
Completely resets the device incl. job parameter sets to the factory settings

Table 65: Factory settings

Setting	Value
Det. mode (Detection mode)	Proximity
Invert output (Invert output signal)	Not invert. (not inverted)
Response time	250 µs
Language (display)	English
Indicator mode (display)	Digits
Brightness (display)	50%
Turn display (display)	Off
Inversion (display)	Off
Display alerts (display)	Off
Zeroing (display value)	Deactivate
Save energy	Off
Timer mode (time function)	Deactivated
Time setting**(time1)**	1 ms
Time setting**(time 2)**	1 ms
Hysteresis	5%
Switch. point mode (Switching point mode)	Single/window
SPC (Sender Power Control)	On
AutoAdapt	Off
Sender power	Max. (maximum sender power)
Counter mode	Off
Compare value (count compare value)	10
Counter value	0
Edge direct. (Edge direction)	Pos + neg (both edge directions)
Edge offset	12500 µs (50 cycles x response time 250 µs)
Edge hyst. (Edge hysteresis)	5 (digits)
Digital output	Push-pull
Pin 2 config. (Pin 2 configuration)	Switching signal 2 (Q2 or QL2 for IO-Link devices)
Pin 5 config. (Pin 5 configuration) (3-wire or 5-wire cable)	Switching signal 2
Pin 2 config. (Pin 2 configuration) (3-wire or 5-wire cable)	Teach-in

Setting	Value
Lock level	Lock UI&input (Lock UI and input)
Copy to all (copy to all modules)	No
Zero set all (Set display values of all modules to zero)	No
Zero reset all (reset the zeroing of the display values of all modules)	No
Appl. rst all (application reset of all modules)	No
Fact. rst all (factory settings reset of all modules)	No
Teach-in all (teach-in of all modules)	No
Reset	No
Teach mode	Two-point teach-in
Teach-in offset	-10%

7.12 Teach-in

Setting the sensing range or specifying the switching point or switching points can be done manually or with the help of various teach-in modes that can be selected in the teach-in menu. The two special teach-in modes, zone teach-in and window teach-in, each define a switching window (consisting of two switching points SP1 and SP2).

The selected teach-in mode can be performed directly from run mode by holding down the TEACH pushbutton (> 1 second).

For teach-in modes that require two teach-in points (two-point teach-in, dynamic teach-in, window teach-in), the teach pushbutton must be pressed a second time (> 1 second) to confirm the second teach-in point.

The following teach-in methods are available for defining the switching point or switching points of the device:

- 1-point teach-in
- 2-point teach-in
- Dynamic teach-in
- Zone teach-in
- Window teach-in

NOTE

WLL80 is a fiber optic amplifier that can be used both as a through-beam photoelectric sensor and as a photoelectric proximity sensor (depending on the principle of operation of the fibers used). When performing a teach-in, different procedures may be required depending on the principle of operation.

NOTE

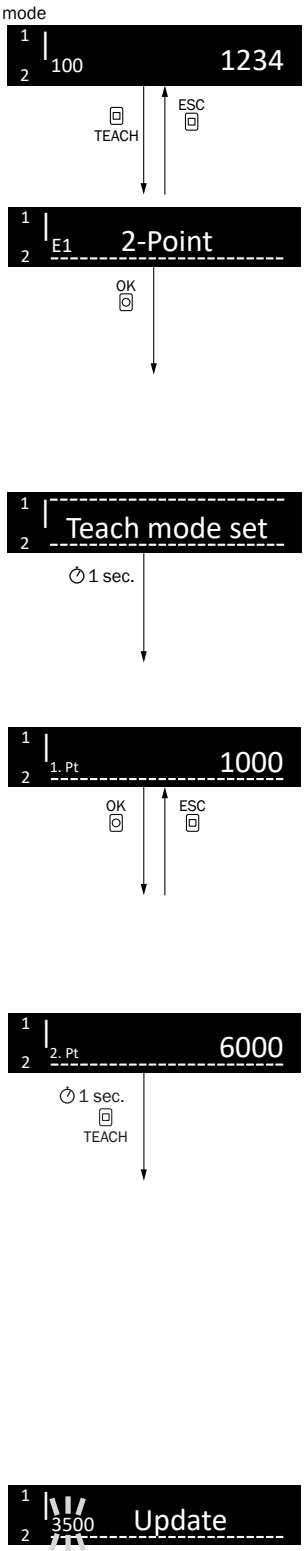
Briefly pressing the TEACH pushbutton cancels the teach process (**Escape**).

NOTE

Teach-in is also shown in a video:

7.12.1 Teach-in menu for selecting the teach-in mode

Table 66: Teach-in mode



Select teach-in mode using ± and confirm using ⊙ OK. After selecting the teach-in mode, the teach-in point (or teach-in points or, if applicable, the teach-in offset) needs to be confirmed using ⊙ OK. The teach-in is then performed and the display returns to run mode.

1-point teach-in
SP = TP ± X%
Sets a switching point (SP) using a teach-in point (TP) and a defined teach-in offset X (as a percentage of the TP).

2-point teach-in
SP = (TP1 and TP2) x 50%
Sets a switching point (SP) using two teach-in points (TP1, TP2).

Dynamic teach-in
SP = (TPmin and TPmax) x 50%
Sets a switching point (SP) during the running process. Between starting and stopping teach-in, the maximum and minimum received light values are determined as teach-in points (TPmax, TPmin).

Zone teach-in
SP1 = TP + X%
SP2 = TP – X%
Sets two switching points (SP1, SP2) using a teach-in point (TP) and a defined teach-in offset X.

Window teach-in
SP1 = TP1
SP2 = TP2
Sets two switching points (SP1, SP2) using two teach-in points (TP1, TP2).

Teach-in offset
Select value in percent (-99% ... +99%) using ± and confirm using ⊙ OK.
Defines the offset of the switching point (for 1-point teach-in) / switching points (for zone teach-in in both directions) relative to the teach-in point.

Table 67: Teach-in mode

	The switching point/switching points are updated. The device switches to run mode. Left value: Switching point (digits) Right value: Current received light value (digits)
Run mode 	

NOTE

The currently set teach-in mode is stored as a preselection (for the currently selected channel respectively) for a quick teach-in in run mode.

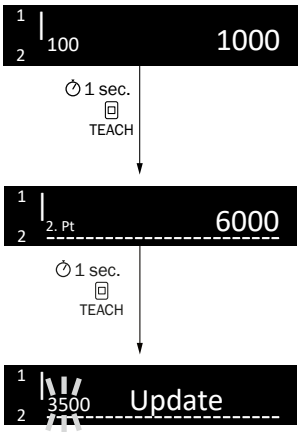
7.12.1.1 Two-point teach-in

The two-point teach-in sets the switching point SP1 to the average value between the received light values of two teach-in points TP1 and TP2. You can teach in the teach-in point with object or without object first.

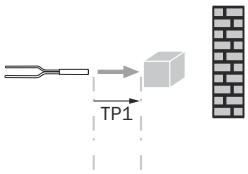
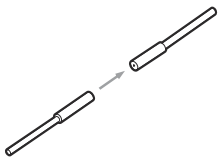
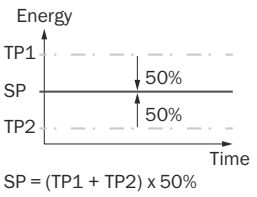
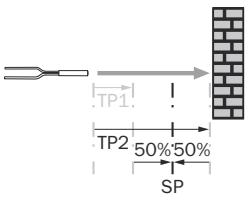
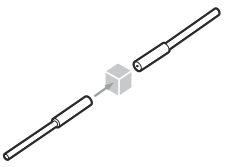
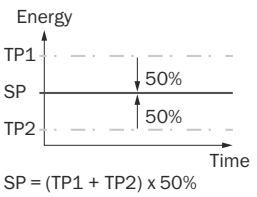
Table 68: 2-point teach-in

Run mode

Run mode



Perform a fast two-point teach-in by pressing and holding (1 second) TEACH (confirmation of teach-in point TP1) and then by holding down (1 second) TEACH (confirmation of teach-in point TP2).
The switching point (SP) is updated according to the taught-in teach-in points (TP1, TP2) and the display returns to run mode.

