



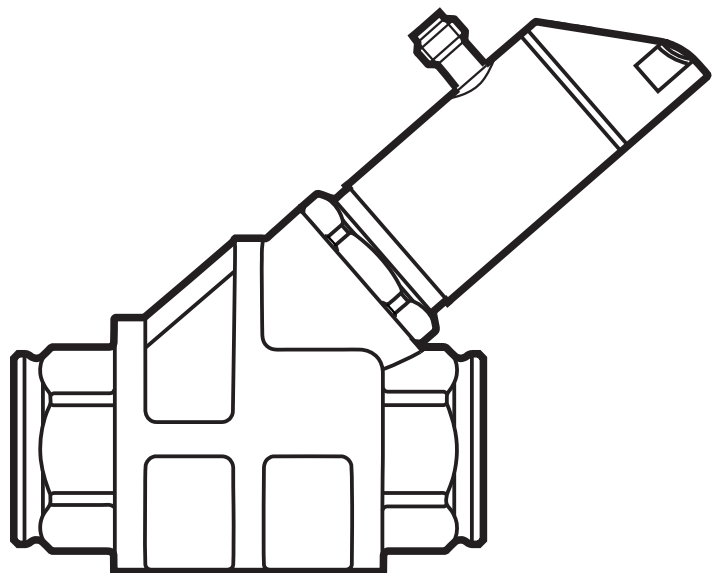
CE

Operating instructions
Mechatronic flow sensor

UK

- SB1xxx**
- SB2xxx**
- SB3xxx**
- SB4xxx**
- SB5xxx**
- SB6xxx**
- SB7xxx**
- SB8xxx**
- SB9xxx**
- SB03xx**

80272822 / 00 03 / 2019



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1 Preliminary note

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

1.1 Symbols used

▶ Instructions

> Reaction, result

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

→ Cross-reference



Important note

Non-compliance may result in malfunction or interference.



Information

Supplementary note.

2 Safety instructions

- The device described is a subcomponent for integration into a system.
 - The manufacturer of the system is responsible for the safety of the system.
 - The system manufacturer undertakes to perform a risk assessment and to create a 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 manufacturer 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 (→ Functions and features).
- Only use the product for permissible media (→ Technical data).
- 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 unit must be carried out by qualified personnel authorised by the machine operator.
- Protect units and cables against damage.

3 Functions and features

The unit monitors industrial oils.

It detects the two process categories volumetric flow and medium temperature.

4 Function

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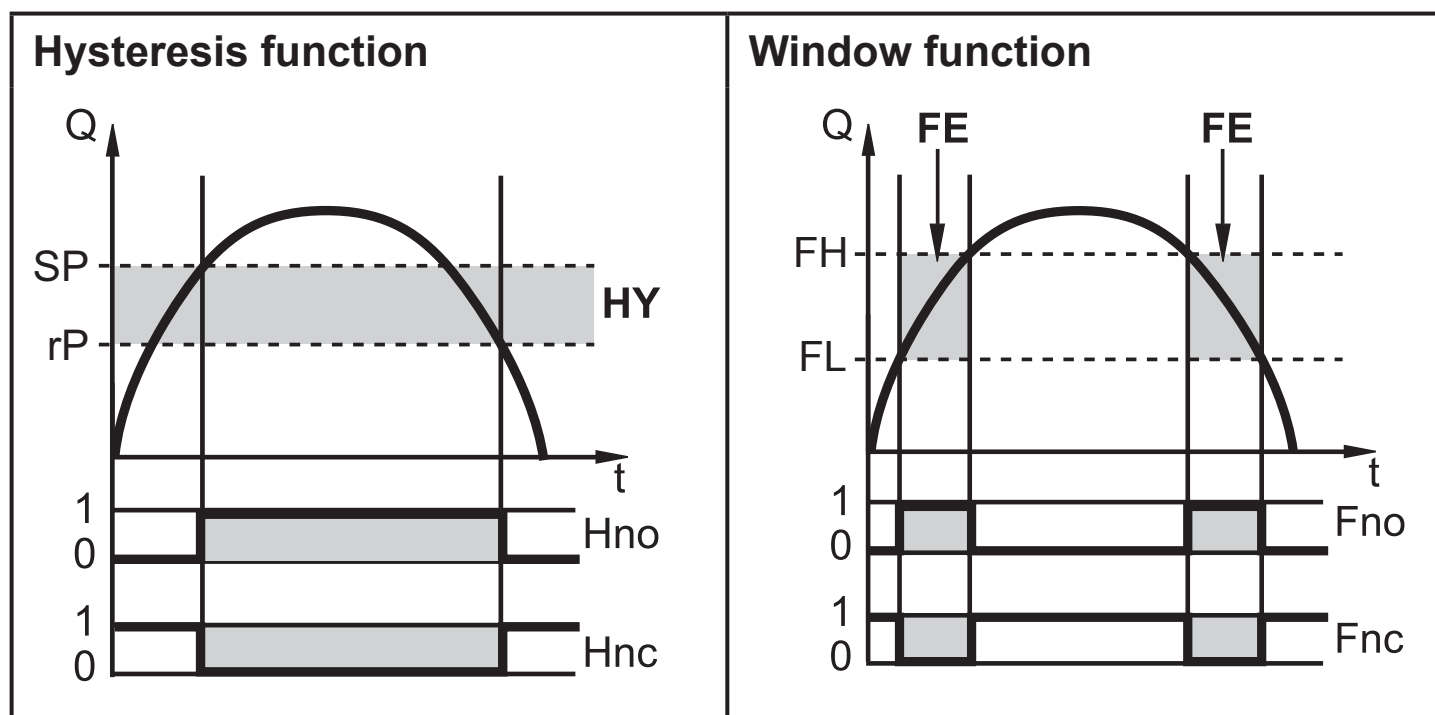
- The unit detects the volumetric flow quantity based on the principle of differential pressure.
- The device has an IO-Link interface. It provides the following additional functions using suitable hardware and software:
 - Remote parameter setting of the unit.
 - Transmission of the set parameter values to other sensors.
 - Electronic locking of the sensor via software.
 - Simultaneous reading of all process values (volumetric flow and temperature) and the binary switching signals.
 - Extensive display of error and event messages.
 - Display of minimum and maximum temperature values.
- The unit displays the current volumetric flow quantity or temperature. It generates 2 output signals according to the parameter setting:

OUT1/IO-Link: 4 selection options	Parameter setting
- Switching signal: limit values for volumetric flow quantity	→ 9.2.1; → 9.2.2
- Switching signal: limit values for temperature	→ 9.3.1; → 9.3.2
- Frequency signal for volumetric flow quantity	→ 9.2.6
- Frequency signal for temperature	→ 9.3.6

OUT2: 4 selection options	Parameter setting
- Switching signal: limit values for volumetric flow quantity	→ 9.2.3; → 9.2.4
- Switching signal: limit values for temperature	→ 9.3.3; → 9.3.4
- Analogue signal for volumetric flow quantity	→ 9.2.5
- Analogue signal for temperature	→ 9.3.5

4.1 Switching function

OUTx changes its switching status if it is above or below the set switching limits (flow or temperature). Hysteresis or window function can be selected. Example of volumetric flow monitoring:



SP = set point

rP = reset point

HY = hysteresis

Hno / Fno = NO (normally open)

FH = upper limit value

FL = lower limit value

FE = window

Hnc / Fnc = NC (normally closed)



When the hysteresis function is set, the set point (SP) is defined first and then the reset point (rP) which must be of a lower value. If only the set point is changed, the reset point remains constant.



When set to the window function the lower limit value (FL) and the upper limit value (FH) have a fixed hysteresis of 0.25 % of the final value of the measuring range. This keeps the switching status of the output stable if the volumetric flow varies slightly.

4.2 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 and 2 are provided.

