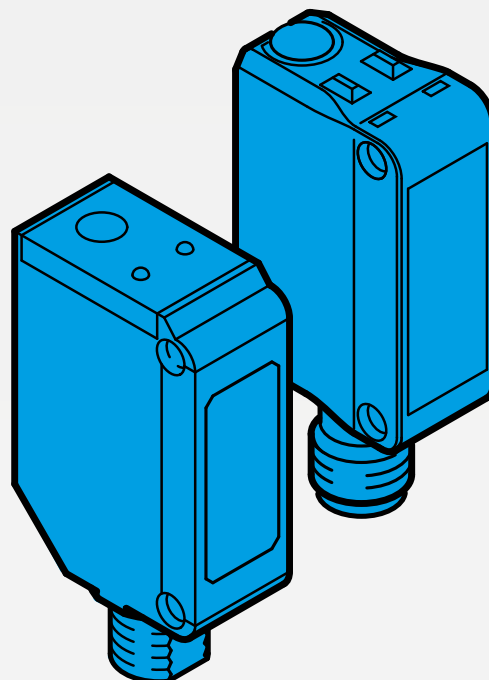


RETROREFLECTIVE LIGHT BARRIERS OR3X-R



600027-0000EN · 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
NEC	National Electrical Code
UL	Underwriters Laboratories
SSC	IO-Link switching signal channel
SP1	IO-Link setpoint 1

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!

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 OR3* sensors are retroreflective light barriers with a polarizing filter. A reflector is required for this to function. An object placed between the sensor and reflector reduces the signal at the receiver. The received intensity level is compared to the setpoint and evaluated as a switching signal.

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

NOTE: Installation instructions for this are located in *Chapter 5.2 Mounting, page 6*.

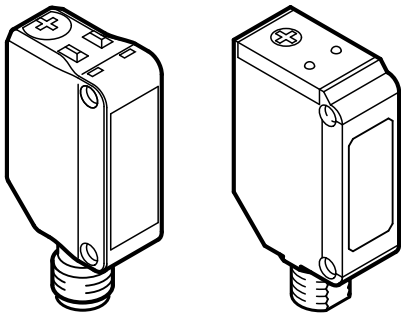
NOTE: Instructions for commissioning the sensor are located in *Chapter 8 Commissioning the sensor, page 9*.

NOTE: Instructions for commissioning with IO-Link are located in *Chapter 9 IO-Link, page 11*.

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. range [mm]	Connection
OR33-RMN-PT-G3-T4	214911	Plastic	LED, red	6000	M8, 4-pin
OR33-RMN-PT-G3-2C	214910	Plastic	LED, red	6000	Cable, 2.0m
OR33-RSN-PT-G3-T4	214913	Plastic	LED, red, pin spot	5000	M8, 4-pin
OR33-RSN-PT-G3-2C	214912	Plastic	LED, red, pin spot	5000	M8, 4-pin
OR34-RMN-PT-G3-T4	214914	Stainless steel	LED, red	6000	M8, 4-pin
OR34-RSN-PT-G3-T4	214915	Stainless steel	LED, red, pin spot	5000	Cable, 2.0m

Variants with a pin spot LED have a small round light spot. The advantages of these sensors are the simplified commissioning and the detection of smaller 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.

The reflector must be located within the permissible range of the sensor.

The maximum range depends on the size of the reflector used.

The maximum range can only be attained with precise alignment.

	Maximum range, RMN variants	Maximum range, RSN variants
R 84	6000 mm	5000 mm
R42	3000 mm	2500 mm
R19x54	3500 mm	1200 mm
Film RFP 50 (50x50)	2500 mm	1500 mm

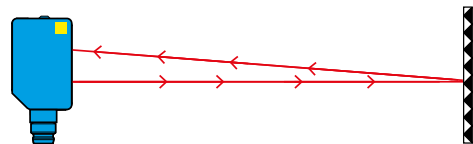
There must not be any objects between the sensor and reflector.

Observe the minimum range in the data sheet (corresponds to minimum distance from reflector)



IMPORTANT! Increasing the distance between the sensor and reflector above the minimum range significantly improves the functional reserve. Observe the "Typical functional reserve" diagram in the appendix.

Fasten the reflector; align the sensor with the center of the reflector and fasten it.



