wenglor
the innovative family

Operating Instructions

# P2KH031

# Reflex Sensor with background suppression electronic




EN

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

# Table of Contents


**1 General ..... 3**

1.1 Information Concerning these Instructions ..... 3

1.2 Explanation of Symbols ..... 3

1.3 Limitation of Liability ..... 4

1.4 Copyrights ..... 4

**2 For Your Safety ..... 5**

2.1 Use for Intended Purpose ..... 5

2.2 Use for Other than the Intended Purpose ..... 5

2.3 Personnel Qualifications ..... 5

2.4 Modification of Products ..... 6

2.5 General Safety Precautions ..... 6

2.6 Approvals and protection classes ..... 6

**3 Technical Data ..... 7**

3.1 General Information ..... 7

3.2 Light spot diameter ..... 8

3.3 Switching Distance Deviation ..... 8

3.4 Housing Dimensions ..... 9

3.5 Control panel ..... 9

3.6 Complementary Products ..... 9

**4 Transport and Storage ..... 10**

4.1 Transport ..... 10

4.2 Storage ..... 10

**5 Installation and Electrical Connection ..... 11**

5.1 Installation ..... 11

5.2 Electrical Connection ..... 11

5.3 Diagnosis ..... 12

**6 Settings ..... 14**

6.1 Setup via Teach-In Key ..... 14

6.2 Setting via IO-Link and wTeach2 ..... 14

6.2.1 Teach-In Mode ..... 14

6.2.2 Pin Functions I/O2 ..... 15

6.2.3 Additional Functions and Settings via IO-Link ..... 16

**7 Maintenance Instructions ..... 17**

**8 Proper Disposal ..... 18**

**9 Declarations of Conformity ..... 19**

# 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

### Reflex Sensors with Background Suppression

Reflex sensors with background suppression evaluate the light reflected by objects. As they operate according to the angle measurement principle, the object's color, shape, and surface finish have practically no influence on the detection range. Even dark objects are reliably recognized against bright backgrounds. When the object reaches the selected detection range, the sensor's output is switched.

### 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
- Consumer goods industry
- Paper industry
- Electronics industry
- Glass industry
- Steel industry
- Aviation industry
- Chemicals industry
- Alternative energies
- Raw materials extraction

## 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 Information

| Optical Data | |
|---|---|
| Range | 120 mm |
| Setting Range | 30...120 mm |
| Switching Hysteresis | < 10 % |
| Light Source | Laser (red) |
| Wavelength | 680 nm |
| Service Life (T = +25 °C) | 100000 h |
| Laser Class (EN 60825-1) | 1 |
| Max. Ambient Light | 10000 Lux |
| Light Spot Diameter | see table 1 |
| Optical axis | Aligned |
| Switching point | Calibrated |
| Principle | Triangulation |

| Electrical Data | |
|---|---|
| Supply Voltage | 15...30 V DC |
| Supply Voltage with IO-Link | 18...30 V DC |
| Current Consumption (Ub = 24 V) | < 20 mA |
| Switching Frequency | 100 Hz |
| Switching Frequency (1 Switching Output) | 1000 Hz |
| Response Time | 5 ms |
| Response time (1 switching output) | 0.5 ms |
| Temperature Drift | < 5 % |
| Temperature Range | -40...50 °C |
| Number of Switching Outputs | 2 |
| Switching Output Voltage Drop | < 2 V |
| Switching Output/Switching Current | 100 mA |
| Residual Current Switching Output | < 50 µA |
| Short Circuit Protection | yes |
| Reverse Polarity Protection | yes |
| Overload Protection | yes |
| Lockable | yes |
| Interface | IO-Link V1.1 |
| Data Storage | yes |
| Protection Class | III |
| FDA Accession Number | 1710976-002 |

| Mechanical Data | |
|---|---|
| Setting Method | Teach-In |
| Housing Material | Stainless steel, V4A (1.4404/316L) |
| Degree of Protection | IP68<br>IP69K |
| Connection | M8 × 1; 4-pin |
| Optic Cover | Plastic, PMMA |

| Safety-relevant Data | |
|---|---|
| MTTFd (EN ISO 13849-1) | 1465.85 a |

| General Data | |
|---|---|
| Scope of delivery | 1 × initial start-up instructions<br>1 × sensor |
| Approvals | Ecolab |

