

ifm electronic



Operating instructions
Magnetic-inductive flow meter

efector300[®]

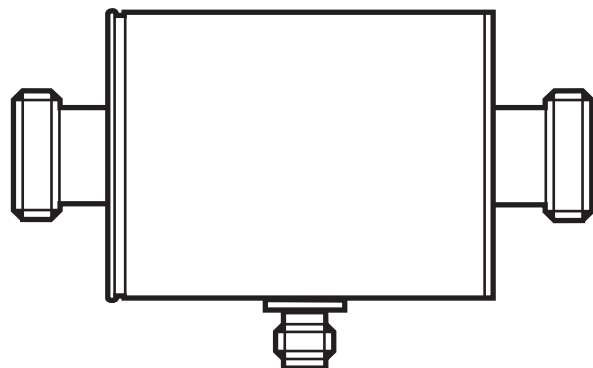
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1 Preliminary note

- ▶ Instructions
- > Reaction, result
- [...] Designation of keys, buttons or indications
- Cross-reference



Important note

Non-compliance may result in malfunction or interference.



Information

Supplementary note.

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2 Safety instructions

- Please read this document prior to set-up of the unit. Ensure that the product is suitable for your application without any restrictions.
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property can occur.
- Improper or non-intended use may lead to malfunctions of the unit or to unwanted effects in your application. That is why installation, electrical connection, set-up, operation and maintenance of the unit must only be carried out by qualified personnel authorised by the machine operator.
- In order to guarantee the correct condition of the device for the operating time it is necessary to use the device only for media to which the wetted materials are sufficiently resistant (→ Technical data).
- The responsibility whether the measurement devices are suitable for the respective application lies with the operator. The manufacturer assumes no liability for consequences of misuse by the operator. Improper installation and use of the devices result in a loss of the warranty claims.
- For medium temperatures above 50 °C (122 °F) some parts of the housing can heat up to over 65 °C (149 °F). Moreover, during installation or in case of a fault (e.g. housing damage) media under high pressure or hot media can leak from the system. To avoid personal injury, take the following measures:
 - ▶ Install the units according to the applicable rules and regulations.
 - ▶ Ensure that the system is free of pressure during installation.

- ▶ Protect the housing against contact with flammable substances and unintentional contact. To do so, equip the units with suitable protection (e.g. protective cover).

3 Functions and features

The unit monitors liquids. It detects the volumetric flow and generates an and converts it into an analogue output signal.

Pressure Equipment Directive (PED)

The units comply with the Pressure Equipment Directive and are designed and manufactured for group 2 fluids in accordance with the sound engineering practice. Use of group 1 fluids on request.

Application area

Conductive liquids with the following properties:

- Conductivity: $\geq 20 \mu\text{S}/\text{cm}$
- Viscosity: $< 70 \text{ mm}^2/\text{s}$ at $40 \text{ }^\circ\text{C}$

4 Function

The unit detects the flow based on the magnetic-inductive volumetric flow measuring principle.

4.1 Analogue function

- The unit provides an analogue signal that is proportional to the volumetric flow quantity.
- Within the measuring range the analogue signal is 4...20 mA.
- If the measured value is outside the measuring range or in the event of an internal error, the current signals indicated in Figure 1 are provided.

