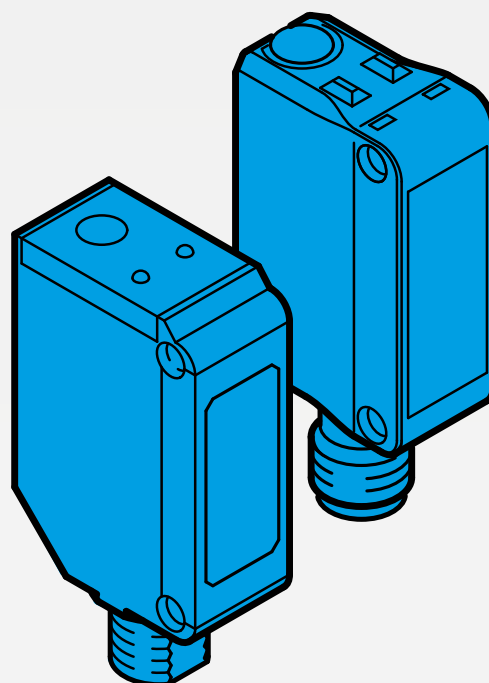


RETROREFLECTIVE DIFFUSE SENSORS OH3X-LR



600023-0000EN · Rev 1 · 2025/11

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1 PRELIMINARY NOTE

1.1 ABOUT THE PRODUCT



IMPORTANT! Technical data, the user manual, data sheet and IODD can be found via the QR code on the packaging or alternatively via the article number at www.di-soric.com.

1.2 SYMBOLS



Warning symbol about personal harm



Note on efficient and trouble-free operation



Important! Malfunctions or faults are possible if not observed

ABBREVIATIONS, TERMS

NC	Switching logic of normally closed contact
NO	Switching logic of normally open contact
PELV	Protective extra low voltage
SELV	Safety extra low voltage
UL	Underwriters Laboratories
SSP	Smart Sensor Profile
SSC	IO-Link switching signal channel
SP1	IO-Link setpoint 1
TP	Teach point
DD mode	Deviation detection mode

2 SAFETY INSTRUCTIONS



WARNING! The device is not a safety component pursuant to 2006/42/EC and EN 61496-1/-2. The device may not be used for personal protection! Non-compliance can lead to death or serious injuries! The device may only be used for the intended purpose!



LASER CLASS 1 PRODUCT: IEC 60825-1:2014 / EN 60825-1:2014+A11:2021

Corresponds to 21 CFR 1040.10, with the exception of conformity with IEC 60825-1 Ed. 3., as in Laser Notice No. 56 dated May 8, 2019



LASER CLASS 1:

Safety instructions:

Non-intended use can result in exposure to harmful laser radiation. Observe the accident prevention regulations and laser class. These devices are not permitted for safety applications, particularly those for which the safety of people depends on proper function of the device. The devices must be used by specialists.

3 INTENDED USE

The product (also known as a sensor) is a sensor for optical, non-contact detection of objects.

4 PRODUCT DESCRIPTION

4.1 PROPERTIES

The OH3*-LR* sensors are retroreflective diffuse sensors with background suppression and have an infrared laser light source. The sensor operates according to the principle of triangulation. The determined distance is compared to the setpoint and evaluated as a switching signal.

IO-Link communication allows distance values and corresponding switching signals to be transmitted as IO-Link process values.

Deviation detection mode (DD mode)

When configuring the DD mode, intensity and distance are simultaneously evaluated in relation to a teach value. With IO-Link communication, the degree of correspondence with a teach value is transferred as a percentage and a corresponding switching signal.



NOTE: The sensor operates according to the principle of triangulation. Installation instructions for this are located in *Chapter 5.2 Mounting, page 6*.



NOTE: Instructions for commissioning the sensor are located in *Chapter 8 Commissioning the sensor, page 11*.



NOTE: Instructions for commissioning with IO-Link are located in *Chapter 9 IO-LINK, page 18*.

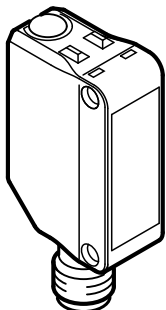


NOTE: For instructions on deviation detection mode, see *Chapter 8.2.3 Teaching in intensity and distance with deviation detection mode (DD mode), page 13*

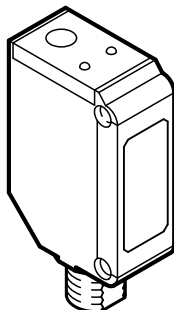
4.2 VARIANTS

The products are available in the O-33 and O-34 series.

The O-33 and O-34 series differ in terms of their mechanical design and housing material. Products from the O-33 series have a housing made of plastic with IP67 degree of protection. Products from the O-34 series have a housing made of stainless steel with IP69K degree of protection.



O-33 series



O-34 series

The individual product variants differ as follows:

Product	Number	Housing material	Light source	Max. scan width [mm]	Connection
OH33-LRMS-TI-G3-T4	214896	Plastic	Laser, red	100	M8, 4-pin
OH33-LRMS-TI-G3-2C	214895	Plastic	Laser, red	100	Cable, 2.0m
OH33-LRMN-TI-G3-T4	214894	Plastic	Laser, red	300	M8, 4-pin
OH33-LRMN-TI-G3-2C	214893	Plastic	Laser, red	300	Cable, 2.0m
OH33-LRML-TI-G3-T4	214892	Plastic	Laser, red	600	M8, 4-pin
OH33-LRML-TI-G3-2C	214891	Plastic	Laser, red	600	Cable, 2.0m
OH34-LRMS-TI-G3-T4	214906	Stainless steel	Laser, red	100	M8, 4-pin
OH34-LRMN-TI-G3-T4	214905	Stainless steel	Laser, red	300	M8, 4-pin
OH34-LRML-TI-G3-T4	214904	Stainless steel	Laser, red	600	M8, 4-pin

Products with a smaller scan width have better background suppression and a higher switching frequency.

Products with a larger scan width have a better functional reserve in the close range for dark and tilted objects.

5 INSTALLATION

5.1 INSTALLATION CONDITIONS



IMPORTANT! The permitted ambient conditions for operation of the device must be maintained. The device must be protected from mechanical loads (e.g. shocks and impacts). The device may be mounted in any position, as long as it is not shaken or subjected to vibration in the process.

5.2 MOUNTING

The O-33 and O-34 series have different mounting holes. The O-33 series has a through-hole for the M3 fastening screws. The O-34 series has an M3 internal thread.

Fasten the device at the mounting holes. Observe the maximum torque for the fastening screws (M3 max. 0.5 Nm). The housing must not be bent out of shape; mechanical tension must be avoided.



NOTE:
Use a suitable mounting bracket (accessory) to mount the sensor.

5.3 ALIGNING THE SENSOR WITH THE OBJECT

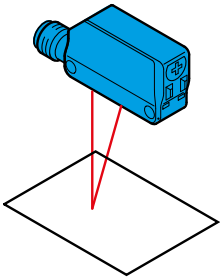
Preparation

The sensor is to be mounted in such a way that no foreign objects are located in the area of the front panel and in the field of view of the sensor. It must be ensured that the front panel is free of dirt. To clean the front panel, use a soft, dust-free cloth.

Aligning the sensor with the object

The object to be detected must be located within the permitted range. Align the sensor so that the light beam strikes the center of the object.

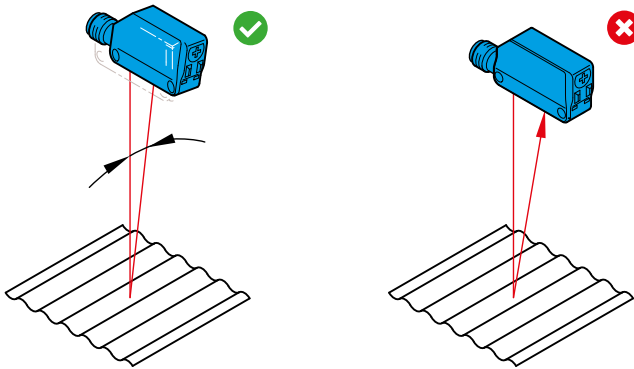
Align the measuring axis at a right angle to the surface of the object. Avoid direct reflections into the receiver.



The sensor operates according to the principle of triangulation; please observe the following installation instructions.

Objects with shiny, light-reflecting surfaces

In the case of shiny surfaces, make sure that the receiver is not struck by any direct reflection. Tilting the sensor can prevent disruptive reflections.

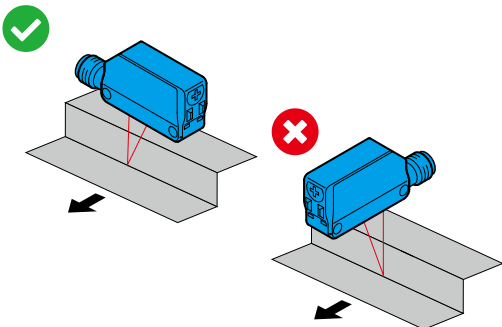


NOTE:

A white sheet of paper on the front panel can be used to make the position of a reflection visible.

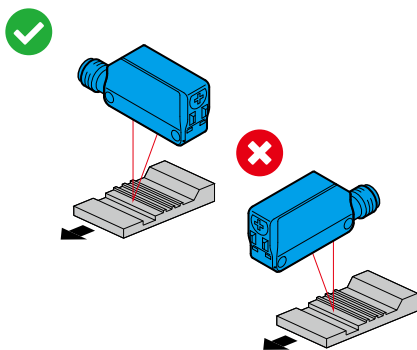
Objects with steps

In the case of objects with steps, prevent shadows from falling on the receiver. To do this, orient the sensor perpendicular to the step.

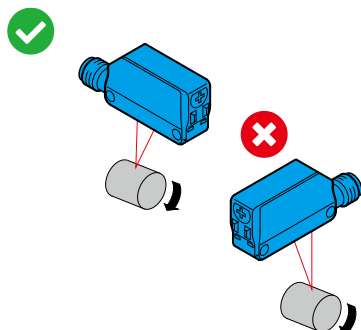


Contour measurement of objects

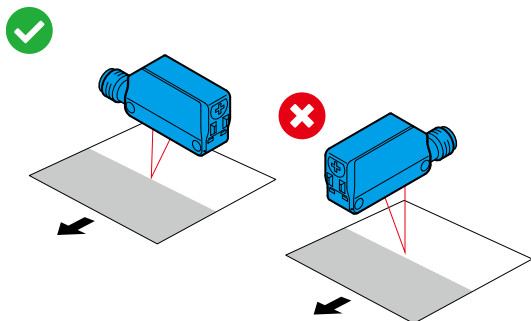
When measuring moving objects, make sure that the sensor is oriented perpendicular to the object. This prevents shadows from falling on the receiver.

**Round objects**

In the case of round, shiny surfaces, make sure that the sensor is oriented parallel to the object axis.

**Objects with color transitions**

In the case of objects with colored edges, make sure that the sensor is oriented perpendicular to the color transition.



6 ELECTRICAL CONNECTION

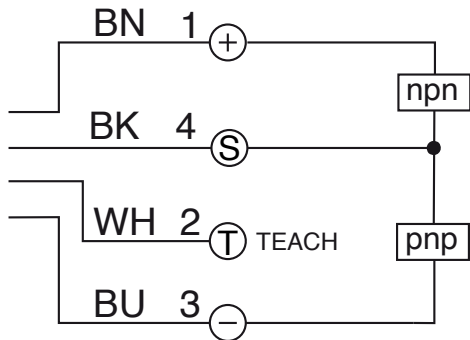
6.1 GENERAL NOTES



IMPORTANT! The device may only be installed by a qualified electrician. National and international regulation for setting up electrotechnical systems are to be adhered to.

6.2 PIN ASSIGNMENT

Depending on the product variant, the device has an M8 connector or a cable connection.



NOTE:

For operation with IO-Link in the factory setting, it is recommended that you connect pin 2 to ground (GND).



NOTE: With IO-Link, the function of pin 2 can be configured to differ from the factory setting. IO-Link configuration enables a second switching output at pin 2.

6.3 SWITCHING LOGIC OF SWITCHING OUTPUT

In the factory setting, the device has a push-pull switching output at pin 4 with NO switching logic. In the factory setting, the resulting switching behavior is "light switching" when operated on a PNP input card.



