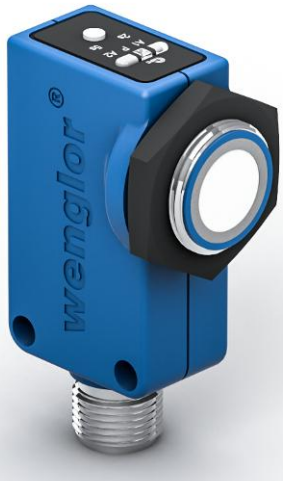
wenglor
the innovative family

Operating Instructions
U1RT003
Distance Sensor



EN

Translation of the original operating instructions
Subject to change without notice
Available as PDF file only
Version 2.0
www.wenglor.com

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1 General

1.1 Information Concerning these Instructions

- These instructions ensure the safe and efficient use of the product.
- These instructions are part of the product and must be retained for its entire service life.
- In addition, local accident prevention regulations and national occupational safety regulations must be observed.
- The product is subject to technical improvements, so the instructions and information in these operating instructions may also be subject to change. You can find the current version at www.wenglor.com in the product's download section.



INFORMATION

The operating instructions must be read carefully before use and kept for future reference.

1.2 Explanation of Symbols

- Safety precautions and warnings are emphasized by means of symbols and signal words.
- Safe use of the product is only possible if these safety precautions and warnings are adhered to.

The safety precautions and warnings are laid out in accordance with the following principle:

SIGNAL WORD

Type and source of danger!

Possible consequences in the event that the hazard is disregarded.

→ Measures for averting the hazard.

The meanings of the signal words, as well as the scope of the associated hazards, are listed below:



⚠ DANGER

This signal word indicates a hazard with a high degree of risk which, if not avoided, results in death or severe injury.



⚠ WARNING

This signal word indicates a hazard with a medium degree of risk which, if not avoided, may result in death or severe injury.



⚠ CAUTION

This signal word indicates a hazard with a low degree of risk which, if not avoided, may result in minor or moderate injury.



NOTICE

This signal word draws attention to a potentially hazardous situation which, if not avoided, may result in property damage.



INFORMATION

Information draws attention to useful tips and suggestions, as well as information on efficient, error-free use.

1.3 Limitation of Liability

- The product has been developed in consideration of the current state-of-the-art technology, as well as applicable standards and guidelines. Subject to change without notice.
- A valid declaration of conformity can be accessed at www.wenglor.com in the product's separate download area.
- wenglor sensoric elektronische Geräte GmbH (hereinafter referred to as "wenglor") excludes all liability in the event of:
  - Non-compliance with the instructions
  - Use of the product for purposes other than those intended.
  - Use by untrained personnel.
  - Use of unapproved spare parts.
  - Unapproved modification of products.
- These operating instructions do not include any guarantees from wenglor with regard to the described procedures or specific product characteristics.
- wenglor assumes no liability for printing errors or other inaccuracies contained in these operating instructions unless wenglor was verifiably aware of such errors at the point in time at which the operating instructions were prepared.

1.4 Copyrights

- The contents of these instructions are protected by copyright law.
- All rights are reserved by wenglor.
- Commercial reproduction or any other commercial use of the provided content and information, in particular graphics and images, is not permitted without previous written consent from wenglor.

2 For Your Safety

2.1 Use for Intended Purpose

ultrasonic distance sensors

This sensor is used for object detection and distance measurement.

Ultrasonic sensors transmit pulsed ultrasonic waves of a specific frequency through the transmission medium—air. The sensors evaluate the transit time of the ultrasonic waves reflected by the object. When the preset switching point is reached, the output switches.

This allows for the configuration of two independent switching outputs. Furthermore, the measured value can be output via IO-Link 1.1. In addition to reflective mode, two sensors can also be used in through-beam mode.

The product may only be used within the specified ambient conditions (see technical data on the product detail page www.wenglor.com). Furthermore, the guidelines, safety technology data, and approvals specified in the technical data [▶ 8] must be observed.

This Product Can Be Used in the Following Industry Sectors:

- Special-purpose mechanical engineering
- Heavy mechanical engineering
- Logistics
- Automotive industry
- Food industry
- Packaging industry
- Pharmaceuticals industry
- Plastics industry
- Woodworking industry
- Clothing industry
- Printing industry
- Consumer goods industry
- Paper industry
- Electronics industry
- Glass industry
- Steel industry
- Aviation industry
- Chemicals industry
- Alternative energies
- Raw materials extraction
- Construction industry
- Agriculture industry

2.2 Use for Other than the Intended Purpose

- Not a safety component in accordance with 2006/42/EC (Machinery Directive).
- The product is not suitable for use in potentially explosive atmospheres.
- The product may be used only with accessories supplied or approved by wenglor, or in combination with approved products. A list of approved accessories and combination products can be found at www.wenglor.com on the product detail page.



⚠ DANGER

Risk of personal injury or property damage in case of use for other than the intended purpose!

Use for other than the intended purpose may lead to hazardous situations.

→ Observe instructions regarding use for intended purpose.

2.3 Personnel Qualifications

- Suitable technical training is a prerequisite.
- In-house electronics training is required.
- Trained personnel who use the product must have (permanent) access to the operating instructions.

