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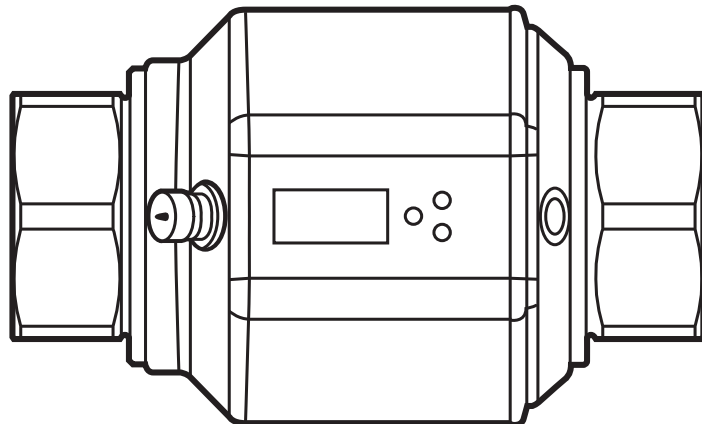
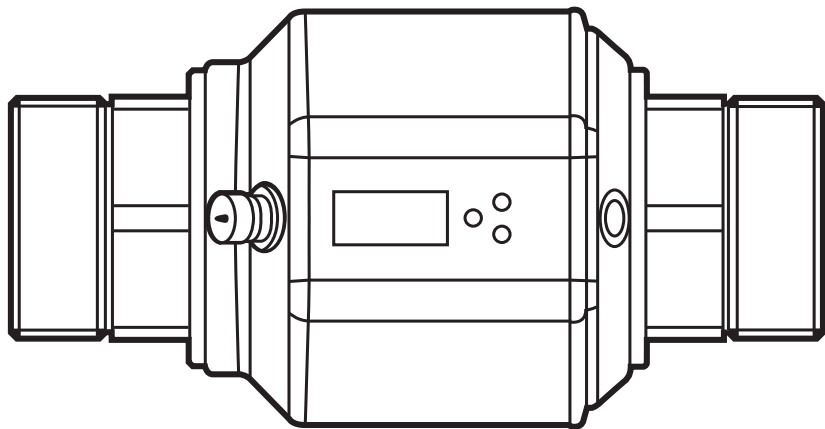
Operating instructions  
Magnetic-inductive  
flow meter

UK

**efector300<sup>®</sup>**

**SM9x04**

**SM2x04**



80223777 / 00 05 / 2016

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# 1 Preliminary note

## 1.1 Symbols used

► Instruction

> Reaction, result

[...] Designation of keys, buttons or indications

→ Cross-reference



Important note

Non-compliance can result in malfunction or interference.



Information

Supplementary note.

## 1.2 Warning signs used



### CAUTION

Warning of personal injury.

Slight reversible injuries may result.

## 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 unit 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 unit with suitable protection (e.g. protective cover).
  - ▶ Do not press the pushbuttons manually; instead use another object (e.g. ballpoint pen).
- This is a class A product. This unit may cause radio interference in domestic areas. If required, take appropriate EMC screening measures.

### 3 Functions and features

Pressure Equipment Directive (PED): The units comply with section 3, article 3 of the Directive 97/23/EC and must be designed and manufactured for non-superheated liquids of group 2 fluids in accordance with the sound engineering practice.

The unit monitors liquid media.

The unit detects the 3 process categories volumetric flow quantity, consumed quantity and medium temperature.

#### 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 °C;  $< 70 \text{ cST}$  at 104 °F

## 4 Function

- The unit detects the flow based on the magnetic-inductive volumetric flow measuring principle.
- The unit also detects the medium temperature.
- It features an IO-Link interface.
- The unit displays the current process value.

### 4.1 Processing of the measured signals

The unit generates 2 output signals according to the parameter setting.

OUT1/IO-Link:	Parameter setting
- Analogue signal for temperature	(→ 10.2)
- Communication interface	(→ 10.5.5)

OUT2:	Parameter setting
- Analogue signal for volumetric flow quantity	(→ 10.3)

### 4.2 Direction of flow

In addition to the flow velocity and the volumetric flow quantity, the unit also detects the direction of flow.

#### 4.2.1 Determination of the direction of flow (Fdir)

An arrow with the text "flow direction" on the unit indicates the positive flow direction. The flow direction can be inversed (→ 10.4.4).



- ▶ Use the supplied label to mark the changed flow direction (new positive direction of flow).

Flow...	Process value display
corresponds to the marked flow direction	+ (positive)
against the marked flow direction	- (negative)

### 4.3 Consumed quantity meter

The unit has an internal mass flow meter which continuously totals the volumetric flow quantity. The total corresponds to the current consumed quantity.

- The quantity meter takes account of the flow direction for totalisation:

- Flow according to the marked flow direction (arrow "flow direction"): meter adds.
- Flow against the marked flow direction: meter subtracts.



The meter saves the totalled consumed quantity every 10 minutes. After a power failure this value is available as the current meter reading. So the possible data loss can be maximum 10 minutes.

The current meter reading can be evaluated via an external parameter setting software (→ 10.5.5 Activating the IO-Link communication interface).

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#### 4.4 Empty pipe detection

The unit detects when the two electrodes are not wetted by the medium. The empty pipe detection can be activated or deactivated (→ 10.4.7). If it is active and the pipe is empty, the unit reacts as follows:

- > [SEnS] is indicated in the display.
- > The flow is set to zero.

The empty pipe detection can be set as time-dependent or not time depending (→ 10.4.8).

#### 4.5 Analogue function

- The unit provides an analogue signal that is proportional to the volumetric flow quantity and the medium temperature.
- 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.
- The measuring range is scalable:  
[ASP] determines at which measured value the output signal is 4 mA.  
[AEP] determines at which measured value the output signal is 20 mA.



Minimum distance between [ASP] and [AEP] = 20 % of the final value of the measuring range.

MAW	Initial value of the measuring range	For non-scaled measuring range (= factory setting)
MEW	Final value of the measuring range	
ASP	Analogue start point	For scaled measuring range
AEP	Analogue end point	

Table 1: Definitions

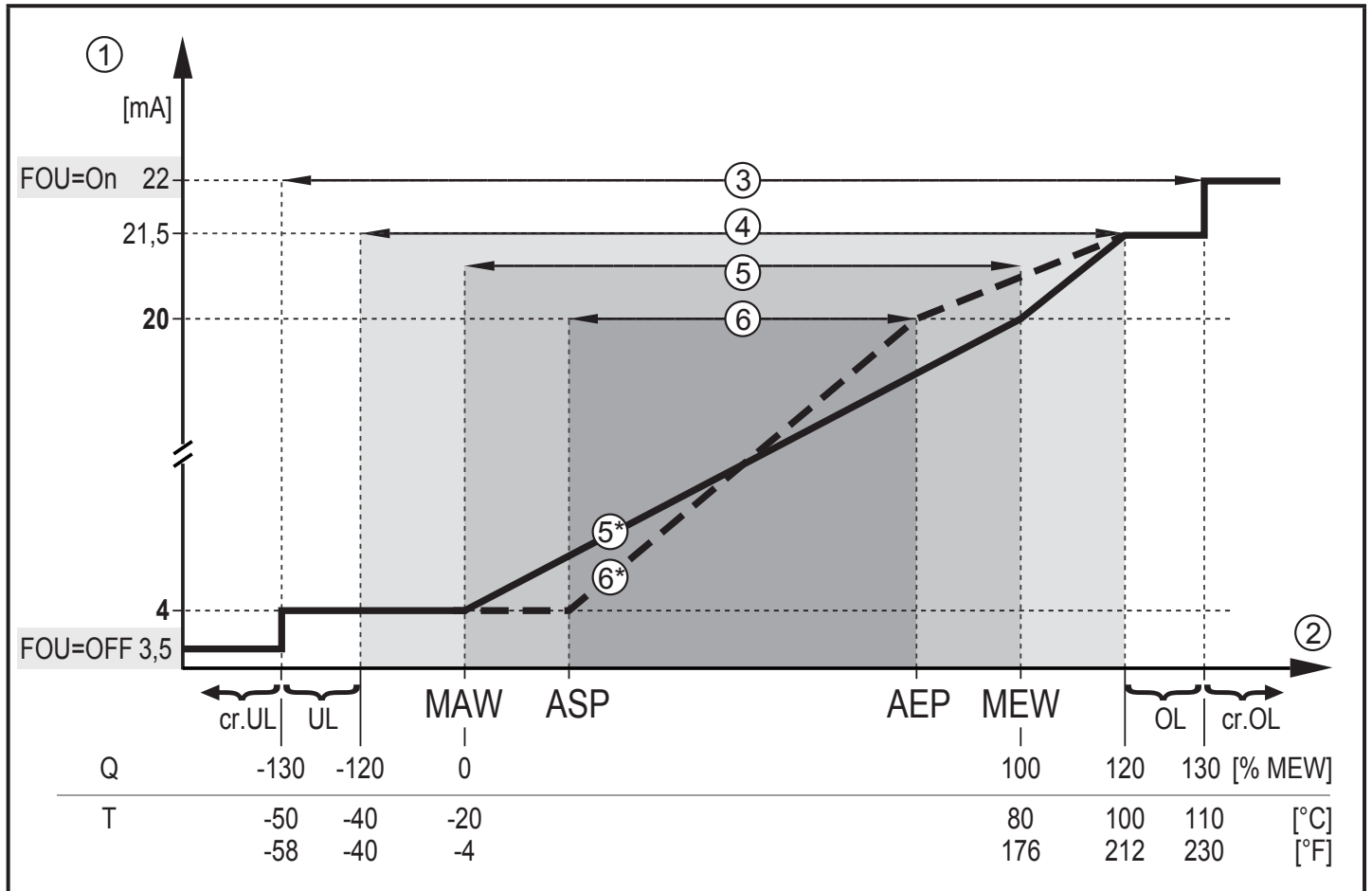


Figure 1: Characteristics of the analogue output according to the standard IEC 60947-5-7.

