

WLL80 Analog

Fiber-optic sensor

SICK
Sensor Intelligence.



Described product

WLL80

Standalone variant

Manufacturer

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

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Original document

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Contents

1	About this document.....	5
1.1	Information on the operating instructions.....	5
1.2	Further information.....	5
1.3	Symbols and document conventions.....	5
2	Safety information.....	7
2.1	Qualification of personnel.....	7
2.2	Intended use.....	7
3	Product description.....	8
3.1	Product identification via the SICK product ID.....	8
3.2	Device overview.....	8
3.3	IO-Link communication interface.....	9
3.4	Documentation and accessories.....	9
4	Mounting.....	10
4.1	Scope of delivery.....	10
4.2	Mounting requirements.....	10
4.3	Connecting fibers.....	10
4.4	Mounting/removing the sensor.....	11
4.5	Ambient temperature.....	12
4.6	Alignment.....	12
5	Electrical installation.....	13
5.1	Notes on UL approval.....	13
5.2	Connections.....	14
5.3	Multifunction input/output.....	15
5.4	Wiring the digital input.....	15
5.5	Wiring the digital outputs.....	15
5.6	Integration of the sensor in IO-Link mode.....	16
6	Commissioning.....	17
6.1	YouTube videos.....	17
6.2	Initial menu settings.....	17
6.3	Setting the sensing range/switching threshold/current or voltage range/teach-in.....	18
7	Operation.....	22
7.1	Control elements.....	22
7.2	General sensor functions.....	23
7.3	Main menu navigation tree (1st menu level).....	25
7.4	Default settings (1st menu level).....	26
7.5	Display settings.....	28
7.6	Time functions.....	31
7.7	Detection parameters.....	34

7.8	I/O settings.....	40
7.9	Device information.....	46
7.10	Analog channel settings.....	48
7.11	Initializing the device.....	51
7.12	Teach-in.....	52
8	Devices with special features.....	67
9	Troubleshooting.....	68
9.1	Troubleshooting integrated IO-Link devices.....	70
10	Sensor replacement/data storage.....	71
11	Disposal.....	72
12	Maintenance.....	73
13	Technical data.....	74
13.1	Technical specifications.....	74
13.2	Dimensional drawings.....	75
14	Annex.....	76
14.1	Conformities and certificates.....	76

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.

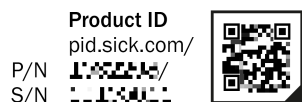


Figure 1: SICK product ID

3.2 Device overview

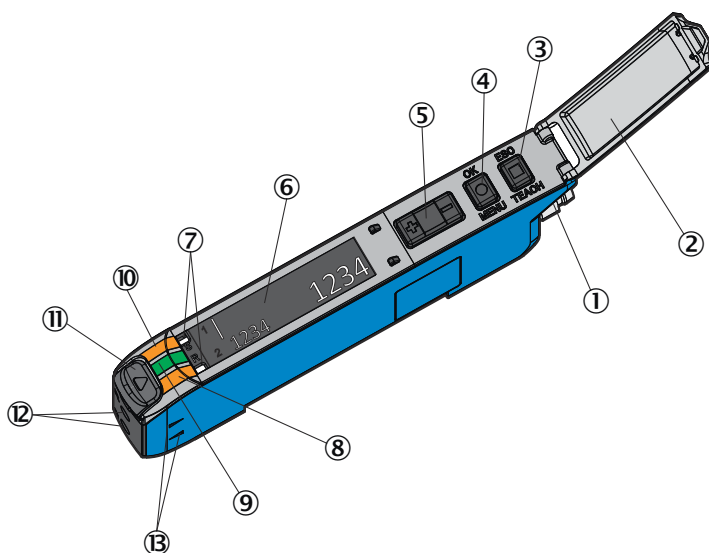


Figure 2: Device overview

- 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 analog channel
- 9 Green LED: Supply voltage 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: Photo-electric sensors, SICK Smart Sensors / IO-Link.**

3.4 Documentation and accessories

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

Documentation and software

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

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

Accessories

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

4 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 74](#).
- 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

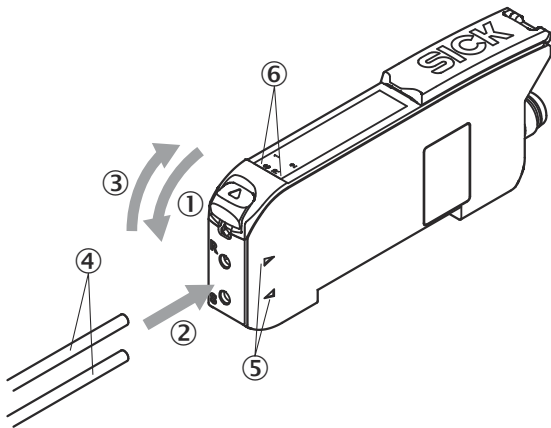


Figure 3: Connecting fibers

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

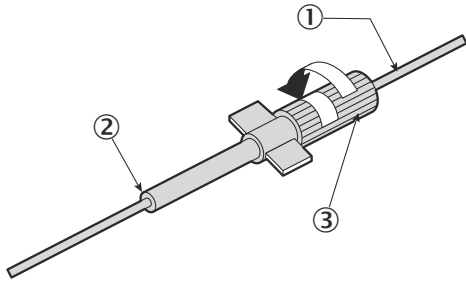


Figure 4: Fiber with thin end sleeve

- 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

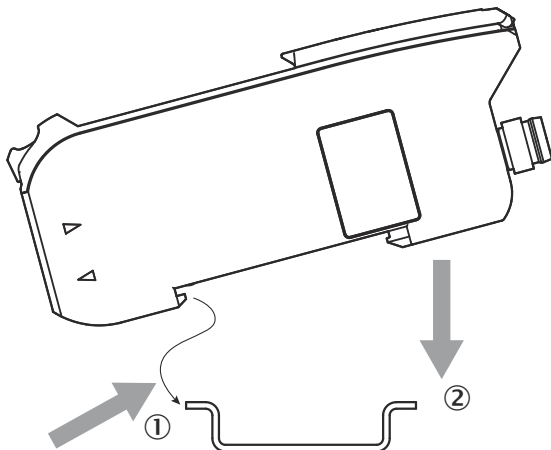


Figure 5: Mount the WLL80 on the DIN rail

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

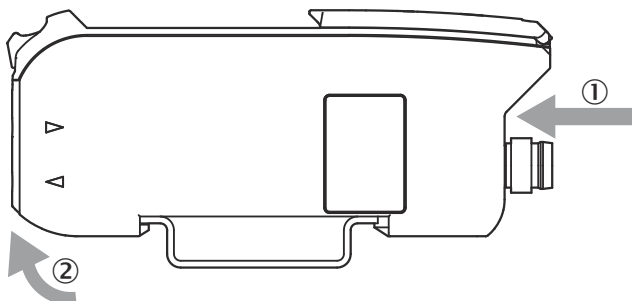


Figure 6: Remove the WLL80 from the DIN rail

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 Ambient temperature

Max. output current: 20 mA.

Ambient temperature during operation:



-25 °C ... +55 °C¹
-13 °F ... +131 °F¹

¹ Air humidity: 35 ... 85%

4.6 Alignment

When using the WLL80 fiber-optic sensor with through-beam fibers, align the sender fibers with the receiving fibers. 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 7]. You must ensure that the optical openings (fiber surfaces) of the fibers are completely clear.

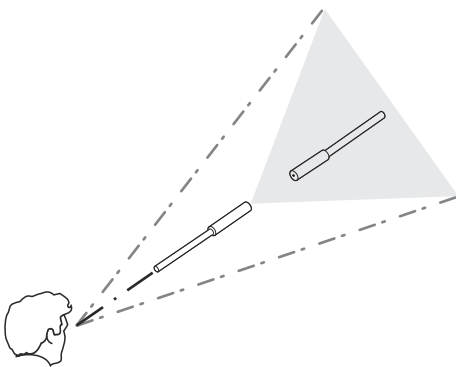


Figure 7: Alignment of through-beam fibers

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 8].

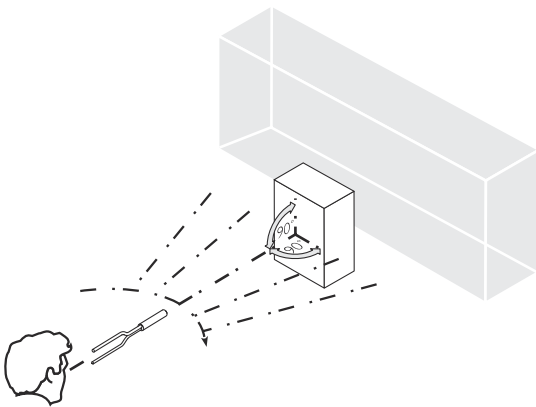


Figure 8: Alignment of proximity fiber

5 Electrical installation

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.

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 = Analog channel

L+ = supply voltage (U_V)

M = ground

5.1 Notes on UL approval

5.1.1 UL Satisfaction Ratings Listed

The total output current and ambient temperature will be restricted as follows depends

on the number of the sensors.



No control output setting

Stand-alone analog model:

Input: 12 - 24 Vdc, Class 2, Max. 0.126 A

Analog current output: Max. 0.024 A

Analog voltage output: Max. 10 V

Maximum Ambient Temperature: +55 °C

1 control output setting

Stand-alone analog model:

Input: 12 - 24 Vdc, Class 2, Max. 0.126 A

Output: 12 - 30 Vdc, Class 2, Max. 0.05 A

Analog current output: Max. 0.024 A

Analog voltage output: Max. 10 V

Maximum Ambient Temperature: +55 °C

Environmental

Enclosure Tye Rating: Type 1

5.2 Connections

U_B: 12 ... 30 V DC



see "Technical data", page 74

Table 1: Pin assignment

WLL80x-	x2xHxxxxxxxxxxx	x1x1xxxxxxxxxxx
1 = BN	+ (L+)	+ (L+)
2 = WH	MFIO (Default: Q1)	MFIn (Default: Teach-in)
3 = BU	- (M)	- (M)
4 = BK	Analog out	Analog out/analog GND
5 = GY	-	Q1

Connection diagram:

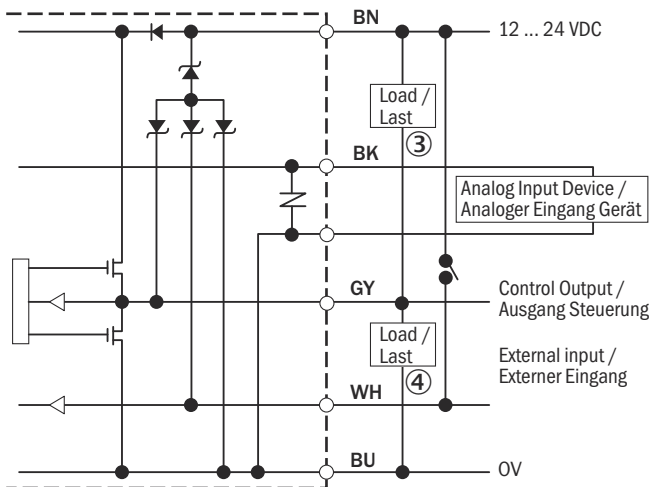


Figure 9: PNP setting or push-pull

- 1 When I/O polarity is set to Push-pull and the sensor is connected with plus common circuits.
- 2 When I/O polarity is set to Push-pull or PNP and the sensor is connected with minus direct current circuits.

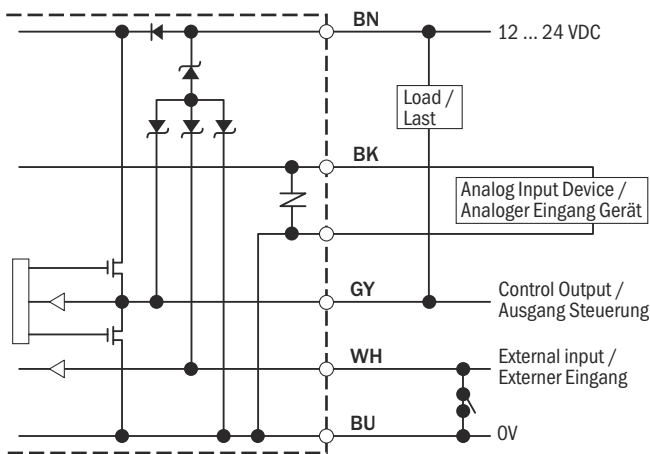


Figure 10: NPN setting

5.3 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)
- Reset counter value
- Reset extreme value memory

MFIO/MFOuT output functions:

- Operational safety alarm (**Quality of Run Alarm**)
- Digital output channel 1
- Response signal for successfully performed teach-in(**feedback**)
- **Error mode** for signal when the measured value is outside the set range.

5.4 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 2: 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 k Ω	

5.5 Wiring the digital outputs

The number of digital inputs available at the connections will vary depending on the sensor, see ["Connections", page 14](#). 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
-

5.6 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**.

