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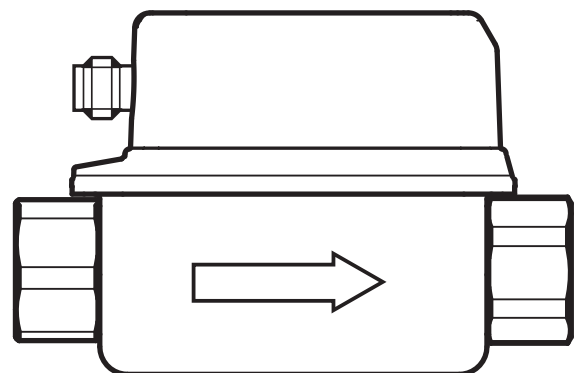
Operating instructions  
Vortex flow meter

**VFS50-5-1002**

**VFS50-10-1002**

**VFS75-26-1002**

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by [Automationdirect.com](https://www.automationdirect.com)

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# 1 Preliminary note

## 1.1 Symbols used

► Instructions

> Reaction, result

[...] Designation of pushbuttons, 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

- The device described is a subcomponent for integration into a system.
  - The manufacturer 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.

## CAUTION

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

- ▶ In this case do not touch the unit.
- ▶ Protect the housing against contact with flammable substances and unintentional contact.
- ▶ Do not press the pushbuttons manually; instead use another object (e.g. ballpoint pen).

## 3 Functions and features

The unit monitors water-based fluids (water, deionized water, cooling water). It detects the two process categories volumetric flow rate and medium temperature.



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.

## 4 Function

- The unit detects the volumetric flow rate based on the Vortex measuring principle.
- The unit displays the current flow and temperature. It generates 2 output signals according to the parameter setting:
  - OUT1: Analog signal for temperature
  - OUT2: Analog signal for volumetric flow rate

## 4.1 Analog function

The unit provides an analog signal that is proportional to the volumetric flow rate and the medium temperature.

Within the measuring range the analog signal is 4...20 mA.

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.

If the measured value is outside the measuring range or in the event of an internal error, the current signal indicated in Fig. 1 is provided.

For measured values outside the display range or in case of a fault, messages are displayed (cr.UL, UL, OL, cr.OL, Err; → 10).

The analog signal in case of a fault is adjustable:

- [FOU] = On  
determines that the analog signal goes to the upper final value (22 mA) in case of an error.
- [FOU] = OFF  
determines that the analog signal goes to the lower final value (3.5 mA) in case of an error.
- [FOU] = OU  
defines that in case of a fault the analog signal reacts as defined by the current parameters.