4.2.1 Volumetric flow monitoring

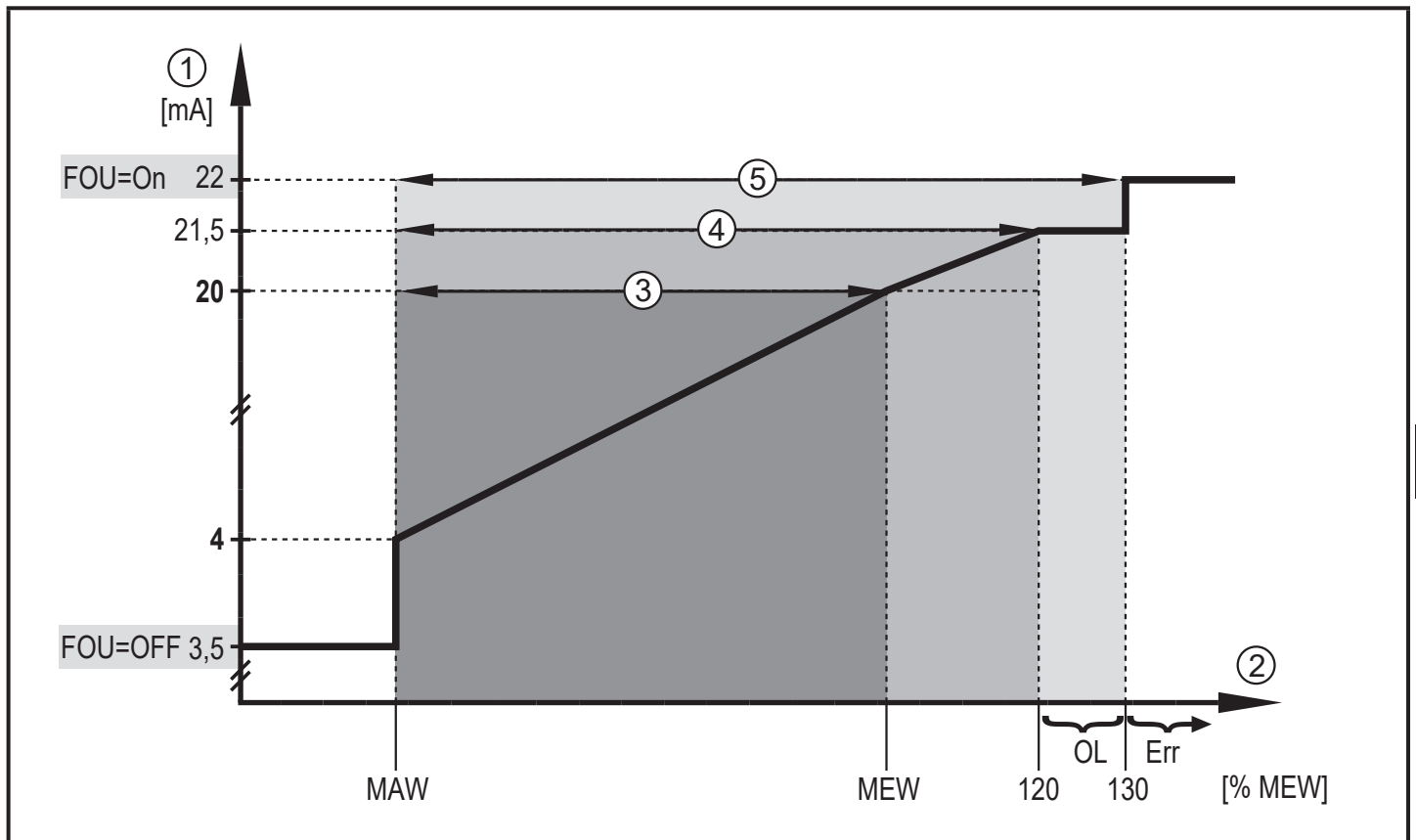


Figure 1

- ① Analogue signal
- ② Volumetric flow quantity
- ③ Measuring range
- ④ Display range
- ⑤ Detection zone

MAW: Initial value of the measuring range

MEW: Final value of the measuring range

OL: Above the display range

Err: The unit is in the error state.

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.

4.2.2 Temperature monitoring

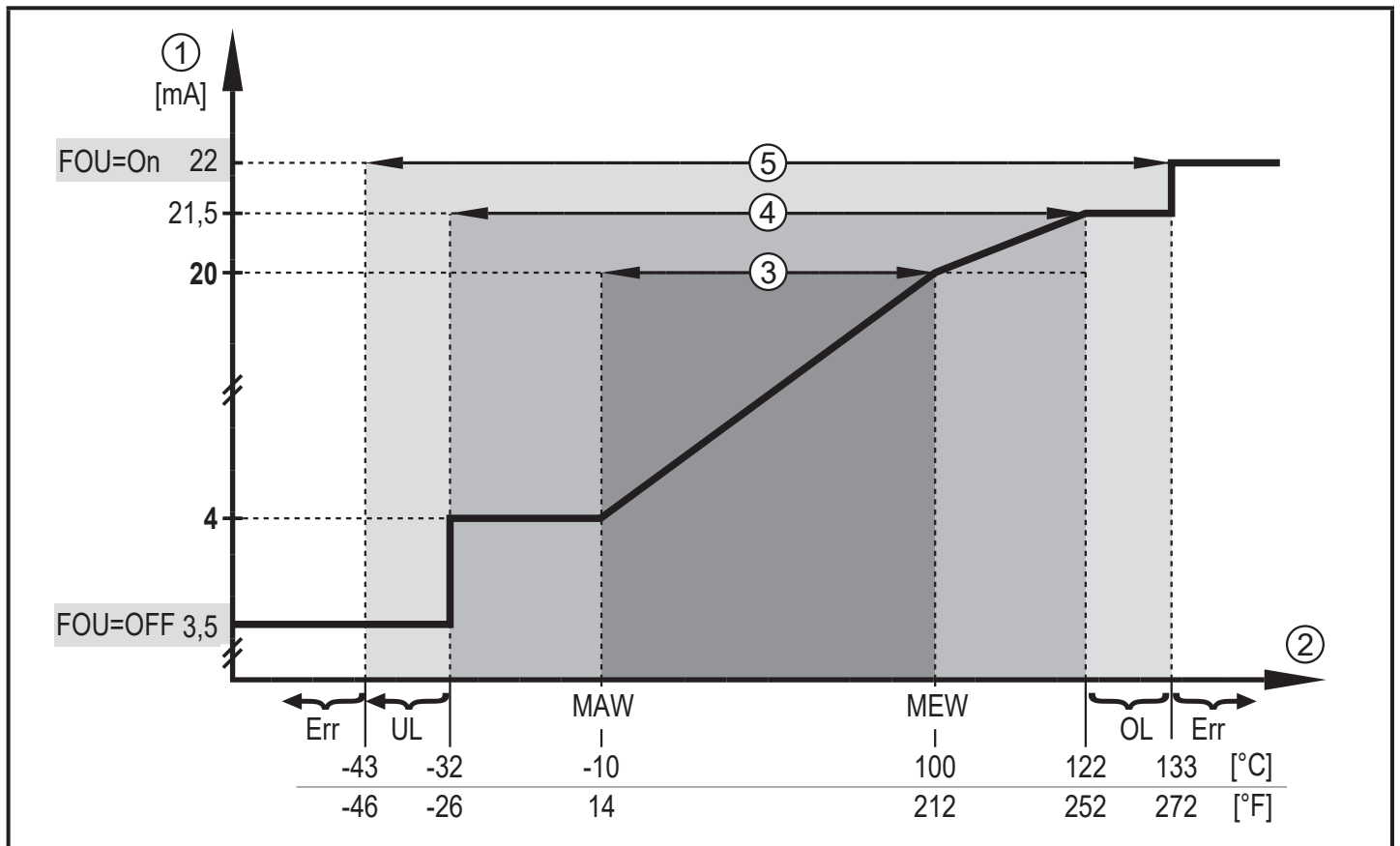


Figure 2

- ① Analogue signal
- ② Medium temperature
- ③ Measuring range
- ④ Display range
- ⑤ Detection zone

MAW: Initial value of the measuring range

MEW: Final value of the measuring range

OL: Above the display range

UL: Below the display range

Err: The unit is in the error state.

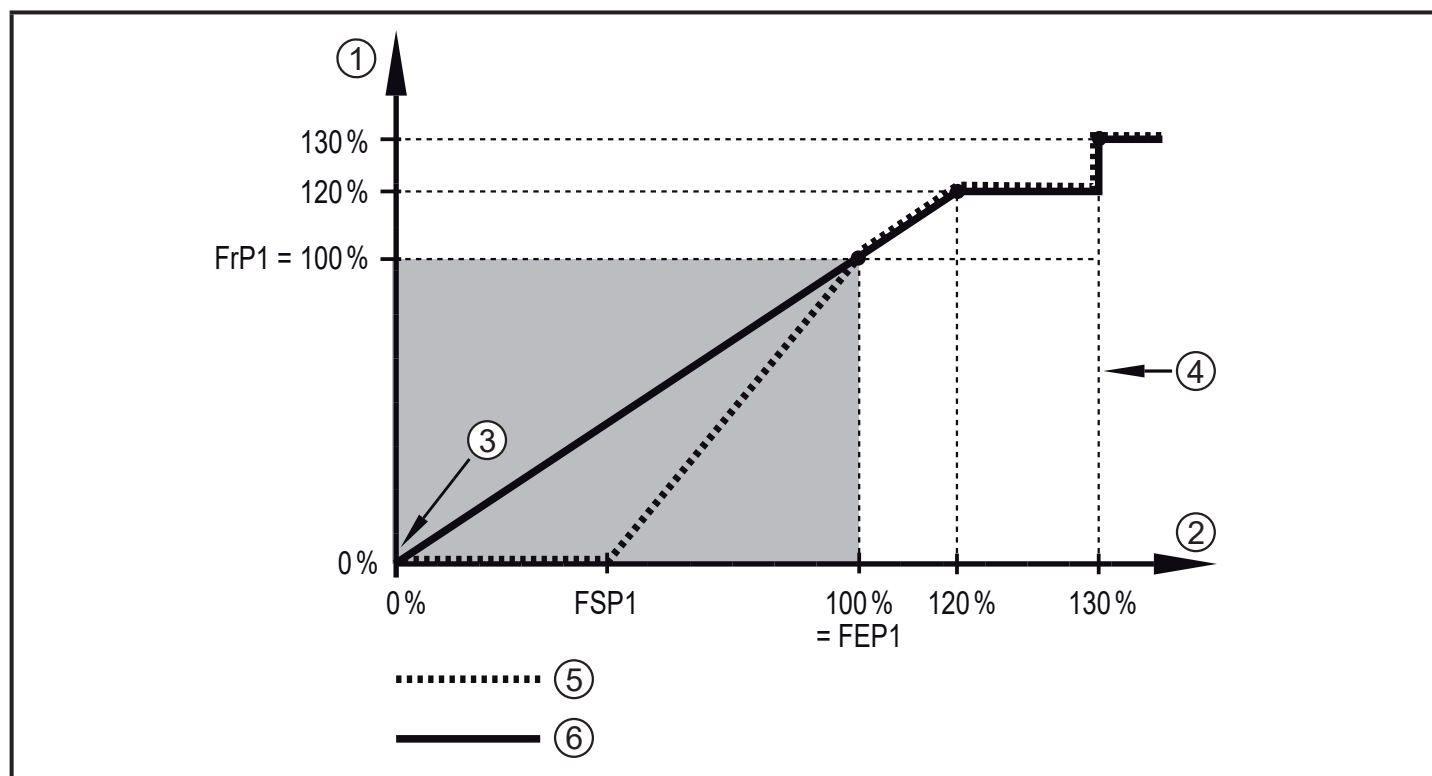
FOU=On: Default setting at which the analogue signal goes to the upper final value in case of an error.

