



Operating instructions
Vortex flow meter
SVxxx4

GB

Contents

1	Preliminary note	3
1.1	Symbols used	3
1.2	Warnings.	3
2	Safety instructions.	4
3	Intended use	5
3.1	Application area	5
4	Function	6
5	Installation.	7
5.1	Non recommended installation position.	8
6	Electrical connection	9
7	Operating and display elements	10
8	Menu.	11
9	Set-up.	13
10	Parameter setting	14
10.1	Parameter setting via the unit keys	14
10.2	Parameter setting via IO-Link	14
10.3	Output configuration	15
10.3.1	Standard unit of measurement	15
10.3.2	Analogue signal	15
10.3.3	Damping	16
10.3.4	Error behaviour of the outputs.	16
10.4	Memory.	16
10.5	Display	17
10.5.1	Display layout	17
10.5.2	Display update rate.	18
10.5.3	Display rotation	18
10.5.4	Display brightness.	18
10.5.5	Display colour setting	18
10.6	Device reset	19
10.7	Lock / unlock.	19
11	Troubleshooting	21
11.1	Warning messages	21
11.2	Error messages.	21
12	Factory setting	22

1 Preliminary note

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

1.1 Symbols used

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

1.2 Warnings

Warnings indicate the possibility of personal injury and damage to property. This enables safe product handling. Warnings are graded as follows:



WARNING

Warning of serious personal injury

▷ If the warning is not observed, fatal and serious injuries are possible.



CAUTION

Warning of minor to moderate personal injury

▷ If the warning is not observed, minor to moderate injuries are possible.

ATTENTION

Warning of damage to property

▷ If the warning is not observed, damage to property is possible.

2 Safety instructions

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

3 Intended use

The unit monitors liquid media.

The unit detects the process categories volume flow (volumetric flow quantity/time) and medium temperature.

3.1 Application area

- Water
- Hydrous media (deionised water, cooling water)



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 media from group 1 fluids on request.

4 Function

- The device detects flow based on the Vortex measuring principle.
- As additional process value the unit detects the medium temperature.
- The unit displays the current process values.
- The unit generates two output signals according to the parameter setting.

Output functions:

OUT1: Analogue signal temperature

OUT2: Analogue signal flow

5 Installation



CAUTION

If the medium temperature is above 50 °C (122 °F), parts of the housing can increase in temperature to over 65 °C (149 °F).

► Risk of burns.

► Protect the housing against contact with flammable substances and unintentional contact.



► Ensure that the system is free of pressure during installation.

► Ensure that no media can leak at the mounting location during installation.

► Fit the device in the pipe in accordance with the flow direction (arrow on the device).

Recommended tightening torque: 30 Nm.

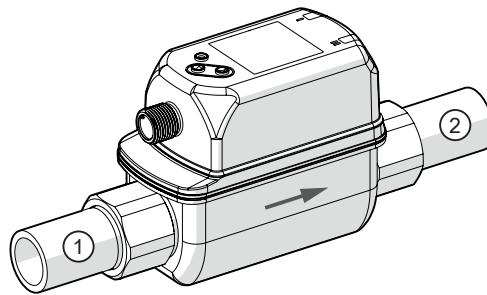
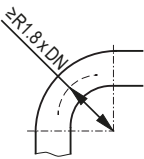


Fig. 1: Inlet pipe length (1) and outlet pipe length (2), direction of flow (arrow)

Structures in the pipe, bends, valves, reducing pieces and the like affect the function of the unit.

► Adhere to the distances between sensor and interference.

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 the internal pipe diameter	$\geq 15 \times \text{DN}$	$\geq 15 \times \text{DN}$
Valve or pump	$\geq 25 \times \text{DN}$	

Tab. 1: Distances for inlet and outlet pipe lengths; DN = nominal width of the pipe

► 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.

► Install in front of or in a rising pipe.

► For direct installation, fix the device on the housing bottom using 4 M4 DIN 7985 lens screws. Maximum housing insertion depth: 5.5 mm.

► Mount the device in a way that no mechanical forces are exerted on the pipe. To do so, use angle brackets if required.

