EN

P1XF001

Color Sensor



IO-Link®

Operating Instructions

Available as PDF only
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www.wenglor.com

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1. General

1.1. Information Concerning these Instructions

- These instructions apply to the product with ID code P1XF001.
- They make it possible to use the product safely and efficiently.
- These instructions are an integral part of the product and must be kept on hand for the entire duration of its service life.
- Local accident prevention regulations and national work safety regulations must be complied with as well.



NOTE!
The operating instructions must be read carefully before using the product and must be kept on hand for later reference.

1.2. Explanations of Symbols

- Safety precautions and warnings are emphasized by means of symbols and attention-getting 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:



ATTENTION-GETTING 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 attention-getting words, as well as the scope of the associated hazards, are listed below:



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



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



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



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

NOTE!
A note draws attention to useful tips and suggestions, as well as information regarding efficient, error-free use.

1.3. Limitation of Liability

- The product has been developed in consideration of the current state-of-the-art and applicable standards and guidelines. Subject to change without notice.
- 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 replacement parts
    - Unapproved modification of products

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

The spectral composition of the colors of objects can be measured and analyzed with the P1XF001 6-band Multi-Spectral Sensor. Innovative color chip technology divides the selected color spectrum into six spectral ranges (ROYGBV color space) with separately adjustable tolerance ranges. In combination with glass fiber-optic cables, the sensor adapts itself to the specific requirements of any given application and can be operated in the scanning as well as the through-beam mode. The Color Sensor is equipped with twelve switching outputs and integrated LED technology, which automatically ensures ideal adjustment of light intensity. Sensor settings can be selected directly at the OLED display, via the RS-232 port or via the IO-Link interface.

This product can be used in the following industry sectors:

- Automotive industry
- Food industry
- Packaging industry
- Pharmaceuticals industry
- Clothing industry
- Plastics industry
- Consumer goods industry
- Paper industry
- Electronics industry
- Glass industry
- Printing industry

2.2. Use for Other than the Intended Purpose

- Not a safety component in accordance with the EC machinery directive.
- The product is not suitable for use in potentially explosive atmospheres.
- Only accessories supplied or approved by wenglor may be used with the product.



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.



CAUTION!
Danger of burns!
Some housing components heat up to 25 K above ambient temperature.

2.3. Personnel Qualifications

- Suitable technical training is a prerequisite.
- In-house electronics training is required.
- Trained personnel must have uninterrupted access to the operating instructions.

WARNING!
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

NOTE!
Modification of the product is impermissible. Non-observance may result in loss of the CE marking and the guarantee may be rendered null and void.

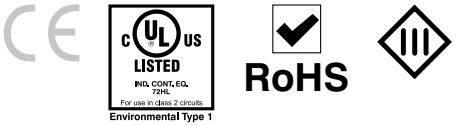
2.5. General Safety Precautions

NOTES!
- These instructions are an integral part of the product and must be kept on hand for the entire duration of its service life.
- Read the operating instructions carefully before using the product.
- Protect the sensor against contamination and mechanical influences.
- Installation, initial start-up and maintenance of the product may only be carried out by qualified personnel.
- Not a safety component in accordance with the EU machinery directive

2.6. Laser/LED Warnings

WARNING!
Risk of personal injury in the event of direct contact with the eye!
Personal injury may occur.
– Avoid direct eye contact with the sensor's light beam.

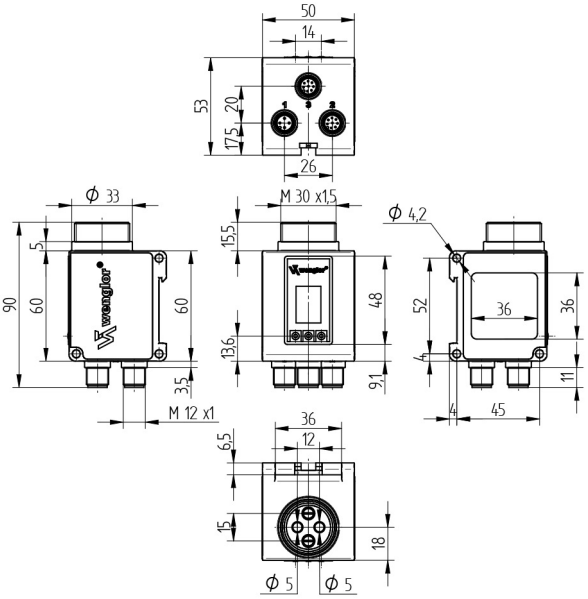
2.7. Approvals and IP Protection



3. Technical Data

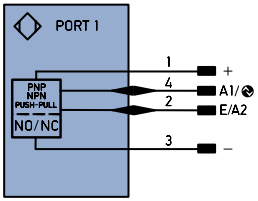
Order No. / Technical Data	P1XF001
Optical Characteristics	
Spectral Sensitivity	450…700 mm
Light Source	White Light
Electrical Characteristics	
Supply Voltage	10...30 V DC
Current Consumption ((Ub = 24 V)	~ 260 mA
Switching Frequency	2 kHz
Switching Outputs	12
Response Time	400 µs
Switching Output Voltage Drop	1,5 V
PNP Switching Output/Switching Current	100 mA
Short Circuit Protection	Ja
Reverse Polarity Protection	Ja
Overload Protection	Ja
Interface	RS-232/IO-Link
IO-Link-Version	1.1
Protection Class	III
Mechanical Characteristics	
Temperature Range	–25…60 °C
Adjustment	Teach-in
Degree of Protection	IP67
Connection	M12×1, 4+8-pin
DIN-Rail mounting	35 mm
Function	
Menüsprache einstellbar	yes
Output function	
PNP-NO/NC switchable	yes
NO/NC switchable	yes
RS-232 Interface	yes
Error Output	yes
Contamination Output	yes