6 CONNECTION

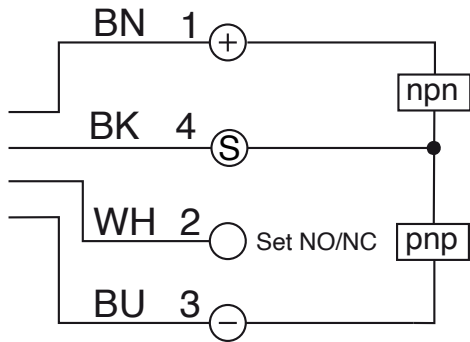
6.1 GENERAL NOTES



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: With IO-Link, the function of pin 2 can be configured from the factory setting in product variants with 4 pins. 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 "dark switching" when operated on a PNP input card.



NOTE: In the factory setting, the resulting switching behavior is "light 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. Only operate power supplies with supply class 2 in the case of UL applications.

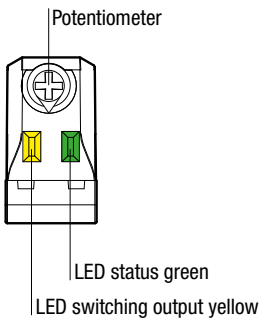


IMPORTANT! Only operate UL applications with supply class 2 power supplies. Maintain a minimum distance of 12.5 mm between the proximity sensor and all uninsulated live parts. Use an overcurrent protection device with a maximum nominal current of 2 A.

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.

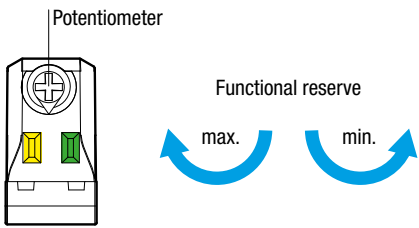
- De-energize the device
- Connect supply voltage to device in accordance with the technical data

7 OPERATING AND DISPLAY ELEMENTS



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

The setpoint is set by a potentiometer with a setting range of 270°. If the potentiometer is located on the left limit stop (as viewed from the front of the sensor), the setpoint is set to the maximum functional reserve. If the potentiometer is located on the right limit stop, the functional reserve is minimal.



i **NOTE:** For more details on how to operate with a potentiometer, see *Chapter 8.2 Parameterization on the sensor with operating elements, page 9.*

8 COMMISSIONING THE SENSOR

8.1 GENERAL NOTES

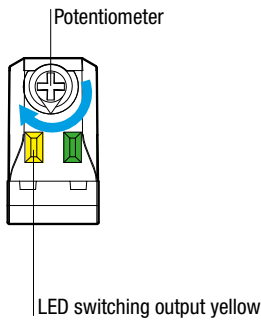
Switching on the supply voltage puts the device into operation. After the time delay before availability has elapsed, the device is operational. In the delivery state, the parameters are set to the factory setting. The device can also be adjusted via appropriate IO-Link configuration software.

8.2 PARAMETERIZATION ON THE SENSOR WITH OPERATING ELEMENTS

The sensor needs an aligned reflector and an object for setting the setpoint (SP1).

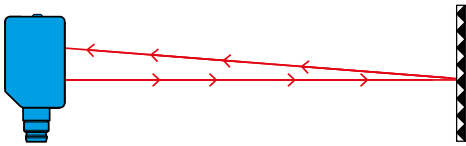
The setpoint is set by means of the potentiometer.

Turn the potentiometer to the left limit stop (maximum functional reserve).

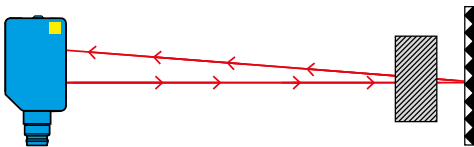


Position the object in the detection range of the sensor and check whether LED2 is lit.

For detection of small objects and partly transparent objects, decrease the functional reserve by turning the potentiometer clockwise.



Remove the object from the detection range of the sensor and check whether LED2 is no longer lit.



NOTE: If LED 2 (yellow) is not lit with the object or is lit only sporadically, decrease the functional reserve, check the application or optimize the sensor configuration with IO-Link (*Chapter 9 IO-Link, page 11*).