6 Commissioning

6.1 YouTube videos

The individual steps for commissioning are also shown in videos:

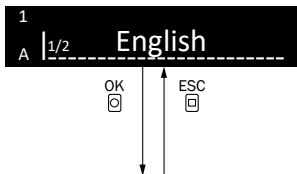
Table 3: Video overview

Commissioning and initial menu settings	 https://youtu.be/lbny_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 4: Initial menu setting

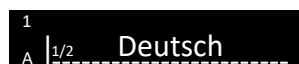


Display language

Select language using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$.



English: English



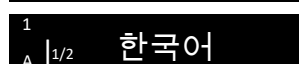
Deutsch: German



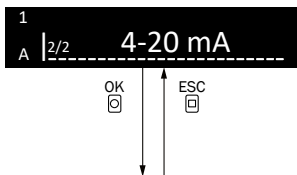
日本語 : Japanese



中文 : Chinese



한국어 : Korean

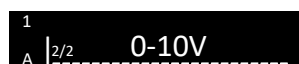


Analog output

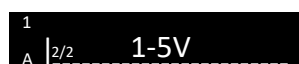
Select analog output using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$.



Analog output current based
4-20 mA



Analog output voltage based
0-10 V



Analog output voltage based
1-5 V



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



Top left value: Upper threshold (digits) of the current or voltage range (assignment of the displayed value to the current or voltage value 20 mA / 10 V / 5 V)
 Bottom left value: Lower threshold (digits) of the current or voltage range (assignment of the displayed value to the current or voltage value 4 mA / 0 V / 1 V)
 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/current or voltage range/teach-in

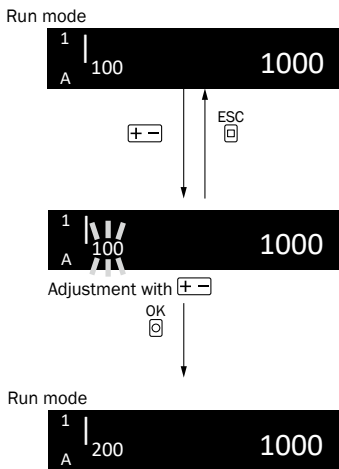
Setting the sensing range or defining the switching point or assigning received light values (digits) to the current or voltage range can be done manually or using various teach-in modes that can be selected in the teach-in menu.

6.3.1 Binary switching channel Q1

Manual setting the switching points:

The switching point or switchings points can be set manually.

Table 5: 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.

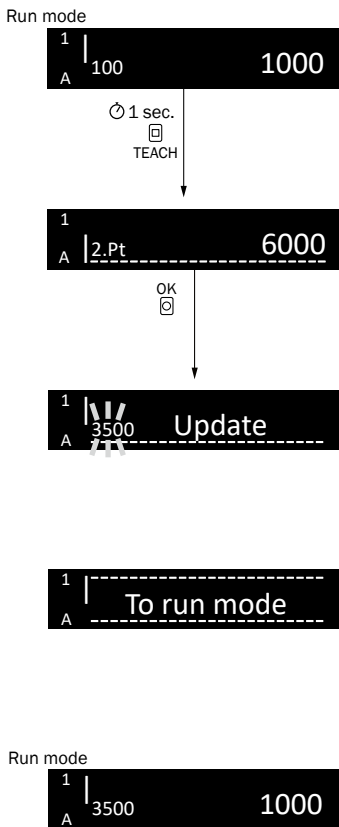
After confirmation (or after 30 seconds without button operation), the display returns to run mode.

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 6: 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).

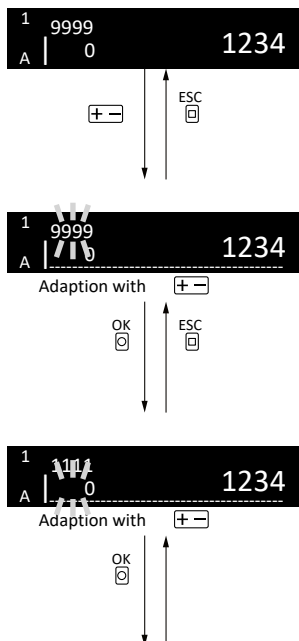
The switching point (SP) is updated according to the taught-in teach-in points (TP1, TP2) and the display returns to run mode.

	Pushbuttons	Through-beam	Energy consideration
Step 1	with object 	without object 	 Energy TP1 SP TP2 Time $SP = (TP1 + TP2) \times 50\%$
Step 2	without object/on background 	with object 	 Energy TP1 SP TP2 Time $SP = (TP1 + TP2) \times 50\%$

6.3.2 Analog channel QA

Manually setting the current or voltage range:

Table 7: Manually setting the current or voltage range



Manually setting the current or voltage range

Activate manual assignment of the received light values (digits) to the current or voltage values using (received light value for assignment to the upper threshold (UT) of the current or voltage range 20 mA / 10 V / 5 V flashes).

Adjust the upper threshold (UT) using (increase) and (decrease). Click to confirm. After confirmation, the received light value for assignment to lower threshold (LT) of the current or voltage range 4 mA / 0 V / 1 V flashes. Adjust the lower threshold (LT) using (increase) and (decrease). Click to confirm.

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

Run mode

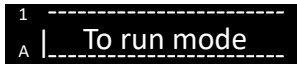
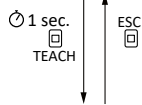


Analog two-point teach-in:

The analog two-point teach-in assigns the higher received light value of the teach-in points TP1 and TP2 to the upper threshold (UT) of the current or voltage range (20 mA / 10 V / 5 V). The lower received light value of the teach-in points TP1 and TP2 is assigned to the lower threshold (LT) of the current or voltage range (4 mA / 0 V / 1 V). Either the teach-in point with the lower received light value or the teach-in point with the higher received light value can be taught in first.

Table 8: Analog two-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.

	Pushbuttons	Through-beam	Energy consideration
Step 1	With object position 1 (higher received light) TP1 = Upper threshold (20 mA / 10 V / 5 V)	With (transparent) object with (high) transmission 1 or without object (higher received light value) 	
Step 2	With object position 2 or without object (lower received light value) TP2 = Lower threshold (4 mA / 0 V / 1 V)	With (transparent) object with (low) transmission 2 (lower received light value) 	

- UT Upper threshold
- LT Lower threshold
- ① Current/voltage value [mA/V]
- ② Received light [digits]

6.3.3 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

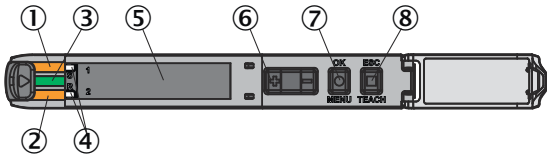


Figure 11: Display and control elements - version with display and operating buttons

- 1 LED yellow: Status digital output channel 1
- 2 LED yellow: Status output analog channel
- 3 Green LED: Supply voltage 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 / analog channel)

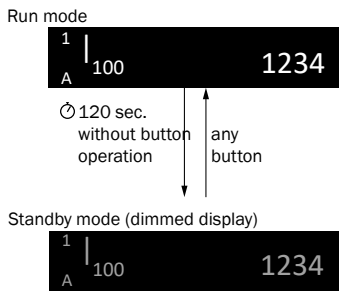
Table 9: Description of control elements

No.	Description	Function
1	Channel 1	Lights up when the digital output on channel 1 is active
2	Analog channel	Lights up when the analog output on the analog channel is active (signal between the lower threshold and upper threshold of the current/voltage range)
3	Green LED	Lights up when the supply voltage is applied
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 10: Standby mode

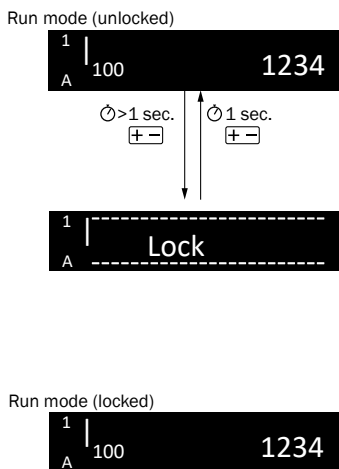


Standby mode

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 11: Sensor lock



Sensor lock

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



Sensor locked

Sensor unlocked



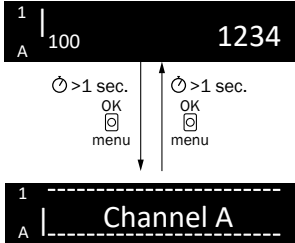
NOTE

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 12: Channel change

Display run mode channel 1



Display run mode channel A



Channel change

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



Display channel 1

Display analog channel

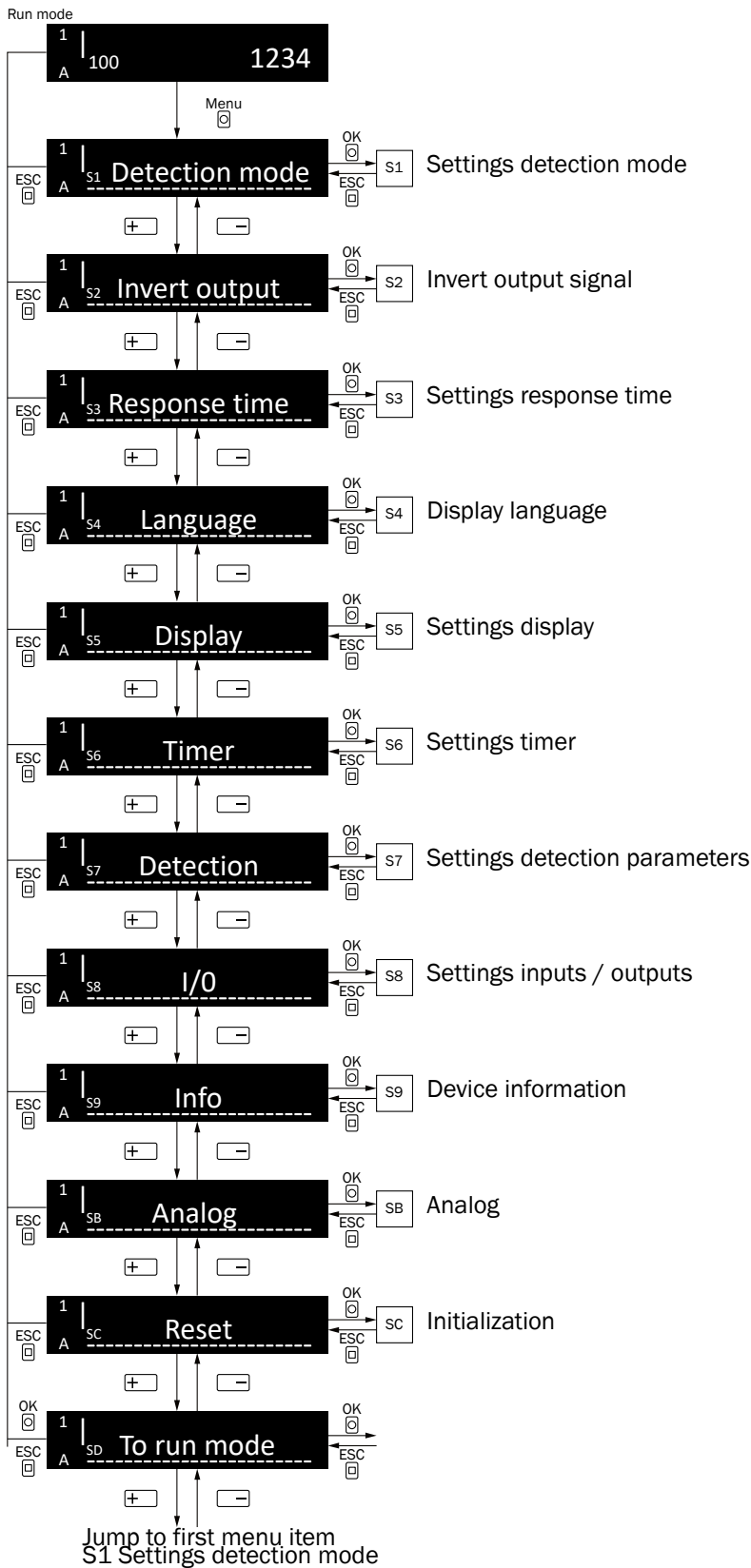


NOTE

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.

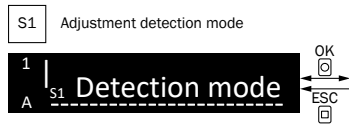
7.3 Main menu navigation tree (1st menu level)



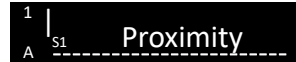
7.4 Default settings (1st menu level)

7.4.1 Setting the detection mode

Table 13: Detection mode

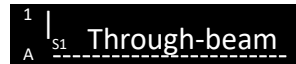


Select Detection mode (according to the principle of operation of the fibers used) using \leftarrow and confirm using \rightarrow OK. After confirmation, the display returns to the higher-level menu.



Pushbuttons

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

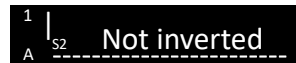
Received light value below the switching point is detected as an object (“dark switching”). Switching point for object moving into the beam less than switching point for object moving out of the beam (positive hysteresis).