3.1. Housing dimensions

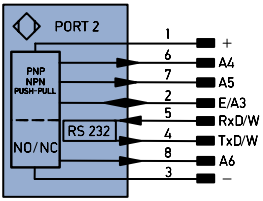


3.2. Connection Diagram

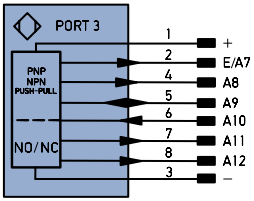
127



128



129



Legend

+	Supply Voltage +
–	Supply Voltage 0 V
~	Supply Voltage (AC Voltage)
A	Switching Output (NO)
Ā	Switching Output (NC)
V	Contamination/Error Output (NO)
V̄	Contamination/Error Output (NC)
E	Input (analog or digital)
T	Teach Input
Z	Time Delay (activation)
S	Shielding
RxD	Interface Receive Path
TxD	Interface Send Path
RDY	Ready
GND	Ground
CL	Clock
E/A	Output/Input programmable
	IO-Link
PoE	Power over Ethernet
IN	Safety Input
OSSD	Safety Output
Signal	Signal Output

PT	Platinum measuring resistor
nc	not connected
U	Test Input
Ū	Test Input inverted
W	Trigger Input
O	Analog Output
O–	Ground for the Analog Output
BZ	Block Discharge
AMV	Valve Output
a	Valve Control Output +
b	Valve Control Output 0 V
SY	Synchronization
E+	Receiver-Line
S+	Emitter-Line
⏚	Grounding
SnR	Switching Distance Reduction
Rx+/–	Ethernet Receive Path
Tx+/–	Ethernet Send Path
BUS	Interfaces-Bus A(+)/B(–)
La	Emitted Light disengageable
Mag	Magnet activation
RES	Input confirmation

ENA	Encoder A
ENB	Encoder B
AMIN	Digital output MIN
AMAX	Digital output MAX
AOK	Digital output OK
SY In	Synchronization In
SY OUT	Synchronization OUT
OLT	Brightness output
	Wire Colors according to DIN IEC 757
BK	Black
BN	Brown
RD	Red
OG	Orange
YE	Yellow
GN	Green
BU	Blue
VT	Violet
GY	Grey
WH	White
PK	Pink

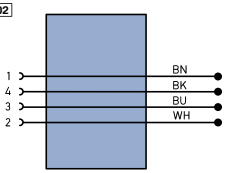
3.3. Complementary Products

wenglor offers Connection Technology for field wiring.

Suiting Connection Technology No.

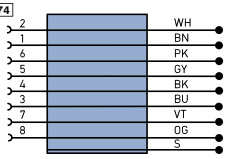
2

S02



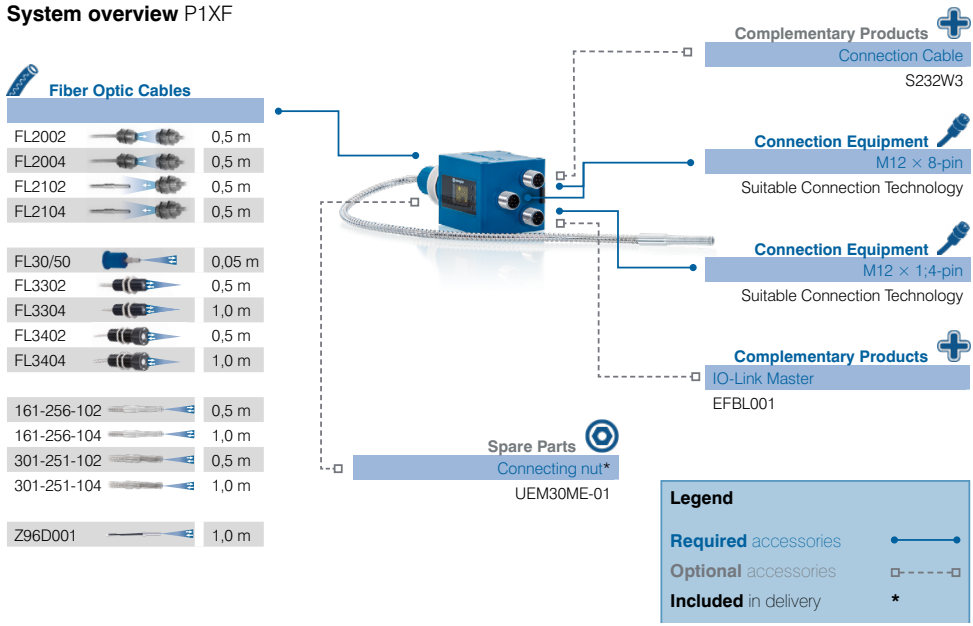
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S74

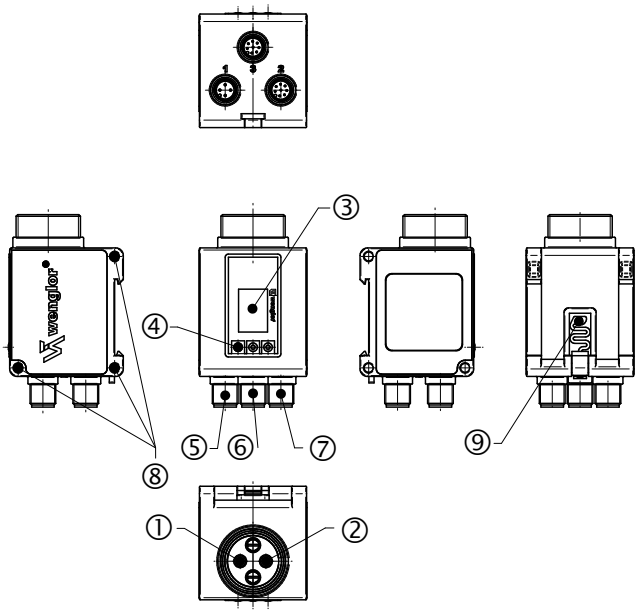


Fiber Optic Cables
IO-Link-Master
Interface Cable S232W3

System overview P1XF

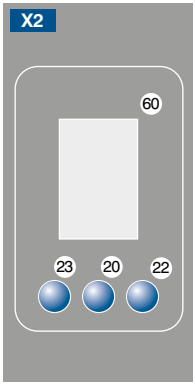


3.4. Layout



① = Receiving diode
② = Emitter diode
③ = Display
④ = Control keys
⑤ = Plug 1: IO-Link
⑥ = Plug 3: outputs
⑦ = Plug 2: RS-232
⑧ = Mounting holes
⑨ = Spring-loaded claw

3.5. Control Panel



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

3.6. Scope of Delivery

- P1XF001
- UEM30ME-01
- Quickstart

4. Transport and Storage

4.1. Transport

Upon receipt of shipment, inspect the goods 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 condition 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.

