GB

Operating instructions
Converter IO-Link sensor – 4…20 mA
EIO104

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Contents

1 Preliminary note

You will find instructions, technical data, approvals and further information using the QR code on the unit / packaging or at www.ifm.com.

1.1 Symbols used

✓	Requirement
▶	Instructions
▷	Reaction, result
[...]	Designation of keys, buttons or indications
→	Cross-reference
	Important note Non-compliance may result in malfunction or interference.
	Information Supplementary note

1.2 Warnings used

CAUTION

Warning of personal injury

▷ Slight reversible injuries may result.

2 Safety instructions

- The unit described is a subcomponent for integration into a system.
  - The system architect is responsible for the safety of the system.
  - The system architect undertakes to perform a risk assessment and to create documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the architect of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ Intended use).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, operation and maintenance of the product must be carried out by qualified personnel authorised by the machine operator.
- Protect units and cables against damage.

3 Intended use

The device is used for the evaluation of a connected sensor with IO-Link interface.

The devlice converts the process values provided via IO-Link signals into analogue signals and outputs them via two analogue current outputs.

The unit is not suited for environments with particular requirements on mechanical stability (e.g. shock/vibration).

The unit is intended for indoor use only.

▶ Observe the operating conditions (→ Technical data at www.ifm.com).

4 Function

The device converts IO-Link process values into max. 2 analogue signals of 4…20 mA.

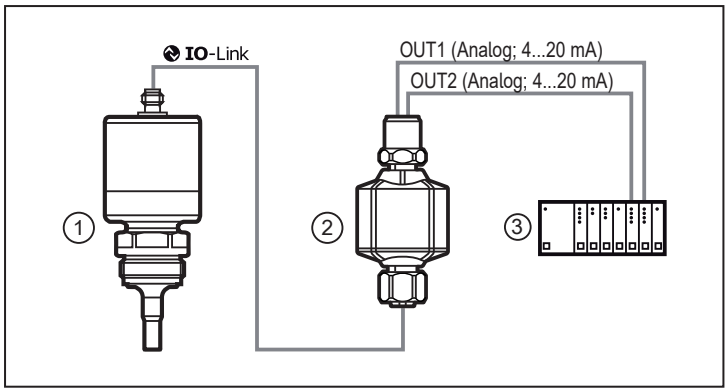


Fig. 1: Application example

1: IO-Link sensor
2: Converter IO-Link sensor – 4…20 mA
3: Analogue evaluation

4.1 Analogue output

The measuring range can be scaled via the parameters [ASP] and [AEP]:

- [ASP] determines at which measured value the output signal is 4 mA
- [AEP] determines at which measured value the output signal is 20 mA

[ASP] must have a lower value than [AEP].

▶ Observe the minimum distance between [ASP] and [AEP] → Operating instructions sensor.

If the measured value is outside the measuring range or in the event of an internal error, the current signal indicated in the following figure is provided.

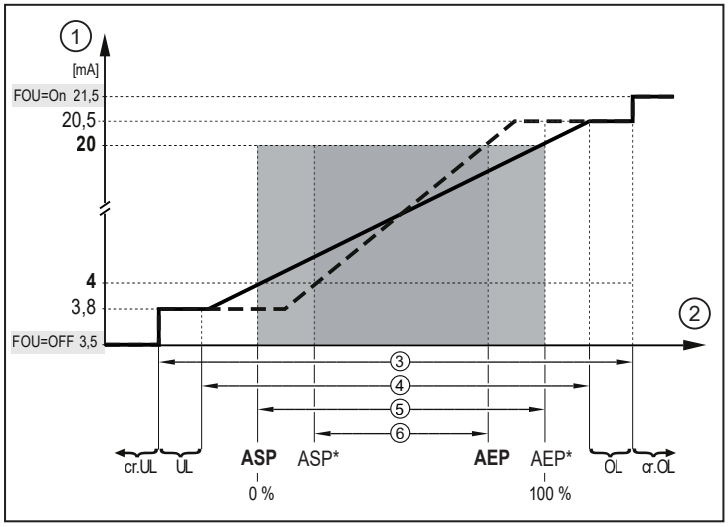


Fig. 2: Characteristics of the analogue output according to the standard IEC 60947-5-2