	Proximity	Through-beam	Energy consideration
Step 1	with object 	without object 	 SP = (TP1 + TP2) x 50%
Step 2	without object/on background 	with object 	 SP = (TP1 + TP2) x 50%

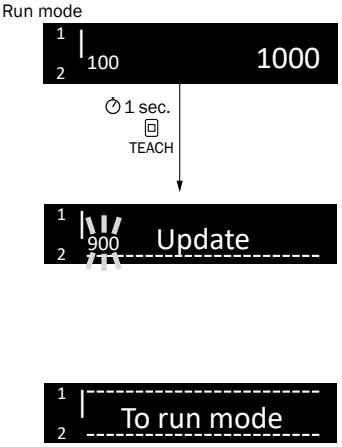
Run mode

7.12.1.2 Single-point teach-in

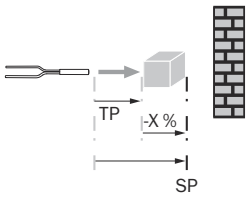
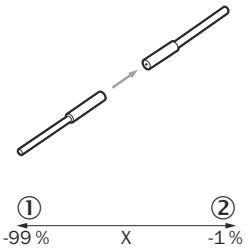
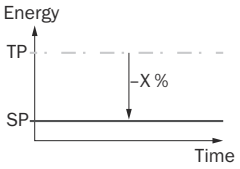
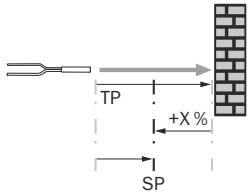
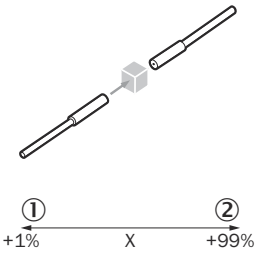
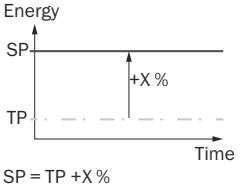
The 1-point teach-in sets the switching point SP1 to a value above or below (specified by the Teach-in offset parameter as a percentage) the received light value that is present at the moment the teach-in is performed (teach-in point TP).

Table 69: Single-point teach-in

Run mode



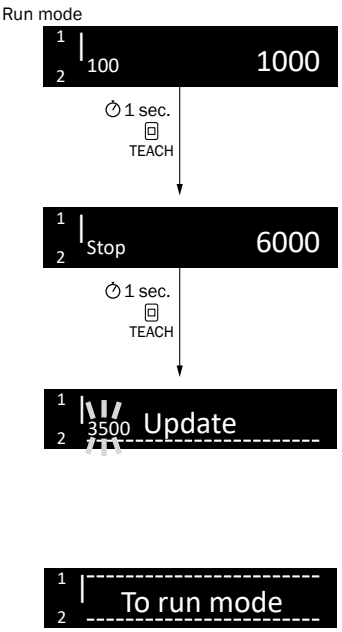
Perform a fast single-point teach-in by pressing and holding TEACH (for 1 second). The switching point (SP) is updated based on the configured teach-in offset value (X) and the display returns to run mode.
The switching point (SP) is updated based on the configured teach-in offset value (X) and the display returns to run mode.

	Proximity	Through-beam	Energy consideration
Teach-in offset negative	with object 	without object 	 SP = TP –X %
Teach-in offset positive	without object/on background 	with object 	 SP = TP +X %

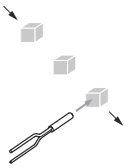
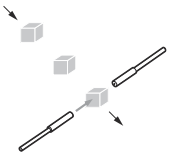
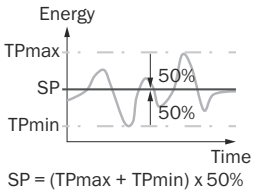
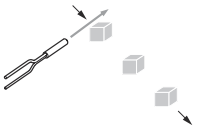
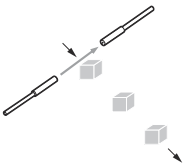
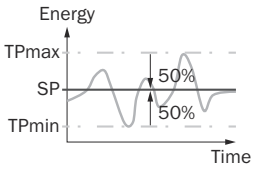
7.12.1.3 Dynamic teach-in

The dynamic teach-in sets the switching point SP1 to the average value between the maximum received light value TPmax and the minimum received light value TPmin detected during the running process between starting and stopping teach-in.

Table 70: Dynamic teach-in



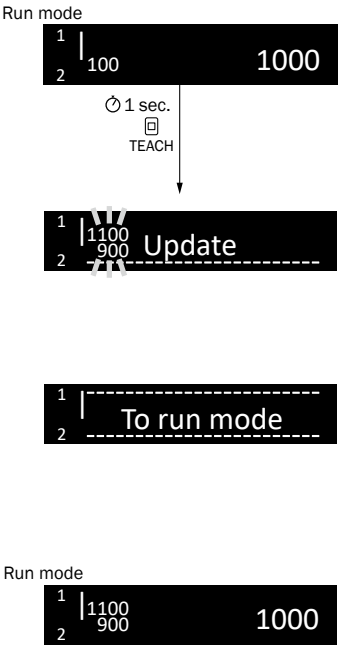
Perform a fast dynamic teach-in by pressing and holding (1 second) TEACH (confirmation teach-in start) and then pressing and holding (1 second) TEACH (confirmation teach-in stop).
The switching point (SP) is determined while the process is running. Between starting and stopping teach-in, the maximum and minimum received light values are determined as teach-in points (TPmax, TPmin). The switching point (SP) is updated according to the determined teach-in points (TPmin, TPmax) and the display returns to run mode.

	Proximity	Through-beam	Energy consideration
Step 1	Teach-in start 	Teach-in start 	 SP = (TPmax + TPmin) x 50%
Step 2	Teach-in stop 	Teach-in stop 	 SP = (TPmax + TPmin) x 50%

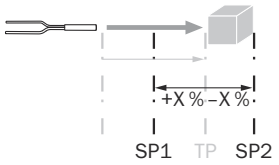
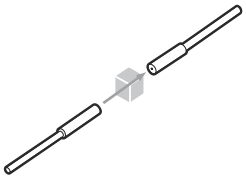
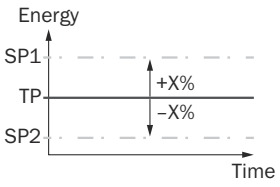
7.12.1.4 Zone teach-in

The zone teach-in sets the switching points SP1 and SP2 to a value above or below (specified by the Teach-in offset parameter as a percentage) the received light value that is present at the moment the teach-in is performed (teach-in point TP).

Table 71: Zone teach-in



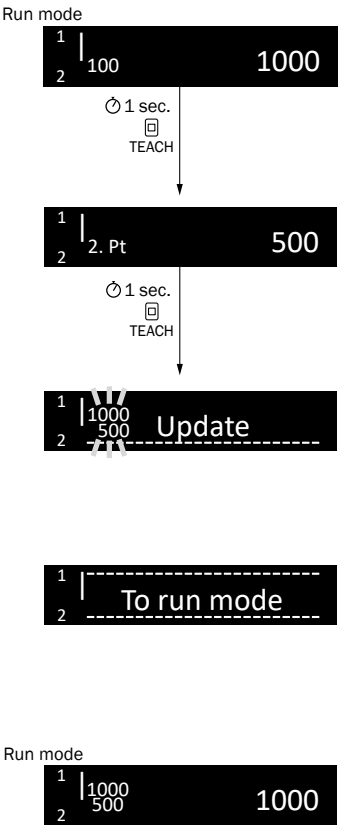
Perform a fast zone teach-in by pressing and holding (1 second) ⊙ TEACH.
The switching points (SP1, SP2) are updated based on the configured teach-in offset value (± X) and the display returns to run mode.

Proximity	Through-beam	Energy consideration
with object  	with (transparent) object 	 SP1 = TP + X % SP2 = TP - X %

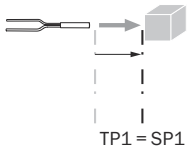
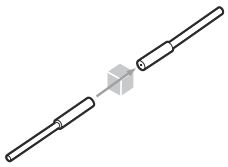
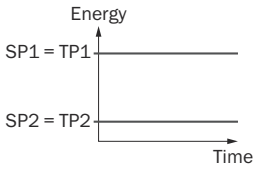
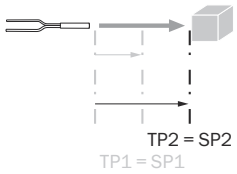
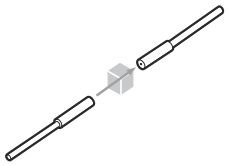
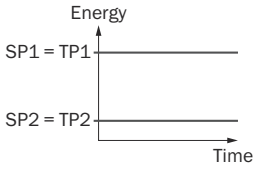
7.12.1.5 Window teach-in

The window teach-in sets switching points SP1 and SP2 to teach-in points TP1 and TP2 of the received light values that are present at the moment the teach-in is performed (teach-in points TP1 and TP2).

Table 72: Window teach-in



Perform a fast window teach-in by pressing and holding (1 second) TEACH (confirmation of teach-in point TP1 = switching point SP1) and then pressing and holding (1 second) TEACH (confirmation of teach-in point TP2 = switching point SP2).
The switching points (SP1, SP2) are updated based on the taught-in teach-in points (TP1, TP2) and the display returns to run mode.

