wenglor
the innovative family

Operating Instructions

FXSL004
Fill-level Sensor with IO-Link

EN

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

Table of Contents

1 General

1.1 Information Concerning these Instructions

- These instructions 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.
- The product is subject to further technical development, and thus the information contained in these operating instructions may also be subject to change. The current version can be found at www.wenglor.com in the product's separate download area.

INFORMATION

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

This sensor is used to monitor fill levels and for the detection of media.

The LevelTech works in accordance with the frequency sweep principal:

Together with its environment, an electrode integrated into the tip of the sensor functions as a capacitor. The medium determines the capacitance value depending on its dielectric constant.

A resonant circuit is created in combination with a coil in the sensor's electronics. The switching signal is triggered depending on the measured resonant frequency and the programmable switching window. The sensor may only be used for detecting the fill levels of liquids and solids with a dielectric constant greater than 1.5. The sensor may only be used for media to which the housing material and the tip of the sensor are resistant.

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.

Installation and removal of the product are only permissible in pressure-free piping systems which have been allowed to cool down.

2.6 Approvals and protection classes

CE

c UL us LISTED
IND. CONT. EQ
72HL / E189727
For use in class 2 circuits

RoHS

WHG

UK CA

3 Technical Data

3.1 General Data

	FXSL004
Sensor-Specific Data	
Measuring principle	Frequency sweep
Measuring Range > DK***	1.5
Medium	Liquids, granulate, powder
Response Time	0,04 s
Ambient Conditions	
Media temperature TM (TU < 50 °C)	-40...115 °C**
Media temperature TM brief (TU < 50 °C, t < 1 h)	-40...130 °C
Ambient temperature	-40...85 °C
Storage temperature	-40...85 °C
Pressure Resistance	100 bar
Electrical Data	
Supply Voltage	8...35 V DC
Current Consumption (Ub = 24 V)	< 0,53 mA
Number of Switching Outputs	2
Power-up Time	< 1,5 s
Switching Output/Switching Current	100 mA
Switching Output Voltage Drop	≤ 1,9 V
Signal source	Change of medium
Leakage Current	< 100 µA
Short Circuit Protection	yes
Reverse Polarity Protection	yes
Interface	IO-Link V1.1
Mechanical Data	
Setting Method	IO-Link
Housing Material	Stainless steel, V4A (1.4404/316L)
Material in contact with media	Stainless steel, V4A (1.4404 / 316L) Plastic, PEEK
Degree of Protection	IP67 IP69K
Connection	M12 × 1; 4-pin
Connector Plug Material	Stainless Steel
Process Connection	G 1/2"
Technical Safety Data	
MTTFd (EN ISO 13849-1)	633,2 a
Function	
Attenuation (adjustable)	
Selective fill-level measurement	
IO-Link	yes
Push-Pull	yes
Adjustable Parameters	
Output	Push-pull NPN PNP
Circuit	NC NC/NO NO
Other parameters	Adaptive trigger Window trigger

INFORMATION

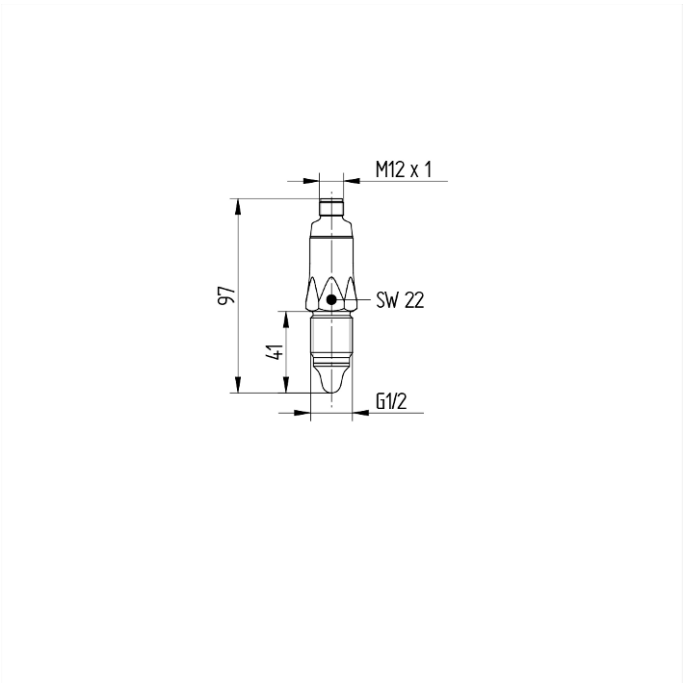
When using pin 2 as an analog output, the ambient temperature may only be within -40...65 °C.