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

4.3 Frequency output

The unit provides a frequency signal that is proportional to the volumetric flow quantity and the medium temperature.

Up to the limit value set under [FEP1] (for OUT1 = TEMP: between the limit values set under [FSP1] and [FEP1]) the frequency signal is between 0 Hz and the frequency value set under [FrP1].



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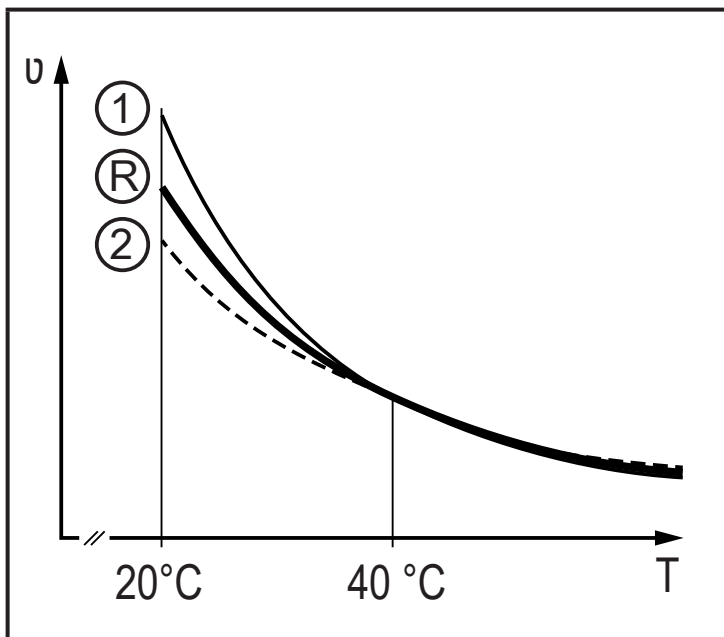
- ① Frequency signal in Hz
- ② Volumetric flow quantity or temperature
- ③ The device is in the error state (FOU = OFF) or the process value transmitted in an analogue way is below the display range or the current flow is 0.
- ④ The unit is in the error state (FOU = ON)
- ⑤ Medium temperature
- ⑥ Volumetric flow

4.4 Customer-specific calibration (CGA)

The viscosity indicated for the sensor application (→ Technical data) applies to an oil temperature of 40 °C. For other temperatures the viscosity of the oil used may deviate from the viscosity of the reference oil used for the calibration of the sensor.

► In this case adapt the calibration factor CGA, see example:

	Temperature	Viscosity	CGA
Reference oil	20 °C	430 mm ² /s	100 (factory setting)
Oil 1	20 °C	540 mm ² /s	80 %
Oil 2	20 °C	360 mm ² /s	120 %



v : viscosity of the oil
 T : temperature of the oil

R: reference oil
 1: oil 1
 2: oil 2

After a change the calibration can be reset to factory setting (\rightarrow 9.5.2).

4.5 IO-Link

This unit has an IO-Link communication interface which enables direct access to process and diagnostic data. In addition it is possible to set the parameters of the unit during operation. Operation of the unit via IO-Link interface requires an IO-Link capable module (IO-Link master).

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

For 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 visit www.ifm.com.

4.6 Measured value damping

With measured value damping, a delay time can be set by means of which the unit provides an erratically occurring flow change. The set damping time stabilises the outputs, the display and the process value transfer via the IO-Link interface.

Two damping times can be set:

[dAP] = damping time for switching signal, display and IO-Link signal
 (63 % rise time).

[dAA] = damping time for analogue signal (10...90 % rise time).

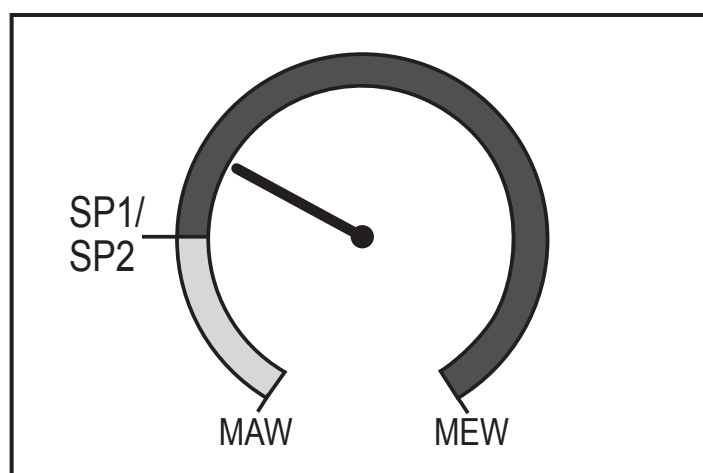
The damping time is added to the response time of the sensor (→ Technical data). The signals [UL] and [OL] (→ 12) are defined under consideration of the damping time.

4.7 Colour change display (coLr)

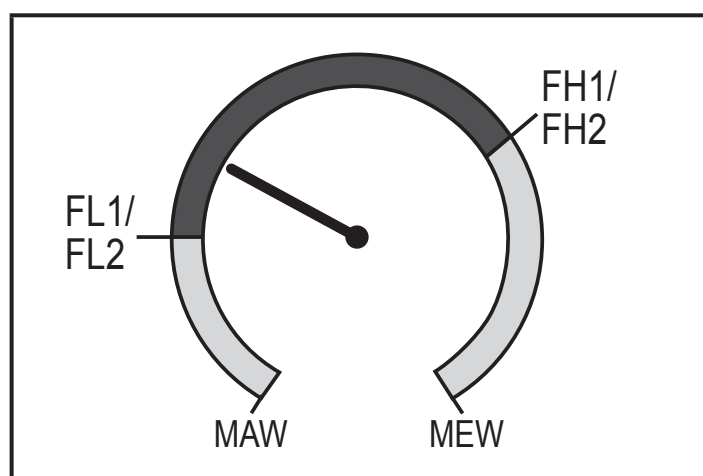
The colour of the characters in the display can be set via the parameter [coLr] (→ 9.4.4). With the set parameters rED (red) and GrEn (green), the display is permanently set to one colour. If the parameters rxou and Gxou are set, the colour of the characters changes depending on the process value:

	OUT1	OUT2	Colour change to ...
Parameter settings	r1ou	r2ou	Red
	G1ou	G2ou	Green

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Hysteresis function:
Colour change if process value
is above the set set point



Window function:
Colour change if process value
is within the window range

MAW = initial value of the measuring range
MEW = final value of the measuring range

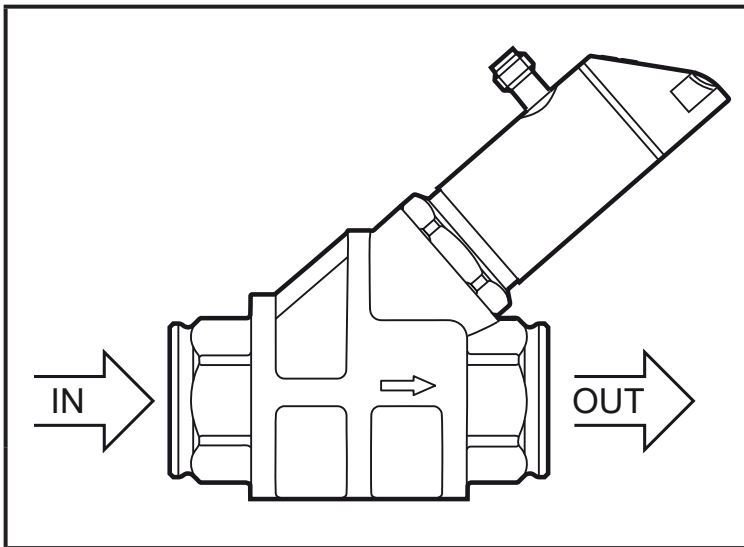
5 Installation

⚠ CAUTION

During installation or in case of a fault (housing damage) media under high pressure or hot media can leak from the system.