1: Analogue signal
2: Process value
3: Detection zone
ASP: Analogue start point (initial value of the measuring range)
AEP: Analogue end point (final value of the measuring range)
*: After change of factory setting
4: Display range
5: Measuring range
6: Scaled measuring range
UL: Below the display range
cr.UL: Below the measuring range
OL: Above the display range
cr.OL: Above the measuring range

The analogue signal in case of a fault can be set via the parameter [FOU].

4.2 Operating modes

As soon as these are connected, the device detects a large number of IO-Link devices from ifm automatically.

There are 2 two operating modes in which the device can be used:

- Plug&Play with standard process values.
- Operation with user-defined process values.

4.2.1 Plug&Play

The device reads the IO-Link data of the connected IO-Link sensors by using the following default settings:

- Reading of the standard values from the process data flow of the sensor.
- The process values are further processed in percent.
- The measuring range of the sensor is unscaled, i.e. for each respective analogue output, the measuring range reaches from ASPx (0 % = 4 mA) to AEPx (100 % = 20 mA).

4.2.2 User settings

The following settings can be made by means of a suitable parameter setting software:

- Selection of the process value types (pressure, temperature etc.) that are output via OUT1 and OUT2.
- Changeover of the factory set percentage unit of measure to fixed units for the corresponding process value types.
- Scaling of the measuring range via the parameters [ASP] and [AEP].
  Restricting the measuring range can be an advantage, e.g. if the sensor is replaced with a sensor with another measuring range.
  Requirements for a sensor replacement:
  - [uni.x] must be set to unit of measure and not to percent.
  - The newly installed sensor covers the physical measuring range of the application.

If the user does not scale the measuring range to suit the sensor, the analogue signal will be exceeded too early or not at all according to the output characteristics → (Fig. 2).

A scaled measuring range does not enhance the resolution of the output signal.
Example:
A pressure sensor with a measuring range of 0...10 bar is used. The measuring range is scaled to 2...8 bar.
When this sensor is replaced with another device with a measuring range of 0...25 bar, the converter will still output analogue signals of 4…20 mA between 2…8 bar.
When replacing with a unit with a measuring range of 0...5 bar, the converter outputs analogue signals of 4...14 mA between 2...5 bar.

4.3 IO-Link

This unit has two IO-Link communication interfaces.

M12 connector:

- Output for analogue signals
- Input for parameter setting using IO-Link software.

M12 socket

- Input for interaction with an IO-Link device.

IO-Link is an internationally standardised IO technology (IEC 61131-9) for communicating with sensors and actuators.

General information about IO-Link can be found at io-link.ifm.

IO Device Description (IODD) with all parameters and process data of the unit can be found at documentation.ifm.com.

5 Electrical connection

The unit must be connected by a qualified electrician.

Observe the national and international regulations for the installation of electrical equipment.

Voltage supply according to SELV, PELV.

CAUTION

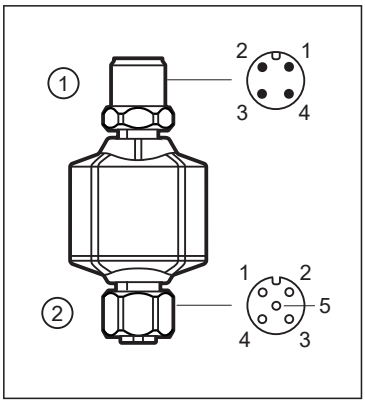
Input current is not limited.

▷ No fire protection.

▶ Protect circuits.

▶ Disconnect power.