⚠ DANGER

Risk of personal injury or property damage in case of incorrect initial start-up and maintenance!

Personal injury and damage to equipment may occur.

→ Adequate training and qualification of personnel

2.4 Modification of Products

⚠ DANGER

Risk of personal injury or property damage if the product is modified!

Personal injury and damage to equipment may occur. Noncompliance may result in loss of the CE and/or UKCA mark and voiding of the warranty.

→ Modification of the product is not permitted

2.5 General Safety Precautions

INFORMATION

These instructions are an integral part of the product and must be kept on hand for the entire duration of its service life.

In the event of possible changes, the current version of the operating instructions can be found at www.wenglor.com in the product's separate download area.

Read the operating instructions carefully before using the product.

Protect the sensor against contamination and mechanical influences.

2.6 Approvals and protection classes

3 Technical Data

3.1 General Data

Ultrasonic Data	
Working range, reflex sensor	100...1200 mm
Working range, through-beam sensor	100...2000 mm
Reproducibility maximum	5 mm
Linearity Deviation	2 mm
Resolution	1 mm
Ultrasonic Frequency	240 kHz
Opening Angle	< 12 °
Service Life (T = +25 °C)	100000 h
Switching Hysteresis	1 % *

Electrical Data	
Supply Voltage	18...30 V DC
Current Consumption (Ub = 24 V)	< 30 mA
Switching frequency, reflex sensor	7 Hz
Switching frequency, through-beam sensor	7 Hz
Response time, reflex sensor	72 ms
Response time, through-beam sensor	72 ms
Temperature Range	-30...60 °C
Number of Switching Outputs	2
Switching Output Voltage Drop	< 2.5 V
Switching Output/Switching Current	100 mA
Synchronous Mode	up to 40 sensors
Short Circuit Protection	yes
Reverse Polarity Protection	yes
Overload Protection	yes
Lockable	yes
Interface	IO-Link V1.1/NFC
Data Storage	yes
Protection Class	III

Mechanical Data	
Setting Method	IO-Link NFC Teach input (for switching output) Teach-in (for switching output)
Housing Material	Plastic, PBT Plastic, ABS Brass, nickel-plated
Sensing face	Epoxy resin/glass bubble mixture Plastic, PBT Silicone
Degree of Protection	IP67 IP68
Connection Type	Plug variant
Connection	M12 × 1; 5-pin

Safety-relevant Data	
MTTFd (EN ISO 13849-1)	1558.4 a

General Data	
Scope of delivery	1 × initial start-up instructions 1 × MUTTER-M18-E012 hex nut 1 × sensor

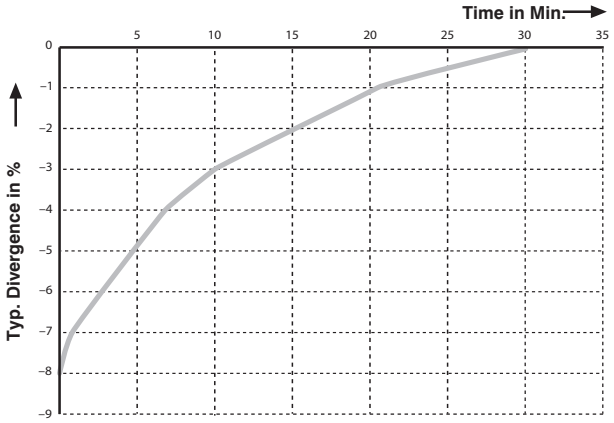
BMECat data	
eCl@ss 5.1.4	27-27-08-04 Ultrasonic distance sensor
eCl@ss 6.x	27-27-08-04 Ultrasonic distance sensor
eCl@ss 7.0	27-27-08-04 Ultrasonic distance sensor
eCl@ss 7.1	27-27-08-04 Ultrasonic distance sensor
eCl@ss 8.x	27-27-08-04 Ultrasonic distance sensor
eCl@ss 10.0.1	27-27-08-04 Ultrasonic distance sensor

3.2 Default Settings

Technical Specifications	
Sensor operating mode	Normal
Filter	0
Sonic cone	Standard
Process data type	Outputs and measured values
O1 Pin Function	switching output
O1 Teach mode	Foreground
O1, PNP/NPN	NPN
O1 NO/NC	NO
O1 Switching point	1200 mm
O1 Additional hysteresis	0 mm
O2 Pin Function	switching output
O2 teach-in mode	Foreground
O2 PNP/NPN	NPN
O2 NO/NC	NO
O2 Switching Point	1200 mm
O2 Additional Hysteresis	0 mm
I3 Function	teach-in input

3.3 Warm-Up Phase

The warm-up phase lasts roughly 30 minutes. At the beginning of the warm-up phase, linearity deviation and reproducibility may deviate from the specified values. During the warm-up phase, the values improve in the form of an exponential function until the values in the technical data are reached. The switch-on drift during this time is shown in the following diagram.