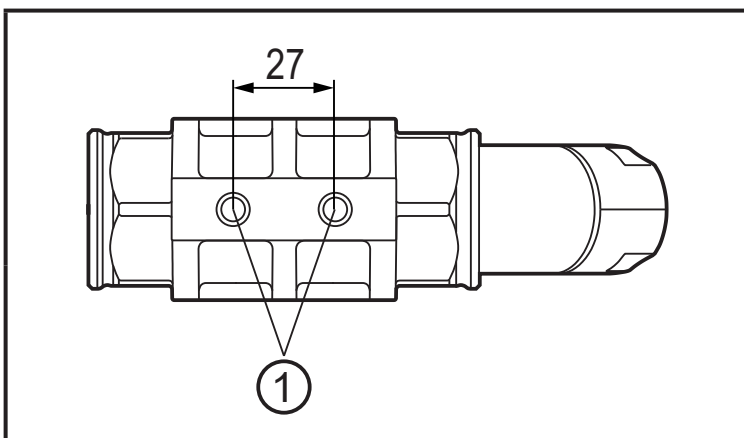
> Risk of burns.

- ▶ Ensure that the system is free of pressure during installation.
- ▶ Ensure that no media can leak at the mounting location during installation.
- ▶ Equip the unit with suitable protection (e.g. cover) to avoid hazard to personnel from leaking media.



- ▶ Insert the unit into the pipe according to the direction of flow (arrow) and tighten.

IN = inlet
OUT = outlet



- ▶ If necessary, fasten the unit on the mounting plate (not supplied) from underneath.

1: Threaded M8 holes (depth 6 mm) on the bottom side of the unit



Baffled pipes on the sensor's inlet or outlet side are not necessary.



The sensor has the function of a return flow inhibitor.



The sensor head can be rotated by 360°.

► The following minimum distances must be adhered to:

Distance between the sensor head and ferromagnetic materials.	≥ 30 mm *
Distance between the sensor head and constant / alternating fields.	≥ 500 mm
Distance between the sensor axes for side-by-side installation.	≥ 50 mm

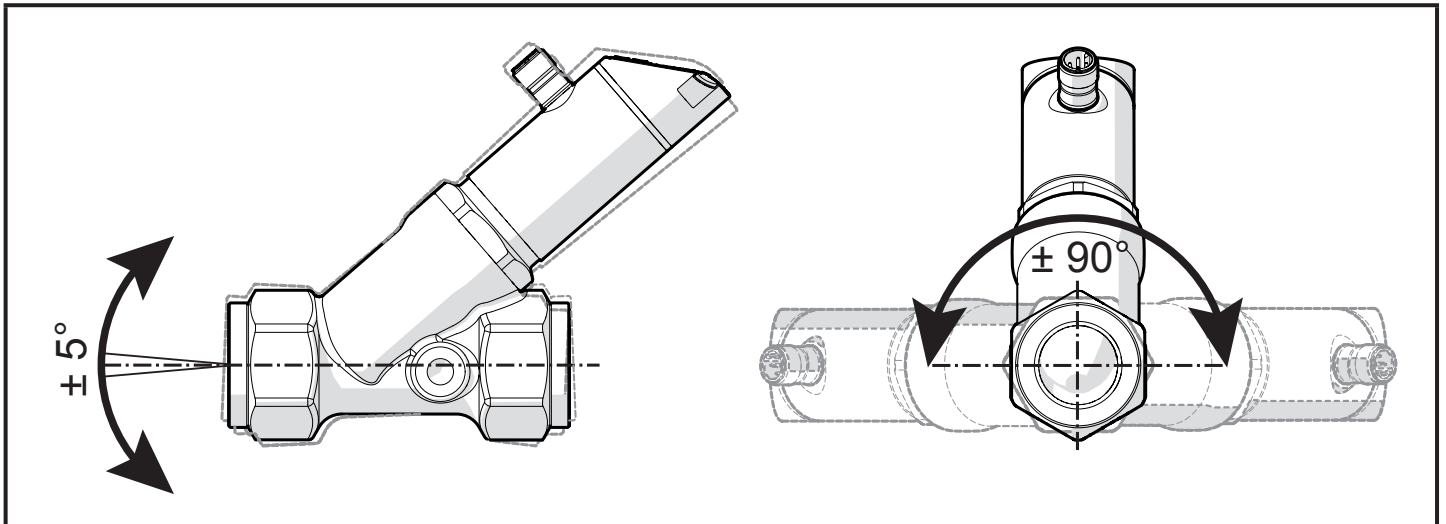
* The pipe may consist of ferromagnetic material.

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5.1 Installation in case of oil containing dirt

In case of oil containing dirt, horizontal installation is recommended.

► Adhere to the inclination angle to the horizontal axis:



In clean oil, installation in vertical pipes is also possible.

6 Electrical connection



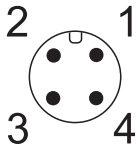
The unit must be connected by a qualified electrician.

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

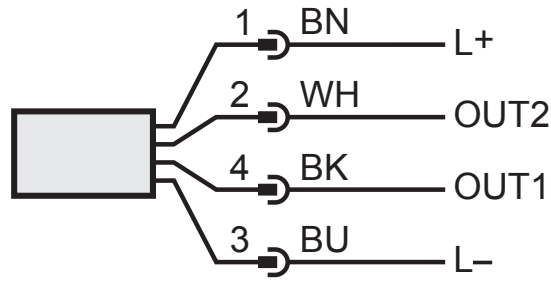
Voltage supply according to EN 50178, SELV, PELV.

► Disconnect power.

► Connect the unit as follows:



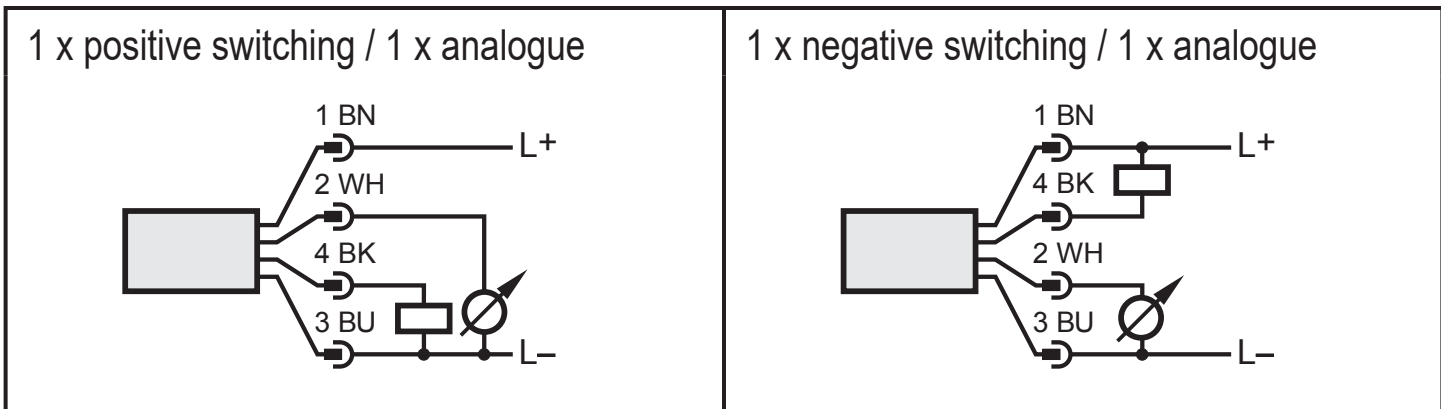
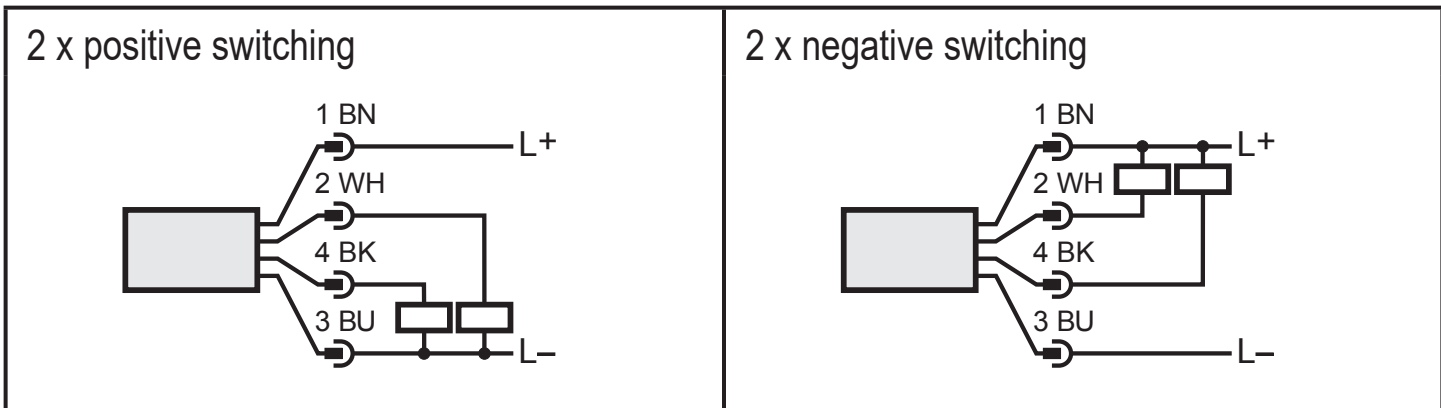
BK: black
 BN: brown
 BU: blue
 WH: white