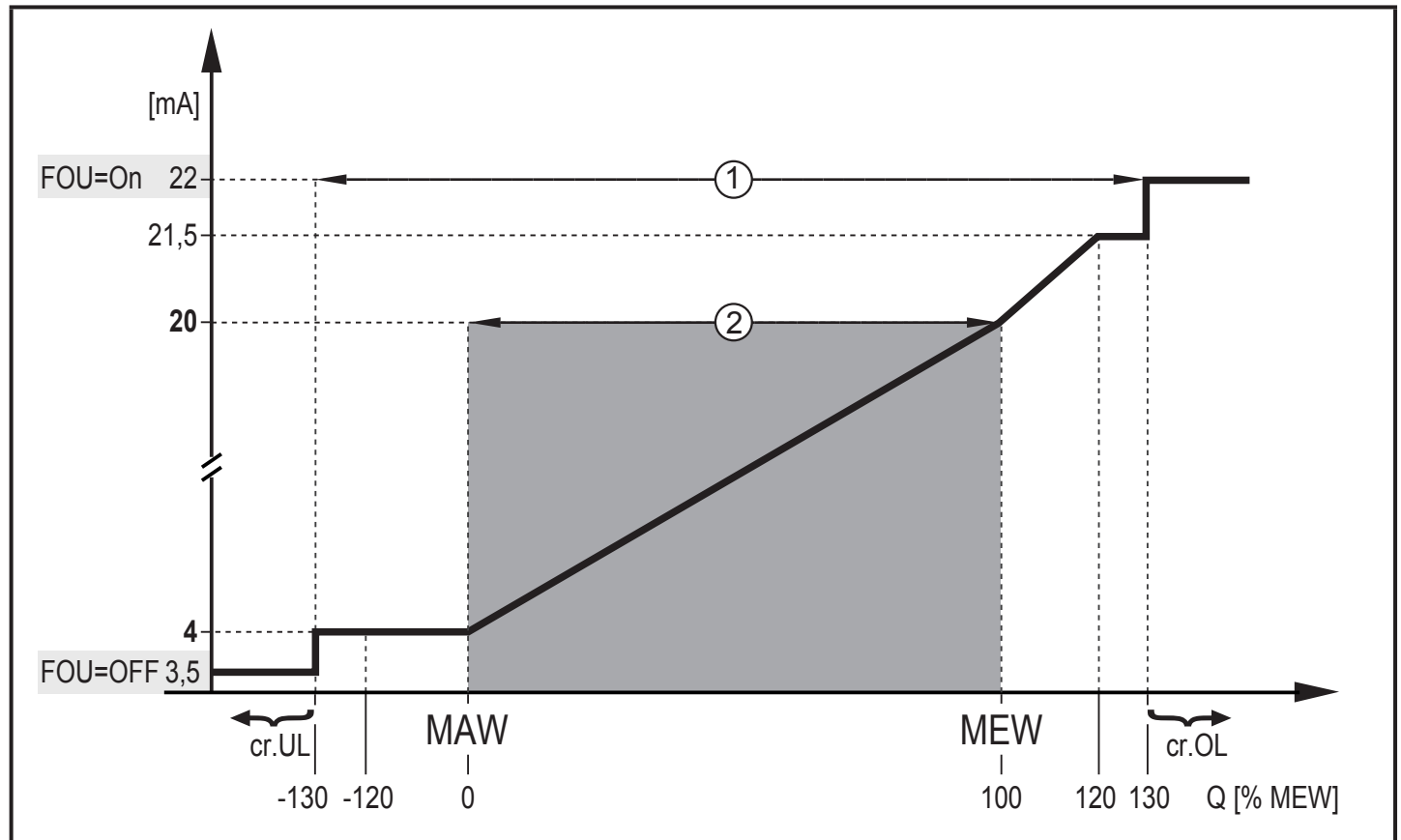


Figure 1: Characteristics of the analogue output according to the standard IEC 60947-5-7.

MAW = Initial value of the measuring range

MEW = Final value of the measuring range

① Detection zone

② Measuring range

Q: Flow (a negative flow value means flow against the marked flow direction)

cr.UL: Below the detection zone (error)

cr.OL: Above the detection zone (error)

FOU=On: Default setting at which the analogue signal goes to the upper final value in case of an error.

FOU=OFF: Default setting at which the analogue signal goes to the lower final value in case of an error.

4.2 IO-Link

This unit has an IO-Link communication interface.

With a PC, suitable IO-Link software and an IO-Link adapter cable communication is possible when the system is not in operation.

The IO-DDs necessary for the configuration of the unit, detailed information about process data structure, diagnostic information, parameter addresses and the necessary information about the required IO-Link hardware and software can be found at www.ifm.com.