- Q: Flow (a negative flow value means flow against the marked flow direction)
- T: Temperature
- UL: Below the display range
- OL: Above the display range
- 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.\*

\* The type of error is displayed: cr.UL, cr.OL, Err (→ 12).



- |  |  |
|--|--|
| ① Analogue signal                      | ⑤* Analogue signal in the measuring range with factory setting |
| ② Measured value (flow or temperature) | ⑥ Scaled measuring range                                       |
| ③ Detection zone                       | ⑥* Analogue signal for scaled measuring range                  |
| ④ Display range                        |  |
| ⑤ Measuring range                      |  |

## 4.6 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, the display and the process value transfer via the IO-Link interface. The signals [UL] and [OL] (→ 12 Troubleshooting) are defined under consideration of the damping time.

## 4.7 Low flow cut-off (LFC)

With the function Low Flow cut-off small volumetric flow quantities can be ignored (→ 10.4.10). Flows below the LFC value are evaluated by the sensor as standstill ( $Q = 0$ ).

## 4.8 Simulation

With this function flow and temperature values can be simulated. (→ 10.5.3). The outputs operate as previously set.

## 4.9 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 IODDs 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](http://www.ifm.com).



- ▶ The memory plug (E30398) must not remain connected to the unit, because it falsifies the analogue output. It must only be connected for parameter setting.

## 5 Installation



► Avoid deposits, accumulated gas and air in the pipe system.

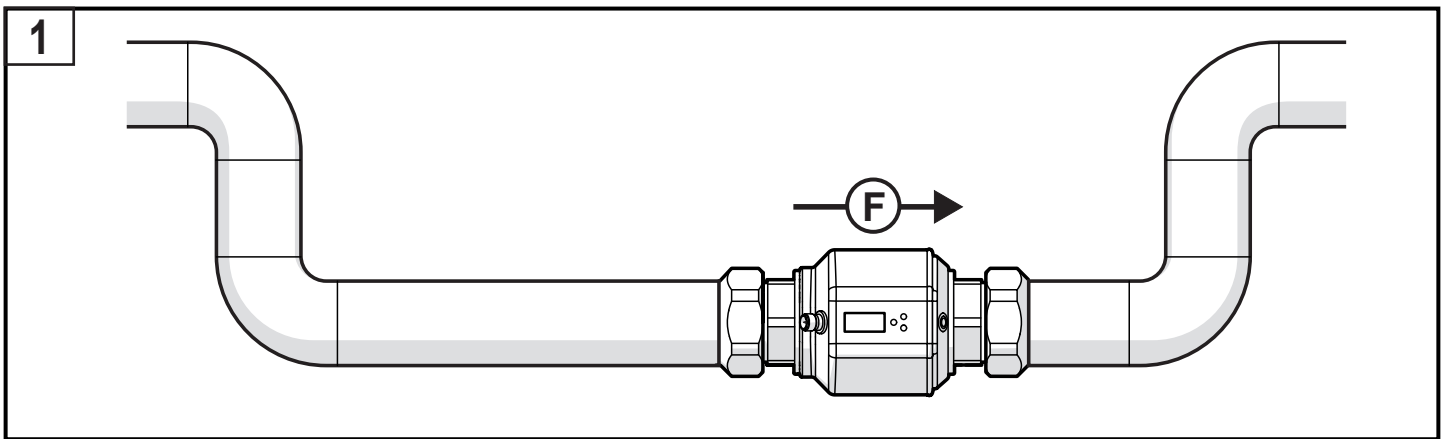


The unit can be installed irrespective of the orientation if the following is ensured:

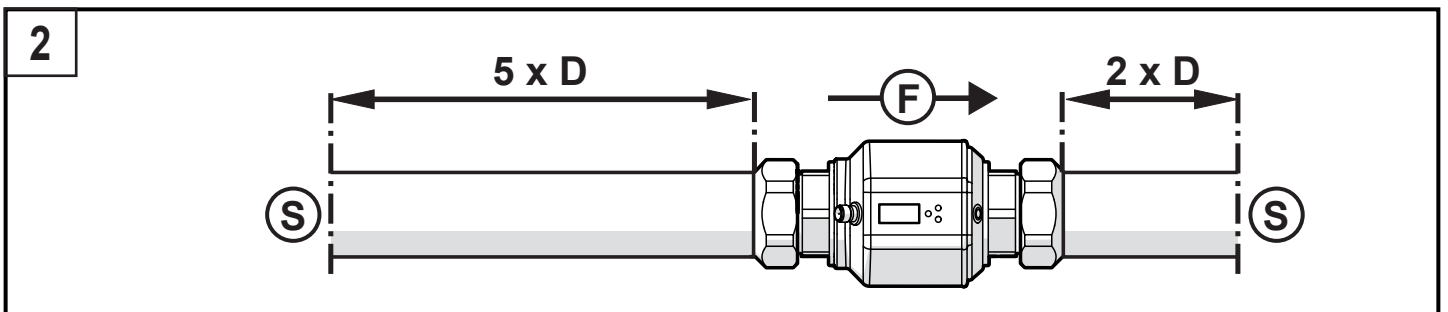
- No air bubbles can form in the pipe system.
- The pipes are always completely filled.

### 5.1 Recommended installation locations

Example of an optimised installation:

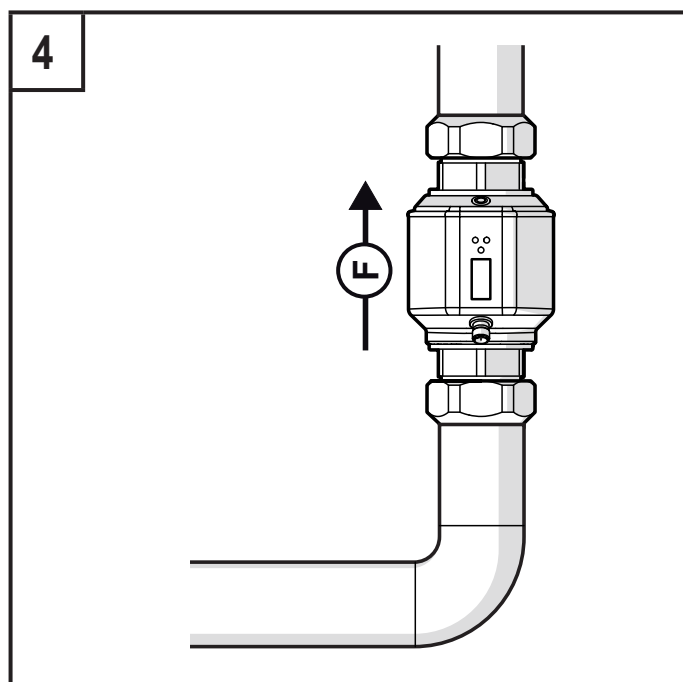
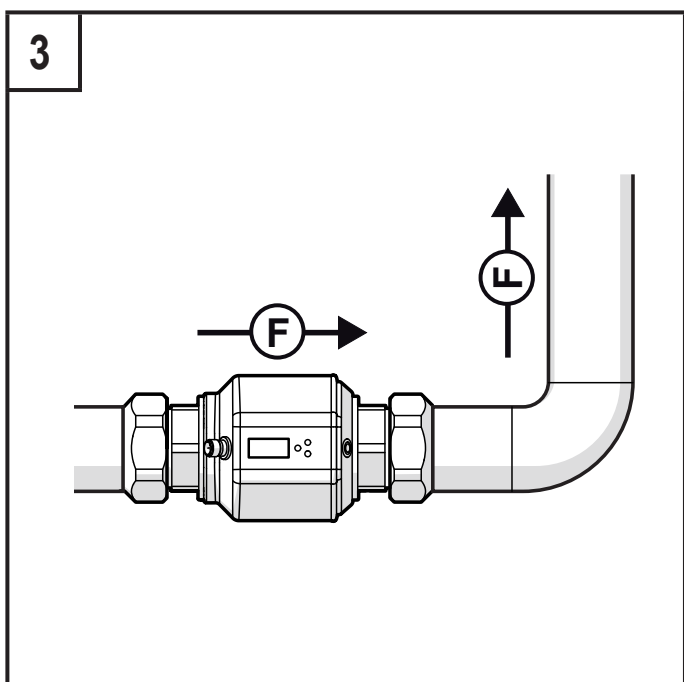


- Install the unit so that the measuring pipe is completely filled.
- Arrange for inlet and outlet pipe lengths. Disturbances caused by bends, valves, reductions, etc. are compensated for. It applies in particular: no shut-off and control devices are allowed directly in front of the unit.



