EN

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the innovative family

FXxQ0xx

Pressure sensors with temperature measurement and IO-Link



IO-Link®

Operating Instructions

Translation of the Original Operating Instruction
Subject to change without notice
Available as PDF version 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 FXxQ0xx.
- 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.
- 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.



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. 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 replacement 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 product is used for pressure and temperature acquisition in closed systems.

Pressure Sensor
weFlux² pressure sensors measure the relative pressure of any desired media in closed systems.
The pressure acting on a pressure sensor is converted into an electronic signal. The switching output outputs the relevant switching signal, the analog output outputs the measured value (optionally in 0…10 V or 4…20 mA). FXxQ0xx pressure sensors also measure the temperature of the medium and are equipped with an IO-Link interface, by means of which the sensor can be configured and read out.

This product can be used in the following industry sectors:

- Special machinery manufacturing
- Heavy machinery manufacturing
- Logistics
- Automotive industry
- Packaging industry
- Clothing industry
- Plastics industry
- Woodworking industry
- Consumer goods industry
- Paper industry
- Electronics industry
- Glass industry
- Steel industry
- Printing industry
- Construction industry
- Chemicals industry
- Agriculture industry
- Alternative energy
- Raw materials extraction

2.2 Use for Other than the Intended Purpose

- Measures must be taken to prevent pressure values that exceed the specified overload pressure.
- The device may be destroyed if the bursting pressure is exceeded. Risk of injury!
- 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 only be used with accessories supplied or approved by wenglor, or in combination with approved products. A list of approved accessories and combination products can be accessed 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.
- Instructions regarding use for intended purpose must be observed.

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.



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

2.5 General Safety Precautions

NOTE!

- 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 respectively current version of the operating instructions can be accessed 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 IP Protection

3. Technical Data

Technical Data / Order Number	FXxQ0xx
Sensor-Specific Data	
Measuring range	–1 ... 10 bar, in various pressure stages
Pressure type	relative
Media temperature	See technical data sheet
Measuring range Temperature	See technical data sheet
Measurement error (incl. hysteresis, linearity, repetition accuracy)	< +/–0,5 %
Temperature measuring accuracy	< +/–1 °C
Ambient Conditions	
Ambient temperature	–25…80 °C
Storage temperature	–25…80 °C
EMC	DIN EN 61326-2-3
Shock resistance per DIN EN 60068-2-27	30 g/11 ms
Vibration resistance per DIN EN 60068-2-6	10 g (10…2000 Hz)
Electrical Data	
Supply power	12…32 V DC
Supply power with IO-Link	18…30 V DC
Current consumption (Uo=24 V)	< 15 mA
Number of switching outputs	2
Number of analog outputs	1
Response Time	< 10 ms
Analog Output	4…20 mA/0…10 V
Output load resistance	$< \frac{(U_o - U_{min})}{20\ mA}$ /> 1 kOhm
Switching Output Voltage drop Switching current Residual current Switchable to NC or NO	 < 1,5 V ≤ 100 mA < 250 µA Yes
Short-circuit protection	Yes
Reverse polarity protected	Yes
Protection class	III
Interface	IO-Link 1.1

Mechanical Data	
Setting method	IO-Link
Housing material	Stainless steel 1.4404
Media contacting materials	Stainless steel 1.4404, Seal material (see technical data sheet), ceramic Al2O3 96 %
Protection	IP65*
Connector type	M12 × 1 , 4-pin
Connection cable length	max. 30 m
Process connection	G3/4"
Output Function	
Configurable as PNP, NPN or push-pull	Yes
Switching output switchable to current or voltage	Yes
Switchable to NC or NO	Yes
Safety-relevant Data	
MTTFd (EN ISO 13849-1)	1157,11 a

* Not UL certified

The following table specifies the tightening torques of the connector plugs and mounting options in order to assure compliant, error-free operation:

Connector Type	Tightening Torque in Nm
Supply voltage and signal connection	
M12	0,4
Process connection	
G3/4 external thread	30

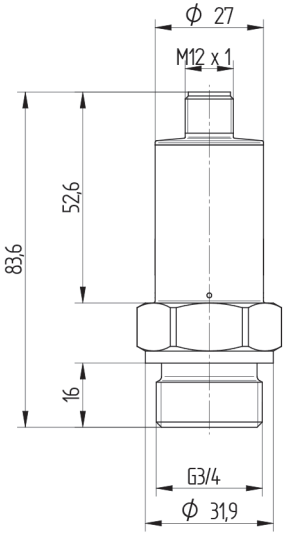


CAUTION!

