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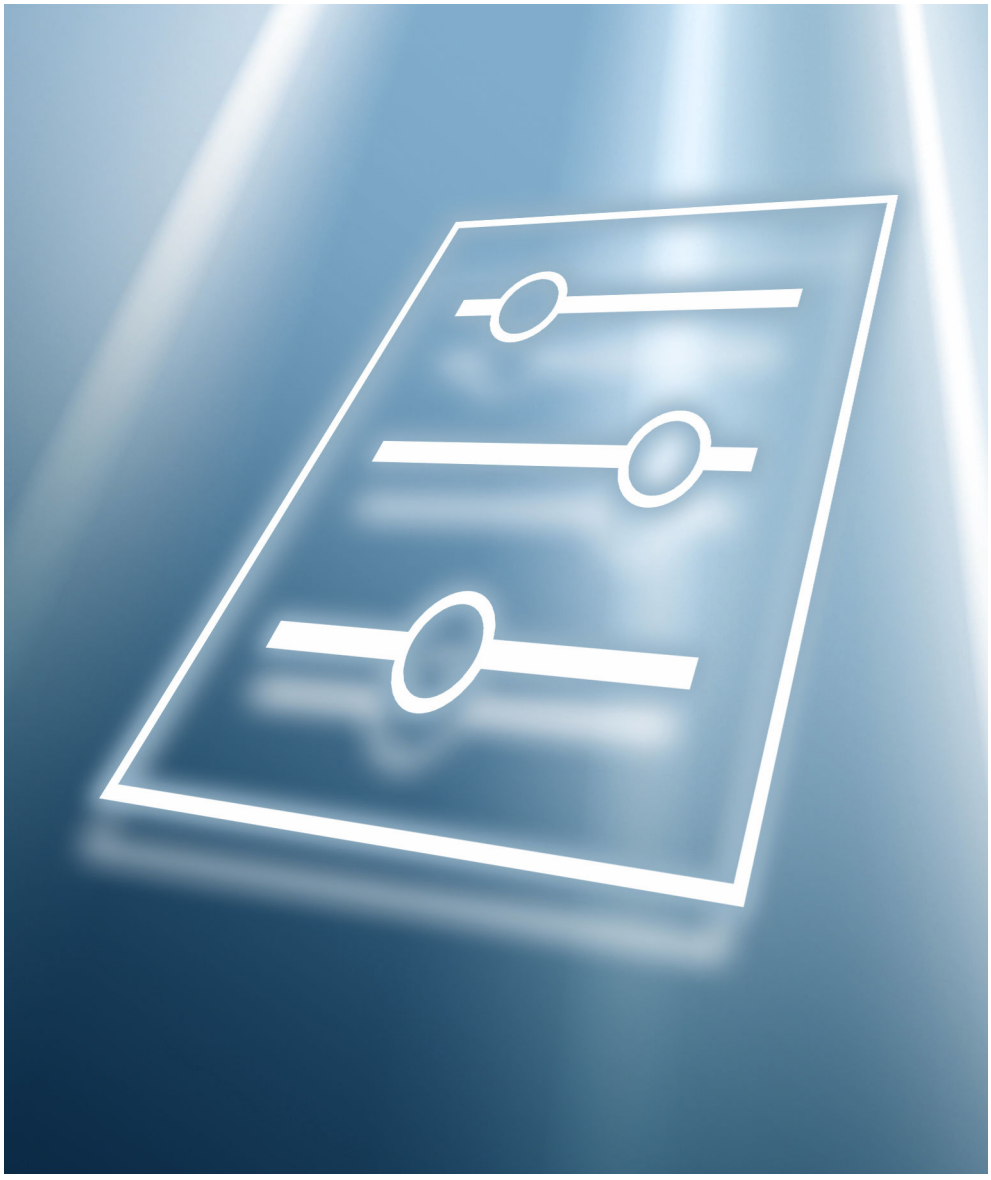
Valid as of version
01.00.zz (Device firmware)

Description of Device Parameters
Proline Promag 10

Electromagnetic flowmeter
IO-Link

IO-Link



Endress+Hauser
People for Process Automation

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1 About this document

1.1 Document function

The document is part of the Operating Instructions and serves as a reference for parameters, providing a detailed explanation of each individual parameter of the operating menus.

It is used to perform tasks that require detailed knowledge of the function of the device:
- Optimal adaptation of the measurement to difficult conditions
- Detailed configuration of the communication interface
- Error diagnostics in difficult cases

1.2 Target group

The document is aimed at specialists who work with the device over the entire life cycle and perform specific configurations.

1.3 Using this document

1.3.1 Symbols

Types of information

✓✓ Preferred procedures, processes or actions

✓ Permitted procedures, processes or actions

✗ Forbidden procedures, processes or actions

ℹ Additional information

Reference to documentation

Reference to page

Reference to graphic

1.3.2 Information on the document structure

The parameters of all the operating menus and the commissioning wizard are described in this document.

- **Guidance** menu with the **Commissioning** wizard (→ 7), which guides the user automatically through all the device parameters that are required for commissioning
- **Application** menu (→ 45)
- **Diagnostics** menu (→ 24)
- **System** menu (→ 71)

1.3.3 Operation concept

Operation method	Operation via: ▪ SmartBlue app [1)] ▪ Commubox FXA291
Reliable operation	▪ Operation in local language ▪ Standardized operating concept on the device and in the SmartBlue app ▪ Write protection ▪ When electronics modules are replaced: configurations are transferred using the T-DAT Backup device memory. The device memory contains process data, device data and the event logbook. No reconfiguration is necessary.
Diagnostic behavior	Efficient diagnostic behavior increases measurement availability: ▪ Open troubleshooting measures via local display and SmartBlue app. ▪ Diverse simulation options ▪ Logbook of events that have occurred.

1) Optional via order code "Display; operation", options H, J or K

IO-Link

The device-specific parameters are configured via IO-Link. There are specific configuration or operating programs from different manufacturers available to the user for this purpose. The device description file (IODD) is provided for the device

IO-Link operating concept
Operator-oriented menu structure for user-specific tasks. Efficient diagnostic behavior increases measurement availability:
- Diagnostic messages
- Remedial measures
- Simulation options

IODD download
Two options for downloading the IODD:
- www.endress.com/download
- https://ioddfinder.io-link.com/

www.endress.com/download

1. Select "Device drivers".
2. Under "Type", select the "IO Device Description (IODD)" item.
3. Select "Product root".
4. Click "Search ".
   ↳ A list of search results is displayed.

Select and download the appropriate version.

https://ioddfinder.io-link.com/

1. Enter and select "Endress" as the manufacturer.
2. Select product name.
   ↳ A list of search results is displayed.

Select and download the appropriate version.

For detailed IO-Link information, see "IO-Link" Special Documentation on the device
→ 6

1.3.4 Structure of a parameter description

The individual parts of a parameter description are described in the following section:

Complete parameter name	Write-protected parameter =

Navigation	Navigation path to the parameter via the operating tool The names of the menus, submenus and parameters are abbreviated to the form in which they appear on the display and in the operating tool.
Prerequisite	The parameter is only available under these specific conditions
Description	Description of the parameter function
Selection	List of the individual options for the parameter ▪ Option 1 ▪ Option 2
User entry	Input range for the parameter
User interface	Display value/data for the parameter
Additional information	Additional explanations (e.g. in examples): ▪ On individual options ▪ On display values/data ▪ On the input range ▪ On the parameter function

1.4 Related documentation

Technical information	Overview of the device with the most important technical data.
Operating instructions	All the information that is required in the various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal as well as the technical data and dimensions.
Sensor Brief Operating Instructions	Incoming acceptance, transport, storage and mounting of the device.
Transmitter Brief Operating Instructions	Electrical connection and commissioning of the device.
Description of Parameters	Detailed explanation of the menus and parameters.
Safety Instructions	Documents for the use of the device in hazardous areas.
Special Documentation	Documents with more detailed information on specific topics.
Installation Instructions	Installation of spare parts and accessories.

The related documentation is available online:

Device Viewer	On the www.endress.com/deviceviewer website, enter the serial number of the device: nameplate
Endress+Hauser Operations App	▶ Scan the Data Matrix code: nameplate ▶ Enter the serial number of the device: nameplate

2 "Guidance" menu

Main functions for use – from fast and safe commissioning to guided support during operation.

Navigation Guidance

Guidance		
	▶ Commissioning	→ 7

2.1 "Commissioning" menu

Complete this wizard to commission the device. NOTE: If you exit the wizard beforehand, the changes you made will be saved. For this reason, the device may be in an undefined state! In this case, reset the device to the default settings.

Navigation Guidance → Commissioning

▶ Commissioning		
	▶ Device identification	→ 7
	▶ System units	→ 8
	▶ Totalizer 1 to n	→ 13
	▶ Measuring conditions	→ 15
	▶ Display	→ 19
	▶ Date/time	→ 22

2.1.1 "Device identification" wizard

Navigation Guidance → Commissioning → Device ident.

▶ Device identification		
	Device name	→ 8
	Serial number	→ 8
	Firmware version	→ 8

Device name

Navigation Guidance → Commissioning → Device ident. → Device name

Description Displays the name of the transmitter. The transmitter name is also provided on the nameplate of the transmitter.

User interface Character string comprising numbers, letters and special characters

Serial number

Navigation Guidance → Commissioning → Device ident. → Serial number

Description Displays the serial number of the measuring device. The serial number is also provided on the nameplate of the sensor and of the transmitter.

The serial number can also be used to retrieve further device-related information and documentation via the Operations app or the Device Viewer on the Endress+Hauser website.

User interface Character string comprising numbers, letters and special characters

Firmware version

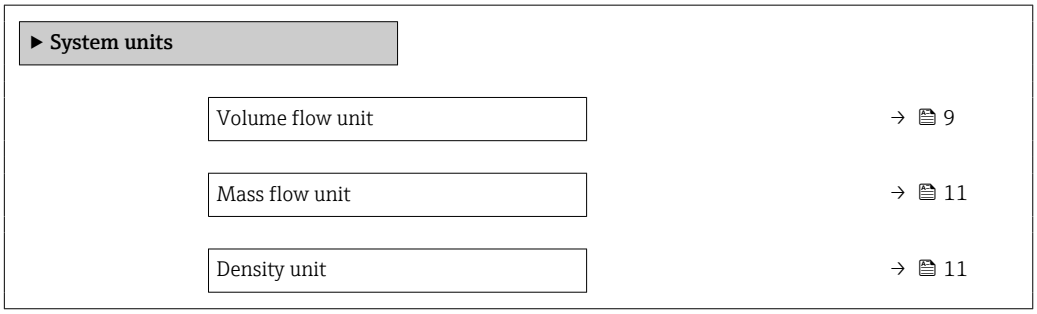
Navigation Guidance → Commissioning → Device ident. → Firmware version

Description Displays the device firmware version installed.

User interface Character string comprising numbers, letters and special characters

2.1.2 "System units" wizard

Navigation Guidance → Commissioning → System units



	Temperature unit	→ 12
	Conductivity unit	→ 12

Volume flow unit

Navigation Guidance → Commissioning → System units → Volume flow unit

Description Select the volume flow unit.

Selection

SI units
- cm^3/s
- cm^3/min
- cm^3/h
- cm^3/d
- dm^3/s
- dm^3/min
- dm^3/h
- dm^3/d
- m^3/s
- m^3/min
- m^3/h
- m^3/d
- ml/s
- ml/min
- ml/h
- ml/d
- l/s
- l/min
- l/h
- l/d
- hl/s
- hl/min
- hl/h
- hl/d
- Ml/s
- Ml/min
- Ml/h
- Ml/d

US units
- af/s
- af/min
- af/h
- af/d
- ft^3/s
- ft^3/min
- ft^3/h
- ft^3/d
- $MMft^3/s$
- $MMft^3/min$
- $MMft^3/h$
- Mft^3/d
- fl oz/s (us)
- fl oz/min (us)
- fl oz/h (us)
- fl oz/d (us)
- gal/s (us)
- gal/min (us)
- gal/h (us)
- gal/d (us)
- Mgal/s (us)
- Mgal/min (us)
- Mgal/h (us)
- Mgal/d (us)
- bbl/s (us;liq.)
- bbl/min (us;liq.)
- bbl/h (us;liq.)
- bbl/d (us;liq.)
- bbl/s (us;beer)
- bbl/min (us;beer)
- bbl/h (us;beer)
- bbl/d (us;beer)
- bbl/s (us;oil)
- bbl/min (us;oil)
- bbl/h (us;oil)
- bbl/d (us;oil)
- bbl/s (us;tank)
- bbl/min (us;tank)
- bbl/h (us;tank)
- bbl/d (us;tank)
- kgal/s (us)
- kgal/min (us)
- kgal/h (us)
- kgal/d (us)

Imperial units
- gal/s (imp)
- gal/min (imp)
- gal/h (imp)
- gal/d (imp)
- Mgal/s (imp)
- Mgal/min (imp)
- Mgal/h (imp)
- Mgal/d (imp)
- bbl/s (imp;beer)
- bbl/min (imp;beer)
- bbl/h (imp;beer)
- bbl/d (imp;beer)
- bbl/s (imp;oil)
- bbl/min (imp;oil)
- bbl/h (imp;oil)
- bbl/d (imp;oil)

Additional information

Options

For an explanation of the abbreviated units: → 90

The IO-Link interface only offers the **m^3/h** option.

Mass flow unit

Navigation Guidance → Commissioning → System units → Mass flow unit

Description Select the mass flow unit.

Selection

SI units
- g/s
- g/min
- g/h
- g/d
- kg/s
- kg/min
- kg/h
- kg/d
- t/s
- t/min
- t/h
- t/d

US units
- oz/s
- oz/min
- oz/h
- oz/d
- lb/s
- lb/min
- lb/h
- lb/d
- STon/s
- STon/min
- STon/h
- STon/d

Additional information The IO-Link interface only offers the **kg/s** option.

Density unit

Navigation Guidance → Commissioning → System units → Density unit

Description Select the density unit.

Selection

SI units
- g/cm³
- g/m³
- kg/l
- kg/dm³
- kg/m³
- SD4°C
- SD15°C
- SD20°C
- SG4°C
- SG15°C
- SG20°C

US units
- lb/ft³
- lb/gal (us)
- lb/bbl (us;liq.)
- lb/bbl (us;beer)
- lb/bbl (us;oil)
- lb/bbl (us;tank)

Imperial units
- lb/gal (imp)
- lb/bbl (imp;beer)
- lb/bbl (imp;oil)

Additional information *Options*

For an explanation of the abbreviated units: → 90

The IO-Link interface only offers the **kg/m³** option.

Temperature unit

Navigation Guidance → Commissioning → System units → Temperature unit

Prerequisite Temperature measurement is only optionally available for Promag H 10 (5HBB): Under order code for "Functionality", option D (enhanced transmitter) and order code for "Sensor option", option CI (fluid temperature measurement)

Description Select the temperature unit.

Selection

SI units
- °C
- K

US units
- °F
- °R

Additional information The IO-Link interface only offers the **°C** option.

Conductivity unit

Navigation Guidance → Commissioning → System units → Conductiv. unit

Prerequisite Conductivity measurement is switched on in the **Conductivity measurement** parameter (→ 59).

Conductivity measurement is only optionally available: Under order code for "Functionality", option D (enhanced transmitter) and order code for "Sensor option", option CX (conductivity measurement)

Description Select the conductivity unit.

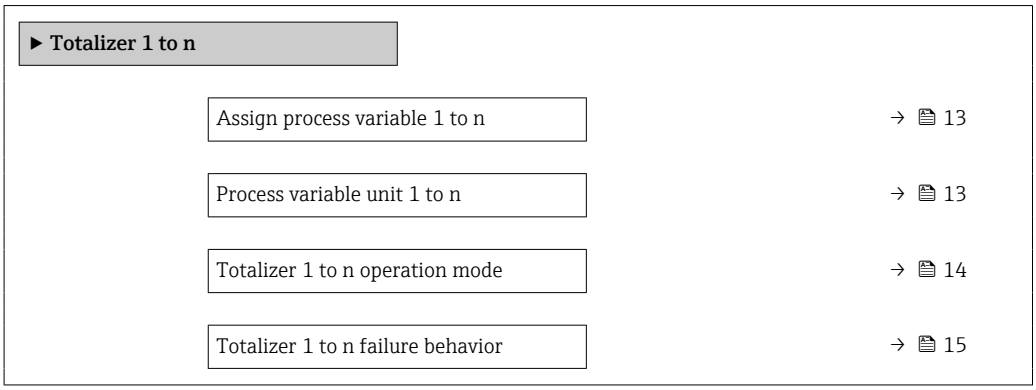
Selection

SI units
- nS/cm
- µS/cm
- µS/m
- µS/mm
- mS/m
- mS/cm
- S/cm
- S/m
- kS/m
- MS/m

Additional information The IO-Link interface only offers the unit **S/m** option.

