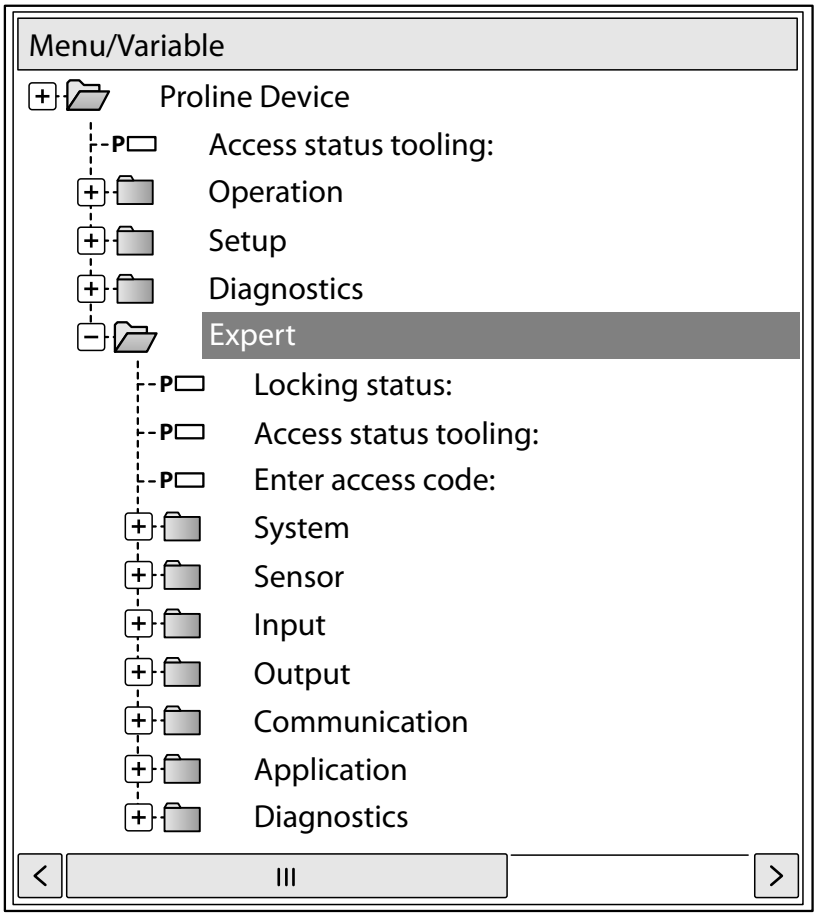
GP01042D/06/EN/01.15
71288065

Valid as of version
01.00.zz (Device firmware)

Description of Device Parameters
Proline Promag 100
PROFINET

Electromagnetic flowmeter



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People for Process Automation

Table of contents

1 Document information

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 Expert operating menu.

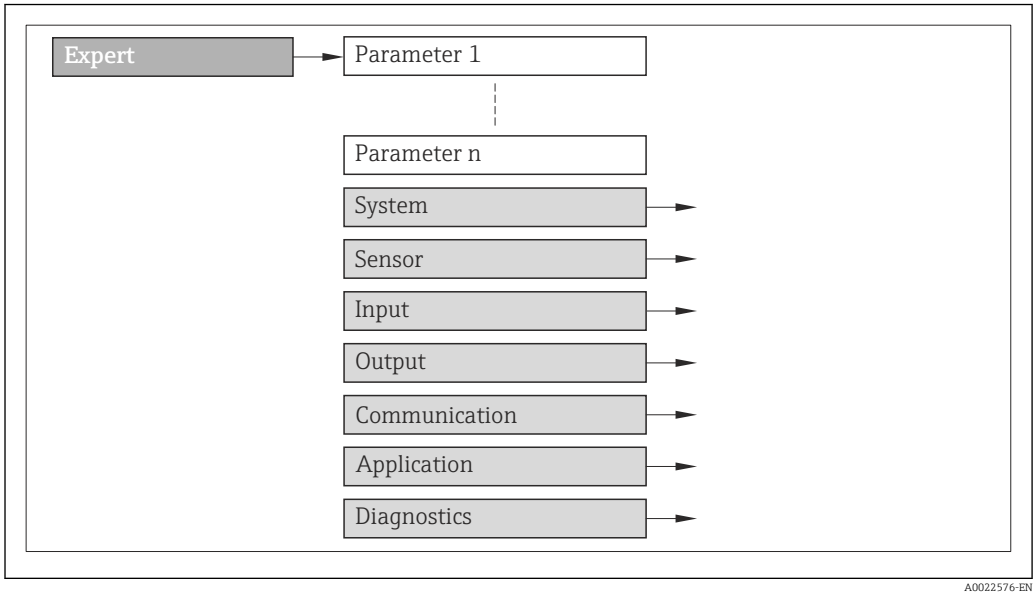
1.2 Target group

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

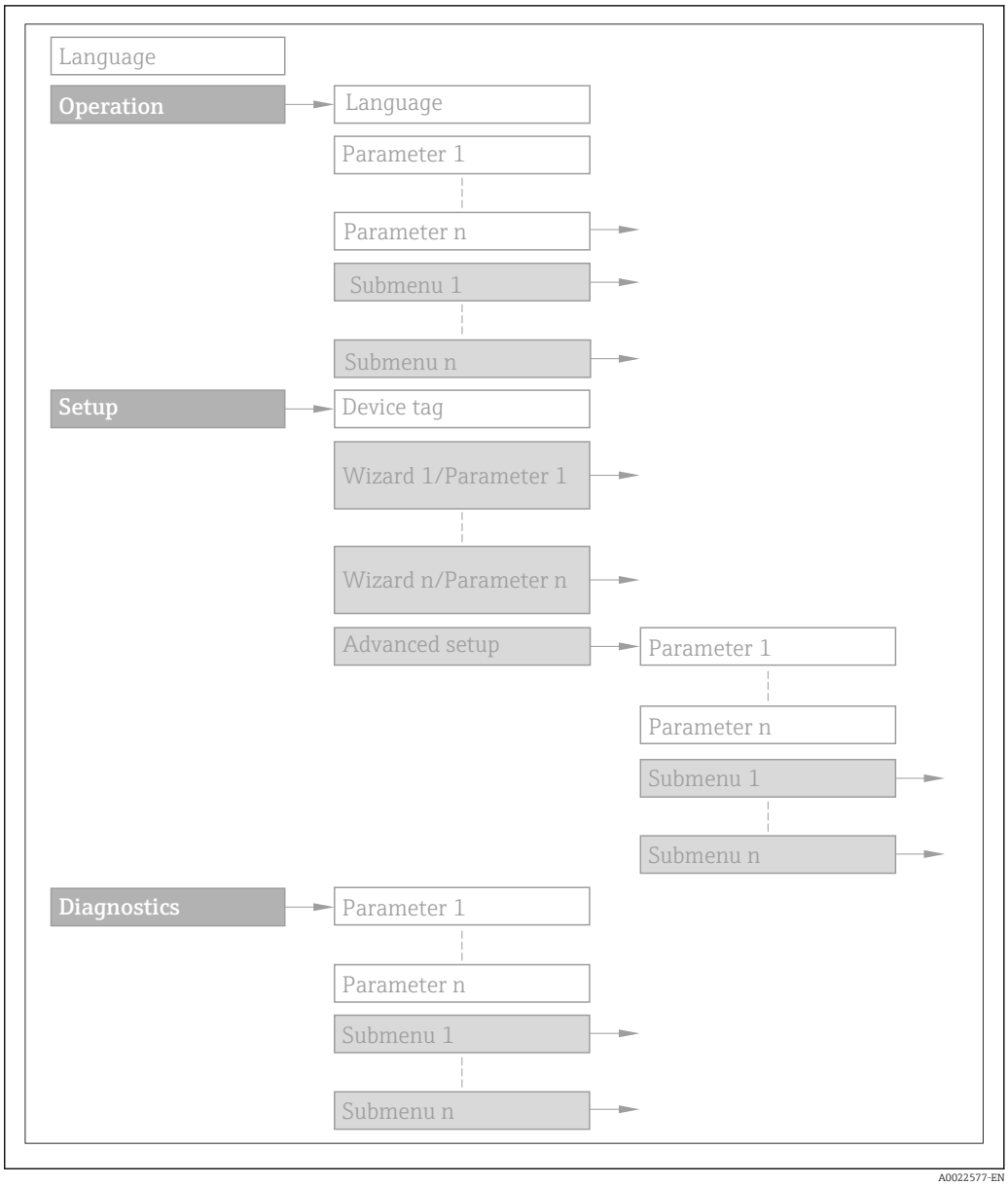
1.3.1 Information on the document structure