- The pressure resistance or pressure range specified in the technical data always makes reference to the sensor itself.
- Amongst other factors, the system's pressure resistance is also dependent on the utilized mounting components (adapters), and is only as high as the pressure resistance of the weakest component.

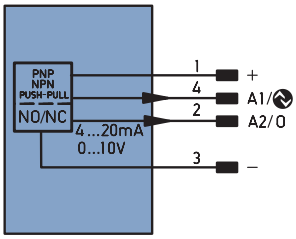
3.1 Housing Dimensions

G3/4"



3.2 Wiring Diagram

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Legend

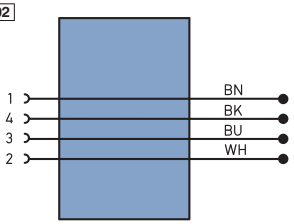
+	Supply Voltage +	
–	Supply Voltage 0 V	
~	Supply Voltage (AC Voltage)	
A	Switching Output	(NO)
Ā	Switching Output	(NC)
V	Contamination/Error Output	(NO)
V̄	Contamination/Error Output	(NC)
E	Input (analog or digital)	
T	Teach Input	
Z	Time Delay (activation)	
S	Shielding	
RxD	Interface Receive Path	
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	
BI_D+/-	Ethernet Gigabit bidirect. data line (A-D)	
EN0 RS422	Encoder 0-pulse 0-0̄ (TTL)	

PT	Platinum measuring resistor
nc	not connected
U	Test Input
Ū	Test Input inverted
W	Trigger Input
W–	Ground for the 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
SY–	Ground for the 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
EDM	Contactor Monitoring

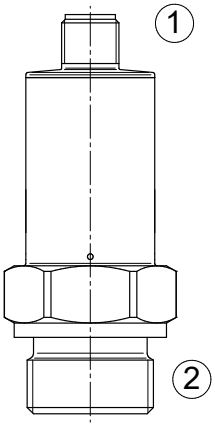
ENA RS422	Encoder A/Ā (TTL)
ENB RS422	Encoder B/B̄ (TTL)
ENA	Encoder A
ENB	Encoder B
AMIN	Digital output MIN
AMAX	Digital output MAX
AOK	Digital output OK
SY In	Synchronization In
SY OUT	Synchronization OUT
OLT	Brightness output
M	Maintenance
rsv	reserved
Wire Colors according to IEC 60757	
BK	Black
BN	Brown
RD	Red
OG	Orange
YE	Yellow
GN	Green
BU	Blue
VT	Violet
GY	Grey
WH	White
PK	Pink
GNYE	Green/Yellow

3.3 Accessory Products

wenglor can provide you with suitable connection technology for your product.

Suitable mounting technology no.	G3/4": 920
Suitable connection technology no.	2 S02 
IO-Link master	ZAI72AN01, EFBL001, EFBL003

3.4 Layout



① = plug connector
② = process connection

3.5 Scope of Delivery

- Pressure Sensor FXxQ0xx
- Quickstart guide
- Seal

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.



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 System Overview



Connector Cables

ZCCL001 (straight, PVC, IP69K) 10 m
S23-2M (straight, PVC) 2 m
S23-2MPUR (straight, PUR) 2 m
S23-5M (straight, PVC) 5 m
S23-5MPUR (straight, PUR) 5 m
S23-10M (straight, PVC) 10 m
S23-10MPUR (straight, PUR) 10 m
S29-2M (angled, PVC) 2 m
S29-5M (angled, PVC) 5 m
S29-5MPUR (angled, PUR) 5 m
S29-10M (angled, PVC) 10 m

Accessory Products

IO-Link master EFBL001/EFBL003, ZAI72AN01

Adapters

…for G3/4":
Welding fitting: ZH4C009

5.2 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 complied with (see “3. Technical Data” on page 9).



ATTENTION!
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.
- Before dismantling, make sure that the system is pressure-free.