7.4.2 Invert output signal

Table 14: Invert output signal



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



Not inverted

Output is defined as an N/O (**normally open**) contact.

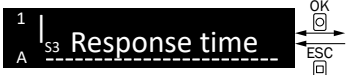























Inverted

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

7.4.3 Setting the response time

Table 15: Setting the response time

<p>S3 Adjustment response time</p> 	<p>Select response time using \leftarrow and confirm using \rightarrow OK. After confirmation, the display returns to the higher-level menu.</p>														
	<table border="0"> <tr> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">16 μs (current received light value)</td> </tr> <tr> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">70 μs (current received light value)</td> </tr> <tr> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">250 μs (current received light value)</td> </tr> <tr> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">500 μs (current received light value)</td> </tr> <tr> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">1 ms (current received light value)</td> </tr> <tr> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">2 ms (current received light value)</td> </tr> <tr> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">8 ms (current received light value)</td> </tr> </table>		16 μ s (current received light value)		70 μ s (current received light value)		250 μ s (current received light value)		500 μ s (current received light value)		1 ms (current received light value)		2 ms (current received light value)		8 ms (current received light value)
	16 μ s (current received light value)														
	70 μ s (current received light value)														
	250 μ s (current received light value)														
	500 μ s (current received light value)														
	1 ms (current received light value)														
	2 ms (current received light value)														
	8 ms (current received light value)														

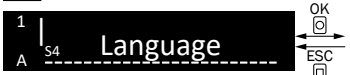
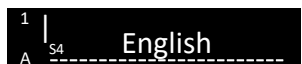




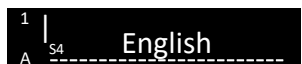




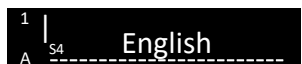






NOTE SELECTING THE APPROPRIATE RESPONSE TIME

- 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.

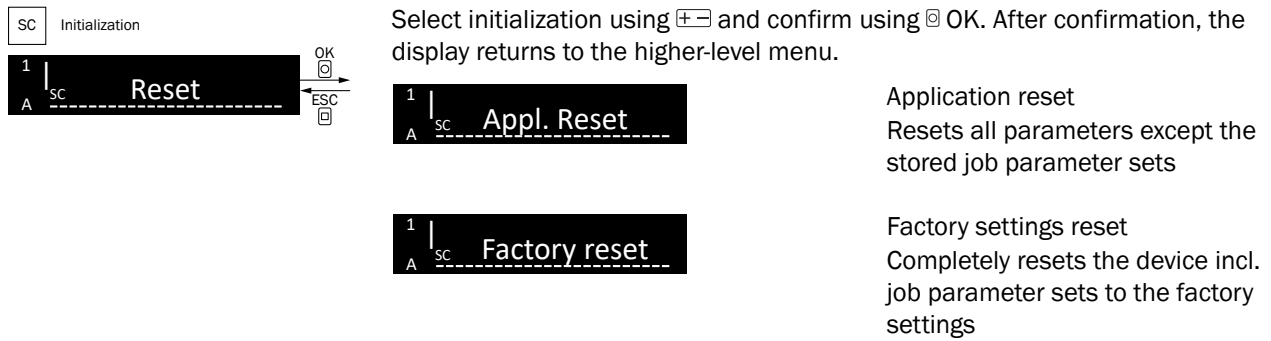
7.4.4 Setting the display language

Table 16: Display language

<p>S4 Display language</p> 	<p>Select language using \leftarrow and confirm using \rightarrow OK. After confirmation, the display returns to the higher-level menu.</p>										
	<table border="0"> <tr> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">English: English</td> </tr> <tr> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">Deutsch: German</td> </tr> <tr> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">日本語 : Japanese</td> </tr> <tr> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">中文 : Chinese</td> </tr> <tr> <td style="vertical-align: top;">  </td> <td style="vertical-align: top;">한국어 : Korean</td> </tr> </table>		English: English		Deutsch: German		日本語 : Japanese		中文 : Chinese		한국어 : Korean
	English: English										
	Deutsch: German										
	日本語 : Japanese										
	中文 : Chinese										
	한국어 : Korean										

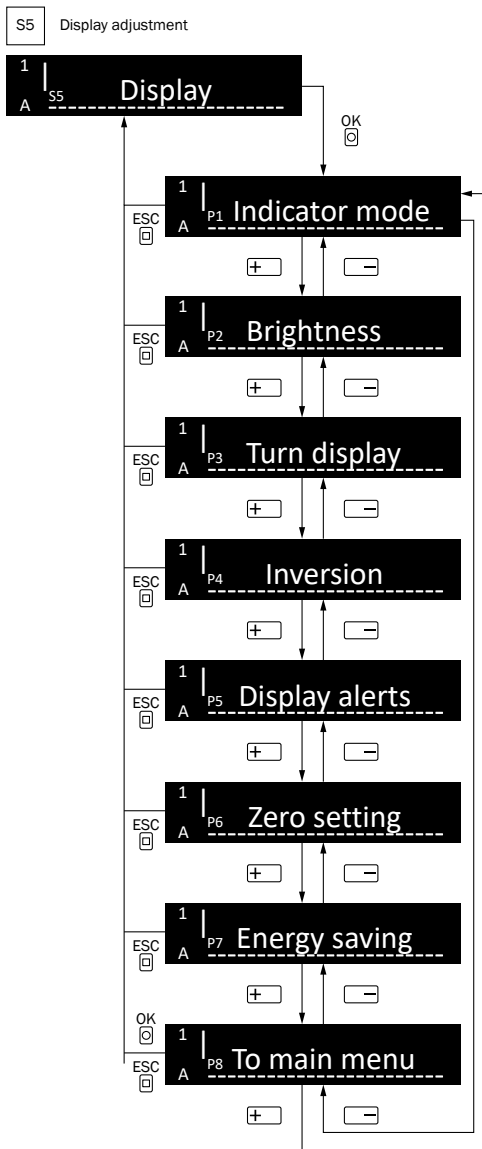
7.4.5 Initializing the sensor

Table 17: Initializing the sensor



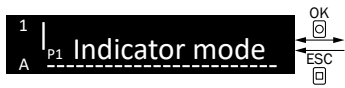
7.5 Display settings

7.5.1 Navigation tree for display settings (S5)



7.5.2 Indicator mode

Table 18: Indicator mode



Select indicator mode using \leftarrow and confirm using \rightarrow OK. After confirmation, the display returns to the higher-level menu.



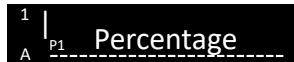
Digits

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 19: Display brightness



Select display brightness using \leftarrow and confirm using \rightarrow 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 20: Rotating the display



Select display rotation by 180° using \leftarrow and confirm using \rightarrow 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 21: Inverting the display colors



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



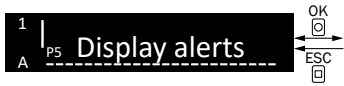
Off
Light characters on a dark background



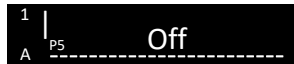
On
Dark characters on a light background

7.5.6 Displaying alerts

Table 22: Displaying alerts



Select the display alerts using \leftarrow and confirm using \rightarrow OK. After confirmation, the display returns to the higher-level menu.



Off
Do not show alerts on the display

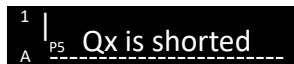
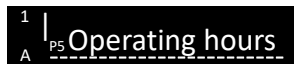
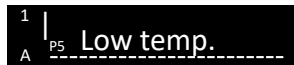
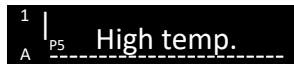


On
Show alerts on the display



NOTE

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

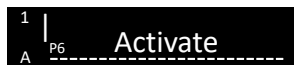


7.5.7 Zeroing the displayed value

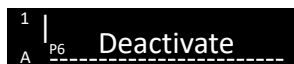
Table 23: Zeroing the displayed value



Select zero the actual received light value shown on the display using \leftarrow and confirm using \rightarrow 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.

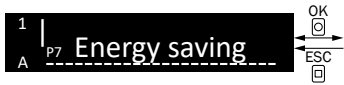


Deactivate
Absolute actual value of the received light is displayed (resetting the zeroing).

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 24: Energy saving mode

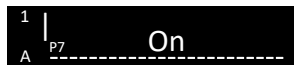


Select energy saving mode using **[+]** and confirm using **[OK]**. After confirmation, the display returns to the higher-level menu.



Off

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



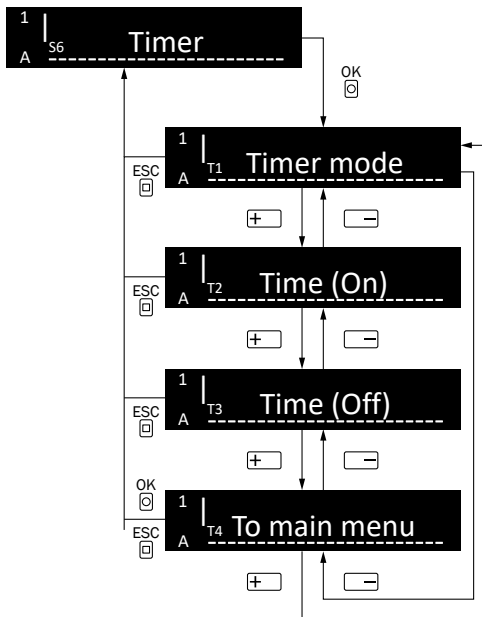
On

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)

S6 Adjustments timer functions



7.6.2 Selecting the time function

Table 25: Selecting the time function

	<p>Select time function using $\left[\begin{smallmatrix} + \\ - \end{smallmatrix} \right]$ and confirm using $\left[\begin{smallmatrix} \text{OK} \\ \text{OK} \end{smallmatrix} \right]$.</p>
	<p>Deactivate No time function active</p>
	<p>Switch-on delay High signal at the output is only applied when the (on) switching point is exceeded for the configured time.</p>
	<p>Switch-off delay High signal at the output remains after falling below the (off) switching point for the configured time.</p>
	<p>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.</p>
	<p>Impulse (one shot) High signal at the output is applied for the configured time as soon as the (on) switching point is exceeded.</p>
	<p>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.</p>



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.

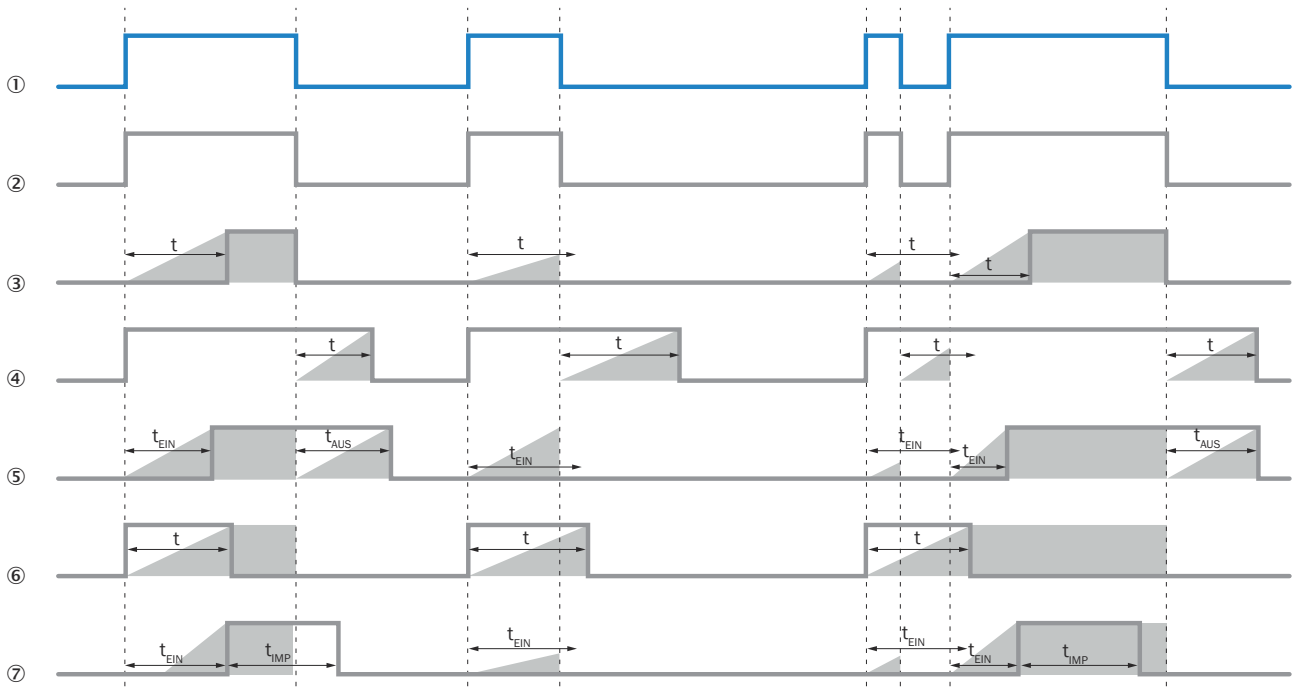
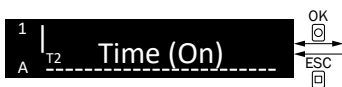


Figure 12: Time functions

- 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 26: Setting the time



Select time setting using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. 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 27: Setting the time



Select time setting using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. After confirmation, the display returns to the higher-level menu.