3.4 Mode-Dependent Data

Some technical specifications depend on the selected mode. Depending on the setting, the following specifications apply:

Reflex and Through-Beam Mode

Filter value	Switching frequency in Hz	Response time in ms
0	7.0	72
1	5.0	100
2	4.0	125
3	3.5	142
4	3.0	167
5	2.5	200
6	2.3	218
7	2.1	238
8	1.9	263
9	1.7	295
10	1.6	310
11	1.5	333
12	1.4	357
13	1.3	381
14	1.2	417
15	1.1	429
16*	1.1	429
17*	1.0	500
18*	0.9	572
19*	0.8	650
20*	0.5	1,000

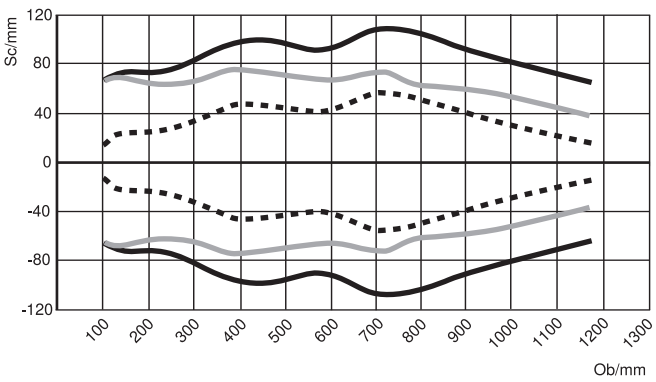
* The specified switching frequency and response time correspond to the maximum duration, including the interference filter. A detailed description of the filter function can be found in the “Sensor Functions” [▶ 19] section.

3.5 Sonic Cone Diagrams

Measurement of the sonic cone on a 100 × 100 mm plate

Characteristic curves show the position of the center or leading edge of the test object (100 × 100 mm plate) at the moment of switching.

U1RT002/U1RT003



Ob = object

Sc = sonic cone

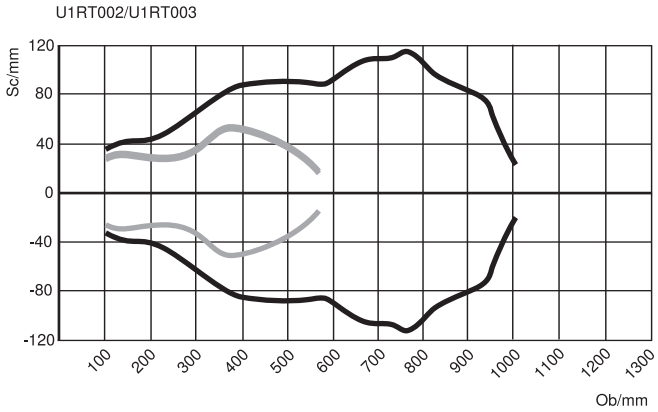
Standard sonic cone (center of the measurement object)

Extra-narrow sonic cone (center of the measured object)

Standard sonic cone (leading edge of the measurement object)

Measurement of the sonic cone on a rod with a diameter of 25 mm

Characteristic curves show the position of the center or leading edge of the test object (rod, Ø 25 mm) at the moment of switching.



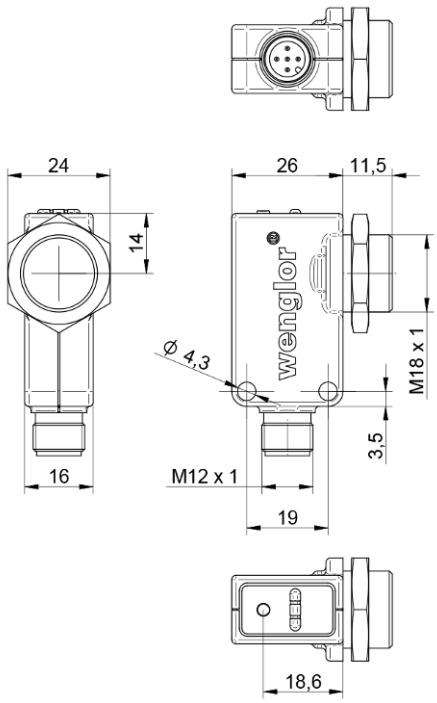
Ob = object

Sc = sonic cone

Standard sonic cone (center of the measurement object)

Extra-narrow sonic cone (center of the measured object)

3.6 Housing Dimensions

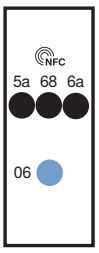


M3 screw = 0.5 Nm

Dimensions in mm (1 mm = 0.03937 inch)

3.7 Control panel

A 49

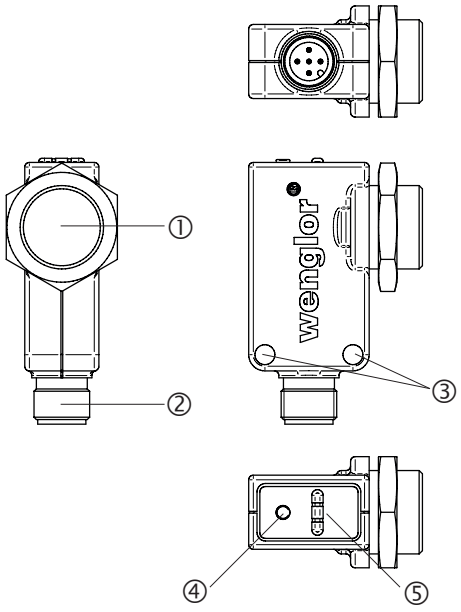


06 = Teach Button
5a = Switching Status Indicator, O1
68 = Power LED
6a = Switching Status Indicator, O2

3.8 Complementary Products

wenglor offers you the right connection and mounting technology as well as other accessories for your product. You can find this at www.wenglor.com on the product details page at the bottom.