ATTENTION!
Risk of property damage in case of improper storage!
The product may be damaged.
– Comply with storage instructions.

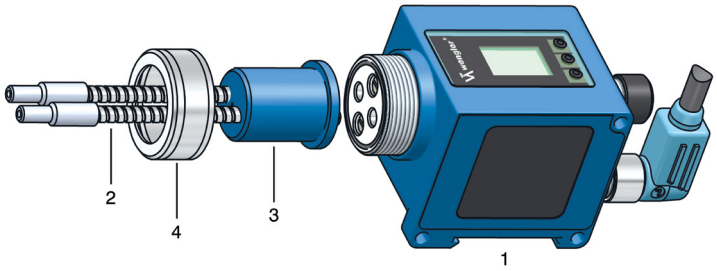
5. Installation and Electrical Connection

5.1. Installation

- Protect the product against contamination during installation
  (see section „2.5. General Safety Precautions“ on page 7)
- Observe all applicable electrical and mechanical regulations, standards, and safety rules.
- Protect the product against mechanical influences.
- Make sure that the sensor is mounted in a mechanically secure fashion.
- The use of corresponding end brackets is recommended for mounting to DIN rails.
- In order to avoid damaging the LED lens, always connect a fiber-optic cable or attach the rubber protector.

Attaching Glass Fiber-Optic Cables

- Remove the protective cap from the sensor before attaching fiber-optic cables.
- Protect fiber-optic cables from mechanical influences!



1 Color Sensor
2 wenglor® Fiber Optic
3 adapter No. 1
4 Sleeve Nut

ATTENTION!
Risk of property damage in case of improper installation!
The product may be damaged.
– Comply with installation instructions.

5.2. Electrical Connection

- Connect the sensor to 10 ... 30 V DC at plug no. 1 and/or 2 and/or 3, depending on which outputs are required (see „3.2. Connection Diagram“ on page 10)
- Even if more than one plug is connected, only one source of supply voltage may be used.

5.3. Diagnostics

Conduct in case of fault:



NOTE!

- Shut down the machine.
- With the help of the diagnostics information, analyze and eliminate the cause of error.
- If the error cannot be eliminated, please contact wenglor's support department.
- Do not operate in case of indeterminate malfunctioning.
- The machine must be shut down if the error cannot be unequivocally clarified or reliably 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.

– Conduct in case of fault as specified.

6. Overview of Functions

6.1. Default Settings

		P1XF001
Pin function	A1	Switching Output
	E/A2	Switching Output
	E/A3	Switching Output
	A4	Switching Output
	A5	Switching Output
	A6	Switching Output
	E/A7	Switching Output
	A8	Switching Output
	A9	Switching Output
	A10	Switching Output
	A11	Switching Output
	A12	Switching Output
Outputs	Teach mode	Windows-Teach-in
	Tolerance	Small
	Tolerance H	Minimum
	Tolerance S	Small
	Tolerance L	Maximum
	PNP/NPN/Push-pull	Push-pull
	NO/NC	NO
	On-Delay	0 ms
	On-Delay	0 ms
	Impulse	0 ms
Display	Mode	Digital
	Intensity	Screen saver
Expert menu		off
Operating Mode		Detection
Filter		8
Emitted light		Automatic
Interface	Baud rate	38400
Language		English
Password	Activate	Off
	Change	0

6.2. Function Definitions

Name	Function	Page
Run	Change to display mode	20
Pin-Function	Selection of pin function	21
Windows-Teach-in	Teach-in with window width (tolerance)	21
Sample-Teach-in	Automatic tolerance adjustment based on a good part or a bad part.	21
Assignment Teach-in	Teach-in with assignment to the most similar output	21
Tolerance	Window size for window teach-in	22
Output function	Selection of NO or NC	23
Time Delay	Adjustment of on-delay, off-delay and pulse	24
Switching Thresholds	Manual shifting of the thresholds	25
Error or Contamination Output	An output which is activated when the sensor is within an unreliable range	22
Emitted Light	LED intensity setting	29
Trigger Input	Setting for an input to which a trigger signal can be applied	22
External Teach-in Input	Setting for an input at which an output is taught in by applying an electrical signal	27
Display	Display settings	27
Expert menu	Selection of whether a partial or the entire scope of functions will appear at the display	28
Operating Mode	Selection of the “Detection” or the “Assignment” mode	28
Filter	Selection of the number of values used by the sensor to generate a mean value	29
Test Input	For checking to ensure that the outputs are correctly connected	30
Interface	Baud rate setting	30
Language	User language selection	31
Info	Information regarding the device	31
Reset	Restoration of default settings	31
Password	Changing the password and disabling the display	32

6.3. Menu structure

- Connect the sensor to the supply voltage. After initialization the sensor shows the indication screen and is ready for operation. During the first commissioning and after a reset you can first of all select the menu language by simply pressing a button (see „7.21. Language“ on page 31)
- Switch to the configuration menu by pressing any key.