This document lists the submenus and their parameters according to the structure of the **Expert** menu (→ 8) menu that are available once the **"Operator" user role** or the **"Maintenance" user role** is enabled.



1 Sample graphic

For information on the arrangement of the parameters according to the structure of the **Operation** menu, **Setup** menu, **Diagnostics** menu (→ 84), along with a brief description, see the Operating Instructions for the device.



2 Sample graphic

For information about the operating philosophy, see the "Operating philosophy" chapter in the device's Operating Instructions

1.3.2 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 local display (direct access code) or Web browser
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

Factory setting
Default setting ex works

Additional information
Additional explanations (e.g. in examples):
- On individual options
- On display values/data
- On the input range
- On the factory setting
- On the parameter function

1.4 Symbols used

1.4.1 Symbols for certain types of information

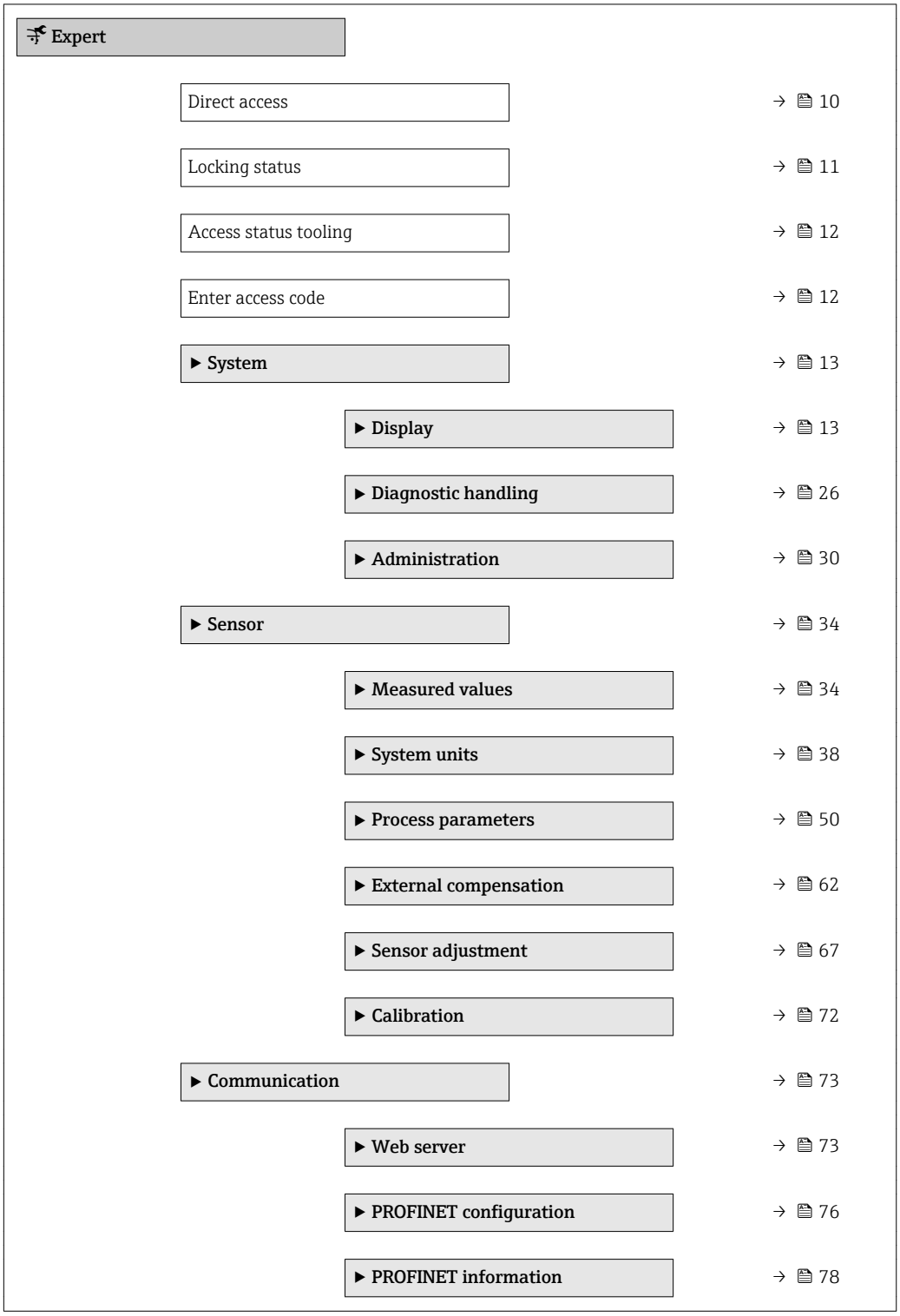
Symbol	Meaning
	Tip Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
	Operation via local display
	Operation via operating tool
	Write-protected parameter