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



Information about available accessories at www.ifm.com

5.1 Non recommended installation position

- Directly in front of a falling pipe.
- In a falling pipe, if the pipe is open at the bottom.
- Directly in front of the spout of a pipe.
- On the suction side of a pump.
- At the highest point of the pipe system.

6 Electrical connection



The unit must be connected by a qualified electrician.

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

Voltage supply according to SELV, PELV.

► Disconnect power.

► Connect the unit as follows:

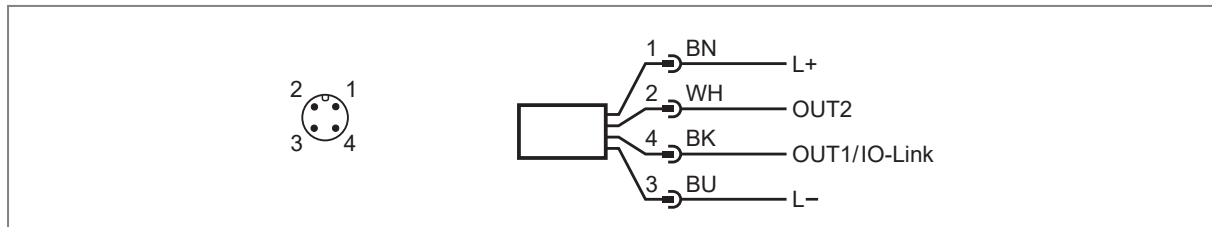


Fig. 2: Wiring diagram (colours to DIN EN 60947-5-2)

BN: Brown

WH: White

BK: Black

BU: Blue

Pin	Assignment
1	L+
3	L-
4 (OUT1)	Analogue signal temperature
2 (OUT2)	Analogue signal flow

7 Operating and display elements

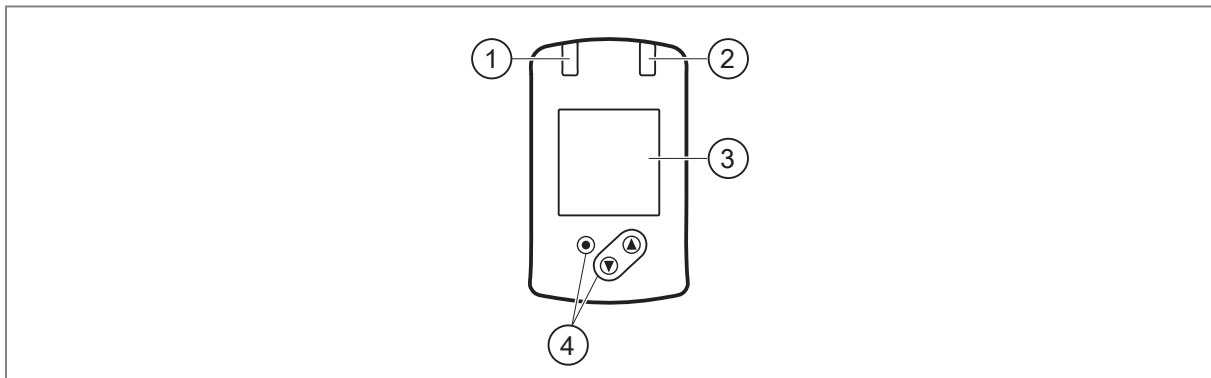


Fig. 3: Operating and display elements

- 1: Without function
- 2: Without function
- 3: TFT display, process value display (→ [Display layout](#) 17)
- 4: Keys for changing views and parameter setting

The device keys can be used to switch between the process value displays during operation:

- ▶ Press [▲] or [▼] until the required display appears.
- ▷ The display switches between the views.
- ▷ After 30 s, the device returns to the standard display.