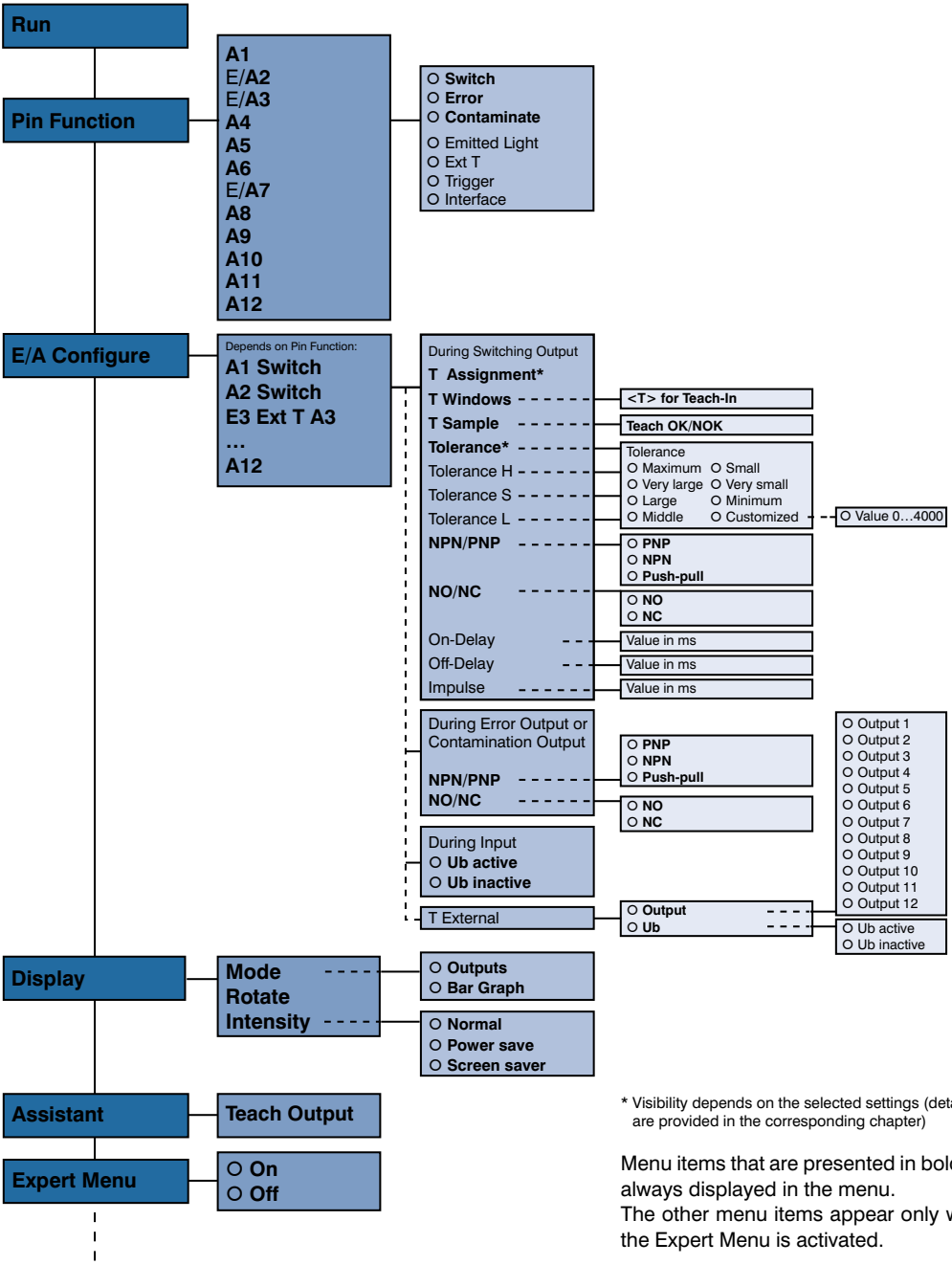
NOTE!
If no setting is made in the configuration setting for a duration of 30 s, the sensor automatically jumps back into the display view. By pressing the button once again, the sensor jumps back to the menu view used last. Settings made are adapted when quitting the configuration menu.

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.
◀ | ▶: Selection is acknowledged with the enter key.
◀ Back: One level up in the menu.
◀◀ Run: Change to the display mode

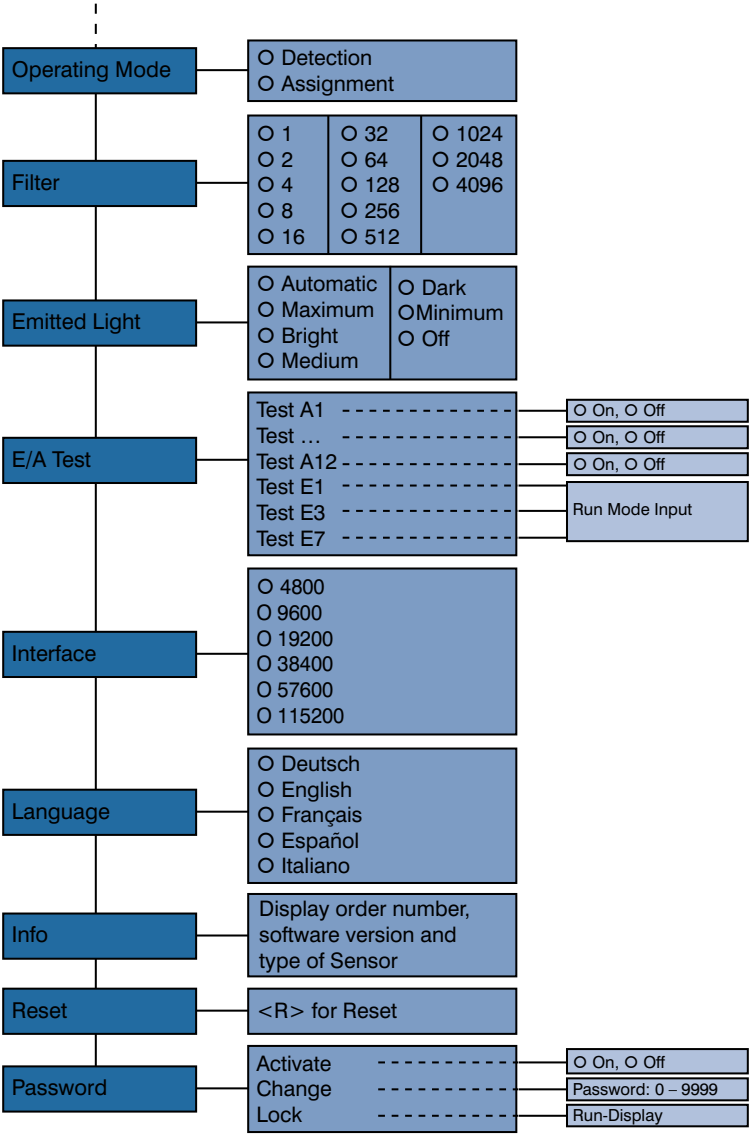
ATTENTION!
Risk of property damage if sharp objects are used!
The keys may be damaged.
– Do not use sharp objects in order to enter settings.