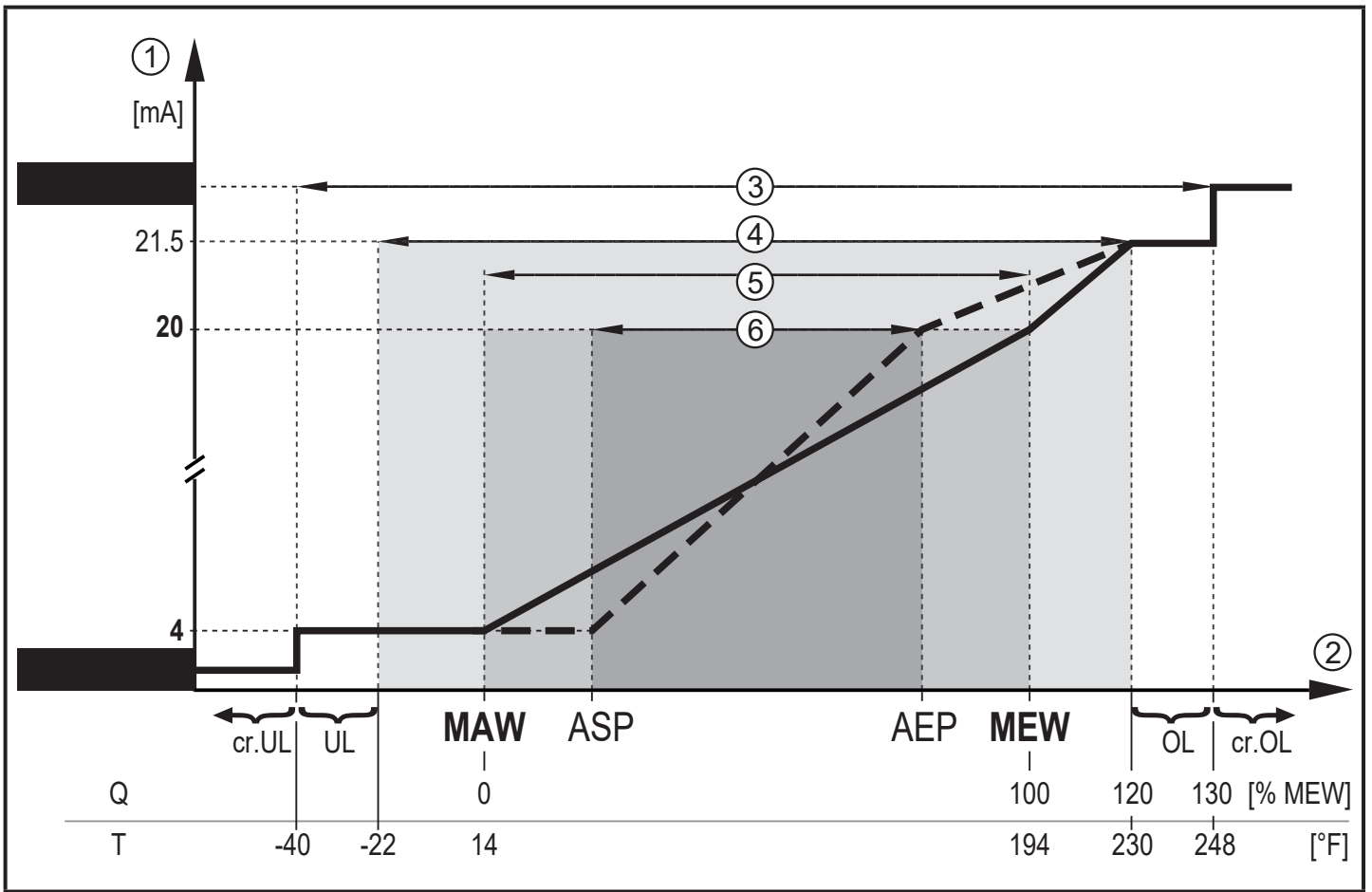


Fig. 1: Characteristics of the analog output according to the standard IEC 60947-5-7.

- ① Analog signal
- ② Measured value (Q = volumetric flow rate; T = temperature)
- ③ Detection zone
- ④ Display range
- ⑤ Measuring range (MAW = initial value of the measuring range; MEW = final value of the measuring range)
- ⑥ Scaled measuring range (ASP = analog start point; AEP = analog end point)

UL: Below the display range

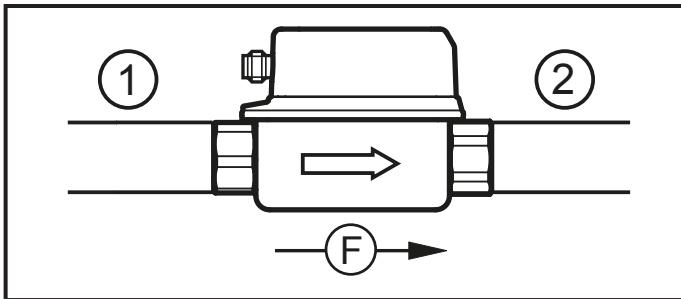
OL: Above the display range

cr.UL: Below the detection zone (error)

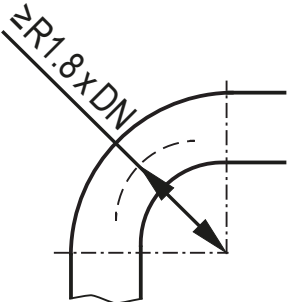
cr.OL: Above the detection zone (error)

## 5 Installation

- ▶ Flow in the direction of the arrow. Observe the installation direction.
- ▶ Make sure that pipe and sensor have the same internal diameter.
- ▶ Avoid deposits, accumulated gas and air in the pipe system. Install the unit so that the measuring pipe is always completely filled with medium.
- ▶ Install in front of or in a rising pipe.
- ▶ Recommended tightening torque: 30 Nm
- ▶ Avoid disturbances on the inlet and outlet side. To do so, provide for the following inlet and outlet pipe lengths:



DN = nominal width of the pipe  
R = radius

Disturbance	Inlet pipe length (1)	Outlet pipe length (2)
Non-ideal bend	$\geq 5 \times \text{DN}$	$\geq 1 \times \text{DN}$
Ideal bend 	$\geq 0.5 \times \text{DN}$	
Multiple bends (2 x 90°)	$\geq 15 \times \text{DN}$	
Reduction of internal pipe diameter	$\geq 15 \times \text{DN}$	$\geq 15 \times \text{DN}$
Valve or pump	$\geq 25 \times \text{DN}$	

- ▶ Mount the unit in a way that no mechanical forces are exerted on the pipe. To do so, use angle brackets if required.
  - For direct installation fix the unit on the surface utilizing the four corner holes on the underside of the unit. Mounting holes are 3.6 mm in diameter with a 57 mm x 16.5 mm on center pattern. Maximum insertion depth in the housing

is 5.5 mm. Use 4 M4 DIN 7985 lens screws. Center holes are not usable due to risk of damaging sensor.

► Avoid the following installation positions:

- Directly in front of a falling pipe.
- In a falling pipe.
- At the highest point of the pipe system, when the pipe is open.
- Directly before the outlet of the pipe.
- On the suction side of a pump.

## 6 Electrical connection



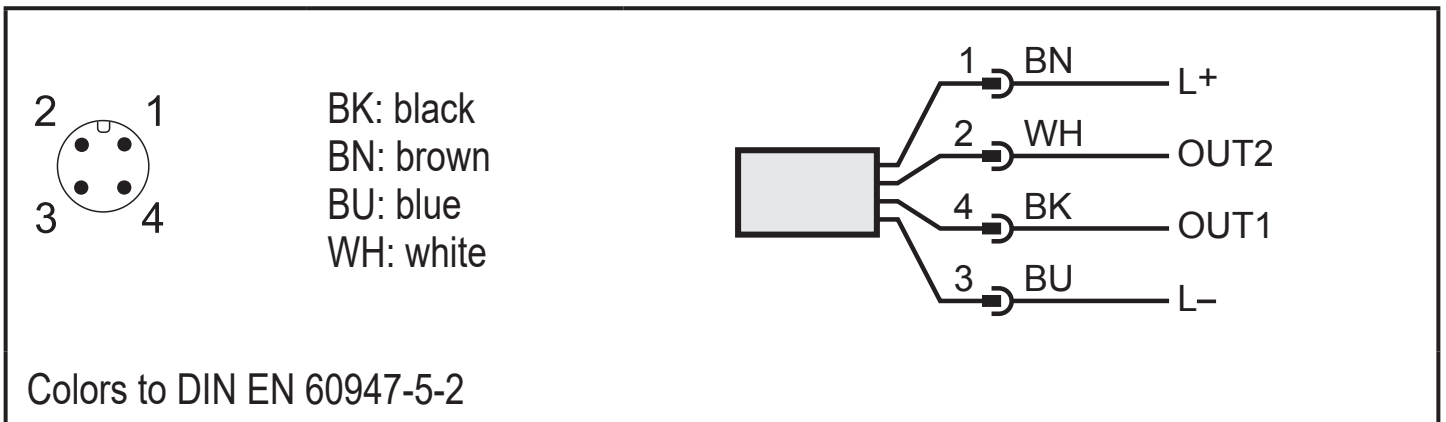
The unit must be connected by a qualified electrician.

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.

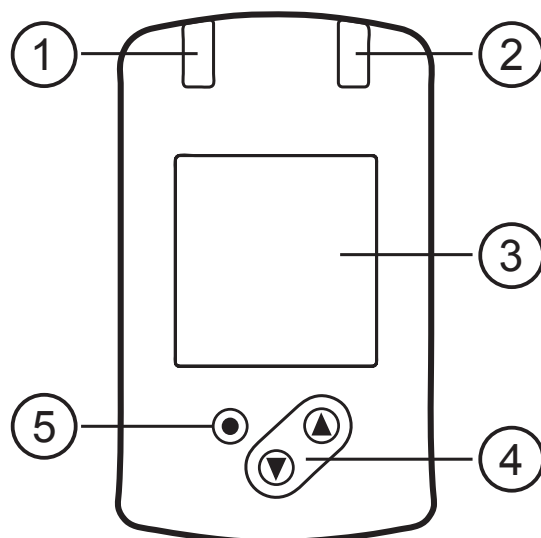
► Connect the unit as follows:



<b>Pin 1</b>	L+
<b>Pin 3</b>	L-
<b>Pin 4 (OUT1)</b>	• Analog signal for temperature
<b>Pin 2 (OUT2)</b>	• Analog signal for volumetric flow rate



## 7 Operating and display elements



### 1 and 2: LEDs

No function

### 3: TFT display

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

### 4: Buttons [▲] and [▼]

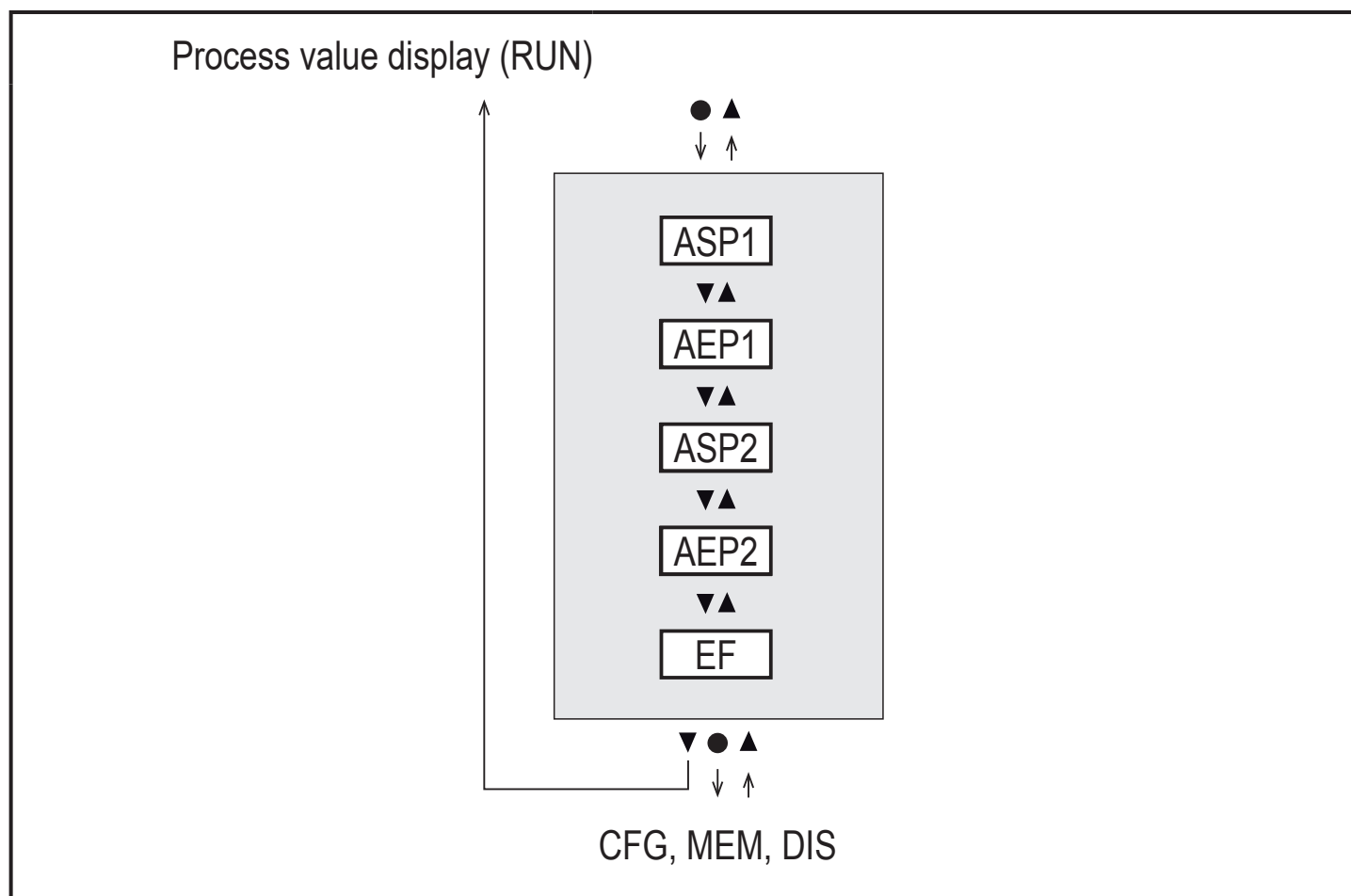
- Select parameters
- Change parameter values (hold button pressed)
- Change of the process value display in the normal operating mode (Run mode)
- Locking / unlocking (press buttons simultaneously > 10 seconds)