5.3 Electrical Connection

- Connect the sensor to 12 to 32 V DC (see “3.4 Layout” on page 13).
- The cable may not exceed a length of 30 m.
- – 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 only be connected by appropriately qualified personnel.

5.4 Diagnostics

Required action in case of fault:



NOTE!

- Shut down the machine.
- 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.

- Required action as specified in case of fault.

6. Functions Overview

6.1 Default Settings

		FXxQ0xx
Function A1 (Pin 4)	Output	Switching output
	Measurement, physical quantity	Pressure
	Output function	PNP NO
	Switching point 1 / Start value Analog output	50 % of the MUL
	Switching point 2 / End value Analog output	25 % of the MUL
Function A2 (Pin 2)	Output	Analog output
	Measurement, physical quantity	Pressure
	Output function	Current: 4…20 mA
	Initial value, analog output	0 % of the MUL
	Final value, analog output	100 % of the MUL

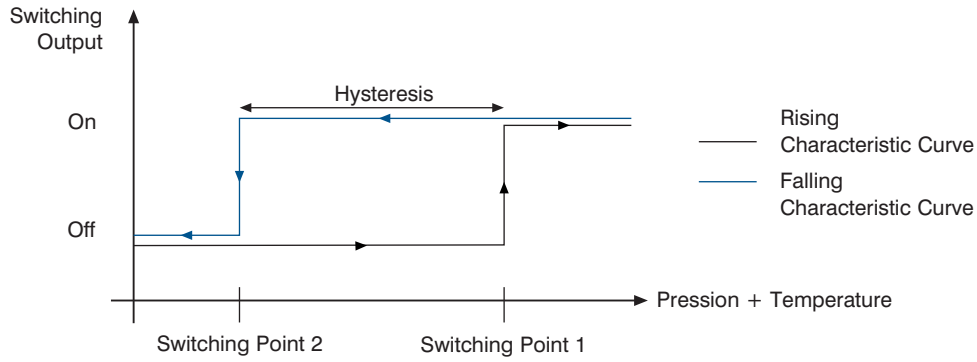
6.2 Function Definitions

- All functions are configured via the IO-Link interface.
- Refer to the interface protocol concerning parameters configuration (available at www.wenglor.com on the product detail page).

Designation	Function	Page
Hysteresis	Adjust switching hysteresis	Page 19
Window width	Set window width	Page 19
Analog value scaling	Scale analog output	Page 20
Remote output	Output for external control signals	Page 20
Filter	Set the filter	Page 22

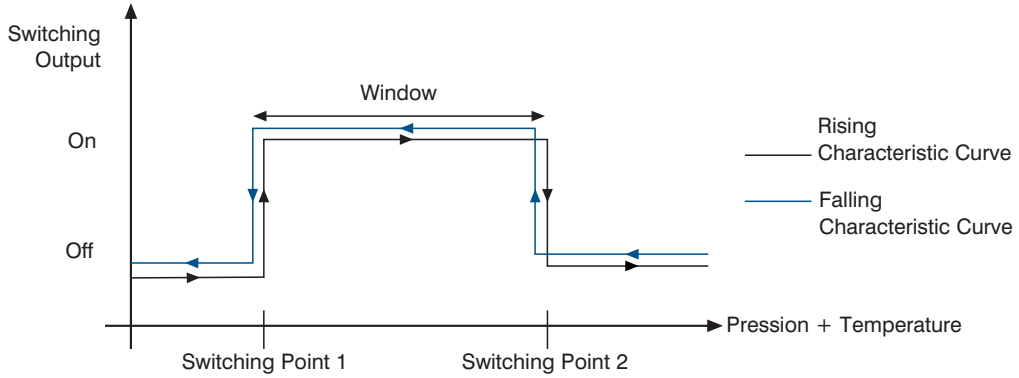
6.2.1 Hysteresis

- Depending on the settings selected for switching points 1 and 2, the sensor's switching performance can be adjusted to the application.



