

ODX402P0088/0099

ODXS960/959

Fiber Optic Cable Sensor



Operating Instructions

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1. Proper Use

This wenglor product is used in accordance with the following mode of operation:

Both plastic fiber optic cables and glass fiber optic cables can be connected to fiber optic cable sensors. Universal reflex sensors can be used both with and without fiber optic cables. Fiber optic cable sensors analyze the light reflected by the object. The output switches when an object reaches the selected range (detection) or when the active light beam is interrupted (operating limits). Bright objects reflect more light than dark objects, and can thus be recognized from greater distances. In barrier operation, the color of the object has no effect on the range.

2. Safety Precautions

- This operating instruction is part of the product and must be kept during its entire service life.
- Read this operating instruction carefully before using the product.
- Installation, start-up and maintenance of this product has only to be carried out by trained personnel.
- Tampering with or modifying the product is not permissible.
- Protect the product against contamination during start-up.
- Not a safety component in accordance with the EU Machinery Directive.

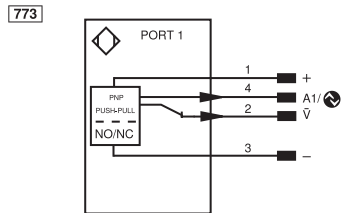
3. General Information Regarding the Product

Three wenglor fiber optic cables can be adapted to these Sensors. Up to 12 add-on modules can be connected to this basic module, making 15 fiber optic cables available. The modern OLED display assures easy, menu-driven Sensor setup. Signal strengths and the switching threshold can be read from the display as numeric values or as a bar graph. Convenient programming and quick diagnosis is possible via the IO-Link interface.

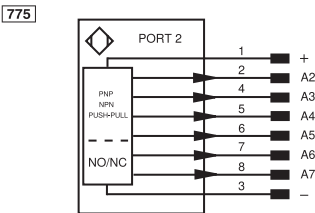
4. Product Features

4.1. Connection Diagrams

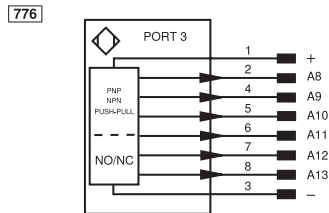
Plug number 1



Plug number 2



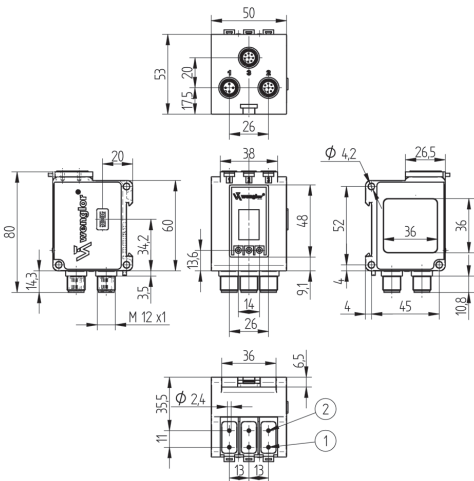
Plug number 3



- + Supply Voltage “+”
- A/⚡ Switching Output (1, 2, 3...)/IO-Link
- A Switching Output (1, 2, 3...)
- ⚡ Contamination Output/Error Output (NC)
- Supply Voltage “0 V”