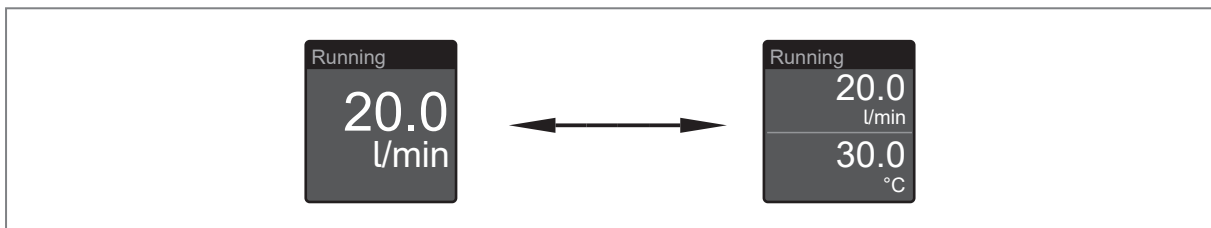
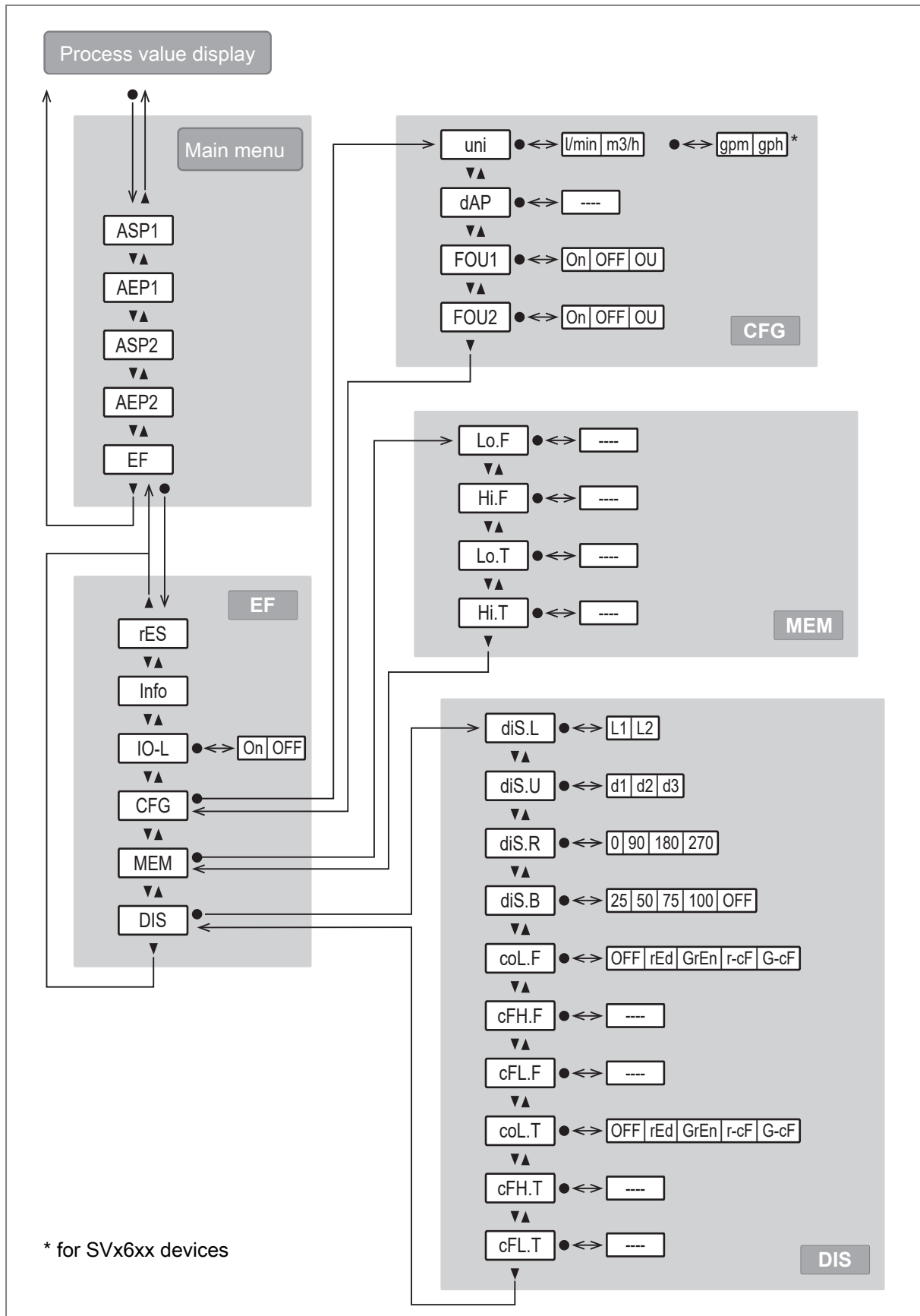


Fig. 4: Change between the views

8 Menu

The figures in which the menus are displayed show the parameters that can be set on the unit by key input. These parameters and other functions are also available via the IO-Link interface.