5 Mounting



- ▶ Ensure that the system is free of pressure during installation.
- ▶ Ensure that no media can leak at the mounting location during installation.

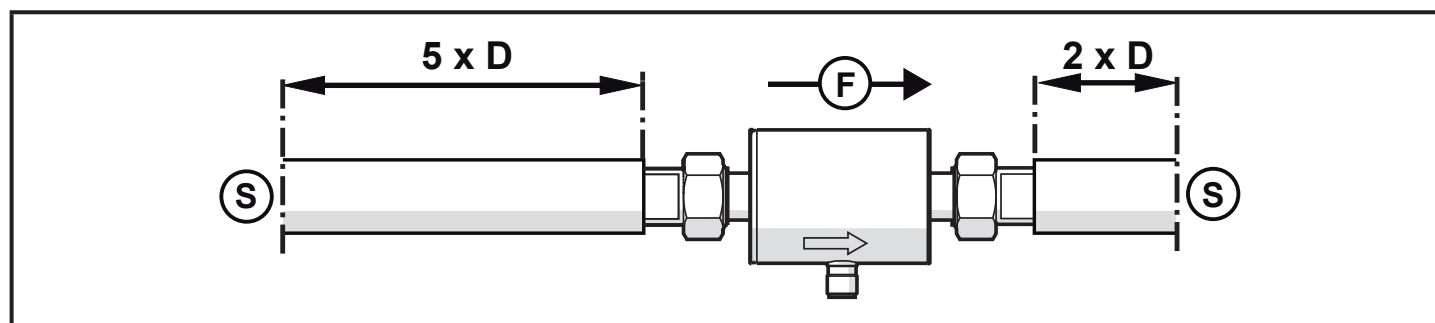


The unit can be installed independently of the orientation if the following is ensured:

- No air bubbles can form in the pipe system.
- The pipes are always completely filled.

5.1 Recommended installation position

- ▶ Install the unit so that the measuring pipe is always completely filled.
- ▶ Arrange for inlet and outlet pipe lengths. Disturbances caused by bends, valves, reductions, etc. are compensated for. It applies in particular: no shut-off and control devices are allowed directly in front of the unit.