S = disturbance; D = pipe diameter; F = flow direction

► Install in front of or in a rising pipe:



F = flow direction

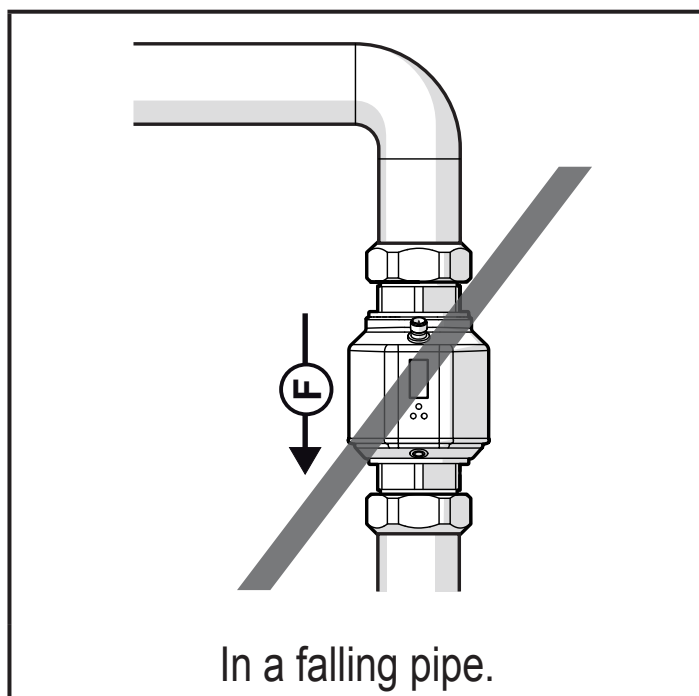
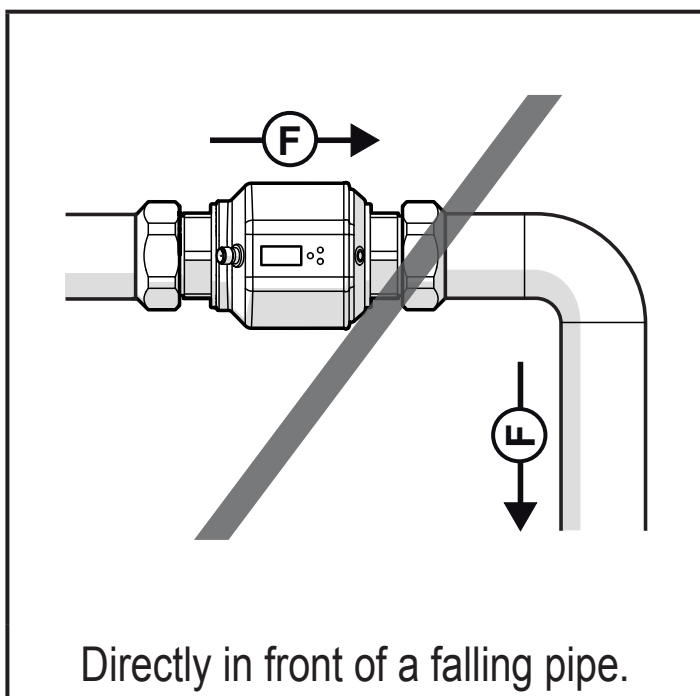


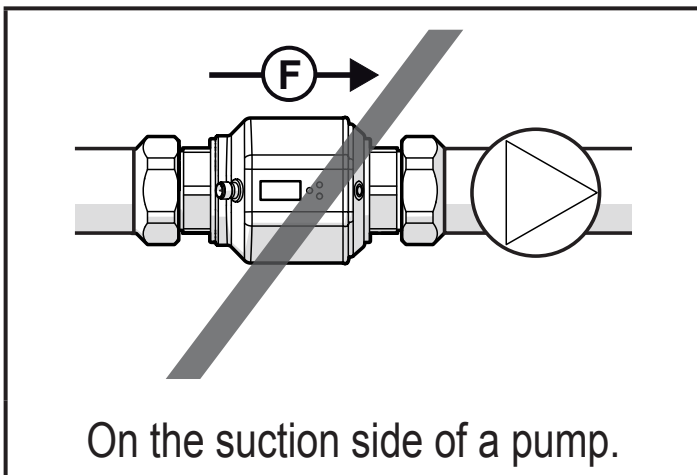
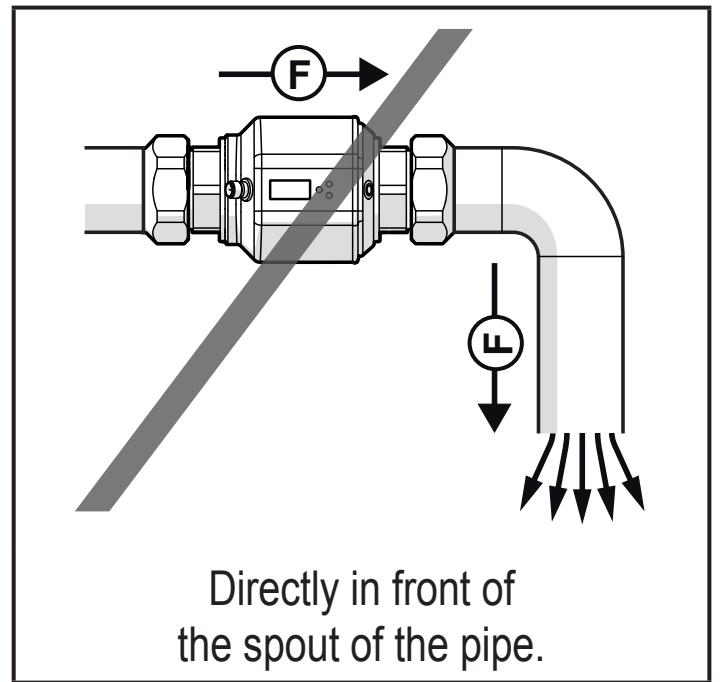
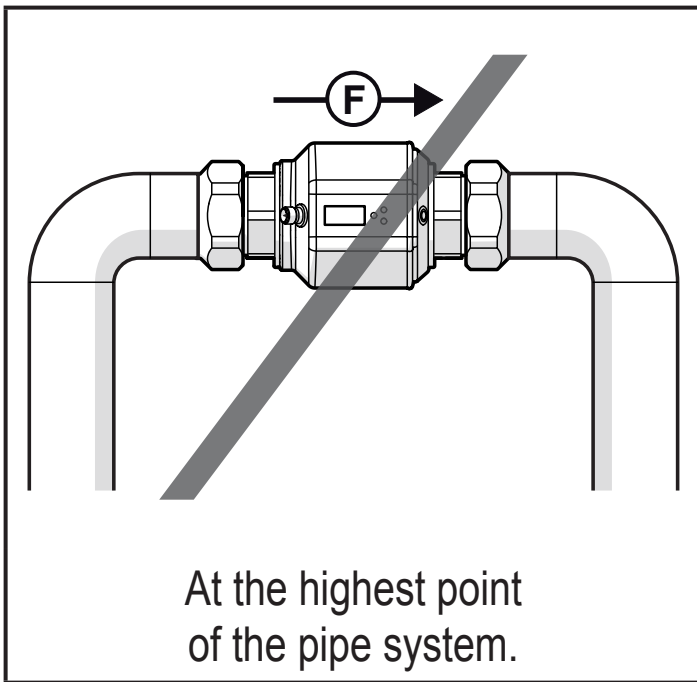
With empty pipe detection:

► Install the unit according to figure 1 or 3.

## 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).

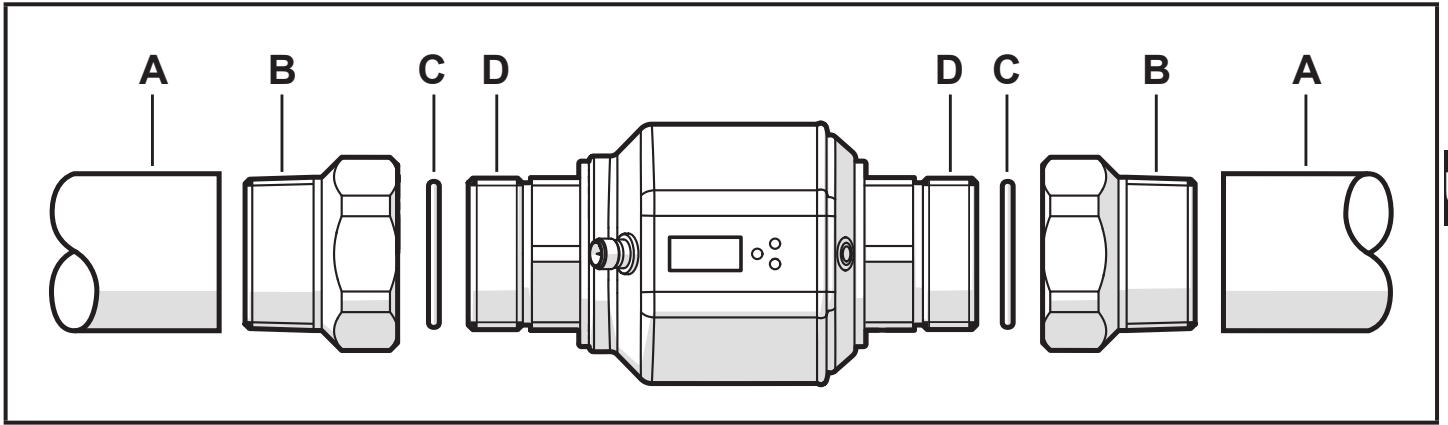
Ground brackets for the M12 connector are available as accessories (→ [www.ifm.com](http://www.ifm.com)).