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

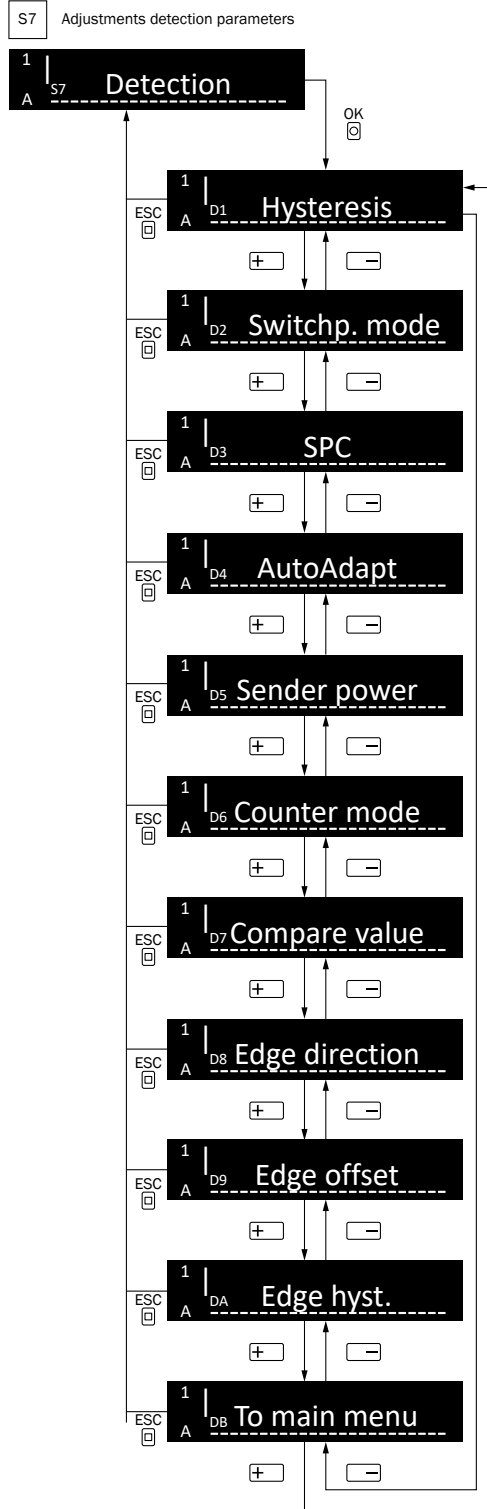


NOTE

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 28: Hysteresis



Select hysteresis using \pm and confirm using \square 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 "Set switching logic (binary switching channel Q1)", page 60.

7.7.3 Switch point mode

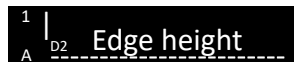
Table 29: Switch point mode



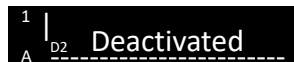
Select switching point mode using \pm and confirm using \square OK. After confirmation, the display returns to the higher-level menu.



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 30: SPC (Sender Power Control)



Select SPC function using \pm and confirm using \square 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.

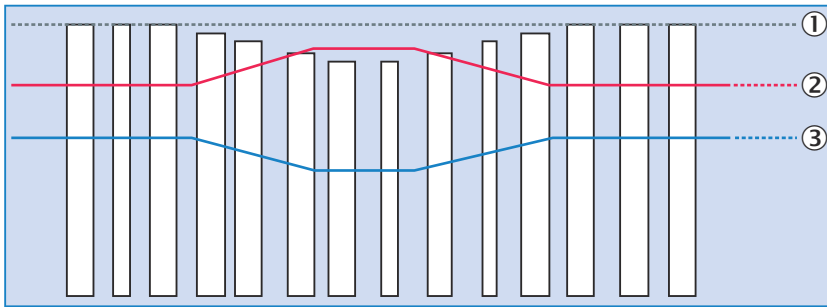


Figure 13: SPC off

- ① Light reception
- ② Temperature
- ③ Sender power

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

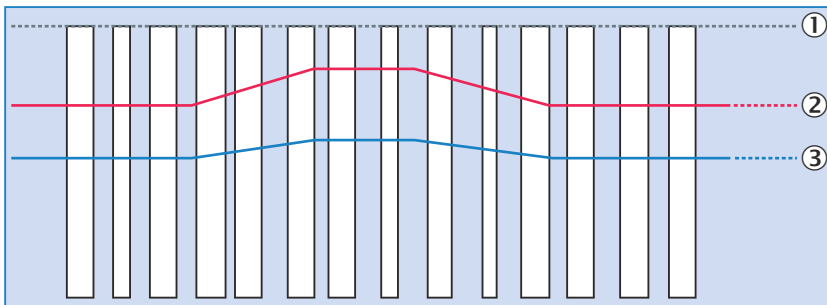


Figure 14: SPC on

- 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 (②), the threshold is adjusted accordingly (①). This function can help to ensure reliable switching even in environments with increased contamination.

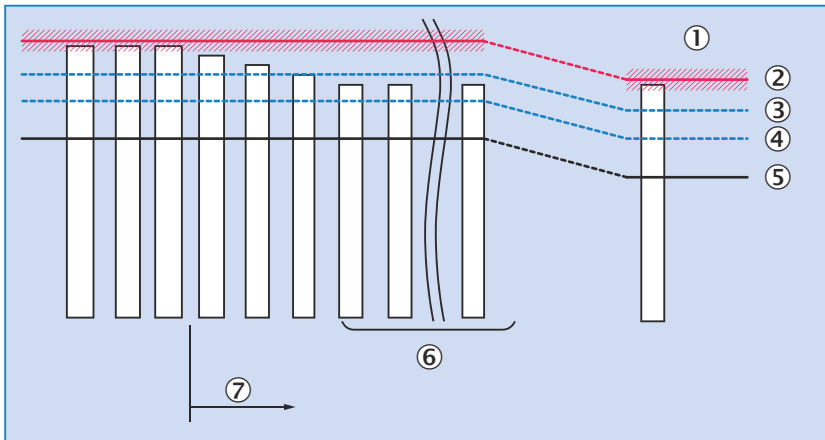


Figure 15: **AutoAdapt** switching point adjustment

- 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 31: Switching point adjustment (**AutoAdapt**)

	<p>Select AutoAdapt function using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. After confirmation, the display returns to the higher-level menu.</p>
	<p>Off No switching point adjustment activated</p>
	<p>On with standard response time (Update cycle of switching threshold: 3,000 ms)</p>
	<p>On with fast response time (Update cycle of the switching threshold: 1,000 ms)</p>
	<p>On with high speed response time (Update cycle of the switching threshold: 250 ms)</p>

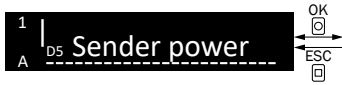


NOTE

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

7.7.6 Sender power

Table 32: Sender power



Select set sender power using \pm and confirm using \square 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)



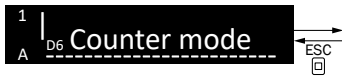
Minimum sender power (current received light value)



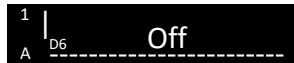
Sender power is regulated, if possible, so that the received light value is 5,000 digits (optimal working range for many applications and to avoid saturation of the received light).

7.7.7 Counter mode

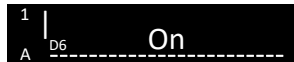
Table 33: Counter mode



Select counter mode using \pm and confirm using \square 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.



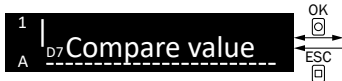
NOTE

The counter function is also shown in a video:



7.7.8 Count compare value

Table 34: Count compare value



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



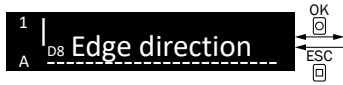
Count compare value (1 ... 16,383)

**NOTE**

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

7.7.9 Edge direction

Table 35: Edge direction



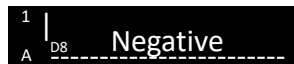
Select edge direction using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. After confirmation, the display returns to the higher-level menu.



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.



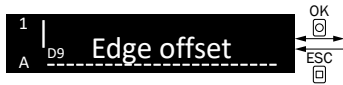
Negative edge direction
Negative edges (decrease in received light value) are detected.

**NOTE**

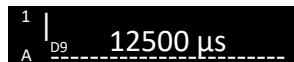
Setting the edge direction is only available if edge mode is activated under switching point mode.

7.7.10 Edge offset

Table 36: Edge offset



Select edge offset using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. 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 37: Edge hysteresis



Select edge hysteresis using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. After confirmation, the display returns to the higher-level menu.



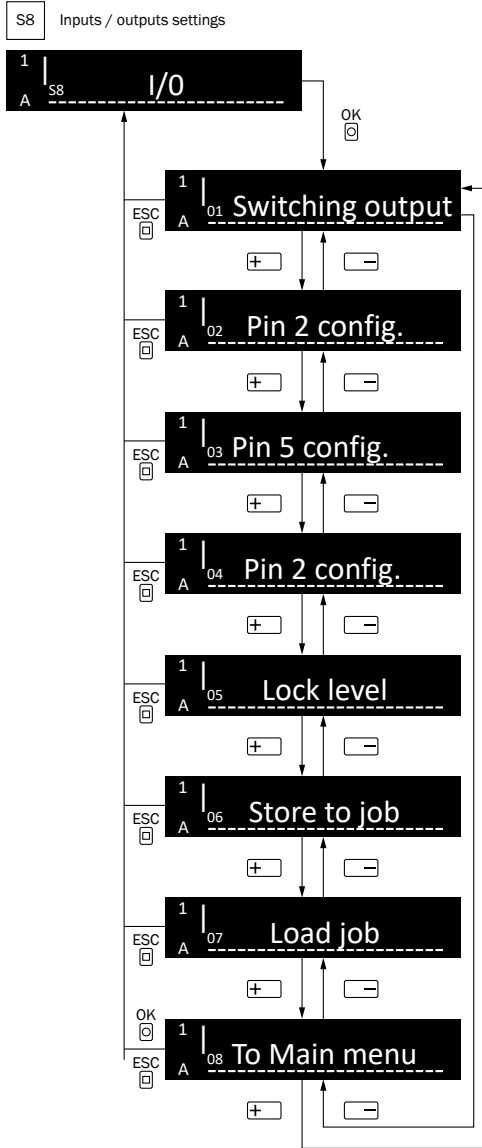
Value of the edge hysteresis in digits (0 ... 9,999 digits)

**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.

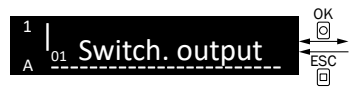
7.8 I/O settings

7.8.1 Navigation tree for setting inputs and outputs (S8)



7.8.2 Digital output

Table 38: Digital output



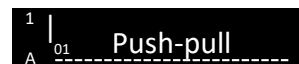
Select digital output using \pm and confirm using OK . After confirmation, the display returns to the higher-level menu.



PNP switching output



NPN switching output



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

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 39, page 41], 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 the Error analysis section.

Table 39: Test function for proximity

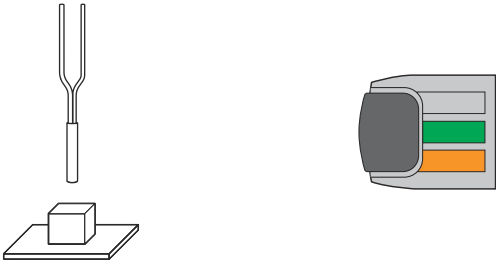
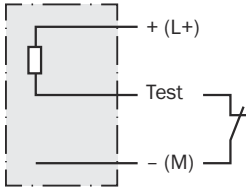
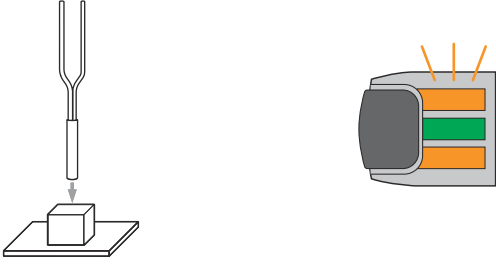
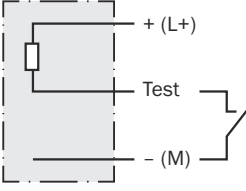
		Test
		
		

Table 40: Test function for through-beam

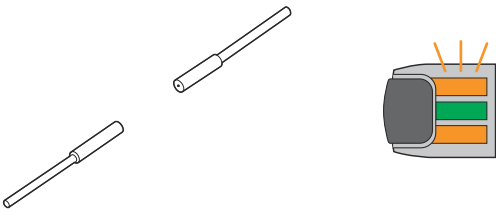
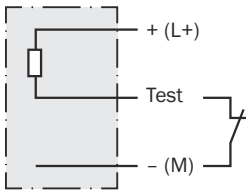
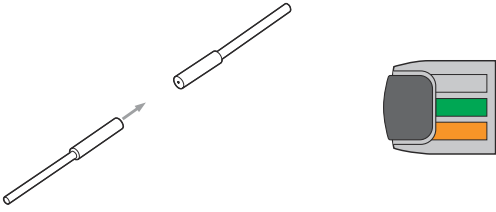
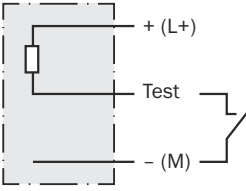
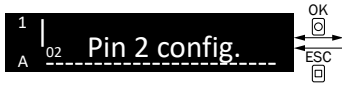
		Test
		
		

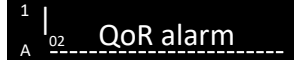
Table 41: Pin 2 configuration



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



Switching output signal for channel 1



Operational safety alarm (**Quality of Run Alarm**)



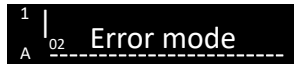
Teach-in by external input signal



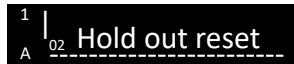
Switches off the sender LED by external input signal



Zeroes the counter



Signal that the received light value is outside the range set as valid.