6.2.2 Window Width

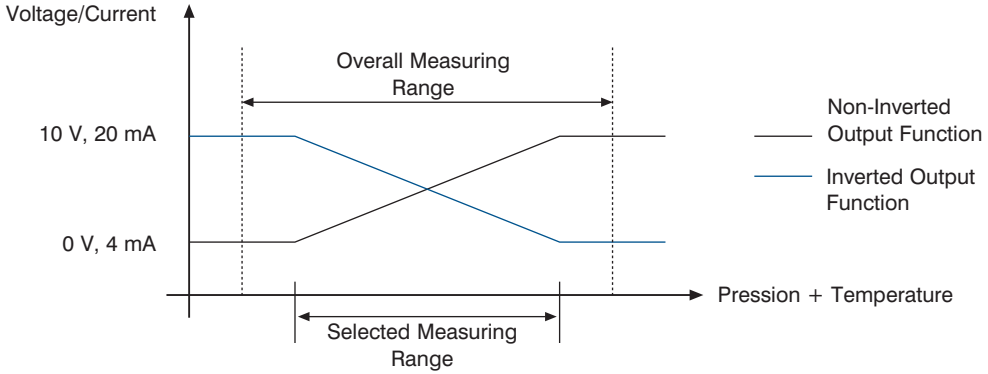
- If switching points 1 and 2 are reversed, a window for actual and target value comparison can be set up with just one switching output.



Hysteresis at the window boundaries amounts to 0.5 % of the measured value.

6.2.3 Analog value scaling

- Allocation of the analog starting point of 4 mA/0 V and the analog end point of 20 mA/10 V to the measuring range is freely selectable.



6.2.4 Remote Output

General Explanation

- If the sensor is operated with IO-Link (pin 4), the free output (pin 2) can be used for control signals.
- The output can be configured as a switching output or as an analog output.
- In this way, the need for an additional output at the controller is eliminated and external components can be switched by the sensor (e.g. a lamp) or actuated by means of an analog control signal (U/I) (e.g. a valve).

Prerequisite

- The sensor must be operated via IO-Link.

Procedure

- See figures 1 and 2 below with regard to wiring and connection.
- Setup via IO-Link in order to specify whether pin 2 is a remote analog output (U/I) or a remote switching output.
- The controller transmits the signal intended for the external component via IO-Link.
- The sensor transmits the signal to pin 2 (analog or switching output) and forwards it.
- The external component is controlled by the sensor's output. No additional output is required at the controller.
- The analog output can be scaled from 0 ... 1000 (0 = 4 mA / 0 V, 1000 = 20 mA / 10 V).