2.1.3 Totalizer 1 to n

Navigation Guidance → Commissioning → Totalizer 1 to n



Assign process variable

Navigation Guidance → Commissioning → Totalizer 1 to n → AssignVariab. 1 to n

Description Select a process variable to activate the totalizer.

If the process variable is changed or the totalizer deactivated, the totalizer is reset to "0".

Selection
- Off
- Volume flow
- Mass flow

Additional information Totalizer 1 is permanently set to**Volume flow** option and cannot be changed. Totalizers 2 and 3 can be changed.

Process variable unit

Navigation Guidance → Commissioning → Totalizer 1 to n → VariableUnit 1 to n

Prerequisite A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

Description Select the unit for the process variable of the totalizer.

Selection

SI units
- g *
- kg *
- t *

US units
- oz *
- lb *
- STon *

* Visibility depends on order options or device settings

or

SI units
- cm^3 *
- dm^3 *
- m^3 *
- ml *
- l *
- hl *
- Ml Mega *

US units
- af *
- ft^3 *
- Mft^3 *
- fl oz (us) *
- gal (us) *
- kgal (us) *
- Mgal (us) *
- bbl (us;liq.) *
- bbl (us;beer) *
- bbl (us;oil) *
- bbl (us;tank) *

Imperial units
- gal (imp) *
- Mgal (imp) *
- bbl (imp;beer) *
- bbl (imp;oil) *

* Visibility depends on order options or device settings

or

Other units
None *

* Visibility depends on order options or device settings

Additional information

Description

The unit is selected separately for each totalizer. The unit is independent of the option selected in the **System units** submenu (→ 8).

Options

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ 13).

- The IO-Link interface only offers the **kg** option, **m^3** option and **Nm^3** option.
- Totalizer 1 is permanently set to **Volume flow** option and cannot be changed. Totalizers 2 and 3 can be changed.

Totalizer operation mode

Navigation Guidance → Commissioning → Totalizer 1 to n → Operat. mode 1 to n

Prerequisite A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

Description Select the totalizer operation mode, e.g. only totalize forward flow or only totalize reverse flow.

Selection
- Net
- Forward
- Reverse

Additional information *Selection*

- **Net** option
  The flow values in the forward and reverse flow directions are totalized and netted against each other. Net flow is recorded in the flow direction.
- **Forward** option
  Only the flow in the forward flow direction is totalized.
- **Reverse** option
  Only the flow in the reverse flow direction is totalized (= reverse flow quantity).

Totalizer failure behavior

Navigation Guidance → Commissioning → Totalizer 1 to n → FailureBehav. 1 to n

Prerequisite A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

Description Specify how the totalizer should behave in the event of a device alarm.

Selection

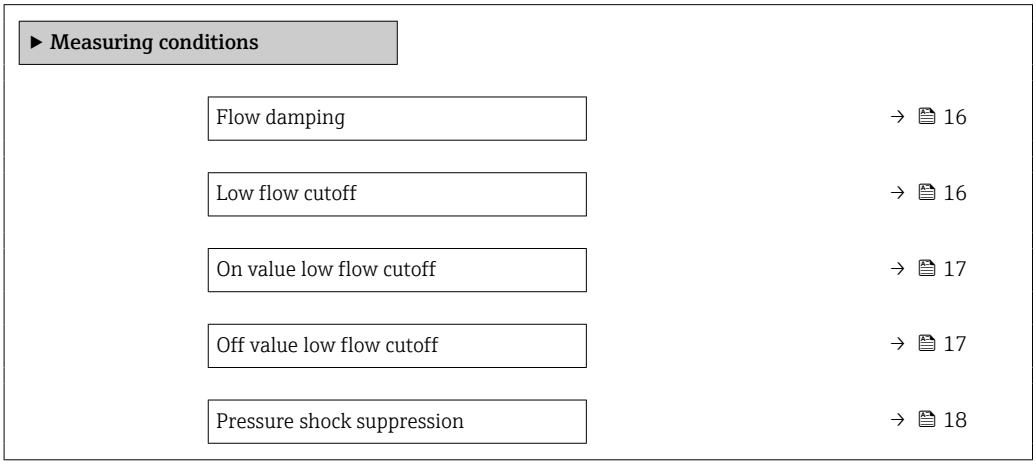
- Hold
- Continue
- Last valid value + continue

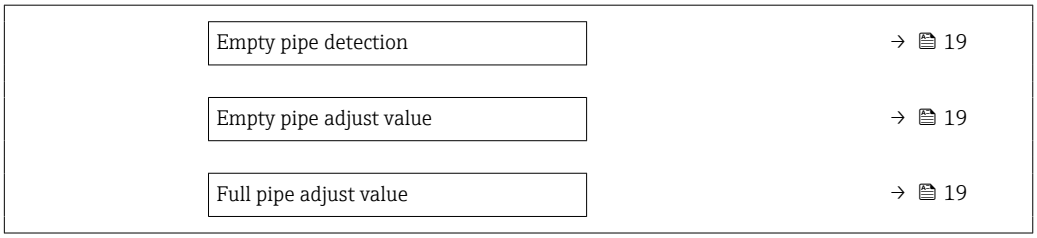
Additional information *Selection*

- **Hold** option
  The totalizer is stopped in the event of a device alarm.
- **Continue** option
  The totalizer continues to totalize based on the current value measured; the device alarm is ignored.
- **Last valid value + continue** option
  The totalizer continues to totalize based on the last valid value measured before the device alarm occurred.

2.1.4 "Measuring conditions" wizard

Navigation Guidance → Commissioning → Meas. conditions





Flow damping

Navigation Guidance → Commissioning → Meas. conditions → Flow damping

Description Enter value for damping of the flow measured value in order to reduce the variability of the flow measured value when exposed to interference.

Additional information:
The depth of the flow filter is determined by this setting. As the filter depth increases, so does the reaction time of the device.
- Value = 0: No damping. Damping of 0 is not recommended, as the measuring signal is then so noisy that it is almost impossible to perform a measurement.
- Value > 0: Damping increases

Optimal damping depends on the measuring period.

Damping impacts the following measuring device variables:
- Outputs
- Low flow cutoff
- Totalizers

User entry 0 to 15

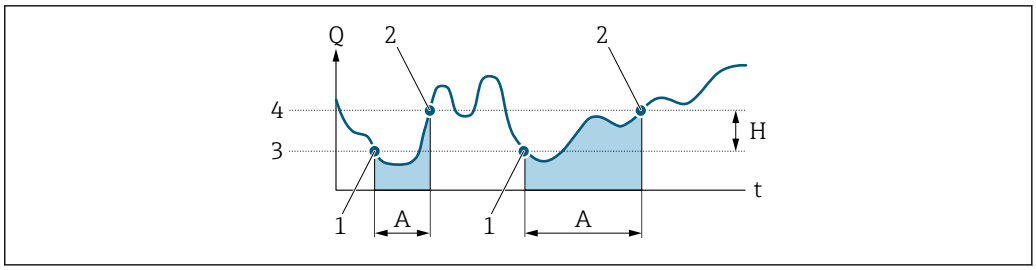
Low flow cutoff

Navigation Guidance → Commissioning → Meas. conditions → Low flow cutoff

Description Select a process variable for low flow cutoff to activate low flow cutoff.

Selection
- Off
- Volume flow
- Mass flow

Additional information Description



Q Flow
t Time
H Hysteresis
A Low flow cut off active
1 Low flow cut off is activated
2 Low flow cut off is deactivated
3 On-value entered
4 Off-value entered

On value low flow cutoff

Navigation Guidance → Commissioning → Meas. conditions → On value

Description Enter on value to switch on low flow cutoff.

Value = 0: No low flow cutoff
Value > 0: Low flow cutoff is activated

User entry Positive floating-point number

Off value low flow cutoff

Navigation Guidance → Commissioning → Meas. conditions → Off value

Description Enter off value to switch off low flow cutoff. The off value is entered as a positive hysteresis with respect to the on value.

User entry 0 to 100.0 %

Pressure shock suppression

Navigation Guidance → Commissioning → Meas. conditions → Pres. shock sup.

Description

Enter a time span for signal suppression (= pressure shock suppression active), for example to prevent the device from registering flow movements in the pipe when a valve is closed.

Pressure schock suppression is activated when the flow rate drops below the on value for low flow cutoff.

Values reported when pressure shock suppression is active:

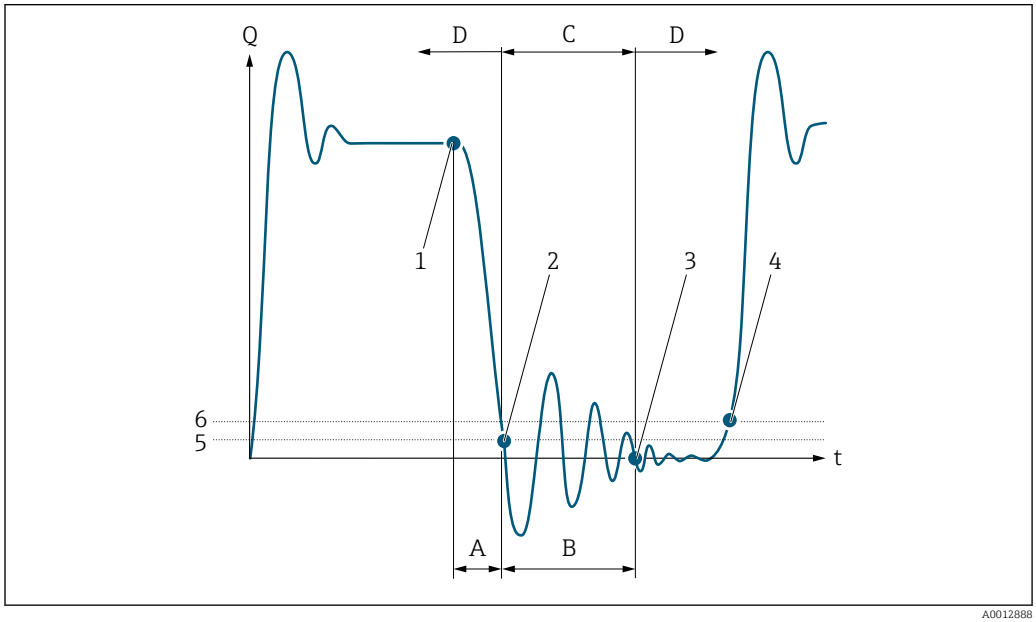
Flow: 0
Totalizer: Last valid value

Pressure shock suppression is deactivated when the time span specified has elapsed and the flow rate exceeds the off value for low flow cutoff.

User entry 0 to 100 s

Additional information *Example*

When a valve is closed, momentarily strong fluid movements may occur in the pipeline, which are registered by the device. These totalized flow values lead to a false totalizer status, particularly during batching processes.



Q Flow
t Time
A After run
B Pressure shock
C Pressure shock suppression active according to the time entered
D Pressure shock suppression inactive
1 Valve closes
2 Flow falls below the on-value of the low flow cut off: pressure shock suppression is activated
3 The time entered has elapsed: pressure shock suppression is deactivated
4 The current flow value is processed and displayed again.
5 On value for low flow cut off
6 Off value for low flow cut off

Empty pipe detection

Navigation Guidance → Commissioning → Meas. conditions → Empty pipe det.

Description Switch empty pipe detection on or off. Switch on empty pipe detection to detect a partially filled or empty measuring tube.

Selection
- Off
- On

Empty pipe adjust value

Navigation Guidance → Commissioning → Meas. conditions → Empty pipe value

Description Displays adjustment value when the measuring tube is empty.

NOTE
Users logged on in the Service role have write access!

User interface Positive floating-point number

Full pipe adjust value

Navigation Guidance → Commissioning → Meas. conditions → Full pipe value

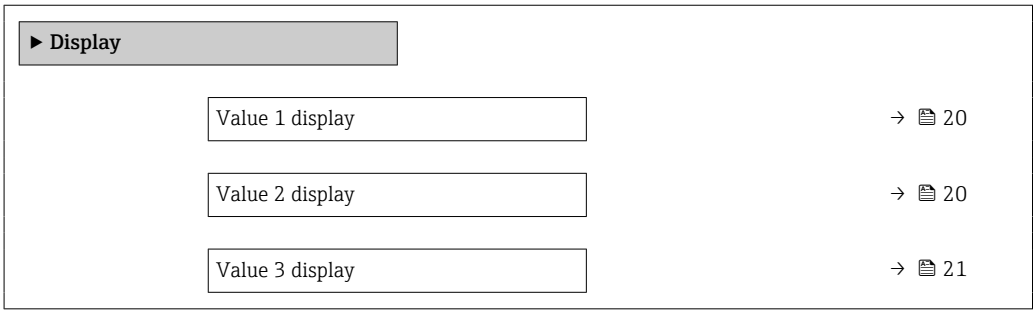
Description Displays adjustment value when the measuring tube is full.

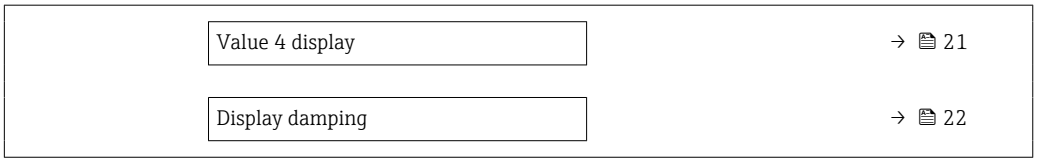
NOTE
Users logged on in the Service role have write access!

User interface Positive floating-point number

2.1.5 "Display" wizard

Navigation Guidance → Commissioning → Display





Value 1 display

Navigation Guidance → Commissioning → Display → Value 1 display

Description Select the measured value to display in the first position on the local display.

The unit is set in the "System units" menu.

Selection
- Volume flow
- Mass flow
- Conductivity *
- Corrected conductivity *
- Temperature *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Noise *
- Coil current shot time *

Value 2 display

Navigation Guidance → Commissioning → Display → Value 2 display

Description Select the measured value to display in the second position on the local display.

The unit is set in the "System units" menu.

Selection
- None
- Volume flow
- Mass flow
- Conductivity *
- Corrected conductivity *
- Temperature *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Noise *
- Coil current shot time *

* Visibility depends on order options or device settings

Value 3 display

Navigation Guidance → Commissioning → Display → Value 3 display

Description Select the measured value to display in the third position on the local display.

The unit is set in the "System units" menu.

Selection
- None
- Volume flow
- Mass flow
- Conductivity *
- Corrected conductivity *
- Temperature *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Noise *
- Coil current shot time *

Value 4 display

Navigation Guidance → Commissioning → Display → Value 4 display

Description Select the measured value to display in the fourth position on the local display.

The unit is set in the "System units" menu.

Selection
- None
- Volume flow
- Mass flow
- Conductivity *
- Corrected conductivity *
- Temperature *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Noise *
- Coil current shot time *

* Visibility depends on order options or device settings

Display damping

Navigation Guidance → Commissioning → Display → Display damping

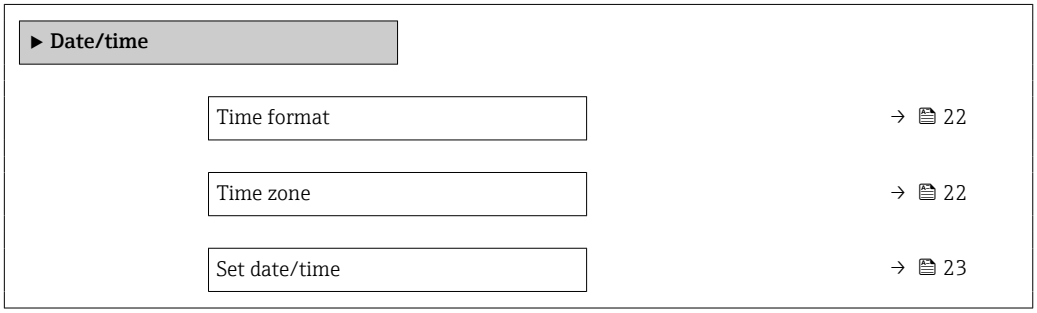
Description Enter a time constant to set the reaction time of the display to fluctuations in the measured value (PT1 element).

The smaller the time constant, the faster the display reacts to fluctuations in the measured value.
If the time constant is set to 0, damping is deactivated.

User entry 0.0 to 999.9 s

2.1.6 "Date/time" wizard

Navigation Guidance → Commissioning → Date/time



Time format

Navigation Guidance → Commissioning → Date/time → Time format

Description Select the time format.

Selection
- 24 h
- 12 h AM/PM

Time zone

Navigation Guidance → Commissioning → Date/time → Time zone

Description Select the time zone. Every time the time zone is changed, a logbook entry is created.