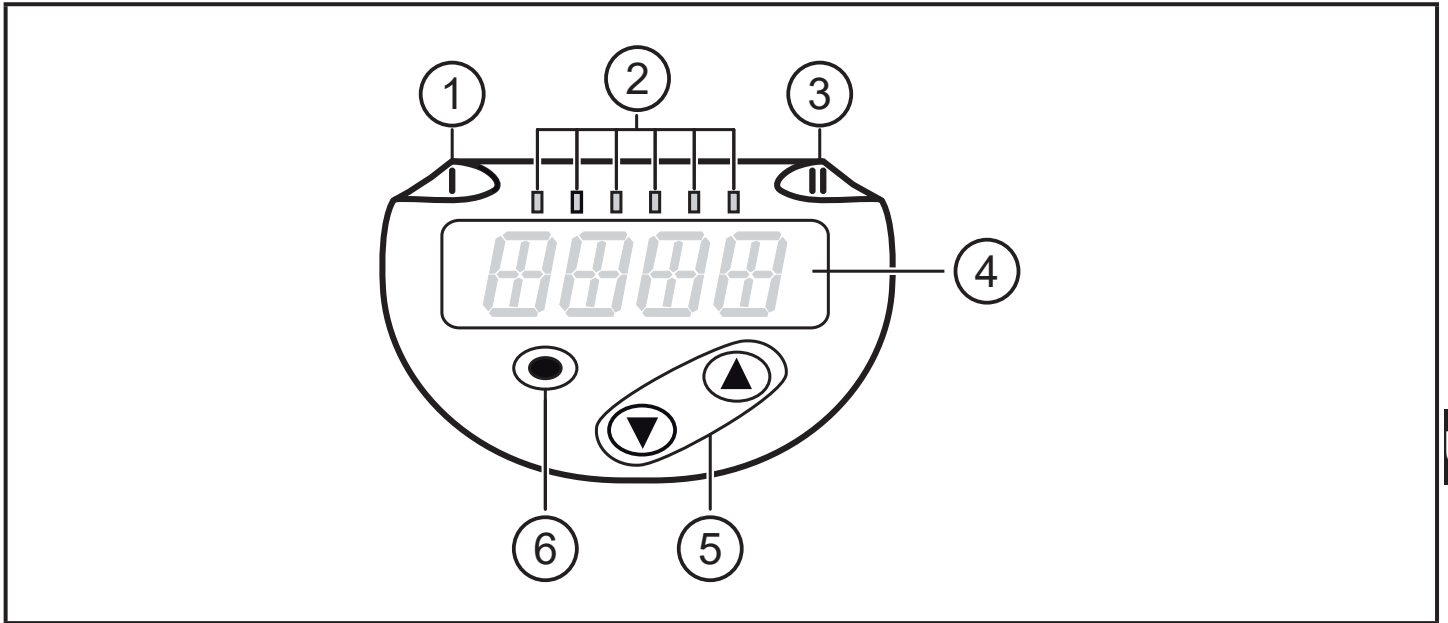
Colours to DIN EN 60947-5-2

4 (OUT1)	<ul style="list-style-type: none"> • Switching signal: limit values for volumetric flow quantity • Switching signal: limit values for temperature • Frequency signal for volumetric flow quantity • Frequency signal for temperature • IO-Link
2 (OUT2)	<ul style="list-style-type: none"> • Switching signal: limit values for volumetric flow quantity • Switching signal: limit values for temperature • Analogue signal for volumetric flow quantity • Analogue signal for temperature

Sample circuits:



7 Operating and display elements



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1, 2, 3: Indicator LEDs

- 1: switching status OUT1 (lights if output 1 is switched)
- 2: process value in the indicated unit of measurement: l/min; m³/h; gpm; gph; °C; °F
- 3: switching status OUT2 (lights if output 2 is switched)

4: Alphanumeric display, 4 digits

- Display of current process values (volumetric flow quantity, temperature)
- Display of the parameters and parameter values.

5: Buttons up [▲] and down [▼]

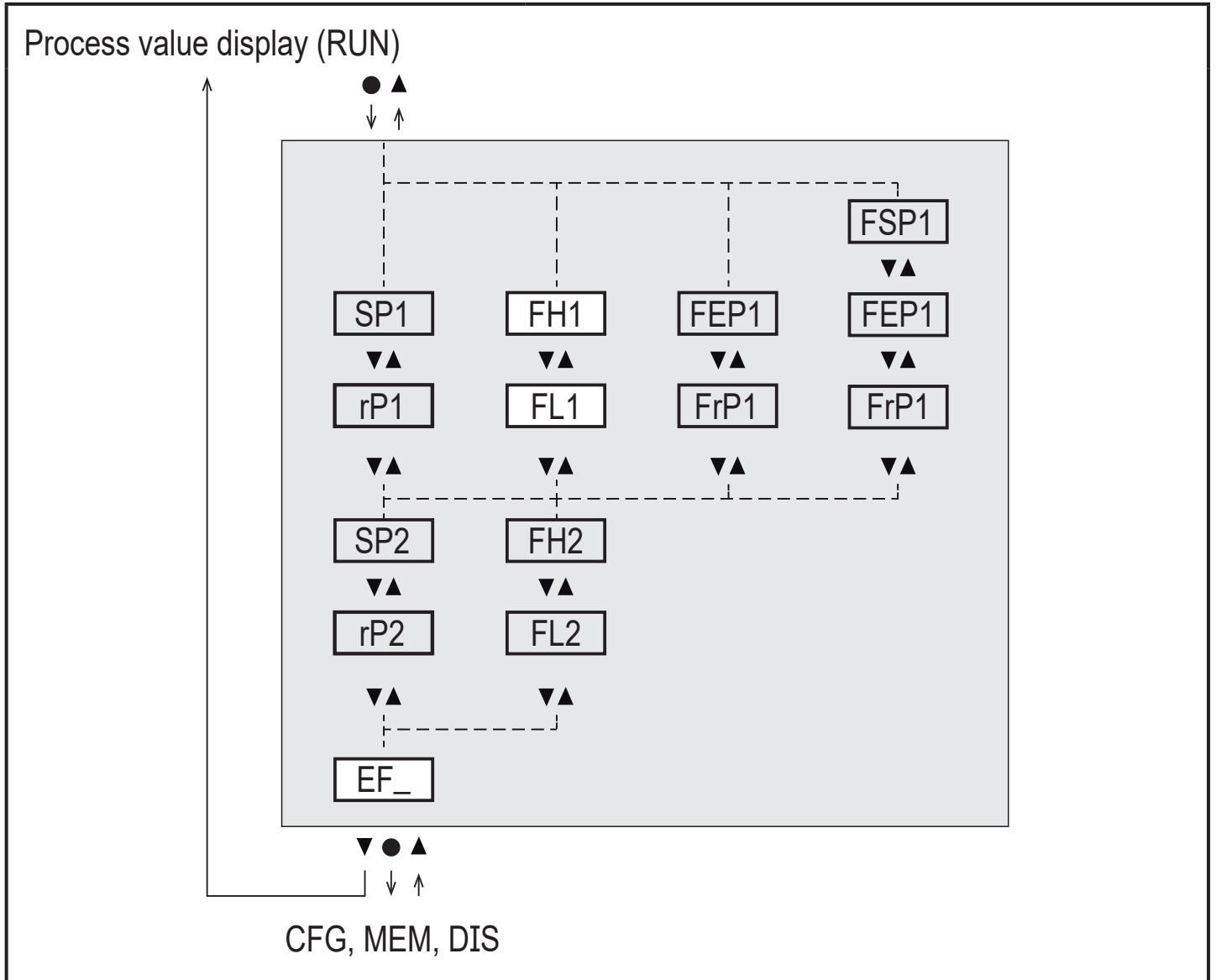
- Select parameters
- Change parameter values (hold button pressed)
- Change of the display unit in the normal operating mode (Run mode)
- Locking / Unlocking (press buttons simultaneously > 10 seconds)

6: Button [●] = Enter

- Change from the RUN mode to the main menu
- Change to the setting mode
- Acknowledge the set parameter value

8 Menu

8.1 Main menu



 Parameters are indicated in case of factory setting → 14.