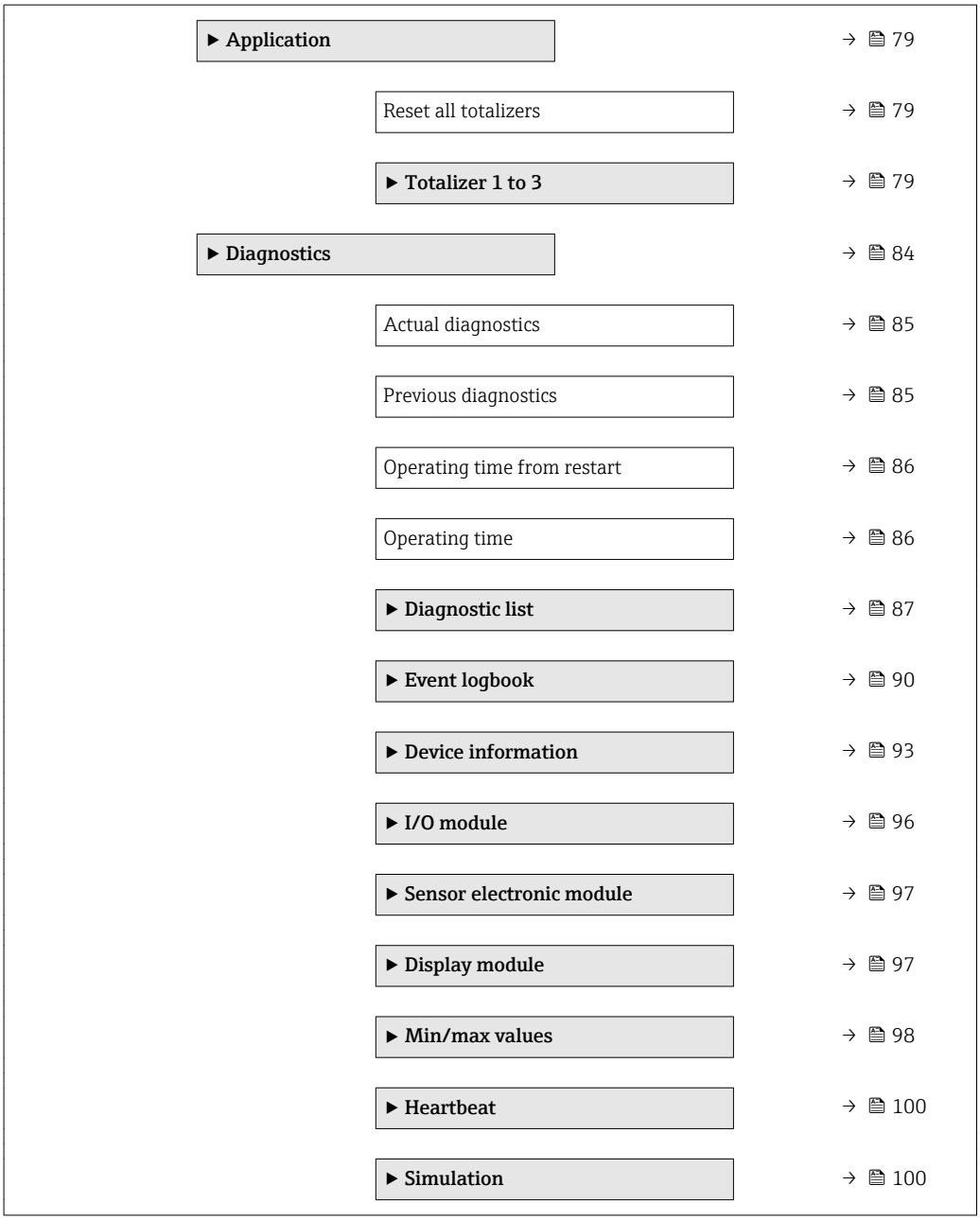
1.4.2 Symbols in graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3 ...	Item numbers	A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections		

2 Overview of the Expert operating menu

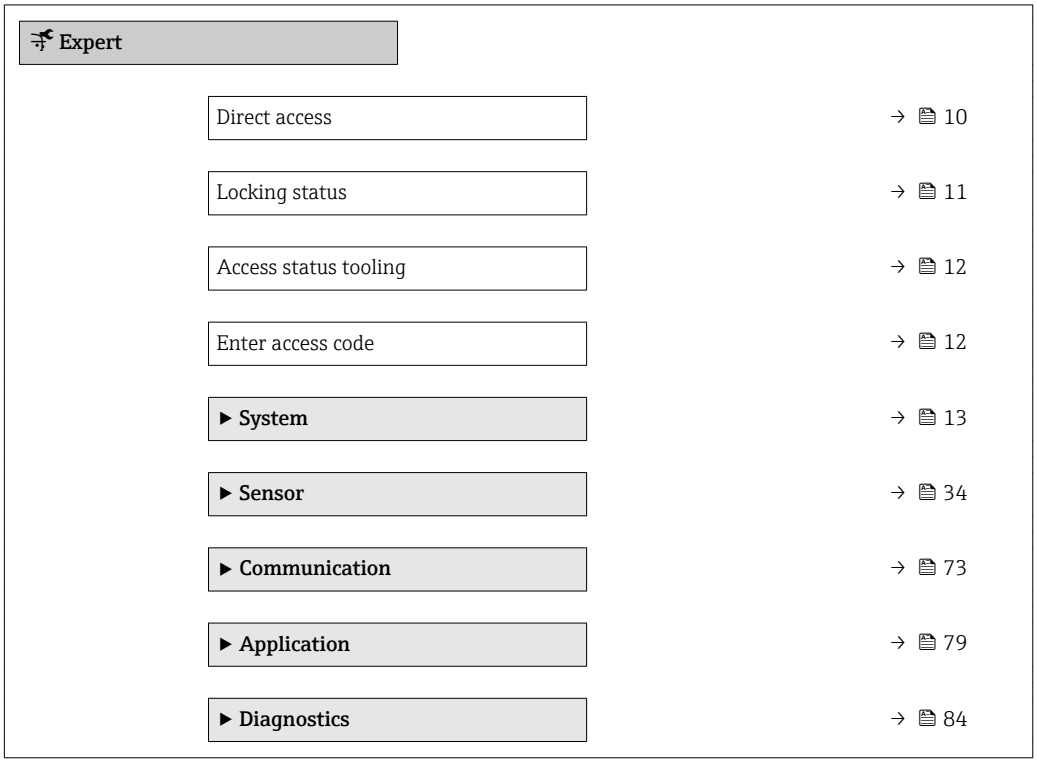
The following table provides an overview of the menu structure of the expert operating menu and its parameters. The page reference indicates where the associated description of the submenu or parameter can be found.




▶ Application
→ 79
Reset all totalizers
→ 79
▶ Totalizer 1 to 3
→ 79
▶ Diagnostics
→ 84
Actual diagnostics
→ 85
Previous diagnostics
→ 85
Operating time from restart
→ 86
Operating time
→ 86
▶ Diagnostic list
→ 87
▶ Event logbook
→ 90
▶ Device information
→ 93
▶ I/O module
→ 96
▶ Sensor electronic module
→ 97
▶ Display module
→ 97
▶ Min/max values
→ 98
▶ Heartbeat
→ 100
▶ Simulation
→ 100

3 Description of device parameters

In the following section, the parameters are listed according to the menu structure of the local display. Specific parameters for the operating tools are included at the appropriate points in the menu structure.