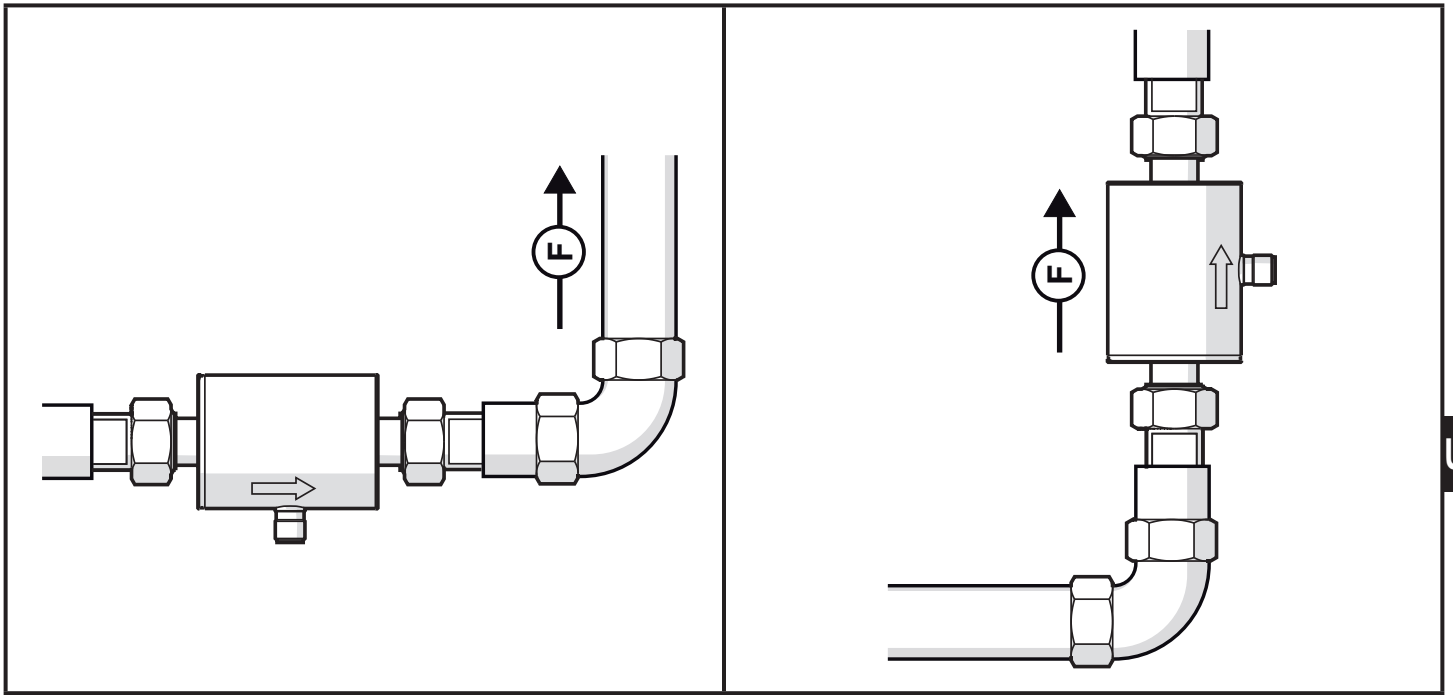


S = disturbance (e.g. shut-off / control device, pump, bends)

D = pipe diameter