	Proximity	Through-beam	Energy consideration
Step 1	with object position 1 	with (transparent) object with transmission 1 	
Step 2	with object position 2 	with (transparent) object with transmission 2 	

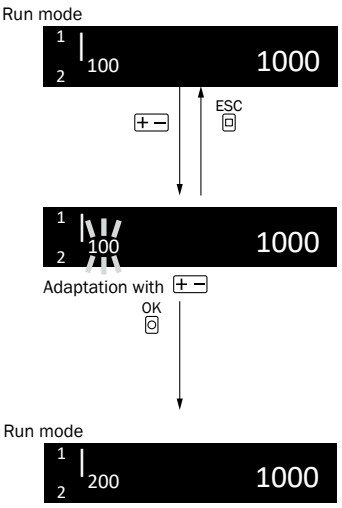
7.12.2 Manually adjusting the switching thresholds

During teach-in, the switching point is automatically set to a value defined by the relevant teach-in mode. If the switching events do not correspond to the expected results, the switching point can be adjusted manually independently of the teach-in.

Manually setting the switching points

The switching point or switchings points can be set manually.

Table 73: Setting the switching threshold manually

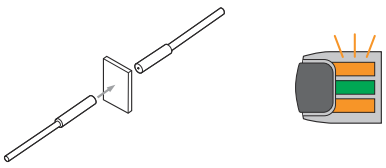
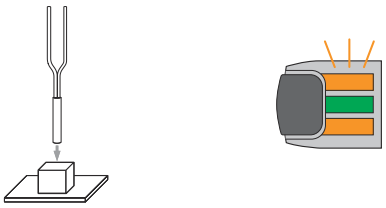
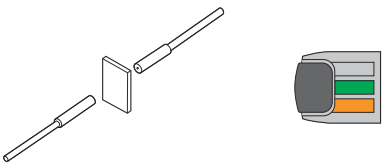
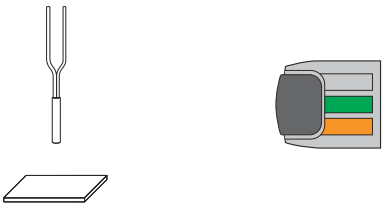
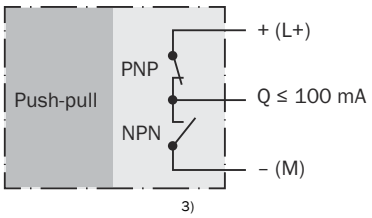
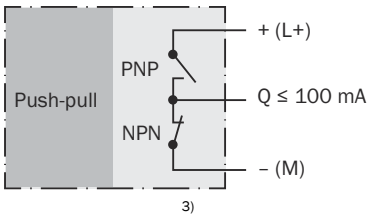
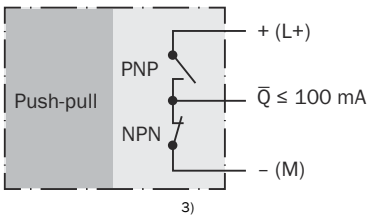
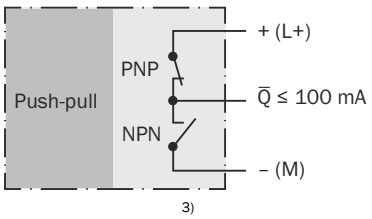


Activate manual setting of the switching point using ⊞ (switching point flashes). Adjust the switching point using ⊞ (increase) and ⊟ (decrease) In modes (zone teach-in, window teach-in) with two switching points – SP1 and SP2 – after confirming SP1 using ⊙ OK, the display changes to the setting of SP2. Adjust SP2 also using ⊞. Confirm using ⊙. After confirmation (or after 30 seconds without button operation), the display returns to run mode.

7.12.3 Setting the switching logic

The switching logic (as well as hysteresis direction) is preset by selecting the detection mode (“Proximity”, “Through-beam”). Therefore, when an object is detected, a HIGH signal is present at the output (Through-beam: “dark switching”, Proximity: “light switching”). This switching logic can be reversed under “Invert output signal” by selecting the “Inverted” setting, see "Invert output signal", page 29.

Table 74: Output function

<table>
<tr><td>WLL80</td><td>Object present[1]
Through-beam mode:
 
Proximity mode[2]:
  </td><td>Object not present[1]
Through-beam mode:
 
Proximity mode[2]:
  </td></tr>
<tr><td>Output:
not inverted</td><td>  </td><td>  </td></tr>
<tr><td>Output:
inverted</td><td>  </td><td>  </td></tr>
</table>

1) Devices with IO-Link: Light switching logic of the LED as shown Devices without IO-Link: Logic of the LED depends on the switching signal at the output.
2) In proximity mode for proximity fibers: object white 90% remission factor, background black 6% remission factor
3) Restrictions in bus operation, see "Wiring the digital outputs", page 20.

NOTE

If the switching logic is changed by adjusting “Invert output”, the switching points for an output signal change ($SP_{SignalChange1}$, $SP_{SignalChange2}$) are retained.

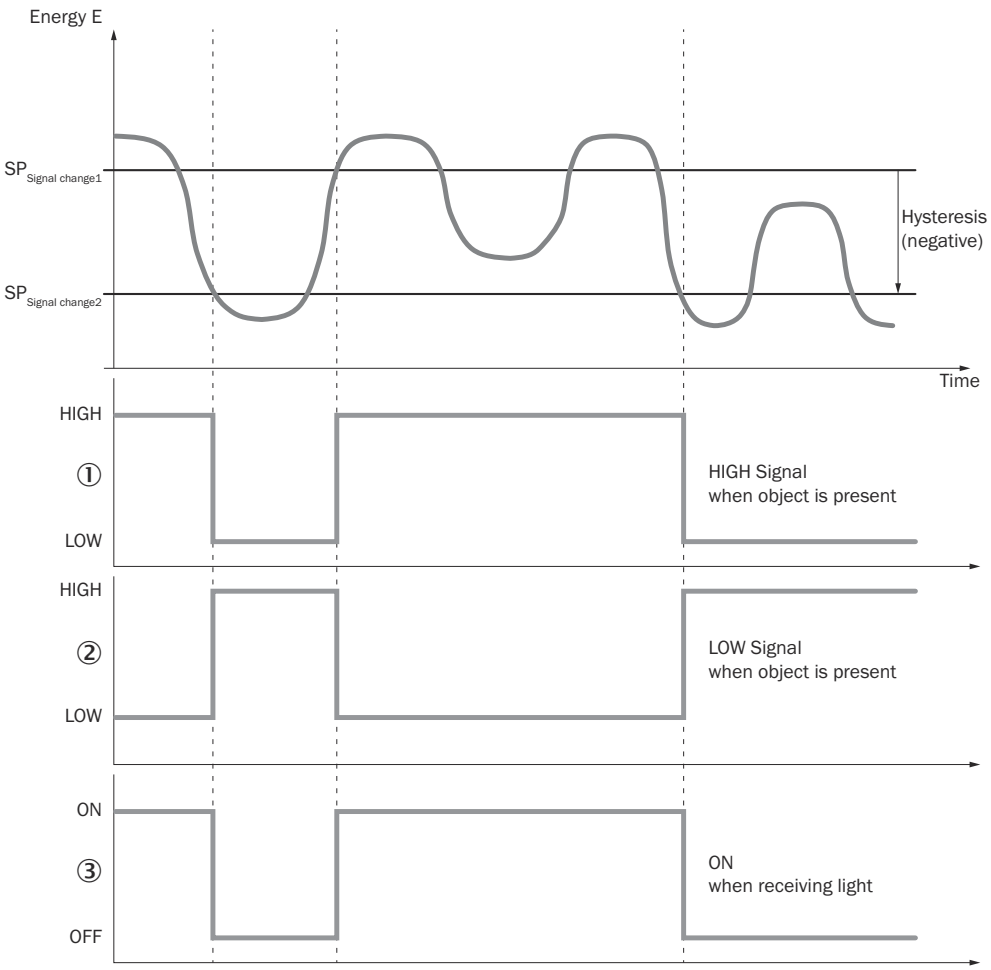


Figure 18: Proximity detection mode

1 Proximity
Output signal not inverted (“light switching”)

2 Proximity
Output signal inverted (“dark switching”)

3 Devices with IO-Link
LED (“light switching”)

NOTE

If "Detection mode = Proximity" is selected, an object moving into the beam triggers a switching signal change at $SP_{SignalChange1}$ and an object moving out of the beam triggers a switching signal change at $SP_{SignalChange2}$.