8.3 ADJUSTING THE SWITCHING LOGIC WITH INPUT AT PIN 2

In the factory setting, the switching output is in push-pull mode with the NO switching logic. After successful parameterization, 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.

Pin 2 is configured in the factory setting as an input (High Active).



Adjusting the switching logic	LED indicator / switching output
Activate pin 2 for at least 2 seconds (24V).	Yellow LED2 on (sequence 1)
Sensor is changed from NO to NC or from NC to NO	Yellow LED2 with adjustment of the switching logic



NOTE: Alternatively, pin 2 may have a different function depending on the IO-Link configuration of the sensor.
(Chapter 9.10 Parameters for multifunction input and output at PIN 2, page 20)

9 IO-LINK

9.1 INTERFACE

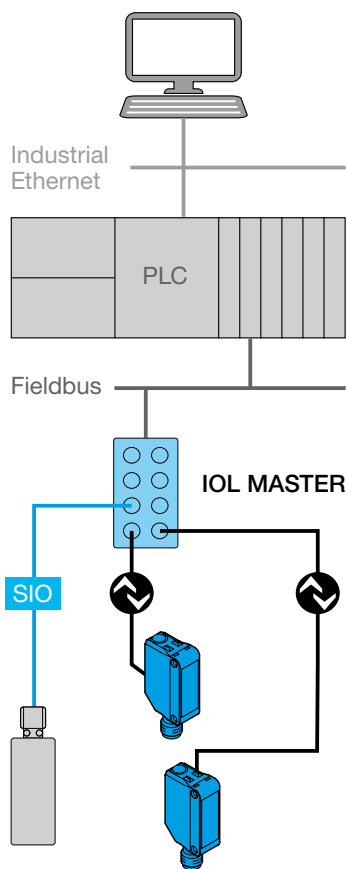
IO-Link is a communication system for connecting intelligent sensors and actuators to automation systems. IO-Link is standardized in the IEC 61131-9 standard.

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) signals the received dimensionless intensity value.

If the reflector is in the detection range of the sensor, the measured value is large. If an object is between the sensor and reflector, the measured value is small or 32664 (no measurement).

The switching state of SSC1 (subindex 3) is used to detect objects.

The switching state of SSC2 (subindex 4) can be used for additional detection of objects.

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 IO-LINK CONFIGURATION FOR SENSORS WITH A POTENTIOMETER**Variable "Adjustment" index=65 id=V_Control**

description: Selection of local / remote adjustment

data type: 8-bit UInteger

allowed values: 0 = Remote, 1 = Local

default value: 1

access rights: rw

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

Alternatively, setpoints can be defined via the potentiometer or the IO-Link configuration (remote).

Index 65 determines whether potentiometer or IO-Link is selected.

Values: 0=Remote, 1=Local.

The factory setting is 1=Local (potentiometer operation)



IMPORTANT! If the switching output needs to be set to pin 4 via IO-Link, the sensor has to be in the Remote setting.

**NOTE:**

The setpoint of the potentiometer can be read out with index 90.

9.7 PARAMETERS FOR THE SWITCHING OUTPUT (PIN 4)

9.7.1 SETPOINT FOR 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	1				Mode	Defines the evaluation mode for the switching signal SSC.
3	0	32-bit Integer	0 = 0, 5..99	0				Hysteresis	Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.

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

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



NOTE:

Index 62 determines setpoints SP1 and SP2 for SSC.2.



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

9.7.2 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).

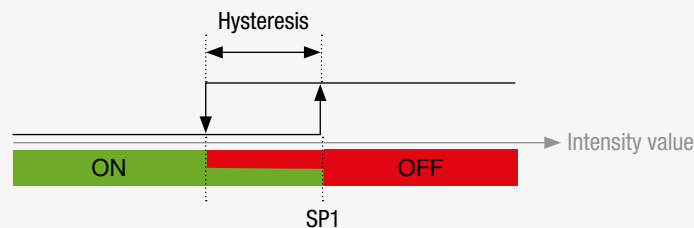
The factory setting is 0=High Active (NO)

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

The factory setting is 1=Single Point

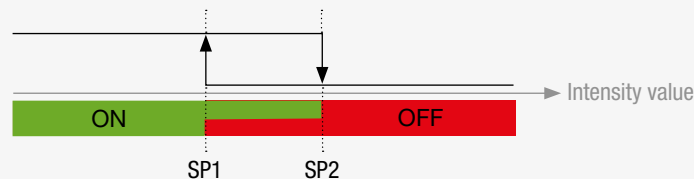
The preset value 1 = Single Point is suitable for object detection. If the intensity is less than SP1, the switching output is active. Unlike SSP "Single Point Mode for quantity detection", Single Point is inverted.