F = direction of flow

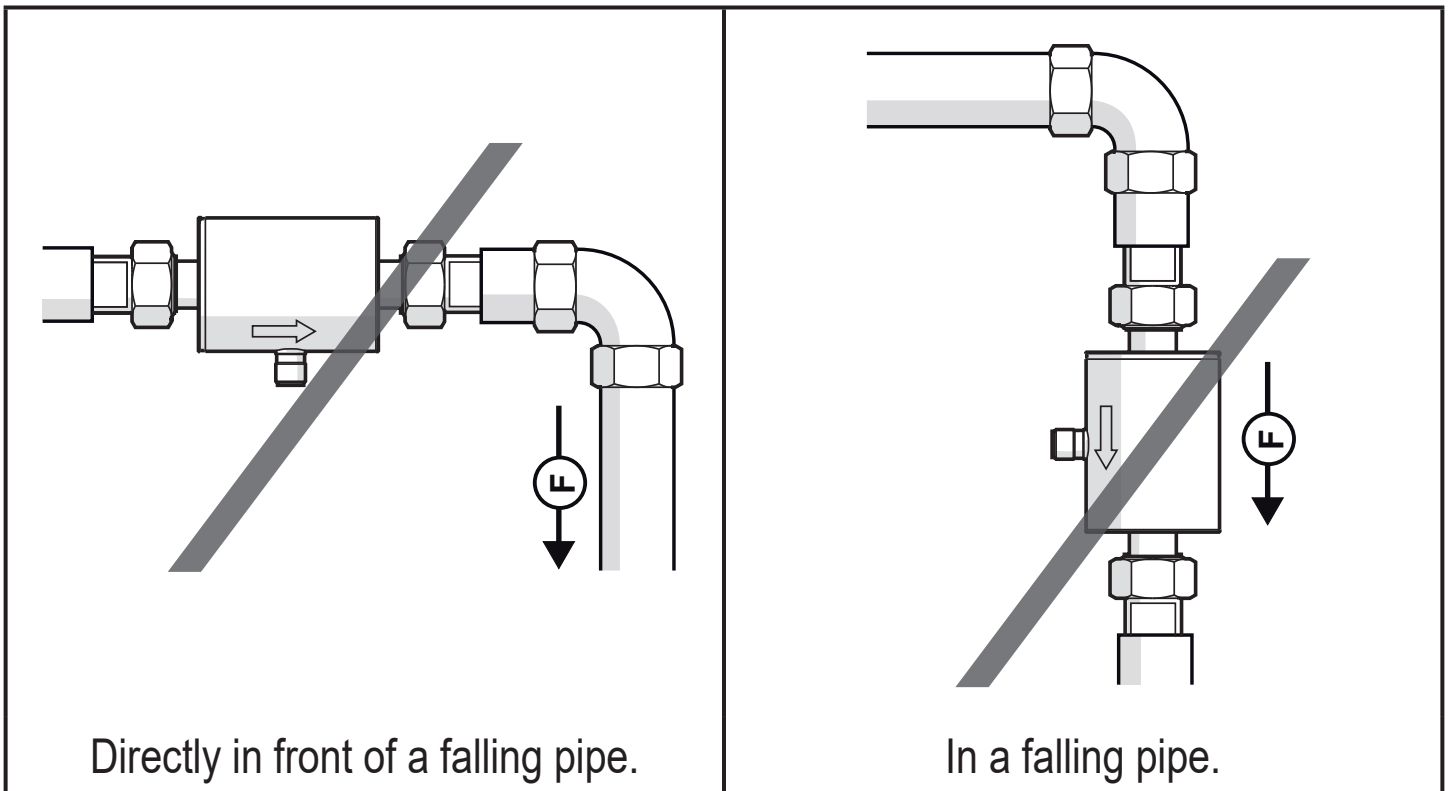
- ▶ Install in front of or in a rising pipe.