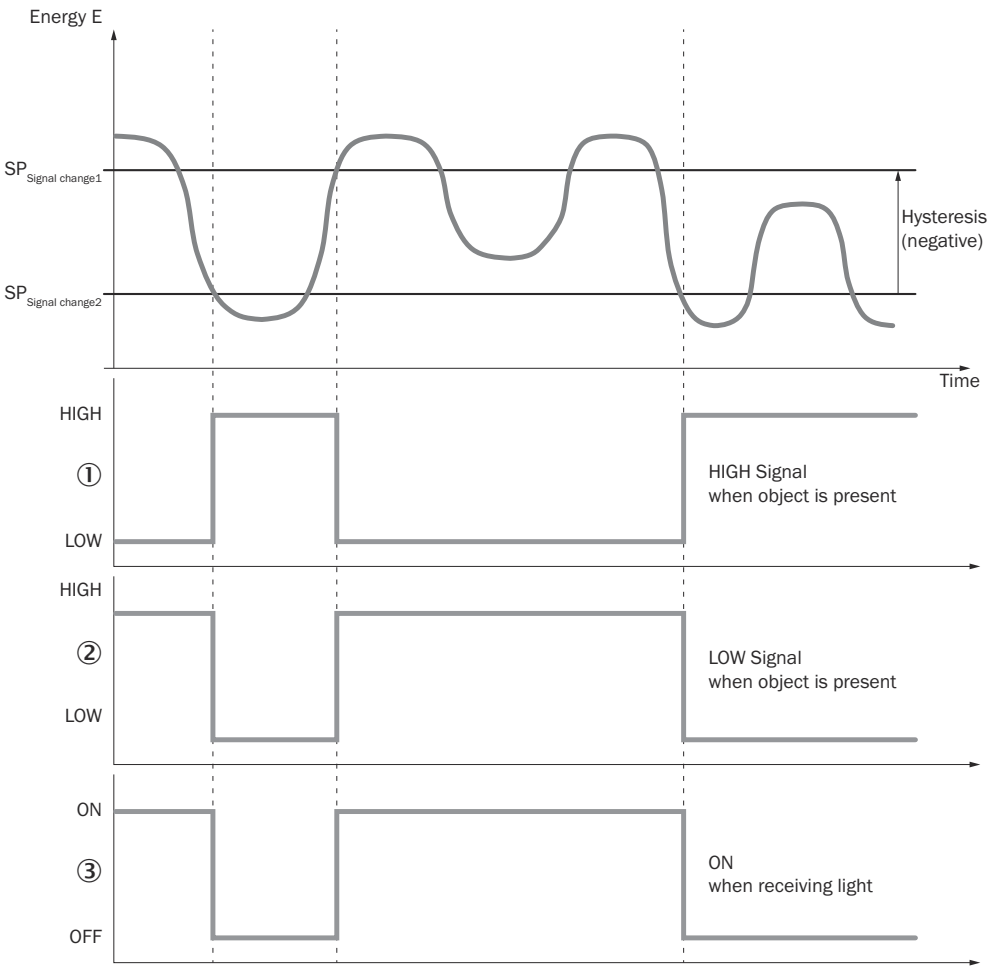


Figure 19: Through-beam detection mode

1 Through-beam
Output signal not inverted (“dark switching”)

2 Through-beam
Output signal inverted (“light switching”)

3 Devices with IO-Link
LED (“light switching”)

NOTE

If “Detection mode = Through-beam” is selected, an object moving into the beam triggers a switching signal change at $SP_{SignalChangel2}$ and an object moving out of the beam triggers a switching signal change at $SP_{Signalchange1}$.

7.13 Other displays and functions

7.13.1 Synchronization

Standalone fiber-optic sensors independently measure the received light at the configured speed. However, mutual interference can occur if the field of view of the fibers overlaps.

To avoid mutual interference, sensors in bus mode are synchronized. Fiber-optic sensors in bus mode measure synchronously one after the other. Note that the following conditions apply in this case:

Table 75: Conditions for synchronization in bus mode

Response time	Maximum number of synchronized bus modules
22 µs	2
70 µs	3
250 µs	4
500 µs	9
1 ms	9
2 ms	12
8 ms	14

7.13.2 Using bus modules with a WI180C gateway

WLL80 bus modules (1 base unit and up to 15 expansion units) can be used with a WI180C series gateway to transmit cyclic and (gateway-specific) acyclic data. For details on each gateway, refer to the following subsections.

NOTE
256 unique record addresses are available for each module.

- Slot 1 - Gateway - records 0x2000 ... 0x20FF
- Slot 2 - Sensor 1 (far left outside) - records 0x2100 ... 0x21FF
- Slot 3 - Sensor 2 - records 0x220 ... 0x22FF
- ...
- Slot 17 - Sensor 16 - records 0x3000 ... 0x30FF

The device supports the following records:

Table 76: Indices

Function	Description	R/W	Length (Byte)	Content/meaning	WI180C-PN: Index no.	WI180C-EC: Object	WI180C-EN: Attribute ID	WI180C-IOA00: Index
Product series	b15-12 manufacturer b11-8 categories b7-0 product family	R	2	0x1120 (model with 1 output) 0x1121 (model with 2 outputs) 0x1122 (model without outputs) 0x1123 (model without outputs, without display) 1: SICK 1: Fiber amplifier 32: WLL80 1 output 33: WLL80 2 outputs 34: WLL80 0 outputs 35: WLL80 0 outputs, no display	0xnn00	0x90n0.01	0x08	0
Product type		R	2	17: WLL80	0xnn01	0x90n0.02	0x09	1
Firmware version		R	2	0xabcd Version a.b.c.d d D=0, R=1, S=2	0xnn02	0x90n0.03	0x0A	2
Protocol version		R	2	0x0001	0xnn03	n/a	0x0B	3

Function	Description	R/W	Length (Byte)	Content/meaning	WI180 C-PN: Index no.	WI180 C-EC: Object	WI180 C-EN: Attribute ID	WI180 C-IOA00: Index
Product version		R	2	0xaaaa Hardware version	0xnn04	0x90n0.04	0x0C	4
Manufacturer name		R	2 ... 16	“SICK AG”	0xnn05	0x90n0.06	0x0D	5
Product name		R	2 ... 32	Respective product type name	0xnn06	0x90n0.07	0x0E	6
Product ID		R	2 ... 16	Respective product type code	0xnn07	0x90n0.08	0x0F	7
User ID		R/W	0 ... 32	“*******" (default)	0xnn08	0x90n0.09	0x10	8
Operating status		R	2	0x0002: Execute	0xnn09	0xA0n0.01	0x11	9
Sensor bus protocol version		R	2	0x0001	0xnn0A	n/a	0x12	10
Error code		R/W	2	Read: Last error code Write any value: Clear last error code	0xnn62	0xA0n0.02	0x6A	98
Display	CH1	R/W	2	0: Numeric display 1: Bar graph 2: Percentage display 3: Edge height jump display	0xnn64	0x80n0.01	0x6C	100
Display	CH2	R/W	2	0: Numeric display 1: Bar graph 2: Percentage display 3: Edge height jump display	0xnn65	0x80n0.02	0x6D	101
Brightness		R/W	2	10...100% (rounds off to whole 10% steps)	0xnn66	0x80n0.03	0x6E	102
Reverse display		R/W	2	0: Normal 1: Display reversed	0xnn67	0x80n0.04	0x6F	103
Invert display		R/W	2	0: Normal 1: Inverted display	0xnn68	0x80n0.05	0x70	104
Display warnings		R/W	2	0: Switched off 1: Switched on	0xnn69	0x80n0.06	0x71	105
Zero reset		R/W	2	0: Switched off 1: Switched on	0xnn6A	0x80n0.07	0x72	106
Eco mode		R/W	2	0: Switched off 1: Switched on	0xnn6B	0x80n0.08	0x73	107
Measurement channel		R/W	2	0: CH1 1: CH2	0xnn6C	0x80n0.09	0x74	108

Function	Description	R/W	Length (Byte)	Content/meaning	WI180 C-PN: Index no.	WI180 C-EC: Object	WI180 C-EN: Attribute ID	WI180 C-IOA00: Index
Threshold		R/W	2	-9,999 ... 9,999 All values outside the range are replaced by the nearest valid values.	0xnn6E	0x80n0.0B	0x76	110
Threshold		R/W	2	-9,999 ... 9,999 All values outside the range are replaced by the nearest valid values.	0xnn6F	0x80n0.0C	0x77	111
Threshold		R/W	2	-9,999 ... 9,999 All values outside the range are replaced by the nearest valid values.	0xnn70	0x80n0.0D	0x78	112
Threshold		R/W	2	-9,999 ... 9,999 All values outside the range are replaced by the nearest valid values.	0xnn71	0x80n0.0E	0x79	113
Current measured value		R	2	-9,999 ... 9,999	0xnn72	TBD	0x7A	114
Key lock		R/W	2	0: cancel 4: Completely locked 8: Locked; external teach-in available however	0xnn73	0x80n0.10	0x7B	115
Detection mode		R/W	2	0: Through-beam 1: Proximity	0xnn74	0x80n0.11	0x7C	116
Response speed		R/W	2	6: 22 µs 5: 70 µs 4: 250 µs 3: 500 µs 2: 1 ms 1: 2 ms 0: 8 ms	0xnn75	0x80n0.12	0x7D	117
Display language		R/W	2	0: English 1: German 2: Japanese 3: Chinese 4: Korean	0xnn76	0x80n0.13	0x7E	118
Counter setting	CH1	R/W	2	0: Delay off 1: Switch-on delay 2: Switch-off delay 3: Switch-on and switch-off delay 4: Single pulse 5: Switch-on delay pulse	0xnn78	0x80n0.15	0x80	120