The sensor configuration menu is set-up as follows:



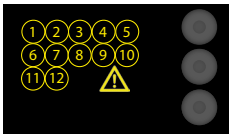
* Visibility depends on the selected settings (details are provided in the corresponding chapter)

Menu items that are presented in bold are always displayed in the menu.
The other menu items appear only when the Expert Menu is activated.


Operating Mode
O Detection
O Assignment
Filter
O 1
O 2
O 4
O 8
O 16
O 32
O 64
O 128
O 256
O 512
O 1024
O 2048
O 4096
Emitted Light
O Automatic
O Maximum
O Bright
O Medium
O Dark
OMinimum
O Off
E/A Test
Test A1
Test …
Test A12
Test E1
Test E3
Test E7
O On, O Off
O On, O Off
O On, O Off
Run Mode Input
Interface
O 4800
O 9600
O 19200
O 38400
O 57600
O 115200
Language
O Deutsch
O English
O Français
O Español
O Italiano
Info
Display order number, software version and type of Sensor
Reset
<R> for Reset
Password
Activate
Change
Lock
O On, O Off
Password: 0 – 9999
Run-Display

7. Settings

7.1. Causes for Triggering of Error Indication (display)



- Not enough light is reflected.
- Very small objects, or objects which do not reflect well, are located within the working range.
- Incorrect installation
- Object is outside of the working range.

7.2. Run

Sensor switches to display mode.



Legend Status-LEDs:

Meaning	Condition 1	Condition 2	Condition 3	Condition 4
Switching Output	❶ Switched	① Not switched	–	–
Error Output	✓ Ok	⚠ No signal	–	–
Contamination Output	✓ Ok	Signal too low	–	–
Switch off emitted light	Emitted Light on	Emitted Light off	–	–
Teach-In Input	Ⓣ Active	Ⓣ Inactive	–	–
Trigger Input	Active	Inactive	–	–
Signal Strength	✓ Ok	Signal too low	Signal too high	⚠ No signal
temperature	✓ Ok	temperature too low	temperature too high	–

7.3. Pin function

The Pin function is used to determine the function of pins A1, E/A2, E/A3, A4, A5, A6, E/A7, A8, A9, A10, A11 and/or A12 since the pins may be used for different functions.

Function	Description
Ax	Configuration of Pin A1, 4, 5, 6, 8, 9, 10, 11 and/or 12
○ Deactivated ○ Switch ○ Error ○ Contamination ◂ Back ◂◂ Run	**Deactivated:** Deactivation of the output **Switch:** Switching Output **Error:** Error Output **Contamination:** Contamination Output
E/Ax	Configuration of Pin E/A2, 3 and/or 7
○ Deactivated ○ Switch ○ Error ○ Contamination ○ Emitted Light ○ T Extern ○ Trigger ◂ Back ◂◂ Run	**Deactivated:** Deactivation of the output **Switch:** Switching Output **Error:** Error Output **Contamination:** Contamination Output **Emitted Light:** Input for switching on/off the emitted light **T Extern:** Teach input for Ax **Trigger:** Input for sensor triggering

7.4. Windows-Teach-in

Function		Description
T Windows		Configuration of Pin A1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 or 12
<T> for Teach-in	**T** ▸	Window teach-in procedure: 1) Align the spot to the background (if there is one) or the object. 2) Press the “T” key. → The switching points are taught in. **NOTE!** • T sample: additional teach-in of an OK or an NOK sample part in order to adjust tolerances. • Window width can be reduced or enlarged in the tolerance menu.
T Sample		Sample teach
Teach OK/NOK	**OK** ▸ **NOK**	Sample teach-in procedure: 1) Teach in an OK sample. • Align the spot to the object. • Press the “OK” key. → The tolerance is increased. 2) Teach in an NOK sample • Align the spot to the object. • Press the “NOK” key. → The tolerance is decreased.

7.4.1. Assignment Teach-in

NOTE!
The menu item is only visible if the operating mode is set to “Assignment”.

Function		Description
T Assignment		Assignment Teach-In
<T> for Teach-in	T	Teach-In Assignment-Teach-In process: 1) Adjust light spot to the object color. 2) Press “T” button. -> The object color is taught in and allocated to the appropriate output.

An explanation of the “Assignment” operating mode is included in section „7.16. Operating mode“ on page 28 .

7.4.2. Tolerance

NOTE!
The menu item is only visible if the expert menu is set to “off”.

Function	Description	
Tolerance	Changing tolerance	
○ Maximum	**Maximum:**	Tolerance is set to a maximum value.
○ Very large	**Very large:**	Tolerance is set to a very large value.
○ Large	**Large**	Tolerance is set to a large value.
○ Middle	**Middle:**	Tolerance is set to a medium value.
○ Small	**Small:**	Tolerance is set to a small value.
○ Very small	**Minimum:**	Tolerance is set to a very small value.
○ Minimum	**Minimal:**	Tolerance is set to a minimum value.
◂ Back		
◂◂ Run		

7.4.3. Tolerance H/S/L

NOTE!
The menu item is only visible if the expert menu is “on” and the operating mode is set to “Detection”.

Function	Description	
Tolerance	Changing tolerance	
○ Maximum	**Maximum:**	Tolerance is set to a maximum value.
○ Very large	**Very large:**	Tolerance is set to a very large value.
○ Large	**Large:**	Tolerance is set to a large value.
○ Middle	**Middle:**	Tolerance is set to a medium value.
○ Small	**Small:**	Tolerance is set to a small value.
○ Very small	**Very small:**	Tolerance is set to a very small value.
○ Minimum	**Minimum:**	Tolerance is set to a minimum value.
○ Customized	**Customized:**	By pressing the “+” , tolerance can be increased. By pressing the “–” , tolerance can be decreased. Keep the button pressed to achieve larger jumps in value.
◂ Back		
◂◂ Run		

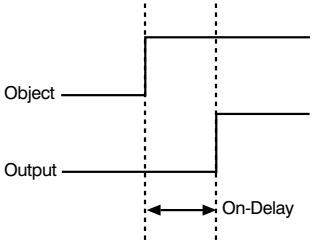
7.5. NO/NC Output Function

Function	Description
NO/NC	Output configuration
○ NO ○ NC ◂ Back ◂◂ Run	**NO:** Normally open. The output closes as soon as an object reaches the switching point. **NC:** Normally closed. The output opens as soon as an object reaches the switching point.

