wenglor
the innovative family

Operating Instructions

P1KY012

Laser Distance Sensor Time of Flight



EN

Translation of the original operating instructions
Subject to change without notice
Available as PDF file only
Version 1.0
www.wenglor.com

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1 General

1.1 Information Concerning these Instructions

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



INFORMATION

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

1.2 Explanation of Symbols

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

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

SIGNAL WORD

Type and source of danger!

Possible consequences in the event that the hazard is disregarded.

→ Measures for averting the hazard.

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



⚠ DANGER

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



⚠ WARNING

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



⚠ CAUTION

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



NOTICE

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

INFORMATION

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

1.3 Limitation of Liability

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

1.4 Copyrights

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

2 For Your Safety

2.1 Use for Intended Purpose

Laser Distance Sensors ToF

Laser distance sensors Time-of-Flight (ToF) work according to the principle of transit time measurement, which means that they cover large working ranges up to 10,000 mm, so that objects can be reliably detected even at great distances. The ToF sensors are extremely robust against interfering ambient light, which ensures reliable operation.

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 Laser Warnings

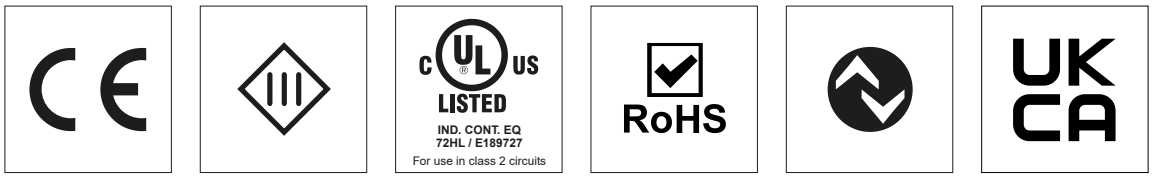


Laser class 1 (EN 60825-1)

Standards and safety regulations must be observed.

Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

2.7 Approvals and protection classes



3 Technical Data

3.1 General Information

Optical Data	
Working Range	0...1000 mm
Setting Range	100...1000 mm
Switching Hysteresis	< 20 mm
Light Source	Laser, red
Wavelength	680 nm
Service Life (T = +25 °C)	100000 h
Laser Class (EN 60825-1)	1
Beam Divergence	< 16 mrad
Max. Ambient Light	10000 Lux
Light Spot Diameter	see table 1
Triple Dot Laser	yes
Reflector required	no

Electrical Data	
Supply Voltage	10...30 V DC
Supply Voltage with IO-Link	18...30 V DC
Current Consumption (Ub = 24 V)	< 30 mA
Switching Frequency	500 Hz
Response Time	1 ms
Temperature Drift (-10 °C < Tu ≤ 50 °C)	< 2 %
Temperature Drift (-40 °C < Tu ≤ 50 °C)	< 3 %
Temperature Range	-40...50 °C
Number of Switching Outputs	2
Switching Output Voltage Drop	< 2.5 V
Switching Output/Switching Current	100 mA
Short Circuit Protection	yes
Reverse Polarity Protection	yes
Overload Protection	yes
Interface	IO-Link V1.1
Protection Class	III
FDA Accession Number	1620293-001

Mechanical Data	
Setting Method	Teach-In
Housing Material	Plastic, ABS/PC Plastic, PC
Optic Cover	Plastic, PMMA
Degree of Protection	IP67
Connection Type	Plug variant
Connection	M8 × 1; 4-pin