3.2 Default Settings

Pin 4	Output	Switching output
	Output function	Push-pull NO
	Polarity	Push-pull
	Working mode	Window trigger
	Switching window min	0%
	Switching window max	75%
	Hysteresis	3%
	Attenuation	0.1 s
Pin 2	Output	Switching output
	Output function	Push-pull NC
	Polarity	Push-pull
	Working mode	Window trigger
	Switching window min	75%
	Switching window max	100%
	Hysteresis	3%
	Attenuation	0.1 s

3.3 Housing Dimensions

For other process connections, see product selector (https://www.wenglor.com/index.php?id=965&L=1).
Overall housing dimensions are included in the respective data sheet.



3.4 Complementary Products

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

3.5 Scope of delivery

- Sensor
- Safety precaution

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!

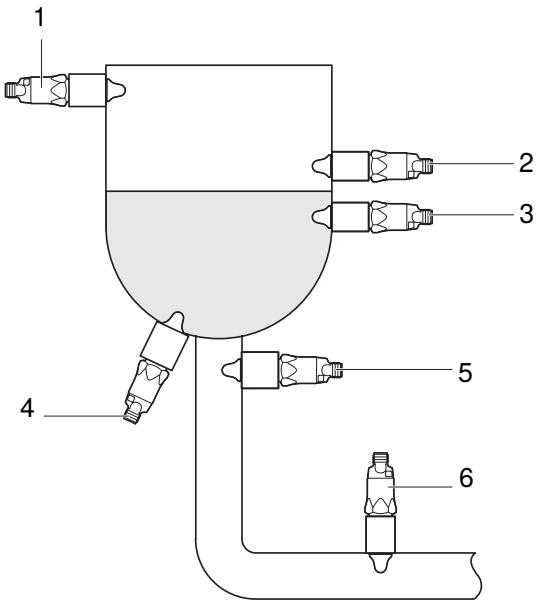
The product may be damaged.

→ Storage instructions must be complied with.

5 Installation and Electrical Connection

5.1 Installation

- Protect the product from contamination during installation.
- Observe 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.
- Specified torque values must be observed.



1	Overfill protection	2	Limit level max.
3	Limit level min.	4	Dry-running protection
5	Dry-running protection	6	Dry-running protection

The sensor can be mounted in any position on the vessel. A sensor (1) mounted on the top of the vessel protects against overfilling. Sensors located further down detect a maximum (2) or minimum (3) level. A sensor (4,5,6) mounted at the bottom or on the outlet pipe can protect a connected pump from running dry.

NOTICE

The sensor can be mounted in any position on the vessel. However, the following mounting instructions must be observed for hygienically correct positioning of the sensor.

INFORMATION

The LevelTech sensor should only be installed on closed metal containers in order to comply with the EMC directive DIN EN 61326.

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.

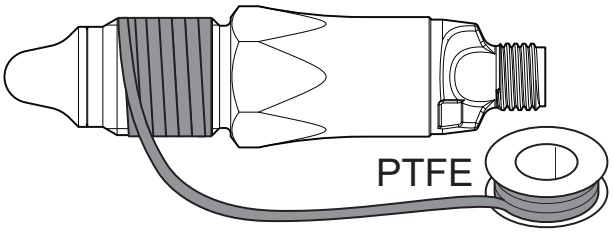
→ Ensure a safe installation environment.