Wiring

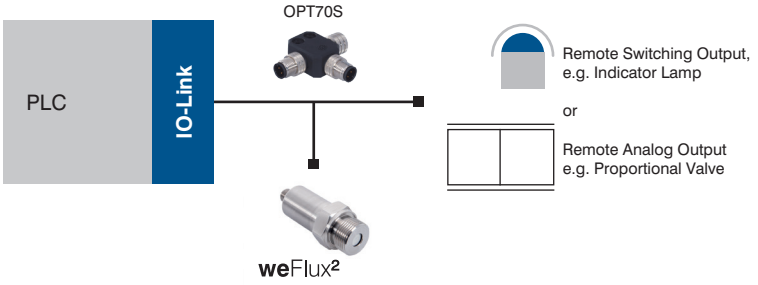


Figure 1: Wiring With Remote Output Function

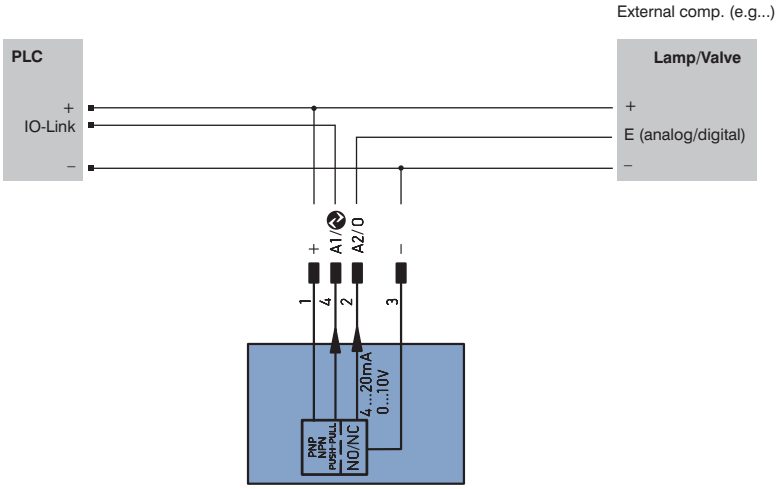


Figure 2: Wiring

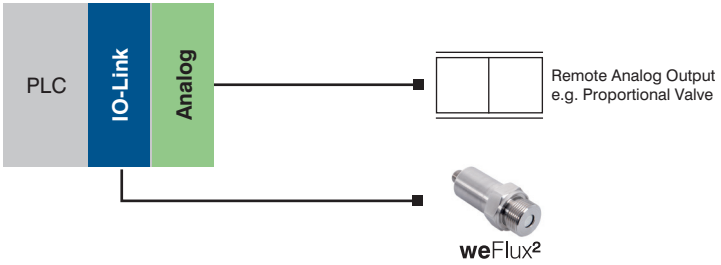
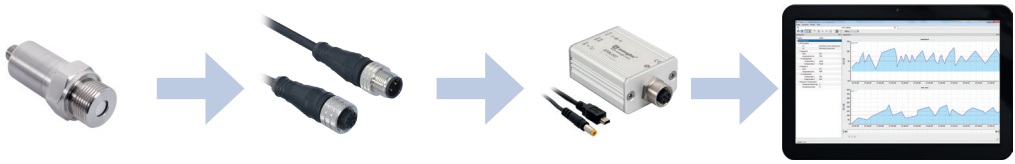


Figure 3: Wiring Without Remote Output Function



FXxQ0xx

Connection cable, e.g. BG2SG2V1-2M

EFBL003 master with USB cable

PC with free software wTeach (DNNF005)

Figure 4: Cables when using wTeach

6.2.5 Filter

- The filter represents the number of values used by the sensor to generate a mean value for pressure measurement.
- The higher the filter number, the longer the sensor's step response time T90 when the measured values change.

Filter	Step Response Time T90
0	8 ms
1	16 ms
2	32 ms
3	66 ms
4	135 ms
5	270 ms
6	500 ms
7	1,0 s
8	2,1 s
9	4,3 s
10	8,4 s

7. Settings

Parameters adjustable via the IO-Link interface:

Sensor Settings	
Pressure unit of measure	bar/mbar (depending on the measured value) PSI kPa MPa
Temperature unit of measure	Celsius Fahrenheit
Switching output function	PNP NPN Push-pull
Analog output function	4…20 mA 0…10 V
Analog output scaling	Initial and final values between 0 and 100 % of the measured value
Function, output 1	switching output Pressure switching output Temperature
Function, output 2	switching output Pressure switching output Temperature Analog output Pressure Analog output Temperature Remote switching output Remote analog output
Filter	0...10, 0 = filter off
Output Settings	
Switching function	NO NC
Switching point	Switching point 1 Switching point 2
Remote output	Open/closed 0...1000 (Analog value)
Sensor Restrictions	
Write access disabling	Yes No
Data storage disabling	Yes No
Standard	Restore default settings

Process data available via IO-Link interface:

- Status of the switching outputs.
- Measured pressure in the selected U/M
- Measured temperature in the selected U/M

NOTE!
When setting and evaluating the pressure sensor via wTeach2, wenglor's USB master EFBL003 is required.

8. IO-Link

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

9. Maintenance Instructions



NOTE!

- This wenglor sensor is maintenance-free.
- Cleaning and inspection of the plug connections at regular intervals is advisable.
- Do not clean the sensor with solvents or cleansers which could damage the product.
- The product must be protected against contamination during initial start-up.
- Deposits upstream from the pressure measuring cell may influence results.

10. 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.

11. 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.

12. Appendix

12.1 List of Abbreviations

Abbreviation	Meaning
MUL	Measuring range upper limit

12.2 Change Index, Operating Instructions

Version	Date	Description/Change
1.0.0	29.04.2019	Initial version of the operating instructions
1.1.0	17.12.2019	Updates of “3. Technical Data” on page 9
1.2.0	23.01.2020	Updates of “3. Technical Data” on page 9
1.3.0	17.12.2019	Updates of “3. Technical Data” on page 9
1.4.0	30.06.2020	Update of “2.6 Approvals and IP Protection” on page 8

12.3 EU Declaration of Conformity

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

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