## 5.4 Installation in pipes

The units with a G thread can be installed in the pipes using adapters.

Information about the available mounting accessories at [www.ifm.com](http://www.ifm.com).

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



1. Screw the adapter (B) into the pipe (A).
2. Place the seals (C) and install the unit according to the marked flow direction.



► To mount the adapters on the process connection of the sensor use suitable lubricants.

3. Screw the adapter (B) with the threads (D) until it is hand-tight.
4. Tighten the two adapters in opposite direction (tightening torque: 30 Nm).

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

Corrective measures:

- Rinse the system after installation for ventilation (rinsing quantity > 15 l/min; 4 gpm).



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

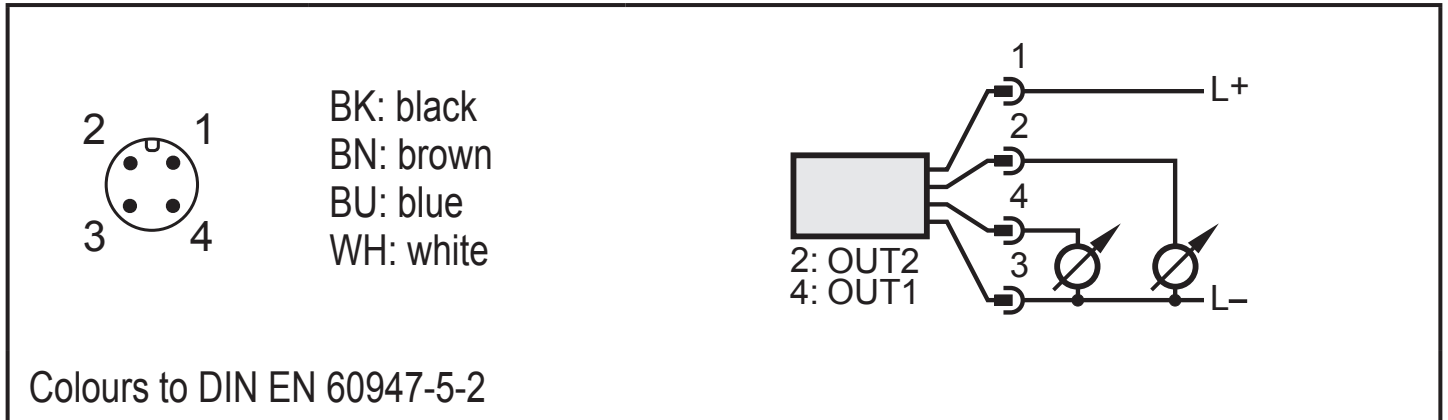


The unit must be connected by a qualified electrician.

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

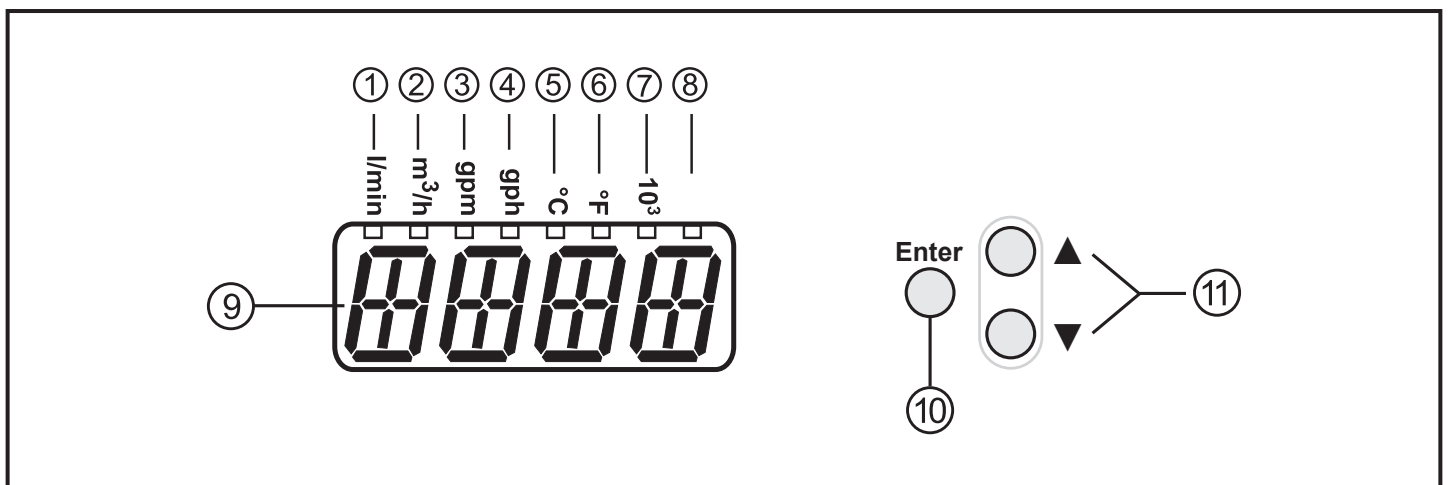
Voltage supply according to EN 50178, SELV, PELV.

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



<b>Pin 1</b>	L+
<b>Pin 3</b>	L-
<b>Pin 4 (OUT1)</b>	<ul style="list-style-type: none"> <li>• Analogue signal for temperature</li> <li>• IO-Link</li> </ul>
<b>Pin 2 (OUT2)</b>	<ul style="list-style-type: none"> <li>• Analogue signal for volumetric flow quantity</li> </ul>

## 7 Operating and display elements



## 1 to 8: indicator LEDs

- LEDs 1-6 = Unit of the currently represented numerical value → 11.1 Reading the process value
- LED 7 = current process value in  $10^3$
- LED 8 = not used

## 9: Alphanumeric display, 4 digits

- Current volumetric flow quantity (with setting [SELd] = [FLOW])
- Current medium temperature (with setting [SELd] = [TEMP])
- Parameters and parameter values

## 10: [Enter] button

- Selection of the parameters
- Reading of the set values
- Confirmation of the parameter values

Representation in → 8 Menu: ○

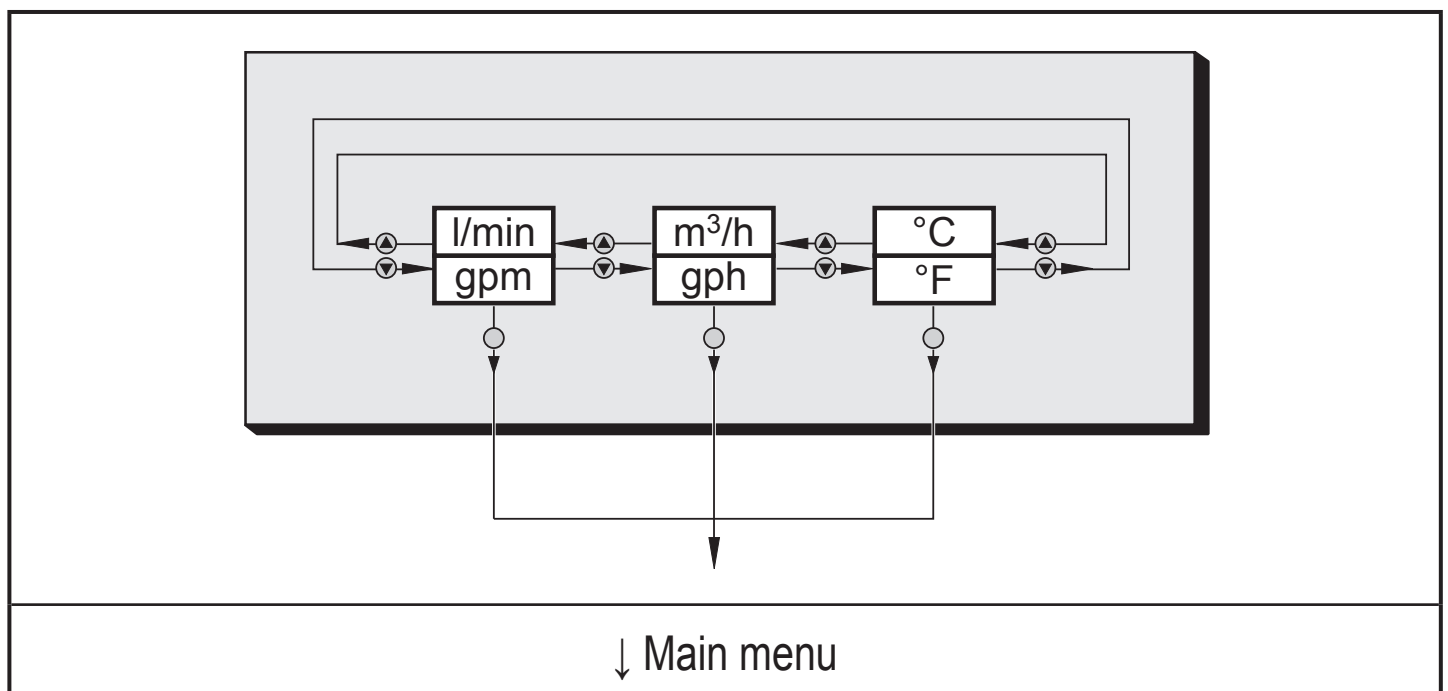
## 11: Buttons up [▲] and down [▼]