Resets the extreme value memory by an external input signal.



No function



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)



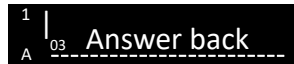
NOTE

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 42: Pin 5 configuration (output)



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



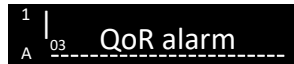
Output signal when teach-in is successful.



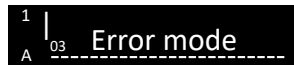
No function



Analog output signal for analog channel



Operational safety alarm (**Quality of Run Alarm**)



Signal that the received light value is outside the range set as valid.

7.8.5 Pin 2 configuration (input)

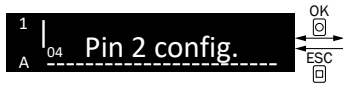


NOTE

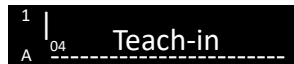
For devices with 3-wire cable, 5-wire cable or 5 pins, the white wire or pin 2 can be configured with different input functions.

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

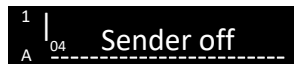
Table 43: Pin 2 configuration (input)



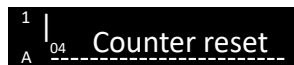
Select function of pin 2 or the white wire using \leftarrow and confirm using \square OK. After confirmation, the display returns to the higher-level menu.



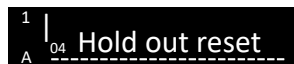
Teach-in by external input signal



Switches off the sender LED by external input signal



Zeroes the counter



Resets the extreme value memory by an external input signal.



No function

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 44: Lock option



Select lock option using \leftarrow and confirm using \square 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.

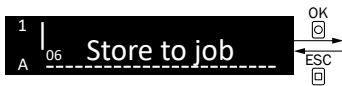


When the device is locked, the operating buttons are locked (external input remains accessible).

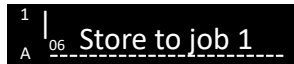
7.8.7 Save job

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.

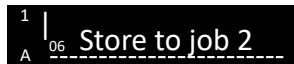
Table 45: Save job



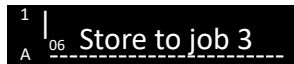
Select the job number to save using \leftarrow and click \square OK to confirm. After confirmation, the display returns to the higher-level menu.



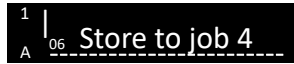
Saves the current device settings under job number 1.



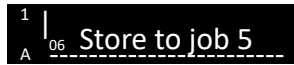
Saves the current device settings under job number 2.



Saves the current device settings under job number 3.



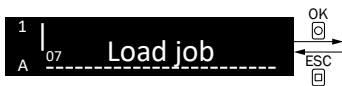
Saves the current device settings under job number 4.



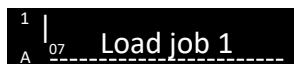
Saves the current device settings under job number 5.

7.8.8 Load job

Table 46: Load job



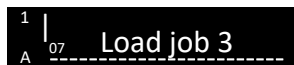
Select the job number to load using \leftarrow and click \square OK to confirm. After confirmation and the loading process has completed, the display returns to run mode (with settings according to the loaded job number).



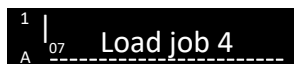
Loads the device settings saved under job number 1



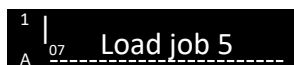
Loads the device settings saved under job number 2



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

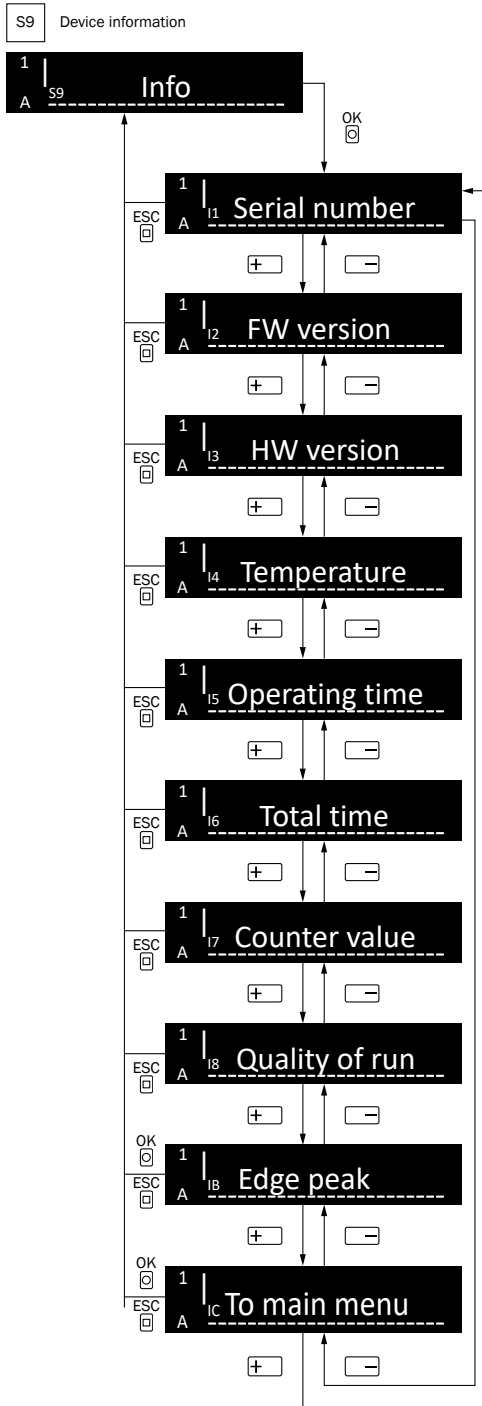
Table 47: Job numbers

Job number	Preset parameters	Description of the application
Job 1	Transmitting power: Minimum Analog output: 4-20 mA Lower threshold: 0 digits = 4 mA Upper threshold: 4,000 digits = 20 mA Pin 2 config. (4-wire cabled devices/plug-in devices): Switching output signal Pin 2 config. (5-wire cabled devices): Teach-in Pin 5 config. (5-wire cabled devices): Switching output signal Teach-in mode (analog channel A): Analog 2-point teach-in	Illustration of the sensor behavior of WLL190T-2x532 (sensor with analog output)
Job 2	Transmitting power: Minimum Response time: 1 ms Analog output: 1-5 V Lower threshold: 25 digits = 1 V Upper threshold: 1,000 digits = 5 V Pin 2 config. (4-wire cabled devices/plug-in devices): Switching output signal Pin 2 config. (5-wire cabled devices): Teach-in Pin 5 config. (5-wire cabled devices): Switching output signal Teach-in mode (analog channel A): Analog 2-point teach-in	Illustration of the sensor behavior of WLL170A (sensor with analog output)
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 μ s (50 x 250 μ s) 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.

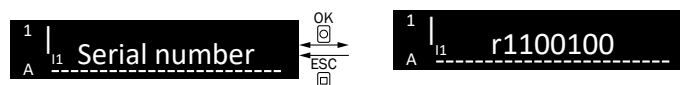
7.9 Device information

7.9.1 Navigation tree for device information (S9)



7.9.2 Serial number

Table 48: Serial number



Serial number of the device (sensor)

7.9.3 Software version

Table 49: Software version



Software version number

7.9.4 Hardware version

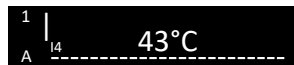
Table 50: Hardware version



Hardware version number

7.9.5 Device temperature

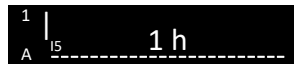
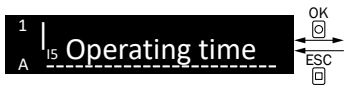
Table 51: Device temperature



Current internal device temperature

7.9.6 Operating time counter (uptime since last initialization)

Table 52: Operating hours



Operating time since last initialization

7.9.7 Operating time counter (total uptime since initial commissioning)

Table 53: Operating time (total)



Operating time since initial commissioning

7.9.8 Counter value

Table 54: Counter value



Current counter value

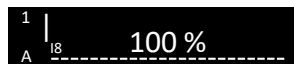
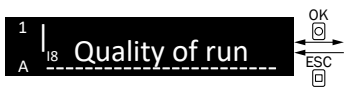


NOTE

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

7.9.9 Operational safety

Table 55: Operational safety (Quality of Run)



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

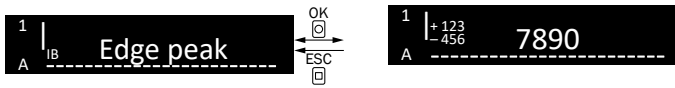


NOTE

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 Edge peak

Table 56: 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)

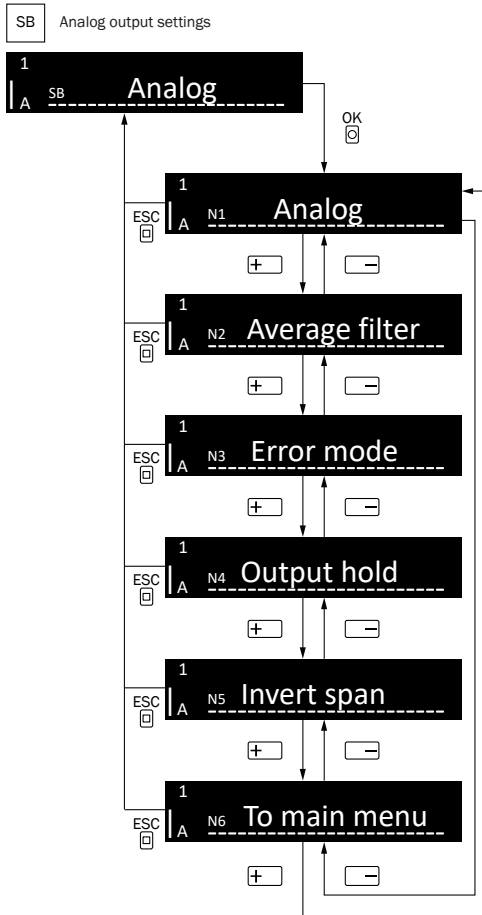


NOTE

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 Analog channel settings

7.10.1 Navigation tree for the analog channel settings (SB)



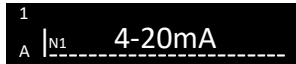
7.10.1.1 Analog output mode

Table 57: Analog mode



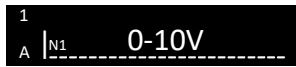
Analog output mode

Select analog output mode using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. After confirmation, the display returns to the higher-level menu.



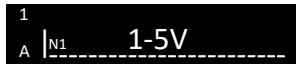
Current based 4-20 mA

The analog output supplies a current in the range 4...20 mA as the signal.



Voltage based 0-10 V

The analog output supplies a voltage in the range 0...10 V as the signal.



Voltage based 1-5 V

The analog output supplies a voltage in the range 1...5 V as the signal.

7.10.1.2 Average filter

Table 58: Average filter



Average value

Select average value using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. After confirmation, the display returns to the higher-level menu.

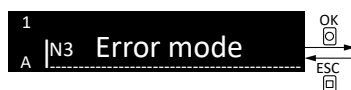


Average value (number n of individual values in increments of 1/2/4/8/16/32/64/128/256/512/1024/2048).

The average is taken from a block of n values. This value is applied to the output for the next n values until it is replaced by the average value of the next block of n values, which corresponds to a smoothing of the analog signal. This number n can be set in increments of 1/2/4/8/16/32/64/128/256/512/1024/2048.

7.10.1.3 Error mode

Table 59: Error mode



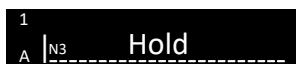
Definition of invalid measured values

Select definition of invalid measured values using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. After confirmation, the display returns to the higher-level menu.