Selection

Other units
- UTC-12:00
- UTC-11:00
- UTC-10:00
- UTC-09:30
- UTC-09:00
- UTC-08:00
- UTC-07:00
- UTC-06:00
- UTC-05:00
- UTC-04:00
- UTC-03:30
- UTC-03:00
- UTC-02:00
- UTC-01:00
- UTC 00:00
- UTC+01:00
- UTC+02:00
- UTC+03:00
- UTC+03:30
- UTC+04:00
- UTC+04:30
- UTC+05:00
- UTC+05:30
- UTC+05:45
- UTC+06:00
- UTC+06:30
- UTC+07:00
- UTC+08:00
- UTC+08:45
- UTC+09:00
- UTC+09:30
- UTC+10:00
- UTC+10:30
- UTC+11:00
- UTC+12:00
- UTC+12:45
- UTC+13:00
- UTC+14:00

Set date/time

Navigation Guidance → Commissioning → Date/time → Set date/time

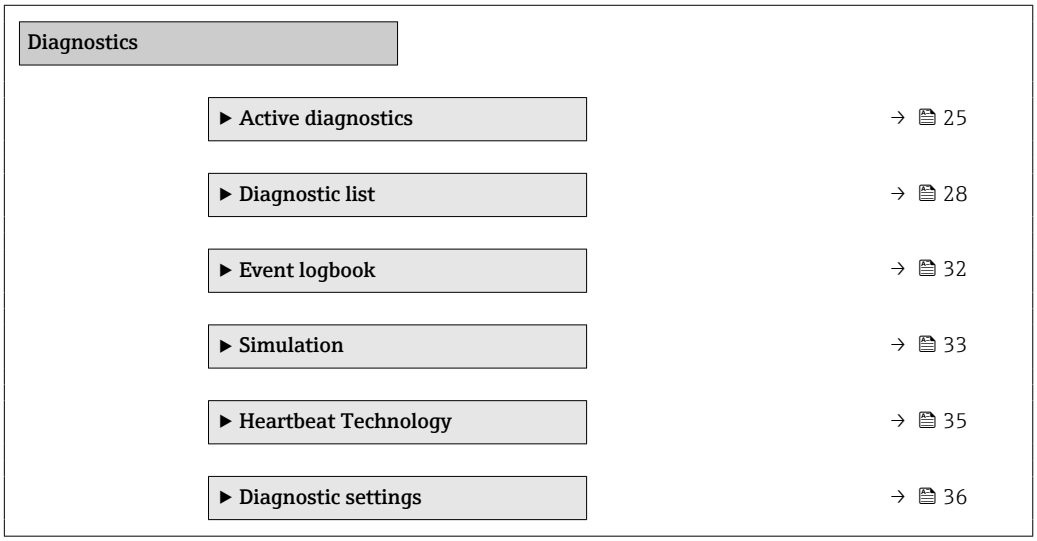
Description Set the date and local time. Every time the date or time is changed, a logbook entry is created.

User entry Date and time

3 "Diagnostics" menu

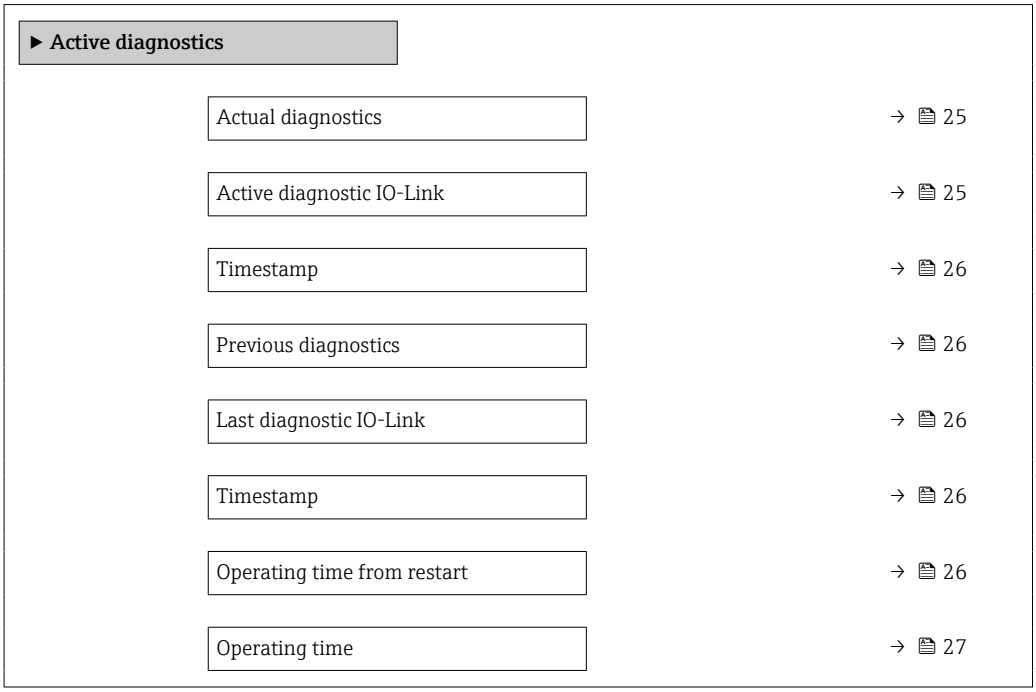
Troubleshooting and preventive maintenance – settings for device behavior during process and device events as well as assistance and measures for diagnostic purposes.

Navigation Diagnostics



3.1 "Active diagnostics" submenu

Navigation Diagnostics → Active diagnos.



Actual diagnostics

Navigation Diagnostics → Active diagnos. → Actual diagnos.

Prerequisite A diagnostic event has occurred.

Description Displays the currently active diagnostic message.

If there is more than one pending diagnostic event, the message for the diagnostic event with the highest priority is displayed.

User interface Positive integer

Active diagnostic IO-Link

Navigation Diagnostics → Active diagnos. → ActDiag IO-Link

Description Displays the IO-Link event code for the currently active diagnostic message. If there is more than one pending diagnostic event, the code for the diagnostic message with the highest priority is displayed.

User interface 0 to 65 535

Timestamp

Navigation Diagnostics → Active diagnos. → Timestamp

Description Displays the timestamp for the currently active diagnostic message.

User interface Days (d), hours (h), minutes (m), seconds (s)

Previous diagnostics

Navigation Diagnostics → Active diagnos. → Prev.diagnostics

Prerequisite At least two diagnostic events have already occurred.

Description Displays the diagnostic message for the last diagnostic event that has ended.

User interface Positive integer

Timestamp

Navigation Diagnostics → Active diagnos. → Timestamp

Description Displays the timestamp of the diagnostic message generated for the last diagnostic event that has ended.

User interface Days (d), hours (h), minutes (m), seconds (s)

Operating time from restart

Navigation Diagnostics → Active diagnos. → Time fr. restart

Description Indicates how long the device has been in operation since the last time the device was restarted.

User interface Days (d), hours (h), minutes (m), seconds (s)

Last diagnostic IO-Link

Navigation Diagnostics → Active diagnos. → LastDiag IO-Link

Description Displays the IO-Link event code for the last diagnostic event that has ended.

User interface 0 to 65 535

Operating time

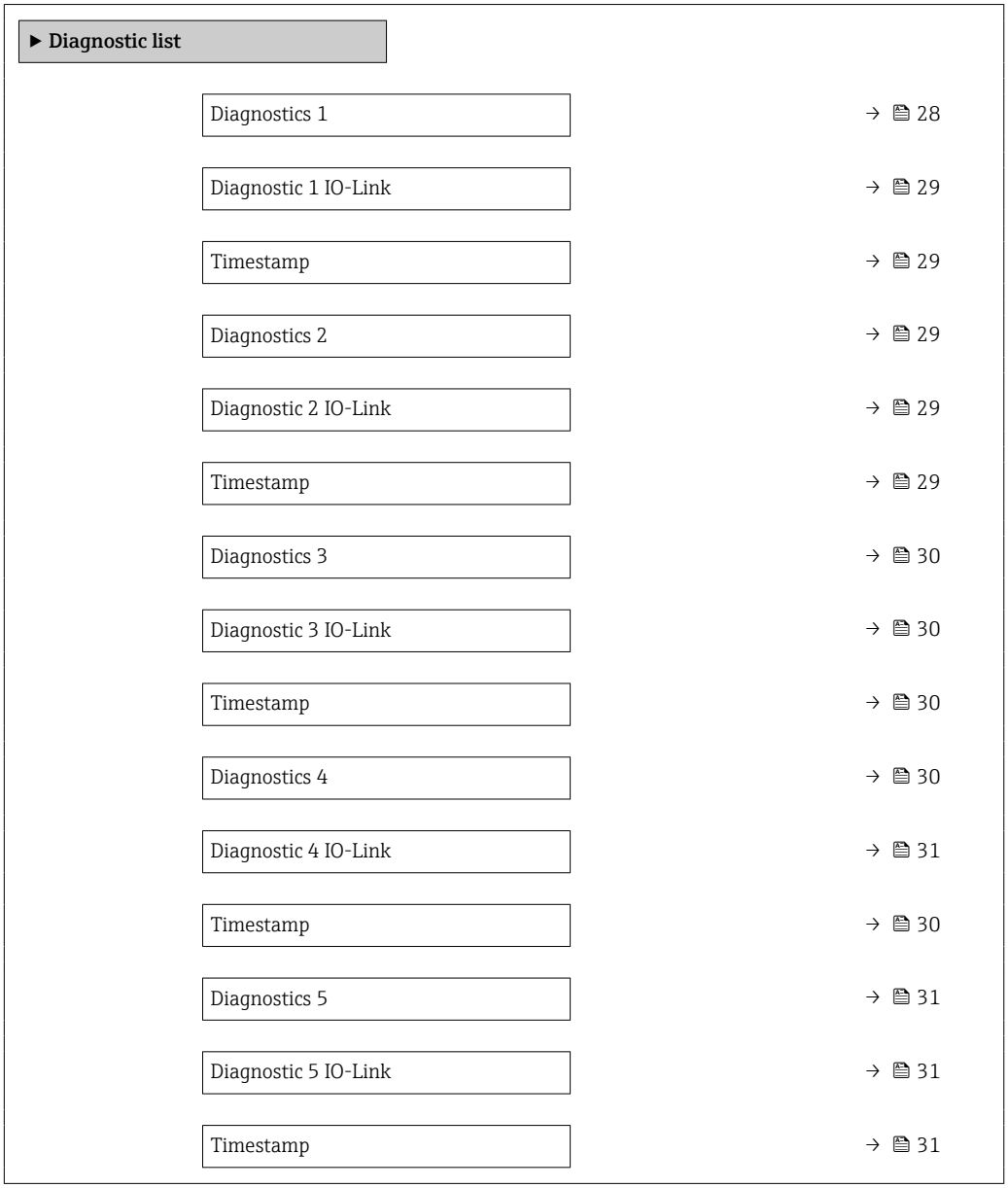
Navigation Diagnostics → Active diagnos. → Operating time

Description Indicates how long the device has been in operation.

User interface Days (d), hours (h), minutes (m), seconds (s)

3.2 "Diagnostic list" submenu

Navigation Diagnostics → Diagnostic list



Diagnostics 1

Navigation Diagnostics → Diagnostic list → Diagnostics 1

Description Displays the currently active diagnostic message with the highest priority.

User interface Positive integer

Diagnostic 1 IO-Link

Navigation Diagnostics → Diagnostic list → Diag. 1 IO-Link

Description Displays the IO-Link event code for the currently active diagnostic message with the highest priority.

User interface 0 to 65 535

Timestamp

Navigation Diagnostics → Diagnostic list → Timestamp

Description Displays the timestamp for the diagnostic message with the highest priority.

User interface Days (d), hours (h), minutes (m), seconds (s)

Diagnostics 2

Navigation Diagnostics → Diagnostic list → Diagnostics 2

Description Displays the currently active diagnostic message with the second highest priority.

User interface Positive integer

Timestamp

Navigation Diagnostics → Diagnostic list → Timestamp

Description Displays the timestamp for the diagnostic message with the second highest priority.

User interface Days (d), hours (h), minutes (m), seconds (s)

Diagnostic 2 IO-Link

Navigation Diagnostics → Diagnostic list → Diag. 2 IO-Link

Description Displays the IO-Link event code for the currently active diagnostic message with the second highest priority.

User interface 0 to 65 535

Diagnostics 3

Navigation Diagnostics → Diagnostic list → Diagnostics 3

Description Displays the currently active diagnostic message with the third highest priority.

User interface Positive integer

Timestamp

Navigation Diagnostics → Diagnostic list → Timestamp

Description Displays the timestamp for the diagnostic message with the third highest priority.

User interface Days (d), hours (h), minutes (m), seconds (s)

Diagnostic 3 IO-Link

Navigation Diagnostics → Diagnostic list → Diag. 3 IO-Link

Description Displays the IO-Link event code for the currently active diagnostic message with the third highest priority.

User interface 0 to 65 535

Diagnostics 4

Navigation Diagnostics → Diagnostic list → Diagnostics 4

Description Displays the currently active diagnostic message with the fourth highest priority.

User interface Positive integer

Timestamp

Navigation Diagnostics → Diagnostic list → Timestamp

Description Displays the timestamp for the diagnostic message with the fourth highest priority.

User interface Days (d), hours (h), minutes (m), seconds (s)

Diagnostics 5

Navigation Diagnostics → Diagnostic list → Diagnostics 5

Description Displays the currently active diagnostic message with the fifth-highest priority.

User interface Positive integer

Timestamp

Navigation Diagnostics → Diagnostic list → Timestamp

Description Displays the timestamp for the diagnostic message with the fifth highest priority.

User interface Days (d), hours (h), minutes (m), seconds (s)

Diagnostic 4 IO-Link

Navigation Diagnostics → Diagnostic list → Diag. 4 IO-Link

Description Displays the IO-Link event code for the currently active diagnostic message with the fourth highest priority.

User interface 0 to 65 535

Diagnostic 5 IO-Link

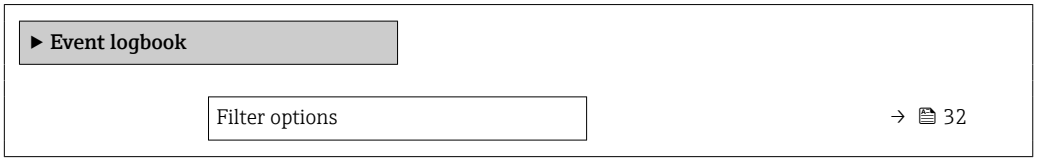
Navigation Diagnostics → Diagnostic list → Diag. 5 IO-Link

Description Displays the IO-Link event code for the currently active diagnostic message with the fifth highest priority.

User interface 0 to 65 535

3.3 "Event logbook" submenu

Navigation Diagnostics → Event logbook



Filter options

Navigation Diagnostics → Event logbook → Filter options

Description Select the category of event notification to display in the event list.

Additional information:
The status signals F, C, S and M are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107.

Selection
- All
- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- Information (I)

Clear event list

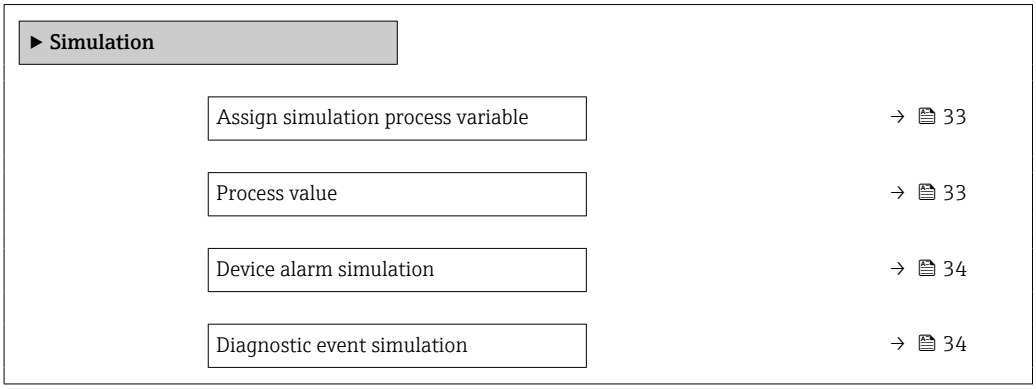
Navigation Diagnostics → Event logbook → Clear event list

Description Deletes all entries from the events list. Once this function has been executed, the events list is empty and all the events are deleted.

Selection
- Cancel
- Clear data

3.4 "Simulation" submenu

Navigation Diagnostics → Simulation



Assign simulation process variable

Navigation Diagnostics → Simulation → Assign proc.var.

Description Select a process variable to activate the simulation.

Selection
- Off
- Volume flow
- Mass flow
- Conductivity *
- Corrected conductivity *
- Temperature *

Additional information *Description*

The display alternates between the measured value and a diagnostics message of the "function check" category (C) when simulation is active.

Process value

Navigation Diagnostics → Simulation → Process value

Description Enter the process value to simulate.

The unit is set in the "System units" menu.

User entry Signed floating-point number

* Visibility depends on order options or device settings

Device alarm simulation

Navigation Diagnostics → Simulation → Dev. alarm sim.

Description Switch the device alarm simulation on or off.

While simulation is in progress, a diagnostic message of the Function Check (C) category is displayed.