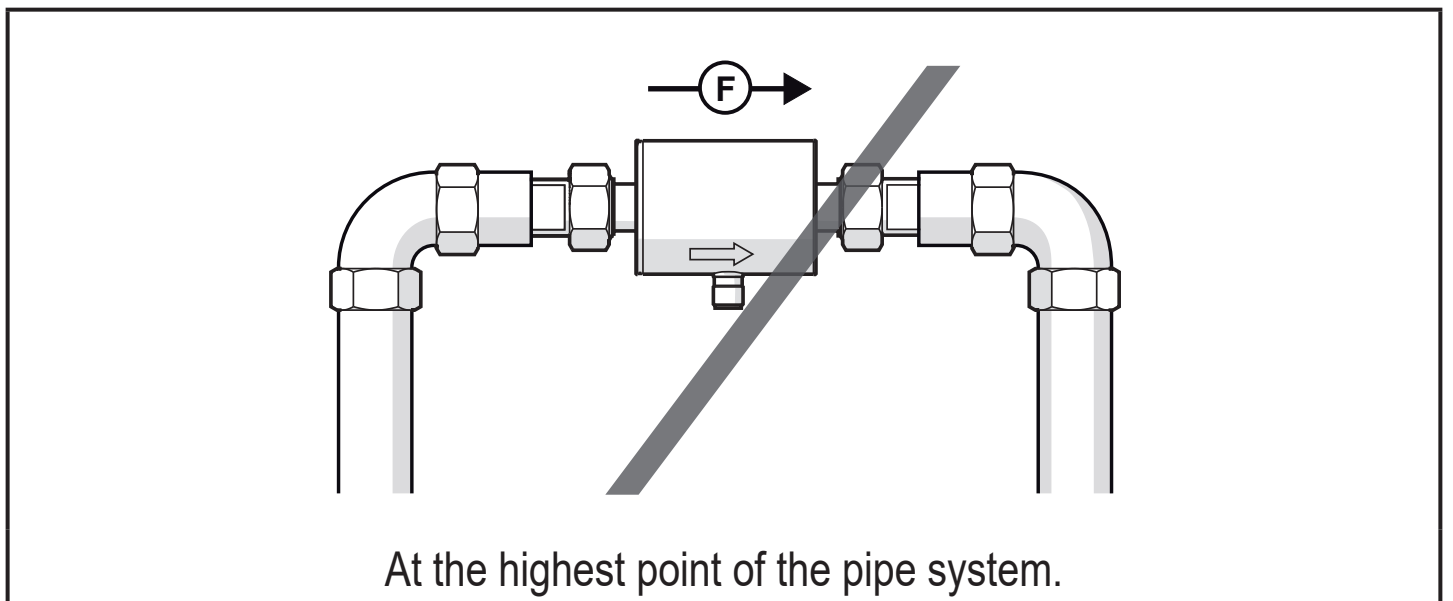
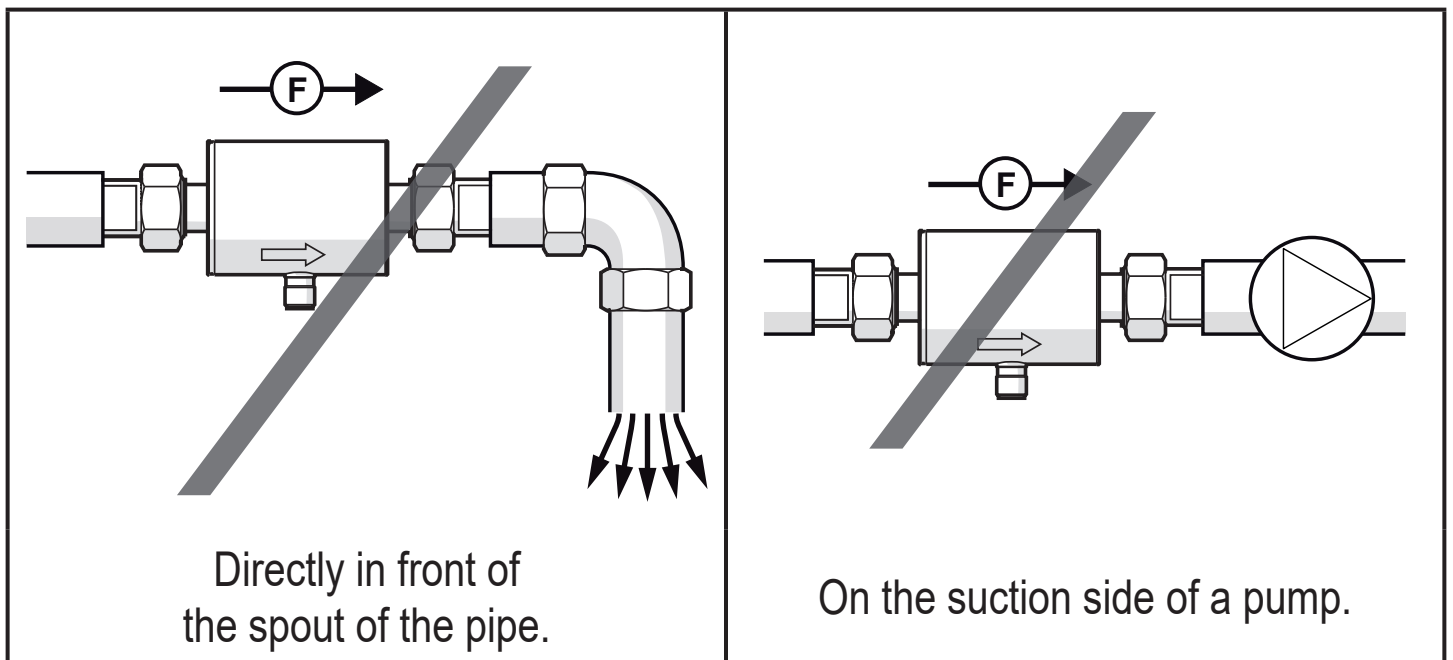