Direct access

Navigation Expert → Direct access

Prerequisite There is a local display with operating elements.

Description Input of the access code to enable direct access to the desired parameter via the local display. For this reason, each parameter is assigned a parameter number that appears in the navigation view on the right in the header of the selected parameter.

User entry 0 to 65 535

Additional information *User entry*

The direct access code consists of a 4-digit number and the channel number, which identifies the channel of a process variable: e.g. 0914-1

- The leading zeros in the direct access code do not have to be entered.
  Example: Input of **"914"** instead of **"0914"**
- If no channel number is entered, channel 1 is jumped to automatically.
  Example: Enter **0914** → **Assign process variable** parameter
- If a different channel is jumped to: Enter the direct access code with the corresponding channel number.
  Example: Enter **0914-3** → **Assign process variable** parameter

Locking status

Navigation Expert → Locking status

Description Displays the active write protection.

User interface
- Hardware locked
- Temporarily locked

Additional information *Display*

If two or more types of write protection are active, the write protection with the highest priority is shown on the local display. In the operating tool all active types of write protection are displayed.

If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the **Locking status** parameter (→ 11).

"Hardware locked" option (priority 1)

The DIP switch for hardware locking is activated on the main electronics module. This locks write access to the parameters (e.g. via local display or operating tool).

Information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device.

"Temporarily locked" option (priority 2)

Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset etc.). Once the internal processing has been completed, the parameters can be changed once again.

Access status display

Navigation Expert → Access stat.disp

Prerequisite A local display is provided.

Description Displays the access authorization to the parameters via the local display.

User interface
- Operator
- Maintenance

Factory setting Operator

Additional information

Description

If the 🔒-symbol appears in front of a parameter, it cannot be modified via the local display with the current access authorization.

Access authorization can be modified via the **Enter access code** parameter (→ 🖹 12).

For information on the **Enter access code** parameter, see the "Disabling write protection via access code" section of the Operating Instructions for the device

If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the **Locking status** parameter (→ 🖹 11).

Display

Information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device.

Access status tooling

Navigation Expert → Access stat.tool

Description Displays the access authorization to the parameters via the operating tool or Web browser.

User interface
- Operator
- Maintenance

Factory setting Maintenance

Additional information

Description

Access authorization can be modified via the **Enter access code** parameter (→ 🖹 12).

If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the **Locking status** parameter (→ 🖹 11).

Display

Information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device.

Enter access code

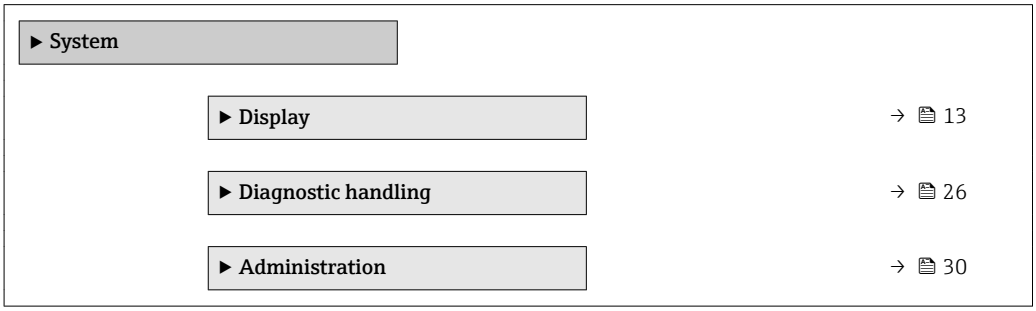
Navigation Expert → Ent. access code

Description Use this function to enter the user-specific release code to remove parameter write protection.