Terminals

Sets the output value to 3.5-4.0 mA / 0 V / 1 V when the lower threshold of the current or voltage range is not reached, and to 20.0-20.5 mA / 10 V / 5 V when the upper threshold of the current or voltage range is exceeded



Hold

Sets the output value to the last valid value within the current or voltage range before the invalid state.

7.10.1.4 Hold output

Table 60: Hold output



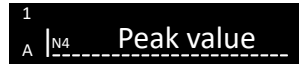
Extreme value memory

Select extreme value memory using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. After confirmation, the display returns to the higher-level menu.



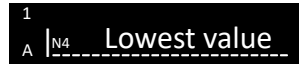
Switching off

Extreme value memory not active.



Maximum value

Maximum value is applied to the output.



Minimum value

Minimum value is applied to the output.

The values continue to be applied to the output until the maximum or minimum is exceeded or undershot or the value is reset (via external input or on the device).

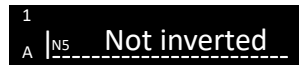
7.10.1.5 Invert signal

Table 61: Invert signal



Inversion analog signal

Select inversion analog signal using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. After confirmation, the display returns to the higher-level menu.



Not inverted

Analog signal is applied as a rising curve as per the settings (lower threshold corresponds to 4 mA / 0 V / 1 V; upper threshold corresponds to 20 mA / 10 V / 5 V).



Inverted

Analog signal is inverted and is applied as a falling curve (lower threshold corresponds to 20 mA / 10 V / 5 V; upper threshold corresponds to 4 mA / 0 V / 1 V).

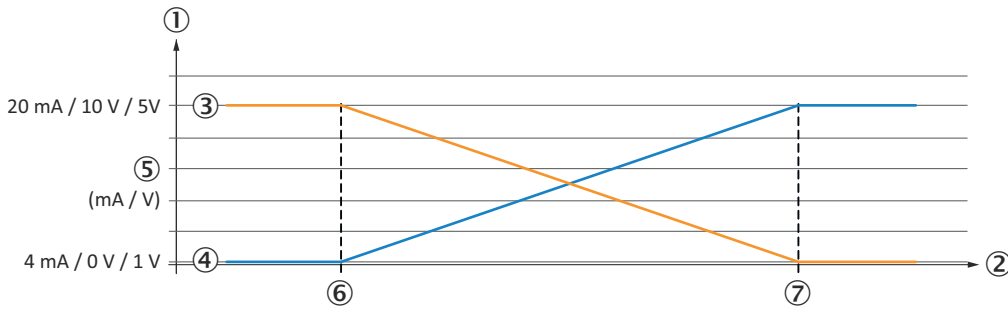


Figure 16: Inversion analog signal

- ① Analog signal
- ② Current received level (live)
- ③ Inverted
- ④ Not inverted
- ⑤ Analog signal
- ⑥ Lower threshold
- ⑦ Upper threshold

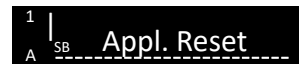
7.11 Initializing the device

7.11.1 Navigation tree for initialization (SB)

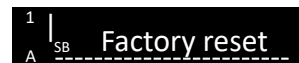
Table 62: Navigation tree for initialization



Select initialization using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. 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 63: Factory settings

Setting	Value
Det. mode (Detection mode)	Pushbuttons
Invert output (Invert output signal)	Not invert. (not inverted)
Response time	250 μ s
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

Setting	Value
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	12,500 μ s (50 cycles x response time 250 μ s)
Edge hyst. (Edge hysteresis)	5 (digits)
Digital output	Push-pull
Pin 2 config. (Pin 2 configuration)	Switching signal for channel 1
Pin 5 config. (Pin 5 configuration) (3-wire or 5-wire cable)	Switching signal for channel 1
Pin 2 config. (Pin 2 configuration) (3-wire or 5-wire cable)	Teach-in
Lock level	Lock UI&input (Lock UI and input)
Reset	No
Teach-in offset	-10%
Analog mode	4 – 20 mA (current-based analog output)
Av. filter (average filter)	64
Error mode	Terminals
Hold output	Off
Invert range	Not invert. (not inverted)
Teach-in mode (channel 1)	2-point (2-point teach-in)
Teach-in mode (analog channel A)	Analog 2-point (analog 2-point teach-in)

7.12 Teach-in

Setting the sensing range or the definition of the switching point or points or the assignment of received light values (digits) to the current or voltage range can be done manually or using 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 (2-point teach-in, Dynamic teach-in, Window teach-in, Analog 2-point teach-in, Analog dynamic teach-in), the teach-in button must be pressed a second time (> 1 second) to confirm the second teach-in point.

Binary switching channel Q1

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-in procedure (**Escape**).

NOTE
 Teach-in is also shown in a video:



7.12.1 Teach-in menu for selecting the teach-in mode in the binary switching channel Q1

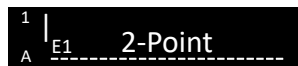
Table 64: Teach-in mode

Run mode



TEACH

ESC



OK



1 sec.



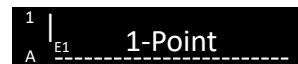
OK

ESC



OK

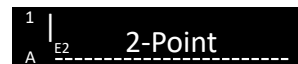
Select teach-in mode using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. After selecting the teach-in mode, the teach-in point (or teach-in points or, if applicable, the teach-in offset) needs to be confirmed using $\left[\text{OK} \right]$. The teach-in is then performed and the display returns to run mode.



1-point teach-in

$$SP = TP \pm X\%$$

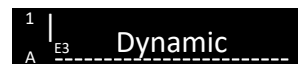
Sets a switching point (SP) using a teach-in point (TP) and a defined teach-in offset X (as a percentage of the TP).



2-point teach-in

$$SP = (TP1 \text{ and } TP2) \times 50\%$$

Sets a switching point (SP) using two teach-in points (TP1, TP2).



Dynamic Teach-in

$$SP = (TP_{min} \text{ and } TP_{max}) \times 50\%$$

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).



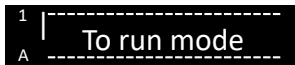
Teach-in offset

Select value in percent (-99% ... +99%) using \pm 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 65: Teach-in mode



The switching point/switching points are updated. The device switches to run mode.

Run mode



Left value: Switching point (digits)

Right value: Current received light value (digits)

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.

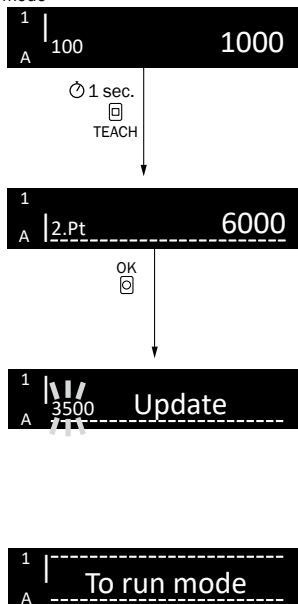
7.12.1.1 Two-point teach-in

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 66: 2-point teach-in

Run mode

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.

	Pushbuttons	Through-beam	Energy consideration
Step 1	with object 	without object 	 Energy TP1 SP TP2 Time $SP = (TP1 + TP2) \times 50\%$
Step 2	without object/on background 	with object 	 Energy TP1 SP TP2 Time $SP = (TP1 + TP2) \times 50\%$

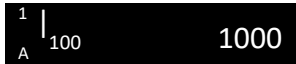
7.12.1.2 Single-point teach-in

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).

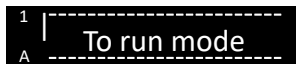
Table 67: Single-point teach-in

Run mode

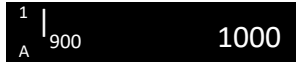
Run mode




1 sec.
TEACH

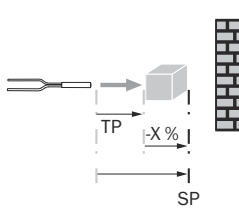
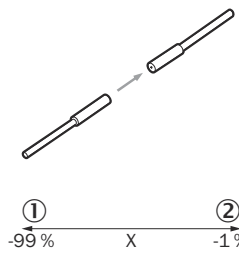
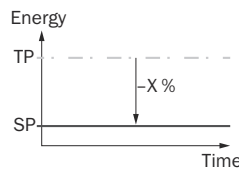
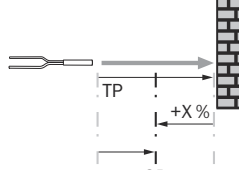
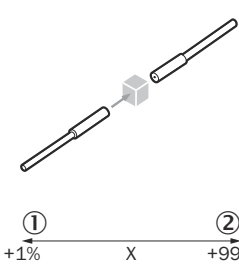
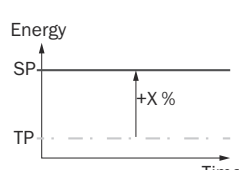


Run mode



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.

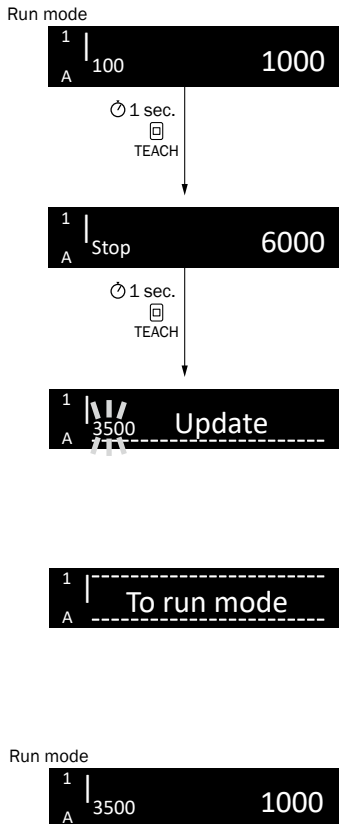
The switching point (SP) is updated based on the configured teach-in offset value (X) and the display returns to run mode.

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

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 68: 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.

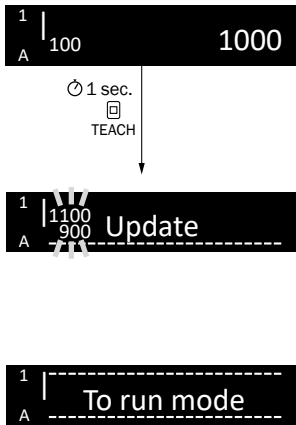
	Pushbuttons	Through-beam	Energy consideration
Step 1	Teach-in start 	Teach-in start 	 $SP = (TPmax + TPmin) \times 50\%$
Step 2	Teach-in stop 	Teach-in stop 	 $SP = (TPmax + TPmin) \times 50\%$

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 69: Zone teach-in

Run mode



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 ($\pm X$) and the display returns to run mode.

Pushbuttons	Through-beam	Energy consideration
with object 	with (transparent) object 	<p>Energy</p> <p>SP1</p> <p>TP</p> <p>SP2</p> <p>Time</p> <p>$+X\%$</p> <p>$-X\%$</p> <p>$SP1 = TP + X\%$</p> <p>$SP2 = TP - X\%$</p>

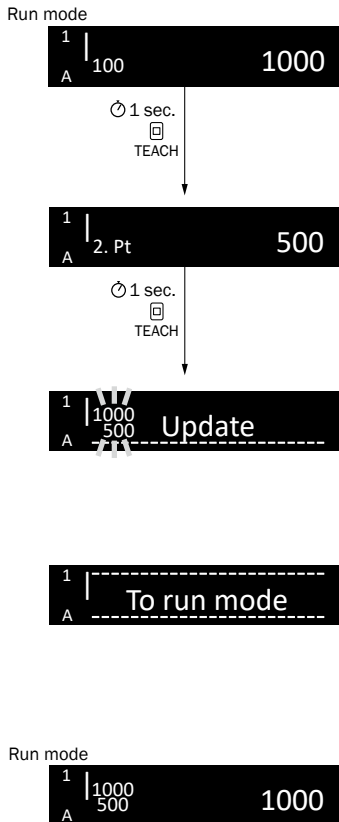
Run mode



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 70: 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.

	Pushbuttons	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 	

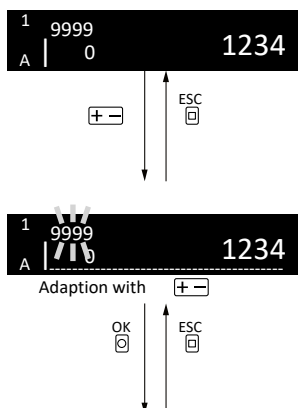
7.12.2 Manually adjusting the switching thresholds

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.

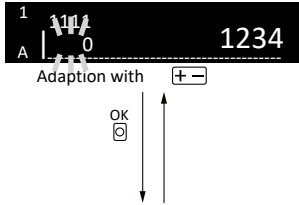
Table 71: Manually setting the current or voltage range



Manually setting the current or voltage range

Activate manual assignment of the received light values (digits) to the current or voltage values using (received light value for assignment to the upper threshold (UT) of the current or voltage range 20 mA / 10 V / 5 V flashes).