NOTE:

In the factory setting, the resulting switching behavior is "dark switching" when operated on an NPN input card.



NOTE:

If the switching logic is set to NC, then an inverted switching behavior results.

6.4 CONNECTING THE SUPPLY VOLTAGE



IMPORTANT!

Ensure a voltage supply in accordance with SELV, PELV.

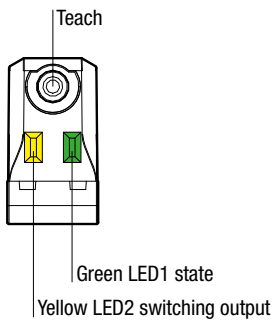


IMPORTANT! Only operate UL applications with supply class 2 power supplies. Maintain a minimum distance of 12.5 mm between the sensor and all uninsulated live parts. Use an overcurrent protection device with a maximum nominal current of 2 A.

Operate UL applications exclusively with power supplies classified as Class 2. Allow a minimum distance of 12.5 mm between the proximity sensor and any uninsulated live parts. Use an overcurrent protection rated 2 A maximum.

- De-energize the device
- Connect supply voltage to device in accordance with the technical data

7 OPERATING AND DISPLAY ELEMENTS



LED1	green on	Sensor ready
LED2	yellow on	Switching output 1 active

Brief description of operation via button

Press 2-4s	Teach in object distance
Press 4-6s	Teach in switching window distance
Press 6-8s	Teach in intensity and distance deviation detection mode (DD mode)
Press >8s	Changing the switching logic



NOTE:
For more details on how to button operation, see *Chapter 8.2 Parameterization on the sensor with operating elements, page 11*.

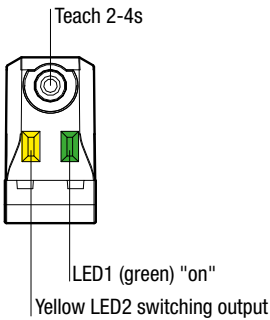
8 COMMISSIONING THE SENSOR

8.1 GENERAL NOTES

Switching on the supply voltage puts the device into operation. After the time delay before availability has elapsed, the device is operational. In the delivery state, the parameters are set to the factory setting. The device can also be adjusted via appropriate IO-Link configuration software.

8.2 PARAMETERIZATION ON THE SENSOR WITH OPERATING ELEMENTS

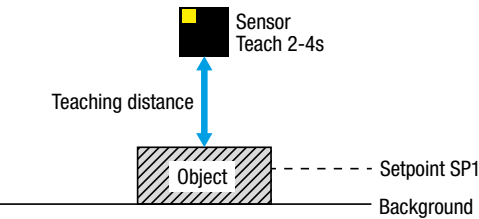
8.2.1 TEACH IN DISTANCE TO OBJECT WITH TEACH



The sensor requires an object for teaching in the setpoint (SP1). The setpoint is taught in as a distance and has a safety reserve relative to the teach distance. The setpoint is greater than the teach distance relative to the object.

The sensor operates according to the functional principle of background suppression. If the distance is less than the taught-in setpoint, the switching output is active.

For teaching in, position the object statically at the precise distance to the sensor and start the teaching process.



NOTE: The difference (safety reserve) between the setpoint SP1 and the teaching distance depends on the sensor mode and the teaching distance. In the factory setting Precision, the safety reserve is minimized in order to detect small differences in distance.

Perform teaching	LED display
Position object at teaching distance	
Actuate button for 2 to 4 seconds	Yellow LED2 on (sequence 1)

Display teach result	LED display
Teaching process successful	LED2 (yellow) flashes (2x)

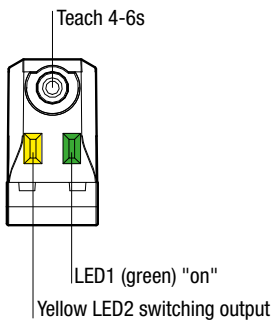
Switching behavior (factory setting)	LED indicator / switching output
Object detected	LED2 yellow on / switching output active
No object detected	LED2 yellow off / switching output not active

NOTE: In case of an unsuccessful teaching process, teach the sensor again.

**NOTE:** If yellow LED stays lit without the object, check the application or optimize the sensor configuration with IO-Link (see *Chapter 9 IO-LINK*, page 18).

**NOTE:** In case of a successful teaching process, the IO-Link switching function of the sensor is: Single point (individual value).

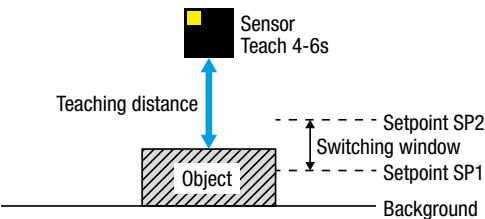
8.2.2 TEACH IN SMALL DISTANCE TO OBJECT WITH TEACH



The sensor requires an object to teach in a switching window that is limited by the setpoint SP1 and the setpoint SP2. The sensor operates according to the functional principle of background and foreground suppression. Objects with a distance within the switching window are detected; the switching output is active.

**NOTE:** This teaching method makes it possible to check objects within a defined distance range. After teaching, a small switching window around the teaching distance is created.

For teaching in, position the object statically at the precise distance to the sensor and start the teaching process.



**NOTE:** The difference (safety reserve) between the setpoint SP1 and the teaching distance depends on the sensor mode and the teaching distance. In the factory setting Precision, the window width is minimized in order to detect small differences in distance.

Perform teaching	LED display
Position object at teaching distance	
Actuate button for 4 to 6 seconds	LED2 (yellow) off (sequence 2)

Display teach result	LED display
Teaching process successful	LED2 (yellow) flashes (2x)

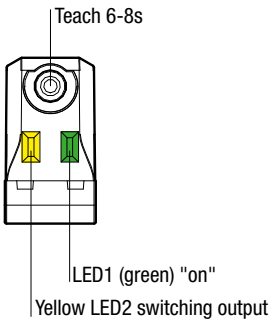
Switching behavior (factory setting)	LED indicator / switching output
Object in switching window detected	LED2 yellow on / switching output active
No object in switching window detected	LED2 yellow off / switching output not active

**NOTE:** In case of an unsuccessful teaching process, teach the sensor again.

NOTE: If yellow LED2 stays lit without the object, check the application or optimize the sensor configuration with IO-Link (see *Chapter 9 IO-LINK*, page 18).

NOTE: In case of a successful teaching process, the IO-Link switching function of the sensor is: Window.

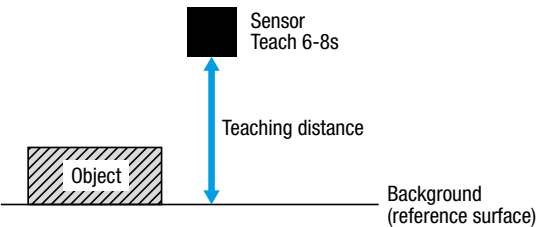
8.2.3 TEACHING IN INTENSITY AND DISTANCE WITH DEVIATION DETECTION MODE (DD MODE)



The sensor requires a background with constant properties as a reference for teaching in. In the DD mode, the intensity and distance are assessed in the sensor simultaneously in relation to the taught-in reference surface. Immediately after teaching in the reference surface, the sensor is in 100% correspondence. The sensor switches if an increased percentage of deviation in the distance or intensity occurs.

IMPORTANT! A reference surface with constant distance and constant surface properties is required for deviation detection mode to work.

For teaching in, position the reference surface statically in the detection range of the sensor and start the teaching process:. The sensor switches if the taught-in reference surface is not detected.



Perform teaching	LED display
Position reference surface	
Actuate button for 6 to 8 seconds	Yellow LED2 on (sequence 3)
Display teach result	LED display
Teaching process successful	LED2 (yellow) flashes (2x)
Switching behavior (factory setting)	LED indicator / switching output
No reference surface detected	LED2 yellow on / switching output active
Reference surface detected	LED2 yellow off / switching output not active

NOTE: Objects are detected if they exhibit a degree of correspondence less than 75% with the reference surface. The detection threshold can be adjusted with IO-Link.



NOTE: If yellow LED2 stays lit without the object, check the application or optimize the sensor configuration with IO-Link (see *Chapter 9 IO-LINK*, page 18).



NOTE: The sensor is in DD mode when the teaching process is successful. *Chapter 9.8.3 DD mode (deviation detection mode)*, page 30 Describes the IO-Link parameter of the DD mode.

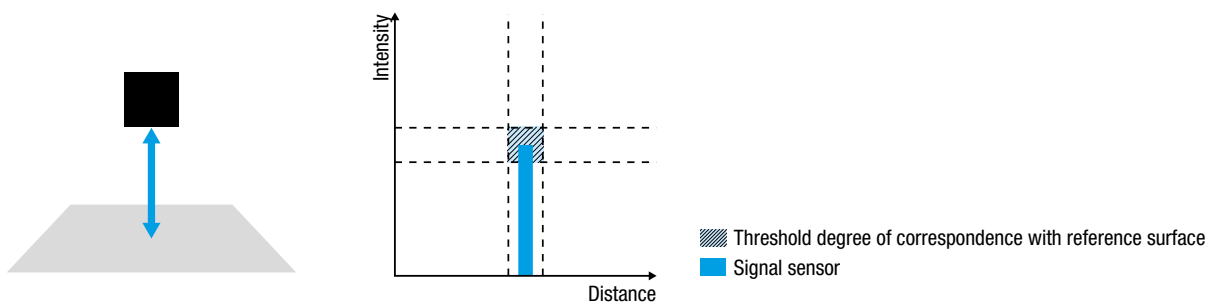
Detection function in DD mode

Detection function in DD mode is based on the assumption: "If no reference surface is detected by the sensor, this indicates the presence of an object." In this case, the switching output is active.

The following exemplary cases can be differentiated.

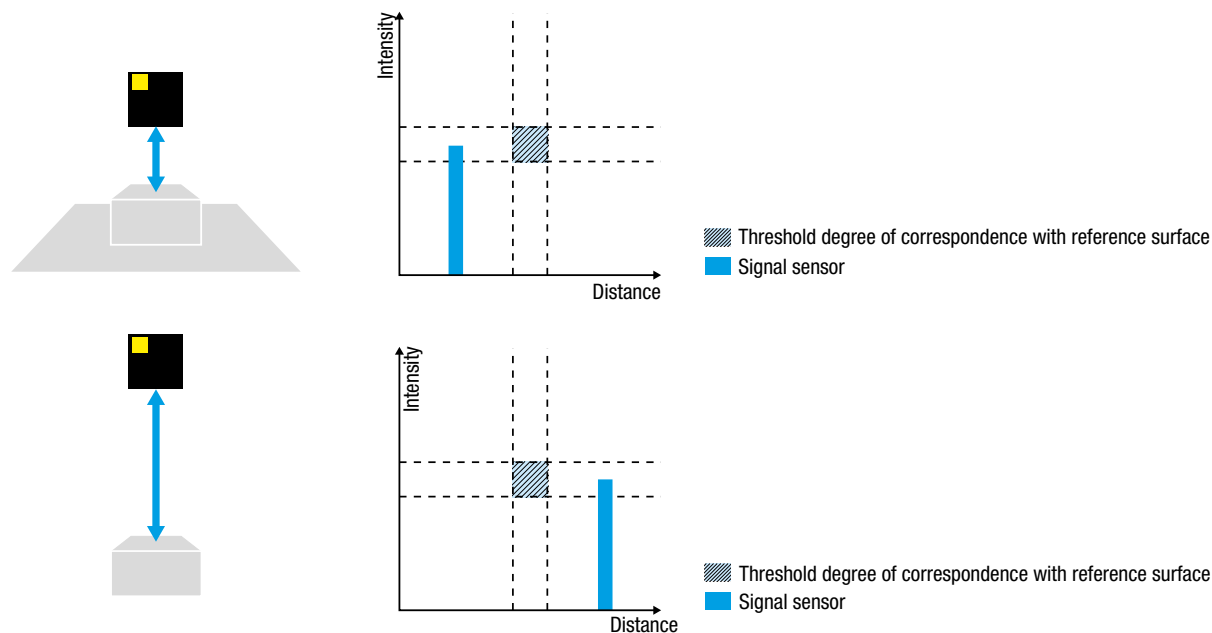
Case A

An object is not detected if an object matches the reference surface in terms of intensity and distance. The switching output is not active if the reference surface is detected.