### 5: Button [●] = Enter

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

# 8 Menu

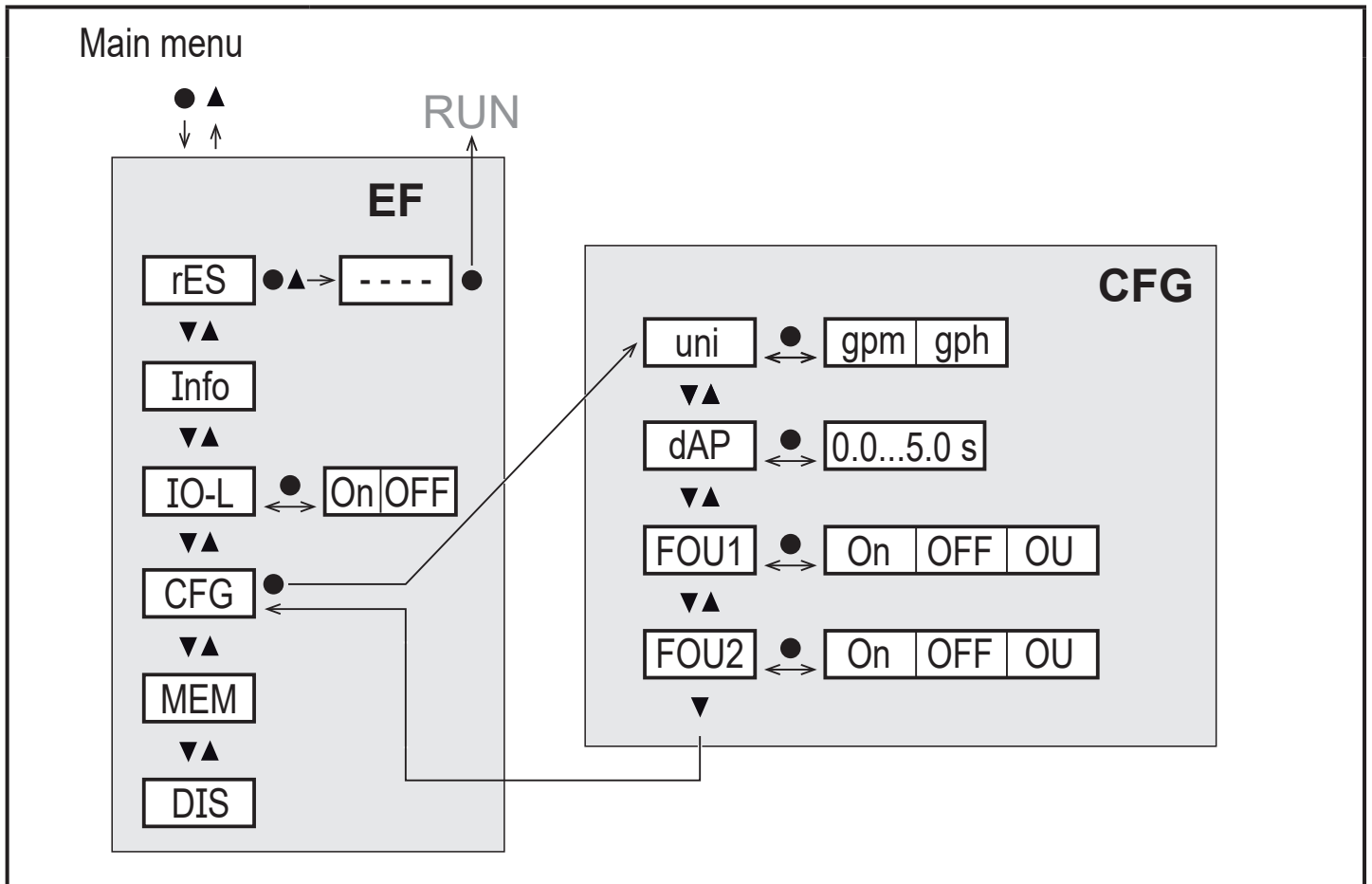
## 8.1 Main menu



### 8.1.1 Explanation main menu

ASP1	Analog start value for temperature
AEP1	Analog end value for temperature
ASP2	Analog start value for volumetric flow rate
AEP2	Analog end value for volumetric flow rate
EF	Extended functions. Opening of the lower menu level.