- Selection of the parameters
- Activation of the setting functions
- Changing the parameter values
- Change of the display unit in the normal operating mode (Run mode)
- Locking / unlocking

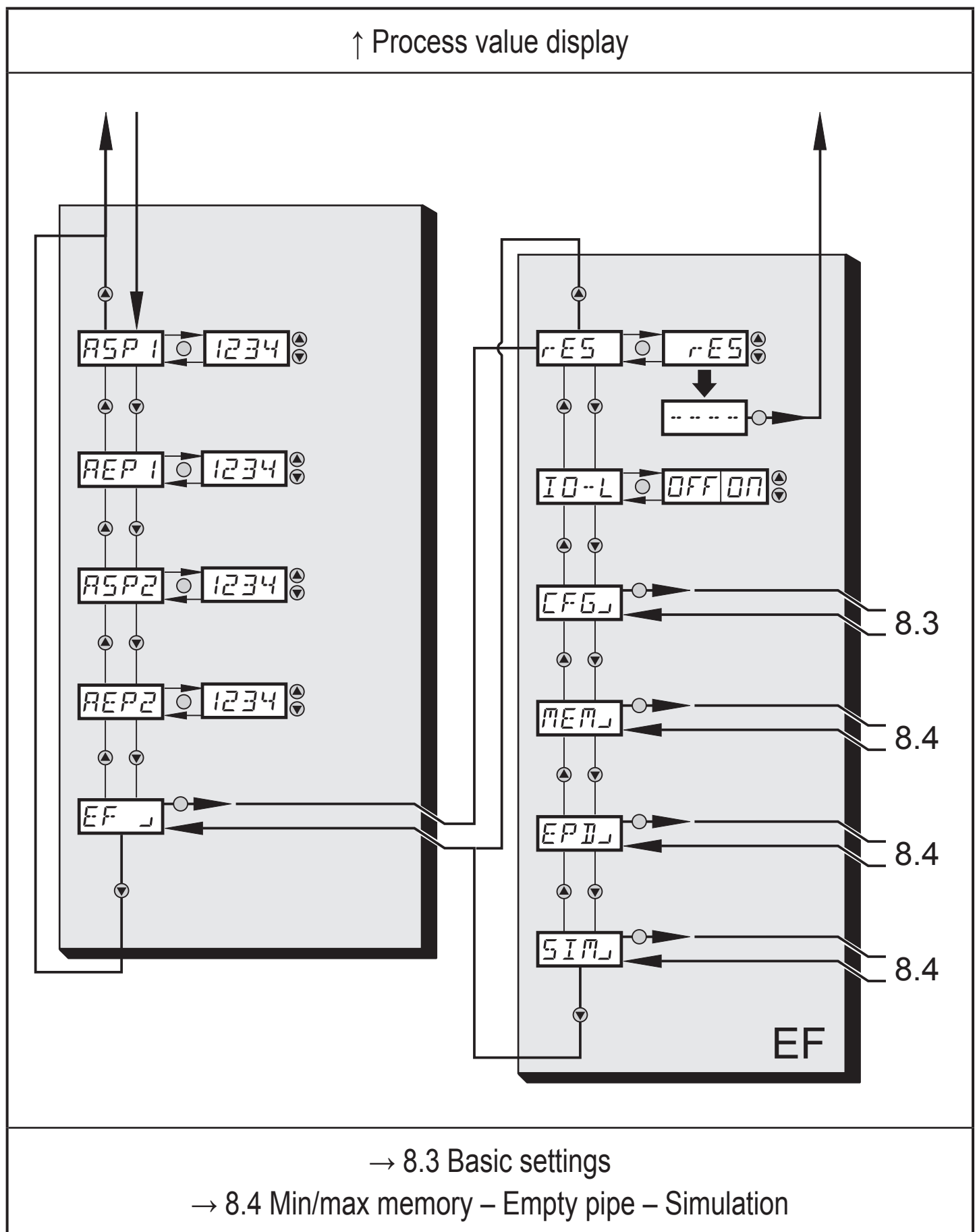
Representation in → 8 Menu: ▲ and ▼

# 8 Menu

## 8.1 Process value display



## 8.2 Main menu, Extended functions





## Explanation main menu

ASP1	Analogue start value for temperature
AEP1	Analogue end value for temperature
ASP2	Analogue start value for volumetric flow
AEP2	Analogue end value for volumetric flow
EF	Extended functions / opening of menu level 2

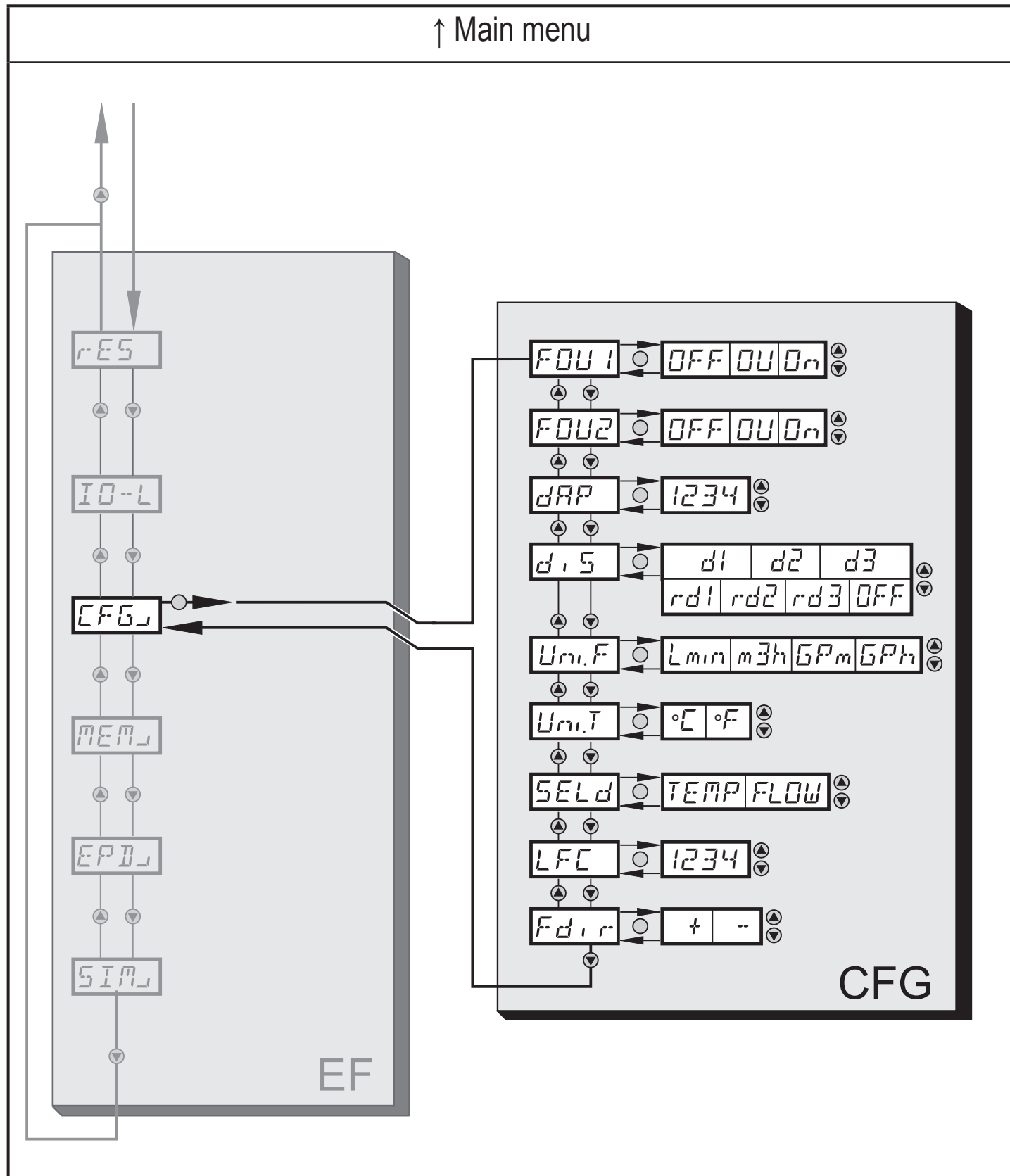
## Explanation extended functions (EF)

rES	Restore factory setting
IO-L	Activate IO-Link communication
CFG	Submenu basic settings
MEM	Submenu min/max memory
EPD	Submenu empty pipe
SIM	Submenu simulation