General product data	
Range	0...1000 mm
Output	NPN
Circuit	NO
Speed	500 Hz

General product data	
Housing	Cuboid miniature
Interface	IO-Link

Safety-relevant Data	
MTTFd (EN ISO 13849-1)	1021.76 a

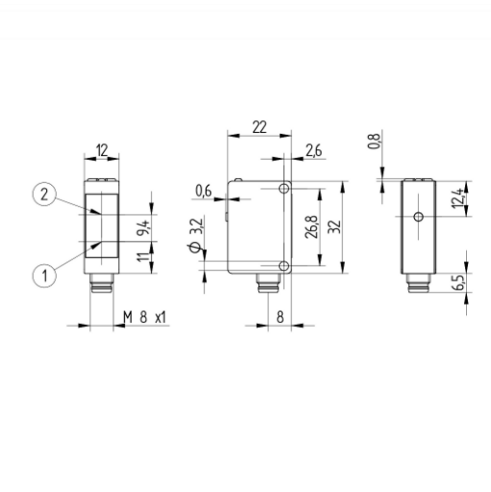
General Data	
Scope of delivery	1 × initial start-up instructions 1 × sensor

BMECat data	
eCl@ss 5.1.4	27-27-08-01 Optical distance sensor
eCl@ss 6.x	27-27-08-01 Optical distance sensor
eCl@ss 7.0	27-27-08-01 Optical distance sensor
eCl@ss 7.1	27-27-08-01 Optical distance sensor
eCl@ss 8.x	27-27-08-01 Optical distance sensor
eCl@ss 10.0.1	27-27-08-01 Optical distance sensor

3.2 Light spot diameter

Table 1			
Working Distance	100 mm	500 mm	1000 mm
Light Spot Diameter	4 mm	7 mm	15 mm

3.3 Housing Dimensions



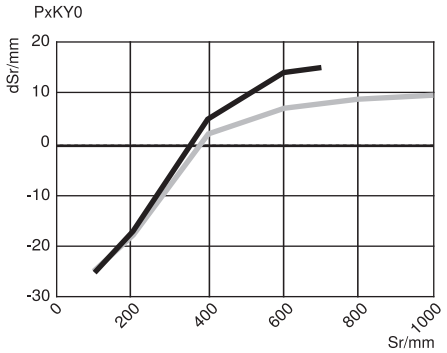
(1) Transmitter Diode

(2) Receiver Diode

Dimensions in mm (1 mm = 0.03937 inch)

3.4 Switching Distance Deviation

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



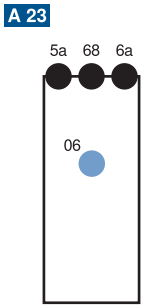
Sr = switching distance

dSr = change in switching distance

Black, 6% remission

Gray, 18% remission

3.5 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

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 in accordance with the connection diagram.
- Switch on the supply voltage (see section Technical Data [▶ 7])
- If using IO-Link, connect the sensor to 18...30 V DC.
- If not using IO-Link, connect the sensor to 10...30 V DC.

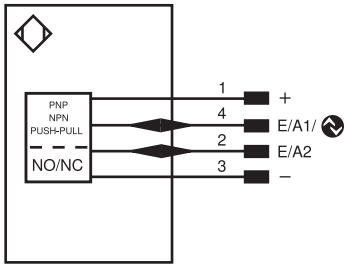
⚠ DANGER

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

Voltage-conducting parts may cause personal injury or damage to equipment.

→ The electric device may be connected by appropriately qualified personnel only.

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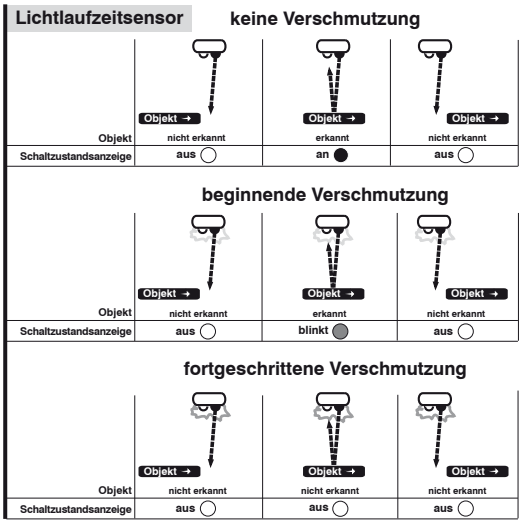