Parameter	Explanation
ASP _x	Analogue start point for OUT _x = process value at which the output signal is 4 mA.
AEP _x	Analogue end point for OUT _x = process value at which the output signal is 20 mA.
EF	Change to the EF (extended functions) submenu
rES	Reset to factory settings
Info	Display of the device information
IO-L	Activate IO-Link communication
CFG	Change to the submenu CFG (basic settings)
MEM	Change to the MEM (memory) submenu
DIS	Change to the DIS (display) submenu.
uni	Standard unit of measurement for flow
dAP	Damping constant in seconds (63 % rise time τ).
FOU _x	Behaviour of output OUT _x in case of an error
Lo.F	Minimum memory value flow
Hi.F	Maximum memory value flow
Lo.T	Minimum memory value temperature
Hi.T	Maximum memory value temperature
diS.L	Display layout
diS.U	Update rate of the display
diS.R	Orientation of the display
diS.B	Brightness of the display
coL.F	Font colour for flow
cFH.F	Upper limit value for colour change (flow)
cFL.F	Lower limit value for colour change (flow)
col.T	Font colour for temperature
cFH.T	Upper limit value for colour change (temperature)
cFL.T	Lower limit value for colour change (temperature)

9 Set-up

After power on and expiry of the power-on delay time, 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 analogue output 2 (OUT2), the output signal is 20 mA during the power-on delay time.

For 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

Parameter setting can be carried out via the IO-Link interface or via the operating elements on the unit.

Parameters can be set before installation 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.



Depending on the parameter setting, the parameters available in the menu may change.

10.1 Parameter setting via the unit keys



CAUTION

If the medium temperature is above 50 °C (122 °F), parts of the housing can increase in temperature to over 65 °C (149 °F).

- ▷ Risk of burns
- ▶ Do not touch the device with your hands.
- ▶ Use another object (e.g. a ballpoint pen) to carry out settings on the unit.

Parameter setting process in general:

Intent	Action
Change from the process value display to the main menu	[●]
Change to the submenu	Use [▼] to navigate to the submenu (e.g. EF), then [●]
Selection of the desired parameter	▲ or [▼]
Change to setting mode	[●]
Changing the parameter value	▲ or [▼] > 1 s
Acceptance of the set parameter	[●]
Exit parameter setting without saving	[▲] + [▼]
Return to next higher menu (Repeat several times to reach process value display)	[▲] + [▼]
Return to the process value display	> 30 seconds (timeout)

10.2 Parameter setting via IO-Link

Requirements for parameter setting via the IO-Link interface:

- ✓ A suitable parameter setting software, e.g. ifm moneo|configure
- ✓ The Input Output Device Description (IODD) of the device
- ✓ An IO-Link master
- ▶ Connect the IO-Link master to a parameter setting software.
- ▶ Set the port of the master to the IO-Link operating mode.
- ▶ Connect the device to a free port of the IO-Link master.
- ▷ The device changes to the IO-Link mode.

- ▶ Change the parameter settings in the software.
- ▶ Write the parameter settings to the device.



Notes on parameter setting → Manual of the parameter setting software.

10.3 Output configuration

10.3.1 Standard unit of measurement

A unit of measurement can be selected with which the process value is shown in the display by default. All further parameter settings are based on this unit.

Selectable values:

Flow: l/min; m³/h; for SVx6xx device types: gpm; gph.

10.3.1.1 Parameter setting via the device keys: Standard unit of measurement

- ▶ Call up the menu [EF] > [CFG].
- ▶ Select [uni] and set the unit of measurement.