▶ Connect the unit as follows:



1: 4-pole M12 connector
- Output for analogue signals
- Input for IO-Link parameter setting

2: 5-pole M12 female connector
- Input for IO-Link signals of the sensor

Fig. 3: Electrical connection

Pin	Output for analogue signals	Input for IO-Link parameter setting
1:	L+ (supply voltage EIO104 + sensor)	L+
2:	OUT2 analogue	Not used
4:	OUT1 analogue	IO-Link (parameter setting)
3:	L- (supply voltage EIO104 + sensor)	L-

Tab. 1: M12 connector pin assignment

Pin	Input for IO-Link signals of the sensor
1:	L+ (supply voltage of the sensor)
2:	Not used
4:	IO-Link
3:	L- (supply voltage of the sensor)
5:	Not used

Tab. 2: M12 socket pin assignment

The device must not be externally supplied via the 5-pole M12 input socket ②. Pin 1 and pin 3 are each linked through.

Connect the sensors with the converter IO-Link sensor – 4…20 mA using the connection cables provided for this purpose (→ Accessories at www.ifm.com).

5.1 Mounting the connector

To achieve the protection rating indicated in the data sheet, the following has to be observed:

▶ Use IO-Link cable with IP class.

▶ Connect the connector with the device. The arrow indicates the position of the coding.

▶ Tighten the coupling nut.

- Minimum tightening torque: 0.6 Nm (tightening by hand).
- Maximum tightening torque: 1.5 Nm (using a torque wrench).

5.2 Removing the connector

▶ Loosen the coupling nut and simultaneously press the connector against the device.

5.3 UL application area

For use in the USA and Canada:

▶ For connecting the device and the IO-Link sensor, use UL-certified cables of category CYJV 2/7/8 having suitable ratings.

5.4 Cable length

- Maximum cable length on the input side (IO-Link): 20 m.
- Maximum cable length on the output side (analogue signal): no recommendation, depending on receiver.

▶ Provide all input and output side cables with a strain relief approx. 200 mm behind the connectors.

6 Operating and display elements

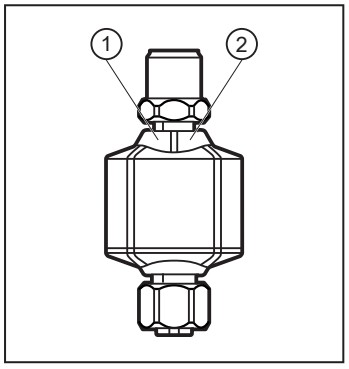


Fig. 4: LEDs

1: LED red
Signals an error.
2: LED green
Is lit during normal operation and when an IO-Link communication is detected

7 Parameter setting

The device detects whether it is connected to a hardware for parameter setting via the M12 connector and is then ready for parameter setting.

The parameter setting can be carried out with or without a sensor connected.

If a sensor is connected, any errors that occur during the parameter setting of the converter are output via the parameter setting software.

Example of a parameter setting via PC:

Information about suitable parameter setting software at www.ifm.com.

▶ Connect the converter IO-Link sensor – 4…20 mA with the PC via an USB interface by using an M12 connector:

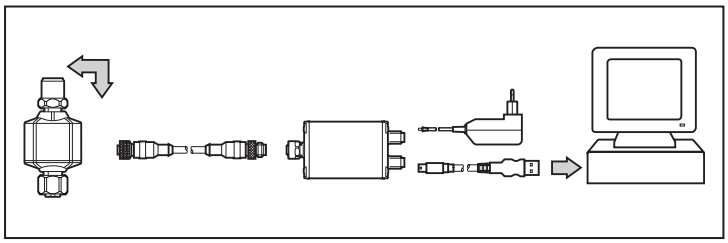


Fig. 5: Parameter setting with a PC

▶ If the device is not detected, update the device catalogue for the parameter setting software via the internet.

▶ Change the parameter settings in the software.