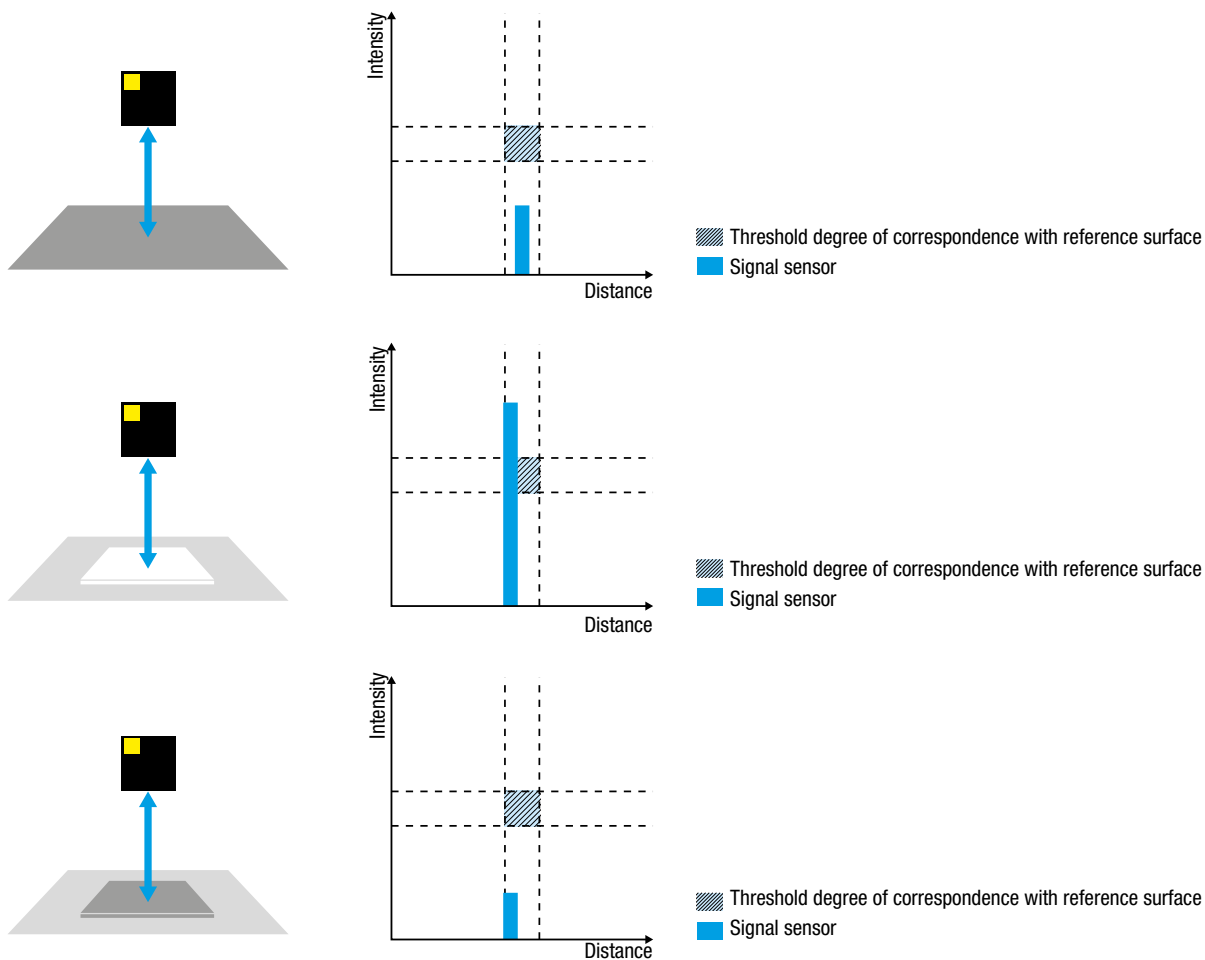
Case B

An object is detected if an object differs in terms of the distance from the reference surface.

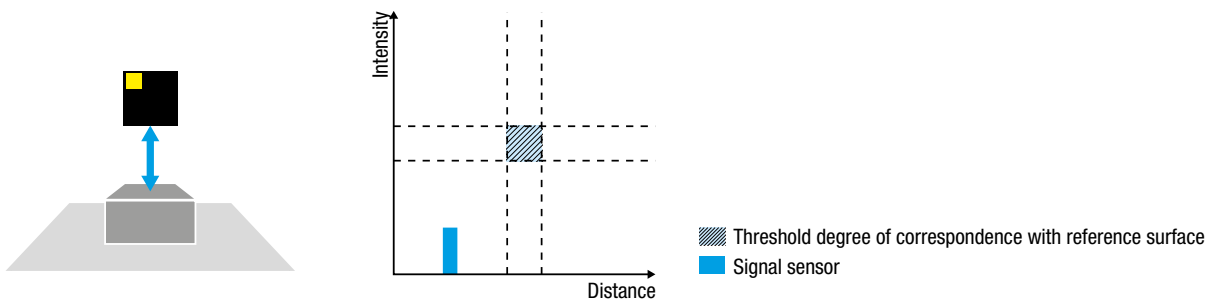


Case C

An object is detected if an object or a surface differs in terms of intensity from the reference surface.

**Case D**

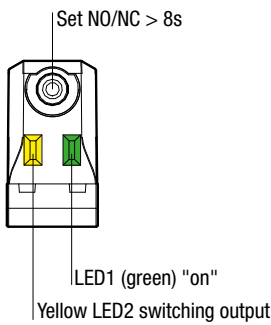
An object is detected if an object differs in terms of intensity and distance from the reference surface.

**NOTE:**

In DD mode, no additional detection functions can be configured at pin 2 with IO-Link.

8.2.4 ADJUSTING SWITCHING LOGIC

In the factory setting, the switching output is in push-pull mode with the NO switching logic. After a an object is taught in, the switching output is active if an object is detected. The operating button can be used to change the switching logic from NO to NC or from NC to NO.



Adjusting the switching logic	LED indicator / switching output
Actuate button for at least 8s	LED2 (yellow) off (sequence 4)
Sensor is changed from NO to NC or from NC to NO	Yellow LED2 with adjustment of the switching logic

8.3 PARAMETERIZATION WITH MULTIFUNCTION INPUT AT PIN 2

The sensor has a remote teaching function. Pin 2 is configured in the factory setting as an input (High Active).

**NOTE:** Alternatively, pin 2 may have a different function depending on the IO-Link configuration of the sensor. (see 9.9 Parameters for multifunction input and output at pin 2)

8.3.1 TEACHING IN DISTANCE TO OBJECT WITH TEACH

For teaching in, position the object statically at the precise distance to the sensor. Start teaching process. For instructions on the function, see *Chapter 8.2.1 Teach in distance to object with Teach, page 11.*



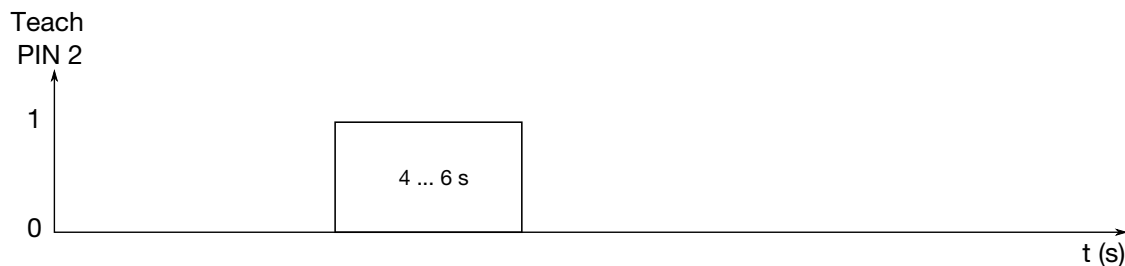
Perform teaching	LED display
Position object at teaching distance	
Activate pin 2 for 2 to 4 seconds (24V).	Yellow LED2 on (sequence 1)

Display teach result	LED display
Teaching process successful	LED2 (yellow) flashes (2x)

Switching behavior (factory setting)	LED indicator / switching output
Object detected	LED2 yellow on / switching output active
No object detected	LED2 yellow off / switching output not active

8.3.2 TEACH IN SMALL DISTANCE TO OBJECT WITH TEACH

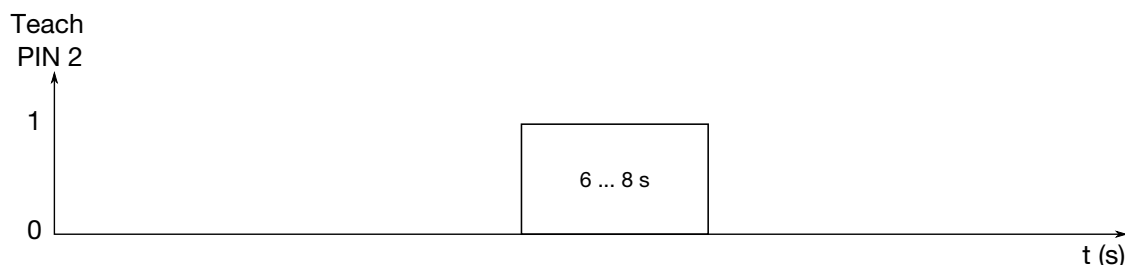
For teaching in, position the object statically at the precise distance to the sensor. Start teaching process. For instructions on the function, see *Chapter 8.2.2 Teach in small distance to object with Teach*, page 12.



Perform teaching	LED display
Position object at teaching distance	
Activate pin 2 for 4 to 6 seconds (24V).	LED2 (yellow) off (sequence 2)
Display teach result	LED display
Teaching process successful	LED2 (yellow) flashes (2x)
Switching behavior (factory setting)	LED indicator / switching output
Object in switching window detected	LED2 yellow on / switching output active
No object in switching window detected	LED2 yellow off / switching output not active

8.3.3 TEACHING IN INTENSITY AND DISTANCE WITH DEVIATION DETECTION MODE (DD MODE)

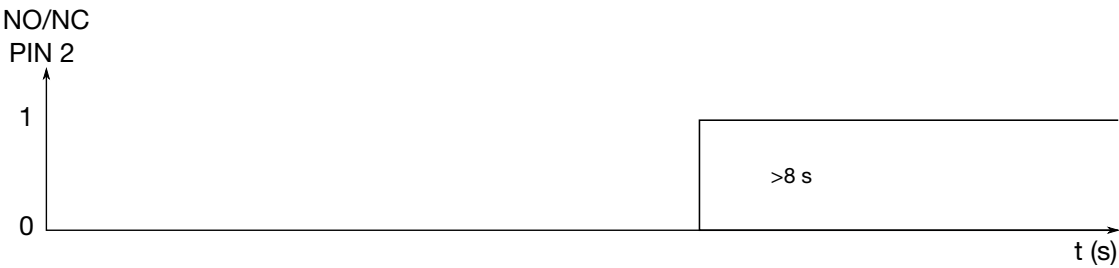
For teaching in, position the background (reference surface) with constant properties statically to the sensor. Start teaching process. For instructions on the function, see *Chapter 8.2.3 Teaching in intensity and distance with deviation detection mode (DD mode)*, page 13.



Perform teaching	LED display
Position object at teaching distance	
Activate pin 2 for 6 to 8 seconds (24V).	LED2 (yellow) off (sequence 3)
Display teach result	LED display
Teaching process successful	LED2 (yellow) flashes (2x)
Switching behavior (factory setting)	LED indicator / switching output
Object in switching window detected	LED2 yellow on / switching output active
No object in switching window detected	LED2 yellow off / switching output not active

8.3.4 ADJUSTING SWITCHING LOGIC

In the factory setting, the switching output is in push-pull mode with the NO switching logic. After a distance is taught in, the switching output is active if an object is detected. Pin 2 can be used to change the switching logic from NO to NC or from NC to NO.