10.3.1.2 Parameter setting via IO-Link: Standard unit of measurement

- ▶ Call up [Parameters] > [Display Setting].
- ▶ Select [uni] and set the unit of measurement.

10.3.2 Analogue signal

The unit provides an analogue signal of 4...20 mA proportional to the process value.

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.

For measured values outside the display range or in case of an error, messages are displayed (cr.UL, UL, OL, cr.OL, Err).

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

10.3.2.1 Parameter setting via unit keys: Analogue signal

- ✓ Standard unit of measurement is selected: [EF] > [CFG] > [Uni].
- ▶ Call up the [main menu].
- ▶ Set the parameters for the temperature measurement: [ASP1] and [AEP1].
- ▶ Set the parameters for the flow measurement: [ASP2] and [AEP2].

10.3.2.2 Parameter setting via IO-Link: Analogue signal

- ✓ Standard unit of measurement is selected: [Parameter] > [Setting of the sensor display] > [uni].
- ▶ Call up the menu [Parameters] > [Analogue output 1] and set the parameters for the temperature measurement: [ASP1] and [AEP1].

- Call up the menu [Parameters] > [Analogue output 2] and set the parameters for the flow measurement: [ASP2] and [AEP2].

10.3.3 Damping

The set damping constant stabilises the output signals. Abrupt changes in the physical process values are smoothed out.

This concerns the outputs and the display.

The damping constant is added to the response time of the sensor (→ Technical data).

The UL and OL signals are defined under consideration of the damping time.



Measured value damping only has an effect on the measured variable flow.

10.3.3.1 Parameter setting via device buttons: Damping

- Call up the menu [EF] > [CFG].
- Select [dAP] and set the damping time in seconds (τ -value 63 %).

10.3.3.2 Parameter setting via IO-Link: Damping

- Call up [Parameters] > [Damping].
- Select [dAP] and set the damping time in seconds (τ -value 63 %).

10.3.4 Error behaviour of the outputs

The response of the OUTx output in case of a fault can be set via the parameter [FOUx]. Depending on the selected output function, the following signals are provided in case of a fault:

- On: The analogue signal goes to 22 mA.
- OFF: The analogue signal goes to 3.5 mA.
- OU: The analogue signal still corresponds to the measured value.

10.3.4.1 Parameter setting via unit keys: Error behaviour of the outputs

- Call up the menu [EF] > [CFG].
- Select [FOUx] and set the error behaviour for OUTx: [On], [OFF], [OU].

10.3.4.2 Parameter setting via IO-Link: Error behaviour of the outputs

- Call up [Parameters] > [Error Configuration Output x].
- Select [FOUx] and set the error behaviour for OUTx: [On], [OFF], [OU].

10.4 Memory

The unit stores the maximum and minimum measured process values.

The current value can be read from the unit's display or via the IO-Link interface.

Selectable values:

- [Lo.F]: Minimum value memory for volumetric flow
- [Hi.F]: Maximum value memory for volumetric flow
- [Lo.T]: Minimum value memory for temperature

- [Hi.T]: Maximum value memory for temperature



It makes sense to delete the memories as soon as the unit operates under normal operating conditions for the first time.

10.4.1 Parameter setting via unit keys: Memory

Show memory:

- ▶ Go to the [EF] > [MEM] menu.
- ▶ Read the value for the minimum and maximum stored process value.

Clear memory:

- ▶ Go to the [EF] > [MEM] menu.

Delete memory:

- ▶ Select [Lo.x] or [Hi.x].
- ▶ Keep [▲] or [▼] pressed.
 - ▷ [----] is displayed.
- ▶ Briefly press [●].

10.4.2 Parameter setting via IO-Link: Memory

Show memory:

- ▶ [Parameters] > Call up [memory] .
- ▶ Select [Lo.x] or [Hi.x] to show the highest or lowest process value measured.

Clear memory:

- ▶ [Parameters] > Call up [memory] .
- ▶ Execute command:
 - [Reset Hi.x and Lo.x memory]
 - [Reset Lo.x memory]
 - [Reset Hi.x memory]

10.5 Display

The presentation in the display can be adjusted via various parameters. The parameters described below are set as follows:

Parameter setting via the device keys:

- ▶ Call up the menu [EF] > [DIS].