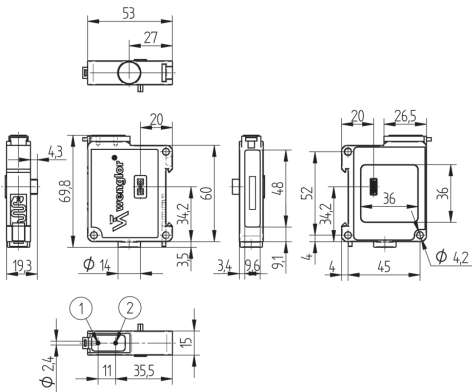
4.2. Housing Dimensions

ODX402P0088

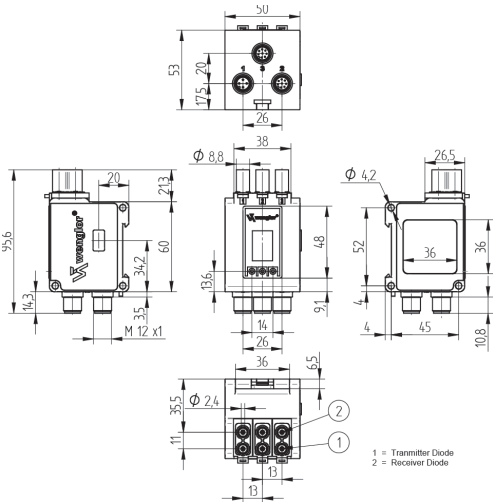


- 1 =Transmitter Diode
- 2 =Receiver Diode

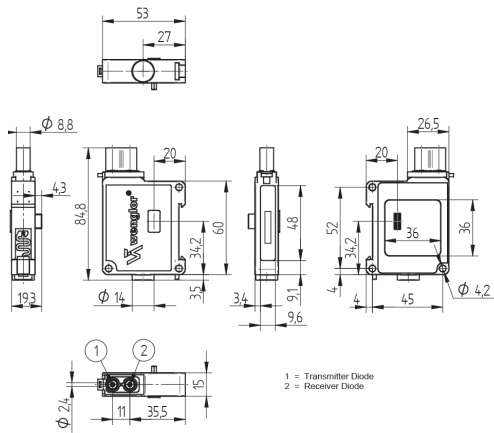
ODX402P0099



ODXS959



ODXS960



4.3. Declarations of Conformity

The declarations of conformity can be found on our website at www.wenglor.com in download area.



4.4. Technical Data

| | ODX402P0088 | ODXS959 | ODX402P0099 | ODXS960 |
|------------------------------------|----------------------------|-------------|----------------------------|-------------|
| Switching Hysteresis | < 15 % | | < 15 % | |
| Light Source | Red Light | | Red Light | |
| Wave Length | 660 nm | | 660 nm | |
| Service Life (Tu = 25 °C) | 100000 h | | 100000 h | |
| max. Ambient Light | 10000 Lux | | 10000 Lux | |
| Supply Voltage | 18...30 V | | --- | |
| Current Consumption (Ub = 24 V) | < 70 mA | < 90 mA | + 10 mA | + 20 mA |
| Switching Frequency | 2 kHz | | 2 kHz | |
| Response Time | 250 µs | | 250 µs | |
| ON-/OFF-Delay | 0...10000 ms | | 0...10000 ms | |
| Temperature Drift | < 10 % | | < 10 % | |
| Temperature Range | -25...60 °C | -25...50 °C | -25...60 °C | -25...50 °C |
| Switching Output Voltage Drop | < 2,5 V | | < 2,5 V | |
| Switching Output/Switching Current | 100 mA | | 100 mA | |
| Short Circuit Protection | Yes | | Yes | |
| Reverse Polarity Protection | Yes | | Yes | |
| Overload Protection | Yes | | Yes | |
| Teach Mode | NT, MT, ZT, DT, TP, HT, FT | | NT, MT, ZT, DT, TP, HT, FT | |
| Adjustment | Menue (OLED) | | Menue (OLED) | |
| Housing | Plastic | | Plastic | |
| Degree of Protection | IP50 | | IP50 | |
| Connection | M12×1; 4+8-pin | | M12×1; 4+8-pin | |
| Protection Class | III | | III | |
| DIN-Rail mounting | 35 mm | | 35 mm | |
| PNP NO | Yes | | Yes | |

4.5. Contamination Output

The contamination output functions as a normally closed contact (NC) and is switched off as soon as at least one of the connected sensors is being operated within the unreliable range.
Unreliable range: contamination, misalignment

4.6. Complementary Products (see catalog)

wenglor offers Connection Technology for field wiring.

2

S02

1

4

3

2

BN

BK

BU

WH

89

S74

2

1

6

5

4

3

7

8

WH

BN

PK

GY

BK

BU

VT

OG

S

Suiting Connection Technology No.
(ODXS959, ODX402P0088)