Function	Description	R/W	Length (Byte)	Content/meaning	WI180 C-PN: Index no.	WI180 C-EC: Object	WI180 C-EN: Attribute ID	WI180 C-IOA00: Index
Counter setting	CH2	R/W	2	0: Delay off 1: Switch-on delay 2: Switch-off delay 3: Switch-on and switch-off delay 4: Single pulse 5: Switch-on delay pulse	0xnn79	0x80n0.16	0x81	121
Delay time 1	CH1	R/W	2	1...30000 ms	0xnn7A	0x80n0.17	0x82	122
Delay time 1	CH2	R/W	2	1...30000 ms	0xnn7B	0x80n0.18	0x83	123
Delay time 2	CH1	R/W	2	1...30000 ms	0xnn7C	0x80n0.19	0x84	124
Delay time 2	CH2	R/W	2	1...30000 ms	0xnn7D	0x80n0.1A	0x85	125
Hysteresis	CH1	R/W	2	1...40%	0xnn82	0x80n0.1F	0x8A	130
Hysteresis	CH2	R/W	2	1...40%	0xnn83	0x80n0.20	0x8B	131
Switching mode	CH1	R/W	2	0: Switched off 1: Normal 2: Edge height jump	0xnn84	0x80n0.21	0x8C	132
Switching mode	CH2	R/W	2	0: Switched off 1: Normal 2: Edge height jump	0xnn85	0x80n0.22	0x8D	133
Edge direction	CH1	R/W	2	0: Rising 1: Falling 2: Both	0xnn86	0x80n0.23	0x8E	134
Edge direction	CH2	R/W	2	0: Rising 1: Falling 2: Both	0xnn87	0x80n0.24	0x8F	135
Edge height jump offset cycles	CH1	R/W	2	1...255 (measurement steps)	0xnn88	0x80n0.25	0x90	136
Edge height jump offset cycles	CH2	R/W	2	1...255 (measurement steps)	0xnn89	0x80n0.26	0x91	137
Edge height jump hysteresis	CH1	R/W	2	1...9999 (steps)	0xnn8A	0x80n0.27	0x92	138

Function	Description	R/W	Length (Byte)	Content/meaning	WI180 C-PN: Index no.	WI180 C-EC: Object	WI180 C-EN: Attribute ID	WI180 C-IOA00: Index
Edge height jump hysteresis	CH2	R/W	2	1...9999 (steps)	0xnn8B	0x80n0.28	0x93	139
Teach offset		R/W	2	-99...99%				140
Teach-in mode	CH1	R/W	2	0: 1-point 1: 2-point 2: Auto 3: Zone 4: Window	0xnn8D	0x80n0.2A	0x95	141
Teach-in mode	CH2	R/W	2	0: 1-point 1: 2-point 2: Auto 3: Zone 4: Window	0xnn8E	0x80n0.2B	0x96	142
Sender control (SPC)		R/W	2	0: Switched off 1: Switched on	0xnn8F	0x80n0.2C	0x97	143
Continuous threshold adjustment (CTA)		R/W	2	0: Switched off 1: Normal 2: Fast 3: Very fast	0xnn90	0x80n0.2D	0x98	144
Sender activity		R/W	2	0: Sender active 1: Sender inactive	0xnn91	0x80n0.2E	0x99	145
Sender power		R/W	2	0: Maximum 1: Medium 2: Minimum 10: Automatic	0xnn92	0x80n0.2F	0x9A	146
Counter mode		R/W	2	0: Switched off 1: Switched on	0xnn93	0x80n0.30	0x9B	147
Reference value		R/W	2	0...16383	0xnn94	0x80n0.31	0x9C	148
Counter value		R/W	2	0...9999	0xnn95	0x80n0.32	0x9D	149
Minimum edge height jump value	CH1	R/W	2	0...9999	0xnn96	0x80n0.33	0x9E	150

Function	Description	R/W	Length (Byte)	Content/meaning	WI180 C-PN: Index no.	WI180 C-EC: Object	WI180 C-EN: Attribute ID	WI180 C-IOA00: Index
Minimum edge height jump value	CH2	R/W	2	0...9999	0xnn97	0x80n0.34	0x9F	151
Maximum edge height jump value	CH1	R/W	2	0...9999	0xnn98	0x80n0.35	0xA0	152
Maximum edge height jump value	CH2	R/W	2	0...9999	0xnn99	0x80n0.36	0xA1	153
Switching logic		R/W	2	0: PNP 1: NPN 2: Push-pull	0xnnA0	0x80n0.3D	0xA8	160
Output inverter	CH1	R/W	2	0: Normal 1: Inverted	0xnnA1	0x80n0.3E	0xA9	161
Output inverter	CH2	R/W	2	0: Normal 1: Inverted	0xnnA2	0x80n0.3F	0xAA	162
Pin 2 configuration	(4-pin variant)	R/W	2	0: Switched off 1: Digital output 2: Warning 3: Teach-in 4: Sender activity 5: Reset counter	0xnnA3	0x80n0.40	0xAB	163
Pin 2 configuration	(5-pin variant)	R/W	2	0: Switched off 3: Teach-in 4: Sender activity 5: Reset counter 6: Load job	0xnnA3	0x80n0.40	0xAB	163
Pin 5 configuration	(5-pin variant)	R/W	2	0: Switched off 1: Digital output 2: Warning 7: Feedback	0xnnA4	0x80n0.41	0xAC	164
Serial number		R	8	YYWWNNN	0xnnAA	TBD	0xB2	170
Temperature		R	2	-127...127 °C	0xnnAB	TBD	0xB3	171
Operating hours since last reset		R	4	0...4294967295 h	0xnnAC	TBD	0xB4	172

Function	Description	R/W	Length (Byte)	Content/meaning	WI180 C-PN: Index no.	WI180 C-EC: Object	WI180 C-EN: Attribute ID	WI180 C-IOA00: Index
Total operating hours		R	4	0...4294967295 h	0xnnAD	TBD	0xB5	173
Quality of run		R	2	0...254% 255: Not available	0xnnAE	TBD	0xB6	174
No. of modules		R	2	1...16	0xnnAF	TBD	0xB7	175
Module number		R	2	1...16	0xnnB0	TBD	0xB8	176
Signal input		R	2	0: Switched off 1: Switched on	0xnnB3	TBD	0xBB	179
Teach status		R	2	0: No teach 1: SP1 successful 2: SP2 successful 3: SP1,2 successful 4: Wait for next teach 5: In progress 7: Error	0xnnB4	TBD	0xBC	180
Teach	1-point	W	2	1: CH1 2: CH2	0xnnC8	0x80n1.01	0xD0	200
Teach	2-Point, 1st	W	2	1: CH1 2: CH2	0xnnC9	0x80n1.02	0xD1	201
Teach	2-Point, 2nd	W	2	1: CH1 2: CH2	0xnnCA	0x80n1.03	0xD2	202
Teach	Auto, Start	W	2	1: CH1 2: CH2	0xnnCB	0x80n1.04	0xD3	203
Teach	Auto, Stop	W	2	1: CH1 2: CH2	0xnnCC	0x80n1.05	0xD4	204
Teach	Zone	W	2	1: CH1 2: CH2	0xnnCD	0x80n1.06	0xD5	205
Teach	Window, 1st	W	2	1: CH1 2: CH2	0xnnCE	0x80n1.07	0xD6	206
Teach	Window, 2nd	W	2	1: CH1 2: CH2	0xnnCF	0x80n1.08	0xD7	207
Factory settings	Do not reset jobs	W	2	1: Execute	0xnnDC	0x80n1.15	0xE4	220
Factory settings	Do not reset jobs	W	2	1: Execute	0xnnDD	0x80n1.16	0xE5	221
Find me		R/W	2	0: Switched off 1: Switched on	0xnnDE	0x80n1.17	0xE6	222
Warm start		W	2	1: Execute	0xnnDF	0x80n1.18	0xE7	223

Function	Description	R/W	Length (Byte)	Content/meaning	WI180C-PN: Index no.	WI180C-EC: Object	WI180C-EN: Attribute ID	WI180C-IOA00: Index
Return to start menu		W	2	1: Execute	0xnnE0	0x80n1.19	0xE8	224
Save job		W	2	1: Job 1 2: Job 2 3: Job 3 4: Job 4 5: Job 5	0xnnE6	0x80n1.1F	0xEE	230
Load job		W	2	1: Job 1 2: Job 2 3: Job 3 4: Job 4 5: Job 5	0xnnE7	0x80n1.20	0xEF	231

7.13.2.1 WI180C-PN (PROFINET)

NOTE
The operating instructions for WI180C-PN can be found under part number 8023552 at www.sick.com.