## 8.2 Extended functions – basic settings

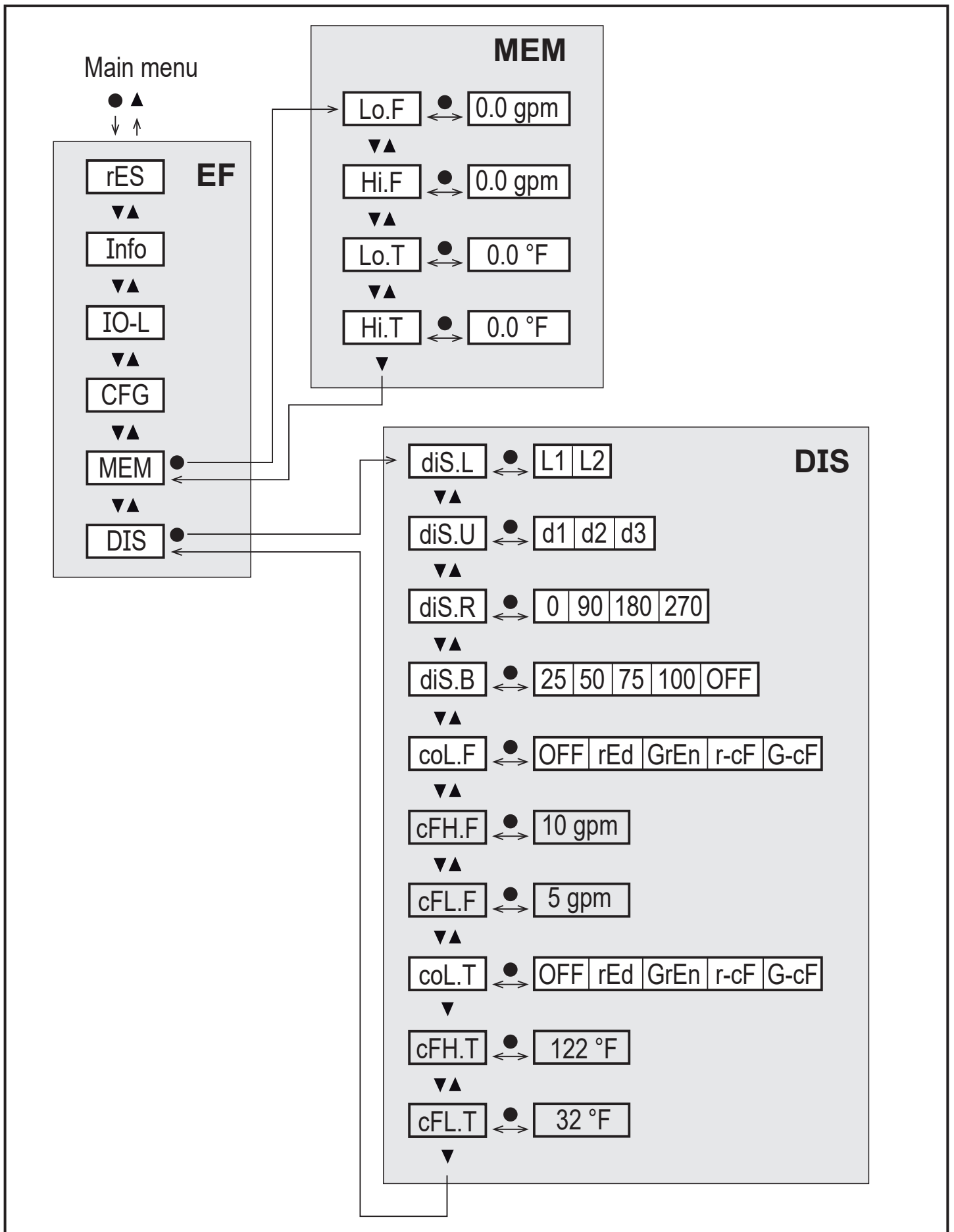


rES	Restoring the factory settings
Info	Device information
IO-L	Parameter not used. Must be set to [OFF].
CFG	Submenu basic settings
MEM	Submenu min/max memory
DIS	Submenu display settings