▶ Transfer the parameter settings to the device.

7.1 Adjustable parameters

Parameter	Function	Values
SEL1 / SEL2	Selection of the measured variable for evaluation by OUT1 / OUT2. When a process value is selected, the settings for ASP and AEP as well as the selection options for uni.x will be automatically adjusted.	• FLOW (flow) • TEMP (temperature) • PRES (pressure) • COND (conductivity) • LEVL (level) • DIST (distance) • FRQ (frequency) • ACC (acceleration) • SPEED (speed) • PDV1...PDV4 (Process Data Value 1...4) *
ASP1 / ASP2	Analogue start point for OUT1 / OUT2 = measured value at which the analogue value is 4 mA.	
AEP1 / AEP2	Analogue end point for OUT1 / OUT2 = measured value at which the analogue signal is 20 mA.	
uni.F (FLOW)	Unit for flow	• m^3/h • l/min • gal/min • ft^3/h • ft^3/min
uni.T (TEMP)	Unit for temperature	• °C • °F

Parameter	Function	Values
uni.P (PRES)	Unit for pressure	• bar • MPa • kPa • PA • Psi • Mbar • inH2O • inHg
uni.L (LEVL)	Unit for level	• m • µm • mm • cm • inches
uni.C (COND)	Unit for conductivity	• µS/cm • S/m • mS/cm
uni.D (DIST)	Unit for distance	• m • µm • mm • cm • inches
uni.D (FRQ)	Unit for frequency	• Hz • rpm
uni.A (ACC)	Unit for acceleration	• m/s^2 • g • mg
uni.S (SPEED)	Unit for speed	• m/s • fts • mm/s • in/s
FOU1 / FOU2	Behaviour of the analogue output OUT1 / OUT2 in case of a fault: • On: The analogue signal goes to 21.5 mA. • OFF: The analogue signal goes to 3.5 mA.	• On • OFF

Tab. 3: Adjustable parameters

* The sequence of process data values to be read out is defined in the IODD of each sensor, For example, when a pressure sensor is connected and [SEL1] = PDV1 is selected, the pressure value will be provided at output 1.

If a sensor has only one process value:

▶ Set the value PDV1 for [SEL1] and [SEL2].

When changing the parameter [uni] from % to an absolute unit of measure and vice versa, the values [ASP] and [AEP] will not be not converted via the parameter setting software. The values programmed last are preserved.

8 Troubleshooting

The unit provides self-diagnostic options.

Errors are indicated by the red LED. In the event of an error, the analogue outputs react according to the setting under [FOU] (→ Chapter analogue output).

Type	Description	Red LED	Output signal	Troubleshooting
1	Supply voltage too low	---	----	▶ Check the supply voltage.
1	Measuring range exceeded	---	20...20.5 mA	▶ Check measuring range.
1	Value below measuring range	---	3.8...4 mA	▶ Check measuring range.
2	No IO-Link communication detected	Flashes	----	▶ Check connections between IO-Link device / parameter setting software and unit.
2	Measured value outside the detection zone	Flashes	Affected output FOU	▶ Check parameter setting.
2	Measuring signal disturbed *	Flashes	Both outputs FOU	▶ Check the connected sensor.
2	Signal error	Flashes	Both outputs FOU	▶ Check wiring.
2	Unit failure	On	Both outputs FOU	▶ Replace the unit.

Tab. 4: Troubleshooting; 1: Warning, 2: Error

* The error display "Measuring signal disturbed" also appears if a sensor is connected that only outputs one process value.

Corrective measures:

▶ Use the parameter setting software for [SEL1] and [SEL2] to set the value PDV1.

9 Maintenance, repair and disposal

The unit is maintenance-free.

▶ After use, dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.

Cleaning the unit:

▶ Disconnect the unit from the voltage supply.

▶ Clean the unit from dirt using a soft, chemically untreated and dry micro-fibre cloth.