7.13.2.2 WI180C-PNS01 (PROFINET)

NOTE
The operating instructions for WI180C-PNS01 can be found under part number 8022757 at www.sick.com.

7.13.2.3 WI180C-EC (EtherCAT®)

NOTE
The operating instructions for WI180C-EC can be found under part number 8024002 at www.sick.com.

7.13.2.4 WI180C-EN (EtherNet/IP™)

NOTE
The operating instructions for WI180C-EN can be found under part number 8024951 at www.sick.com.

7.13.2.5 WI180C-IOA00 (IO-Link)

NOTE
The operating instructions for WI180C-IOA00 can be found under part number 8025085 at www.sick.com.

8 Devices with special features

Table 77: Sensors with special features

Part number	Description
6084904	WLL80P-22T6Y2DZA71Z1Z1: Reduced sensing range due to optical filter for preventing operation in the saturation range.

9 Troubleshooting

The Troubleshooting table indicates measures to be taken if the sensor stops working.

Table 78: Troubleshooting

LED/fault pattern	Cause	Measures
The message “Teach error 1” appears on the display (yellow LED flashes)	The received light value at the teach-in point during the teach-in process is too low to set a corresponding switching threshold (in combination with the configured teach-in offset).	Increase the received light value at the teach-in point during the teach-in process by doing the following: • Ensure that the fibers are fully and correctly inserted into the openings provided for them (check for correctly inserted fibers via the status indicators) • Set a slower response time (if possible) • Increase the sender power (if possible) • Decrease the teach-in offset value • When using proximity fibers: Reduce the distance between the detection object and the proximity fibers • When using through-beam fibers: Align the emitter and receiver fibers exactly with each other
The message “Teach error 2” appears on the display (yellow LED flashes)	The received light value at the teach-in point during the teach-in process is in the saturation range (≥ 9999 digits). It is therefore not possible to set a corresponding switching threshold (in combination with the configured teach-in offset). When using a proximity fiber: Background is too close to the proximity fiber or background is too shiny or sender power is too high. When using through-beam fibers: Distance between sender and receiver fibers is too small or sender power is too high.	Decrease the received light value at the teach-in point during the teach-in process by doing the following: • Set the sender power to “Auto” (automatic reduction of the sender power when the received light value is in the saturation range or when > 5000 digits) • Set a faster response time (if possible) • Decrease the sender power (if possible) • Decrease the teach-in offset • When using a proximity fiber: Increase the distance between the detection object and the proximity fiber • When using through-beam fibers: Increase the distance between the sender and receiver fibers

LED/fault pattern	Cause	Measures
The message “Teach error 3” appears on the display (yellow LED flashes)	The difference between two received light values at the teach-in points (TP1 and TP2) during the teach-in process is too small. When using a proximity fiber: Difference between the received light values of the background and the object too low When using through-beam fibers: Detection object is not attenuating the received light value enough (too transparent) or the beam path along the optical axis is not covered enough by the detection object.	Increase the difference between the two received light values at the teach-in points during the teach-in process by doing the following: • Ensure that there is an object in the beam path for one teach-in point and no object in the beam path for the other teach-in point. • When using a proximity fiber: Reduce the distance between the detection object and the proximity fiber and/or increase the distance between the background and the proximity fiber or avoid a shiny background • When using through-beam fibers: Use a detection object with a lower transmission, or ensure greater coverage of the beam path along the optical axis by the detection object
The message “Teach error 4” appears on the display (yellow LED flashes)	The difference between two switching points (when performing a teach-in that sets two switching points and thus operates the device in window mode: zone teach-in mode, window teach-in mode) is too small.	When using zone teach-in mode: Increase the teach-in offset amount (≠ 0%) When using window teach-in mode: • When using a proximity fiber: Increase or decrease the distance of the detection object when defining one of the switching points. • When using through-beam fibers: Use (transparent) detection objects with significantly different transmission.
The message “Teach error 5” appears on the display (yellow LED flashes)	Error in the sequence of the teach-in process (teach-in point 2 is taught before teach-in point 1). Teach error 5 only occurs for units with IO-Link.	Adhere to the sequence of teach-in points to be taught in: Teach in teach-in point 1, then teach in teach-in point 2.
Green LED does not light up	Voltage interruptions outside the permissible range	Ensure there is a stable power supply without interruptions
Green LED flashes	IO-Link communication	-
Digital outputs not according to graphic	IO-Link communication Manually configured parameter settings different to the default	- Trigger factory settings reset. The digital outputs are reset to factory settings.

LED/fault pattern	Cause	Measures
Yellow LED lights up, no object in the path of the beam	When using a proximity fiber: • Switching point is set to a too low value (or too large sensing range) • Reflectivity of the background too high • Manually configured parameter settings different to the default • The light beam of a proximity fiber hits the receiver of another (neighboring) proximity fiber When using through-beam fibers: • Switching point is set to a too high value (or too short sensing range) • Manually configured parameter settings different to the default • The light beam of a through-beam fiber hits the receiver of another (neighboring) through-beam fiber	When using a proximity fiber: • Increase the switching point • Decrease the reflectivity of the background • Set the detection mode to “Proximity” and set the digital output to “Not inverted” • Use bus modules with anti-interference function to avoid mutual interference When using through-beam fibers: • Decrease the switching point • Set the detection mode to “Through-beam” and set the digital output to “Not inverted” • Use bus modules with anti-interference function to avoid mutual interference • Change the arrangement of the sender and receiver for every second through-beam fiber, or maintain an adequate separation between the through-beam fibers.
Object is in the path of the beam, yellow LED does not light up	When using a proximity fiber: • Distance between sensor and object is too large or switching point is set to a too high value (or too small sensing range) • Manually configured parameter settings different to the default When using through-beam fibers: • (Transparent) object has a too high transmission, or the switching point is set to a too low value • Manually configured parameter settings different to the default • Reflection on strongly reflecting surfaces • Insufficient transmission of the fibers (e.g., fiber breakage)	When using a proximity fiber: • Decrease the switching point • Set the detection mode to “Proximity” and set the digital output to “Not inverted” When using through-beam fibers: • Increase the switching point • Set the detection mode to “Through-beam” and set the digital output to “Not inverted” • Change the position of the fiber or reduce the reflectivity of the reflection surface • Replace the fiber
Signal interruptions when object is detected	Difference between the switch-on and switch-off threshold (=hysteresis value) is too small, or the fluctuation of the light reflected by the object is too large for the configured hysteresis value.	Increase the hysteresis value

10 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: **Technical Information: Photoelectric sensors, SICK Smart Sensors / IO-Link**.

11 Sensor replacement/data storage

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

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

Details on sensor replacement can be found in the detailed IO-Link description: **Technical Information: Photoelectric sensors, SICK Smart Sensors / IO-Link**.

12 Disposal

The product must be disposed of in line with applicable country-specific regulations. When disposing of them, you should try to recycle them (especially the precious metals).

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.
- 

  WEEE:  This symbol on the product, its packaging or in the document indicates that a product is subject to the specified regulations.

13 Maintenance

This SICK sensor is maintenance-free.

We do, however, recommend that the following activities are undertaken regularly:

- Clean the optical interfaces and housing
- Check the fittings and plug connectors

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 optical surfaces at regular intervals and, in the event of contamination, with a lint-free lens cloth (part number 4003353). The cleaning interval essentially depends on the ambient conditions.

No modifications may be made to devices.

Subject to change without notice. Specified product properties and technical data are not written guarantees.

14 Technical data

14.1 Technical specifications

The “Technical Data” section contains only an extract of the technical data of the sensor.

The complete technical data can be found on the homepage www.sick.com under the part number of the sensor.