3.9 Layout



① = sensing face
② = connector plug
③ = mounting holes
④ = teach-in key
⑤ = indicator LEDs

4 Transport and Storage

4.1 Transport

Upon receipt of shipment, the goods must be inspected for damage in transit. In the case of damage, conditionally accept the package and notify the manufacturer of the damage. Then return the device, making reference to damage in transit.

4.2 Storage

The following points must be taken into consideration with regard to storage:

- Do not store the product outdoors.
- Store the product in a dry, dust-free place.
- Protect the product against mechanical impacts.
- Protect the product against exposure to direct sunlight.



NOTICE

Risk of property damage in case of improper storage!

The product may be damaged.

→ Storage instructions must be complied with.

5 Installation and Electrical Connection

5.1 Installation

- Protect the product from contamination during installation.
- Observe the applicable electrical and mechanical regulations, standards, and safety rules.
- Protect the product from mechanical impact.
- Ensure that the sensor is mechanically secure during installation.
- Torque specifications must be observed (see the section “ Technical Data [▶ 8] ”).
- If the object has smooth surfaces, the angle between the axis of the sound waves and the surface of the object should be 90° ±3°. The angle can be considerably larger in the case of rough object surfaces.
- The active surface of the sensor may not contact any other machine parts.

INFORMATION

Observe the blind spot.

In the area between the sensor’s active surface and the beginning of its working range, correct functioning of the sensor is not assured. No objects may be located in this area.

	Object Position			switching output / Switching LED	error output / Error LED	measured value IO-Link
working range		x		defined	defined	defined
blind spot	x			undefined	undefined	undefined
Above working range			x	defined	defined	defined

NOTICE

Risk of property damage in case of improper installation!

The product may be damaged!

→ Comply with installation instructions.

⚠ CAUTION

Risk of personal injury or property damage during installation!

Personal injury and damage to the product may occur.

→ Ensure a safe installation environment.

5.2 Electrical Connection

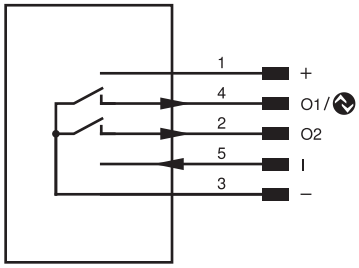
- Wire the sensor according to the connection diagram.
- Switch on the supply voltage (see section Technical Data [▶ 8]).
- The blue supply voltage indicator light comes on.

⚠ DANGER

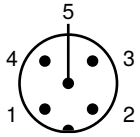
Risk of personal injury or property damage due to electric current.

Live parts may cause damage to persons and equipment.

→ The electrical device may only be connected by qualified personnel.



pin	Pin Function	Polarity	Circuit
1	Supply Voltage +		
2	Switching output 2	NPN	NO
3	Supply voltage 0 V		
4	Switching output 1 IO-Link	NPN	NO
5	input	High active	



1	brown	2	white
3	blue	4	black
5	gray		

5.3 Diagnosis

indicator	Condition	Meaning
Power LED P	☀	Sensor ready for operation
	○	No voltage supply available
Switching status indicator O1, O2	☀	Switching output active
	☀ (2.5 Hz)	Warning
	☀ (5 Hz)	Error
	○	Switching output not active

○ = Not lit

☀ = Lit continuously

☀ = Flashing

NOTICE

Required action in case of fault:

1. Shut down the machine.
2. Analyze and eliminate the cause of error with the aid of the diagnostics information.
3. If the error cannot be eliminated, please contact wenglor's support department.
4. Do not operate in case of indeterminate malfunctioning.
5. The machine must be shut down if the error cannot be definitively explained or properly eliminated.

⚠ DANGER

Risk of personal injury or property damage in case of non-compliance!

The system's safety function is disabled. Personal injury and damage to equipment may occur.

→ Required action as specified in case of fault.

5.4 Troubleshooting

Error	Possible cause	Elimination
Warning	Warning signal	• Reduce distance between sensor and object • Adjust angle of sensor to object
	Undervoltage	• Increase voltage supply to min. 18 V DC
Error	No signal	• Adjust sensor object distance • Minimize environmental influences (air circulation, ultrasonic sources) • Check installation
	Object too close	• Increase sensor object distance
	Object too far	• Decrease sensor object distance
	Short circuit	• Check the electrical wiring and eliminate the short circuit
	Over-temperature	• Disconnect the sensor from the supply voltage and allow it to cool
	Device error	• Disconnect the sensor from the supply voltage and restart it • Replace the sensor

Via IO-Link, it is possible to identify the respective causes precisely by means of condition monitoring. Further diagnosis functions and status messages are also possible. See section Condition Monitoring/Process Data [▶ 29].

NOTICE

Required action in case of fault:

1. Shut down the machine.
2. Analyze and eliminate the cause of error with the aid of the diagnostics information.
3. If the error cannot be eliminated, please contact wenglor's support department.
4. Do not operate in case of indeterminate malfunctioning.
5. The machine must be shut down if the error cannot be definitively explained or properly eliminated.