INFORMATION

The LevelTech sensor can be mounted and sealed in 2 different ways (depending on the process connection):

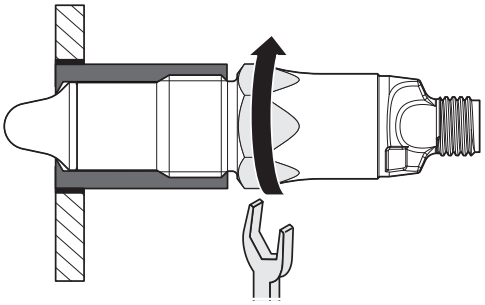
- Sealing via PTFE tape
- Sealing via PEEK to metal

1. sealing with PTFE tape



- Containers and pipes are free of media.
- Seal the thread on the sensor with Teflon tape (PTFE).
- Screw in the sensor.
- Tightening torque G½": 30 Nm max.
- Tightening torque G1/2" NPT: 20 Nm max.
- Pressure load up to 100 bar

2. sealing by means of PEEK on metal



- Tanks and pipes are free of media.
- The adapter or the weld-in sleeve must be installed free of dead space and in a completely drainable position.
- Screw in the sensor.
- Tightening torque: 15...20 Nm
- Pressure load up to 10 bar

INFORMATION

When mounting with PEEK on a metal seal, only original wenglor accessories should be used. The corresponding parts can be found at www.wenglor.com under Mounting technology on the product detail page. Accessories for this type of installation are marked accordingly.

5.2 Cleaning

For cleaning from the outside, the permissible ambient temperature and degree of protection must be observed.

The resistance of the materials must be taken into account when selecting the cleaning agents.

See also

Installation [▶ 11]

5.3 Electrical Connection

- Wire the sensor in accordance with the connection diagram.
- Switch on the supply voltage (see section Technical Data [▶ 7])
- Connect the sensor to 8...36 V DC.
- When operated with IO-Link:
  - An IO-Link master with class A port must be used because pin 5 is not connected in the case of a class A port.
  - In the case of excessive interference, a shielded cable should be used.

⚠ 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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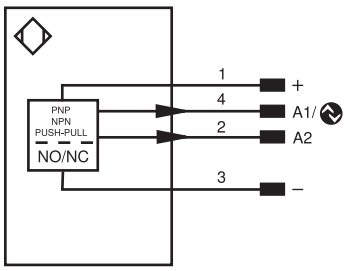


6 Settings

The sensor can be set via wTeach2 or IO-Link. If foam formation or adhesions of media must be detected, a configuration with wTeach2 is recommended.

To carry out the setting via wTeach2 and IO-Link, 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.

6.1 Pin function

The main pin functions are shown below.

Pin	Possible settings	Default setting
A1	**Switching output** For the setting options, see Window Trigger [▶ 14] and Adaptive Trigger [▶ 15]. Deactivated	Switching output
A2/O	**Switching output** For the setting options, see Window Trigger [▶ 14] and Adaptive Trigger [▶ 15]. **Current output** Scalable and invertible Deactivated	Switching output

6.2 Window Trigger

As part of the window trigger, the respective switching windows are defined for each switching output. If the input signal is within the limits, the switching output is actuated. This allows different media to be distinguished from each other, e.g. oil versus water or beer versus foam.

The window trigger is activated upon shipment from the factory. The following setting options and default settings apply:

Parameters	Possible settings	Defaults
Lower limit value of switching window	0...100%	A1: 0% A2: 75%
Upper limit value of switching window	0...100%	A1: 75% A2: 100%
Hysteresis	0...50%	3%
Damping on/off-delay	0...10 ms	0.1 s
Polarity	NPN/PNP/push-pull/inactive	Push-pull
Circuit	Normally Open (NO) The output is high when the condition has been satisfied, depending on the settings. Normally Closed (NC)	A1: NO A2: NC

Parameters	Possible settings	Defaults
	The output is low when the condition has been satisfied, depending on the settings.	