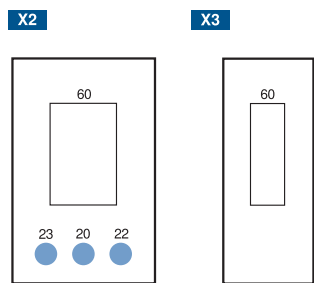
Glass Fiber Optic Cable

IO-Link Master

Plastic Fiber Optic Cable

Add-on Module ODX402P0099, ODXS960

4.7. Control Panel



- 20 = Enter Button
- 22 = Up Button
- 23 = Down Button
- 60 = Display

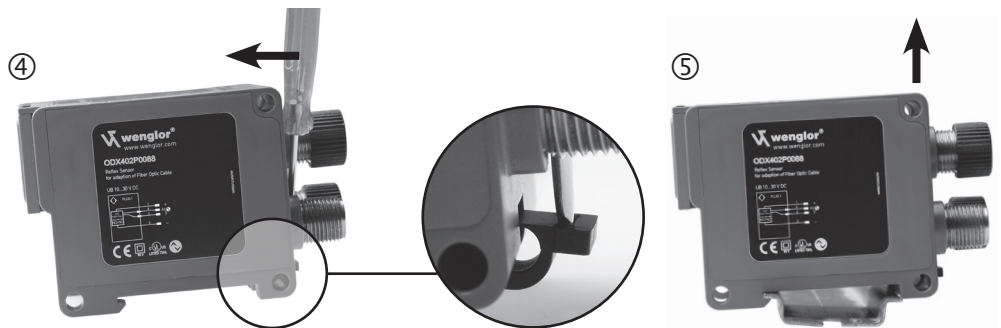
4.8. Installation Instructions

All applicable electrical and mechanical regulations, standards and safety precautions must be adhered to when installing and operating the Sensor. The Sensor must be protected against mechanical influences. Install the device such that its installation position cannot be inadvertently changed.

4.8.1 Mounting to a DIN rail



Fig.1 Mounting of the Sensor to a DIN rail



4.8.2 Side mounting

Side mounting a unit: Secure the Sensor with screws (M4) through the mounting holes.



Fig. 2 Side mounting of the Sensor

4.8.3 Connecting the plastic fibre-optic cable

- Please cut the plastic fibre-optic cable once before using with the Z0015 cutting tool.
- Open the mounting slide with a screwdriver (see fig. 3-1)
- Insert the light cable into the opening provided to this end (see fig. 3-2)
- Close the mounting slide (see fig. 3-3)



Fig. 3 Connecting the plastic fibre-optic cable

5. Initial Start-Up

Before the configuration, connect plug no. 1 and/or 2 and/or 3, depending on which outputs you need (view chapter [“Connection Diagrams” on page 4](#)).

Note: If more than one plug is used, only one Supply Voltage can be used. The desired menu language must be selected after initial start-up, and after each reset (see chapter [“Display” on page 19](#) in this regard).

Switch to the configuration menu by pressing any key.

Note: If no settings are adjusted in the configuration menu for a period of 30 seconds, the Sensor is automatically returned to the display mode.

The Sensor accesses the last used menu view when a key is once again activated. If a setting is configured, it becomes active when the configuration menu is exited.

The keys are used for navigation, and for configuring settings. The functions of the navigation keys vary from menu to menu. The functions of the keys appear in the display as follows:

- ▲ : Navigate up.
- ▼ : Navigate down.
- ◀ Back: Move up one level within the menu.
- ◀◀ Run: Switch to the display mode.

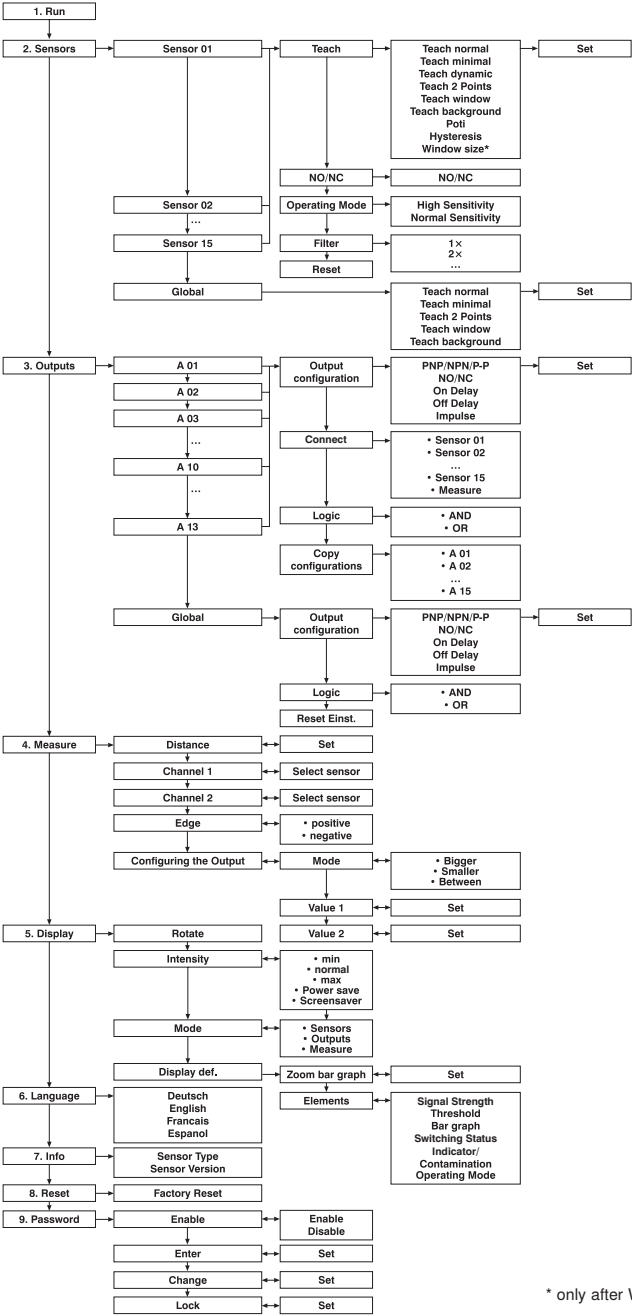
Selection is acknowledged with the enter key.