User entry 0 to 9 999

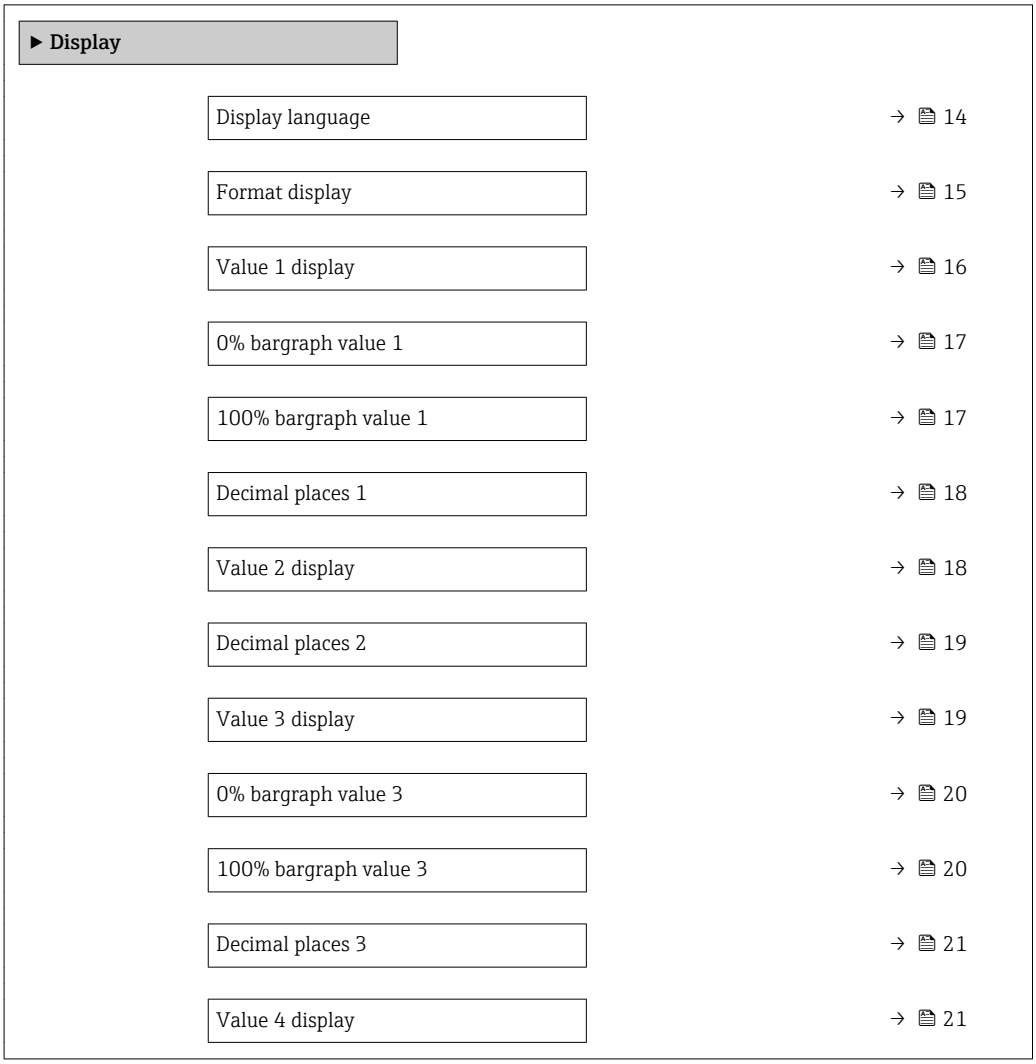
3.1 "System" submenu

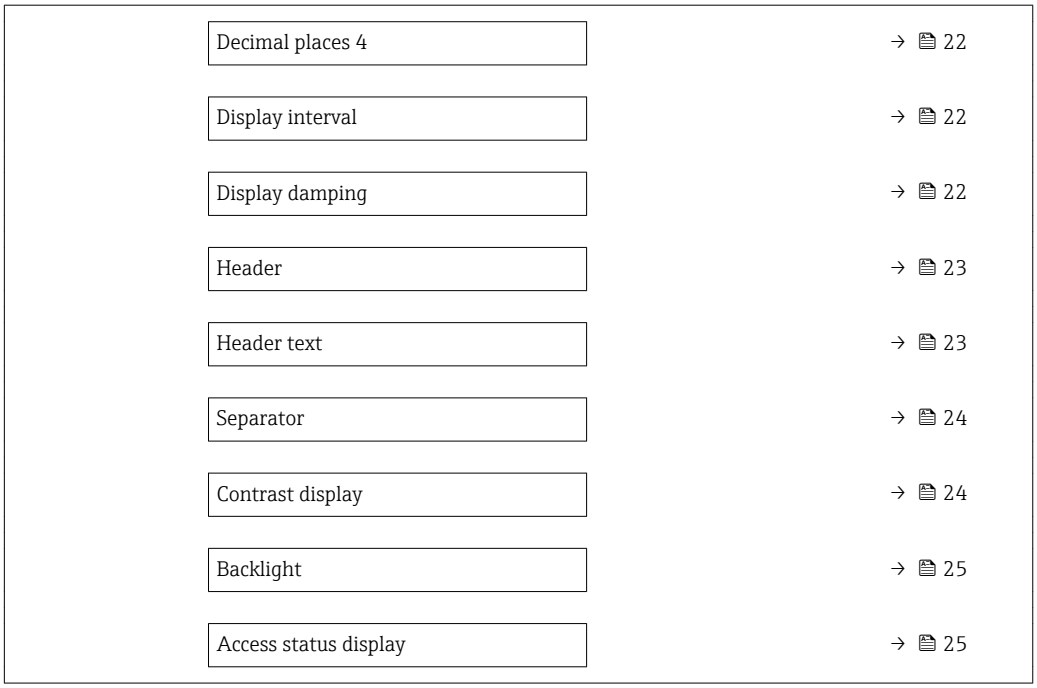
Navigation Expert → System



3.1.1 "Display" submenu

Navigation Expert → System → Display





Display language

Navigation Expert → System → Display → Display language

Prerequisite A local display is provided.

Description Use this function to select the configured language on the local display.

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

Factory setting English (alternatively, the ordered language is preset in the device)

* Visibility depends on order options or device settings

Format display

Navigation Expert → System → Display → Format display

Prerequisite A local display is provided.

Description Use this function to select how the measured value is shown on the local display.

Selection
- 1 value, max. size
- 1 bargraph + 1 value
- 2 values
- 1 value large + 2 values
- 4 values

Factory setting 1 value, max. size

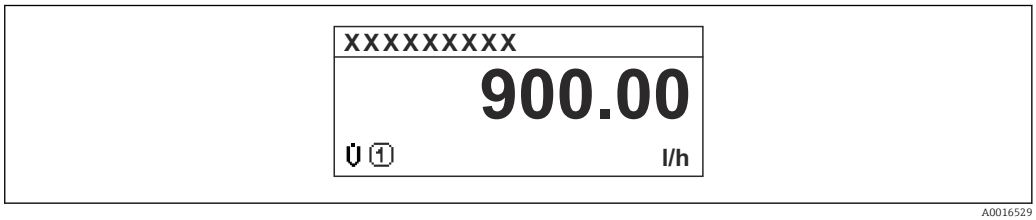
Additional information *Description*

The display format (size, bar graph etc.) and number of measured values displayed simultaneously (1 to 4) can be configured. This setting only applies to normal operation.

- The **Value 1 display** parameter (→ 16) to **Value 4 display** parameter (→ 21) are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device display. The display time until the next change is configured via the **Display interval** parameter (→ 22).

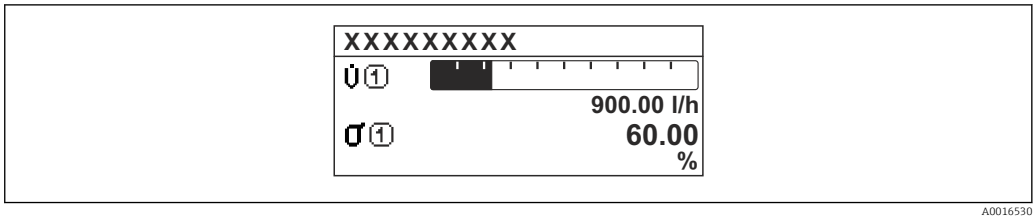
Possible measured values shown on the local display:

"1 value, max. size" option



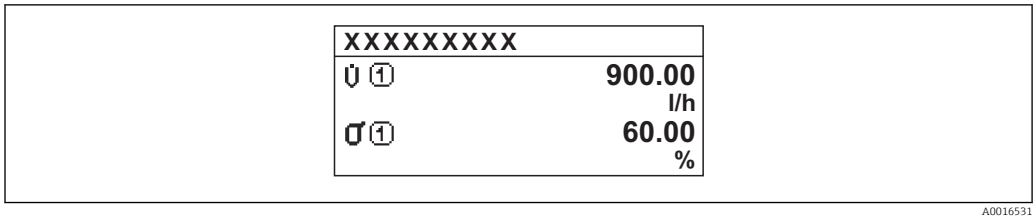
A0016529

"1 bargraph + 1 value" option



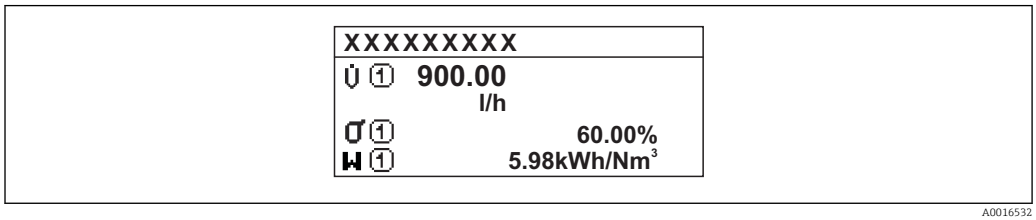
A0016530

"2 values" option

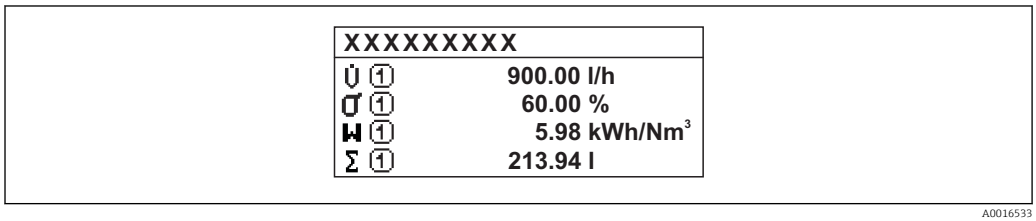


3

"1 value large + 2 values" option



"4 values" option



Value 1 display

Navigation Expert → System → Display → Value 1 display

Prerequisite A local display is provided.