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5.2 Not recommended installation position

- ▶ Avoid the following installation positions:





F = flow direction

5.3 Grounding



If installed in an ungrounded pipe system (e.g. plastic pipes), the unit must be grounded (functional earth).

Ground brackets for the M12 connector are available as accessories

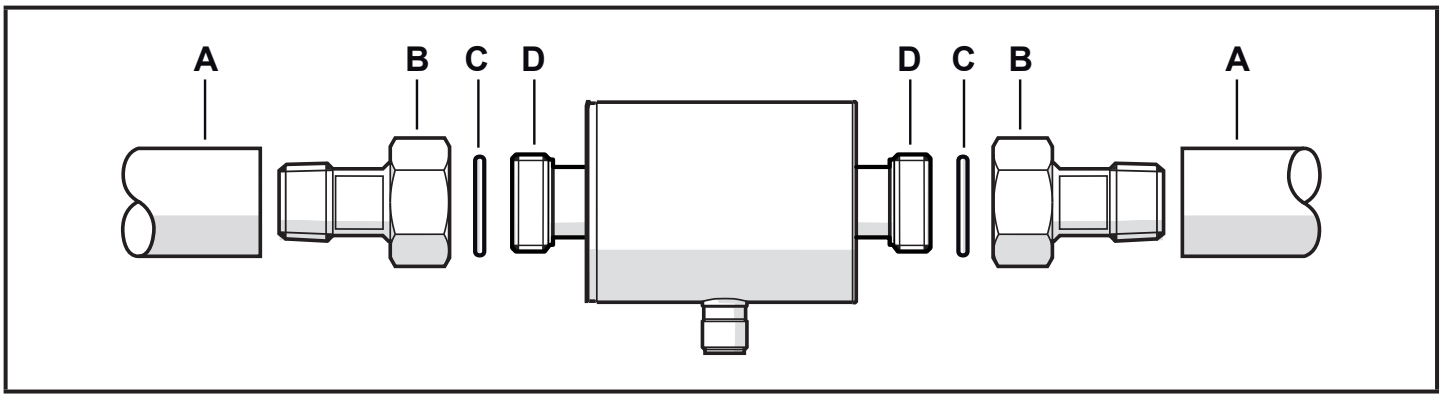
→ www.ifm.com.

5.4 Installation in pipes

The unit can be installed in pipes using adapters.

Information about the available mounting accessories at www.ifm.com.

A correct fit of the unit and ingress resistance of the connection are only ensured using ifm adapters.



1. Grease the threads of the process connection, adapter and sensor. Use a lubricating paste which is suitable and approved for the application.
2. Screw the adapter (B) into the pipe (A).
3. Place the seals (C) and install the unit according to the marked flow direction.
4. Screw the adapter (B) with the threads (D) until it is hand-tight.
5. Tighten the two adapters in opposite direction (Tightening torque: 30 Nm).

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After installation air bubbles in the system can affect the measurement.

- Corrective measures: Rinse the system after installation for ventilation:
Rinsing quantity > 3 l/min.



In case of horizontal installation:

As a result of design requirements a small quantity of the medium always remains in the measuring channel after switching off the pump.

6 Electrical connection

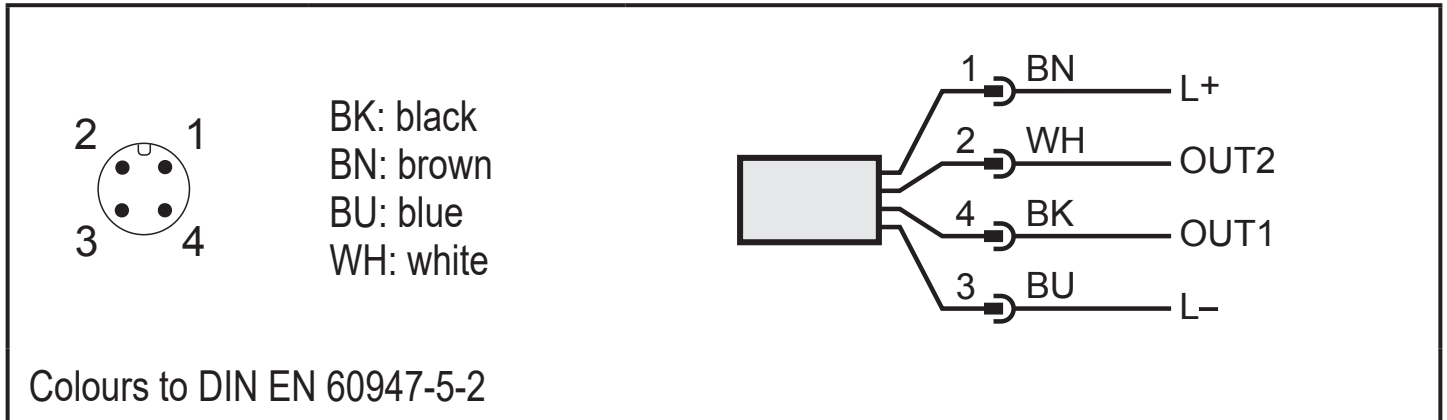


The unit must be connected by a qualified electrician.