Selection
- Off
- On

Diagnostic event simulation

Navigation Diagnostics → Simulation → Diagnostic event

Description Select the diagnostic event to simulate.

Selection Off

3.5 "Heartbeat Technology" submenu

The **Heartbeat Technology** submenu (→ 35) is only available with the optional "Heartbeat Verification + Monitoring" application package.
- Order code for: Application package
- Option: EB "Heartbeat Verification + Monitoring"

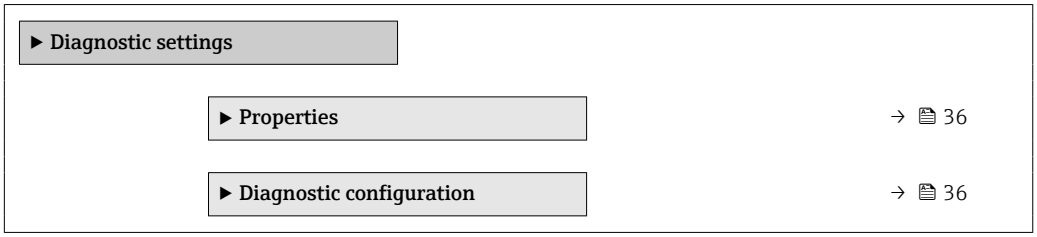
Detailed information and all descriptions of the device parameters of the application package are available in the "Heartbeat Verification + Monitoring" Special Documentation

Navigation Diagnostics → Heartbeat Techn.

▶ **Heartbeat Technology**

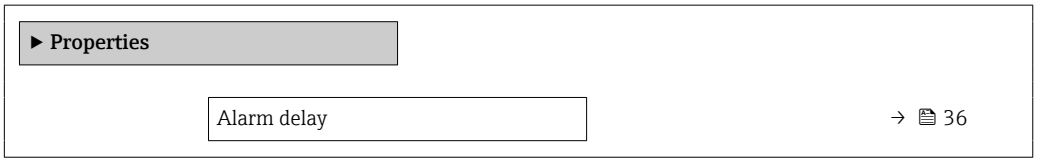
3.6 "Diagnostic settings" submenu

Navigation Diagnostics → Diag. settings



3.6.1 "Properties" submenu

Navigation Diagnostics → Diag. settings → Properties



Alarm delay

Navigation Diagnostics → Diag. settings → Properties → Alarm delay

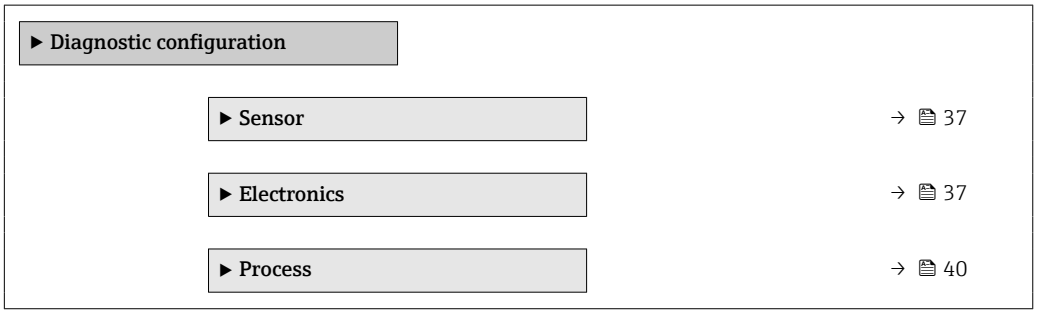
Description Enter a delay to suppress momentarily pending diagnostic messages.

Only applies to diagnostic events that allow for a delay before the diagnostic message is generated.

User entry 0 to 60 s

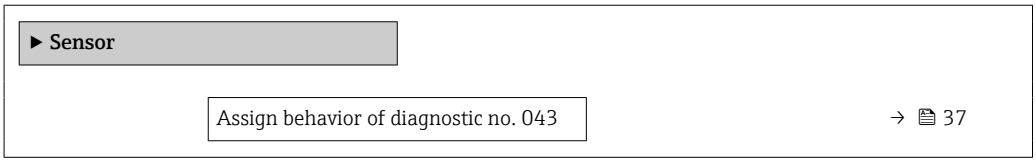
3.6.2 "Diagnostic configuration" submenu

Navigation Diagnostics → Diag. settings → Diag. config.



"Sensor" submenu

Navigation Diagnostics → Diag. settings → Diag. config. → Sensor



Assign behavior of diagnostic no. 043

Navigation Diagnostics → Diag. settings → Diag. config. → Sensor → Diagnostic no. 043

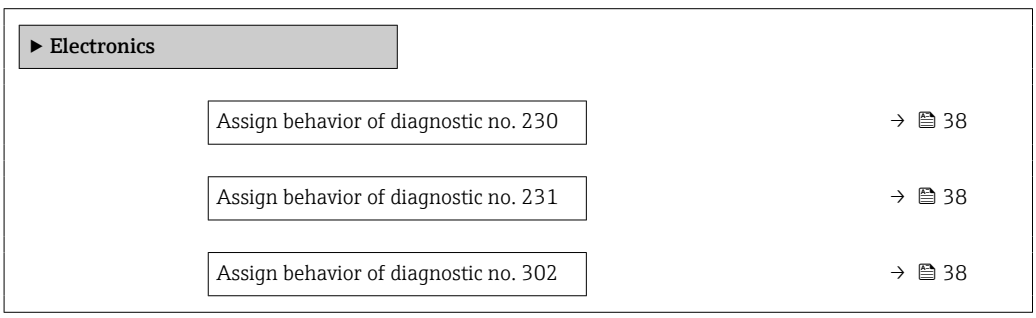
Description Select behavior for diagnostic event "043 Sensor short circuit detected".

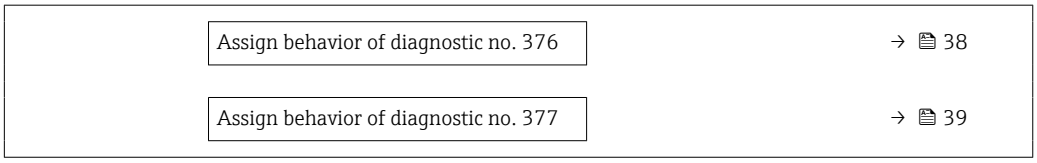
Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*
- **Off** option
  The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
  The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
  The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

"Electronics" submenu

Navigation Diagnostics → Diag. settings → Diag. config. → Electronics





Assign behavior of diagnostic no. 230

Navigation Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 230

Description Select behavior for diagnostic event "230 Date/time incorrect".

Selection
- Alarm
- Warning
- Logbook entry only

Assign behavior of diagnostic no. 231

Navigation Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 231

Description Select behavior for diagnostic event "231 Date/time not available".

Selection
- Alarm
- Warning
- Logbook entry only

Assign behavior of diagnostic no. 302

Navigation Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 302

Description Select behavior for diagnostic event "302 Device verification active".

Selection
- Off
- Warning
- Logbook entry only

Assign behavior of diagnostic no. 376

Navigation Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 376

Description Select behavior for diagnostic event "376 Sensor electronics (ISEM) faulty".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*
- **Off** option
  The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
  The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
  The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 377

Navigation Diagnostics → Diag. settings → Diag. config. → Electronics → Diagnostic no. 377

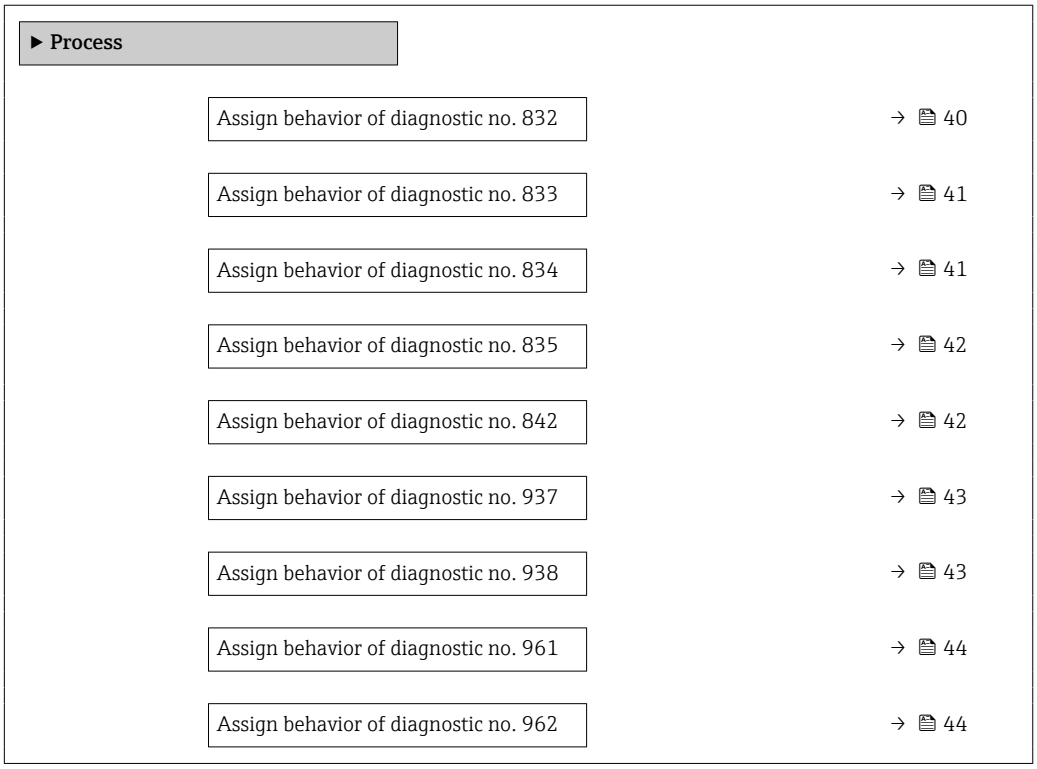
Description Select behavior for diagnostic event "377 Electrode signal integrity".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*
- **Off** option
  The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
  The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
  The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

"Process" submenu

Navigation Diagnostics → Diag. settings → Diag. config. → Process



Assign behavior of diagnostic no. 832

Navigation Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 832

Description Select behavior for diagnostic event "832 Sensor electronics temperature too high".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*
- **Off** option
  The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
  The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
  The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 833

Navigation Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 833

Description Select behavior for diagnostic event "833 Sensor electronics temperature too low".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*
- **Off** option
  The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
  The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
  The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 834

Navigation Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 834

Description Select behavior for diagnostic event "834 Process temperature too high".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*
- **Off** option
  The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
  The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
  The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 835

Navigation Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 835

Description Select behavior for diagnostic event "835 Process temperature too low".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*
- **Off** option
  The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
  The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
  The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 842

Navigation Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 842

Description Select behavior for diagnostic event "842 Process value below limit".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*
- **Off** option
  The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
  The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
  The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 937

Navigation Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 937

Description Select behavior for diagnostic event "937 Sensor symmetry".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*
- **Off** option
  The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
  The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
  The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 938

Navigation Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 938

Description Select behavior for diagnostic event "938 Coil current not stable".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*
- **Off** option
  The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
  The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
  The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 961

Navigation Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 961

Description Select behavior for diagnostic event "961 Electrode potential out of specification".

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*
- **Off** option
  The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
  The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
  The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

Assign behavior of diagnostic no. 962

Navigation Diagnostics → Diag. settings → Diag. config. → Process → Diagnostic no. 962

Description Select behavior for diagnostic event "962 Pipe empty".

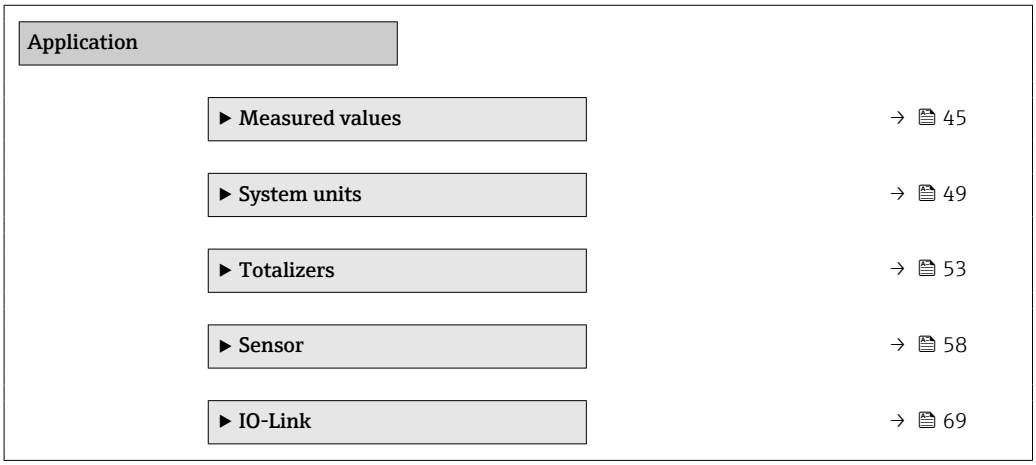
Selection
- Off
- Alarm
- Warning
- Logbook entry only

Additional information *Selection*
- **Off** option
  The diagnostic event is ignored and no diagnostic message is generated or logged.
- **Alarm** option
  The device stops measuring. The signal outputs and totalizers assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues measuring. The signal outputs and totalizers are not affected. A diagnostic message is generated.
- **Logbook entry only** option
  The device continues measuring. The diagnostic message is only displayed in the "Event logbook" submenu and does not alternate with the standard operational information displayed.

4 "Application" menu

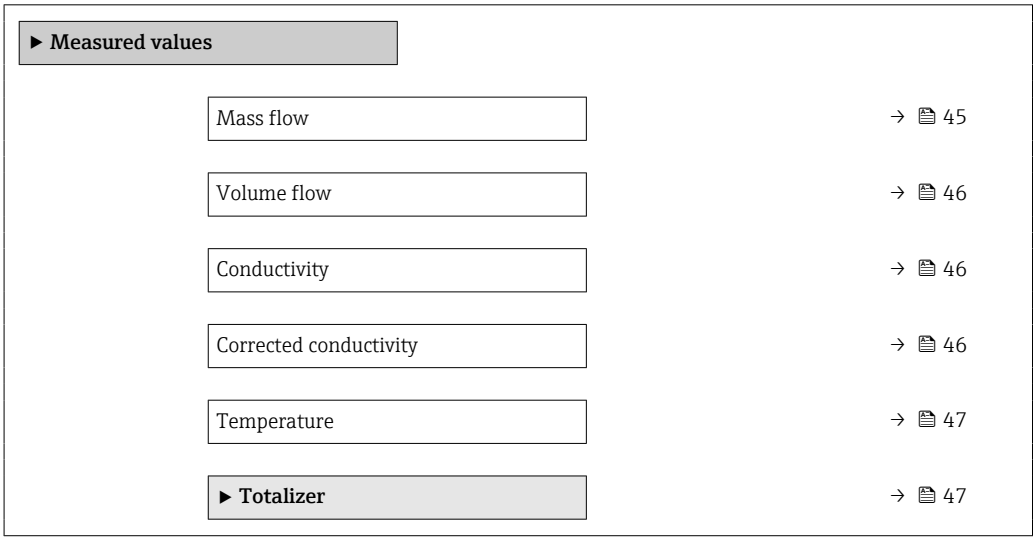
Targeted optimization to the application – comprehensive device settings from sensor technology to system integration for optimum application adaptation.

Navigation Application



4.1 "Measured values" submenu

Navigation Application → Measured values



Mass flow

Navigation Application → Measured values → Mass flow

Description Displays the mass flow calculated.
The unit is set in the "System units" menu.

User interface Signed floating-point number

Additional information The IO-Link interface only offers the **kg/s** option.

Volume flow

Navigation Application → Measured values → Volume flow

Description Displays the volume flow measured.

The unit is set in the "System units" menu.

User interface Signed floating-point number

Additional information The IO-Link interface only offers the **m^3/h** option.

Conductivity

Navigation Application → Measured values → Conductivity

Prerequisite Conductivity measurement is switched on in the **Conductivity measurement** parameter (→ 59).

Conductivity measurement is only optionally available: Under order code for "Functionality", option D (enhanced transmitter) and order code for "Sensor option", option CX (conductivity measurement)

Description Displays the conductivity measured.

The unit is set in the "System units" menu.

User interface Positive floating-point number

Additional information The IO-Link interface only offers the **S/m** option.

Corrected conductivity

Navigation Application → Measured values → CorrConductivity

Prerequisite Conductivity measurement is switched on in the **Conductivity measurement** parameter (→ 59).

Conductivity measurement is only optionally available: Under order code for "Functionality", option D (extended transmitter) and order code for "Sensor option", option CX (conductivity measurement)

Description Displays the conductivity measured compensated for temperature.

The unit is set in the "System units" menu.

User interface Positive floating-point number

Temperature

Navigation Application → Measured values → Temperature

Prerequisite Temperature measurement is only optionally available for Promag H 10 (5HBB): Under order code for "Functionality", option D (enhanced transmitter) and order code for "Sensor option", option CI (fluid temperature measurement)

Description Displays the medium temperature measured.