Important: Do not use any sharp objects to press the keys when configuring settings, because they might otherwise be damaged.

5.1. Overview of functions

| Description | Function | Page |
|-------------|---|------|
| Run | Switch to display mode | 12 |
| Sensors | Configuring of the Sensors | 12 |
| Outputs | Select output function | 15 |
| Measure | Configuration of the Speed Measurement Function | 17 |
| Display | Select display characteristics | 19 |
| Language | Select the desired menu language | 20 |
| Info | Read out information regarding the Sensor | 20 |
| Reset | Return to default settings | 20 |
| Password | Protection against unauthorized changes to settings | 21 |

5.2. Menu Structure

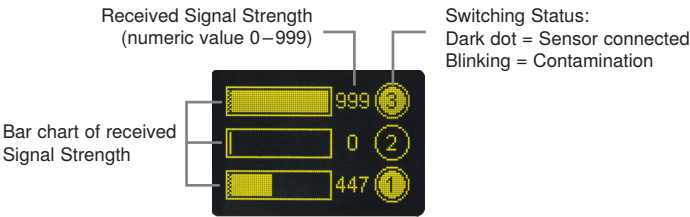


* only after Window Teach

6. Settings

6.1. Run


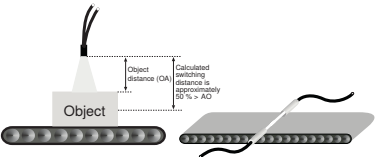
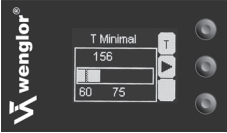
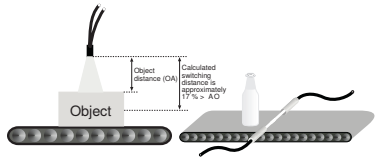
The Sensor is switched to the display mode when the enter key is pressed.

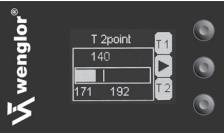
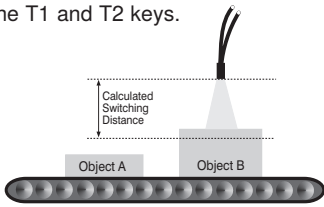
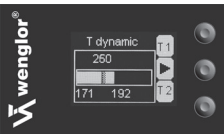
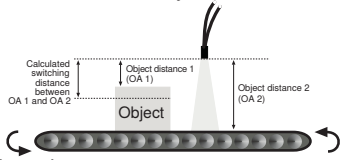
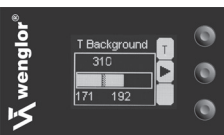
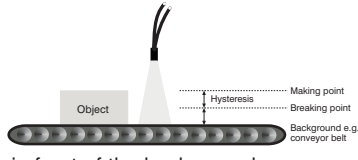
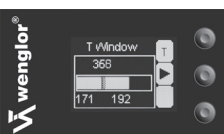
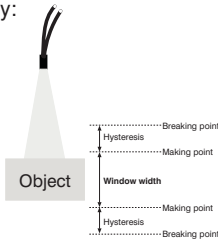
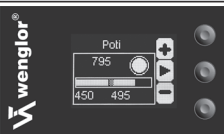



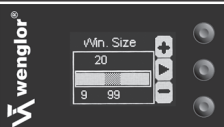
6.2. Sensors

In the menu Sensors the connected Sensors are configured. Therefor select one of the connected Sensors, or all Sensors (Global) with the navigation keys and the enter key. The Sensor(s) then can be configured.