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## 8.3 Basic settings

↑ Main menu

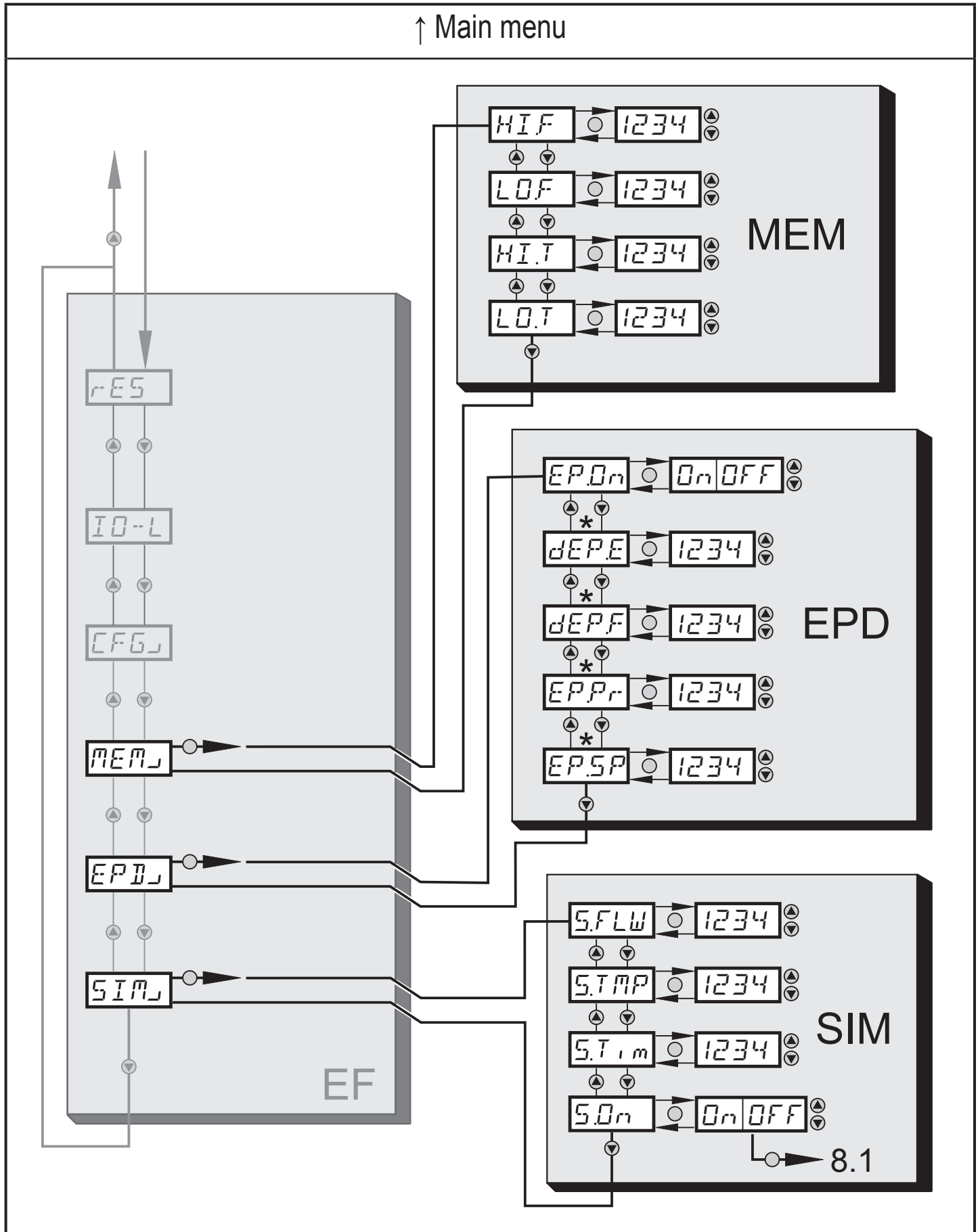


## Explanation basic settings (CFG)

FOU1	Behaviour of output 1 in case of an error
FOU2	Behaviour of output 2 in case of an error
dAP	Measured value damping / damping constant in seconds
diS	Update rate and orientation of the display
Uni.F	Standard unit of measurement for volumetric flow
Uni.T	Standard unit of measurement for temperature
SELd	Standard measuring unit of the display: volumetric flow value / medium temperature
LFC	Low flow cut-off
Fdir	Direction of flow

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## 8.4 Min/max memory – Empty pipe – Simulation



\* Parameters are only displayed for the selection EP.On = On.

## Explanation min/max memory (MEM)

HI.F	Max. value flow
LO.F	Min. value flow
HI.T	Max. value temperature
LO.T	Min. value temperature

## Explanation empty pipe (EPD)

EP.On	Empty pipe detection on / off
dEP.E.	Delay time empty signal
dEP.F	Delay time full signal
EP.Pr	Current measured value of empty pipe detection
EP.SP	Switch point of empty pipe detection

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## Explanation simulation (SIM)

S.FLW	Simulation flow value
S.TMP	Simulation temperature value
S.Tim	Simulation time
S.On	Simulation start

## 9 Set-up

After power on and expiry of the power-on delay time (approx. 5 seconds) the unit is in the normal operating mode. It carries out its measurement and evaluation functions and generates output signals according to the set parameters.

For the analogue output 2 (OUT2), the output signal is 20 mA during the power-on delay time.

In the first 2 seconds, analogue output 1 (OUT1) is passive and available for IO-Link communication. During the remaining power-on delay time, the output signal is at 20 mA.

## 10 Parameter setting

Parameters can be set before installation and set-up of the unit or during operation.



If you change parameters during operation, this will influence the function.

► Ensure that there will be no malfunctions in your plant.

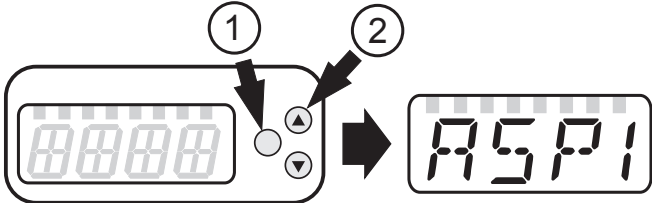

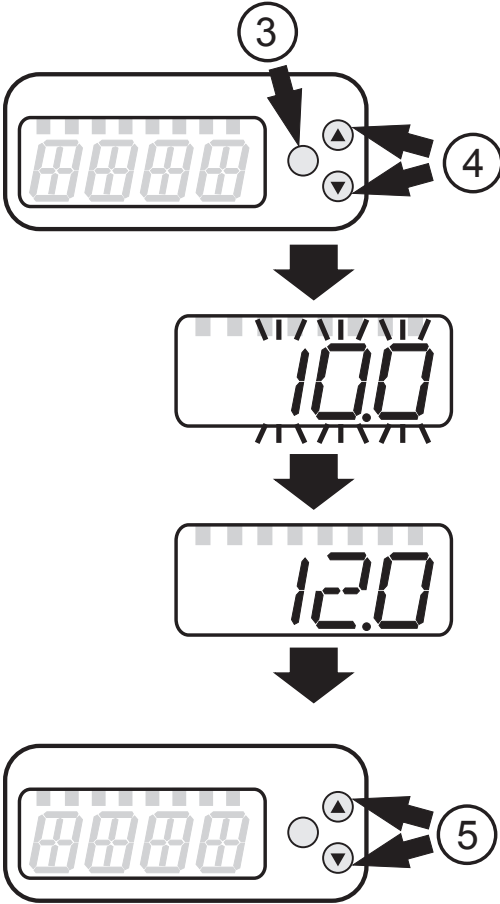
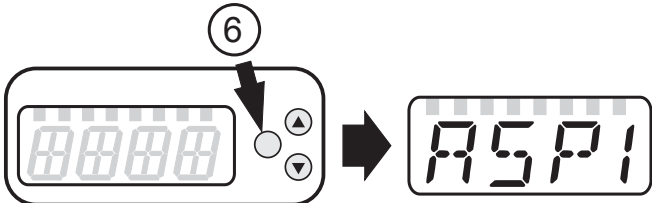
During parameter setting the unit remains in the operating mode. It continues to monitor with the existing parameter until the parameter setting has been completed.


### CAUTION

For medium temperatures above 50 °C (122 °F) some parts of the housing can heat up to over 65 °C (149 °F).

► Do not press the pushbuttons manually; instead use another object (e.g. ballpoint pen).