The value 2 = Two Point is suitable for monitoring limit values based on the intensity evaluation.

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

Unlike SSP "Two Point Mode for quantity detection", Two Point is inverted.



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



NOTE: The value 3 = Window is not feasible for retroreflective light barriers due to application reasons. Therefore, use of it is not recommended.

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

For SSC.1, the hysteresis can be set to % automatically (default/fine adjustment) or manually.

Value 0=Automatic hysteresis

The factory setting is 0 = Automatic hysteresis

9.7.3 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 9.8 Parameters for additional switching channel SCC.2, page 18.

9.7.4 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	

9.8 PARAMETERS FOR ADDITIONAL SWITCHING CHANNEL SCC.2

9.8.1 SETPOINT FOR SSC.2

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

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	0..1500	20				SP1	Defines the setpoint 1 value for the switching signal channel.
2	0	32-bit Integer	0..1500	1500				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.

The value range depends on the device variant.

Setpoint SP2 for switching output SSC.2 is defined with index 62, subindex 2.

The value range depends on the device variant.



IMPORTANT: If the switching function of index 63, subindex 2 is Window or Two Point, the value of setpoint SP2 must always be greater than the value of setpoint SP1.

9.8.2 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	0				Mode	Defines the evaluation mode for the switching signal SSC.
3	0	32-bit Integer	0 = 0, 5..99	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

The factory setting is 1=Single Point

Chapter 9.7.2 describes the function and graphically illustrates the different characteristics of the switching function.

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

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

Value 0=Automatic hysteresis

9.9 PARAMETERS FOR SENSOR FUNCTION

9.9.1 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=Default, 1=Precision

The factory setting is the default sensor mode; this can be used to detect fast moving objects.

Depending on the sensor mode, the following properties change:

- Switching frequency
- Measured value filter

	Switching frequency	Measured value
Standard	1000 Hz	Unfiltered
Precision	100 Hz	Median value 10

9.9.2 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 mode (e.g. for flashing light), 2,3=2 Sensor mode, 4,5,=3 Sensor mode

The factory setting is 0=Deactivated



NOTE:

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

9.10 PARAMETERS FOR MULTIFUNCTION INPUT AND OUTPUT AT PIN 2

Variable "Multi I/O (Pin 2)" index=71 id=V_OutputMode

description: Operation mode for Multi I/O (Pin 2)

data type: 8-bit UInteger

allowed values: 0 = Deactivated, 1 = Teach High active, 2 = Teach Low active, 3 = SSC.1 PP, 4 = SSC.1 NPN, 5 = SSC.1 PNP, 6 = SSC.2 PP, 7 = SSC.2 NPN, 8 = SSC.2 PNP

default value: 1

access rights: rw

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

In addition to the factory setting described in *Chapter 8.3 Adjusting the switching logic with input at PIN 2, page 10*, for changing the switching logic, index 71 can be used alternatively to configure pin 2 as a switching output or deactivate it completely. Index 71 can be used to parameterize the following additional functions:

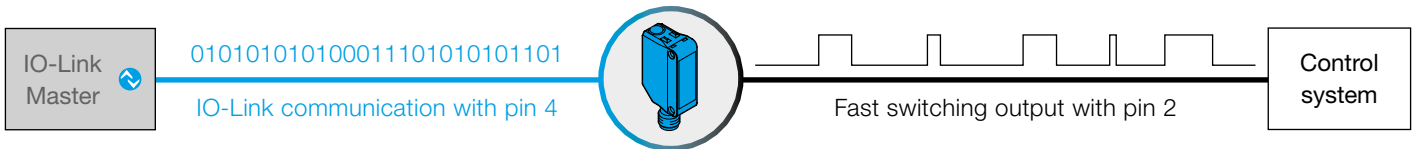
Value 0=Pin 2 is deactivated, 1=Input (High Active), 2=Input (Low Active)

Value 3,4,5=Parallel operation of (SSC.1) at pin 2 with IO-Link communication at pin 4, polarity alternatively PP, NPN or PNP

Value 6,7,8=Second additional switching output (SSC.2) at pin 2, polarity alternatively PP, NPN or PNP



NOTE: If pin 2 signals SSC.1, then the sensor can operate in parallel mode to transmit fast switching signals to pin 2 and IO-Link data to pin 4 simultaneously.