Parameter setting via IO-Link:

- ▶ Call up [Parameters] > [Display Setting].

10.5.1 Display layout

The standard display can be set via the parameter [diS.L].

Selectable values:

- L1: current process value for flow

- L2: current process value for flow and temperature

10.5.2 Display update rate

The update rate of the display can be set via the parameter [diS.U].

Selectable values:

- d1: fast
- d2: medium
- d3: slow

10.5.3 Display rotation

Use the parameter [diS.R] to rotate the text in the display clockwise for better readability.

Selectable values:

- 0° (not rotated)
- 90°
- 180°
- 270°

10.5.4 Display brightness

The display brightness can be set via the parameter [diS.B].

Selectable values:

- 25%
- 50%
- 75%
- 100%
- OFF: energy-saving mode. The display is switched off in the operating mode. Display activation by pressing any key. After 30 s of inactivity, the display is switched off again.



In case of warnings or error messages, the display will come back on even with the setting [OFF].

10.5.5 Display colour setting

The font colour in the display can be set via the parameter [coL.x].

- [coL.F]: font colour for flow
- [coL.T]: font colour for temperature

Permanent font colour

The display font colour for flow and temperature can be set permanently:

Setting for [coLx]	Font colour
[rEd]	Red
[GrEn]	Green

Colour change

Alternatively, a colour change can be configured for the displayed flow and temperature depending on the current process value:

Setting for [coL.x]	Font colour
[r-cF]	Red = process value inside window Green = process value outside window
[G-cF]	Green = process value inside window Red = process value outside window



If “Colour change” is selected, the limit values of the window section must be set via the parameters [cFL.x] and [cFH.x]. The limits can be freely selected within the measuring range and are independent of the output function.

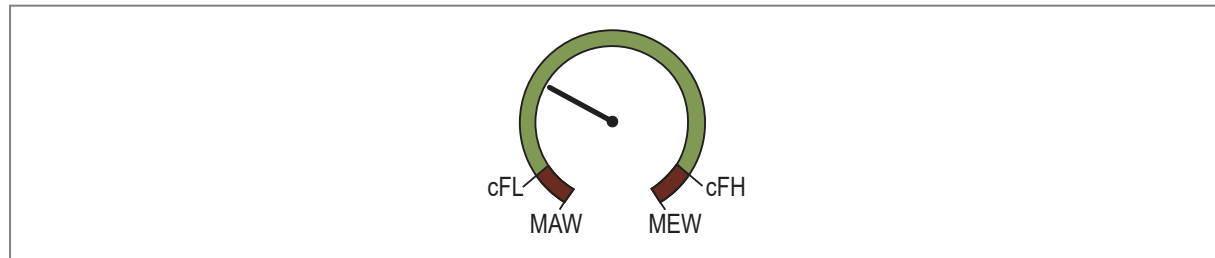


Fig. 5: Colour change in the window section. Example: [coL.x] = [G-cF]

cFL.F: Lower limit for flow
 cFL.T: Lower limit for temperature
 cFH.F: Upper limit for flow
 cFH.T: Upper limit for temperature
 MAW: Initial value of the measuring range
 MEW: Final value of the measuring range

10.6 Device reset

The unit can be reset to factory settings.



We recommend documenting your own settings in the chapter Factory setting before carrying out a reset.

10.6.1 Parameter setting via unit keys: Device reset

- ▶ Select the [EF] menu.
- ▶ Select [rES].
- ▶ Keep [▲] or [▼] pressed.
 - ▷ [----] is displayed.
- ▶ Briefly press [●].
- ▷ The device carries out a reboot.

10.6.2 Parameter setting via IO-Link: reset the unit

- ▶ Select [Parameters] > [Setup].
- ▶ Execute command: [Restore Factory Settings].
- ▷ The unit carries out a reboot.

10.7 Lock / unlock

The device can be electronically locked.

This lock prevents parameter settings on the device from being changed.

Factory setting: not locked.