Adjusting the switching logic	LED indicator / switching output
Activate pin 2 for at least 8 seconds (24V).	Yellow LED2 on (sequence 4)
Sensor is changed from NO to NC or from NC to NO	Yellow LED2 with adjustment of the switching logic

i **NOTE:** Alternatively, pin 2 may have a different function depending on the IO-Link configuration of the sensor. (see Chapter 9.9 Parameters for multifunction input and output at PIN 2, page 32)

9 IO-LINK

9.1 INTERFACE

IO-Link is a communication system for connecting intelligent sensors and actuators to automation systems. IO-Link is standardized in the IEC 61131-9 standard.

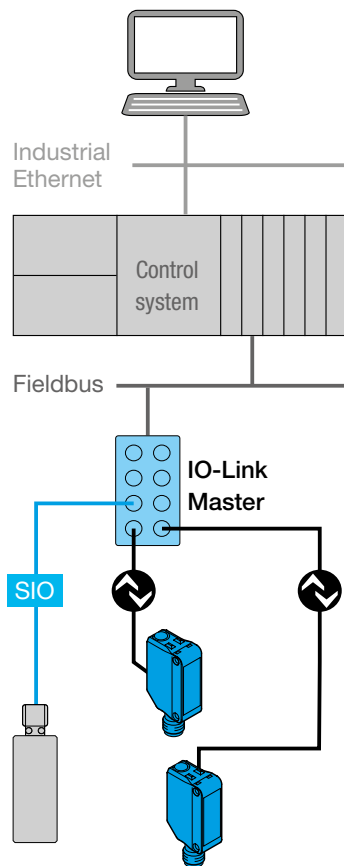
The devices have the following IO-Link specification: IO-Link version V1.1.4, COM2 (38.4 kbaud), Smart Sensor Profile 2nd edition V1.2 SSP 4.1.1

The device can also be parameterized with appropriate IO-Link parameterization software and an IO-Link Master. Offline parameterization can be performed with the following di-soric products:

- with a computer and IOL Master with software version V 5.1 and higher
- without a computer, with IOL Portable

The IO-Link Master establishes the connection between IO-Link devices and the automation system. An IO-Link Master may

have multiple IO-Link ports. One IO-Link device can be connected to each port (point-to-point communication).



Possible system architecture

9.2 IODD

In addition to an IO-Link Master with software, you also need the IODD (IO Device Description) for the device. The IODD can be found via the QR code on the packaging or via the article number at www.di-soric.com under "Downloads". You can also find the IODD in the IODDfinder portal of the IO-Link Consortium: ioddfinder.io-link.com

The IODD consists of an XML file and images. The download file is a ZIP file. The IODD describes IO-Link devices. It contains information regarding identification, device parameters, process and diagnostics data, communication properties and the structure of the user interface in the engineering tool.



NOTE: In the IODD download at www.di-soric.com, there are HTML files that graphically represent the contents of the XML main file. The following descriptions were taken from the English HTML file with the "Specialist" user role.

9.3 IDENTIFICATION

IO-Link enables the identification of IO-Link devices with an IO-Link Master connected. The following identification data is located in the Identification menu:

Identification Menu	
Identification	
V_VendorName	
V_VendorText	
V_ProductName	
V_ProductText	
V_ProductID	
V_SerialNumber	
V_HardwareRevision	
V_FirmwareRevision	
V_ApplicationSpecificTag	
V_CP_FunctionTag	
V_CP_LocationTag	
V_SystemCommand, Button:=126	
V_SystemCommand, Button:=127	



NOTE: The Locator function offers the option to quickly find the device in the system with a command. With the values 126 for Locator start and 127 for Locator stop, the device can be easily visually identified.

9.4 PROCESS DATA

The process data is transferred to the Master in a cyclical data telegram. The input data PDIn has a data length of 4 bytes.

ProcessData id=P_ProcessData

ProcessDataIn "PD Input" id=PI_SSP_PDI32_MSDC32

bit length: 32

data type: 32-bit Record (subindex access not supported)

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	16	16-bit Integer	-32760 = Out of range (-), 32760 = Out of range (+), 32764 = No measurement data, 0..6000					MDC	Shows the current measurement value of the sensing element.
2	8	8-bit Integer						MDC - Scale	Shows the multiplier for the measurement value of the sensor - $10^{\text{exp}(\text{scale})}$.
3	0	Boolean	false = Low, true = High					SSC.1	Indicates the detection status of a switching signal channel depending on process data and SSC.1 Param and SSC.1 Config.
4	1	Boolean	false = Low, true = High					SSC.2	Indicates the detection status of a switching signal channel depending on process data and SSC.2 Param and SSC.2 Config.

Octet 0

bit offset	31	30	29	28	27	26	25	24
subindex	1							
element bit	15	14	13	12	11	10	9	8

Octet 1

bit offset	23	22	21	20	19	18	17	16
subindex	1							
element bit	7	6	5	4	3	2	1	0

Octet 2

bit offset	15	14	13	12	11	10	9	8
subindex	2							
element bit	7	6	5	4	3	2	1	0

Octet 3

bit offset	7	6	5	4	3	2	1	0
subindex	//////	//////	//////	//////	//////	//////	4	3

The measured value (subindex 1) shows the distance between the sensor and object in mm. The output resolution of the measured value of the IO-Link interface is 0.1 mm.



NOTE:

The value range depends on the device variant.

The state of SSC.1 (subindex 3) is used to detect objects.

The state of SSC.2 (subindex 4) can be configured with an additional detection function



NOTE: If the sensor is operated in DD mode, SSC.1 is active if no reference surface is detected. In DD mode, no additional detection functions can be configured with IO-Link.

9.5 BASIC FUNCTIONS

Basic functions are established through the IO-Link standard. The description of elementary commands is below.

Reset the device to factory settings (application reset) using value 129

Reset the device to factory settings and disconnect IO-Link connection (back to box) using value 131

Variable locking of local operating elements via IO-Link with index 12, subindex 4,

Value: 0=Not locked, 1=Locked

Standard Variable "Device Access Locks" index=12 id=V_DeviceAccessLocks

description: The access to the device parameters can be restricted by setting appropriate flags within this parameter.

data type: 16-bit Record (subindex access not supported)

access rights: rw

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	0	Boolean	false = Unlocked, true = Locked					Parameter Write Access	This lock prevents the write access to all read/write parameters of the device except for the parameter 'Device Access Locks'.
2	1	Boolean	false = Unlocked, true = Locked					Data Storage	This lock prevents the write access to the device parameters via the data storage mechanism.
3	2	Boolean	false = Unlocked, true = Locked	false				Local Parameterization	This lock prevents the device settings from being changed via local operating elements on the device.
4	3	Boolean	false = Unlocked, true = Locked	false				Local User Interface	This lock prevents the access to the device settings and display via a local user interface. The user interface is disabled.

Octet 0

bit offset	15	14	13	12	11	10	9	8
subindex	/////	/////	/////	/////	/////	/////	/////	/////

Octet 1

bit offset	7	6	5	4	3	2	1	0
subindex	/////	/////	/////	/////	4	3	2	1



NOTE:

Further basic functions can be seen in the IODD of the device.

9.6 PARAMETERS FOR THE SWITCHING OUTPUT (PIN 4)

In the factory setting, the switching output is set to pin 4 with SSC.1.

9.6.1 SETPOINT FOR SSC.1

Variable "SSC.1 Param" index=60 id=V_SSP_SSC01_Param

description: Defines the setpoint values for switching signal channel 1 of sensor 1.

data type: 64-bit Record

access rights: rw

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	32	32-bit Integer	10..6000	6000				SP1	Defines the setpoint 1 value for the switching signal channel.
2	0	32-bit Integer	10..6000	200				SP2	Defines the setpoint 2 value for the switching signal channel.

octet	0	1	2	3	4	5	6	7
bit offset	63 - 56	55 - 48	47 - 40	39 - 32	31 - 24	23 - 16	15 - 8	7 - 0
subindex	1	1	1	1	2	2	2	2
element bit	31 - 24	23 - 16	15 - 8	7 - 0	31 - 24	23 - 16	15 - 8	7 - 0

Setpoint SP1 for switching output SSC.1 is defined with index 60, subindex 1, with mm as the unit.
The value range depends on the device variant.

Setpoint SP2 for switching output SSC.1 is defined with index 60, subindex 2, with mm as the unit.
The value range depends on the device variant.

**NOTE:**

Index 62 determines mm as the unit for setpoints SP1 and SP2 for SSC.2.



IMPORTANT! If the switching function of index 61, subindex 2 is Window, Two Point or Foreground Suppression, the value of setpoint SP1 must always be greater than the value of setpoint SP2.



NOTE: If the sensor is operated in DD mode, different parameters have an effect on the detection function of pin 4. In DD mode, no additional detection functions can be configured with pin 2.

9.6.2 SWITCHING LOGIC, SWITCHING FUNCTION; HYSTERESIS OF SSC.1**Variable "SSC.1 Config" index=61 id=V_SSP_SSC01_Config**

description: Defines the configuration parameter for switching signal channel 1.

data type: 48-bit Record

access rights: rw

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	40	8-bit UInteger	0 = High active, 1 = Low active	0				Logic	Defines the logical representation of the switching signal SSC in the process data.
2	32	8-bit UInteger	0 = Deactivated, 1 = Single point, 2 = Window, 3 = Two point, 128 = Foreground Suppression	1				Mode	Defines the evaluation mode for the switching signal SSC.
3	0	32-bit Integer	0 = 0, 5..2000	0				Hysteresis	Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.

octet	0	1	2	3	4	5
bit offset	47 - 40	39 - 32	31 - 24	23 - 16	15 - 8	7 - 0
subindex	1	2	3	3	3	3
element bit	7 - 0	7 - 0	31 - 24	23 - 16	15 - 8	7 - 0

The switching logic is determined with index 61, subindex 1. Values: 0=High Active (NO), 1=Low Active (NC).
The factory setting is 0=High Active (NO)

The switching function for the switching output is defined with index 61, subindex 2.

Permitted values: 0=Deactivated, 1=Single Point, 2=Window, 3=Two Point, 128=Foreground Suppression

The factory setting is 1=Single Point

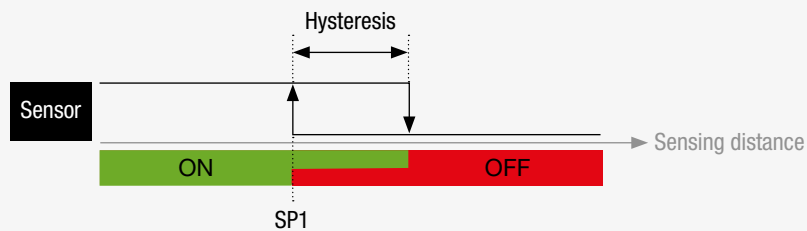


NOTE:

If the sensor is operated in DD mode, different parameters have an effect on the detection function.

The preset value 1 = Single Point is appropriate for object detection according to the functional principle of background suppression. If the distance is less than SP1, the switching output is active.

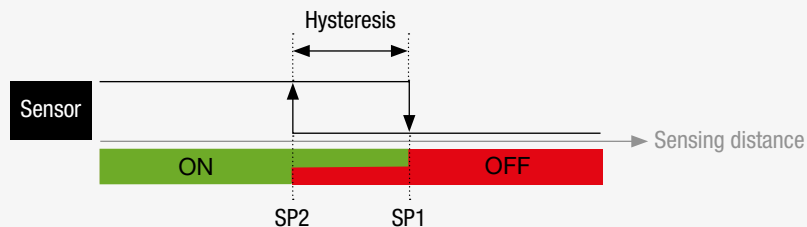
Single-Point is implemented in accordance with SSP "Single Point Mode for object detection".



The value 2 = Two Point is suitable for monitoring limit values as in the case of monitoring fill levels.

Switch-on point SP2 and switch-off point SP1 can be configured. The difference between SP1 and SP2 forms the hysteresis. The hysteresis parameter has no effect on the sensor function.