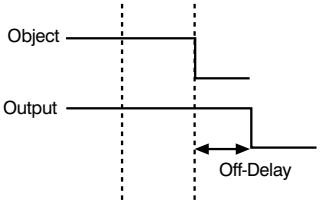
7.6. NPN PNP

Function	Description
NPN/PNP	Output configuration
○ PNP ○ NPN ○ Push-pull ◂ Back ◂◂ Run	**PNP:** A load or the evaluation device is connected between the negative pole (supply) and the output. If switched, the output is connected with the positive pole via an electric switch. **NPN:** A load or the evaluation device is connected between the positive pole (supply) and the output. If the sensor switches, the output is connected with the negative pole via an electric switch. **Push-pull:** Push-pull output. Acts like an electronic switch which optionally switches the output to the positive pole or the negative pole.

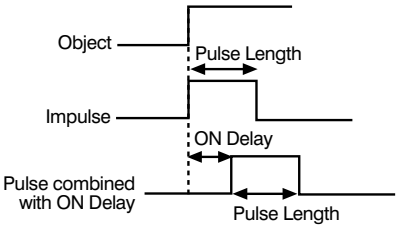
7.7. On-Delay

Function		Description
On-Delay		Setting of On-Delay
A1 Switch On-Delay 10 ms	+ ▸ –	By pressing the "+" or "–" button, a On-Delay from 0 ms to 10000 ms can be set. The On-Delay is an adjustable extension of the response time. Keep the button pressed to achieve larger jumps in value. 

7.8. Off-Delay

Function		Description
Off-Delay		Setting of Off-Delay
A1 Switch Off-Delay 10 ms	+ ▸ –	By pressing the “+” or “–” button, a Off-Delay from 0 ms to 10000 ms can be set. The Off-Delay is an adjustable extension of the drop-out time. If an impulse length has been set, no Off-Delay can be set. In this case, the notice “Impulse” will appear in the control panel! Keep the button pressed to achieve larger jumps in value. 

7.9. Impulse

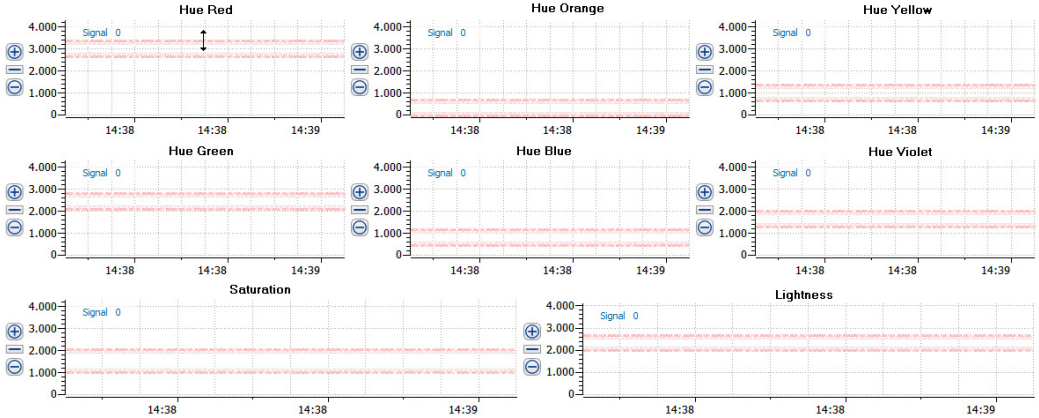
Function		Description
Impulse		Adjusting Impulse Duration
A1 Schalt Impuls 10 ms	+ ▸ –	The pulse length defines how long the switching state is held. A pulse length of 0 to 10000 ms can be set by pressing the “+” key or the “–” key. After the selected pulse duration has elapsed, the output signal is returned to the deactivated state. 

7.10. Switching Thresholds

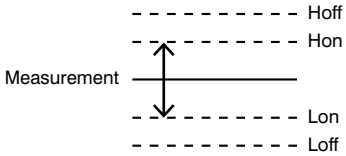
The switching thresholds can be set manually via IO-Link or via the RS-232 port, for example with the help of wenglor's wTeach configuration software. The software can be downloaded free of charge at: www.wenglor.com → Product World → Search (Enter the product number) → Download

7.10.1. Thresholds in the Detection operating mode

In the "Detection" operating mode, an upper and a lower threshold can be set for each individual hue, for saturation and for brightness. And thus a separate window width is possible for each channel.



Switching points:
The following switching points are calculated on the basis of the measured value during Teach-In:



Hoff = Hon + Hysteresis
Hon = Hue value + window size
Lon = Hue value – window size (this result can easily become negative)
Loff = Lon – Hysteresis (this result can easily become negative)

Only the Hon and Lon threshold values can be changed with wTeach2 software. The other values are calculated on the basis of hysteresis, although hysteresis is not a fixed value itself but rather a calculated value as well.

7.10.2. Thresholds In the Assignment operating mode

In the “Assignment” operating mode, a threshold can be set for each individual hue:

- Red
- Orange
- Yellow
- Green
- Blue
- Violet

7.11. Error or Contamination Output

When the pin is configured as an error or a contamination output, the following functions can be selected:

Function	Description	
A1 Error (example)	Error output or contamination output	
NPN/PNP NO/NC ◂ Back ◂◂ Run	**NPN/PNP:** **NO/NC:**	Output configuration Output configuration

Explanations concerning “NPN/PNP” are included in section „7.6. NPN PNP“ on page 23. Explanations concerning “NO/NC” are included in section „7.5. NO/NC Output Function“ on page 23

7.12. Emitted Light or Trigger Input

When the pin is set up, for example, as an input for shutting down emitted light, you can select whether the input is Ub active or Ub inactive:

Function	Description	
E3 Emitted Light (example)	Setting E2, E3 and/or E7 input	
○ Ub active ○ Ub inactive ◂ Back ◂◂ Run	**Ub active:** **Ub inactive:**	The input is activated when operating voltage (Ub) is on. The input is activated when operating voltage is off.