Features

Sensing range				
Depending on the fibers used				
Emitted beam				
		Standalone system	Bus base unit	Bus expansion unit
	Light sender	LED		
	Type of light	WLL80P: Visible red light WLL80I: Infrared light, invisible		
	Light spot size / distance	Depending on the fibers used		

Communication interface

Table 79: Communication interface

IO-Link		
	IO-Link	1.1
	Data transmission rate	COM3

Electrical data

	Standalone system	Bus base unit	Bus expansion unit
Supply voltage U_B	12 ... 30 V DC[1)2)]	12 ... 24 V DC[1)]	12 ... 24 V DC[1)]
Ripple	± 10 %		
Current consumption	≤ 50 mA		
Protection class	III[3)]		

1) Limit values
Reverse polarity protected U_B connections
Residual ripple max. 5 V_{ss}
2) In IO-Link operation: 18 ... 30 V DC
3) Reference voltage DC 50 V

Digital output		
	Output current $I_{max.}$	≤ 100 mA
	Circuit protection	A, B, D [1)]
	Response time	16/70/250/500/1000/2000/8000 µs [2)]
	Switching frequency	31.2 kHz; 7.1 kHz; 2 kHz; 1 kHz; 500 Hz; 250 Hz; 62.5 Hz[3)]

1) B = Inputs and outputs reverse polarity protected
D = Outputs overcurrent and short circuit protected
2) Signal transit time with resistive load
3) With light / dark ratio 1:1
8) Valid for Q\ on Pin2, if configured via software

Mechanical data

Enclosure rating	IP54
Ambient temperature, operation	-25 ... +55 °C[1)]

1) Restrictions in bus operation (see "Ambient temperature", page 14)

14.2 Dimensional drawings

Standalone device

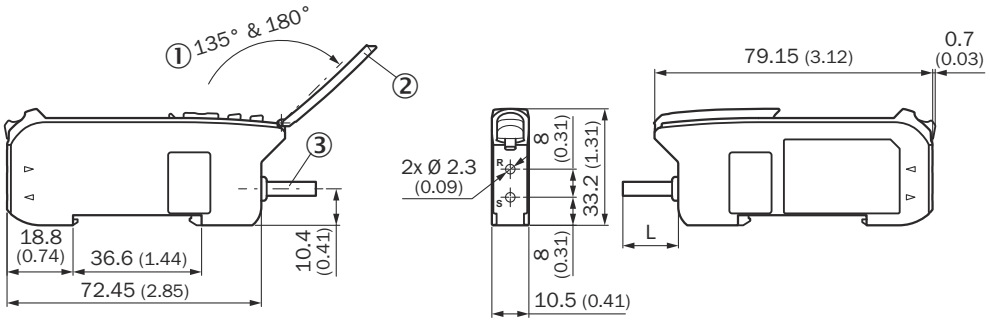


Figure 20: Standalone device with cable

① Aperture angle
② Hinged cover for the pushbuttons
③ Connection

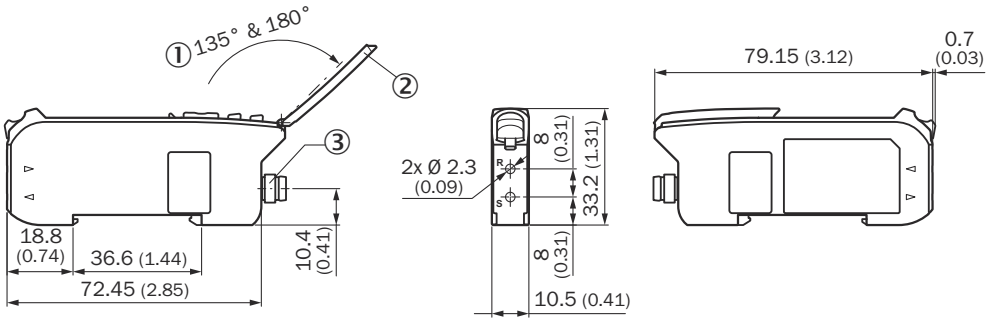


Figure 21: Standalone device with male connector, M8

① Aperture angle
② Hinged cover for the pushbuttons
③ Male connector M8

Base unit

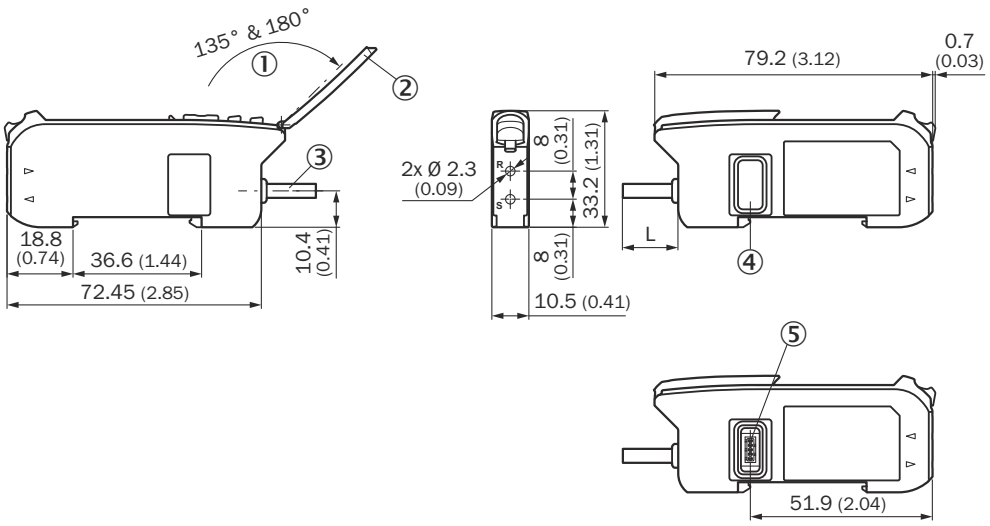


Figure 22: Base unit with cable

① Aperture angle
② Hinged cover for the pushbuttons
③ Connection
④ Side cover
⑤ Female connector for bus module

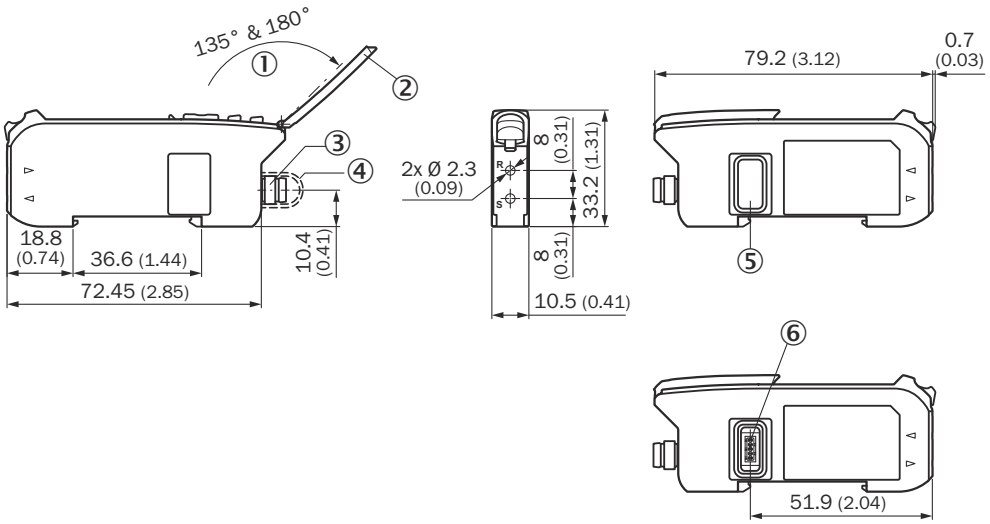


Figure 23: Base unit with male connector, M8

① Aperture angle
② Hinged cover for the pushbuttons
③ Male connector M8
④ M8 connector cap
⑤ Side cover
⑥ Female connector for bus module

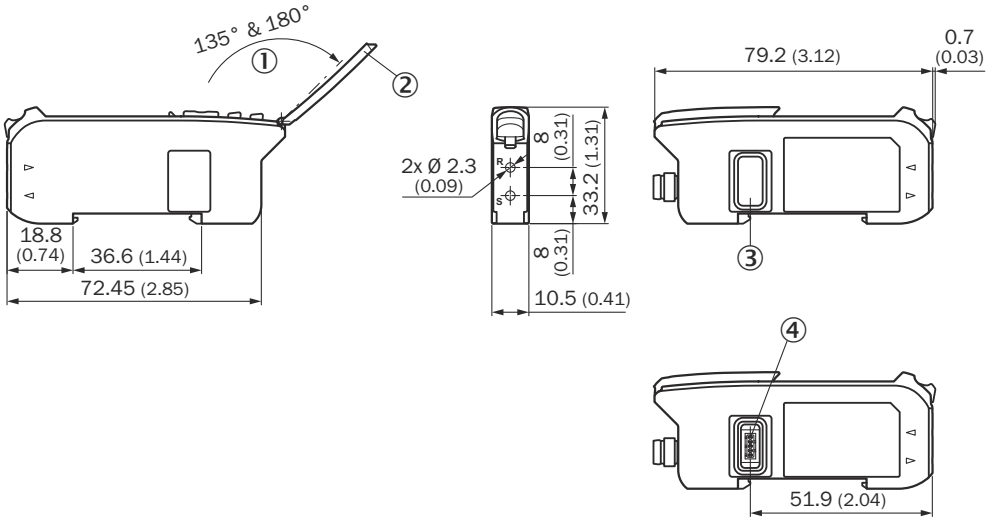


Figure 24: Base unit without connection

① Aperture angle
② Hinged cover for the pushbuttons
③ Side cover
④ Female connector for bus module