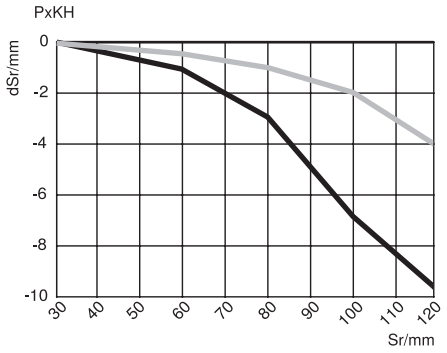
| BMECat data | |
|---|---|
| eCl@ss 5.1.4 | 27-27-09-04 Light scanner w. background masking |
| eCl@ss 6.x | 27-27-09-04 Light scanner w. background masking |
| eCl@ss 7.0 | 27-27-09-04 Light scanner w. background masking |
| eCl@ss 7.1 | 27-27-09-04 Light scanner w. background masking |
| eCl@ss 8.x | 27-27-09-04 Light scanner w. background masking |
| eCl@ss 10.0.1 | 27-27-09-04 Light scanner w. background masking |

## 3.2 Light spot diameter

| Table 1 | | | |
|---|---|---|---|
| Detection Range | 40 mm | 80 mm | 120 mm |
| Light Spot Diameter | 2,5 mm | 1,5 mm | 1 mm |

## 3.3 Switching Distance Deviation

Typical characteristic curve based on Kodak white (90% remission).



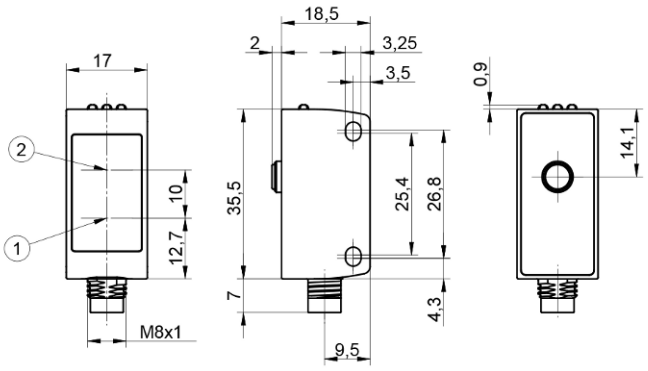

Sr = switching distance

dSr = change in switching distance

Black, 6% remission

Gray, 18% remission

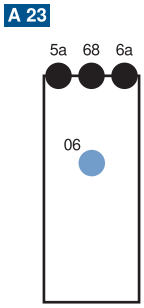
## 3.4 Housing Dimensions




① Transmitter Diode
② Receiver Diode
Screw M3 = 0,5 Nm
M8 × 1 plug without snap lock

Dimensions in mm (1 mm = 0.03937 inch)

## 3.5 Control panel




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

## 3.6 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.

# 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 “ Housing Dimensions ”).

**NOTICE**

Follow the manufacturer's specifications regarding the required torque for the connection line.

**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

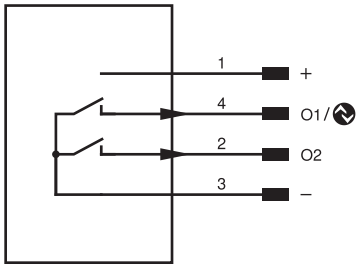
- Wire the sensor according to the connection diagram.
- Switch on the supply voltage (see section Technical Data [▶ 7]).

**⚠ 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 |

| pin | Pin Function | Polarity | Circuit |
|---|---|---|---|
| 3 | Supply voltage 0 V | | |
| 4 | Switching output 1<br>IO-Link | NPN | NO |

## 5.3 Diagnosis

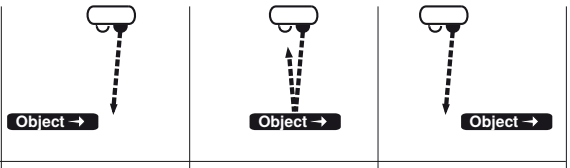
Causes triggering the contamination warning (flashing LED):

| Display LED | Diagnosis/Cause | Elimination |
|---|---|---|
| Continuous flashing at approx. 2.5 Hz | Contamination | Carefully clean the optic cover with a cloth |
| | Aged emitter diode | Replace the sensor |
| | Unreliable working range | • Increase the sensor's switching distance<br>• Reduce distance between sensor and object |
| Continuous flashing at approx. 5 Hz | Short circuit | Check electrical wiring and eliminate the short circuit |
| | Over-temperature | Disconnect the sensor from the supply voltage and allow it to cool |
| | Hardware error | Replace the sensor |

### Contamination Warning Flowcharts

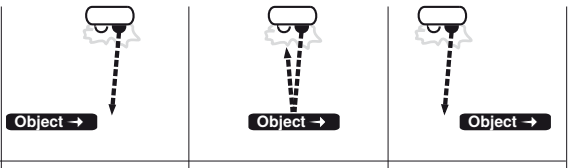
**Reflex Mode**

**no contamination**



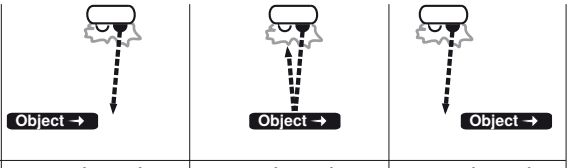

| | | | |
|---|---|---|---|
| Object | not detected | detected | not detected |
| Switching Status Indicator NO | off ○ | on ● | off ○ |
| Switching Status Indicator NC | on ● | off ○ | on ● |