⚠ DANGER

Risk of personal injury or property damage in case of non-compliance!

The system's safety function is disabled. Personal injury and damage to equipment may occur.

→ Required action as specified in case of fault.

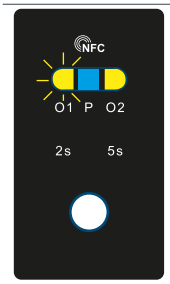
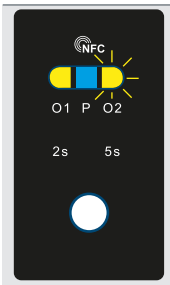
6 Settings

The sensor can be adjusted via teach-in, IO-Link, wTeach2 and weCon. The different setting options are outlined below.

6.1 Settings at the Touch of a Button / teach-in

teach-in

Three different teach-in modes are available: foreground teach-in, background teach-in, and window teach-in. These can be set via IO-Link (see section Parameters [▶ 29]) or using the teach-in key on the sensor. Please note that window teach-in must be performed exclusively via IO-Link and not via the buttons. Foreground teach-in is used by default.

	**Teach-in for O1** 1. Install the sensor according to the installation instructions. 2. Place the object in front of the sensor. 3. Press and hold the teach-in key for 2 seconds until the O1 LED begins to flash. 4. Release the teach-in key. 5. The distance is programmed, and the LED on O1 lights up to confirm successful programming.
	**Teach-in for O2** 1. Install the sensor according to the installation instructions. 2. Place the object in front of the sensor. 3. Hold down the teach-in key for 5 seconds until the O2 LED begins to flash. 4. Release the teach-in key. 5. The distance is programmed, and the LED on O2 lights up to confirm successful programming.

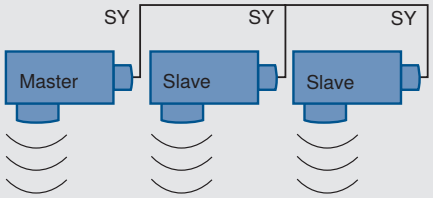
NOTICE

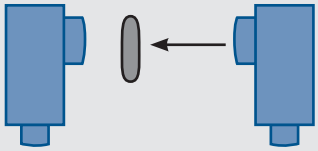
If there is no object in the measuring range, the switching distance is set to the end of the setting range.

7 Function Description

The functions described in the following section can be set via wTeach or IODD using IO-Link and also via the weCon app using NCF.

7.1 Sensor Functions

Function	Possible settings	Default setting
Localization	The LEDs O1 and O2 on the sensor can be set to flash. This makes it easy to locate the sensor in a system. **On** The LEDs O1 and O2 flash. **Off** LEDs in normal operation.	Off
Sensor Mode	**Normal** The sensor operates as a reflex sensor. **Synchronous Master Unit** **Synchronous Sub-Unit** To cover a larger area, up to 40 sensors can be used together in synchronous operation. The sensors emit pulsed ultrasonic signals simultaneously (synchronously). 1. Connect I3/pin 5 of all sensors to each other. 2. Set one sensor as the “Synchronous Master.” 3. Set all other sensors as “Synchronous Sub Units.”  **NOTE!** • Synchronous operation is only possible with the PNP output function. • In synchronous operation, both outputs O1 and O2 can still be used, since synchronization is handled exclusively via I3. **NOTE!** • For optimal measurement results, sensors in synchronous operation should have the same beam pattern settings. • The response time of the sensors increases in synchronous operation to 1.43 × the response time in normal mode (e.g., filters 0: response time in normal mode = 72 ms; response time in synchronous operation = 103 ms). **NOTE!** Synchronous operation is designed for direct wiring. **Through-beam sensor emitter** **Through-beam sensor** In addition to reflex mode, there is also one-way barrier mode.	Normal

<table>
<tr><th>Function</th><th>Possible settings</th><th>Default setting</th></tr>
<tr><td></td><td>This requires two sensors.
1. Configure one sensor as a “through-beam sensor.”
2. Configure another sensor as a “through-beam sensor receiver.”
3. If the receiver is configured as a NC contact, it switches when an object is located between the emitter and the receiver.

Technical specifications in through-beam mode:
Range: 1...2000 mm
Switching frequency: 7 Hz
Response time: 72 ms
In one-way barrier mode, it is possible to distinguish between one and two layers of thin materials such as paper and film.
1. Position the emitter and receiver close to each other.
2. Adjust the distance between the emitter and receiver so that the receiver continues to trigger when there is one layer but no longer triggers when there are two layers.
NOTE!
• Teach-in via the teach-in key is not possible in single-beam mode.
• Adjustments can be made by changing the distance between the emitter and receiver and by adjusting the beam width setting on the emitter.
• For distances of 1...100 mm, the sonic cone must be set to “Extra Narrow”
• The influence of reflections from the surroundings (e.g., when detecting gaps) can be minimized by setting the sonic cone width to “Narrow” or “Extra Narrow.”</td><td></td></tr>
<tr><td>filters</td><td>The selected filter affects the response time (see the Technical Data [▶ 8] section) and the number of distance values that are evaluated.
<table>
<tr><th>filters</th><th>Description</th></tr>
<tr><td>0–15</td><td>Median filter
Median filter based on the specified number of measured values. An error is output if the signal is missing or invalid.
This filter can provide additional signal smoothing in applications involving objects with a homogeneous surface in a stable environment.</td></tr>
<tr><td>0</td><td>Median filter based on 2 measured values</td></tr>
<tr><td>1</td><td>Median filter based on 3 measured values</td></tr>
<tr><td>2</td><td>Median filter based on 4 measured values</td></tr>
<tr><td>3</td><td>Median filter based on 5 measured values</td></tr>
<tr><td>4</td><td>Median filter based on 6 measured values</td></tr>
<tr><td>5</td><td>Median filter based on 7 measured values</td></tr>
<tr><td>6</td><td>Median filter based on 8 measured values</td></tr>
<tr><td>7</td><td>Median filter based on 9 measured values</td></tr>
</table></td><td>0</td></tr>
</table>