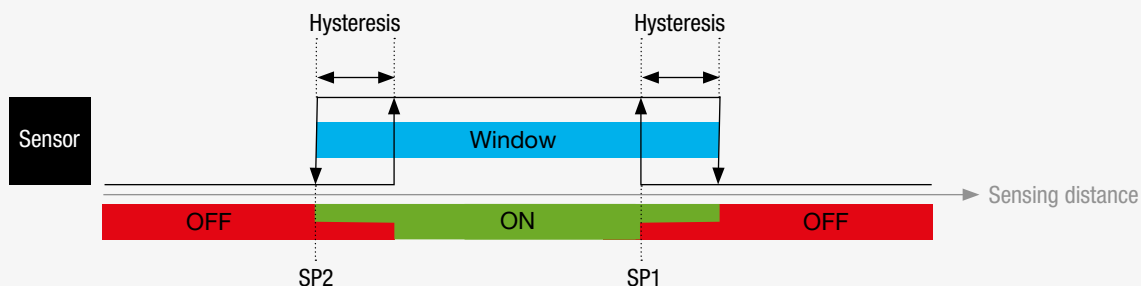
Two Point is implemented in accordance with SSP "Two Point Mode for object detection".



IMPORTANT! If the switching function of index 61, subindex 2 is Window, Two Point or Foreground Suppression, the value of setpoint SP1 must always be greater than the value of setpoint SP2.

The value 3 = Window is suitable for object detection in a defined range of distance. If there is distance between SP1 and SP2, the switching output is active.

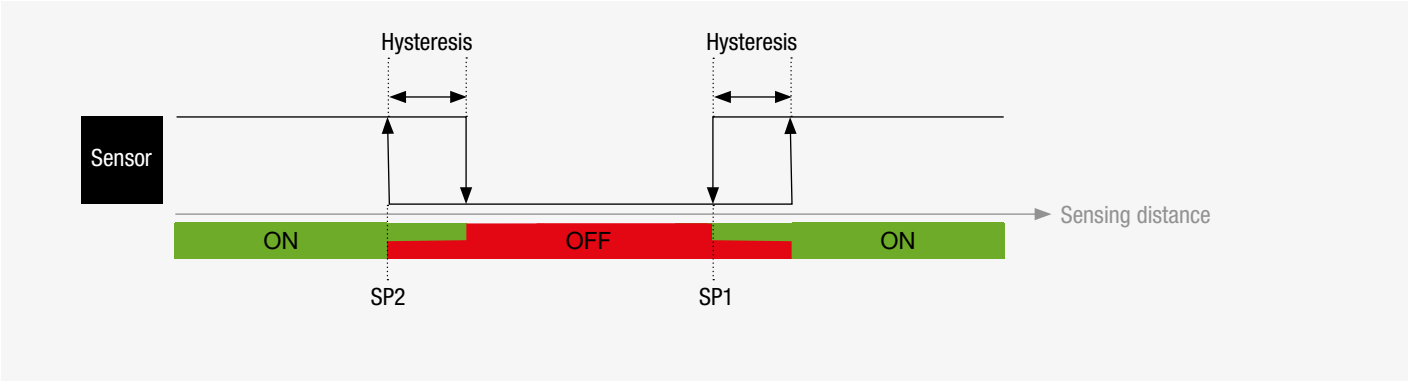
Window is implemented in accordance with SSP "Window Mode".





IMPORTANT! If the switching function of index 61, subindex 2 is Window, Two Point or Foreground Suppression, the value of setpoint SP1 must always be greater than the value of setpoint SP2.

The value 128 = Foreground Suppression is suitable for detecting a background at a defined range of distance.
If the distance is outside of SP1 and SP2, the switching output is active.





IMPORTANT! If the switching function of index 61, subindex 2 is Window, Two Point or Foreground Suppression, the value of setpoint SP1 must always be greater than the value of setpoint SP2.

The hysteresis of SSC.1 is defined with index 61, subindex 2.
For SSC.1, the hysteresis can be set to mm automatically or manually.
Value 0=Automatic hysteresis

The factory setting is 0=Automatic hysteresis



NOTE: The hysteresis for value 0=Automatic hysteresis depends on the setpoint and the sensor mode. In the factory setting Precision, hysteresis is minimized.

9.6.3 POLARITY AND SSC ASSIGNMENT OF PIN 4

Variable "Switching Output (Pin 4)" index=70 id=V_OutputModeinSIOMode

description: polarity of the switching output
data type: 8-bit UInteger
allowed values: 0 = SSC.1 PP, 1 = SSC.1 NPN, 2 = SSC.1 PNP, 3 = SSC.2 PP, 4 = SSC.2 NPN, 5 = SSC.2 PNP
default value: 0
access rights: rw

octet	0	
bit offset	7 - 0	
element bit	7 - 0	

The assignment of polarity and of switching channels SSC.1 or SSC.2 to pin 4 is determined by Index 70.
Values: 0=SSC.1, push-pull output (PP), 1=SSC.1, NPN output, 2=SSC.1, PNP output
3=SSC.2, push-pull output (PP), 4=SSC.2, NPN output, 5=SSC.2, PNP output
The factory setting is 0= SSC.1, push-pull output: (PP)



NOTE:
For instructions on configuring SSC.2, see *Chapter 9.7 Parameters for additional switching channel SCC.2, page 27.*

9.6.4 DD MODE POLARITY AND SWITCHING LOGIC PIN 4

Variable "Switching Output (Pin 4)" index=73 id=V_DD_OutputModeinSIOMode

description: polarity of the switching output

data type: 8-bit UInteger

allowed values: 0 = Deviation Detection PP High active, 1 = Deviation Detection NPN High active, 2 = Deviation Detection PNP High active, 3 = Deviation Detection PP Low active, 4 = Deviation Detection NPN Low active, 5 = Deviation Detection PNP Low active

default value: 0

access rights: rw

octet	0	
bit offset	7 - 0	
element bit	7 - 0	

If the sensor is in DD mode, the assignment of polarity and the switching logic to pin 4 is determined with index 73.

Values: 0=DD mode result PP High Active, 1= DD mode result NPN High Active, 2=DD mode result PNP High Active, 3=DD mode result PP Low Active, 4= DD mode result NPN Low Active, 5=DD mode result PNP Low Active

The factory setting is 0 = DD mode result PP High Active



NOTE:

In DD mode, no additional detection functions can be configured with pin 2.

9.6.5 PIN 4 SWITCHING DELAY

Variable "SSC.1 Delay Time" index=66 id=V_SSC11_DS

description: Defines the delay time for the switching signal of signal channel 1

data type: 16-bit UInteger

allowed values: 0..10000

default value: 0

access rights: rw

octet	0	1	
bit offset	15 - 8	7 - 0	
element bit	15 - 8	7 - 0	

Index 66 determines the time of the switching delay for pin 4.

Value range: 0 to 10,000 ms

The factory setting is 0 ms

Variable "SSC.1 Delay Control" index=68 id=V_SO1_DELAY_CTRL

description: SSC.1 Delay Control [disabled, Ton, Toff, Ton/Toff].

data type: 8-bit UInteger

allowed values: 0 = Disabled Timer, 1 = T-on delay, 2 = T-off delay, 3 = T-on/T-off delay

default value: 0

access rights: rw

octet	0	
bit offset	7 - 0	
element bit	7 - 0	

Index 68 determines the function of the switching delay for pin 4.

Values: 0=Deactivated, 1=Switch-on delay, 2= Switch-off delay, 3=Switch-on and switch-off delay

The factory setting is 0=disabled

9.7 PARAMETERS FOR ADDITIONAL SWITCHING CHANNEL SCC.2

9.7.1 SETPOINT FOR SSC.2

Variable "SSC.2 Param" index=62 id=V_SSP_SSC02_Param

description: Defines the setpoint values for switching signal channel 2 of sensor 1.
data type: 64-bit Record
access rights: rw

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	32	32-bit Integer	10..6000	6000				SP1	Defines the setpoint 1 value for the switching signal channel.
2	0	32-bit Integer	10..6000	200				SP2	Defines the setpoint 2 value for the switching signal channel.

octet	0	1	2	3	4	5	6	7
bit offset	63 - 56	55 - 48	47 - 40	39 - 32	31 - 24	23 - 16	15 - 8	7 - 0
subindex	1	1	1	1	2	2	2	2
element bit	31 - 24	23 - 16	15 - 8	7 - 0	31 - 24	23 - 16	15 - 8	7 - 0

Setpoint SP1 for switching output SSC.2 is defined with index 62, subindex 1, with mm as the unit.
The value range depends on the device variant.

Setpoint SP2 for switching output SSC.2 is defined with index 62, subindex 2, with mm as the unit.
The value range depends on the device variant.



NOTE:
Index 62 determines mm as the unit for setpoints SP1 and SP2 for SSC.2.



IMPORTANT! If the switching function of index 61, subindex 2 is Window, Two Point or Foreground Suppression, the value of setpoint SP1 must always be greater than the value of setpoint SP2.



NOTE: If the sensor is operated in DD mode, different parameters have an effect on the detection function of pin 4. In DD mode, no additional detection functions can be configured with pin 2.

9.7.2 SWITCHING LOGIC, SWITCHING FUNCTION; HYSTERESIS OF SSC.2

Variable "SSC.2 Config" index=63 id=V_SSP_SSC02_Config

description: Defines the configuration parameter for switching signal channel 2 of sensor 1.

data type: 48-bit Record

access rights: rw

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	40	8-bit UInteger	0 = High active, 1 = Low active	0				Logic	Defines the logical representation of the switching signal SSC in the process data.
2	32	8-bit UInteger	0 = Deactivated, 1 = Single point, 2 = Window, 3 = Two point, 128 = Foreground Suppression	0				Mode	Defines the evaluation mode for the switching signal SSC.
3	0	32-bit Integer	0 = 0, 5..2000	0				Hysteresis	Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.

octet	0	1	2	3	4	5	
bit offset	47 - 40	39 - 32	31 - 24	23 - 16	15 - 8	7 - 0	
subindex	1	2	3	3	3	3	
element bit	7 - 0	7 - 0	31 - 24	23 - 16	15 - 8	7 - 0	

The switching logic is determined with index 63, subindex 1.

Values: 0=High Active (NO), 1=Low Active (NC).

The factory setting is 0=High Active (NO)

The switching function for the switching output is defined with index 63, subindex 2.

Permitted values: 0=Deactivated, 1=Single Point, 2=Window, 3=Two Point, 128=Foreground Suppression The factory setting is 1=Single Point

Chapter 9.6.2 Switching logic, switching function; hysteresis of SSC.1, page 23 describes the function and graphically illustrates the different characteristics of the switching function.

**NOTE:**

If the sensor is operated in DD mode, SSC.2 cannot be configured.

The hysteresis of SSC.2 is defined with index 63, subindex 2.

For SSC.2, the hysteresis can be set to mm automatically (default/fine adjustment) or manually.

Value 0=Automatic hysteresis

The factory setting is 0=Automatic hysteresis



NOTE: The hysteresis for value 0 = Automatic hysteresis depends on the sensor mode. In the factory setting Precision, hysteresis is minimized.

9.8 PARAMETERS FOR SENSOR FUNCTION

9.8.1 SENSOR MODE

With the sensor mode (index 72), the device can be optimized for specific application cases.

Variable "Sensor Mode" index=72 id=V_SensorPresets

data type: 8-bit UInteger

allowed values: 0 = Precision (Factory Setting), 1 = High Functional Reliability, 2 = Speed

default value: 0

access rights: rw

octet	0	
bit offset	7 - 0	
element bit	7 - 0	

Value: 0=Precision 1= High functional safety 2=Speed

The factory setting is the Precision sensor mode; this can be used to detect smaller height differences

Depending on the sensor mode, the following properties change:

- Switching frequency
- Response curves
- In type LRML, the maximum range to dark objects (6% remission)
- Safety reserve during teach processes
- Automatically determined hysteresis

Sensor mode	Functional reserve for dark objects	Switching frequency	Safety reserve when teaching in	Hysteresis***	Response curve
Precision	High	Small (350/150/40 Hz**)	Low	Small	Normal
High functional reliability	High	Small (350/150/40 Hz**)	Large	Large	Normal
Speed	Low*	High (800/500/200 Hz**)	Large	Large	Partly narrow***

* maximum range 6% 400mm with OH*-LRML-*

** depends on device variant

*** narrow with OH*-LRMN-* and OH*-LRML



NOTE: Technical data can be found via the QR code on the packaging or alternately via the article number at www.di-soric.com.