**beginning contamination**




| | | | |
|---|---|---|---|
| Object | not detected | detected | not detected |
| Switching Status Indicator NO | off ○ | blinking ◍ | off ○ |
| Switching Status Indicator NC | on ● | blinking ◍ | on ● |

**advanced contamination**




| | | | |
|---|---|---|---|
| Object | not detected | not detected | not detected |
| Switching Status Indicator NO | off ○ | off ○ | off ○ |
| Switching Status Indicator NC | on ● | on ● | on ● |

## 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 set via the control, IO-Link and wTeach2. The different setting options are outlined below.

## 6.1 Setup via Teach-In Key

## 6.2 Setting via IO-Link and wTeach2

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.

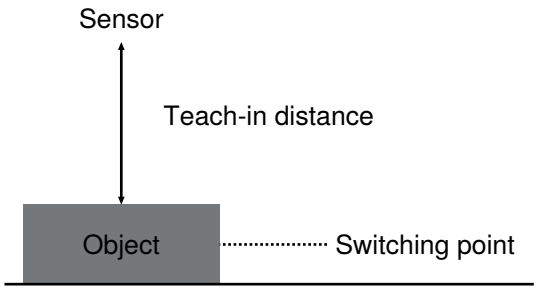
To this end, the sensor is connected to a suitable IO-Link master (see product detail page/complementary products). The interface protocol and the IODD can be found at www.wenglor.com in the download area for the respective product.

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.

### 6.2.1 Teach-In Mode

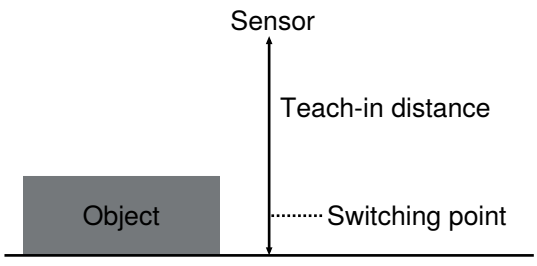
#### 6.2.1.1 Foreground Teach-In (VT)

Teach-in is performed while the sensor is aligned to the object. The switching distance is then automatically set to a distance which is slightly greater than the clearance between the sensor and the object. The sensor is thus switched for all objects whose distance to the sensor is equal to or less than the distance to the object used for the teach-in procedure.




#### 6.2.1.2 Background Teach-In (HT)

Teach-in is performed while the sensor's light spot is aligned to the background. The switching distance is then automatically set to a distance which is slightly less than the clearance between the sensor and the background. The sensor is thus switched whenever an object is located between the background and the sensor.



## 6.2.2 Pin Functions I/O2

The I/O2 function can be configured as either an output or an input.

### External Teach-In Input

Teach in output O1 via teach-in input.

With Ub setting active:

1. Set the function pin I/O2 as external teach-in input.
2. Apply 18...30 V to pin I/O2 for at least 2 seconds (4 seconds maximum).
3. As soon as the voltage drops at the input, O1 is taught in.

**INFORMATION**

Setting Ub active is preset.

With Ub setting inactive:

1. Set the function pin I/O2 as external teach-in input.
2. Disconnect pin I/O2 or apply 0 V to it for at least 2 seconds (4 seconds maximum).
3. As soon as the voltage is applied to the input, O1 is taught in.

### Locking

If the teach-in input is continuously activated, the teach-in key is locked and protected against inadvertent changes.

With Ub setting active:

1. Set the pin function of I/O2 to external teach-in input.
2. Permanently connect pin I/O2 to 18...30 V DC.
3. The sensor is protected against inadvertent changes caused by the teach-in key.

**INFORMATION**

The setting Ub active is preset

With Ub setting inactive:

1. Set the function pin I/O2 to external teach-in input.
2. Permanently disconnect pin I/O2 or connect it to 0 V.
3. The sensor is protected against inadvertent changes caused by the teach-in key.

### Error/Contamination Output

The error output is switched in the following cases:

- Contamination
- Aged emitter diode
- Unreliable working range
- Short circuit
- Over-temperature
- Hardware error

### 6.2.3 Additional Functions and Settings via IO-Link

- PNP/NPN/push-pull
- NC/NO
- Switching hysteresis
- On/off-delay
- Mode of operation
- Switch emitted light off
- Test mode
- Data storage (IO-Link)

# 7 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.

# 8 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.

# 9 Declarations of Conformity

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