8	Median filter based on 10 measured values
9	Median filter based on 11 measured values
10	Median filter based on 12 measured values
11	Median filter based on 13 measured values
12	Median filter based on 14 measured values
13	Median filter based on 15 measured values
14	Median filter based on 16 measured values
15	Median filter based on 17 measured values
16–20	Special filters based on a specified number of measured values, with missing values interpolated. The additional interference filter helps improve measurement reliability during brief disturbances in the measurement path. Waves, air vortices, sound-absorbing areas, or bulk material can briefly generate invalid signals that may lead to measurement errors. A higher level of filters causes interference signals to be ignored for a defined period of time. In the event of continuous changes in distance, the response time remains unchanged when the filters are activated.
16	Filters based on 18 measured values and interpolation of 4 missing measured values (112 ms)
17	Filters based on 21 measured values and interpolation of 7 missing measured values (196 ms)
18	Filters based on 24 measured values and interpolation of 15 missing measured values (420 ms)
19	Filters based on 27 measured values and interpolation of 31 missing measured values (868 ms)
20	Filters based on 28 measured values and interpolation of 62 missing measured values (1.7 ms)
NOTE! The technical data resulting from the various modes is specified in the section “ Technical Data [▶ 8].”	

Transmission Signal	The sensor’s transmission signal can be turned off. This allows the sensor to be deactivated when not in use and helps prevent interference. **On** Transmission signal is on. **Off** Transmission signal is off. No measurement is taking place. The switching behavior is identical to that when no received signal is present in reflex mode or when used as a through-beam sensor.	On
sonic cone	This setting allows you to adjust the shape and range of the sonic cone. The diagrams for the individual sonic cones on standardized objects can be found in the sonic cone diagrams [▶ 10]. Narrow cones can be used to suppress constant interference in the measurement path (e.g., tank walls). **Standard** **Narrow** **Extra Narrow**	Standard
Measured Value Unit (Process Data Type)	The measured distance can be displayed in millimeters or inches. **Millimeters**	Millimeters

	Output of distance values in mm with internal temperature compensation or external temperature compensation via the parameters **Inches** Output of distance values in 1/10 inch with internal temperature compensation or external temperature compensation via the parameters **Millimeters (with external temperature)** Output of distance values in mm and input of external temperature via Process Data Out **Inch (with external temperature)** Output of distance values in 1/10 inch and input of external temperature via Process Data Out	
Temperature Mode	The sensor features internal temperature compensation. Alternatively, the temperature can be measured externally and sent to the sensor as a process variable or parameter. **Internal** The sensor operates with internal temperature compensation. **External** The sensor operates with external temperature compensation and uses the transmitted process or parameter data [▶ 29] (see the “Condition Monitoring/Process Data” [▶ 29] section). Whether process or parameter data is used is determined by the setting under “Measured Value Unit: Process Data Type.”	Internal
External Temperature	Temperature values can be transmitted to the sensor with a resolution of 1 °C for temperature compensation. Parameter is used when external temperature compensation is to be performed via the parameters. **–30…+60 °C** **NOTE!** Regular updating of the external temperature data is recommended to prevent temperature spikes and resulting fluctuations in the measurement result. If no temperature value is transmitted when the sensor starts up in external temperature mode, the default value of 23 °C is used.	23 °C

7.2 Input/output functions (I/O)

7.2.1 Pin Function

The Pin function is used to define the function of pins I/O1, I/O2, and I3, since these can be used for different functions.

pin	Possible Settings	Default
I/O1	**switching output** The switching output is assigned to switching point SSC1. **error output** The error output activates when one of the assigned errors occurs; see the "Status Messages [▶ 26]" table. **Warning output** The warning output activates when one of the assigned warnings occurs; see the "Status Messages [▶ 26]" table. **Transmit Signal Off Input**	switching output