9.8.2 ANTI-CROSSTALK

Variable "Anti Crosstalk" index=78 id=V_interference_protection

data type: 8-bit UInteger

allowed values: 0 = Off, 1 = 1 Sensor mode, 2 = 2 Sensor mode - Sensor 1, 3 = 2 Sensor mode - Sensor 2, 4 = 3 Sensor mode - Sensor 1, 5 = 3 Sensor mode - Sensor 2, 6 = 3 Sensor mode - Sensor 3

default value: 0

access rights: rw

octet	0	
bit offset	7 - 0	
element bit	7 - 0	

The parameter (index 78) can be used to prevent mutual interference of multiple sensors or strong optical interference (e.g. flashing light).

Values: 0=deactivated, 1=1-sensor operation (e.g., with flashing light), 2,3=2-sensor operation, 4,5,6=3-sensor operation

The factory setting is 0=deactivated

**NOTE:**
Activation of anti-crosstalk substantially decreases the switching frequency (up to 14% of the nominal value).

9.8.3 DD MODE (DEVIATION DETECTION MODE)

In DD mode, the degree of correspondence of the DD sensor signal (distance and intensity) is evaluated in relation to a taught-in reference surface. For information on DD mode, see *Chapter 8.2.3 Teaching in intensity and distance with deviation detection mode (DD mode)*, page 13.

The DD mode (deviation detection mode) is activated with index 88 and value 1.

Variable "Deviation Detection Mode (DD-Mode)" index=88 id=V_Special_Func_Selector

data type: 8-bit UInteger
allowed values: 0 = Off, 1 = On
default value: 0
access rights: rw

octet	0	
bit offset	7 - 0	
element bit	7 - 0	

**IMPORTANT:** Teach in the reference surface in DD mode using the "Teach Background" command, index 2 with the value 166.-

The taught-in distance is found under index 98, subindex 1; the taught-in intensity is found under index 98 subindex 2
In the factory setting, the sensor signal is detected as "object" if the sensor signal exhibits a degree of correspondence less than 75% with the reference surface.
The required degree of correspondence in the unit % can be adjusted with IO-Link index 98, subindex 3.
Switching hysteresis in the unit % can be adjusted with IO-Link index 98, subindex 4.
With index 98 subindex 5, an automatic adjustment in the target values can be activated in DD mode. This function is activated in the factory setting.

**NOTE:**
In DD mode, no additional detection functions can be configured with pin 2.

Variable "DD-Mode Parameter" index=98 id=V_DD_Setup

data type: 88-bit Record
access rights: rw

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	56	32-bit UInteger	20..6500	6000				Teach Distance	
2	24	32-bit UInteger	0..65535	2000				Teach Excess Gain	
3	16	8-bit UInteger	0..100	75				Setpoint	
4	8	8-bit UInteger	0..100	10				Hysteresis	
5	0	8-bit UInteger	0 = Auto level OFF, 1 = Auto level ON	1				Auto level	

octet	0	1	2	3	4	5	6	7
bit offset	87 - 80	79 - 72	71 - 64	63 - 56	55 - 48	47 - 40	39 - 32	31 - 24
subindex	1	1	1	1	2	2	2	2
element bit	31 - 24	23 - 16	15 - 8	7 - 0	31 - 24	23 - 16	15 - 8	7 - 0

octet	8	9	10
bit offset	23 - 16	15 - 8	7 - 0
subindex	3	4	5
element bit	7 - 0	7 - 0	7 - 0

Variable "DD-Mode Result" index=99 id=V_DD_Result

data type: 32-bit Record
access rights: ro

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	24	8-bit UInteger	0..100					Distance Match	
2	16	8-bit UInteger	0..100					Excess Gain Match	
3	8	8-bit UInteger	0..100					Match	
4	0	8-bit UInteger	0 = No background detected, 1 = Background detected					Background Detected	

octet	0	1	2	3
bit offset	31 - 24	23 - 16	15 - 8	7 - 0
subindex	1	2	3	4
element bit	7 - 0	7 - 0	7 - 0	7 - 0

The degree of correspondence of the distance with the reference surface is displayed under index 99 subindex 1.

The degree of correspondence of the intensity with the reference surface is displayed under index 99 subindex 2.

Results of the sensor can be queried in DD mode through querying the parameter "Result" under index 99.

The degree of correspondence of the sensor signal (distance and intensity) with the reference surface is found under index 99 subindex 3.

The area under index 99 subindex 4 displays whether the reference surface is detected.

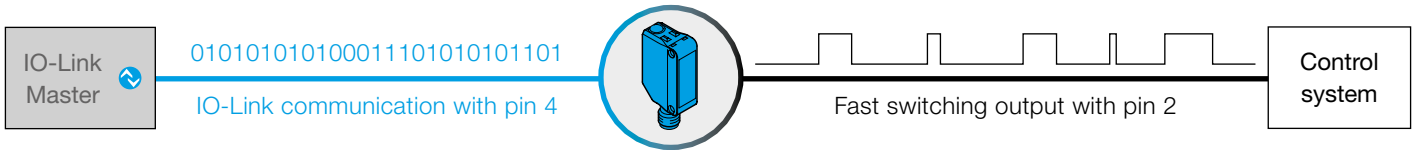
9.9 PARAMETERS FOR MULTIFUNCTION INPUT AND OUTPUT AT PIN 2

Variable "Multi I/O (Pin 2)" index=74 id=V_DD_OutputMode

description: Operation mode for Multi I/O (Pin 2)
data type: 8-bit UInteger
allowed values: 0 = Deactivated, 1 = Teach-In Deviation Detection Mode High active, 2 = Teach-In Deviation Detection Mode Low active, 3 = Deviation Detection PP High active, 4 = Deviation Detection NPN High active, 5 = Deviation Detection PNP High active, 6 = Deviation Detection PP Low active, 7 = Deviation Detection NPN Low active, 8 = Deviation Detection PNP Low active
default value: 1
access rights: rw

octet	0	
bit offset	7 - 0	
element bit	7 - 0	

In addition to the factory setting Remote Teach described in *Chapter 8.3 Parameterization with multifunction input at PIN 2*, page 16, index 74 can be used alternatively to configure pin 2 as a switching output or deactivate it completely. The following additional functions can be parameterized with index 71
Value 0=pin 2 is deactivated, 1=Input (High Active), 2=Input (Low Active)
Values 3,4,5,6,7,8= Parallel mode with result in DD mode Polarity alternatively PP, NPN or PNP, switching function High Active or Low Active.
The factory setting 1=Input (High Active).
If pin 2 signals SSC.1 or the result of the DD mode, then the sensor can operate in parallel mode to transmit fast switching signals to pin 2 and IO-Link data to pin 4 simultaneously.



9.10 TEACH COMMANDS FOR IO-LINK

9.10.1 SELECTING A SWITCHING CHANNEL FOR TEACHING

Variable "Teach Select" index=58 id=V_SSP_TI_TeachSelect

description: Selects the switching signal channel for which a teach procedure will be applied.
data type: 8-bit UInteger
allowed values: 1 = SSC.1, 2 = SSC.2
default value: 1
access rights: rw
excluded from data storage

octet	0	
bit offset	7 - 0	
element bit	7 - 0	

Index 58 is used to select a switching channel for an IO-Link teach command.

9.10.2 OVERVIEW OF TEACH FUNCTIONS

The setpoint (SP) can be set with the IO-Link teach commands. The teach function that is suitable for this depends on the configured switching function; an overview is provided in the following table.

Recommendation for teach functions				
	Switching function (Config.Mode)			
	Single Point	Window	Two Point	Foreground suppression
SSP: Teach-Single Value, Teach SP1	ok	ok **	nok ***	ok **
SSP: Teach-Single Value, Teach SP2	nok *	ok **	nok ***	nok ***
SSP: Teach Window	nok	ok	nok ***	nok ***
Sensor Specific Teach Object	ok	nok	nok ***	nok ***
Sensor Specific Teach Background	ok	nok	nok ***	nok ***

ok = feasible

nok = not feasible or not supported

* SP2 not required for Single Point

** Sequence Teach SP1 then Teach SP2, setpoint SP1 must be greater than SP2

*** Value input in mm index 60 or 62, subindex 1 and 2



NOTE: First select the desired switching function and then execute the corresponding teach function.



NOTE: To ensure functional reliability, the teach functions operate with a safety reserve. Therefore, the actually configured setpoints (SP) differ from the teach points (TP). The safety reserve depends on the sensor mode and the teaching distance.



NOTE:
The teach functions described in the following are not suited for DD mode.

9.10.3 BASIC TEACH FUNCTIONS BASED ON THE SMART SENSOR PROFILE

Basic teach functions are determined through the IO-Link default.

The sensor supports the following teach functions defined in the Smart Sensor Profile.

Single Value Teach

Teaching in SP1 with Single Value Teach using the "Teach SP1" command, index 2 with the value 65.

Teaching in SP2 with Single Value Teach using the "Teach SP2" command, index 2 with the value 66.



IMPORTANT!
The value of setpoint SP1 must always be greater than the value of setpoint SP2.

Window Teach

A switching window with SP1 and SP2 is taught in symmetrically relative to the teach point (TP) using the "Teach Window" command, index 2 with the value 75.

The width of the switching window in mm is defined with index 16511.

Variable "Teach window size" index=16511 id=V_SSP_TI_TeachWindowSize

description: Size of spacing between SP1 and SP2 after successful teach

data type: 32-bit Integer

allowed values: 0 = Auto, 1..2000

access rights: rw

octet	0	1	2	3	
bit offset	31 - 24	23 - 16	15 - 8	7 - 0	
element bit	31 - 24	23 - 16	15 - 8	7 - 0	

The factory setting is 5.0 mm.



NOTE: The function of Window Teach corresponds to the teaching process according to *Chapter 8.2.2 Teach in small distance to object with Teach, page 12.*



NOTE: For window teaching, configure the appropriate switching channel and the window switching function.

9.10.4 SPECIFIC TEACH FUNCTIONS

The sensor supports the following teach functions in particular.

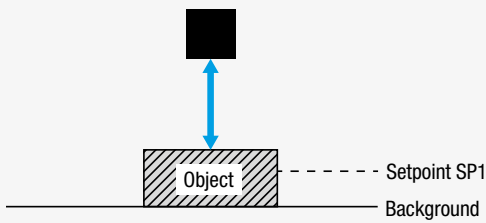
Teach object

The sensor needs an object to teach in the setpoint. The setpoint is taught in as a distance and has a safety reserve relative to the teach distance. The setpoint is greater than the teach distance relative to the object.

SP1 is taught in using the "Teach Object" command, index 2 with the value 76.



NOTE: Configure the appropriate switching channel and the Single Point switching function for Teach Object.

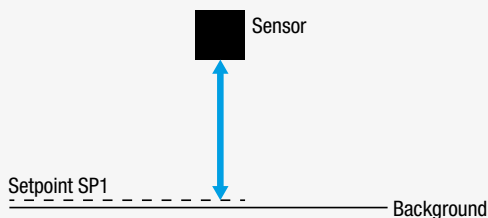


NOTE: The function of Teach Object corresponds to the teaching process according to *Chapter 8.2.1 Teach in distance to object with Teach, page 11.*

Teach background

The sensor needs the background to teach in the setpoint. The setpoint is taught in as a distance and has a safety reserve relative to the teach distance. The setpoint is less than the teach distance relative to the background.

SP1 is taught in using the "Teach Background" command, index 2 with the value 77.



NOTE: Configure the appropriate switching channel and the Single Point switching function for Teach Background.

9.10.5 TEACH RESULTS BASED ON THE SMART SENSOR PROFILE

Variable "Teach Result" index=59 id=V_SSP_TI_TeachResult

description: Shows the complete result information of the teach procedure including current state and result flags.

data type: 8-bit Record (subindex access not supported)

access rights: ro

dynamic

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	0	4-bit UInteger	0 = Idle, 1 = SP1 success, 2 = SP2 success, 3 = SP1, SP2 success, 4 = Wait for command, 5 = Busy, 7 = Error	0				State	Indicates the current state of the teach procedure.
2	4	Boolean	false = Initial or not ok, true = Ok	false				Flag SP1 TP1	Indicates the current teach result for the teach point.
3	5	Boolean	false = Initial or not ok, true = Ok	false				Flag SP1 TP2	Indicates the current teach result for the teach point.
4	6	Boolean	false = Initial or not ok, true = Ok	false				Flag SP2 TP1	Indicates the current teach result for the teach point.
5	7	Boolean	false = Initial or not ok, true = Ok	false				Flag SP2 TP2	Indicates the current teach result for the teach point.