Description Use this function to select one of the measured values to be shown on the local display.

Selection
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronic temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- None

* Visibility depends on order options or device settings

Factory setting Volume flow

Additional information *Description*

If several measured values are displayed at once, the measured value selected here will be the first value to be displayed. The value is only displayed during normal operation.

The **Format display** parameter (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 38).

0% bargraph value 1

Navigation Expert → System → Display → 0% bargraph 1

Prerequisite A local display is provided.

Description Use this function to enter the 0% bar graph value to be shown on the display for the measured value 1.

User entry Signed floating-point number

Factory setting Country-specific:
- 0 l/h
- 0 gal/min (us)

Additional information *Description*

The **Format display** parameter (→ 15) is used to specify that the measured value is to be displayed as a bar graph.

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 38).

100% bargraph value 1

Navigation Expert → System → Display → 100% bargraph 1

Prerequisite A local display is provided.

Description Use this function to enter the 100% bar graph value to be shown on the display for the measured value 1.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter → 103

Additional information *Description*

The **Format display** parameter (→ 15) is used to specify that the measured value is to be displayed as a bar graph.

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 38).

Decimal places 1

Navigation Expert → System → Display → Decimal places 1

Prerequisite A measured value is specified in the **Value 1 display** parameter (→ 16).

Description Use this function to select the number of decimal places for measured value 1.

Selection
- x
- x.x
- x.xx
- x.xxx
- x.xxxx

Factory setting x.xx

Additional information *Description*

This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.

Value 2 display

Navigation Expert → System → Display → Value 2 display

Prerequisite A local display is provided.

Description Use this function to select one of the measured values to be shown on the local display.

Selection For the picklist, see the **Value 1 display** parameter (→ 16)

Factory setting None

Additional information *Description*

If several measured values are displayed at once, the measured value selected here will be the second value to be displayed. The value is only displayed during normal operation.

The **Format display** parameter (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 38).

Decimal places 2

Navigation Expert → System → Display → Decimal places 2

Prerequisite A measured value is specified in the **Value 2 display** parameter (→ 18).

Description Use this function to select the number of decimal places for measured value 2.

Selection
- x
- x.x
- x.xx
- x.xxx
- x.xxxx

Factory setting x.xx

Additional information *Description*

This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.

Value 3 display

Navigation Expert → System → Display → Value 3 display

Prerequisite A local display is provided.

Description Use this function to select one of the measured values to be shown on the local display.

Selection Picklist, see **Value 1 display** parameter (→ 16)

Factory setting None

Additional information *Description*

If several measured values are displayed at once, the measured value selected here will be the third value to be displayed. The value is only displayed during normal operation.

The **Format display** parameter (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 38).

0% bargraph value 3

Navigation Expert → System → Display → 0% bargraph 3

Prerequisite A selection has been made in the **Value 3 display** parameter (→ 19).

Description Use this function to enter the 0% bar graph value to be shown on the display for the measured value 3.

User entry Signed floating-point number

Factory setting Country-specific:
- 0 l/h
- 0 gal/min (us)

Additional information *Description*

The **Format display** parameter (→ 15) is used to specify that the measured value is to be displayed as a bar graph.

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 38).

100% bargraph value 3

Navigation Expert → System → Display → 100% bargraph 3

Prerequisite A selection was made in the **Value 3 display** parameter (→ 19).

Description Use this function to enter the 100% bar graph value to be shown on the display for the measured value 3.

User entry Signed floating-point number

Factory setting 0

Additional information *Description*

The **Format display** parameter (→ 15) is used to specify that the measured value is to be displayed as a bar graph.

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 38).

Decimal places 3

Navigation Expert → System → Display → Decimal places 3

Prerequisite A measured value is specified in the **Value 3 display** parameter (→ 19).

Description Use this function to select the number of decimal places for measured value 3.

Selection
- x
- x.x
- x.xx
- x.xxx
- x.xxxx

Factory setting x.xx

Additional information *Description*

This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.

Value 4 display

Navigation Expert → System → Display → Value 4 display

Prerequisite A local display is provided.

Description Use this function to select one of the measured values to be shown on the local display.

Selection Picklist, see **Value 1 display** parameter (→ 16)

Factory setting None

Additional information *Description*

If several measured values are displayed at once, the measured value selected here will be the fourth value to be displayed. The value is only displayed during normal operation.

The **Format display** parameter (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 38).

Decimal places 4

Navigation Expert → System → Display → Decimal places 4

Prerequisite A measured value is specified in the **Value 4 display** parameter (→ 21).

Description Use this function to select the number of decimal places for measured value 4.

Selection
- x
- x.x
- x.xx
- x.xxx
- x.xxxx

Factory setting x.xx

Additional information *Description*

This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.

Display interval

Navigation Expert → System → Display → Display interval

Prerequisite A local display is provided.

Description Use this function to enter the length of time the measured values are displayed if the values alternate on the display.

User entry 1 to 10 s

Factory setting 5 s

Additional information *Description*

This type of alternating display only occurs automatically if the number of measured values defined exceeds the number of values the selected display format can display simultaneously.

- The **Value 1 display** parameter (→ 16) to **Value 4 display** parameter (→ 21) are used to specify which measured values are shown on the local display.
- The display format of the displayed measured values is specified using the **Format display** parameter (→ 15).

Display damping

Navigation Expert → System → Display → Display damping

Prerequisite A local display is provided.

Description Use this function to enter the reaction time of the local display to fluctuations in the measured value caused by process conditions.

User entry 0.0 to 999.9 s

Factory setting 0.0 s

Additional information *User entry*

A time constant is entered:
- If a low time constant is entered, the display reacts particularly quickly to fluctuating measured variables.
- On the other hand, the display reacts more slowly if a high time constant is entered.

Header

Navigation Expert → System → Display → Header

Prerequisite A local display is provided.