Expansion unit

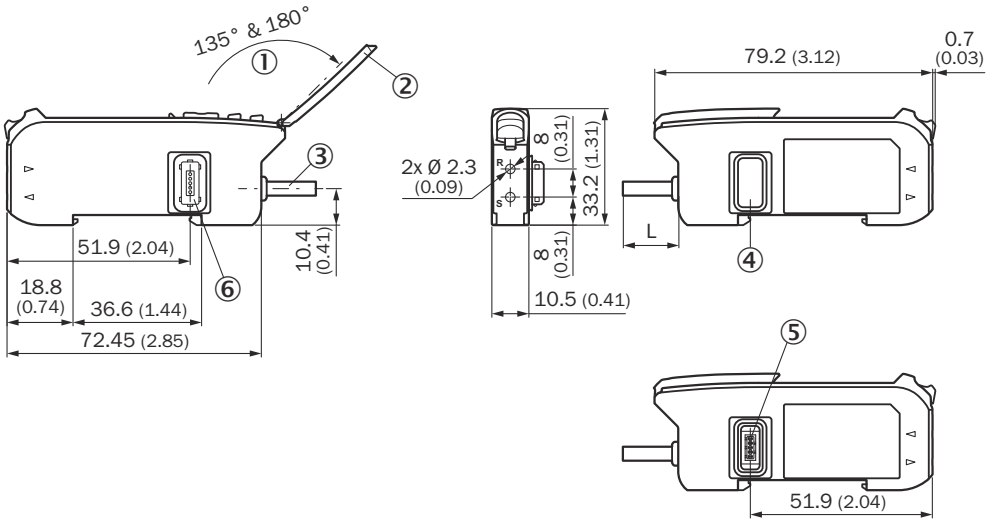


Figure 25: Expansion unit with cable

① Aperture angle
② Hinged cover for the pushbuttons
③ Connection
④ Side cover
⑤ Female connector for bus module
⑥ Male connector for bus module

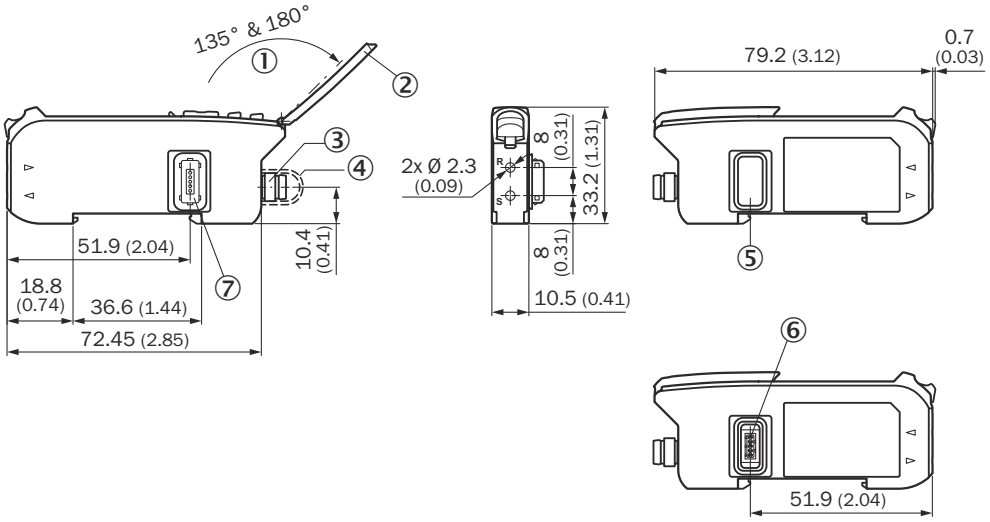


Figure 26: Expansion unit with male connector, M8

① Aperture angle
② Hinged cover for the pushbuttons
③ Male connector M8
④ M8 connector cap
⑤ Side cover
⑥ Female connector for bus module
⑦ Male connector for bus module

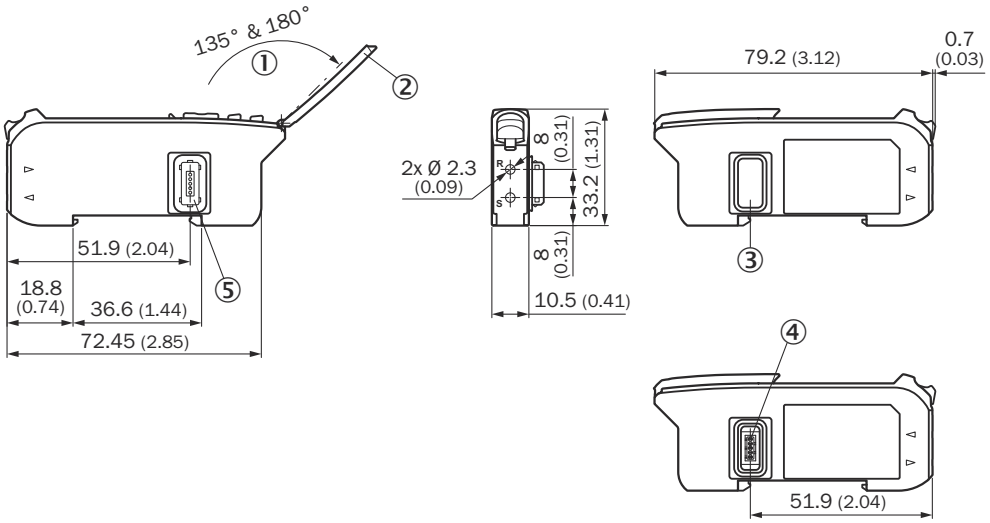


Figure 27: Expansion unit without connection

① Aperture angle
② Hinged cover for the pushbuttons
③ Side cover
④ Female connector for bus module
⑤ Male connector for bus module

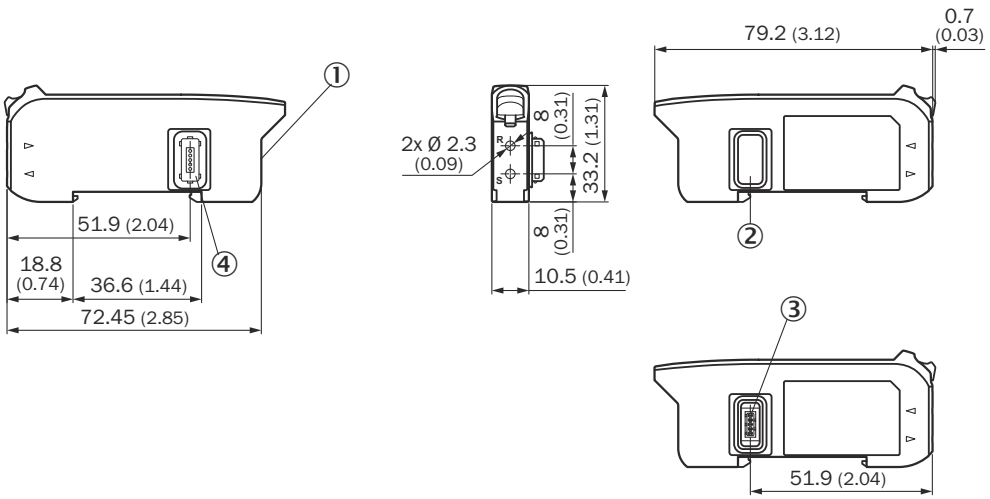


Figure 28: Expansion unit without display, without connection

① Without connection
② Side cover
③ Female connector for bus module
④ Male connector for bus module

14.3 Process data structure

WLL80	A71
IO-Link	V1.1
Process data	4 bytes
	Byte 0: Bits 31 ... 24 Byte 1: Bits 23 ... 16 Byte 2: Bits 15 ... 8 Byte 3: Bits 7 ... 0
Bit 0 / data type	Q_{L1} / Boolean
Bit 1 / data type	Q_{L2} / Boolean
Bit 2 / data type	Q_{int1} / Boolean
Bit 3 / data type	Q_{int2} / Boolean
Bit 4 ... 15 / description/data type	Reserved
Bit 16 ... 31 / description / data type	Analog value/signed integer (subindex: 120, value:0) Counter value/integer (subindex: 120, value: 18)

Information on the IO-Link functions can be found in the enclosed IO-Link photoelectric sensor operating instructions or downloaded from www.sick.com under the part number.

15 Annex

15.1 Conformities and certificates

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).

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