6.2.1 Teach-In

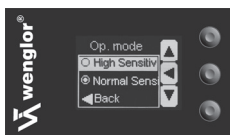
| Function | Description |
|--|--|
| T Normal | Normal Teach-In |
|  | <div>The object is taught in by pressing the T key:</div> <ul style="list-style-type: none">Align the spot to the object.Briefly press the T key.→ The switching distance to the object is set.If necessary, readjust the switching distance with the help of the “Potentiometer” menu item.  |
| T Minimal | Minimal Teach-In/Glass recognition |
|  | <div>The object is taught in by pressing the T key:</div> <ul style="list-style-type: none">Align the spot to the object.Briefly press the T key.→ The switching distance to the object is set.If necessary, readjust the switching distance with the help of the “Potentiometer” menu item.  |
| T 2-Point | Two-Point Teachin |

| | |
|--|---|
|  | <p>To two objects are taught in by pressing the T1 and T2 keys.</p> <ul style="list-style-type: none"> Align the spot to object A. Briefly press the T1 key. Align the spot to object B. Briefly press the T2 key. <p>→ The switching point is automatically set between the signal strength from objects A and B.</p>  |
|  | <p>Dynamic Teach-In</p> <p>The Sensor enters a recording phase when the T1 key is pressed, and the minimum and maximum signal strength is saved to memory.</p> <ul style="list-style-type: none"> Align the spot to the background (e. g. conveyor belt). Briefly press the T1 key. Move objects through the light beam. Briefly press the T2 key. <p>→ The switching point is set automatically between the minimum and maximum signal strength saved to memory during the recording phase.</p>  |
|  | <p>Background Teach-In</p> <p>The background is taught in by pressing the T key, like this a quasi background suppression is possible:</p> <ul style="list-style-type: none"> Align the spot to the background (e. g. conveyor belt). Briefly press the T key. <p>→ The Switching Point is set slightly in front of the background.</p>  |
|  | <p>Window Teach-In</p> <p>A window tolerance is taught in by pressing the T key:</p> <ul style="list-style-type: none"> Align the spot to the object. Briefly press the T key. <p>→ Tolerance window is set up around the switching point. The window width value and hysteresis are both adjustable (see below). If the object is located within the window width, the Sensor is switched. The lower and the upper switching thresholds are displayed alternately while the window is being taught in.</p>  |
|  | <p>Readjusting Switching Distance</p> <p>Switching distance can be readjusted by pressing the + or – key.*</p> |
| <p>Hysteresis</p> | <p>Adjusting Switching Hysteresis</p> |


| | |
|--|--|
|  | <p>The hysteresis value is adjusted by pressing the + or – key.* Normal Sensitivity: Minimum value: 20, maximum value: 200 High Sensitivity: Minimum value: 45, maximum value: 200</p> |
|  | <p>Setting Window Width</p> <p>(only adjustable after window teach-in) Window width is selected by pressing the + or – key. *Minimum value: 25, maximum value: 500</p> |

* Press and hold the + or – key in order to scroll quickly through the numbers.

6.2.2 Configuring the Operating Mode

| Function | Description |
|--|---|
| <p>Operating Mode</p>  | <p>Configuration of the Sensitivity</p> <p>By pressing the key ▲ and ▼ the desired operating mode is selected and confirmed by pressing the Enter key.</p> <p>High Sensitivity: Highest sensitivity for large ranges.</p> <p>Normal Sensitivity: Normal sensitivity for standard applications and applications with the lenses LA27 and 28.</p> |


6.2.3 Set filter

| Function | Description |
|--|--|
| <p>Filter</p>  | <p>Set filter</p> <p>By pressing the key + or – a filter is set respectively the filter function is deactivated.</p> <p>If the filter function is set, several additional light impulses are used in order to make the signal more resistant against influences of ambient light.</p> <p>Note: An alteration of the filter changes the max. Switching Frequency proportionally.</p> |

| Filter | 1 | 2* | 3 | 4 | 5 | 6 | 7 | 8 |
|---------------------|-------|-------|--------|--------|--------|--------|--------|--------|
| Switching Frequency | 2 kHz | 1 kHz | 660 Hz | 500 Hz | 400 Hz | 330 Hz | 285 Hz | 250 Hz |

* Default Setting

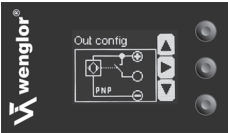

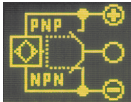
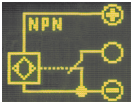
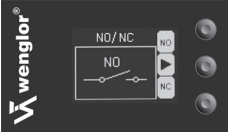
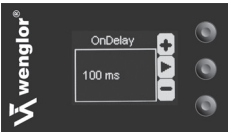
6.2.4 Reset

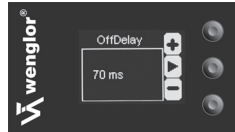
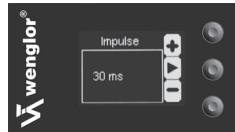
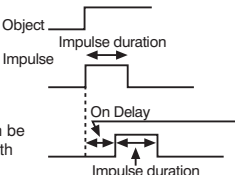
| Function | Description |
|--|---|
| Reset | Default setting |
|  | All of the selected Sensor settings are returned to their default values by pressing the R key. |

6.3. Output

In the menu Outputs the 13 outputs of the Sensor are configured and linked. Therefor select one of the 13 outputs, or all outputs (Global) with the navigation keys and the enter key. The output(s) then can be configured and linked.