An operation is triggered by applying an edge to the input (i. e. by changing the electrical signal from negative to positive or vice versa).

7.13. External Teach-in Input

When the pin is set up as an input for external teach-in, you can select whether the input is Ub active or Ub inactive and which output will be taught in externally:

Function	Description	
E3 External Teach-in (example)	Setting E2, E3 and/or E7 input	
○ Ub ○ Output ◂ Back ◂◂ Run	**Ub active:** **Ub inactive:** **Output:**	The input is activated when operating voltage (Ub) is on. The input is activated when operating voltage is off. When the input is activated, the selected output is taught in.

Depending on the selected operating mode, external teach-in executes either a window or an assignment teach-in operation. An operation is triggered by applying an edge to the input (i. e. by changing the electrical signal from negative to positive or vice versa).

7.14. Display

Function	Description	
Display	Adjusting the display device	
○ Rotate ○ Intensity ○ Mode ◂ Back ◂◂ Run	**Rotate:** **Intensity:** **Mode:**	Rotate display by 180°. The display is rotated by 180° by pressing the key. The rotation is canceled by pressing this key again. Set the display intensity Select display mode
Intensity	Set the display intensity	
○ Normal ○ Power save ○ Screen saver ◂ Back ◂◂ Run	**Normal:** **Power save:** **Screen saver:**	The intensity of the display is set to a normal value. The display switches off after one minute without a button being pressed and automatically switches back on when a button is pressed. The colors of the display are inverted every minute.
Mode	Select display mode	
○ Digital ○ Bar Graph ◂ Back ◂◂ Run	**Digital:** **Bar Graph:**	The condition of each output is indicated on the display. The ROYGBV color spaces / shares of the object are indicated in a bar graph.

7.15. Expert Menu

Depending on whether the expert menu is “on” or “off”, different menu items and sub-items appear in the menu. The expert menu is disabled in the default settings. Thus, the menu is shorter and easier to use. If the available menu items are not sufficient for the application solution, the expert menu can be enabled and the entire scope of sensor functions can be used.

Function	Description	
Expert Menu	Enable or disable expert menu	
○ Off ○ On ◂ Back ◂◂ Run	**Off:** **On:**	The expert menu is enabled and all menu items are displayed. The expert menu is disabled and only a few menu items are displayed..

7.16. Operating mode

NOTE!
The menu item is only visible if the expert menu is set to “on”.

Function	Description	
Operating mode	Select operating mode	
○ Detection ○ Assignment ◂ Back ◂◂ Run	**Detection:** **Assignment:**	In the “Detection” operating mode, color windows are taught in to an output. The sensor detects the taught-in colors within a certain range if they are within the tolerance (see „7.4.2. Tolerance“ on page 22) liegen. In the “Assignment” operating mode, one color each can be taught in and assigned to the outputs. The sensor evaluates the current color value and assigns it to the most similar color of the corresponding output. Thus, one of the outputs is always enabled in this operating mode. Thus, the reliable assignment of all object colors is possible.

7.17. Filter

NOTE!
The menu item is only visible if Expert Menu “On” has been set.

Function	Description
Filter	Number of values for averaging.
○ 4 ○ 8 ○ 16 ○ 32 ○ 64 ○ 128 ○ 256 ○ 512 ○ 1024 ○ 2048 ○ 4096 ◂ Back ◂◂ Run	The filter (filter size) is the number of measured values the sensor uses for averaging. The larger the filter, the slower the response time of the sensor.

7.18. Emitted Light

In the “Emitted Light” menu item, the intensity of the emitted light can be modified or the emitted light can be switched off.

NOTE!
The menu item is only visible if the expert menu is set to “on”.

Function	Description	
Emitted Light	Set emitted light	
○ Automatic ○ Maximum ○ Bright ○ Medium ○ Darkl ○ Minimum ○ Off ◂ Back ◂◂ Run	**Automatic:** **Maximum:** **Minimum:** **Off:**	Automatically adjustment depending on the received intensity. That function decreases the response time of the sensor. Increased signal strength makes it possible to detect dark objects with minimal remission. Reduced signal strength makes it possible to better detect the color values of very bright objects. Emitted light is switched off and only extraneous light is evaluated. Luminescent objects can be detected in this way..

7.19. Test Input

This functions changes the outputs manually, regardless of the sensor's momentary measured value. This makes it possible to monitor, for example, whether or not outputs are correctly connected to a controller, or if there's a disturbance in the cable which is altering the analog value. It's also possible to test whether or not voltage is being applied to the input pin. The test is ended automatically when the test menu is exited.

NOTE!
The menu item is only visible if Expert Menu "On" has been set. Only the functions for which the pin is set are displayed in each case.

Function	Description
E/A Test	E/A Test of the inputs and outputs
Test A1 Test E/A2 Test … Test A12 ◂ Back ◂◂ Run	**Ax test:** On: activate output (24 V) Off: deactivate output (0 V) **Ex test:** Display whether 0 V or 24 V is being applied to input 4.

7.20. Interface

NOTE!
The menu item is only visible if the expert menu is set to "on".

Function	Description
Baud rate	Setting the baud rate
○ 4800 ○ 9600 ○ 19200 ○ 38400 ○ 57600 ○ 115200 ◂ Back ◂◂ Run	**4800:** 4800 Baud **9600:** 9600 Baud **19200:** 9200 Baud **38400:** 38400 Baud (standard setting) **57600:** 57600 Baud **115200:** 115200 Baud

7.21. Language

The menu language can be changed in the menu item “Language”. The user is automatically prompted for his desired language at initial operation and after each reset..

NOTE!
The menu item is only visible if the expert menu is set to “on”.

Function	Description
Language	Set menu language
○ Deutsch ○ English ○ Francais ○ Espanol ○ Italiano ◂ Back ◂◂ Run	The menu appears in the selected language immediately after selection.

7.22. Info

NOTE!
The menu item is only visible if Expert Menu “On” has been set.