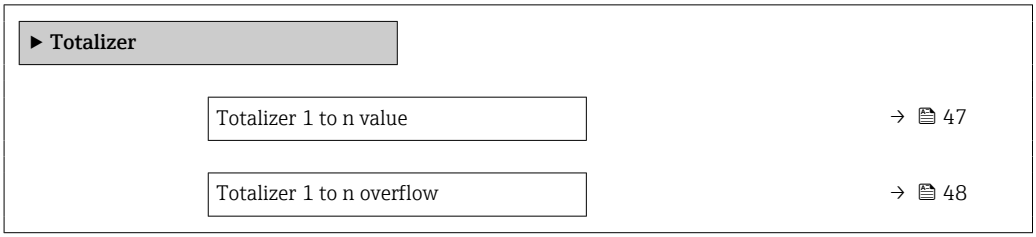
The unit is set in the "System units" menu.

User interface Positive floating-point number

Additional information The IO-Link interface only offers the **°C** option.

4.1.1 "Totalizer" submenu

Navigation Application → Measured values → Totalizer



Totalizer value

Navigation Application → Measured values → Totalizer → Tot. 1 to n value

Prerequisite A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

Description Displays the totalizer counter since the last reset.

This parameter can only display figures up to 7 digits. If the counter exceeds this range, the overflow is displayed in the "Totalizer overflow " parameter.

Example:

Value of "Totalizer value" parameter: 1,968,457 m^3
Value of "Totalizer overflow " parameter: 1 × 10^7 (1 overflow) = 10,000,000 m^3
Counter (total): 11,968,457 m^3

In the event of a fault condition, the totalizer behaves as specified in the "Totalizer failure behavior" parameter.

User interface Signed floating-point number

Additional information Totalizer 1 is permanently set to volume flow and cannot be changed. Totalizers 2 and 3 can be changed.

Totalizer overflow

Navigation Application → Measured values → Totalizer → Tot. 1 to n overflow

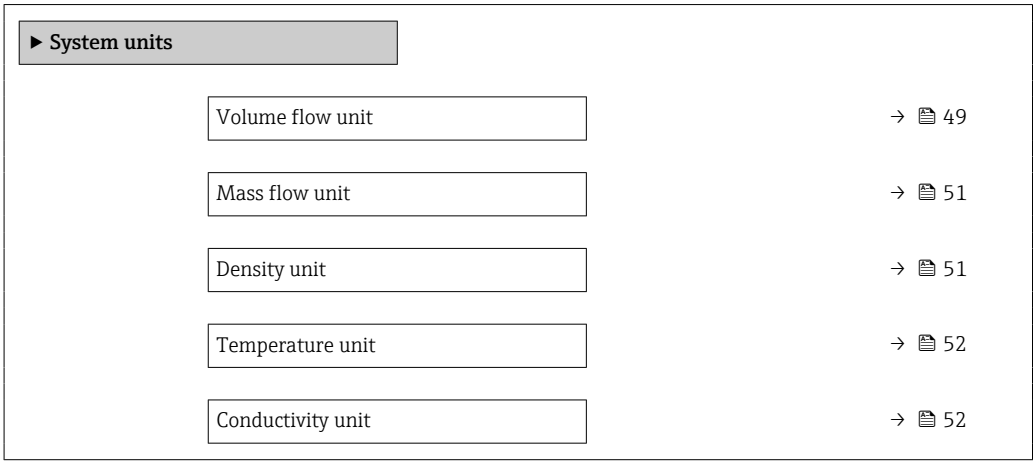
Prerequisite A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

Description Displays the number of overflows for the totalizer counter ("Totalizer value" parameter).

User interface −32 000.0 to 32 000.0

4.2 "System units" submenu

Navigation Application → System units



Volume flow unit

Navigation Application → System units → Volume flow unit

Description Select the volume flow unit.

Selection

SI units
- cm^3/s
- cm^3/min
- cm^3/h
- cm^3/d
- dm^3/s
- dm^3/min
- dm^3/h
- dm^3/d
- m^3/s
- m^3/min
- m^3/h
- m^3/d
- ml/s
- ml/min
- ml/h
- ml/d
- l/s
- l/min
- l/h
- l/d
- hl/s
- hl/min
- hl/h
- hl/d
- Ml/s
- Ml/min
- Ml/h
- Ml/d

US units
- af/s
- af/min
- af/h
- af/d
- ft^3/s
- ft^3/min
- ft^3/h
- ft^3/d
- $MMft^3/s$
- $MMft^3/min$
- $MMft^3/h$
- Mft^3/d
- fl oz/s (us)
- fl oz/min (us)
- fl oz/h (us)
- fl oz/d (us)
- gal/s (us)
- gal/min (us)
- gal/h (us)
- gal/d (us)
- Mgal/s (us)
- Mgal/min (us)
- Mgal/h (us)
- Mgal/d (us)
- bbl/s (us;liq.)
- bbl/min (us;liq.)
- bbl/h (us;liq.)
- bbl/d (us;liq.)
- bbl/s (us;beer)
- bbl/min (us;beer)
- bbl/h (us;beer)
- bbl/d (us;beer)
- bbl/s (us;oil)
- bbl/min (us;oil)
- bbl/h (us;oil)
- bbl/d (us;oil)
- bbl/s (us;tank)
- bbl/min (us;tank)
- bbl/h (us;tank)
- bbl/d (us;tank)
- kgal/s (us)
- kgal/min (us)
- kgal/h (us)
- kgal/d (us)

Imperial units
- gal/s (imp)
- gal/min (imp)
- gal/h (imp)
- gal/d (imp)
- Mgal/s (imp)
- Mgal/min (imp)
- Mgal/h (imp)
- Mgal/d (imp)
- bbl/s (imp;beer)
- bbl/min (imp;beer)
- bbl/h (imp;beer)
- bbl/d (imp;beer)
- bbl/s (imp;oil)
- bbl/min (imp;oil)
- bbl/h (imp;oil)
- bbl/d (imp;oil)

Additional information

Options

For an explanation of the abbreviated units: → 90

The IO-Link interface only offers the **m^3/h** option.

Mass flow unit

Navigation Application → System units → Mass flow unit

Description Select the mass flow unit.

Selection

SI units
- g/s
- g/min
- g/h
- g/d
- kg/s
- kg/min
- kg/h
- kg/d
- t/s
- t/min
- t/h
- t/d

US units
- oz/s
- oz/min
- oz/h
- oz/d
- lb/s
- lb/min
- lb/h
- lb/d
- STon/s
- STon/min
- STon/h
- STon/d

Additional information The IO-Link interface only offers the **kg/s** option.

Density unit

Navigation Application → System units → Density unit

Description Select the density unit.

Selection

SI units
- g/cm³
- g/m³
- kg/l
- kg/dm³
- kg/m³
- SD4°C
- SD15°C
- SD20°C
- SG4°C
- SG15°C
- SG20°C

US units
- lb/ft³
- lb/gal (us)
- lb/bbl (us;liq.)
- lb/bbl (us;beer)
- lb/bbl (us;oil)
- lb/bbl (us;tank)

Imperial units
- lb/gal (imp)
- lb/bbl (imp;beer)
- lb/bbl (imp;oil)

Additional information *Options*

For an explanation of the abbreviated units: → 90

The IO-Link interface only offers the **kg/m³** option.

Temperature unit

Navigation Application → System units → Temperature unit

Prerequisite Temperature measurement is only optionally available for Promag H 10 (5HBB): Under order code for "Functionality", option D (enhanced transmitter) and order code for "Sensor option", option CI (fluid temperature measurement)

Description Select the temperature unit.

Selection

SI units
- °C
- K

US units
- °F
- °R

Additional information The IO-Link interface only offers the **°C** option.

Conductivity unit

Navigation Application → System units → Conductiv. unit

Prerequisite Conductivity measurement is switched on in the **Conductivity measurement** parameter (→ 59).

Conductivity measurement is only optionally available: Under order code for "Functionality", option D (enhanced transmitter) and order code for "Sensor option", option CX (conductivity measurement)

Description Select the conductivity unit.

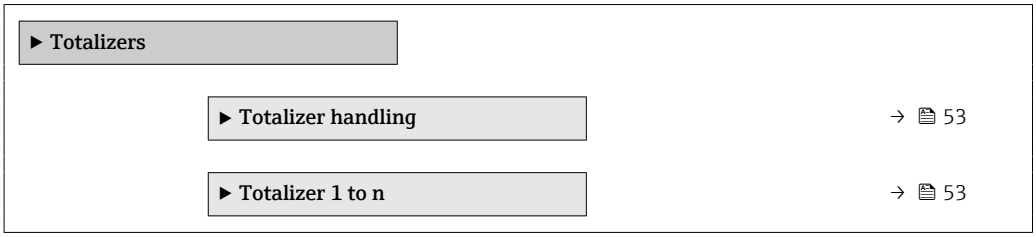
Selection

SI units
- nS/cm
- µS/cm
- µS/m
- µS/mm
- mS/m
- mS/cm
- S/cm
- S/m
- kS/m
- MS/m

Additional information The IO-Link interface only offers the unit **S/m** option.

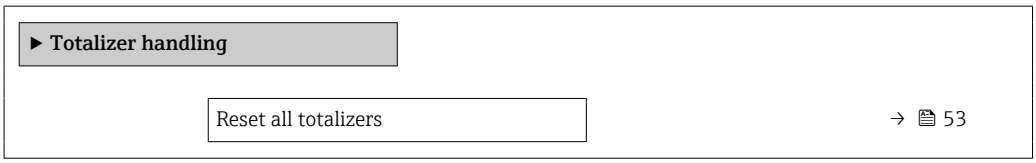
4.3 "Totalizers" submenu

Navigation Application → Totalizers



4.3.1 "Totalizer handling" submenu

Navigation Application → Totalizers → Totalizer



Reset all totalizers

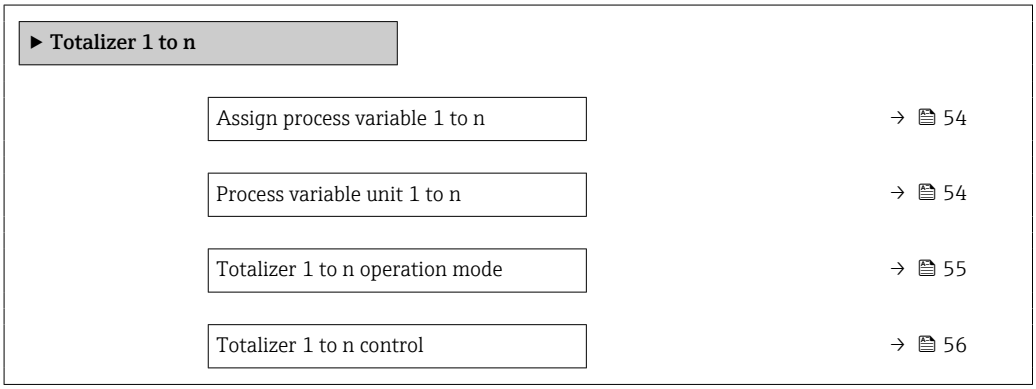
Navigation Application → Totalizers → Totalizer → Reset all tot.

Description Reset all totalizers to "0" and restart the totalizers. The counter readings are not logged prior to the reset.

Selection
- Cancel
- Reset + totalize

4.3.2 "Totalizer 1 to n" submenu

Navigation Application → Totalizers → Totalizer 1 to n



Preset value 1 to n	→ 56
Totalizer 1 to n failure behavior	→ 57

Assign process variable

Navigation Application → Totalizers → Totalizer 1 to n → AssignVariab. 1 to n

Description Select a process variable to activate the totalizer.

If the process variable is changed or the totalizer deactivated, the totalizer is reset to "0".

Selection
- Off
- Volume flow
- Mass flow

Additional information Totalizer 1 is permanently set to**Volume flow** option and cannot be changed. Totalizers 2 and 3 can be changed.

Process variable unit

Navigation Application → Totalizers → Totalizer 1 to n → VariableUnit 1 to n

Prerequisite A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

Description Select the unit for the process variable of the totalizer.

Selection

SI units
- g*
- kg*
- t*

US units
- oz*
- lb*
- STon*

* Visibility depends on order options or device settings

or

SI units
- cm³ *
- dm³ *
- m³ *
- ml *
- l *
- hl *
- Ml Mega *

US units
- af *
- ft³ *
- Mft³ *
- fl oz (us) *
- gal (us) *
- kgal (us) *
- Mgal (us) *
- bbl (us;liq.) *
- bbl (us;beer) *
- bbl (us;oil) *
- bbl (us;tank) *

Imperial units
- gal (imp) *
- Mgal (imp) *
- bbl (imp;beer) *
- bbl (imp;oil) *

* Visibility depends on order options or device settings

or

Other units
None *

* Visibility depends on order options or device settings

Additional information

Description

The unit is selected separately for each totalizer. The unit is independent of the option selected in the **System units** submenu (→ 8).

Options

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ 13).

- The IO-Link interface only offers the **kg** option, **m³** option and **Nm³** option.
- Totalizer 1 is permanently set to **Volume flow** option and cannot be changed. Totalizers 2 and 3 can be changed.

Totalizer operation mode

Navigation Application → Totalizers → Totalizer 1 to n → Operat. mode 1 to n

Prerequisite A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

Description Select the totalizer operation mode, e.g. only totalize forward flow or only totalize reverse flow.

Selection
- Net
- Forward
- Reverse

Additional information *Selection*

- **Net** option
  The flow values in the forward and reverse flow directions are totalized and netted against each other. Net flow is recorded in the flow direction.
- **Forward** option
  Only the flow in the forward flow direction is totalized.
- **Reverse** option
  Only the flow in the reverse flow direction is totalized (= reverse flow quantity).

Totalizer control

Navigation Application → Totalizers → Totalizer 1 to n → Tot. 1 to n control

Prerequisite A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

Description Operate the totalizer.

Selection

- Totalize
- Reset + hold
- Preset + hold
- Reset + totalize
- Hold

Additional information *Selection*

- **Totalize** option
  The totalizer is started or continues running.
- **Reset + hold** option
  The totalizer is reset to "0" and stopped.
- **Preset + hold** option
  The totalizer is stopped and set to the start value specified in the "Preset value " parameter.
- **Reset + totalize** option
  The totalizer is reset to "0" and restarted.
- **Hold** option
  The totalizer is stopped.

Preset value

Navigation Application → Totalizers → Totalizer 1 to n → Preset value 1 to n

Prerequisite A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

Description Specify a start value for the totalizer.

User entry Signed floating-point number

Additional information *Description*

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 13).

Example

This configuration is suitable for applications such as iterative filling processes with a fixed batch quantity.

Totalizer failure behavior

Navigation Application → Totalizers → Totalizer 1 to n → FailureBehav. 1 to n

Prerequisite A process variable has been selected in the **Assign process variable** parameter in the **Totalizer 1 to n** submenu.

Description Specify how the totalizer should behave in the event of a device alarm.

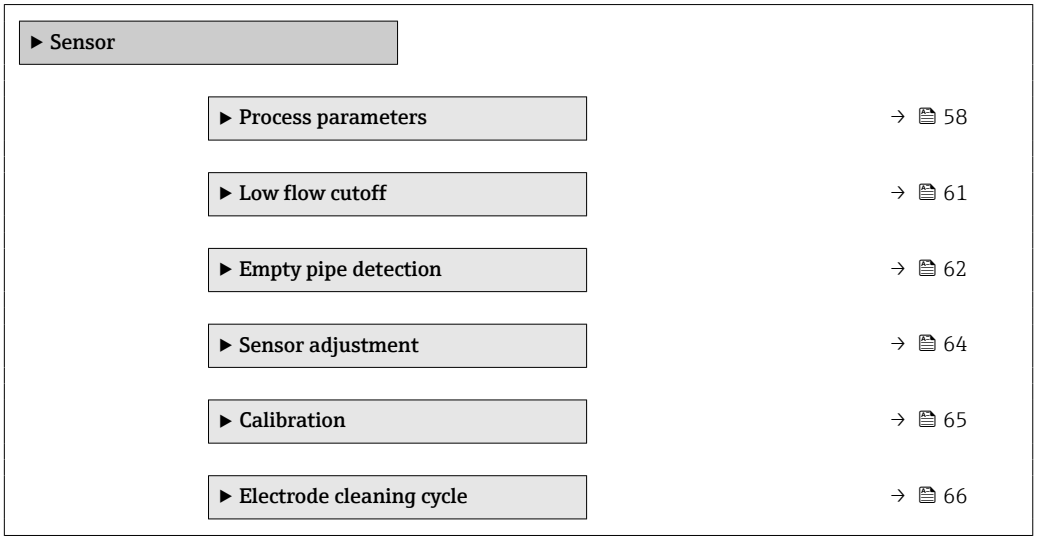
Selection
- Hold
- Continue
- Last valid value + continue

Additional information *Selection*

- **Hold** option
  The totalizer is stopped in the event of a device alarm.
- **Continue** option
  The totalizer continues to totalize based on the current value measured; the device alarm is ignored.
- **Last valid value + continue** option
  The totalizer continues to totalize based on the last valid value measured before the device alarm occurred.