pin	Possible Settings	Default
	For an explanation, see I3. **teach-in input** See I3 for explanation. **Disabled** The pin is disabled.	
I/O2	**switching output** The switching output is assigned to the switching point SSC2. **Antivalent switching output** The switching output operates in antivalent mode with switching output O1. **error output** The error output activates when one of the assigned errors occurs; see the"Status Messages [▶ 26]" table. **Warning output** The warning output activates when one of the assigned warnings occurs; see the "Status Messages [▶ 26]" table. **Transmit Signal Off Input** For an explanation, see I3. **teach-in input** See I3 for explanation. **Disabled** The pin is disabled.	switching output
I3	**Transmit Signal Off Input** The sensor's transmitter light is deactivated as long as the input is active. The sensor then does not provide a measured value and sets the status to "No signal." **teach-in input** teach-in The outputs can be configured using the same procedure as with the teach-in key (see the section "Configuration via Button Press / Teach-in" [▶ 18]). An activated input corresponds to a pressed teach-in key. **Lock** If the teach-in input is permanently set to 18...30 V DC, the teach-in key remains locked and protected against unintentional adjustment for as long as the input signal is present. **Synchronous Input/Output*** The input is used for communication between the interconnected sensors. **Disabled** The pin is disabled.	Transmit Signal Off Input

7.3 Output Functions

The output functions are used to set the physical outputs.

Digital Outputs

Function	Possible settings	Default
Polarity	**PNP** **NPN** **Push-pull**	PNP
Circuit	**NO** Light switching (Normally Open) The output is high when the condition has been satisfied, depending on settings (switching point, warning, error). **NC** Dark switching (normally closed) The output is low when the condition has been fulfilled depending on the setting (switching point, warning, error).	NO
On-delay	**0…10,000 ms**	0 ms
Off-delay	**0…10,000 ms**	0 ms

7.4 Input Functions

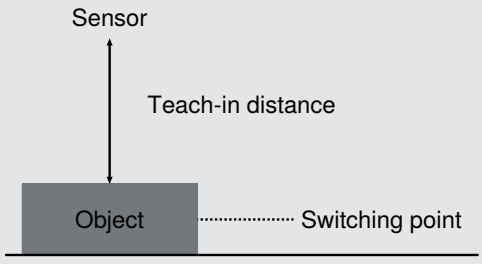
The input functions are used to set the physical inputs.

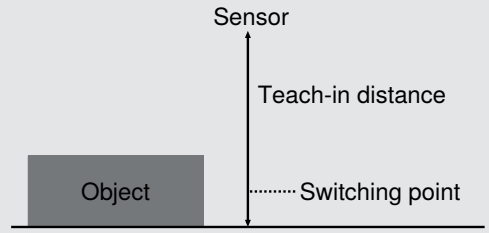
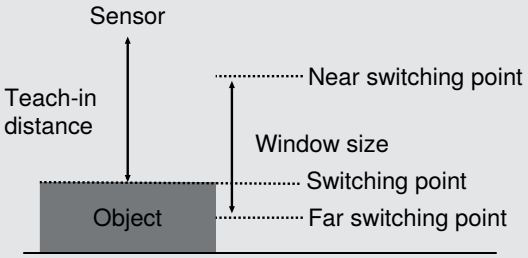
Function	Possible settings	Default
Input mode	**Supply voltage active** Function is triggered as soon as supply voltage is applied to the input. **Supply voltage inactive** Function is triggered as soon as 0 V is applied to the input or the input is opened.	Supply voltage active

7.5 Switching Point Functions (SSC1/SSC2)

The two switching points, SSC1 and SSC2, are set using the switching point functions.

SSC1 is assigned to output O1 and SSC2 is assigned to output O2.

Function	Possible settings	Default
Teach-in	Starts the teach-in process.	
teach-in-mode	**foreground teach-in**  **background teach-in**	foreground teach-in

Function	Possible settings	Default
	 **window teach-in** 	
switching point	**100…1200 mm**	1,200 mm
Near window switching point	**100…1200 mm**	100 mm
Window switching point (far)	**100…1200 mm**	100 mm
Additional hysteresis	**0…500 mm** Hysteresis is the difference between the on and switch-off points. The sensor has a minimum hysteresis of 1% of the switching distance, but at least 2 mm. This cannot be changed. An additional hysteresis in mm can be set for each switching point. The total hysteresis is calculated as internal switching hysteresis (1%) + additional hysteresis. The sum of the switching point, hysteresis, and additional hysteresis must not exceed the sensor's maximum measuring range.	0 mm

7.6 Condition Monitoring Functions

7.6.1 Status Message Function

The sensor provides various status messages. Due to the process data structure, four status messages can be transmitted as individual process data.

These parameters can be used to set the status messages that are transmitted via the process data.

Function	Possible Settings	Default
Message 1	See Table: Status Messages	Warning Signal
Message 2	See Status Messages Table	Short Circuit
Message 3	See Status Messages Table	Undervoltage
Message 4	See Status Messages Table	No Signal

7.6.2 Warning/Error Output Function

For both the warning output and the error output, you can define the status messages that will be used to trigger the collective message. The status messages are OR-linked, so that the output is activated when any one of the defined status messages is triggered.

Function	Possible Settings	Default
Warning output	See table “Status Messages”	Warning signal, undervoltage
error output	See Status Messages Table	No signal, object too close, object too far, short circuit, device error

Status Messages

Warning	
Undervoltage	The supply voltage is too low.
Signal Warning	The object reflects too little sound (weak signal).
Emitter Off	The sensor's emitter is turned off.