10.7.1 Parameter setting via unit keys: lock / unlock

Locking:

- ▶ Make sure that the unit is in the normal operating mode.
- ▶ Press [▲] and [▼] simultaneously for 10 s until [Loc] is displayed.
- ▷ The device is locked for parameter setting via the device keys. When trying to change a parameter value, the symbol  appears in the display.



The locking can only be removed via the device keys. Changing the parameter setting is still possible via the IO-Link interface.

Unlocking:

- ▶ Make sure that the unit is in the normal operating mode.
- ▶ Press [▲] and [▼] simultaneously for 10 s until [uLoc] is displayed.
- ▷ The locking of the device keys is removed.

10.7.2 Parameter setting via IO-Link: lock / unlock

- ▶ Make sure that the unit is in the normal operating mode.
- ▶ Call up [Parameters] > [Display Setting].
- ▶ Select [Loc] and set the lock.
- ▷ The device is locked for parameter setting via the device keys. When trying to change a parameter value, the symbol  appears in the display.



The locking can be removed via the IO-Link parameter [uLoc] or via the device keys.

- or -

- ▶ Select [Parameters] > [Setup].
- ▶ Select [Device Access Locks.Local User Interface] and set [Locked].
- ▷ The device is locked for parameter setting via the device keys. When trying to change a parameter value, the symbol  appears in the display.



The locking can only be removed via the IO-Link parameter [Unlocked].

- or -

- ▶ Select [Device Access Locks.Data Storage] and set [Locked]
- ▷ The device is locked for the data storage function of the IO-Link master.



The locking can be removed via the IO-Link parameter [Unlocked].

11 Troubleshooting

The device provides self-diagnostic options. It monitors itself automatically during operation.

Warnings and error states are displayed even if the display is switched off.

If several diagnostic events occur simultaneously, only the diagnostic message of the event with the highest priority is displayed.

11.1 Warning messages

Indication	Problem/remedy
🔒 Locked via key	Setting buttons on the device locked, parameter change rejected. ▶ Unlock the device using the device keys.
🔒 Locked via communication	Setting buttons on the device temporarily locked, parameter setting via IO-Link communication active. ▶ Finish parameter setting via IO-Link communication.
🔒 Locked via system	Setting buttons locked via parameter setting software, parameter change rejected. ▶ Unlock the device via IO-Link interface using the parameter setting software.
UL	Value below the minimum value of the temperature measuring range. Measured value lower than -20 % of the final value of the measuring range. ▶ Check the temperature range.
OL	Temperature or flow measuring range exceeded: Measured value higher than 120 % of the final value of the measuring range. ▶ Check volumetric flow range / temperature range.

11.2 Error messages

Indication	Problem/remedy
Display off	Supply voltage too low. ▶ Check the supply voltage. Display switched off. ▶ Check whether [DIS] = OFF is set and change setting if necessary.
Err	Device faulty / malfunction. ▶ Replace the device. Measured value outside the detection zone. ▶ Check volumetric flow range / temperature range.
PARA	Parameter setting outside the valid range. ▶ Check parameter setting.
cr.UL	Value critically below the minimum value of the temperature measuring range: measured value lower than -30 % of the final value of the measuring range. ▶ Check the temperature range.
cr.OL	Temperature measuring range critically exceeded: measured value higher than 130 % of the final value of the measuring range. ▶ Check volumetric flow range / temperature range.

12 Factory setting

Parameter	Factory setting	User setting
ASP1 (TEMP)	0 % MEW	
AEP1 (TEMP)	100 % MEW	
ASP1 (FLOW)	0 % MEW	
AEP1 (FLOW)	100 % MEW	
FOU1 (TEMP)	OFF	
FOU2 (FLOW)	OFF	
coL.F (FLOW)	OFF	
coL.T (TEMP)	OFF	
uni	l/min (SVx6xx: gpm)	
dAP	0.6 s	
diS.L	L2	
diS.U	d2	
diS.R	0	
diS.B	75 %	
cFH.F	MEW	
cFL.F	MAW	
cFH.T	MEW	
cFL.T	MAW	

MAW = initial value of the measuring range

MEW = final value of the measuring range