6.3.1 Configuring the Output

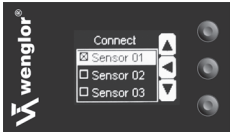
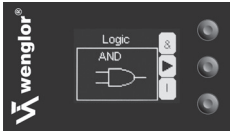
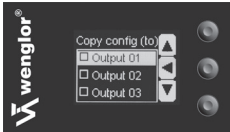
| Function | Description |
|--|--|
| PNP/NPN | Selecting the Output Type |
|  | <p>The output is preset to PNP. Pressing the ▼ key sets the output to push-pull. Pressing the ▼ key again sets the output to NPN.</p> <p>The respective circuit diagram indicates how the output is set:</p> <div><div>PNP</div><div>Push-Pull</div><div>NPN</div></div> <p>Note: NPN possible only for outputs 2 – 13.</p> |
| NO/NC | Selecting the Output Function |
|  | The normally open or normally closed output function is selected by pressing the NO or the NC key. The respective circuit diagram is displayed. |
| On-Delay | Adjusting On-Delay |
|  | On-delay can be adjusted within a range of 0 to 10000 ms by pressing the + or – key.* See figure 4 on page 17. |

| Off-Delay | Adjusting Off-Delay |
|--|--|
|  | <p>Off-delay can be adjusted within a range of 0 to 10000 ms by pressing the + or – key.* Off-delay is disabled if a impulse duration has already been selected. See figure 4 on page 17.</p> |
| Impulse | Adjusting Impulse Duration |
|  | <p>Pulse duration defines how long the output signal remains in the activated state. A impulse length can be selected within a range of 0 to 10000 ms by pressing the + or – key.* After the selected pulse duration has elapsed, the output signal is returned to the deactivated state. (Description applies to NO contacts in scanning mode or NC contacts in barrier mode.)</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>Function can be combined with ON-Delay</p> </div>  </div> |

* Press and hold the + or – key in order to scroll quickly through the numbers.

6.3.2 Link the outputs

The outputs can be linked to one or more Sensors, or to the speed measurement function.

| Function | Description |
|--|--|
| Sensors | Select the Sensors to be linked |
|  | <p>The Sensors to be linked are selected in the select list den with the navigation keys and the enter key. One or maximal all connected Sensors can be selected.</p> <p>Also “Measure” can be selected to link the speed measurement function to an output. See section “Measure” on page 17.</p> |
| Logic | Selecting the Linkage Logic |
|  | <p>By pressing the & key and the I key the logic by which the selected Sensors are linked is selected. The respective symbol is displayed.</p> |
| Copy Configurations | Copy Configurations to other Outputs |
|  | <p>The configurations of one output are copied to one or several other outputs. Therefor the output/s where the configuration should be copied are selected with the keys ▲ and ▼ and the enter key. Select <Copy with key ▲ and ▼ and confirm by pressing the enter key.</p> |

6.3.3 ON-/OFF-Delay

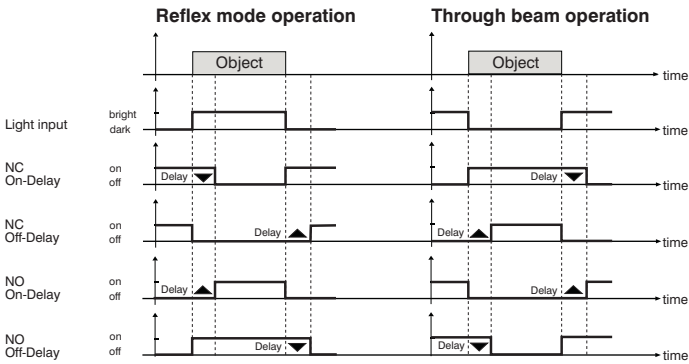
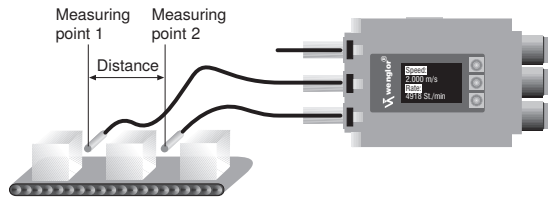