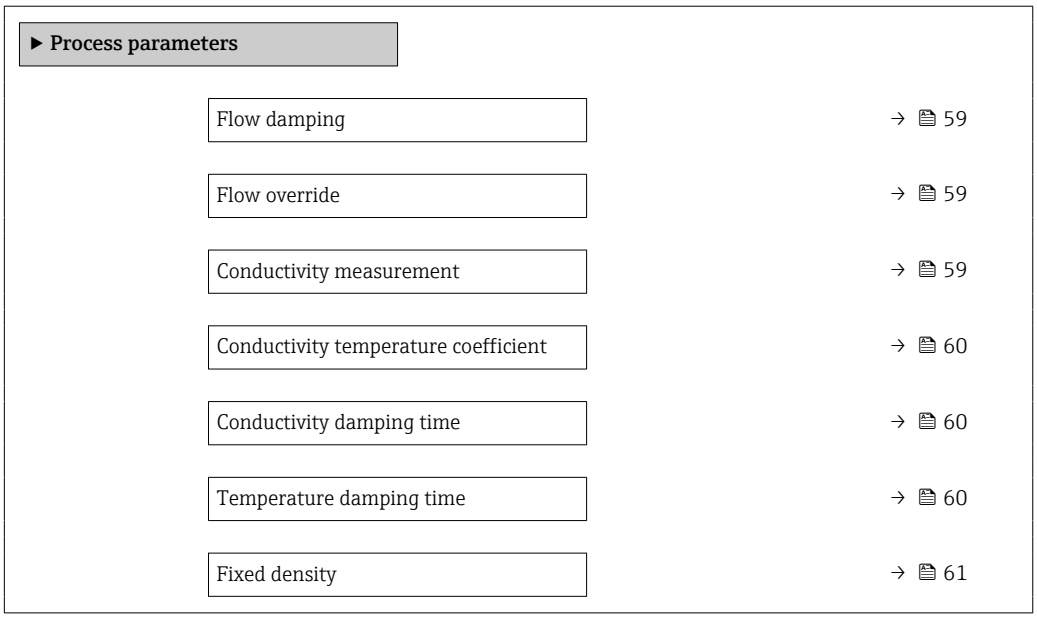
4.4 "Sensor" submenu

Navigation Application → Sensor



4.4.1 "Process parameters" submenu

Navigation Application → Sensor → Process param.



Flow damping

Navigation Application → Sensor → Process param. → Flow damping

Description Enter value for damping of the flow measured value in order to reduce the variability of the flow measured value when exposed to interference.

Additional information:
The depth of the flow filter is determined by this setting. As the filter depth increases, so does the reaction time of the device.
- Value = 0: No damping. Damping of 0 is not recommended, as the measuring signal is then so noisy that it is almost impossible to perform a measurement.
- Value > 0: Damping increases

Optimal damping depends on the measuring period.

Damping impacts the following measuring device variables:
- Outputs
- Low flow cutoff
- Totalizers

User entry 0 to 15

Flow override

Navigation Application → Sensor → Process param. → Flow override

Description Reports the flow rate as zero until flow override is deactivated. Can be used for example when cleaning the pipeline.

Selection
- Off
- On

Additional information *Selection*

"On" option
Activates flow override and the diagnostic message "453 Flow override active" is generated.

Values reported:
Flow variables: Zero
Other process variables: As measured
Totalizers: Stop totalizing

Conductivity measurement

Navigation Application → Sensor → Process param. → Conduct. measur.

Prerequisite Conductivity measurement is only optionally available: Under order code for "Functionality", option D (extended transmitter) and order code for "Sensor option", option CX (conductivity measurement)

Description Switch conductivity measurement on or off. To be able to measure conductivity, the medium must have a minimum conductivity of 5 µS/cm.

Selection
- Off
- On

Conductivity temperature coefficient

Navigation Application → Sensor → Process param. → Cond. temp.coeff

Prerequisite
Conductivity measurement is switched on in the **Conductivity measurement** parameter (→ 59).

Conductivity measurement is only optionally available: Under order code for "Functionality", option D (extended transmitter) and order code for "Sensor option", option CX (conductivity measurement)

Description
Enter the temperature coefficient to calculate the corrected conductivity.

User entry
Signed floating-point number

Conductivity damping time

Navigation Application → Sensor → Process param. → ConductDampTime

Prerequisite
Conductivity measurement is switched on in the **Conductivity measurement** parameter (→ 59).

Conductivity measurement is only optionally available: Under order code for "Functionality", option D (extended transmitter) and order code for "Sensor option", option CX (conductivity measurement)

Description
Enter time constant for conductivity damping (PT1 element):
- Value = 0: No damping
- Value > 0: Damping increases

Additional information:
Damping is implemented by means of a proportional transmission behavior with first order delay (PT1 element).

User entry
0 to 999.9 s

Temperature damping time

Navigation Application → Sensor → Process param. → TempDampingTime

Prerequisite
Temperature measurement is only optionally available for Promag H 10 (5HBB): Under order code for "Functionality", option D (extended transmitter) and order code for "Sensor option", option CI (medium temperature measurement)

Description
Enter time constant for damping the temperature value.

User entry 0 to 999.9 s

Fixed density

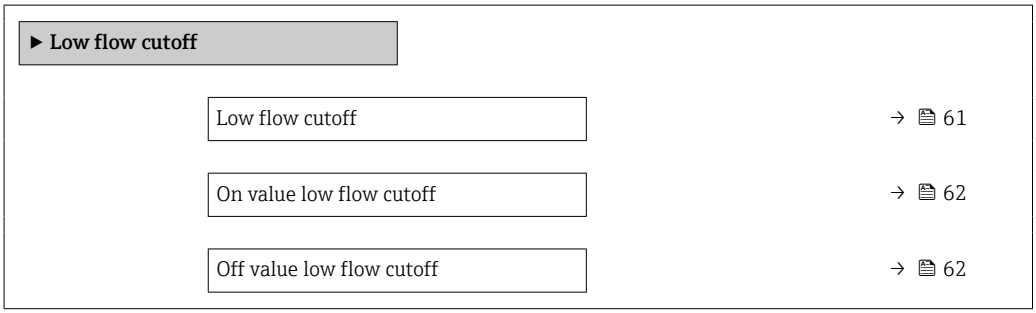
Navigation Application → Sensor → Process param. → Fixed density

Description Enter a fixed value for the density.
The unit is set in the "" menu.

User entry Positive floating-point number

4.4.2 "Low flow cutoff" submenu

Navigation Application → Sensor → Low flow cutoff



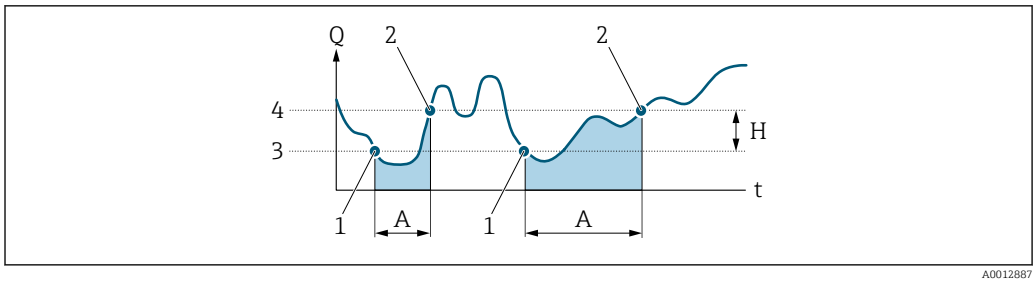
Low flow cutoff

Navigation Application → Sensor → Low flow cutoff → Low flow cutoff

Description Select a process variable for low flow cutoff to activate low flow cutoff.

Selection
- Off
- Volume flow
- Mass flow

Additional information Description



Q Flow
t Time
H Hysteresis
A Low flow cut off active
1 Low flow cut off is activated
2 Low flow cut off is deactivated
3 On-value entered
4 Off-value entered

On value low flow cutoff

Navigation Application → Sensor → Low flow cutoff → On value

Description Enter on value to switch on low flow cutoff.

Value = 0: No low flow cutoff
Value > 0: Low flow cutoff is activated

User entry Positive floating-point number

Off value low flow cutoff

Navigation Application → Sensor → Low flow cutoff → Off value

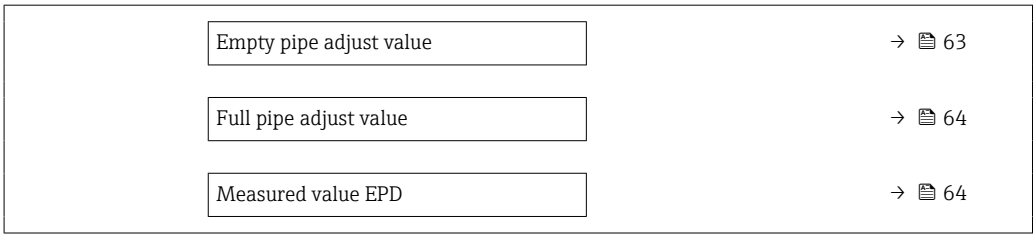
Description Enter off value to switch off low flow cutoff. The off value is entered as a positive hysteresis with respect to the on value.

User entry 0 to 100.0 %

4.4.3 "Empty pipe detection" submenu

Navigation Application → Sensor → Empty pipe det.

▶ Empty pipe detection	
Empty pipe detection	→ 63
New adjustment	→ 63



Empty pipe detection

Navigation Application → Sensor → Empty pipe det. → Empty pipe det.

Description Switch empty pipe detection on or off. Switch on empty pipe detection to detect a partially filled or empty measuring tube.

Selection
- Off
- On

New adjustment

Navigation Application → Sensor → Empty pipe det. → New adjustment

Description Select empty pipe or full pipe adjustment to perform a new adjustment. To adjust empty pipe detection, perform the empty pipe adjustment first and then the full pipe adjustment.

Additional information:
The measuring device is pre-adjusted at production using water (approx. 300 µS/cm). For liquids that deviate from this conductivity, a new empty pipe and full pipe adjustment must be performed on site.

Selection
- Cancel
- Empty pipe adjust
- Full pipe adjust

Empty pipe adjust value

Navigation Application → Sensor → Empty pipe det. → Empty pipe value

Description Displays adjustment value when the measuring tube is empty.

NOTE
Users logged on in the Service role have write access!

User interface Positive floating-point number

Full pipe adjust value

Navigation Application → Sensor → Empty pipe det. → Full pipe value

Description Displays adjustment value when the measuring tube is full.

NOTE
Users logged on in the Service role have write access!

User interface Positive floating-point number

Measured value EPD

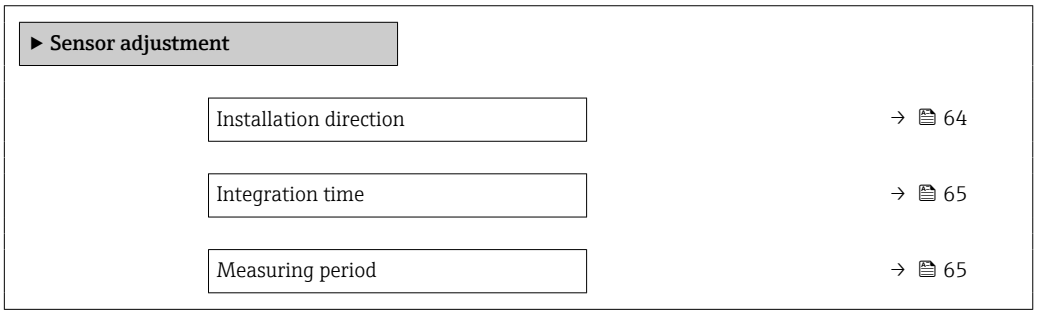
Navigation Application → Sensor → Empty pipe det. → Meas. value EPD

Description Displays the value currently measured for empty pipe detection.

User interface Positive floating-point number

4.4.4 "Sensor adjustment" submenu

Navigation Application → Sensor → Sensor adjustm.



Installation direction

Navigation Application → Sensor → Sensor adjustm. → Install. direct.

Description Select the sign of the flow direction.

Selection
- Forward flow
- Reverse flow

Integration time

Navigation Application → Sensor → Sensor adjustm. → Integration time

Description Displays the duration of an integration cycle.

Users logged on in the Service role have write access.

User interface 1 to 65 ms

Measuring period

Navigation Application → Sensor → Sensor adjustm. → Measuring period

Description Displays the duration of a full measuring period.

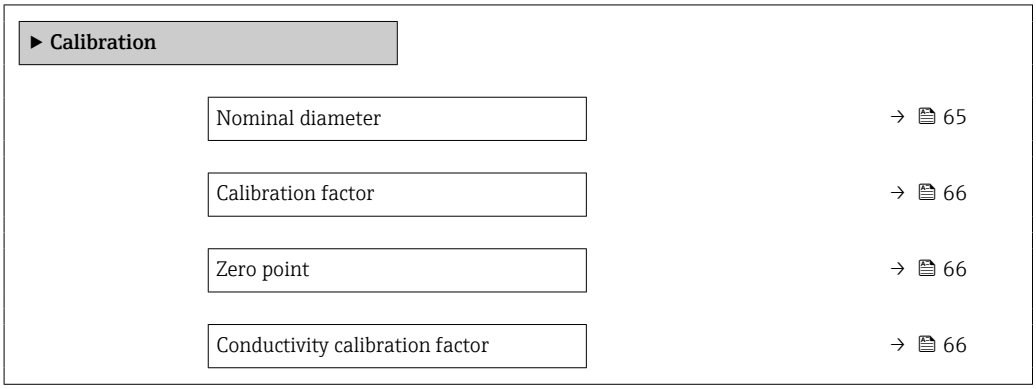
The measuring period is the time span over which a magnetic field is produced to create a measuring point.

Users logged on in the Service role have write access.

User interface 0 to 1 000 ms

4.4.5 "Calibration" submenu

Navigation Application → Sensor → Calibration



Nominal diameter

Navigation Application → Sensor → Calibration → Nominal diameter

Description Displays the nominal diameter of the sensor.

User interface Character string comprising numbers, letters and special characters

Calibration factor

Navigation Application → Sensor → Calibration → Cal. factor

Description Displays the current calibration factor for the sensor. The factory setting for the calibration factor can be found on the sensor's nameplate.

User interface Positive floating-point number

Zero point

Navigation Application → Sensor → Calibration → Zero point

Description Displays the zero point correction value for the sensor.

Users logged on in the Service role have write access.

User interface Signed floating-point number

Conductivity calibration factor

Navigation Application → Sensor → Calibration → Cond. cal. fact.

Prerequisite Conductivity measurement is switched on in the **Conductivity measurement** parameter (→ 59).

Conductivity measurement is only optionally available: Under order code for "Functionality", option D (extended transmitter) and order code for "Sensor option", option CX (conductivity measurement)

Description Displays the calibration factor for conductivity measurement.

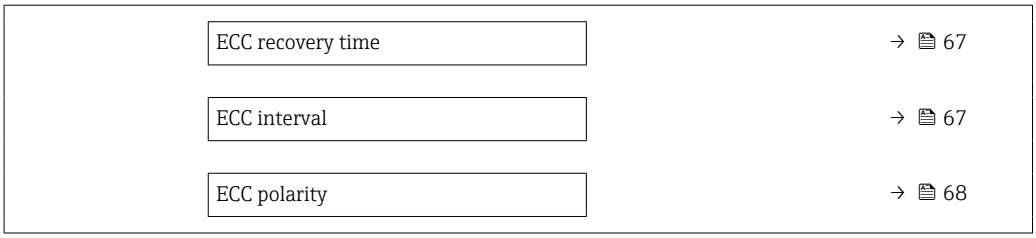
Users logged on in the Service role have write access.

User interface 0.01 to 10 000

4.4.6 "Electrode cleaning cycle" submenu

Navigation Application → Sensor → Elec. clean cycl

▶ Electrode cleaning cycle		
	Electrode cleaning cycle	→ 67
	ECC duration	→ 67



Electrode cleaning cycle

Navigation Application → Sensor → Elec. clean cycl → Elec. clean cycl

Description Switch electrode cleaning on or off.

Selection
- Off
- On

ECC duration

Navigation Application → Sensor → Elec. clean cycl → ECC duration

Description Specify the duration of the cleaning phase for the cycle. Diagnostic message "530 Electrode cleaning active" is displayed until the cleaning phase and recovery phase are both complete.

User entry 0.01 to 30 s

ECC recovery time

Navigation Application → Sensor → Elec. clean cycl → ECC recov. time

Description Specify the maximum timespan for recovery after the cleaning phase has completed to prevent interference with the signal outputs. The output signal values will be frozen for the duration of the recovery, unless flow measurement can resume beforehand. If the timespan specified is not sufficient for recovery, diagnostic message "512 ECC recovery time exceeded" is generated.