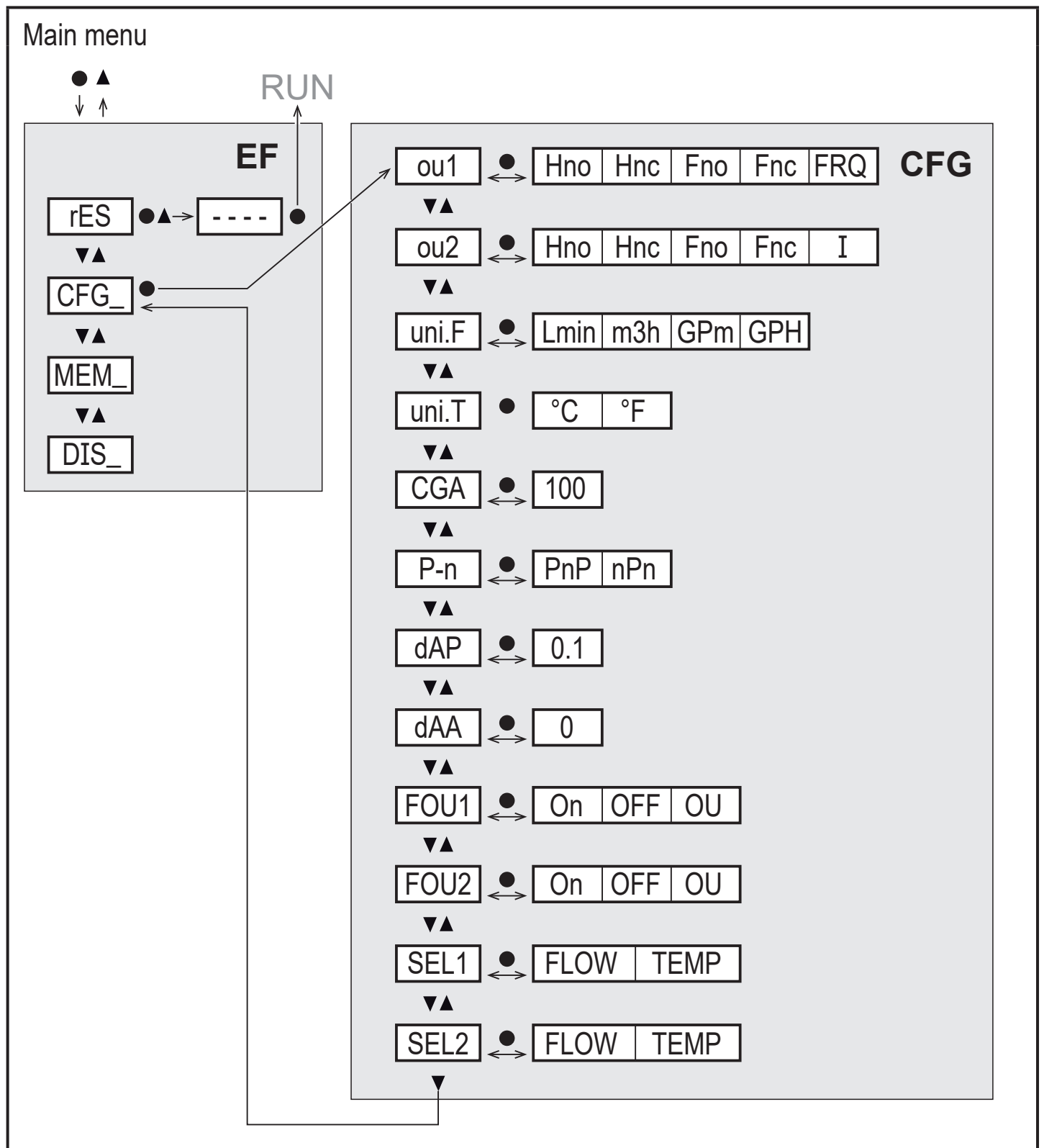
 Parameters are only displayed when selected at [ou1] und [ou2] → 8.2.

Explanation main menu

Switching output with hysteresis function	
SP1	Set point 1 = upper limit value at which OUT1 switches
rP1	Reset point 1 = lower limit value at which OUT1 is reset
SP2	Set point 2 = upper limit value at which OUT2 switches
rP2	Reset point 2 = lower limit value at which OUT2 is reset
Switching output with window function	
FH1	Upper limit value at which OUT1 switches
FL1	Lower limit value at which OUT1 switches
FH2	Upper limit value at which OUT2 switches
FL2	Lower limit value at which OUT2 switches
Frequency output	
FSP1	Process value start point on OUT1 (only if SEL1 = TEMP)
FEP1	Process value end point on OUT1
FrP1	Frequency at process value end point on OUT1
Extended functions	
EF_	Opening of the lower menu level

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8.2 Extended functions – Basic settings (CFG)



Explanation extended functions (EF)

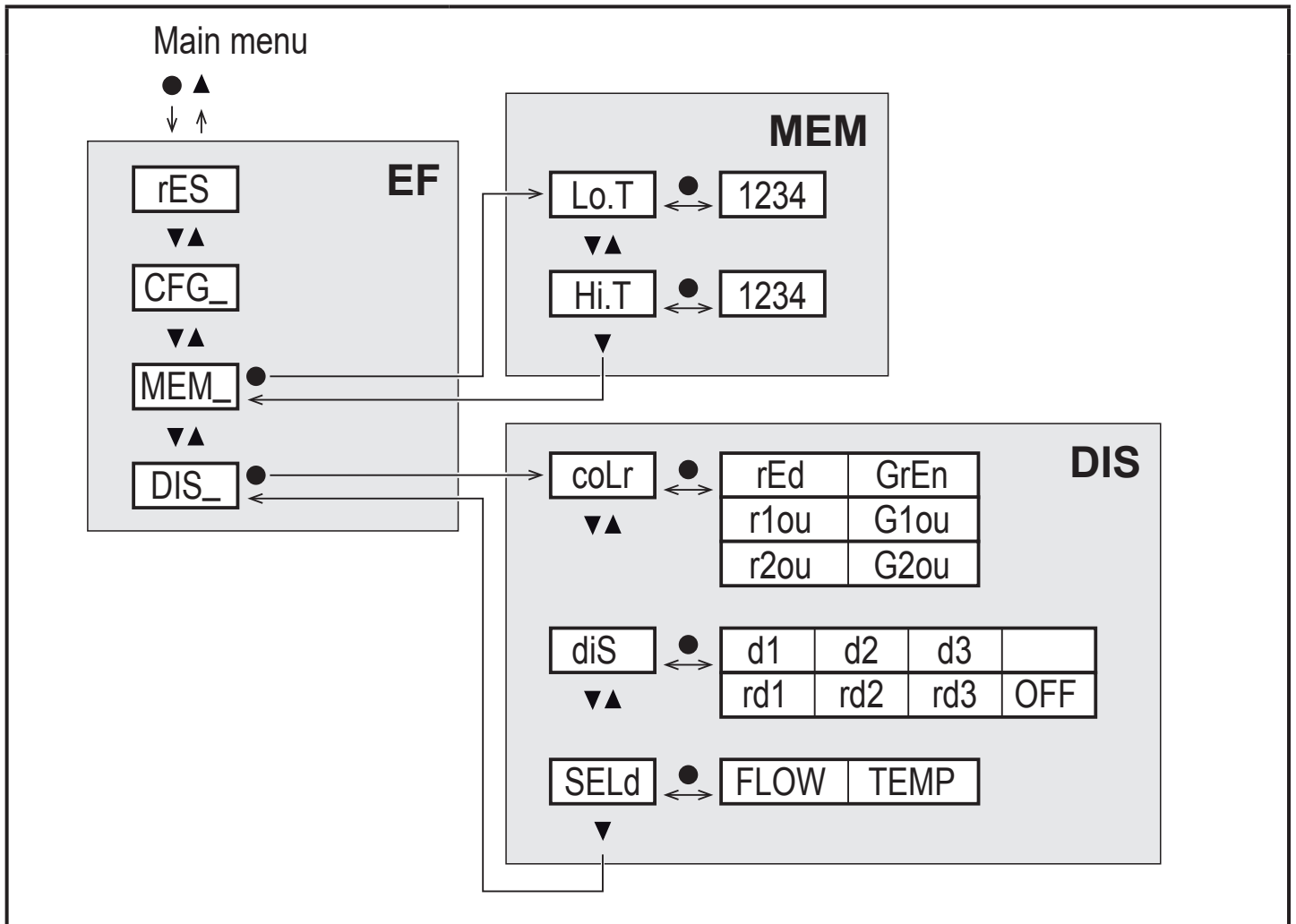
rES	Restoring the factory settings
CFG_	Submenu basic settings
MEM_	Submenu min/max memory
DIS_	Submenu display settings

Explanation basic settings (CFG)

ou1 / ou2	Output functions OUT1 / OUT2 (flow and temperature) Hno = Hysteresis function normally open Hnc = Hysteresis function normally closed Fno = Window function normally open Fnc = Window function normally closed FRQ = Frequency output I = Analogue signal 4...20 mA.
uni.F	Standard unit of measurement for volumetric flow
uni.T	Standard unit of measurement for temperature
CGA	Calibration of the measurement graph (pitch)
P-n	Output logic: pnp / npn
dAP	Measured value damping for switching output, display and IO-Link signal in seconds
dAA	Measured value damping for analogue output in seconds
FOU1	Behaviour of output OUT1 in case of an error
FOU2	Behaviour of output OUT2 in case of an error
SEL1	Standard unit of measurement for evaluation by OUT1: volumetric flow value or medium temperature
SEL2	Standard measured variable for evaluation by OUT2: volumetric flow value or medium temperature

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8.3 Min/max memory (MEM) – Display (DIS)



Explanation min/max memory (MEM)

Lo.T	Min. value of the temperature measured in the process
Hi.T	Max. value of the temperature measured in the process

Explanation display settings (DIS)

coLr	<p>Colour configuration of the display</p> <ul style="list-style-type: none"> rEd = Display always red GrEn = Display always green r1ou = Display red in case of switched output OUT1 G1ou = Display green in case of switched output OUT1 r2ou = Display red in case of switched output OUT2 G2ou = Display green in case of switched output OUT2
------	--

diS	Update rate and orientation of the display d1 = update of the measured values every 50 ms. d2 = update of the measured values every 200 ms. d3 = update of the measured values every 600 ms. rd1, rd2, rd3 = display as for d1, d2, d3; rotated by 180°. OFF = the measured value display is deactivated in the Run mode.
SELd	Standard measuring unit of the display: volumetric flow value or medium temperature

9 Parameter setting

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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 of the plant.