Adjust the upper threshold (UT) using (increase) and (decrease). Click to confirm. After confirmation, the received light value for assignment to the lower threshold (LT) of the current or voltage range 4 mA / 0 V / 1 V flashes. Adjust the lower threshold (LT) using (increase) and (decrease). Click to confirm.



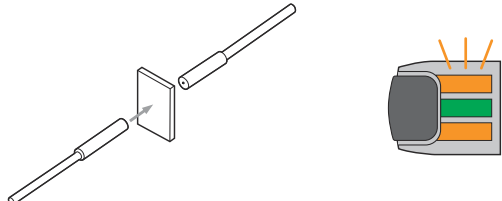
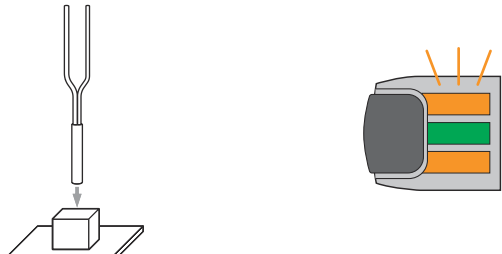
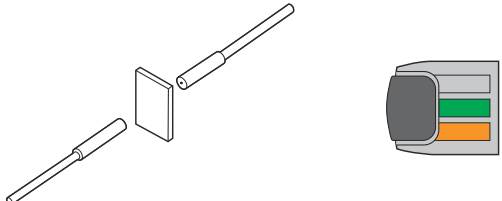
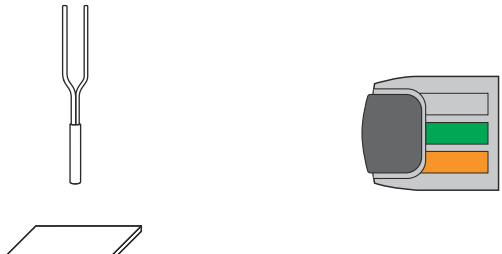
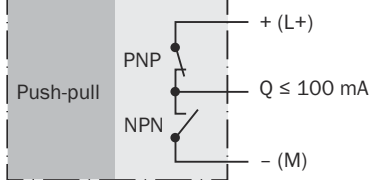
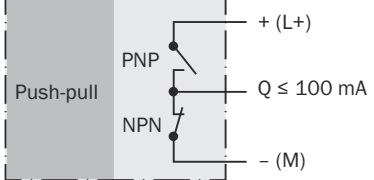
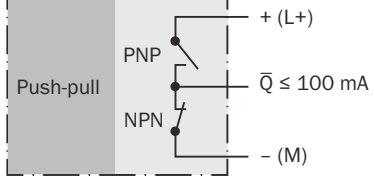
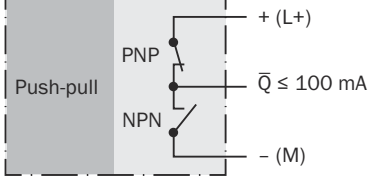
After confirmation (or 30 seconds without button operation), the display returns to run mode.



7.12.3 Set switching logic (binary switching channel Q1)

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 26.

Table 72: Output function

WLL80	<p>Object present¹⁾ Through-beam mode:</p>  <p>Proximity mode²⁾:</p> 	<p>Object not present¹⁾ Through-beam mode:</p>  <p>Proximity mode²⁾:</p> 
Output: not inverted		
Output: inverted		

1) Logic of the LED follows the switching signal at the output.

2) In proximity mode for proximity fibers: object white 90% remission factor, background black 6% remission factor

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.

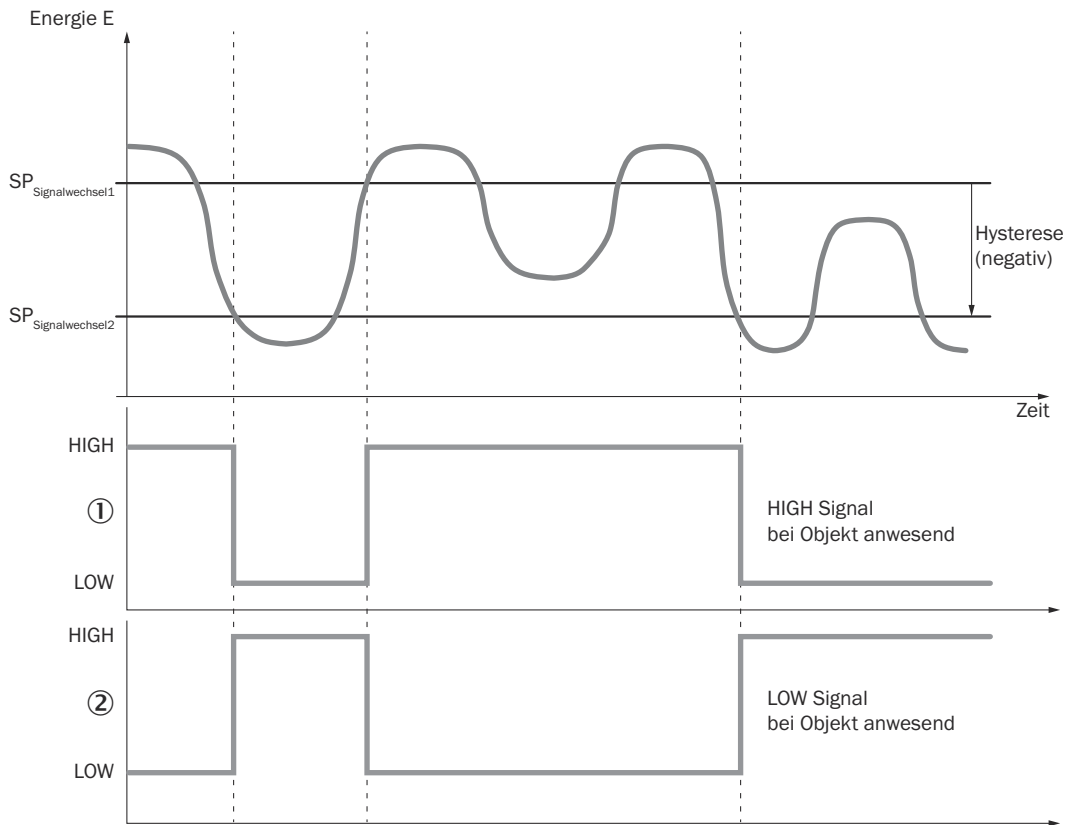


Figure 17: Proximity detection mode

- 1 Proximity
Output signal not inverted ("light switching")
- 2 Proximity
Output signal inverted ("dark switching")

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

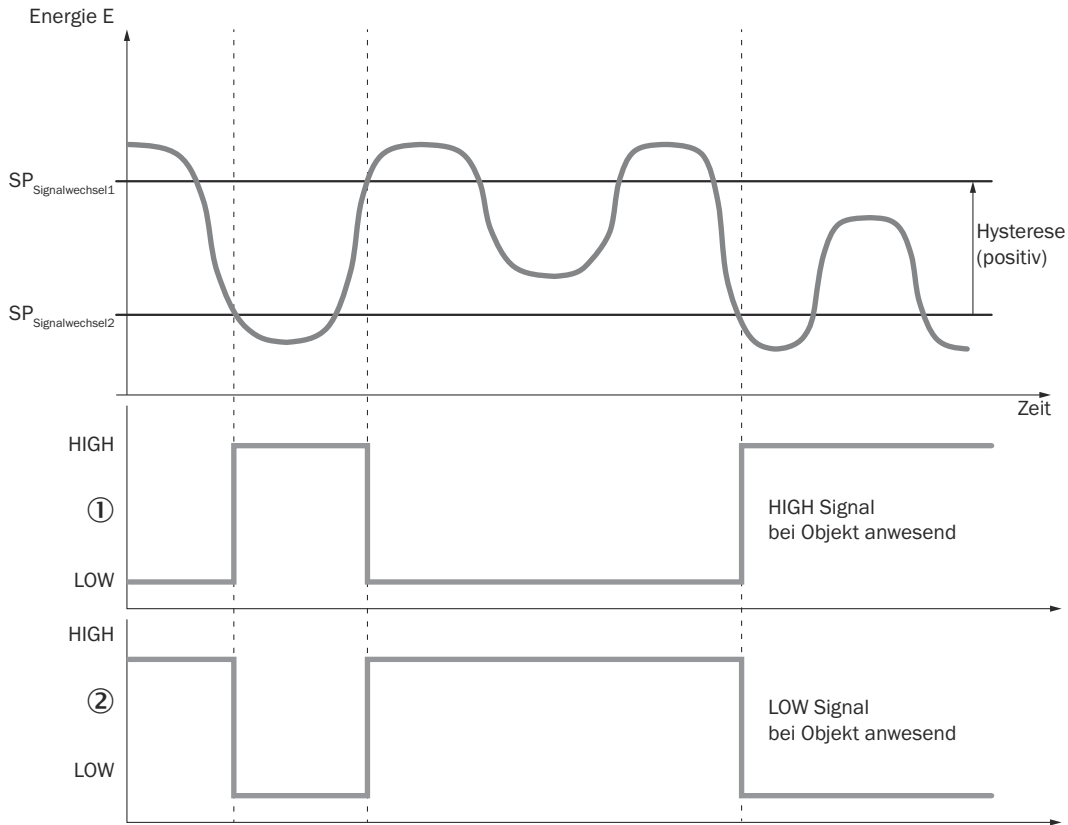


Figure 18: Through-beam detection mode

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



NOTE

If “Detection mode = Through-beam” is selected, an object moving into the beam triggers a switching signal change at $SP_{\text{SignalChange}2}$ and an object moving out of the beam triggers a switching signal change at $SP_{\text{SignalChange}1}$.

7.12.4 Analog channel QA

The following teach-in procedures are available for assigning the received light values to the current or voltage range:

- Analog 2-point teach-in
- Analog dynamic 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.

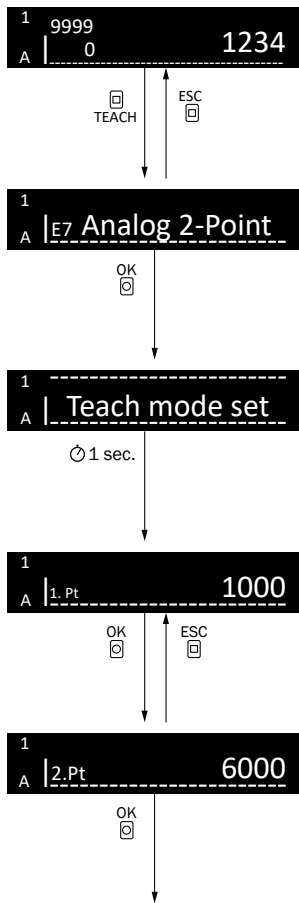


NOTE

Briefly pressing the TEACH pushbutton cancels the teach-in procedure (Escape).

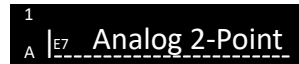
7.12.4.1 Teach-in menu for selecting the teach-in mode in the analog channel QA

Table 73: Teach-in mode



Teach-in mode

Select teach-in mode using $\left[\pm \right]$ and confirm using $\left[\text{OK} \right]$. After selecting the teach-in mode, the teach-in points need to be confirmed using $\left[\text{OK} \right]$. The teach-in is then performed and the display returns to run mode.



Analog 2-point teach-in

TP1 = Lower threshold of the current or voltage range (4 mA value or 0 V value or 1 V value)

TP2 = Upper threshold of the current or voltage range (20 mA value or 10 V value or 5 V value)

Setting a current or voltage range (4-20 mA / 0-10 V / 1-5 V) using two teach-in points (TP1, TP2). The analog 2-point teach-in assigns the higher received light value of the teach-in points TP1 and TP2 to the upper threshold (UT) of the current or voltage range (20 mA / 10 V / 5 V).

The lower received light value of the teach-in points TP1 and TP2 is assigned to the lower threshold (LT) of the current or voltage range (4 mA / 0 V / 1 V). Either the teach-in point with the lower received light value or the teach-in point with the higher received light value can be taught in first.

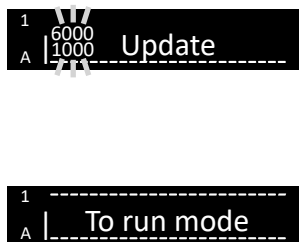
Analog dynamic teach-in

TPmin = Lower threshold value of the current or voltage range (4 mA value or 0 V value or 1 V value)

TPmax = Upper threshold of the current or voltage range (20 mA value or 10 V value or 5 V value) Setting a current or voltage range (4-20 mA / 0-10 V / 1-5 V) during the running process. Between the start and stop of teach-in, the maximum and minimum received light values are determined as the teach-in points (TPmax, TPmin) and set as the upper or lower threshold value of the current/voltage range.



Table 74: Teach-in mode



The threshold values are updated and the device switches to run mode.