User entry 1 to 600 s

ECC interval

Navigation Application → Sensor → Elec. clean cycl → ECC interval

Description Specify the duration of the interval between one cleaning cycle and the next.

User entry 0.5 to 168 h

ECC polarity

Navigation Application → Sensor → Elec. clean cycl → ECC polarity

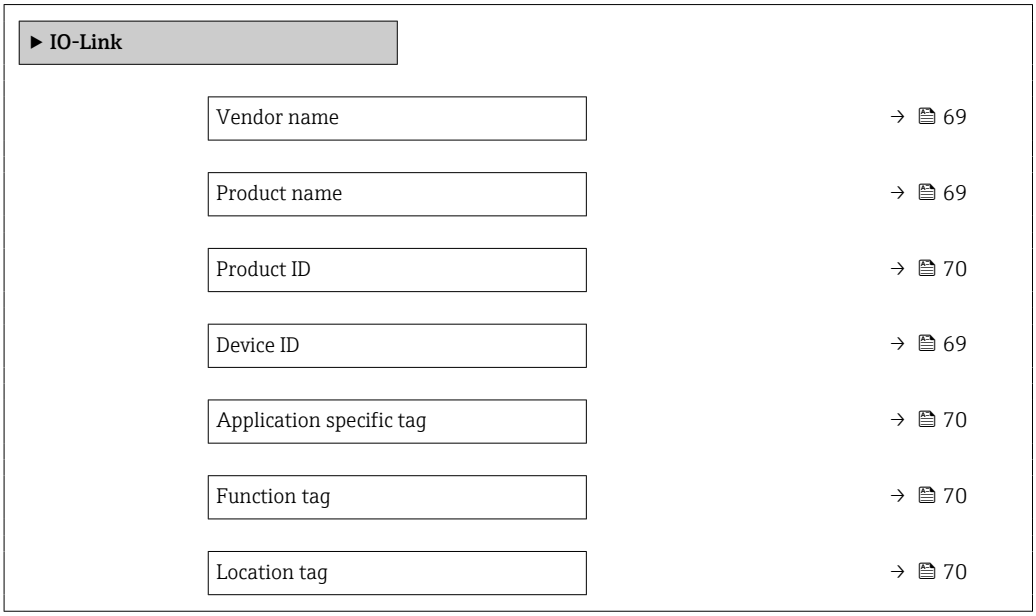
Description Displays the setting for the electrode cleaning polarity. The polarity depends on the material of the electrodes.

User interface
- Positive
- Negative

Additional information *User interface*
- **Positive** option
  For tantalum, Alloy C22, or stainless steel electrodes
- **Negative** option
  For platinum electrodes

4.5 "IO-Link" submenu

Navigation Application → IO-Link



Vendor name

Navigation Application → IO-Link → Vendor name

Description Displays the manufacturer.

User interface Character string comprising numbers, letters and special characters

Product name

Navigation Application → IO-Link → Product name

Description Displays the name of the transmitter.

User interface Character string comprising numbers, letters and special characters

Device ID

Navigation Application → IO-Link → Device ID

Description Displays the device ID registered with the IO-Link Community.

User interface Positive integer

Product ID

Navigation Application → IO-Link → Product ID

Description Displays the product root.

User interface Character string comprising numbers, letters and special characters

Application specific tag

Navigation Application → IO-Link → Application tag

Description Enter the tag of the application in which the device is used, e.g. the designation of the production process or step (max. 32 characters).

User entry Character string comprising numbers, letters and special characters (32)

Function tag

Navigation Application → IO-Link → Function tag

Description Enter the tag of the function the device performs in the application (max. 32 characters).

User entry Character string comprising numbers, letters and special characters (32)

Location tag

Navigation Application → IO-Link → Location tag

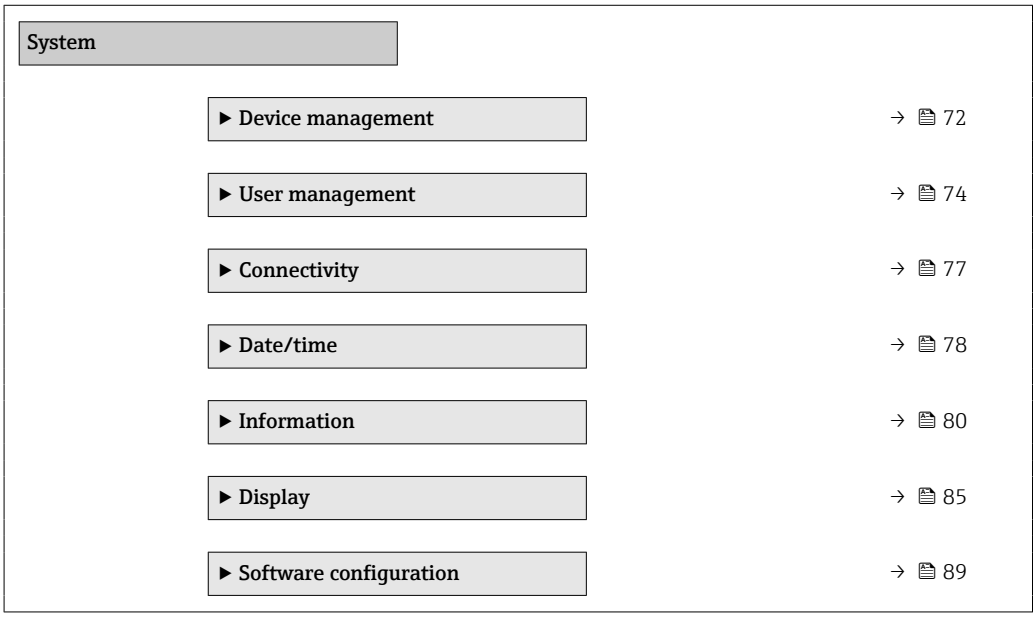
Description Enter the tag of the device location in the plant (max. 32 characters).

User entry Character string comprising numbers, letters and special characters (32)

5 "System" menu

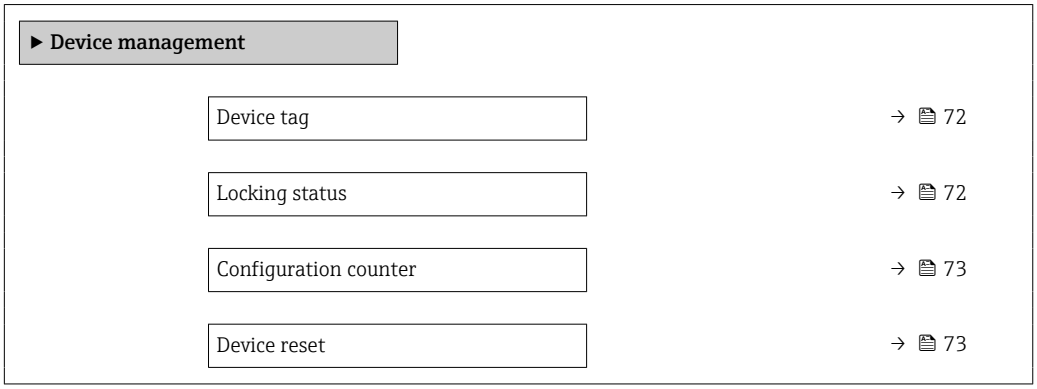
Overall device management and security settings – management of system settings and adaption to operational requirements.

Navigation System



5.1 "Device management" submenu

Navigation System → Device manag.



Device tag

Navigation System → Device manag. → Device tag

Description Displays the name for the measuring point.

User entry Character string comprising numbers, letters and special characters (32)

Locking status

Navigation System → Device manag. → Locking status

Description Indicates the write protection with the highest priority that is currently active.

User interface
- Hardware locked
- **Temporarily locked** option (e.g. during IO-Link block configuration or parameter upload)

Additional information
- The DIP switch is on the back of the display.
- While a block parameterization or the DataStorage mechanism is active via the IO-Link communication, the **Temporarily locked** option becomes active.

Configuration counter

Navigation System → Device manag. → Config. counter

Description Displays the counter for the number of times the device configuration has changed.

If the value for a static parameter changes, the counter increments by 1. This is to enable tracking different parameter versions.

When multiple parameters are changed simultaneously, e.g. when loading a configuration file into the device from an external source such as FieldCare, the counter may increment.

The counter cannot be reset. Nor is it reset to a default value on performing a device reset. Once the counter has incremented to 65535, it restarts at 1.

User interface 0 to 65 535

Device reset

Navigation System → Device manag. → Device reset

Description Reset the device configuration - either entirely or in part - to a defined state.

Selection
- Cancel
- To delivery settings
- Restart device
- Restore S-DAT backup *
- Create T-DAT backup
- Restore T-DAT backup *

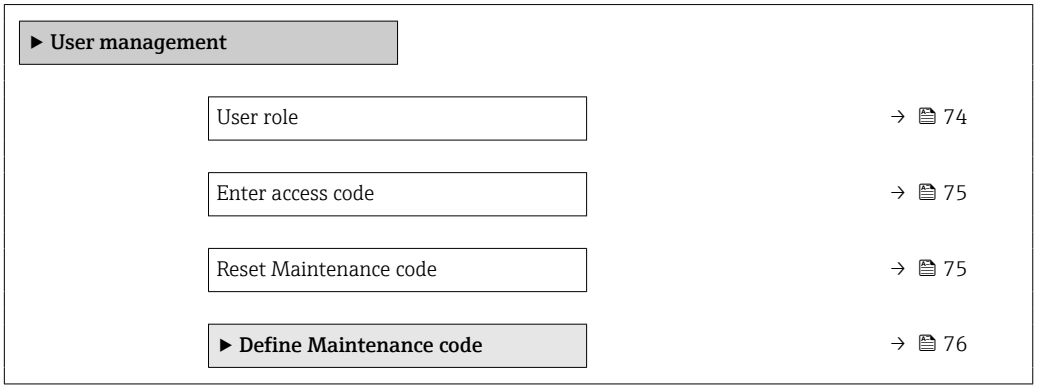
Additional information *Selection*

- **To delivery settings** option
  Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting.
- **Restart device** option
  The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.
- **Restore S-DAT backup** option
  Restores the data that is saved on the S-DAT.
  This function can be used to resolve the memory issue "083 Memory content inconsistent" or to restore the S-DAT data when a new S-DAT has been installed.
- **Create T-DAT backup** option
  Creates T-DAT backup.
- **Restore T-DAT backup** option
  Restores the data saved on the T-DAT.
  This function can be used to resolve the memory issue "283 Memory content inconsistent" or to restore the T-DAT data when a new T-DAT has been installed.

* Visibility depends on order options or device settings

5.2 "User management" submenu

Navigation System → User manag.



User role

Navigation System → User manag. → User role

Description Displays the role the user is currently logged on in.

The role determines the user's access rights for the parameters. Until a "Maintenance" code has been set in the "Define Maintenance code" parameter, all users are automatically logged on in the "Maintenance" role. Once the "Maintenance" code has been set, all users are automatically logged on in the "Operator" role. The access rights can be changed via the "Enter access code" parameter.

User interface

- Operator
- Maintenance
- Service
- Production
- Development

Additional information *User interface*

- **Operator** option
  Provides only read access to parameters.
- **Maintenance** option
  Provides read and write access to parameters.
  For some parameters, the user must be logged on in the Service role to obtain write access.
- **Service** option
  Provides read and write access to Service parameters.

Enter access code

Navigation System → User manag. → Ent. access code

Description For users logged on in the Operator role, enter the Maintenance code to change the access status to Maintenance and disable write protection of parameters. For users logged on in the Maintenance role, enter the Service code to change the access status to Service and enable read and write access to Service parameters.

User entry Max. 16-digit character string comprising numbers, letters and special characters

Reset Maintenance code

Navigation System → User manag. → Reset Maint code

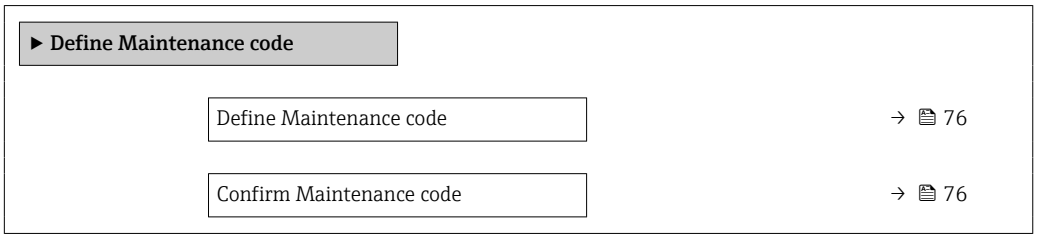
Description Enter the code provided by Endress+Hauser Technical Support to reset the Maintenance code.

User entry Character string comprising numbers, letters and special characters (32)

5.2.1 "Define Maintenance code" wizard

Complete this wizard to specify an access code for the Maintenance role.

Navigation System → User manag. → Def. Maint. code



Define Maintenance code

Navigation System → User manag. → Def. Maint. code → Def. Maint. code

Description Specify an access code that is required to obtain the access rights for the Maintenance role.

User entry 0 to 9 999

Confirm Maintenance code

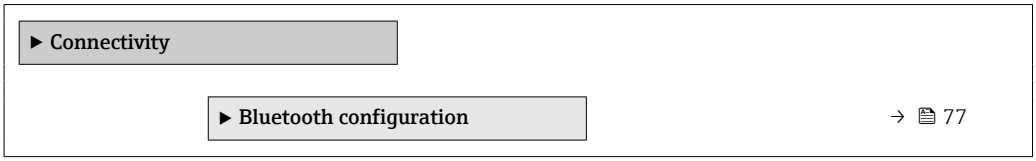
Navigation System → User manag. → Def. Maint. code → Conf. Maint code

Description Confirm the access code entered for the Maintenance role.

User entry 0 to 9 999

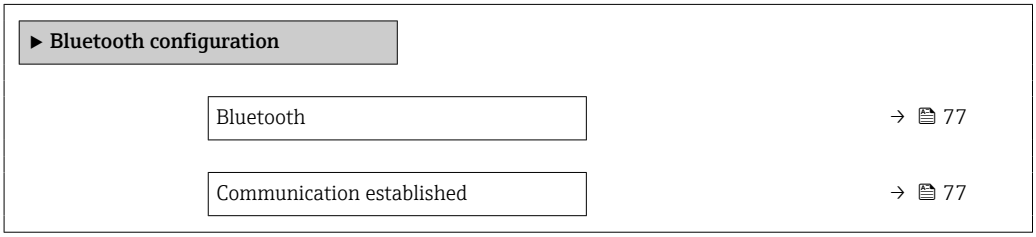
5.3 "Connectivity" submenu

Navigation System → Connectivity



5.3.1 "Bluetooth configuration" submenu

Navigation System → Connectivity → Bluetooth conf.



Bluetooth

Navigation System → Connectivity → Bluetooth conf. → Bluetooth

Description Enable or disable Bluetooth.

Selection
- Enable
- Disable
- Not available *

Communication established

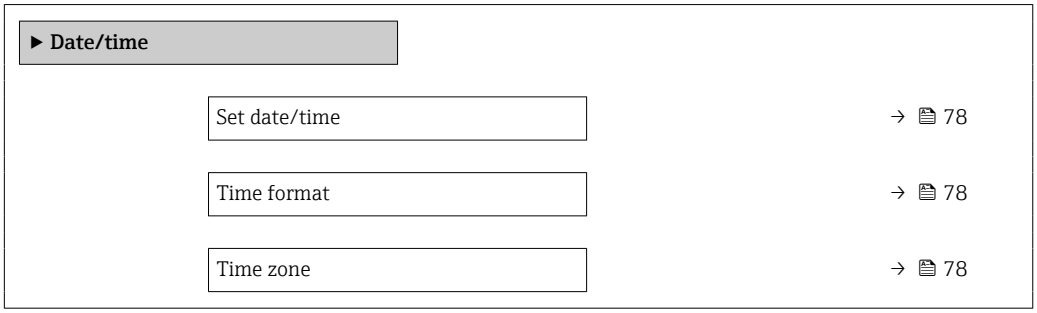
Navigation System → Connectivity → Bluetooth conf. → Communi. establ.

User interface
- No
- Yes

* Visibility depends on order options or device settings

5.4 " Date / Time" submenu

Navigation System → Date / Time



Set date/time

Navigation System → Date/time → Set date/time

Description Set the date and local time. Every time the date or time is changed, a logbook entry is created.

User entry Date and time

Time format

Navigation System → Date/time → Time format

Description Select the time format.