The following information about the Sensor is displayed in the “Info” menu item.
Order number
Software version
Serial number

7.23. Reset

The Sensor setting can be reset to the delivery state in the menu item “Reset”.

Function		Description
Reset		delivery state
Reset to push <R> for Reset	R ▸	The Sensor settings that have been made can be reset to the delivery state by pressing the “R” key.

7.24. Password

Password protection prevents against unintended changing of the set data.

NOTE!
The menu item is only visible if the expert menu is set to “on”.

Function	Description
Activating Password ○ inactive ○ active	Activating or Deactivating the Password Function Password protection can be activated or deactivated with the 5 and 6 keys. When password protection is activated, sensor operation is disabled after supply power has been interrupted and is not enabled again until the password has been correctly entered.
Change Password Change 0	Password Entry for Enabling A password within a range of 1 to 9999 can be selected using the + and – keys. Selection is acknowledged by pressing the enter key.
Lock Password Activate Change Lock	Locking the Sensor Disabling the sensor inhibits its operation immediately, if “Activate password” is set to on.

NOTE!
If the password function has been activated, the password must be entered each time supply power is interrupted. After pressing any 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.
It must be assured that the selected password is noted before any changes occur. If the password is forgotten, it has to be overwritten with a master password. The master password can be requested by e-mail from support@wenglor.com.

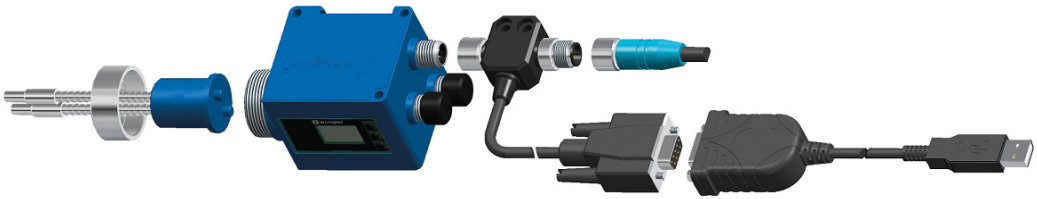
8. Interfaces

8.1. RS-232

The RS-232 port makes use of the software handshake procedure. All settings can be configured and queried via a computer. RS-232 port terminals RxD (5) and TxD (4) are linked to minus (pin 3), and can be connected to the corresponding terminals at the communication partner.

Technical Data, RS-232 Port
Adjustable baud rate, 8 data bits, no parity, 1 stop bit
Connect the sensor to the PC or the controller as follows using wenglor's S232W3 interface cable:

- Insert the S232W3 interface cable into plug no. 2 directly at the sensor.
- Plug the ZAS89xxx 8-conductor connection cable into the interface cable.
- Connect the 9-pin D-sub pug connector on the S232W3 cable to the serial port, or to the PC or controller via the AB-USB01 USB adapter.



8.2. IO-Link

Process and parameters data can be found at www.wenglor.com in the product's separate download area:

www.wenglor.com → Product World → Search (Enter the product number) → Download

9. Maintenance Instructions

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

10. Proper Disposal

Respectively valid national waste disposal regulations apply to product disposal.

11. Exclusion of Liability

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12. Appendix

12.1. Index of Abbreviations

Abbreviation	Meaning
A	Output
E	Input
DC	Direct current
kHz	Kilohertz
LED	Light Emitting Diode
mA	Milliamperes
mm	Millimeters
ms	Milliseconds
NC	Normally closed
NO	Normally Open
NPN	Negative-positive-negative
Nr.	Number
OLED	Organic light emitting display
PNP	Positive-negative-positive
Ub	Operating voltage
V	Volts
z.B.	For example
°C	Degrees Celsius
K	Kelvin

12.2. Frequently Asked Questions (FAQ)

What do I have to do in order to use the sensor in a high-speed application?

The following procedure can be used to increase switching frequency:

- Set the filter to a low value. The higher the filter setting the more values have to be consolidated, thus resulting in slower sensor switching (see „7.17. Filter“ on page 29).

NOTE!
The switching frequency of the sensor itself is higher than that of the display. For this reason, only take the actual switching outputs into consideration.

After completing window teach-in, NOK samples also cause the sensor to switch.

The following options are available:

- **NOK sample teach-in:** automatic tolerance adjustment based on a bad part. The sensor determines the switching threshold automatically based on the sample, so that the NOK sample is excluded from the tolerance range (see „T Sample“ on page 21).
- **Reduce window size (tolerance)** (see „7.4.2. Tolerance“ on page 22 and „7.4.3. Tolerance H/S/L“)
- **Shift the switching thresholds:** Switching threshold values can be changed manually via the interface, so that the NOK sample is excluded from the window (see „7.10. Switching Thresholds“ on page 25)

How can I detect transparent objects like foils and jars?

No further adjustment to the sensor is required in order to use it in the through-beam mode. It’s only necessary to connect fiber-optic cables to the sensor for the through-beam mode.

Which settings are required in order to detect luminescent objects?

Emitted light should be switched off entirely, or almost entirely (see „7.18. Emitted Light“ on page 29).

When is the detection mode suitable, and when the assignment mode?

In the “**assignment**” teach-in mode, one color is taught in to each of the outputs. The sensor evaluates the detected color value and allocates it to the respective output with the most similar color.

→ Advisable for distance fluctuations and objects with large color tolerances. However, due to the fact that one output is always switched, it must be assured that the background does not change and that the sensor is triggered by the object.

There are two switching points in the case of **window teach-in**. The distance between the two switching points is called the window. The size of the window is defined as window width. The sensor is switched when an object is within the window.

→ This operating mode is well suited for identifying the known object from an unknown sample. Differentiation amongst very fine color nuances is also possible in this operating mode.

12.3. Change Index, Operating Instructions

Version	Date	Description/Change	Associated Software
1.0.0	7/24/2015	Initial version of the operating instructions	Software: wTeach2 Firmware: 1.0.6

12.4. EC Declaration of Conformity

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

The products are developed, constructed and manufactured according to the directive 2004/108/EC.
The following international standards and specifications apply:

EN 60947-5-2:2007+ A1:2012 Low-voltage switchgear and controlgear
Part 5-2: Control circuit devices and switching elements – Proximity switches