Octet 0

bit offset	7	6	5	4	3	2	1	0
subindex	5	4	3	2	1	1	1	0
element bit					3	2	1	0



NOTE:

Teach results are visible in index 59

9.11 DIAGNOSTICS

IO-Link diagnostics enable efficient maintenance of the device. The Diagnosis menu can be found below:

Diagnosis Menu	
Diagnosis	
Device Status Information	
V_DeviceStatus	
V_DetailedDeviceStatus	
Not Resettable Information	
V_Excess_Gain	
V_Temperature * 1 °C, Dec.0	
V_Temperature_Max * 1 °C, Dec.0	
V_Temperature_Min * 1 °C, Dec.0	
V_OperatingTime h	
V_StartUps	
V_SwitchcounterSSC11	
Service Functions	
V_SystemCommand, Button:=126	
Description=The visual indicators of the device are switched to the localization display pattern, which makes it easier to spot a device in an application.	
V_SystemCommand, Button:=127	
Description=The localization indication pattern is stopped. The optical indicators of the device will show again the device specific states of operation.	
V_SystemCommand, Button:=131	
Description=The parameter of the device are set to factory default values and communication will be inhibited until the next power cycle.	
Note: Directly detach the device from the master port!	
Measurement Data Information	
V_SSP_MDC_Descriptor	

9.11.1 DEFAULT

The value status with index 36 displays the current device status. Value: 0=Device is OK, 1=Maintenance required, 2=Outside specification, 3=Function test, 4=Error

Additional information can be found under the detailed device status on index 37.

9.11.2 DEVICE-SPECIFIC DIAGNOSIS

Non-resettable diagnosis:

Index 104: Functional reserve, high value: high signal strength, value less than 2: Signal weak

Index 87: current internal temperature in device in °C

Index 96: Maximum temperature after switch-on in °C

Index 97: Minimum temperature after switch-on in °C

**NOTE:**

If the sensor is operated in DD mode, index 104 is not effective.

Index 93: Sensor operating hours

Index 94: Number of times switched on

9.12 PARAMETERS FOR ERROR TYPES

Code	Additional code	Name	Description
128 (0x80)	0 (0x00)	Device application error - no details	Service was denied by the technology-specific application. No detailed root-cause information is available.
128 (0x80)	17 (0x11)	Index not available	Read or write access attempt to a non-existing index.
128 (0x80)	18 (0x12)	Subindex not available	Read or write access attempt to a non-existing subindex of an existing index.
128 (0x80)	32 (0x20)	Service temporarily not available	Parameter not accessible due to the current state of the technology-specific application.
128 (0x80)	35 (0x23)	Access denied	Write access to a read-only parameter or read access to write-only parameter.
128 (0x80)	48 (0x30)	Parameter value out of range	Written parameter value is outside of the permitted value range.
128 (0x80)	49 (0x31)	Parameter value above limit	Written parameter value is above its specified value range.
128 (0x80)	50 (0x32)	Parameter value below limit	Written parameter value is below its specified value range.
128 (0x80)	51 (0x33)	Parameter length overrun	Written parameter is longer than specified.
128 (0x80)	52 (0x34)	Parameter length underrun	Written parameter is shorter than specified.
128 (0x80)	53 (0x35)	Function unavailable	Written command is not supported by the technology-specific application.
128 (0x80)	54 (0x36)	Function temporarily unavailable	Written command is unavailable due to the current state of the technology-specific application.
128 (0x80)	64 (0x40)	Invalid parameter set	Written single parameter value collides with other existing parameter settings.
128 (0x80)	65 (0x41)	Inconsistent parameter set	Parameter set inconsistencies at the end of block parameter transfer. Device plausibility check failed.
128 (0x80)	130 (0x82)	Application not ready	Read or write access denied. The technology-specific application is temporarily unavailable.

EVENTS

Code	Type	Name	Description
0 (0x0000)	Notification	No malfunction	
16384 (0x4000)	Error	Temperature fault	Overload
16912 (0x4210)	Warning	Device temperature overrun	Clear source of heat
16928 (0x4220)	Warning	Device temperature underrun	Insulate device
20480 (0x5000)	Error	Device hardware fault	Exchange device
30480 (0x7710)	Error	Short circuit	Check installation
35840 (0x8c00)	Error	Technology-specific application fault	Reset device
35841 (0x8c01)	Warning	Simulation active	Check operating mode
35904 (0x8c40)	Warning	Maintenance required - Cleaning	Clean device
36350 (0x8dfe)	Warning	Test Event 1	Event appears by setting index 2 to value 240, Event disappears by setting index 2 to value 241
36351 (0x8dff)	Warning	Test Event 2	Event appears by setting index 2 to value 242, Event disappears by setting index 2 to value 243

10 TROUBLESHOOTING

LED / fault pattern	Possible cause	Measures
Green LED1 off	No voltage or voltage outside service voltage	Check voltage supply
Object detection disrupted	Sensor poorly oriented in relation to the object	Optimize sensor alignment (see <i>Chapter 5.3 Aligning the sensor with the object, page 6</i>) Optimize sensor configuration with operating element or IO-Link
Sensor does not respond to operation with operating element	Operating element locked	Unlock operating element via IO-Link (pay attention to Device Access Locks)
Sensor does not respond when pin 2 is connected	Pin 2 is not configured as input	Configure pin 2 as input via IO-Link or set device to factory setting via IO-Link
Mutual interference of sensors	The light beam of a sensor strikes the receiver of a neighboring sensor	Optimize the alignment of sensors with respect to each other. Configure anti-crosstalk via IO-Link.
Deviation detection mode is not functioning correctly	Reference object is vibrating, or remission is not stable	Optimize reference object Optimize sensor configuration with operating element or IO-Link
Sensor function is unclear	Sensor configuration is not comprehensible	De-energize sensor and connect supply voltage Use IO-Link to set sensor to factory setting and reconfigure

In case of faulty device behavior:

- Disconnect power from device and re-establish factory settings
- Perform IO-Link diagnosis

If the problems persist, contact di-soric Service.

Have the following information ready when contacting Service:

- Customer number
- Article designation or article number
- Serial or batch number
- Description of support inquiry

11 MAINTENANCE, REPAIRS, DISPOSAL

11.1 MAINTENANCE

The device operates without maintenance during ongoing operation.

For optimum function, observe the following:

- Regularly clean the front panel with a soft, lint-free cloth
- Regularly check the fastening and the electrical connections

11.2 REPAIR

Defective devices may only be repaired by the manufacturer.

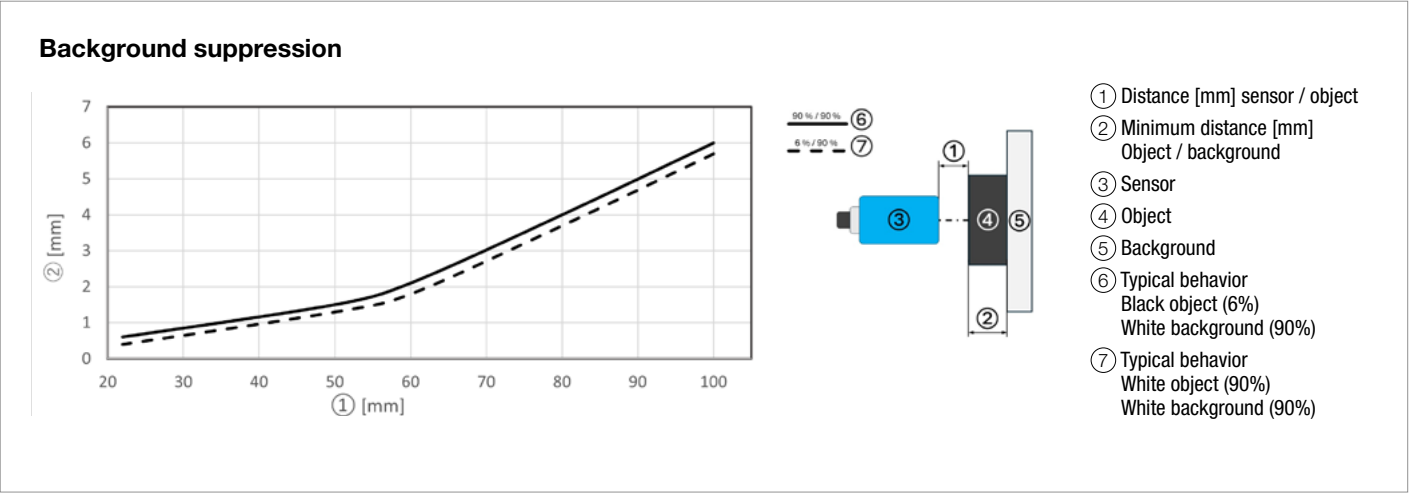
11.3 DISPOSAL

The device is to be disposed of in an environmentally appropriate manner according to the respectively applicable waste removal regulations.

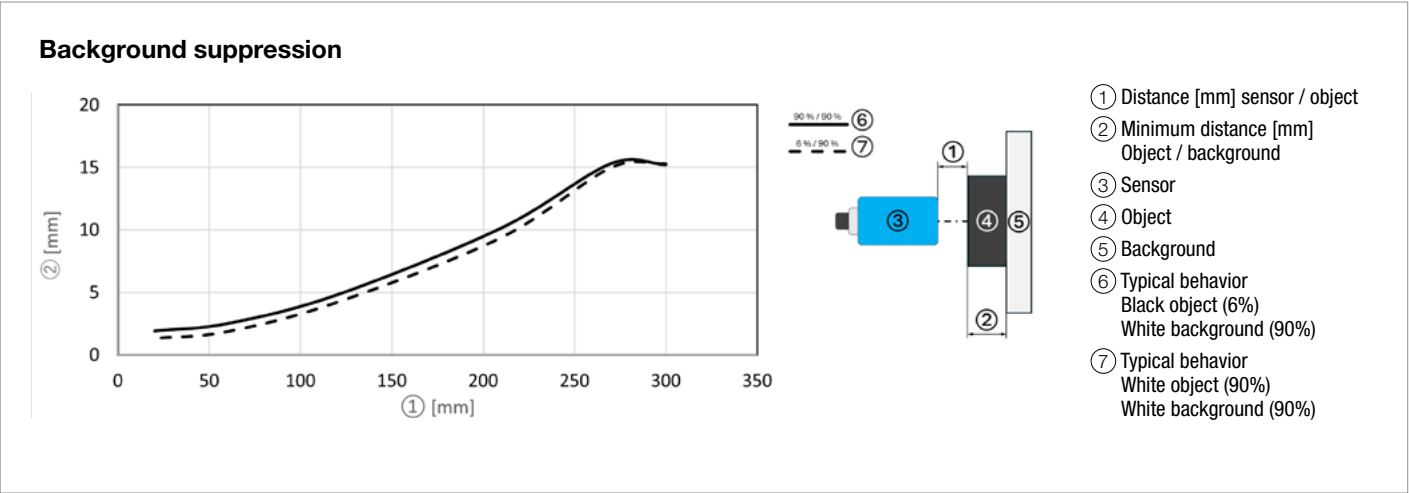
APPENDIX

TYPICAL MINIMUM DISTANCE TO THE BACKGROUND
IN PRECISION SENSOR MODE (FACTORY SETTING)