Upper left value: Upper threshold (digits) of the current or voltage range (assignment of the displayed value to current or voltage value 20 mA / 10 V / 5 V)



Bottom left value: Lower threshold (digits) of the current or voltage range (assignment of the displayed value to the current or voltage value 4 mA / 0 V / 1 V) Right value: Current received light value (digits)

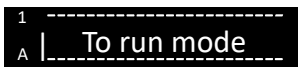
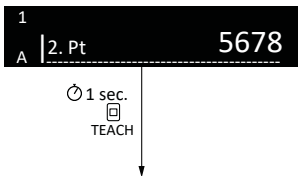
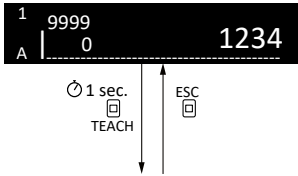
NOTE
The currently set teach-in mode is stored as a preselection (for the currently selected channel respectively) for a quick teach-in in run mode.

7.12.4.2 Analog two-point teach-in

The analog two-point teach-in assigns the higher received light value of the teach-in points TP1 and TP2 to the upper threshold (UT) of the current or voltage range (20 mA / 10 V / 5 V). The lower received light value of the teach-in points TP1 and TP2 is assigned to the lower threshold (LT) of the current or voltage range (4 mA / 0 V / 1 V). Either the teach-in point with the lower received light value or the teach-in point with the higher received light value can be taught in first.

Table 75: Analog two-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.

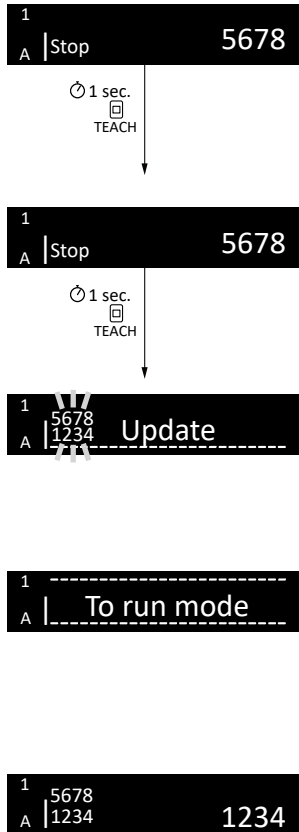
	Pushbuttons	Through-beam	Energy consideration
Step 1	<p>With object position 1 (higher received light)</p> <p>TP1 = Upper threshold (20 mA / 10 V / 5 V)</p>	<p>With (transparent) object with (high) transmission 1 or without object (higher received light value)</p>	
Step 2	<p>With object position 2 or without object (lower received light value)</p> <p>TP2 = Lower threshold (4 mA / 0 V / 1 V)</p>	<p>With (transparent) object with (low) transmission 2 (lower received light value)</p>	

- UT Upper threshold
- LT Lower threshold
- ① Current/voltage value [mA/V]
- ② Received light [digits]

7.12.4.3 Analog dynamic teach-in

The analog dynamic teach-in assigns to the lower threshold of the current or voltage range the minimum received light value TPmin, and to the upper threshold the maximum received light value TPmax detected during the running process between the start and stop of teach-in.

Table 76: Analog dynamic teach-in



Perform a fast analog 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 assignment of the received light values to the upper (UT) and lower threshold (LT) of the current or voltage range is done during the running process. The maximum and minimum received light values between the start and stop of teach-in are determined as the teach-in points (TPmax, TPmin). The upper threshold (20 mA / 10 V / 5 V) of the current or voltage range is assigned to TPmax and the lower threshold (4 mA / 0 V / 1 V) to TPmin. After the update, the display returns to run mode.

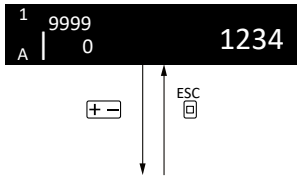
	Pushbuttons	Through-beam	Energy consideration
Step 1	Teach-in start 	Teach-in start 	 UT = TPmax received light LT = TP min [digits]
Step 2	Teach-in stop 	Teach-in stop 	 UT = TPmax received light LT = TP min [digits]

- 1 Current/voltage value [mA/V]
- 2 Received light [digits]

7.12.4.4 Manually adjusting the range of the analog output

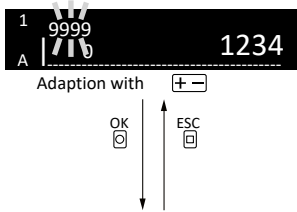
During teach-in, the current or voltage range is automatically set to the value defined by the relevant teach-in mode. If the current or voltage range does not correspond to the expected results, the thresholds can be adjusted manually independently of the teach-in.

Table 77: Manually setting the current or voltage range

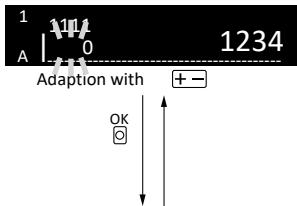


Manually setting the current or voltage range

Activate manual assignment of the received light values (digits) to the current or voltage values using **+ -** (received light value for assignment to the upper threshold (UT) of the current or voltage range 20 mA / 10 V / 5 V flashes).

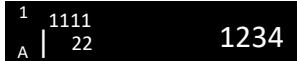


Adjust the upper threshold (UT) using **+ -** (increase) and **- +** (decrease). Confirm using **OK**. After confirmation, the received light value for assignment to the lower threshold (LT) of the current or voltage range 4 mA / 0 V / 1 V flashes. Adjust the lower threshold (LT) using **+ -** (increase) and **- +** (decrease). Confirm using **OK**.



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

Run mode



NOTE

The yellow LED (for indicating the status of the analog channel) lights up when the analog output is active (signal in the range of the configured lower and upper thresholds 4-20 mA / 0-10 V / 1-5 V).

8 Devices with special features

Table 78: Sensors with special features

Part number	Description
60835 98	<p>WLL80P-22THY1XZS01Z1Z1:</p> <p>“Load job” function possible via cable.</p> <p>Default setting of pin 2 configuration = Load job.</p> <p>Input signals: Job 1 to job 5 can be loaded based on the following input signals and durations (required setting: pin 2 config. = Load job):</p> <p>Job 1: 50 ... 100 ms</p> <p>Job 2: 150 ... 200 ms</p> <p>Job 3: 250 ... 300 ms</p> <p>Job 4: 350 ... 400 ms</p> <p>Job 5: 450 ... 500 ms</p>

9 Troubleshooting

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

Table 79: 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).	<p>Increase the received light value at the teach-in point during the teach-in process by doing the following:</p> <ul style="list-style-type: none"> • 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)	<p>The received light value at the teach-in point during the teach-in process is in the saturation range ($\geq 9,999$ digits). It is therefore not possible to set a corresponding switching threshold (in combination with the configured teach-in offset).</p> <p>When using a proximity fiber: Background is too close to the proximity fiber or background is too shiny or sender power is too high.</p> <p>When using through-beam fibers: Distance between sender and receiver fibers is too small or sender power is too high.</p>	<p>Decrease the received light value at the teach-in point during the teach-in process by doing the following:</p> <ul style="list-style-type: none"> • Set the sender power to "Auto" (automatic reduction of the sender power when the received light value is in the saturation range or when $> 5,000$ 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)	<p>The difference between two received light values at the teach-in points (TP1 and TP2) during the teach-in process is too small.</p> <p>When using a proximity fiber: Difference between the received light values of the background and the object too low</p> <p>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.</p>	<p>Increase the difference between the two received light values at the teach-in points during the teach-in process by doing the following:</p> <ul style="list-style-type: none"> • 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)	<p>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.</p>	<p>When using zone teach-in mode: Increase the teach-in offset amount ($\neq 0\%$)</p> <p>When using window teach-in mode:</p> <ul style="list-style-type: none"> • 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.
Green LED does not light up	Voltage interruptions outside the permissible range	Ensure there is a stable power supply without interruptions
Digital outputs not according to graphic	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	<p>When using a proximity fiber:</p> <ul style="list-style-type: none"> 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 <p>When using through-beam fibers:</p> <ul style="list-style-type: none"> 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 	<p>When using a proximity fiber:</p> <ul style="list-style-type: none"> 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 <p>When using through-beam fibers:</p> <ul style="list-style-type: none"> 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	<p>When using a proximity fiber:</p> <ul style="list-style-type: none"> 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 <p>When using through-beam fibers:</p> <ul style="list-style-type: none"> (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) 	<p>When using a proximity fiber:</p> <ul style="list-style-type: none"> Decrease the switching point Set the detection mode to “Proximity” and set the digital output to “Not inverted” <p>When using through-beam fibers:</p> <ul style="list-style-type: none"> 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

9.1 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.

10 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.

11 Disposal

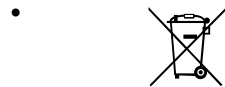
The product must be disposed of in line with applicable country-specific regulations. When disposing of them, you should try to recycle them (especially the precious metals).




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.

12 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.

13 Technical data

13.1 Technical specifications

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

The complete technical specifications 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	
Light sender	Standalone system
Type of light	LED
Light spot size / distance	Visible red light
	Depending on the fibers used

Electrical data

Supply voltage U_B	Standalone system 12 ... 24 V DC ¹⁾
Ripple	± 10%
Current consumption	≤ 52 mA
Protection class	III ²⁾
¹⁾ Limit values Reverse polarity protected U_B connections Residual ripple max. 5 V _{SS}	
²⁾ Reference voltage DC 50 V	
Digital output	
Output current I_{max}	≤ 50 mA (Q1)
Circuit protection	A, B, D ¹⁾
Response time	16/70/250/500/1,000/2,000/8,000 μs ²⁾
Switching frequency	31.2 kHz; 7.1 kHz; 2 kHz; 1 kHz; 500 Hz; 250 Hz; 62.5 Hz ³⁾
Analog output	
Output current I_{max} (current-based)	4...20 mA, invalid range 3.5 mA, 20.5 mA (load resistance: max. 300 Ohm)
Output voltage U_{max} (voltage-based 0...10 V):	0...10 V, invalid range 0 V, 10 V (load resistance: min. 10 kOhm)
Output voltage U_{max} (voltage-based 1...5 V):	1...5 V, invalid range 1 V, 5 V (load resistance: min. 10 kOhm)
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

13.2 Dimensional drawings

Standalone device

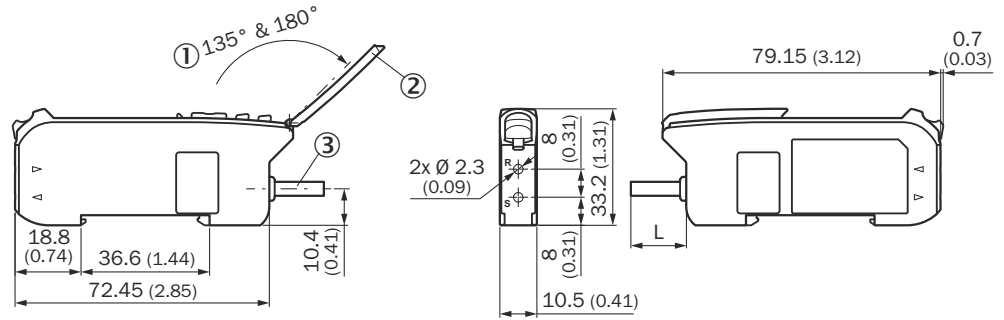


Figure 19: Standalone device with cable

- ① Aperture angle
- ② Hinged cover for the pushbuttons
- ③ Connection

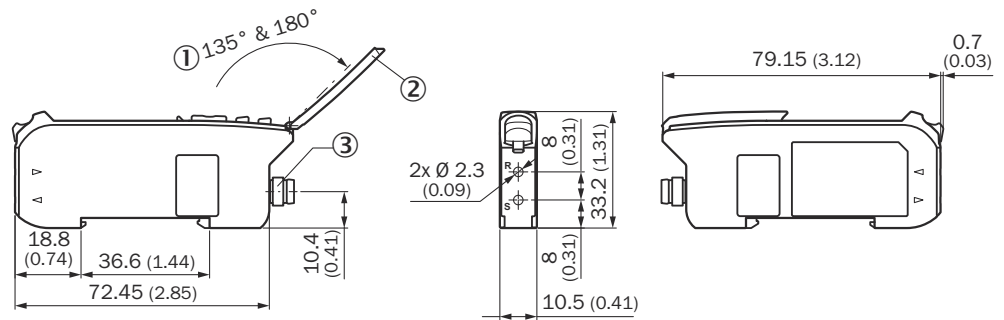


Figure 20: Standalone device with male connector, M8

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

14 Annex

14.1 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).

Australia

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

Austria

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

Belgium/Luxembourg

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

Brazil

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

Canada

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

Czech Republic

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

Chile

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

China

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

Denmark

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

Finland

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

France

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

Germany

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

Greece

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

Hong Kong

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

Hungary

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

India

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

Israel

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

Italy

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

Japan

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

Malaysia

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

Mexico

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

Netherlands

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

New Zealand

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

Norway

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

Poland

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

Romania

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

Singapore

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

Slovakia

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

Slovenia

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

South Africa

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

South Korea

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

Spain

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

Sweden

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

Switzerland

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

Taiwan

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

Thailand

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

Turkey

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

United Arab Emirates

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

United Kingdom

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

USA

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

Vietnam

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

Detailed addresses and further locations at www.sick.com