### 8.2.1 Explanation basic settings (CFG)

uni	Standard unit of measurement for volumetric flow rate
dAP	Measured value damping in seconds (only for volumetric flow rate)
FOU1	Behavior of output OUT1 in case of an error
FOU2	Behavior of output OUT2 in case of an error

### 8.3 Extended functions – min / max memory – display



 The parameters are only displayed when selected r-cF or G-cF.

### 8.3.1 Explanation min/max memory (MEM)

Lo.F	Minimum value of the flow measured in the process
Hi.F	Maximum value of the flow measured in the process
Lo.T	Minimum value of the temperature measured in the process
Hi.T	Maximum value of the temperature measured in the process

### 8.3.2 Explanation display function (DIS)

diS.L	Standard layout of the display(L1: flow or L2: flow and temperature)	
diS.U	Update rate of display	
diS.R	Display rotation	
diS.B	Display brightness	
coL.F	Color configuration volumetric flow rate	
coL.T	Color configuration temperature	
OFF	No color change	
rEd	Process value always red	
GrEn	Process value always green	
r-cF	Display red if measured value between limit values cFL...cFH	
G-cF	Display green if measured value between limit values cFL...cFH	
cFH.F	Upper limit value for color change flow	Only if r-cF or G-cF is selected.
cFL.F	Lower limit value for color change flow	
cFH.T	Upper limit value for color change temperature	
cFL.T	Lower limit value for color change temperature	

## 9 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 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.

## 9.1 Parameter setting in general

1. Change from RUN mode to the main menu	[●]
2. Selection of the requested parameter	[▲] or [▼]
3. Change to setting mode	[●]
4. Modification of the parameter value	[▲] or [▼] > 1 s
5. Acknowledgement of the set parameter value	[●]
6. Return to the RUN mode	> 30 seconds (timeout) or press [▲] + [▼] simultaneously until the RUN mode is reached.

## 10 Troubleshooting

Display	Type	Description
[Err]	Error	Unit faulty / malfunction
Off	Error	Supply voltage too low or setting diS.B = OFF
[PArA]	Error	Parameter setting outside the valid range
[cr.UL]	Error	Measured value smaller than -30 %, critically low temperature
[cr.OL]	Error	Measured value greater than 130 %, critical excess flow / temperature
[🔒 Locked via key]	Warning	Setting pushbuttons on the unit locked, parameter change rejected.
[UL]	Warning	Below the detection zone: Measured value lower than -20 % of the final value of the measuring range.
[OL]	Warning	Detection zone exceeded: Measured value greater than 120 % of the final value of the measuring range.

# 11 Factory setting

Parameter	Factory setting	User setting
<b>ASP1</b> (TEMP)	<b>0 % *</b>	
<b>AEP1</b> (TEMP)	<b>100 % *</b>	
<b>ASP2</b> (FLOW)	<b>0 % *</b>	
<b>AEP2</b> (FLOW)	<b>100 % *</b>	
<b>FOU1</b> (TEMP)	<b>OFF</b>	
<b>FOU2</b> (FLOW)	<b>OFF</b>	
<b>col.F</b> (FLOW)	<b>OFF</b>	
<b>col.T</b> (TEMP)	<b>OFF</b>	
<b>uni</b>	<b>gpm</b>	
<b>dAP</b>	<b>0.6 s</b>	
<b>diS.L</b>	<b>L2</b>	
<b>diS.U</b>	<b>d2</b>	
<b>diS.R</b>	<b>0</b>	
<b>diS.B</b>	<b>75 %</b>	
<b>cFH.F</b>	<b>MEW</b>	
<b>cFL.F</b>	<b>MAW</b>	
<b>cFH.T</b>	<b>MEW</b>	
<b>cFL.T</b>	<b>MAW</b>	

MEW = final value of the measuring range

MAW = initial value of the measuring range

\* The percentage values refer to the final value of the measuring range.