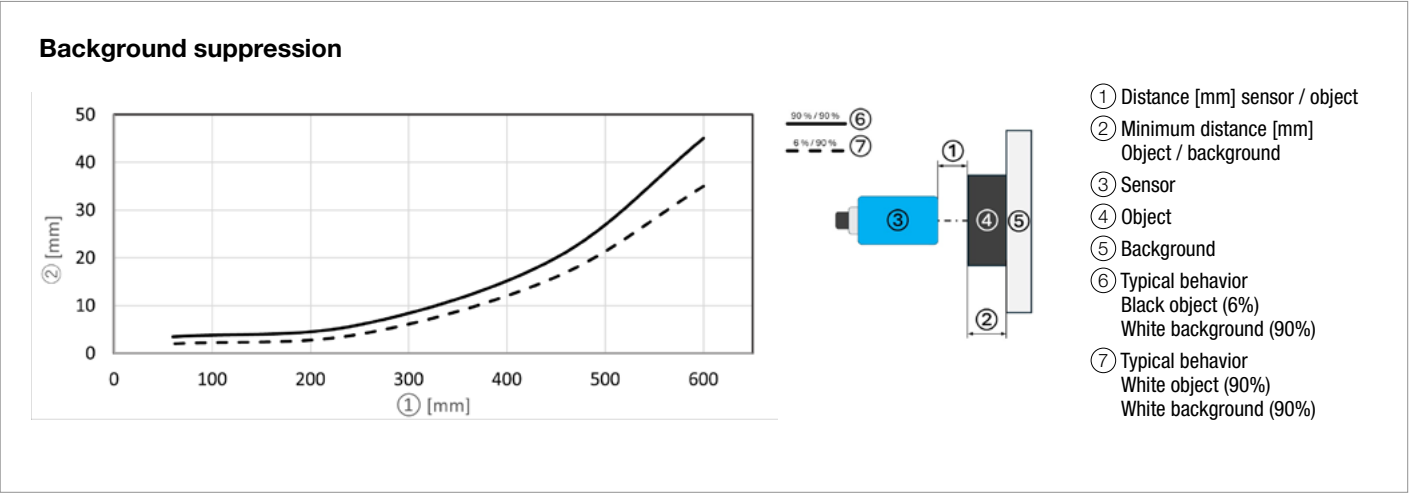
OH3*-LRMS



OH3*-LRMN

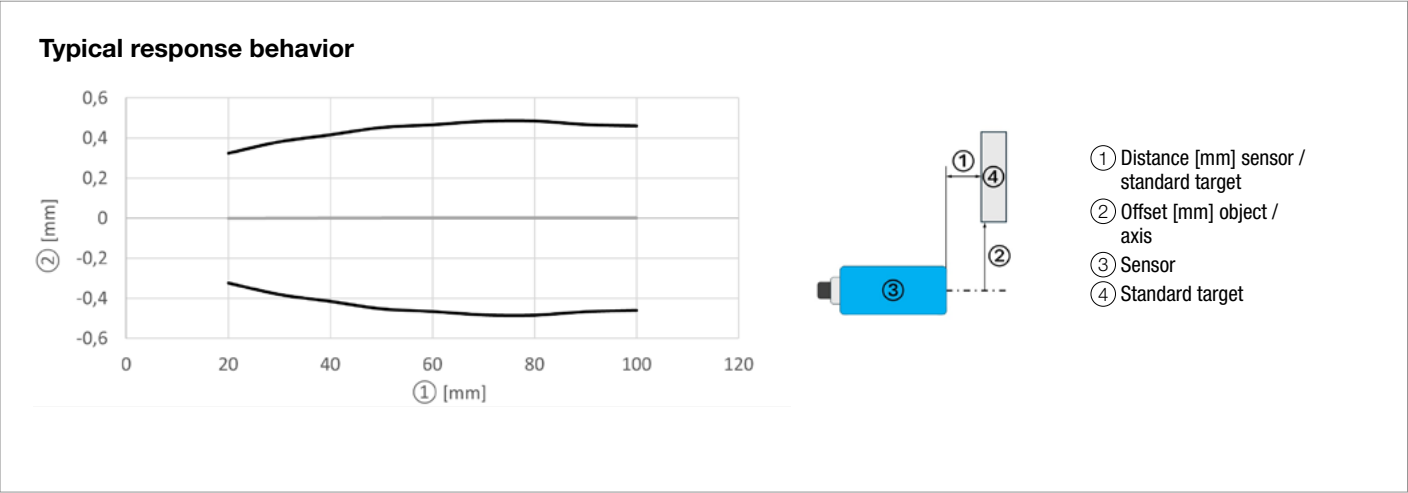


OH3*-LRML

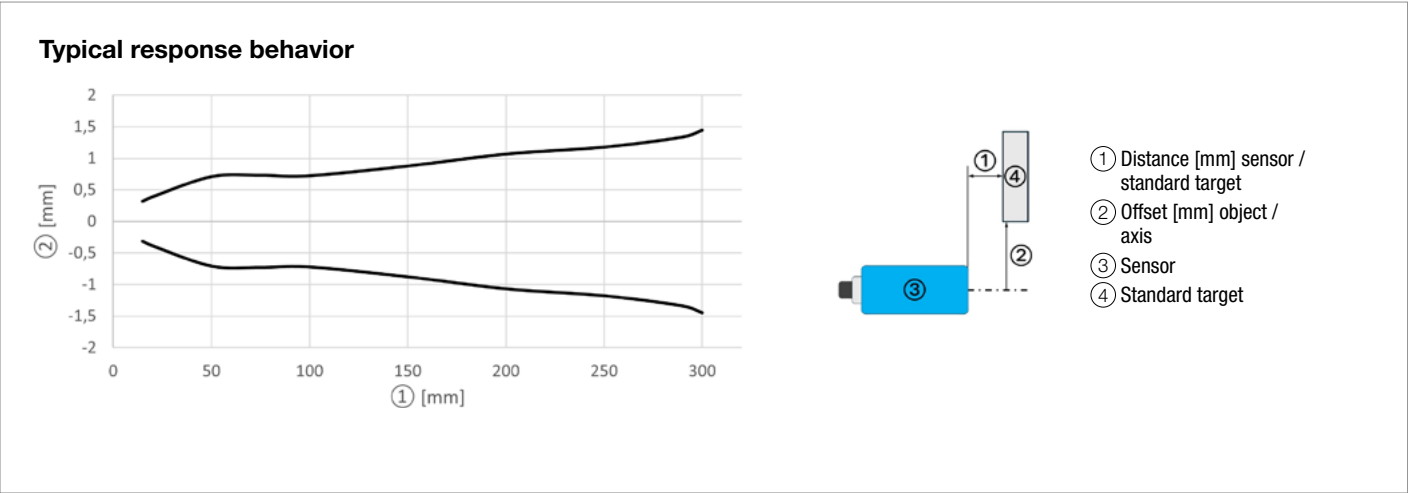


TYPICAL RESPONSE BEHAVIOR (WHITE 90%)
IN PRECISION SENSOR MODE (FACTORY SETTING)

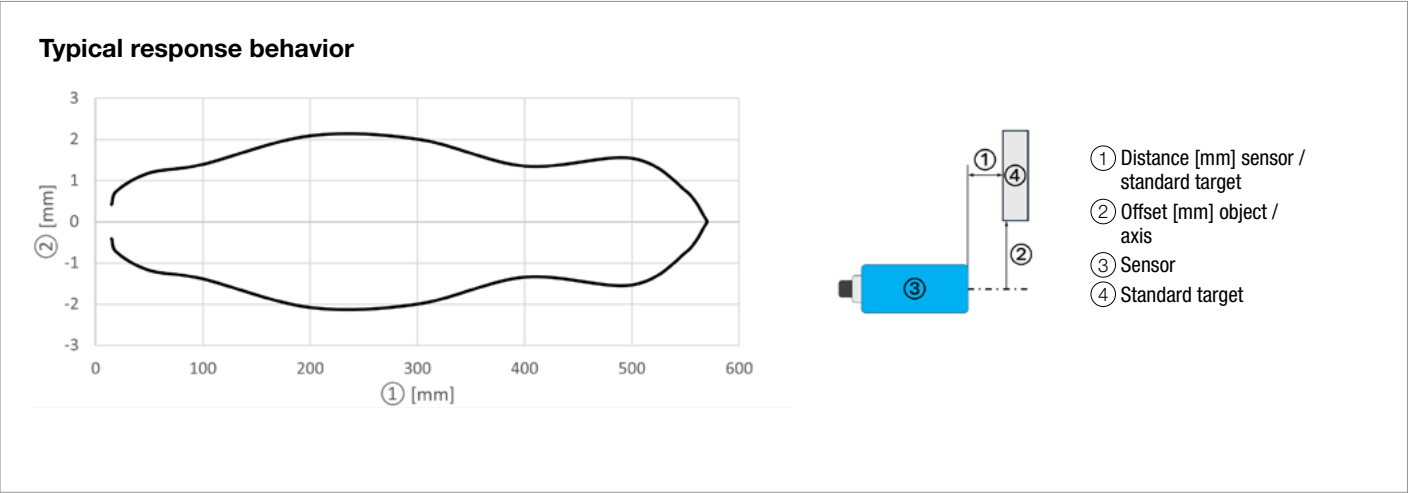
OH3*-LRMS



OH3*-LRMN



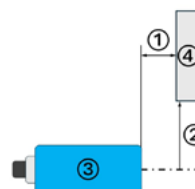
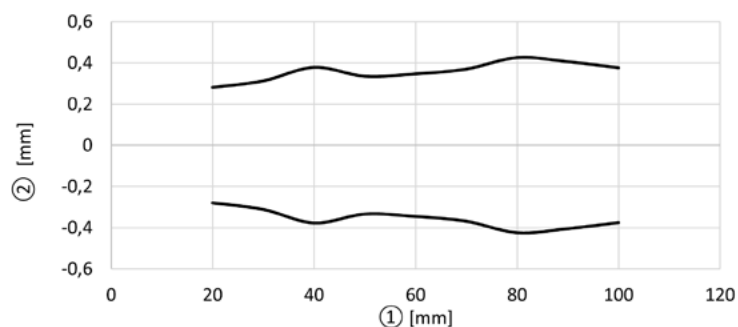
OH3*-LRML



TYPICAL RESPONSE BEHAVIOR (WHITE 90%) IN SPEED SENSOR MODE

OH3*-LRMS

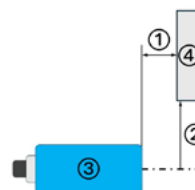
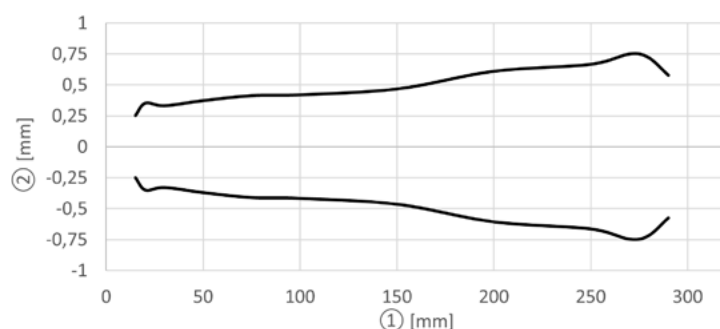
Typical response behavior



- ① Distance [mm] sensor / standard target
- ② Offset [mm] object / axis
- ③ Sensor
- ④ Standard target

OH3*-LRMN

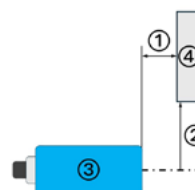
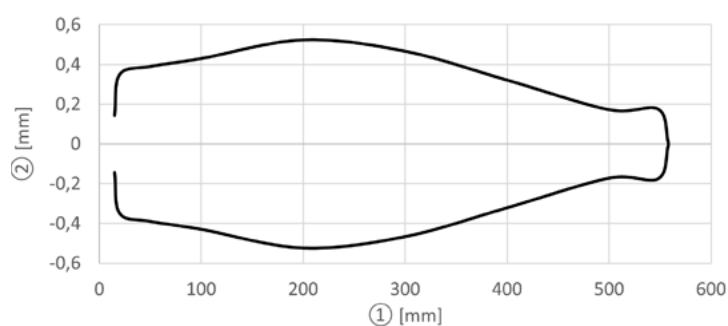
Typical response behavior



- ① Distance [mm] sensor / standard target
- ② Offset [mm] object / axis
- ③ Sensor
- ④ Standard target

OH3*-LRML

Typical response behavior



- ① Distance [mm] sensor / standard target
- ② Offset [mm] object / axis
- ③ Sensor
- ④ Standard target

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