► 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.



The parameters can also be set via the IO-Link interface (→ 4.5).

9.1 Parameter setting in general

1. Change from the RUN mode to the main menu	[●]
2. Select the requested parameter	[▲] or [▼]
3. Change to the setting mode	[●]
4. Modification of the parameter value	[▲] or [▼] > 1 s
5. Acknowledge the set parameter value	[●]
6. Return to the RUN mode	→ 9.1.3



If [C.Loc] is displayed when attempting to change a parameter value, a change is made via a parameter setting software at the same time (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.

9.1.1 Select submenu

- ▶ Click [▲] or [▼] to select submenu (EF, CFG, MEM, DIS).
- ▶ Briefly press [●] to change to the submenu.

9.1.2 Exit parameter setting or menu level

- ▶ Press [▲] + [▼] simultaneously.
- > Return to the next higher menu level. The changed parameter settings are not accepted.

9.1.3 Change to the process value display (RUN mode)

There are 3 possibilities:

1. Wait for 30 seconds (→ 9.1.5 Timeout).
2. Change from the submenu to the main menu, from the main menu to the process value display with [▲] or [▼].
3. Press [▲] + [▼] simultaneously until the RUN mode is reached.

9.1.4 Locking / Unlocking

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

Locking:

- ▶ Make sure that the unit is in the normal operating mode.
- ▶ Press [▲] and [▼] simultaneously for 10 s until [Loc] is displayed.



During operation: [LOC] is briefly displayed if you try to change parameter values.

Unlocking:

- ▶ Make sure that the unit is in the normal operating mode.
- ▶ Press [▲] and [▼] simultaneously for 10 s until [uLoc] is displayed.

9.1.5 Timeout

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

9.2 Settings for consumed quantity monitoring

9.2.1 Limit value monitoring with OUT1 / hysteresis function

<ul style="list-style-type: none">▶ Select [SEL1] and set [FLOW].▶ Select [ou1] and set the switching function:<ul style="list-style-type: none">- [Hno] = hysteresis function/normally open- [Hnc] = hysteresis function/normally closed▶ Select [SP1] and set the value at which the output is set.▶ Select [rP1] and set the value at which the output is reset.	Menu CFG: [SEL1] [ou1] Main menu: [SP1] [rP1]
---	--

9.2.2 Limit value monitoring with OUT1 / window function

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<ul style="list-style-type: none">▶ Select [SEL1] and set [FLOW].▶ Select [ou1] and set the switching function:<ul style="list-style-type: none">- [Fno] = window function/normally open- [Fnc] = window function/normally closed▶ Select [FH1] and set the value at which the output switches.▶ Select [FL1] and set the value at which the output is reset.	Menu CFG: [SEL1] [ou1] Main menu: [FH1] [FL1]
---	--

9.2.3 Limit value monitoring with OUT2 / hysteresis function

<ul style="list-style-type: none">▶ Select [SEL2] and set [FLOW].▶ Select [ou2] and set the switching function:<ul style="list-style-type: none">- [Hno] = hysteresis function/normally open- [Hnc] = hysteresis function/normally closed▶ Select [SP2] and set the value at which the output is set.▶ Select [rP2] and set the value at which the output is reset.	Menu CFG: [SEL2] [ou2] Main menu: [SP2] [rP2]
---	--

9.2.4 Limit value monitoring with OUT2 / window function

<ul style="list-style-type: none">▶ Select [SEL2] and set [FLOW].▶ Select [ou2] and set the switching function:<ul style="list-style-type: none">- [Fno] = window function/normally open- [Fnc] = window function/normally closed▶ Select [FH2] and set the value at which the output switches.▶ Select [FL2] and set the value at which the output is reset.	Menu CFG: [SEL2] [ou2] Main menu: [FH2] [FL2]
---	--

9.2.5 Configure the analogue output for volumetric flow

<ul style="list-style-type: none">▶ Select [SEL2] and set [FLOW].▶ Select [ou2] and set the function:<ul style="list-style-type: none">- [I] = current signal proportional to volumetric flow (4...20 mA)	Menu CFG: [SEL2] [ou2]
--	------------------------------

9.2.6 Configure the frequency signal for volumetric flow

<ul style="list-style-type: none">▶ Select [SEL1] and set [FLOW].▶ Select [ou1] and set [FRQ].▶ Select [FEP1] and set the flow value at which the frequency set in FrP1 is provided.▶ Select [FrP1] and set the frequency.	Menu CFG: [SEL1] [ou1] Main menu: [FEP1] [FrP1]
---	--

9.3 Settings for temperature monitoring

9.3.1 Limit value monitoring with OUT1 / hysteresis function

<ul style="list-style-type: none">▶ Select [SEL1] and set [TEMP].▶ Select [ou1] and set the switching function:<ul style="list-style-type: none">- [Hno] = hysteresis function/normally open- [Hnc] = hysteresis function/normally closed▶ Select [SP1] and set the value at which the output is set.▶ Select [rP1] and set the value at which the output is reset.	Menu CFG: [SEL1] [ou1] Main menu: [SP1] [rP1]
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9.3.2 Limit value monitoring with OUT1 / window function

<ul style="list-style-type: none">▶ Select [SEL1] and set [TEMP].▶ Select [ou1] and set the switching function:<ul style="list-style-type: none">- [Fno] = window function/normally open- [Fnc] = window function/normally closed▶ Select [FH1] and set the value at which the output switches.▶ Select [FL1] and set the value at which the output is reset.	Menu CFG: [SEL1] [ou1] Main menu: [FH1] [FL1]
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9.3.3 Limit value monitoring with OUT2 / hysteresis function

<ul style="list-style-type: none"> ▶ Select [SEL2] and set [TEMP]. ▶ Select [ou2] and set the switching function: <ul style="list-style-type: none"> - [Hno] = hysteresis function/normally open - [Hnc] = hysteresis function/normally closed ▶ Select [SP2] and set the value at which the output is set. ▶ Select [rP2] and set the value at which the output is reset. 	Menu CFG: [SEL2] [ou2] Main menu: [SP2] [rP1]
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9.3.4 Limit value monitoring with OUT2 / window function

<ul style="list-style-type: none"> ▶ Select [SEL2] and set [TEMP]. ▶ Select [ou2] and set the switching function: <ul style="list-style-type: none"> - [Fno] = window function/normally open - [Fnc] = window function/normally closed ▶ Select [FH2] and set the value at which the output switches. ▶ Select [FL2] and set the value at which the output is reset. 	Menu CFG: [SEL2] [ou2] Main menu: [FH2] [FL2]
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9.3.5 Configure the analogue output for temperature

<ul style="list-style-type: none"> ▶ Select [SEL2] and set [TEMP]. ▶ Select [ou2] and set the function: <ul style="list-style-type: none"> - [I] = current signal proportional to volumetric flow (4...20 mA) 	Menu CFG: [SEL2] [ou2]
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9.3.6 Configure the frequency signal for temperature

<ul style="list-style-type: none"> ▶ Select [SEL1] and set [TEMP]. ▶ Select [ou1] and set [FRQ]. ▶ Select [FSP1] and set the lower temperature value at which 0 Hz is provided. ▶ Select [FEP1] and set the temperature value at which the frequency set in FrP1 is provided. ▶ Select [FrP1] and set the frequency. 	Menu CFG: [SEL1] [ou1] Main menu: [FSP1] [FEP1] [FrP1]
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9.4 User settings (optional)

9.4.1 Set the standard unit of measurement for volumetric flow

▶ Select [uni.F] and set the unit of measurement: l/min, m ³ /h, gpm, gph.	Menu CFG: [uni.F]
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9.4.2 Set the standard unit of measurement for temperature

▶ Select [uni.T] and set the unit of measurement: °C, °F.	Menu CFG: [uni.T]
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9.4.3 Configuration of the standard display

<ul style="list-style-type: none">▶ Select [SELd] and determine the standard measuring unit:<ul style="list-style-type: none">- [FLOW] = the current volumetric flow value in the standard unit of measurement is displayed.- [TEMP] = the current medium temperature in the standard unit of measurement is displayed.▶ Select [diS] and set the update rate and orientation of the display:<ul style="list-style-type: none">- [d1]: update of the measured values every 50 ms.- [d2]: update of the measured values every 200 ms.- [d3]: update of the measured values every 600 ms.- [rd1], [rd2], [rd3]: display as for d1, d2, d3; rotated by 180°.- [OFF] = The measured value display is deactivated in the Run mode. The LEDs remain active even if the display is deactivated. Error messages are displayed even if the display is deactivated.	Menu DIS: [SELd] [diS]
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9.4.4 Configure colour change display

▶ Select [coLr] and define the colour of the process value display: rEd, GrEn, r1ou, G1ou, r2ou, G2ou (→ 4.7).	Menu DIS: [coLr]
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9.4.5 Set the damping for the switching output

▶ Select [dAP] and set the damping constant in seconds (T value. 63 %); setting range 0...5 s.	Menu CFG: [dAP]
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9.4.6 Set damping for the analogue output

▶ [Select [dAA] and set a damping constant in seconds. setting range 0...5 s.	Menu CFG: [dAA]
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9.4.7 Set output status in fault condition