Legend					
+	Supply Voltage +	PT	Platinum measuring resistor	ENARS422	Encoder A/Ā (TTL)
–	Supply Voltage 0 V	nc	Not connected	ENBRS422	Encoder B/B̄ (TTL)
~	Supply Voltage (AC Voltage)	U	Test Input	ENA	Encoder A
A	Switching Output (NO)	Ū	Test Input inverted	ENB	Encoder B
Ā	Switching Output (NC)	W	Trigger Input	AMIN	Digital output MIN
V	Contamination/Error Output (NO)	W–	Ground for the Trigger Input	AMAX	Digital output MAX
V̄	Contamination/Error Output (NC)	O	Analog Output	AOK	Digital output OK
E	Input (analog or digital)	O–	Ground for the Analog Output	SY In	Synchronization In
T	Teach Input	BZ	Block Discharge	SY OUT	Synchronization OUT
R	Reset input	AMV	Valve Output	OLT	Brightness output
Z	Time Delay (activation)	a	Valve Control Output +	M	Maintenance
S	Shielding	b	Valve Control Output 0 V	rsv	Reserved
RxD	Interface Receive Path	SY	Synchronization	Wire Colors according to DIN IEC 60757	
TxD	Interface Send Path	SY–	Ground for the Synchronization	BK	Black
RDY	Ready	E+	Receiver-Line	BN	Brown
GND	Ground	S+	Emitter-Line	RD	Red
CL	Clock	⏚	Grounding	OG	Orange
E/A	Output/Input programmable	SnR	Switching Distance Reduction	YE	Yellow
	IO-Link	Rx+/–	Ethernet Receive Path	GN	Green
PoE	ower over Ethernet	Tx+/–	Ethernet Send Path	BU	Blue
IN	Safety Input	Bus	Interfaces-Bus A(+)/B(–)	VT	Violet
OSSD	Safety Output	La	Emitted Light disengageable	GY	Grey
Signal	Signal Output	Mag	Magnet activation	WH	White
BI_D+/–	Ethernet Gigabit bidirect. data line (A-D)	RES	Input confirmation	PK	Pink
EN0 RS422	Encoder 0-pulse 0/0̄ (TTL)	EDM	Contactor Monitoring	GNYE	Green/Yellow

5.3 Diagnosis

Causes of the contamination warning (LED flashing):

Indicator LED	Diagnosis/Cause	Remedy
Continuous flashing at approx. 2.5 Hz	contamination	Carefully clean the optic cover with a cloth
	Unsafe working range	• Increase the sensor's switching distance • Decrease the distance between the emitter and the object
Continuous flashing at approx. 5 Hz	Hardware error	Replace the sensor



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.

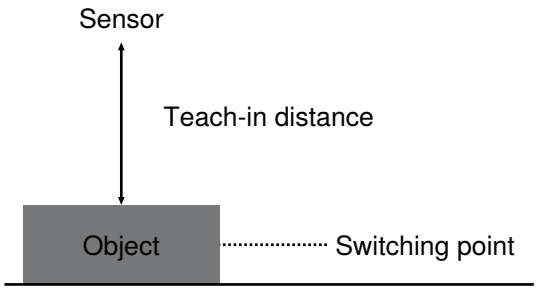
→ Required action as specified in case of fault.

6 Settings

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

6.1 Setup via Teach-In Key

By pressing the teach-in key on the sensor, the switching distance of both outputs from the object can be programmed (foreground teach-in).



Foreground teach-in for Switching Output 1

1. Install the sensor according to the installation instructions.
2. Place the object in front of the sensor.
3. Hold down the teach-in key for 2 seconds until LED O1 begins to flash.
4. Release the teach-in key.
5. The distance is programmed, and LED O1 confirms successful programming.