## 10.1 Parameter setting in general

<p><b>Select parameter</b></p> <ol style="list-style-type: none"> <li>1. Press [Enter] briefly.</li> <li>2. Press [▲] or [▼] until the requested parameter is displayed.</li> </ol>	
<p><b>Changing the parameter value</b></p> <ol style="list-style-type: none"> <li>3. Press [Enter] briefly. &gt; The currently set value is displayed.</li> <li>4. Keep [▲] or [▼] pressed for 1 s. &gt; Display flashes first, then permanent.</li> <li>5. Change value by pressing [▲] or [▼].</li> </ol> <p> Keep [▲] or [▼] pressed. &gt; Faster cycle of the numerical values.</p>	
<p><b>Confirm the parameter value</b></p> <ol style="list-style-type: none"> <li>6. Press [Enter] briefly. &gt; The parameter is displayed again. The new setting value is saved.</li> </ol>	
<p><b>Finish parameter setting and change to the process value display:</b></p> <ul style="list-style-type: none"> <li>▶ Wait for 30 seconds</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>▶ Change from the submenu to the main menu, from the main menu to the process value display with [▲] or [▼].</li> </ul>	

 If [C.Loc] is displayed when an attempt is made to modify a parameter value, an IO-Link communication is active (temporary locking).  
If [S.Loc] is displayed, the sensor is permanently locked via software. This locking can only be removed with a parameter setting software.


### 10.1.1 Switching between the menu levels

Change to the submenu	Switching to the next submenu via the parameters [EF], [CFG], [MEM], [EPD] or [SIM]. ▶ Select a submenu with [▲] or [▼] and switch to the submenu by pressing [Enter].
Back to the process value display	▶ Wait for 30 seconds or ▶ Change from the submenu to the main menu, from the main menu to the process value display with [▲] or [▼].

### 10.1.2 Locking / unlocking

The unit can be locked electronically to prevent unintentional settings. On delivery: not locked.


Locking is also possible via an IO-Link capable parameter setting tool.

Locking	<ul style="list-style-type: none"> <li>▶ Make sure that the unit is in the normal operating mode.</li> <li>▶ Press [▲] and [▼] simultaneously for 10 s.</li> <li>&gt; [Loc] is displayed.</li> </ul> <div style="display: flex; align-items: center; margin-top: 10px;">  <p>During operation: [Loc] is briefly displayed if you try to change parameter values.</p> </div>
Unlocking	<ul style="list-style-type: none"> <li>▶ Press [▲] and [▼] simultaneously for 10 s.</li> <li>&gt; [uLoc] is displayed.</li> </ul>


### 10.1.3 Timeout

If no button is pressed for 30 s during parameter setting, the unit returns to the operating mode with unchanged parameter.

## 10.2 Setting the analogue value for temperature

<ul style="list-style-type: none"> <li>▶ Select [ASP1] and set the value at which the minimum value is provided.</li> <li>▶ Select [AEP1] and set the value at which the maximum value is provided.</li> </ul>	
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## 10.3 Setting the analogue value for volumetric flow

<ul style="list-style-type: none"> <li>▶ Select [ASP2] and set the value at which the minimum value is provided.</li> <li>▶ Select [AEP2] and set the value at which the maximum value is provided.</li> </ul>	
--	---



## 10.4 User settings (optional)

### 10.4.1 Setting of the standard unit of measurement for temperature

▶ Select [Uni.T] and set the unit of measurement: [°C] or [°F].	Uni.T
---	-------

### 10.4.2 Setting of the standard unit of measurement for volumetric flow

▶ Select [Uni.F] and set the unit of measurement: [Lmin], [m3h], [gpm] or [gph]	Uni.F
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### 10.4.3 Configuration of the standard display

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<ul style="list-style-type: none"><li>▶ Select [SELd] and determine the standard measuring unit:<ul style="list-style-type: none"><li>- [FLOW] = the current volumetric flow value in the standard unit of measurement is displayed.</li><li>- [TEMP] = the current medium temperature is displayed.</li></ul></li><li>▶ Select [diS] and set the update rate and orientation of the display:<ul style="list-style-type: none"><li>- [d1] = update of the measured values every 50 ms.</li><li>- [d2] = update of the measured values every 200 ms.</li><li>- [d3] = update of the measured values every 600 ms.</li><li>- [rd1], [rd2], [rd3] = display as for d1, d2, d3; rotated by 180°.</li><li>- [OFF ] = the display is switched off in the operating mode.</li></ul></li></ul>	SELd d1 S
--	--------------

### 10.4.4 Changing the direction of the flow rate measurement

▶ Select [Fdir] and set the direction of flow: [+] = flow in the direction of the flow arrow (= factory setting) [-] = flow against the flow arrow ▶ label over the arrow	Fdir
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### 10.4.5 Setting of measured value damping

▶ Select [dAP] and set the damping constant in seconds ( $\tau$ value 63 %).	dAP
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### 10.4.6 Setting of the error behaviour of the outputs

<ul style="list-style-type: none"><li>▶ Select [FOU1] and set the value:<ul style="list-style-type: none"><li>- [On ] = the analogue signal goes to the upper fault value.</li><li>- [OFF ] = the analogue signal goes to the lower fault value.</li><li>- [OU] = the analogue signal corresponds to the measured value.</li></ul></li><li>▶ Select [FOU2] and set the value:<ul style="list-style-type: none"><li>- [On ] = the analogue signal goes to the upper fault value.</li><li>- [OFF ] = the analogue signal goes to the lower fault value.</li><li>- [OU] = the analogue signal corresponds to the measured value.</li></ul></li></ul>	FOU1 FOU2
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## 10.4.7 Activating / deactivating empty pipe detection

<ul style="list-style-type: none"><li>▶ Select [EP.On] and set the function:<ul style="list-style-type: none"><li>- [OFF] = empty pipe detection deactivated.</li><li>- [On] = empty pipe detection activated.</li></ul></li></ul>	EP.On
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## 10.4.8 Time-delay empty pipe detection

<ul style="list-style-type: none"><li>▶ Select [dEP.E] and set the delay time from 0...30 s, at which the signal should be provided when the pipe is empty.</li><li>▶ Select [dEP.F] and set the delay time from 0...30 s, at which the signal should be provided when the pipe is full.</li></ul>	dEP.E dEP.F
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## 10.4.9 Setting of the empty pipe detection

<ul style="list-style-type: none"><li>▶ Select [EP.Pr] to display the current value of the empty pipe detection in percent.</li><li>▶ Select [EP.SP] and set the switch point of empty pipe detection.</li></ul>	EP.Pr EP.SP
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## 10.4.10 Setting of the low flow cut-off


<ul style="list-style-type: none"><li>▶ Select [LFC] and set the limit value.</li></ul>	LFC
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## 10.5 Service functions

### 10.5.1 Reading the min/max values for the volumetric flow

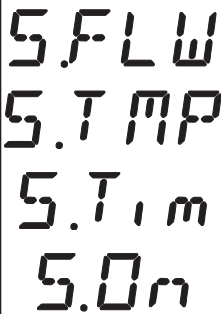
<ul style="list-style-type: none"><li>▶ Select [HI.F] or [LO.F] [HI.F] = max. value, [LO.F] = min. value.</li></ul> Delete memory: <ul style="list-style-type: none"><li>▶ Select [HI.F] or [LO.F].</li><li>▶ Press [Enter] briefly.</li><li>▶ Keep [▲] or [▼] pressed.</li><li>&gt; [----] is displayed.</li><li>▶ Press [Enter] briefly.</li></ul> It makes sense to delete the memories as soon as the unit operates under normal operating conditions for the first time.	HI.F LO.F
---	--------------

## 10.5.2 Reading the min/max values for the temperature


<ul style="list-style-type: none"> <li>▶ Select [HI.T] or [LO.T] [HI.T] = max. value, [LO.T] = min. value.</li> </ul> <p>Delete memory:</p> <ul style="list-style-type: none"> <li>▶ Select [HI.T] or [LO.T].</li> <li>▶ Press [Enter] briefly.</li> <li>▶ Keep [▲] or [▼] pressed.</li> </ul> <p>&gt; [----] is displayed.</p> <ul style="list-style-type: none"> <li>▶ Press [Enter] briefly.</li> </ul> <p>It makes sense to delete the memories as soon as the unit operates under normal operating conditions for the first time.</p>	
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## 10.5.3 Simulation menu

<ul style="list-style-type: none"> <li>▶ Select [S.FLW] and set the flow value to be simulated.</li> <li>▶ Select [S.TMP] and set the temperature value to be simulated.</li> <li>▶ Select [S.Tim] and set the time of the simulation in minutes.</li> <li>▶ Select [S.On] and set the function: <ul style="list-style-type: none"> <li>- [On]: The simulation starts. The values are simulated for the time set at [S.Tim]. [SIM] is displayed simultaneously with the process values. Cancel with [Enter].</li> <li>- [OFF]: The simulation is not active.</li> </ul> </li> </ul>	
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## 10.5.4 Resetting all parameters to factory setting

<ul style="list-style-type: none"> <li>▶ Select [rES].</li> <li>▶ Press [Enter] briefly.</li> <li>▶ Keep [▲] or [▼] pressed.</li> </ul> <p>&gt; [----] is displayed.</p> <ul style="list-style-type: none"> <li>▶ Press [Enter] briefly.</li> </ul> <p>For the factory settings please refer to the end of these instructions → 14. We recommend taking down your own settings in that table before carrying out a reset.</p>	
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## 10.5.5 Activating the IO-Link communication interface