9.11 TEACH COMMANDS FOR IO-LINK

9.11.1 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.



IMPORTANT! If the switching output needs to be set to pin 4 with teach commands, the sensor has to be in the Remote setting. (Index 65, value 0)

9.11.2 TEACH BASED ON THE SMART SENSOR PROFILE



NOTE: Teach functions based on the Smart Sensor Profile are not feasible for application reasons. Therefore, use of them is not recommended.

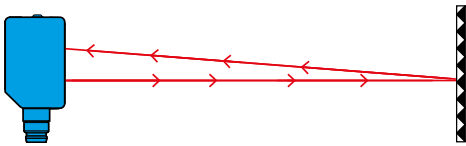
9.11.3 SPECIFIC TEACH FUNCTIONS

The sensor supports the following teach functions in particular.

Teach Reflector:

The sensor needs a clear view of the reflector for teaching in the setpoint. The setpoint is taught in as an intensity value and has a functional reserve for the teach value to the reflector. The setpoint is lower than the teach value.

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

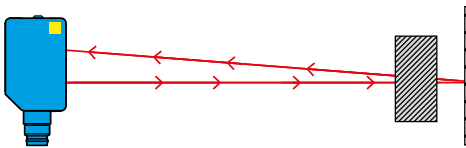


NOTE: Configure the appropriate switching channel and the Single Point switching function for Teach Reflector.

Teach Object:

The sensor needs an object between the sensor and reflector for teaching in the setpoint. The setpoint is taught in as an intensity value and has a functional reserve for the teach value. The setpoint is greater than the teach value.

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



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



IMPORTANT!

The "Teach Object" function can be critical for applicative reasons. After it is taught in, check the application.

9.12 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

9.12.1 BASIC DIAGNOSTIC FUNCTIONS OF SMART SENSOR PROFILE

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 at index 37

9.12.2 DEVICE-SPECIFIC DIAGNOSIS

Index 104: Functional reserve only for evaluating the signal in the damped state with an object, value 255: Complete damping, value 1: Low functional reserve value > 1: Increased functional reserve
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
Index 93: Sensor operating hours
Index 94: Number of switch-on processes
Index 95: Number of switching processes SSC1

9.13 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.

9.14 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 reflector and object	Optimize alignment of the sensor and reflector (see Chapter 5.3) Optimize sensor configuration with operating element or IO-Link
Sensor does not respond to operation with operating element	IO-Link Remote configuration active	Activate IO-Link potentiometer configuration (Local, index 65, value 1)
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 via IO-Link as input or set device to factory setting via IO-Link
Detection disrupted, multiple sensors are mounted near each other	Mutual interference	Increase the distance between the sensors Configure anti-crosstalk function via 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

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.