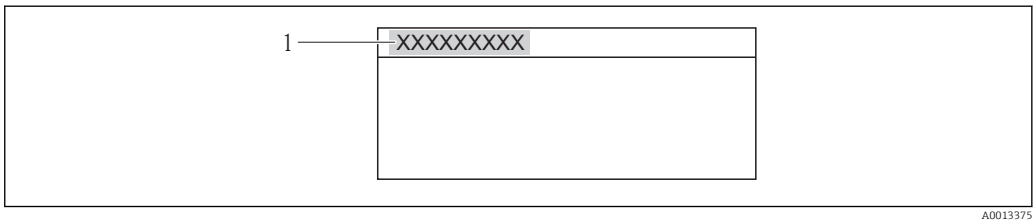
Description Use this function to select the contents of the header of the local display.

Selection
- Device tag
- Free text

Factory setting Device tag

Additional information *Description*

The header text only appears during normal operation.



1 Position of the header text on the display

Selection

Free text
Is defined in the **Header text** parameter (→ 23).

Header text

Navigation Expert → System → Display → Header text

Prerequisite The **Free text** option is selected in the **Header** parameter (→ 23).

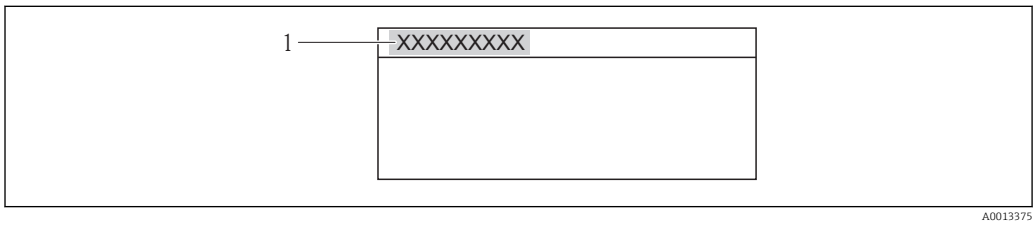
Description Use this function to enter a customer-specific text for the header of the local display.

User entry Max. 12 characters such as letters, numbers or special characters (e.g. @, %, /)

Factory setting ----------

Additional information *Description*

The header text only appears during normal operation.



1 Position of the header text on the display

User entry

The number of characters displayed depends on the characters used.

Separator

Navigation Expert → System → Display → Separator

Prerequisite A local display is provided.

Description Use this function to select the decimal separator.

Selection
- . (point)
- , (comma)

Factory setting . (point)

Contrast display

Navigation Expert → System → Display → Contrast display

Prerequisite A local display is provided.

Description Use this function to enter a value to adapt the display contrast to the ambient conditions (e.g. the lighting or viewing angle).

User entry 20 to 80 %

Factory setting Depends on the display

Backlight

Navigation Expert → System → Display → Backlight

Prerequisite Order code for "Display; operation", option E "SD03 4-line, illum.; touch control + data backup function"

Description Use this function to switch the backlight of the local display on and off.

Selection
- Disable
- Enable

Factory setting Enable

Access status display

Navigation Expert → System → Display → Access stat.disp

Prerequisite A local display is provided.

Description Displays the access authorization to the parameters via the local display.

User interface
- Operator
- Maintenance

Factory setting Operator

Additional information

Description

If the -symbol appears in front of a parameter, it cannot be modified via the local display with the current access authorization.

Access authorization can be modified via the **Enter access code** parameter (→ 12).

For information on the **Enter access code** parameter, see the "Disabling write protection via access code" section of the Operating Instructions for the device

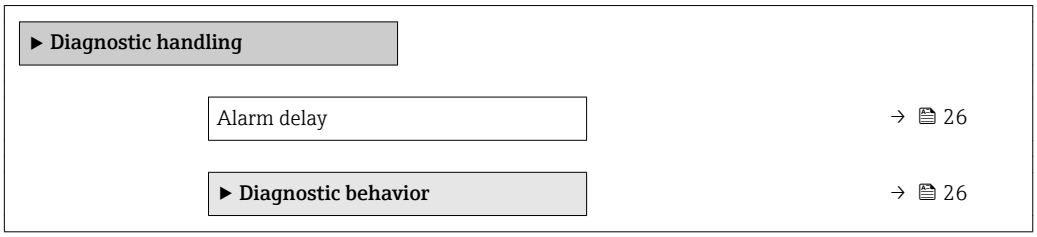
If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the **Locking status** parameter (→ 11).

Display

Information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device.

3.1.2 "Diagnostic handling" submenu

Navigation Expert → System → Diagn. handling



Alarm delay

Navigation Expert → System → Diagn. handling → Alarm delay

Description Use this function to enter the time interval until the device generates a diagnostic message.

The diagnostic message is reset without a time delay.

User entry 0 to 60 s

Factory setting 0 s

Additional information *Effect*

This setting affects the following diagnostic messages:
- 832 Electronic temperature too high
- 833 Electronic temperature too low
- 834 Process temperature too high
- 835 Process temperature too low
- 862 Partly filled pipe

"Diagnostic behavior" submenu

Each item of diagnostic information is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic information in the **Diagnostic behavior** submenu (→ 26).

The following options are available in the **Assign behavior of diagnostic no. xxx** parameters:

Diagnostic behavior	Description
Alarm	The device stops measurement. The totalizers assume the defined alarm condition. A diagnostic message is generated.
Warning	The device continues to measure. The measured value output via PROFINET and the totalizers are not affected. A diagnostic message is generated.

Diagnostic behavior	Description
Logbook entry only	The device continues to measure. The diagnostic message is displayed only in the **Event logbook** submenu (→ 🖹 90) (**Event list** submenu (→ 🖹 92)) and not in alternation with the operational display.
Off	The diagnostic event is ignored, and no diagnostic message is generated or entered.

For a list of all the diagnostic events, see the Operating Instructions for the device.

Navigation Expert → System → Diagn. handling → Diagn. behavior

► **Diagnostic behavior**

Assign behavior of diagnostic no. 531	→ 🖹 27
Assign behavior of diagnostic no. 832	→ 🖹 28
Assign behavior of diagnostic no. 833	→ 🖹 28
Assign behavior of diagnostic no. 834	→ 🖹 28
Assign behavior of diagnostic no. 835	→ 🖹 29
Assign behavior of diagnostic no. 862	→ 🖹 29
Assign behavior of diagnostic no. 937	→ 🖹 29
Assign behavior of diagnostic no. 302	→ 🖹 30

Assign behavior of diagnostic no. 531 (Empty pipe detection)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 531

Description Use this function to change the diagnostic behavior of the diagnostic message **531 Empty pipe detection**.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see

Assign behavior of diagnostic no. 832 (Electronic temperature too high)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832

Description Use this function to change the diagnostic behavior of the diagnostic message **832 Electronic temperature too high**.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see

Assign behavior of diagnostic no. 833 (Electronic temperature too low)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833

Description Use this function to change the diagnostic behavior of the diagnostic message **833 Electronic temperature too low**.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see

Assign behavior of diagnostic no. 834 (Process temperature too high)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 834

Description Use this function to change the diagnostic behavior of the diagnostic message **834 Process temperature too high**.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see

Assign behavior of diagnostic no. 835 (Process temperature too low)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 835

Description Use this function to change the diagnostic behavior of the diagnostic message **835 Process temperature too low**.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see

Assign behavior of diagnostic no. 862 (Empty pipe)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 862

Description Use this function to change the diagnostic behavior of the diagnostic message **862 Empty pipe**.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see

Assign behavior of diagnostic no. 937 (EMC interference)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 937

Description Use this function to change the diagnostic behavior of the diagnostic message **937 EMC interference**.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available, see

Assign behavior of diagnostic no. 302 (Device verification active)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 302

Description Use this function to change the diagnostic behavior of the diagnostic message **302 Device verification active**.