<ul style="list-style-type: none"> <li>▶ Select [IO-L] and set the function: <ul style="list-style-type: none"> <li>- [OFF] = IO-Link interface deactivated.</li> <li>- [On] = IO-Link interface activated.</li> </ul> </li> </ul> <p> The analogue output OUT1 is deactivated when the IO-Link interface is activated.</p>	
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# 11 Operation

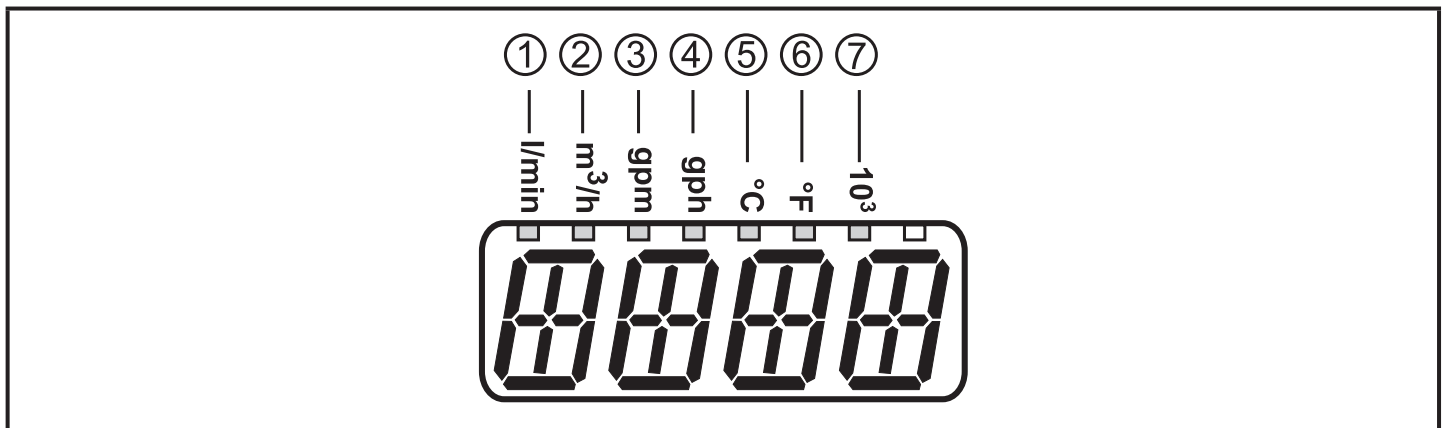
## 11.1 Reading the process value

The LEDs 1-6 signal which process value is currently displayed.

The process value to be displayed as standard (temperature, flow velocity) can be preset. → 10.4.3 Configuration of the standard display. A standard unit of measurement can be defined for the flow velocity (l/min, m<sup>3</sup>/h, gpm or gph) → 10.4.2). For temperature measurement, °C or °F can be selected as standard unit of measurement (→ 10.4.1).

Further process values can be read in addition to the preset standard display:

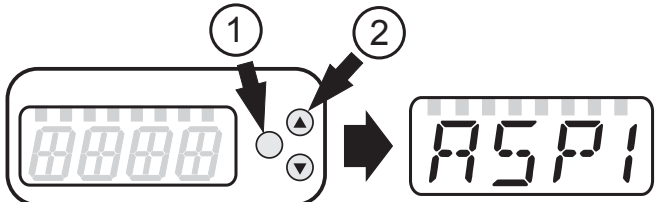

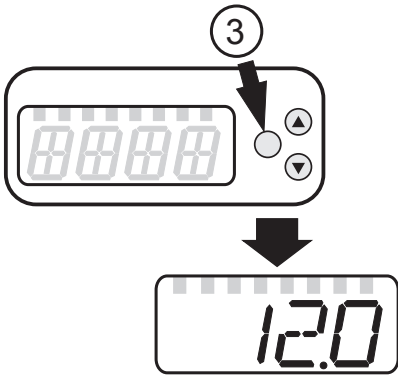
- ▶ Press the buttons [▲] or [▼].
- > The LED of the selected process value display is lit and the current process value is displayed.
- > After 30 seconds the display changes to the standard display.



LED	Process value display	Unit
1	Current flow volume per minute	l / min
2	Current flow volume per hour	m <sup>3</sup> / h
3	Current flow volume per minute	gal / min
4	Current flow volume per hour	gal / h
5	Current medium temperature	°C
6	Current medium temperature	°F
7	Current flow volume in 10 <sup>3</sup>	

## 11.2 Reading the parameter value

Take the following steps to display the currently set parameter value:

<p><b>Select parameter</b></p> <ol style="list-style-type: none"> <li>1. Press [Enter] briefly</li> <li>2. Press [▲] or [▼] until the requested parameter is displayed.</li> </ol>	
<p><b>Display the parameter value</b></p> <ol style="list-style-type: none"> <li>3. Press [Enter] briefly</li> </ol> <p>&gt; The currently set value is displayed for 30 s.</p> <p> By pressing [Enter] briefly several times, the display switches between parameter and parameter value.</p>	
<p><b>Switching to the process value display</b></p> <ul style="list-style-type: none"> <li>▶ Wait for 30 seconds</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>▶ Change from the submenu to the main menu, from the main menu to the process value display with [▲] or [▼].</li> </ul>	

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## 12 Troubleshooting

The unit has many self-diagnostic options. It monitors itself automatically during operation.

Warnings and error states are displayed, even when the display is switched off. Error indications are also available via IO-Link.

Display	Type	Description	Fault correction
IOE.n	Error	<ul style="list-style-type: none"> <li>• Unit faulty / malfunction</li> </ul>	<ul style="list-style-type: none"> <li>▶ Replace the unit.</li> </ul>
SEnS	Warning	Sensor signal invalid. <ul style="list-style-type: none"> <li>• Measuring pipe not sufficiently filled.</li> <li>• Medium with a too low conductivity.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Check installation position → 5.</li> <li>▶ Check conductivity of the media (<math>\geq 20 \mu\text{S/cm}</math>)</li> </ul>
Err	Error	<ul style="list-style-type: none"> <li>• Unit faulty / malfunction.</li> <li>• Measured value greater than 130 % MEW.</li> <li>• Measured value lower than -130 % MEW.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Replace the unit.</li> <li>▶ Check flow range / temperature range.</li> </ul>

Display	Type	Description	Fault correction
No display	Error	<ul style="list-style-type: none"> <li>• Supply voltage too low.</li> <li>• Setting [diS] = OFF</li> </ul>	<ul style="list-style-type: none"> <li>▶ Check the supply voltage.</li> <li>▶ Change the setting [diS] → 10.4.3</li> </ul>
Loc	Warning	Setting pushbuttons on the unit locked, parameter change rejected.	▶ Unlock the unit → 10.1.2
C.Loc	Warning	Setting buttons on the unit temporarily locked, parameter setting via IO-Link communication active.	▶ Finish parameter setting via IO-Link communication.
S.Loc	Warning	Setting buttons locked via parameter software, parameter change rejected.	▶ Unlock the unit via IO-Link interface using the parameter setting software.
UL	Warning	Below the display range. <ul style="list-style-type: none"> <li>• Current value between -130 % ... -120 % MEW</li> <li>• Temperature value between -50...-40 °C or -58...-40 °F</li> </ul>	▶ Check flow range / temperature range.
cr.UL	Error	Below the detection zone. <ul style="list-style-type: none"> <li>• Flow value &lt; -130 % MEW</li> <li>• Temperature value &lt; - 50 °C or -58 °F</li> </ul>	▶ Check flow range / temperature range.
OL	Warning	Display range exceeded. <ul style="list-style-type: none"> <li>• Current value between 120 % ... 130 % MEW</li> <li>• Temperature value between 100...110 °C or 212...230 °F</li> </ul>	▶ Check flow range / temperature range.
cr.OL	Error	Detection zone exceeded. <ul style="list-style-type: none"> <li>• Flow value &gt; 130 % MEW</li> <li>• Temperature value &gt; 110 °C or 230 °F</li> </ul>	▶ Check flow range / temperature range.
PArA	Error	Parameter setting outside the valid range.	▶ Repeat parameter setting.

MEW = final value of the measuring range

## 13 Technical data

Technical data and scale drawing at [www.ifm.com](http://www.ifm.com).

## 14 Factory setting

	Factory setting	User setting
ASP2 (FLOW)	0 % *	
AEP2 (FLOW)	100 % *	
ASP1 (TEMP)	-20 °C	
AEP1 (TEMP)	80 °C	
IO-L	OFF	
FDir	+	
FOU1	OFF	
FOU2	OFF	
dAP	0.6 s	
diS	d2	
Uni.F	SMx004: l/min SMx604: gpm	
Uni.T	SMx004: °C SMx604: °F	
SELd	FLOW	
LFC	5 l/min	
EP.On	OFF	
dEP.E	0 s	
dEP.F	2 s	
EP.SP	75 %	
S.FLW	20 % *	
S.TMP	20 °C	
S.Tim	3 min	
S.On	OFF	

\* of the final value of the measuring range

More information at [www.ifm.com](http://www.ifm.com)