Fig. 4 ON-/OFF-Delay

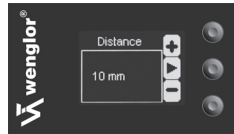
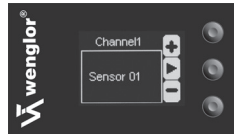
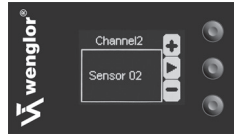
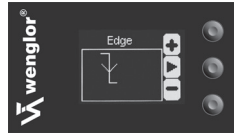
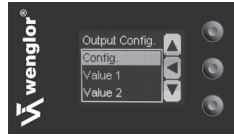
6.4. Measure



In the menu Measure the speed measurement function is set.

This function measures the time between the interruption of measurement point one and measurement point two and calculates the speed. The speed is displayed in the display mode "Measurement" and can be read out via IO-Link. In

addition this function can be linked to an output. The output switches as soon as the entered speed is reached.

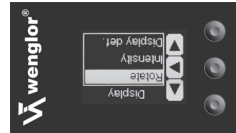
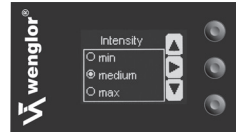
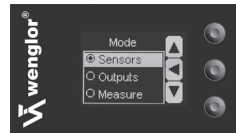
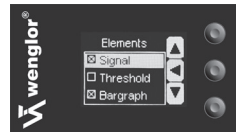
| Function | Description |
|--|--|
| Distance | Enter the Measurement Distance |
|  | <p>By pressing the key + resp. – the distance between the two Measurement points is set *.</p> <p>Minimal value: 10 mm; Maximal value: 10000 mm</p> |
| Channel 1 | Set Measurement Point 1 |
|  | <p>By pressing the key + and – the first measurement point for the speed measurement is selected under the connected Sensors.</p> |
| Channel 2 | Set Measurement Point 2 |
|  | <p>By pressing the key + and – the second measurement point for the speed measurement is selected under the connected Sensors.</p> |
| Edge | Set Edge |
|  | <p>For the determination of the speed the rising (positive) or the falling (negative) edge of des switching signal can be used. By pressing the key + and – the rising or the falling edge is selected.</p> |
| Out. config | Output configuration |
|  | <ul style="list-style-type: none"> • Mode: <ul style="list-style-type: none"> ➔ Bigger: The output switches as soon as the measurement speed is higher than value 1. ➔ Smaller: The output switches as soon as the measurement speed is lower than value 2. ➔ Between: The output switches as soon as the measurement speed is between value 1 and value 2. • Value 1: Entry of lower speed • Value 2: Entry of upper speed** |

* Press and hold the + or – key in order to scroll quickly through the numbers.

** Only if mode "Between" is activated.


6.5. Display

The display is set up with the help of the display menu.

| Function | Description |
|---|---|
| Rotate | Rotating the Display |
|  | <p>The display is rotated 180° by pressing the enter key. The display can be returned to its original position by pressing the same key once again.</p> |
| Intensity | Adjusting Display Brightness |
|  | <p>After pressing the ► and ◀ keys, the menu appears immediately with the selected brightness setting (min., normal or max). In setting power save the display turns off after 60 seconds. In setting screensaver, the display inverts every 60 seconds. The brightness is set to normal during these settings.</p> <p>Selection is acknowledged by pressing the enter key.</p> |
| Mode | Select the Display Mode |
|  | <p>By pressing the key ▲ and ▼ the display mode is selected and confirmed by pressing the enter key. The selectable modes are:</p> <ul style="list-style-type: none">• Sensors: Status of the Sensors (view “elements”) is displayed• Outputs: Status of all 15 outputs is displayed• Measurement: The current speed of the measurement function is displayed. |
| Display Definition | Defining the Display |
|  | <p>Zooming the bar graph: The bar graph is zoomed by pressing the ▲ and ▼ keys.</p> <p>Display elements:</p> <p>The elements which will appear at the display can be selected with the ▲ and ▼ keys and acknowledged by pressing the enter key.</p> <p>Displayable elements include:</p> <ul style="list-style-type: none">• Signal Strength(numeric value 0–999)• Threshold (numeric value 0–999)• Bar graph• Switching Status Indicator/contamination warning (output)• Operating Mode <p>The elements can be displayed all together, individually or in any desired combination.</p> |

6.6. Language

The desired menu language can be selected in the “Language” menu.