6.3 Adaptive Trigger

The adaptive trigger is a plug-and-play solution for applications with frequent medium changes. Normally, no additional configuration of the sensor is required for the use of the adaptive trigger, as the sensor automatically adjusts to the respective new medium and triggers the output signal.

The empty state of the tank can be taught in if necessary in order to avoid any interference, e.g. due to adhesion. Additional measurement stabilization can also be activated so that the switching output only switches when the input signal is stable for at least 1 second.

The following conditions must be met to use the adaptive trigger:

- The input signal must be as stable as possible
- To obtain a switching signal, the new measured value must deviate from the old measured value by at least 3%.
- During the start-up phase, the sensor must be in air as the medium

NOTICE

If a medium is measured whose DK value is lower than the previously measured medium, the sensor tip must be cleaned.

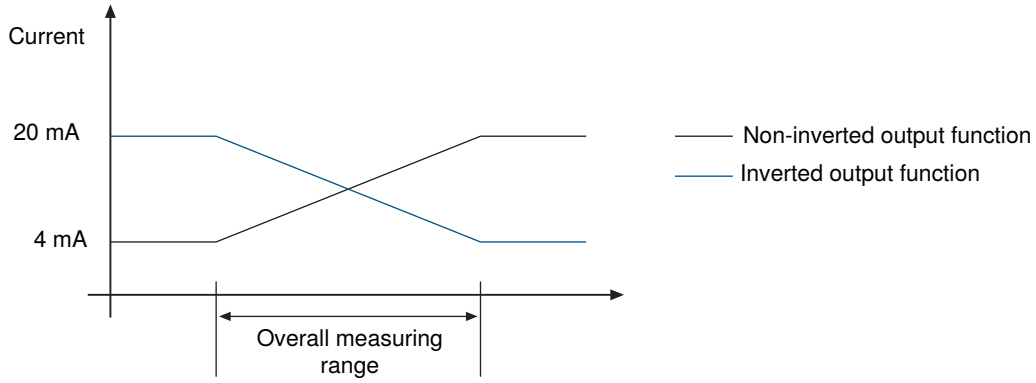
The window trigger is activated upon shipment from the factory. When switching to the adaptive trigger, the following setting options and presets apply:

Parameters	Possible settings	Defaults
Limit value 1	0...100% Below the limit, the adaptive trigger is always active. A downshift only takes place as soon as the limit value and the trigger distance are exceeded.	0%
Limit value 2	0...100% Above the limit, the adaptive trigger is inactive. A switching occurs as soon as the input signal is below the limit value and the trigger distance is exceeded.	100%
Attenuation On/off-delay	0...10 s Delay of response/fall time	0.1 s
Trigger distance	3...50% Sensitivity set via the sensor. It is defined by how many % the new measured value must deviate from the previous measured value for the sensor to switch.	3%
Start level	0...100% The start level defines whether or not the switching output should be activated when the power supply is connected. If the measuring level is below the start level when the sensor is connected, the switching output is activated.	0%

Parameters	Possible settings	Defaults
Stabilization function	On/Off/Inactive If the stabilization function is activated, the input signal must be stable for at least one second for the switching output to switch.	Off
Polarity	NPN/PNP/push-pull/inactive	Push-pull
Circuit	Normally Open (NO) The output is high when the condition has been satisfied, depending on the settings. Normally Closed (NC) The output is low when the condition has been satisfied, depending on the settings.	A1: NO A2: NC

6.4 Analog Output

Pin 2 of the sensor can be used both as a switching and analog output. When used as an analog output, the sensor outputs the measured value as a linear proportional current value. The analog output can be scaled and inverted via 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.

Contamination which adheres to the measuring probe distorts the measured value for flow rate.

8 Returns

Due to legal regulations and for the protection of employees, wenglor sensoric GmbH requires a signed declaration of decontamination before your order can be processed.

The corresponding form is available at www.wenglor.com → Download → General Terms and Conditions and Returns.

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.