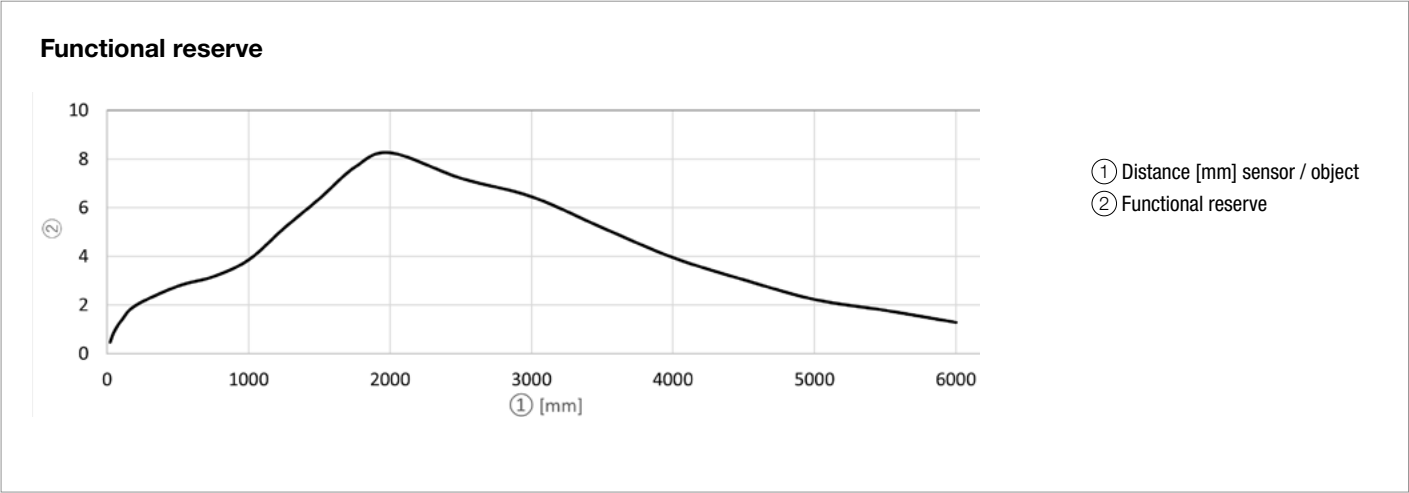
11.3 DISPOSAL

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

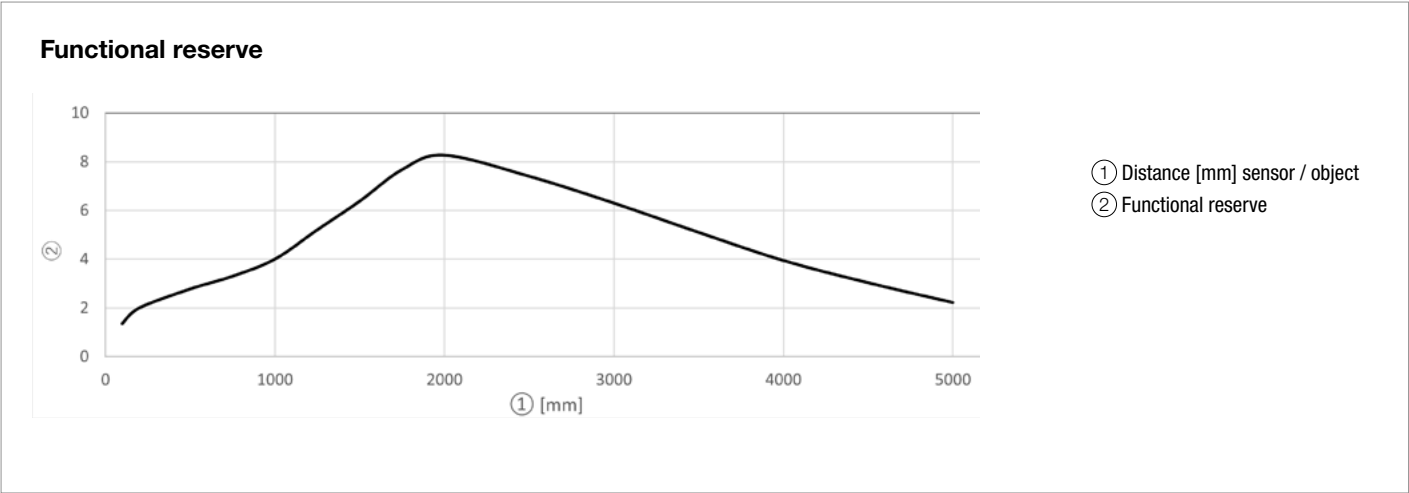
APPENDIX

TYPICAL FUNCTIONAL RESERVE (REFLECTOR R84)