Foreground teach-in for Switching Output 2

1. Install the sensor according to the installation instructions.
2. Place the object in front of the sensor.
3. Hold down the teach-in key for 5 seconds until LED O2 begins to flash.
4. Release the teach-in key.
5. The distance is programmed, and LED O2 confirms successful programming.

INFORMATION

Note

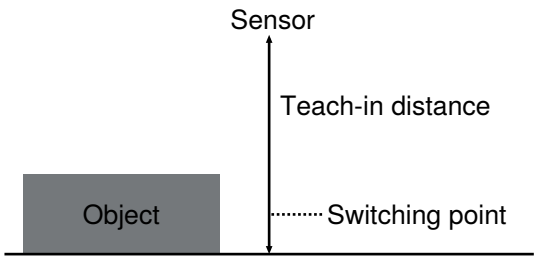
If teach-in is performed without an object or if an object is too far from the sensor, the switching distance is set to the end of the setting range and the O1/O2 LED flashes at 8 Hz. The same applies if an object is too close; in this case, the switching distance is set to the beginning of the setting range.

7 IO-Link

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

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

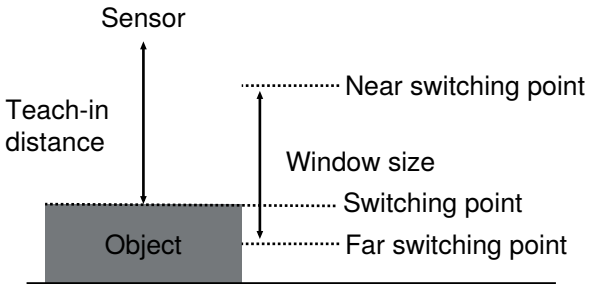
7.1 Background Teach-In



1. Install the sensor in accordance with the installation instructions.
2. Align the sensor to the background.
3. Configure or teach-in the switching output / the switching output function via IO-Link.
4. The sensor is switched as soon as an object is located between the background and the sensor.

7.2 Window teach-in

In addition to foreground teach-in (default setting), the switching output also supports window teach-in:



1. Install the sensor according to the installation instructions.
2. Align the sensor with the background.
3. If necessary, adjust the window using the near and far switching points.
4. The sensor switches when an object is located between the two switching points.

INFORMATION

The far switching point must be greater than the near switching point.

7.3 Lock

If the teach-in input is permanently set to 18–30 V DC, the teach-in key is locked and protected against unintentional adjustment.

1. Set the pin function of O1/O2 to “External Teach.”
2. Set pin O1/O2 permanently to 18...30 V DC.

3. The teach-in key is disabled.

7.4 Transmitter Light Can Be Turned Off

The sensor's transmitted light can be turned off via an IO-Link parameter. Furthermore, the sensors' inputs can be programmed via IO-Link so that the "Transmitted light can be turned off" function is also available by applying 24 V to the respective input.

7.5 External Teach-In

Teach the O1/O2 output via the teach-in input.

1. Set the I/O1 or I/O2 pin function to "external teach-in input" in IO-Link or wTeach2.
2. Apply 24 V to the pin selected as an input to teach switching output 1 (2 sec) and switching output 2 (5 sec).
3. As soon as the voltage at the input drops, the outputs are programmed.



INFORMATION

Note

Please note: During external teach-in via one of the two configurable output pins, both independent switching points are stored in the sensor and can be output at any time via the IO-Link process data. If you wish to perform evaluation of both outputs via the pins, the previously configured teach-in input must be reconfigured as an output.

7.6 error output

The error output activates in the following cases:

- Insufficient signal from the object
- Incorrect installation
- Object is outside the working range

7.7 Test Mode

A test mode can be activated for the sensors using the parameters. This simulates the sensor's test operation—for example, switching the outputs or entering a measured value—without the sensor actually detecting an object. Test operation of the application, including physically correct switching of outputs and indicator LEDs, is possible.

8 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.

9 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.

10 Declarations of Conformity

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