<p>▶ Select [FOU1] and set the value:</p> <ol style="list-style-type: none">1. Switching output:<ul style="list-style-type: none">- [On] = output 1 switches ON in case of an error.- [OFF] = output 1 switches OFF in case of an error.- [OU] = output 1 switches irrespective of the fault as defined with the parameters.2. Frequency output:<ul style="list-style-type: none">- [On] = 130 % of FrP1.- [OFF] = 0 Hz- [ou1] = frequency signal is provided without any changes. <p>▶ Select [FOU2] and set the value:</p> <ol style="list-style-type: none">1. Switching output:<ul style="list-style-type: none">- [On] = output 2 switches ON in case of an error.- [OFF] = output 2 switches OFF in case of an error.- [OU] = output 2 switches irrespective of the fault as defined with the parameters.2. Analogue output<ul style="list-style-type: none">- [On] = output 2 switches ON in case of an error, the analogue signal goes to the upper error value.- [OFF] = output 2 switches OFF in case of an error, the analogue signal goes to the lower error value.- [ou] = output 2 switches irrespective of the fault as defined with the parameters. The analogue signal corresponds to the measured value.	Menu CFG: [FOU1] [FOU2]
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9.5 Service functions

9.5.1 Read the min/max values for the temperature

<p>▶ Select [Hi.T] or [Lo.T] and read the value. [HI.T] = max. value, [LO.T] = min. value.</p> <p>Delete memory:</p> <p>▶ Select [Hi.T] or [Lo.T].</p> <p>▶ Briefly press [●].</p> <p>▶ Keep [▲] or [▼] pressed.</p> <p>> [----] is displayed.</p> <p>▶ Briefly press [●].</p> <p> It makes sense to delete the memories as soon as the unit operates under normal operating conditions for the first time.</p>	Menu MEM: [Hi.T] [Lo.T]
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9.5.2 Resetting all parameters to factory setting

<ul style="list-style-type: none"> ▶ Select [rES]. ▶ Press [●]. ▶ Press [▲] or [▼] and keep pressed until [----] is displayed. ▶ Briefly press [●]. <p> It is recommended to take down your own settings in the table before carrying out the function → 14 Factory setting.</p>	Menu EF: [rES]
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10 Operation

10.1 Reading the process value

The LEDs signal which process value is currently displayed (LED2 → 7 Operating and display elements).


The process value to be displayed as standard (volumetric or temperature) can be preset → 9.4.3.

A standard unit of measurement can be defined for the volumetric flow quantity and temperature → 9.4.1 and → 9.4.2.

In RUN mode, 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.

10.2 Reading the set parameter value

1. Change from the RUN mode to the main menu	[●]
2. Select the requested parameter	[▲] or [▼]
3. Change to the setting mode > The currently set value is displayed for 30 s.  By pressing [●] several times, the display switches between parameter and parameter value.	[●]
4. Return to the RUN mode without parameter change	→ 9.1.3

11 Technical data

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

12 Troubleshooting

12.1 Measurement error caused by dirt

If there are dirt particles between the float and the housing the display value of the sensor does not return to zero in case of flow standstill. In case of dirt the display value can be up to 30 % of the final value of the measuring range.

Corrective measure → 13 Maintenance, repair and disposal.

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12.2 Error indications

Display	Warning message
[PARA]	Parameter setting outside the valid range.
[SC1]	Short circuit in OUT1. LED1 for OUT1 flashing (→ 7 Operating and display elements).
[SC2]	Short circuit in OUT2. LED2 for OUT2 flashing (→ 7 Operating and display elements).
[SC]	Short circuit in both outputs. LED1 and LED2 flashing (→ 7 Operating and display elements).
[OL]	Display range of volumetric flow or temperature exceeded. - Volumetric flow value between 120...130 % of the final value of the measuring range. - Temperature value between 122...133 °C (252...272 °F).
[UL]	Below the display range of temperature. Temperature value between -32...-43 °C (-26...-46 °F).
[Err]	<ul style="list-style-type: none">• Unit faulty / malfunction.• Measured value outside the detection zone.<ul style="list-style-type: none">- Volumetric flow value > 130 % of the final value of the measuring range.- Temperature value < -43 °C (< -46 °F) or > 133 °C (> 272 °F)
[C.Loc]	Setting pushbuttons locked, parameter change rejected. Active IO-Link communication.
[S.Loc]	Setting pushbuttons locked, parameter change rejected. Unlock using parameter setting software.
[IOE.n]	Malfunctioning. The unit is faulty and must be replaced.

13 Maintenance, repair and disposal

If used correctly, no maintenance and repair measures are necessary.

Only the manufacturer is allowed to repair the unit.

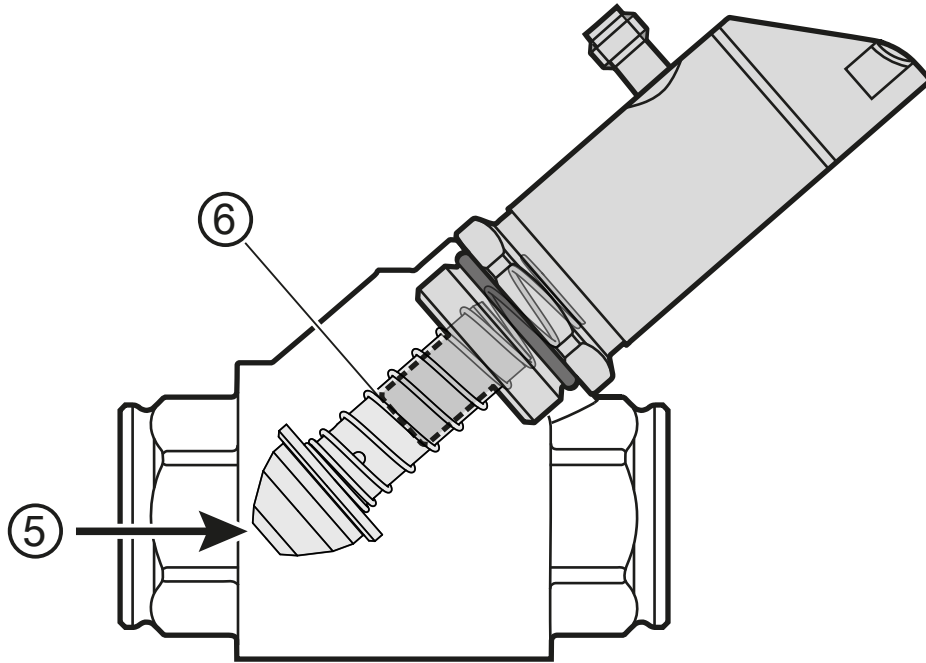
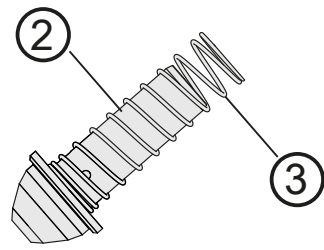
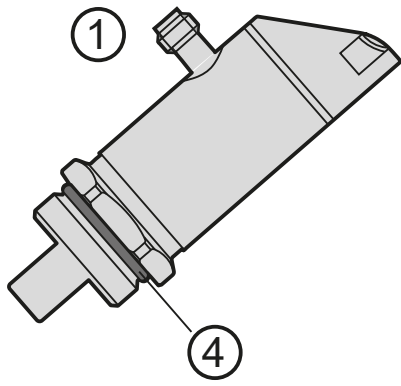
After use dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.

In case of heavily polluted media:

▶ Mount a filter in front of the inlet (IN). Recommendation: use a 200-micron filter.

If measurement errors occur because of an insufficient filtration (→ 12.1) cleaning may be required:

- ▶ Screw off sensor head (1).
- ▶ Remove float (2) and spring (3).
- ▶ Clean float, e.g. using compressed air.
- ▶ Clean housing inside, e.g. with a cloth or compressed air.
- ▶ Before re-assembly check O-ring (4) for damage. If necessary, replace and grease.
- ▶ After cleaning install components again.
- ▶ Tighten sensor head with a tightening torque of 10 Nm.
- ▶ To restore the measurement accuracy, press the float until you feel a stop (6) using something non magnetic (5), e.g. a finger and hold for at least 2 seconds.



14 Factory setting

Parameter	Factory setting	User setting
SP1 / FH1 (FLOW)	20 %	
rP1 / FL1 (FLOW)	19 %	
SP1 / FH1 (TEMP)	70 °C	
rP1 / FL1 (TEMP)	20 °C	
FrP1 (FLOW/TEMP)	10 %	
FSP1 (TEMP)	-10 °C	
FEP1 (TEMP)	100 °C	
FEP1 (FLOW)	100 %	
SP2 / FH2 (FLOW)	40 %	
rP2 / FL2 (FLOW)	39 %	
SP2 / FH2 (TEMP)	34 °C	
rP2 / FL2 (TEMP)	33 °C	
ou1	Fno	
ou2	I	
SEL1	TEMP	
SEL2	FLOW	
SELd	FLOW	
FOU1	ou	
FOU2	ou	
uni.F (FLOW)	L/min	
uni.T (TEMP)	°C	
P-n	PnP	
dAP (FLOW)	0.1 s	
dAA (FLOW)	0 s	
CGA (FLOW)	100 %	
coLr	rEd	
diS	d2	

The percentage values refer to the final value of the measuring range (MEW).

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