| Function | Description |
|--|--|
| Language | Selecting the Display Language |
|  | <p>The desired display language is selected by pressing the ▲ and ▼ keys, and is acknowledged by pressing the enter key. The desired language appears in the menus as soon as it has been selected.</p> <p><u>Selectable languages:</u></p> <ul style="list-style-type: none">• German• English• French• Spanish <p>The display language must be selected after initial start-up, and after each reset.</p> |

6.7. Information

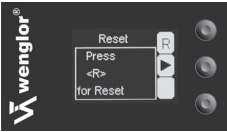
The following information regarding the Sensor is displayed in the “Info” menu:

- Sensor type
- Sensor version



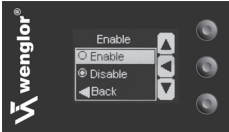



6.8. Reset

Sensor settings can be returned to their default values with the help of the “Reset” menu.

| Function | Description |
|--|--|
| Reset | Default setting |
|  | <p>All of the selected Sensor settings are returned to their default values by pressing the R key.</p> |

6.9. Password

The Sensor can be locked by entering a password in the “Password” menu, so that setting can not be readjusted.

| Function | Description |
|---|--|
| Enable | Switching the Password Function On or Off |
|  | “Enable” or “Disable” can be selected with the ▲ and ▼ keys. The password function is thus switched on or off. If the password function is activated, Sensor operation is disabled after supply power has been interrupted. Immediate disabling is also possible with the help of the “Disable” submenu. |
| Enter | Password Entry for Enabling the Sensor |
|  | The password for enabling the Sensor is selected with the + or – key.* Selection is acknowledged by pressing the enter key. The password is set to “0” upon shipment from the factory. |
| Change | Changing the Password |
|  | The desired new password is selected with the + or – key.* Selection is acknowledged and the password is changed by pressing the enter key. |
| Disabling | Disabling the Sensor |
|  | The Sensor is disabled without interrupting supply power. The Sensor is disabled by pressing the enter key, and the password entry window is displayed immediately. The Sensor is switched to the display mode after approximately 30 seconds. A password must be entered in order to continue using the Sensor. |

Notes regarding password functions:

If the password function has been activated, the password must be entered each time supply power to the Sensor is interrupted. After pressing a key, the menu is automatically switched to the password entry mode.

After the password has been correctly entered, the entire menu is enabled and the Sensor can be operated.

- The password function is deactivated upon shipment from the factory.
- The password is set to “0” upon shipment from the factory.
- Passwords can be selected within a range of 0000 to 9999.

It must be assured that the newly selected password is noted before the password is changed. If the password is forgotten, it must be overwritten with a master password. The master password can be requested by e-mail from support@wenglor.com.

7. IO-Link

Parameter data can be found in the interface protocol under: www.wenglor.com

8. Add-on Modules

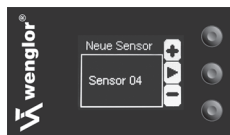
8.1. Connect the Add-on Modules

Up to 12 Add-on Modules can be connected to the Sensor. At each Add-on Module another Plastic Fiber Optic Cable can be connected, The Add-on Modules are configured like the Sensors of the Basic Module via the menu. The Add-on Module can be connected to the Basic Module before operation or during operation through the plug connection. We suggest to use end brackets for the DIN-Rail.

The Basic Module signalizes in the display that an Add-on Module has been connected. In order to configure this Module a Sensor number between 4 and 15 has to be attributed. Select the number with key ▲ and ▼ and confirm with the enter key.

The Sensor confirms the distribution of the Sensor number in its display.

The Add-on Module is generally attributed to the closest output that is still free. In the menu "Outputs" this attribution can be changed.



In the menu Sensors the Add-on Module can be configured. Therefor the Sensor has to be selected with the keys ▲ and ▼ and has to be confirmed with the enter key (view chapter "Sensors" on page 12).

8.2. Disconnect the Add-on Modules

There are two possibilities to disconnect one or several Add-on Modules:

1. without previous reset
2. with previous reset

In case of disconnection without previous reset the Add-on Module is disconnected during operation or in OFF status from the Basic Module.

Here the configurations of the Module and the Sensor number are kept.

If this Add-on Module is connected with another system afterwards, where the Sensor number is already taken, a double attribution and thus an error will occur.

Thus we suggest to reset the Sensor before disconnecting it from the Basic Module.

In case of disconnection with previous reset the Sensor is reseted (like in chapter "Reset" on page 20) and then disconnected from the Basic Module. If this Add-on Module is connected with another system afterwards, a new Sensor number has to be attributed first.

9. Maintenance Instructions

- This wenglor Sensor is maintenance-free.
- It is advisable to clean the lens and the display, and to check the plug connections at regular intervals.
- Do not clean with solvents or cleansers which could damage the product.

10. 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.