Selection
- 24 h
- 12 h AM/PM

Time zone

Navigation System → Date/time → Time zone

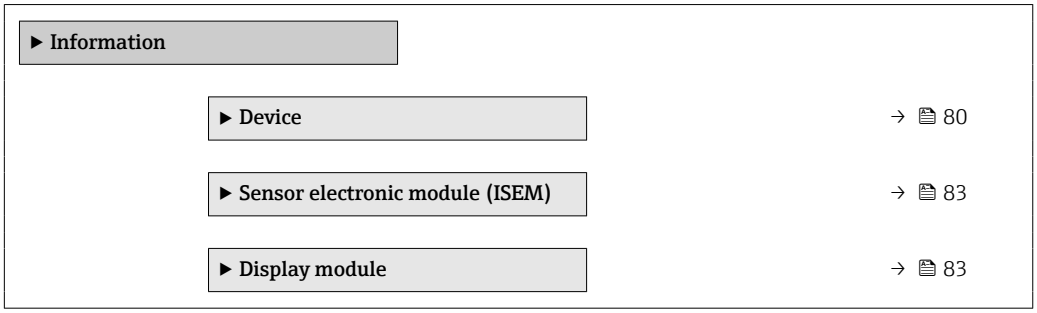
Description Select the time zone. Every time the time zone is changed, a logbook entry is created.

Selection

Other units
- UTC-12:00
- UTC-11:00
- UTC-10:00
- UTC-09:30
- UTC-09:00
- UTC-08:00
- UTC-07:00
- UTC-06:00
- UTC-05:00
- UTC-04:00
- UTC-03:30
- UTC-03:00
- UTC-02:00
- UTC-01:00
- UTC 00:00
- UTC+01:00
- UTC+02:00
- UTC+03:00
- UTC+03:30
- UTC+04:00
- UTC+04:30
- UTC+05:00
- UTC+05:30
- UTC+05:45
- UTC+06:00
- UTC+06:30
- UTC+07:00
- UTC+08:00
- UTC+08:45
- UTC+09:00
- UTC+09:30
- UTC+10:00
- UTC+10:30
- UTC+11:00
- UTC+12:00
- UTC+12:45
- UTC+13:00
- UTC+14:00

5.5 "Information" submenu

Navigation System → Information



5.5.1 "Device" submenu

Navigation System → Information → Device

Device name

Navigation System → Information → Device → Device name

Description Displays the name of the transmitter. The transmitter name is also provided on the nameplate of the transmitter.

User interface Character string comprising numbers, letters and special characters

Device tag

Navigation System → Information → Device → Device tag

Description Displays the name for the measuring point.

User entry Character string comprising numbers, letters and special characters (32)

Serial number

Navigation System → Information → Device → Serial number

Description Displays the serial number of the measuring device. The serial number is also provided on the nameplate of the sensor and of the transmitter.

The serial number can also be used to retrieve further device-related information and documentation via the Operations app or the Device Viewer on the Endress+Hauser website.

User interface Character string comprising numbers, letters and special characters

Order code

Navigation System → Information → Device → Order code

Description Displays the device order code.

The order code is used for instance to order a replacement or spare device or to verify that the device features specified on the order form match the shipping note.

User interface Character string comprising numbers, letters and special characters

Firmware version

Navigation System → Information → Device → Firmware version

Description Displays the device firmware version installed.

User interface Character string comprising numbers, letters and special characters

Extended order code 1

Navigation System → Information → Device → Ext. order cd. 1

Description Displays the first, second and/or third part of the extended order code.

Due to character length restrictions, the extended order code is split into a maximum of 3 parameters. The extended order code indicates for each feature in the product structure the selected option, thereby uniquely identifying the device model.

The extended order code can also be found on the nameplate.

User interface Character string comprising numbers, letters and special characters

Extended order code 2

Navigation System → Information → Device → Ext. order cd. 2

Description Displays the first, second and/or third part of the extended order code.

Due to character length restrictions, the extended order code is split into a maximum of 3 parameters. The extended order code indicates for each feature in the product structure the selected option, thereby uniquely identifying the device model.

The extended order code can also be found on the nameplate.

User interface Character string comprising numbers, letters and special characters

Extended order code 3

Navigation System → Information → Device → Ext. order cd. 3

Description Displays the first, second and/or third part of the extended order code.

Due to character length restrictions, the extended order code is split into a maximum of 3 parameters. The extended order code indicates for each feature in the product structure the selected option, thereby uniquely identifying the device model.

The extended order code can also be found on the nameplate.

User interface Character string comprising numbers, letters and special characters

ENP version

Navigation System → Information → Device → ENP version

Description Displays the version of the electronic nameplate (ENP).

User interface Character string comprising numbers, letters and special characters

Manufacturer

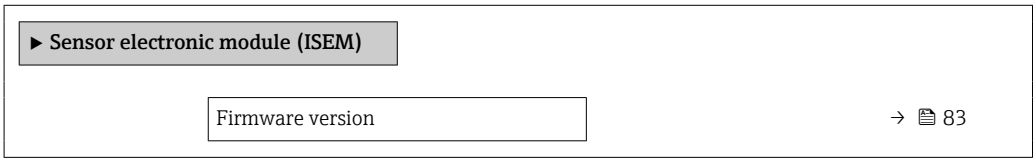
Navigation System → Information → Device → Manufacturer

Description Displays the manufacturer.

User interface Character string comprising numbers, letters and special characters

5.5.2 "Sensor electronic module (ISEM)" submenu

Navigation System → Information → Sens. electronic



Firmware version

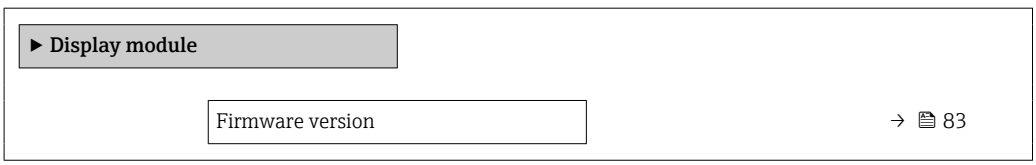
Navigation System → Information → Sens. electronic → Firmware version

Description Displays the firmware version of the module.

User interface Positive integer

5.5.3 "Display module" submenu

Navigation System → Information → Display module



Firmware version

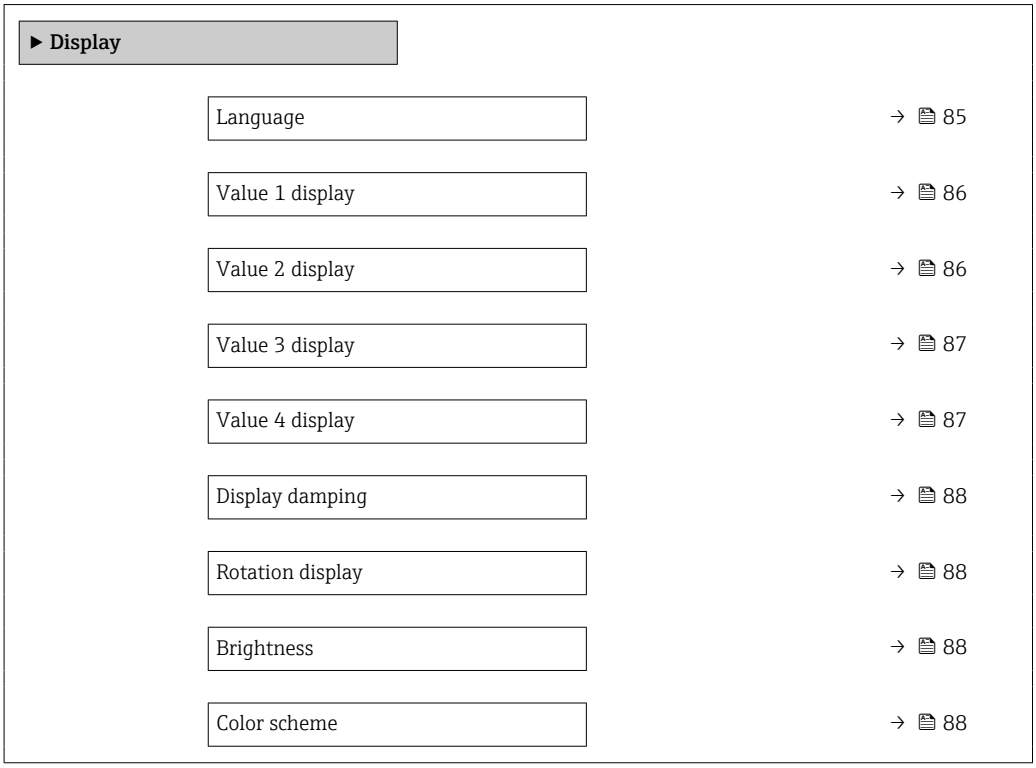
Navigation System → Information → Display module → Firmware version

Description Displays the firmware version of the module.

User interface	Positive integer

5.6 "Display" submenu

Navigation System → Display



Language

Navigation System → Display → Language

Description Set display language.

Selection
- English
- Deutsch
- Français
- Español
- Italiano
- Nederlands
- Portuguesa
- Polski
- русский язык (Russian)
- Svenska
- Türkçe
- 中文 (Chinese)
- 日本語 (Japanese)
- 한국어 (Korean)
- العَرَبيّة (Arabic) *
- Bahasa Indonesia *

* Visibility depends on order options or device settings

- ภาษาไทย (Thai) *
- tiếng Việt (Vietnamese) *
- čeština (Czech)

Value 1 display

Navigation System → Display → Value 1 display

Description Select the measured value to display in the first position on the local display.

The unit is set in the "System units" menu.

Selection
- Volume flow
- Mass flow
- Conductivity *
- Corrected conductivity *
- Temperature *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Noise *
- Coil current shot time *

Value 2 display

Navigation System → Display → Value 2 display

Description Select the measured value to display in the second position on the local display.

The unit is set in the "System units" menu.

Selection
- None
- Volume flow
- Mass flow
- Conductivity *
- Corrected conductivity *
- Temperature *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Noise *
- Coil current shot time *

* Visibility depends on order options or device settings

Value 3 display

Navigation System → Display → Value 3 display

Description Select the measured value to display in the third position on the local display.

The unit is set in the "System units" menu.

Selection
- None
- Volume flow
- Mass flow
- Conductivity *
- Corrected conductivity *
- Temperature *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Noise *
- Coil current shot time *

Value 4 display

Navigation System → Display → Value 4 display

Description Select the measured value to display in the fourth position on the local display.

The unit is set in the "System units" menu.

Selection
- None
- Volume flow
- Mass flow
- Conductivity *
- Corrected conductivity *
- Temperature *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Noise *
- Coil current shot time *

* Visibility depends on order options or device settings

Display damping

Navigation System → Display → Display damping

Description Enter a time constant to set the reaction time of the display to fluctuations in the measured value (PT1 element).

The smaller the time constant, the faster the display reacts to fluctuations in the measured value.
If the time constant is set to 0, damping is deactivated.

User entry 0.0 to 999.9 s

Rotation display

Navigation System → Display → Rotation display

Description Select rotation angle of the display text to optimize local display readability.

Selection
- Auto
- 0 degree
- 90 degree
- 180 degree
- 270 degree

Brightness

Navigation System → Display → Brightness

Description Adjust brightness.

User entry 0 to 100 %

Color scheme

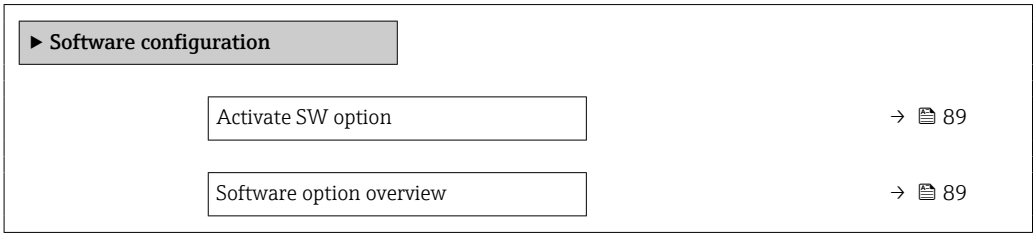
Navigation System → Display → Color scheme

Description Select the preferred color scheme.

Selection
- Light
- Dark

5.7 "Software configuration" submenu

Navigation System → Software config.



Activate SW option

Navigation System → Software config. → Activate SW opt.

Description Enter application package code or code of the functionality ordered separately to activate it.

Additional information:
- If a measuring device was ordered with an add-on software option, the activation code is programmed into the measuring device ex factory.
- After entering the activation code: Check whether the new software option is displayed in the "Software option overview" parameter and therefore active.

NOTE
If an invalid code is entered the software options that have already been activated are invalidated!
Before entering a new activation code: Create a record of the existing activation code.

User entry Positive integer

Software option overview

Navigation System → Software config. → SW option overv.

Description Displays all software options included in the order ex factory or ordered at a later date that have been enabled via the operating interface.

If a new software option is not displayed after entering the activation code, the code entered was inaccurate or invalid. In this case, contact the appropriate Endress+Hauser sales organization for assistance.

User interface
- Extended HistoROM
- Heartbeat Verification
- Heartbeat Monitoring

6 Explanation of abbreviated units

6.1 SI units

Process variable	Units	Explanation
Density	g/cm³, g/m³	Gram/volume unit
	kg/dm³, kg/l, kg/m³	Kilogram/volume unit
	SD4°C, SD15°C, SD20°C	Specific density: The specific density is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
	SG4°C, SG15°C, SG20°C	Specific gravity: The specific gravity is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
Mass	g, kg, t	Gram, kilogram, metric ton
Mass flow	g/s, g/min, g/h, g/d	Gram/time unit
	kg/s, kg/min, kg/h, kg/d	Kilogram/time unit
	t/s, t/min, t/h, t/d	Metric ton/time unit
Temperature	°C , K	Celsius, Kelvin
Volume	cm³, dm³, m³	Cubic centimeter, cubic decimeter, cubic meter
	ml, l, hl, Ml Mega	Milliliter, liter, hectoliter, megaliter
Time	s, m, h, d, y	Second, minute, hour, day, year

6.2 US units

Process variable	Units	Explanation
Density	lb/ft³, lb/gal (us)	Pound/cubic foot, pound/gallon
	lb/bbl (us;liq.), lb/bbl (us;beer), lb/bbl (us;oil), lb/bbl (us;tank)	Pound/volume unit
Mass	oz, lb, STon	Ounce, pound, standard ton
Mass flow	oz/s, oz/min, oz/h, oz/d	Ounce/time unit
	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	STon/s, STon/min, STon/h, STon/d	Standard ton/time unit
Temperature	°F, °R	Fahrenheit, Rankine
Volume	af	Acre foot
	ft³	Cubic foot
	fl oz (us), gal (us), kgal (us), Mgal (us)	Fluid ounce, gallon, kilogallon, million gallon
	bbl (us;liq.), bbl (us;beer), bbl (us;oil), bbl (us;tank)	Barrel (normal liquids), barrel (beer), barrel (petrochemicals), barrel (filling tanks)
Volume flow	af/s, af/min, af/h, af/d	Acre foot/time unit
	ft³/s, ft³/min, ft³/h, ft³/d	Cubic foot/time unit
	fl oz/s (us), fl oz/min (us), fl oz/h (us), fl oz/d (us)	Fluid ounce/time unit
	gal/s (us), gal/min (us), gal/h (us), gal/d (us)	Gallon/time unit
	kgal/s (us), kgal/min (us), kgal/h (us), kgal/d (us)	Kilogallon/time unit

Process variable	Units	Explanation
	Mgal/s (us), Mgal/min (us), Mgal/h (us), Mgal/d (us)	Million gallon/time unit
	bbl/s (us;liq.), bbl/min (us;liq.), bbl/h (us;liq.), bbl/d (us;liq.)	Barrel/time unit (normal liquids) Normal liquids: 31.5 gal/bbl
	bbl/s (us;beer), bbl/min (us;beer), bbl/h (us;beer), bbl/d (us;beer)	Barrel /time unit (beer) Beer: 31.0 gal/bbl
	bbl/s (us;oil), bbl/min (us;oil), bbl/h (us;oil), bbl/d (us;oil)	Barrel/time unit (petrochemicals) Petrochemicals: 42.0 gal/bbl
	bbl/s (us;tank), bbl/min (us;tank), bbl/h (us;tank), bbl/d (us;tank)	Barrel/time unit (filling tank) Filling tanks: 55.0 gal/bbl
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

6.3 Imperial units

Process variable	Units	Explanation
Density	lb/gal (imp), lb/bbl (imp;beer), lb/bbl (imp;oil)	Pound/volume unit
Volume	gal (imp), Mgal (imp)	Gallon, mega gallon
	bbl (imp;beer), bbl (imp;oil)	Barrel (beer), barrel (petrochemicals)
Volume flow	gal/s (imp), gal/min (imp), gal/h (imp), gal/d (imp)	Gallon/time unit
	Mgal/s (imp), Mgal/min (imp), Mgal/h (imp), Mgal/d (imp)	Mega gallon/time unit
	bbl/s (imp;beer), bbl/min (imp;beer), bbl/h (imp;beer), bbl/d (imp;beer)	Barrel /time unit (beer) Beer: 36.0 gal/bbl
	bbl/s (imp;oil), bbl/min (imp;oil), bbl/h (imp;oil), bbl/d (imp;oil)	Barrel/time unit (petrochemicals) Petrochemicals: 34.97 gal/bbl
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

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