Error	
Short circuit	A short circuit has occurred on at least one pin.
No Signal	The sensor is not receiving a signal. This error can occur, for example, due to: • Strong air turbulence • Ultrasonic sources that are too strong within the measuring range • There are very small or poorly reflecting (sound-absorbing) objects in the working range • Incorrect installation
Object too close	The object is below the setting range or the set measuring range.
Object too far	The object is above the setting range or the set measuring range.
Device error	A hardware error has occurred. For safety reasons, the emitted light is switched off.

7.6.3 Simulation Functions

This function simulates the behavior of the sensor regardless of its current status and measured value. This allows you to check whether a system in which the sensor is integrated responds correctly to the data supplied by the sensor and processes it accordingly.

If a measured value is specified, the sensor behaves as if the specified measured value corresponds to the actual measured value. This means that the behavior of the outputs and status messages is simulated according to the specified measured value.

In addition, the individual outputs and status messages can be simulated separately from the measured value.

Function	Possible settings	Default
Simulation mode	On Off	Off
Simulation measured value	Current measured value Min...max. measuring range	Current measured value
Simulation SSC1	According to the measured value On Off	According to measured value
Simulation SSC2	According to the measured value On Off	According to measured value
Simulation status messages	Tests the individual status messages According to the measured value	According to measured value

Function	Possible settings	Default
	On Off	

INFORMATION

The O1 output is used for IO-Link communication in this function and cannot be simulated.
Simulation mode is automatically terminated as soon as the voltage supply is interrupted.

8 NFC

The devices can be set up and their parameters can be configured via the NFC interface with the aid of a smartphone and the wenglor “weCon” app. Process data cannot be read out via NFC but are available via IO-Link.

You can download the wenglor app free of charge from the Google Play Store or the App Store. Download the app and follow the installation instructions.

Scan the code below to go directly to the wenglor app.

The settings are defined via the app and are then transmitted to the sensor. With the “Read” or “Write” mode activated, hold the smartphone’s antenna just above the sensor’s active NFC sensing surface.

INFORMATION

NFC antenna position

The position of the NFC antenna varies from smartphone to smartphone.

The exact position of the antenna can be found in the operating instructions

If a connection isn’t established immediately, move the smartphone across the active surface until connection is successful,

The sensor does not necessarily have to be connected to the supply voltage for data transmission; that is to say, transmission is also possible in a de-energized state. The only exception is the “Reset” function. This requires a connection to the supply voltage.

9 IO-Link

The sensors can exchange parameters and process data via IO-Link. The parameters can be used to make many additional settings on the device. The process data transmit cyclical data and condition monitoring.

To this end, the sensor is connected to a suitable IO-Link master (see product detail page/complementary products). The interface protocol and the IODD can be found at www.wenglor.com in the download area for the respective product.

9.1 Parameters

The parameters that can be configured via IO-Link are given in the functional description in the section Function description [▶ 19].

9.2 Condition Monitoring/Process Data

The data described in the following section can be read or written cyclically via IO-Link/process data.

9.2.1 Process Data In

Data	Meaning
Measured value	Measured distance in mm or 1/10 inch As the sensor cannot determine a measured value in the following error cases, substitute values are read out: No signal: 0x7FFC / 32764 mm Object too close: 0x8008 / –32760 mm Object too far: 0x7FF8 / 32760 mm
Scale	Scaling of the measured value to the base length unit; –3 corresponds to mm.
SSC1	Switching point 1
SSC2	Switching point 2
Warning	Collective warning in the event of one of the warning status messages (see table “Status messages”) in the error output function)
Error	Collective warning in the event of one of the error status messages (see table “Status messages”) in error output function.
Message 1	Status message 1 read out see Status Message Function [▶ 25]
Message 2	Status message 2 read out see Status Message Function [▶ 25]
Message 3	Status message 3 read out see Status Message Function [▶ 25]
Message 4	Status message 4 read out see Status Message Function [▶ 25]

9.2.2 Process Data Out

Data	Meaning
Transmission signal	Transmit signal on/off
Teach-in SSC1	Starts the teach-in process for SSC1
Teach-in SSC2	Starts the teach-in process for SSC2
External temperature value	Enter the external temperature in °C for temperature compensation
Localization	Sensor flashes for easy sensor location

9.2.3 Events

Events are diagnostic information that is standardized by IO-Link and exchanged between the IO-Link master and the device. The following events are supported:

Name	Event code	Type	Specification
Device error – unknown error	0x1000	Error	IO-Link
Short circuit – check installation	0x7710	Error	IO-Link
Supply voltage too low – check tolerances	0x5111	Warning	IO-Link

10 wTeach2 Configuration Software

For information on installing and connecting the wTeach2 software and its structure, as well as information on the general functions, see the wTeach2 operating instructions. They can be found online in the download area at www.wenglor.com under order number DNNF005.

11 Maintenance Instructions



NOTICE

This wenglor product is maintenance-free.

Cleaning and inspection of the plug connections at regular intervals are advisable.

Do not clean the product with solvents or cleaning agents that could damage the product.

The product must be protected against contamination during initial start-up.

12 Proper Disposal

wenglor sensoric GmbH does not accept the return of unusable or irreparable products. Respectively valid national waste disposal regulations apply to product disposal.

13 Declarations of Conformity

Declarations of conformity can be found on our website at www.wenglor.com in the product's separate download area.