The national and international regulations for the installation of electrical equipment must be adhered to.

Voltage supply according to EN 50178, SELV, PELV.

- ▶ Disconnect power.
- ▶ Connect the unit as follows:



Pin 1	L+
Pin 3	L-
Pin 2 (OUT2)	Analogue signal for volumetric flow quantity
Pin 4 (OUT1)	IO-Link

7 Set-up

After power on and expiry of the power-on delay time of approx. 5 s the unit is in the RUN mode (= normal operating mode). It carries out its measurement and evaluation functions and generates an analogue signal proportional to the volumetric flow.

During the power-on delay time the output signal is at 20 mA.

8 Parameter setting

Using an IO-Link capable parameter setting tool, the following options are available:

- Reading current process values.
- Reading, changing and saving current parameter settings and transmitting them to other units of the same type.

- ▶ Connect the unit via the IO-Link interface to a PC or PLC with suitable parameter setting software.



ifm offers an IO-Link interface for the connection of the sensor via USB port.

Parameters can be set before installation or during operation.



- If you change parameters during operation, this will influence the function.
 - ▶ Ensure that there will be no malfunctions in your plant.

During parameter setting the unit remains in the operating mode. It continues to monitor with the existing parameter until the parameter setting has been completed.

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8.1 Adjustable parameters

8.1.1 Measured value damping (dAP)

The damping time allows to set after how many seconds the output signal has reached 63 % of the final value if the flow value changes suddenly. The set damping time stabilises the outputs and the display.

8.1.2 Low flow cut-off (LFC)

With the function Low Flow cut-off small volumetric flow quantities can be suppressed. Flows below the LFC value are evaluated by the sensor as standstill ($Q = 0$).

8.1.3 Restore the factory setting (rES)

With this function the sensor is reset to the factory settings.



→ 11 Factory setting. We recommend taking down your own settings in that table before carrying out a reset.

8.1.4 Error behaviour of the output (FOU2)

With this function the response of the output in case of a fault is defined. The following output functions can be set.

- On = The analogue signal goes to the upper fault value (→ 4.1).
- OFF = The analogue value goes to the lower fault value (→ 4.1).
- OU = The analogue signal corresponds to the measured value.

9 Troubleshooting

The unit has many self-diagnostic options. It monitors itself automatically during operation. If the measured value is outside the measuring range or in the event of an internal error, the following current signals are provided:

Signal	→ 4.1	Possible causes	Troubleshooting
3,5	cr.UL or Err	<ul style="list-style-type: none"> Below the detection zone: Measured value < -130 % MEW The unit is in the error state if FOU = OFF. 	<ul style="list-style-type: none"> ▶ Check measuring range. ▶ Replace the unit.
4		Measured value between -130 % ... -120 % MEW	▶ Check measuring range.
21,5		Measured value between 120 % ... 130 % MEW	▶ Check measuring range.
22	cr.OL or Err	<ul style="list-style-type: none"> Detection zone exceeded: Measured value > 130 % MEW The unit is in the error state if FOU = On. 	<ul style="list-style-type: none"> ▶ Check measuring range. ▶ Replace the unit.

MEW = final value of the measuring range

10 Technical data

Technical data and scale drawing at www.ifm.com.

11 Factory setting

Parameter	Factory setting	User setting
LFC	MAW	
FOU2	OFF	
dAP	0.6 s	

MAW = Initial value of the measuring range

Technical data, approvals, accessories and further information at
www.ifm.com.