OR3*-RMN

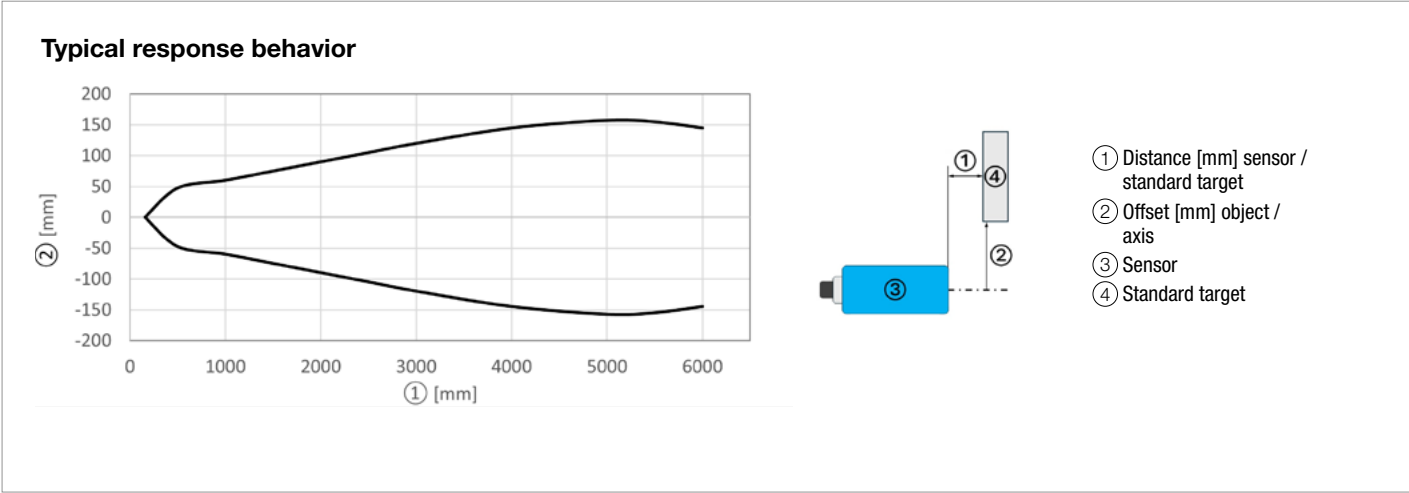


OR3*-RSN

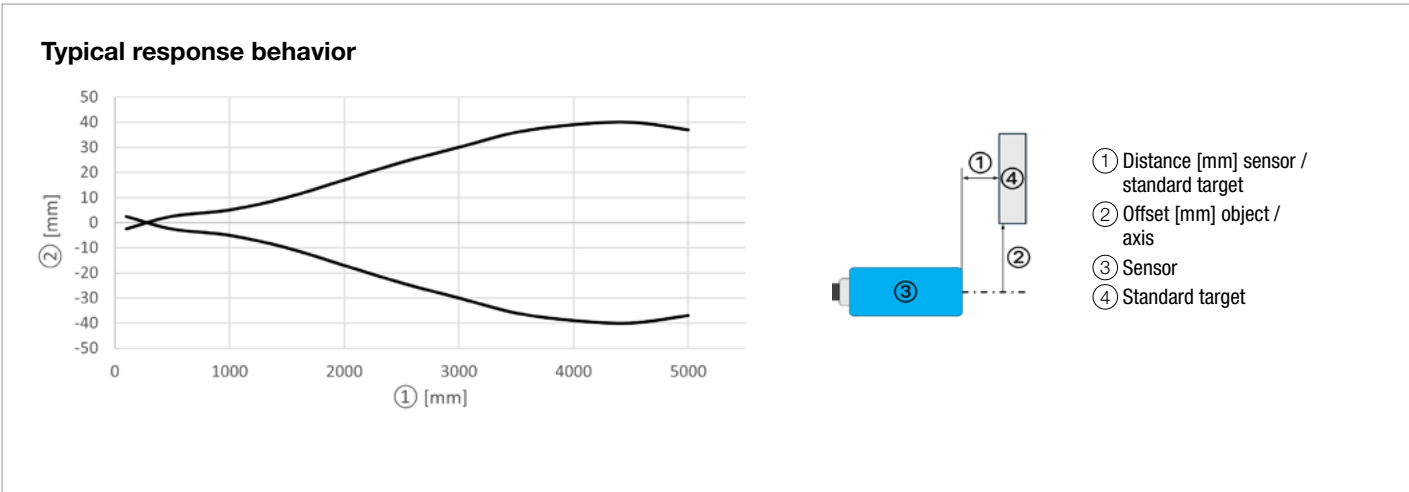


TYPICAL RESPONSE BEHAVIOR (WHITE 90%)

OR3*-RMN



OR3*-RSN



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