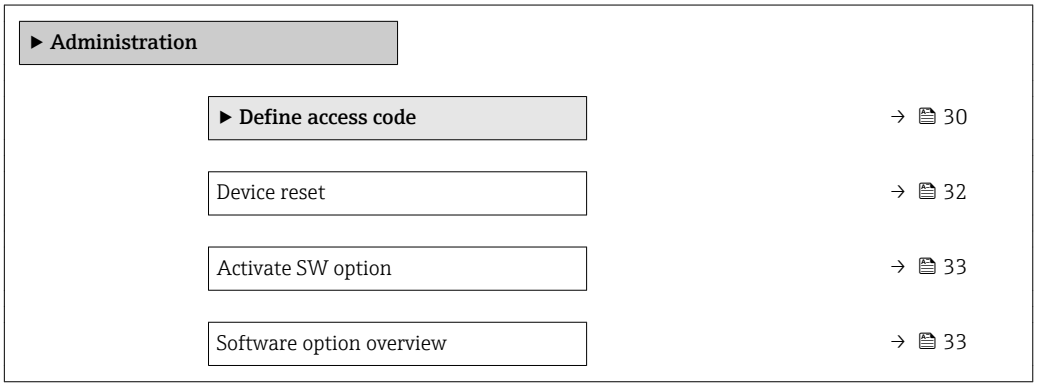
Selection
- Alarm
- Warning

Factory setting Warning

Additional information For a detailed description of the options available, see

3.1.3 "Administration" submenu

Navigation Expert → System → Administration

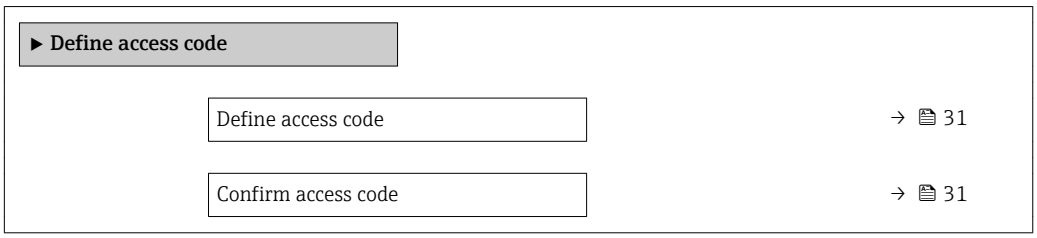


"Define access code" wizard

The **Define access code** wizard (→ 30) is only available when operating via the local display or Web browser.

If operating via the operating tool, the **Define access code** parameter (→ 32) can be found directly in the **Administration** submenu. There is no **Confirm access code** parameter if the device is operated via the operating tool.

Navigation Expert → System → Administration → Def. access code



Define access code

Navigation Expert → System → Administration → Def. access code → Def. access code

Description Use this function to enter a user-specific release code to restrict write-access to the parameters. This protects the configuration of the device against any inadvertent changes via the local display or Web browser.

User entry 0 to 9 999

Factory setting 0

Additional information

Description

The write protection affects all parameters in the document marked with the symbol.

On the local display, the symbol in front of a parameter indicates that the parameter is write-protected.

The parameters that cannot be write-accessed are grayed out in the Web browser.

Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the **Enter access code** parameter (→ 12).

If you lose the access code, please contact your Endress+Hauser Sales Center.

User entry

A message is displayed if the access code is not in the input range.

Factory setting

If the factory setting is not changed or **0** is defined as the access code, the parameters are not write-protected and the device configuration data can be modified. The user is logged on in the **"Maintenance"** role.

Confirm access code

Navigation Expert → System → Administration → Def. access code → Confirm code

Description Enter the defined release code a second time to confirm the release code.

User entry 0 to 9 999

Factory setting 0

Additional parameters in the "Administration" submenu

Define access code

Navigation Expert → System → Administration → Def. access code

Description Use this function to enter a user-specific release code to restrict write-access to the parameters. This protects the configuration of the device against any inadvertent changes via the operating tool.

User entry 0 to 9 999

Factory setting 0

Additional information

Description

The write protection affects all parameters in the document marked with the symbol.

Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the **Enter access code** parameter (→ 12).

If you lose the access code, please contact your Endress+Hauser Sales Center.

User entry

A message is displayed if the access code is not in the input range.

Factory setting

If the factory setting is not changed or **0** is defined as the access code, the parameters are not write-protected and the device configuration data can be modified. The user is logged on in the **"Maintenance"** role.

Device reset

Navigation Expert → System → Administration → Device reset

Description Use this function to choose whether to reset the device configuration - either entirely or in part - to a defined state.

Selection
- Cancel
- To delivery settings
- Restart device
- Delete factory data

Factory setting Cancel

Additional information

"Cancel" option

No action is executed and the user exits the parameter.

"To delivery settings" option

Every parameter for which a customer-specific default setting was ordered is reset to this customer-specific value. All other parameters are reset to the factory setting.

This option is not visible if no customer-specific settings have been ordered.

"Restart device" option

The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.

Activate SW option

Navigation Expert → System → Administration → Activate SW opt.

Description Use this function to enter an activation code to enable an additional, ordered software option.

User entry Max. 10-digit string consisting of numbers.

Factory setting 0

Additional information

User entry

Endress+Hauser provides the corresponding activation code for the software option with the order.

NOTICE! This activation code varies depending on the measuring device and the software option. If an incorrect or invalid code is entered, this can result in the loss of software options that are already been activated. After commissioning the measuring device: in this parameter only enter activation codes which Endress+Hauser has provided (e.g. when a new software option was ordered). If an incorrect or invalid activation code is entered, enter the activation code from the parameter protocol again and contact your Endress+Hauser sales organization, quoting the serial number of your device.

Example for a software option

Order code for "Application package", option EB "Heartbeat Verification + Monitoring"

Web browser

Once a software option has been activated, the page must be loaded again in the Web browser.

Software option overview

Navigation Expert → System → Administration → SW option overv.

Description Displays all the software options that are enabled in the device.

User interface

- Electrode cleaning circuit
- Heartbeat Verification
- Heartbeat Monitoring

Additional information

Description

Displays all the options that are available if ordered by the customer.

"Electrode cleaning circuit" option

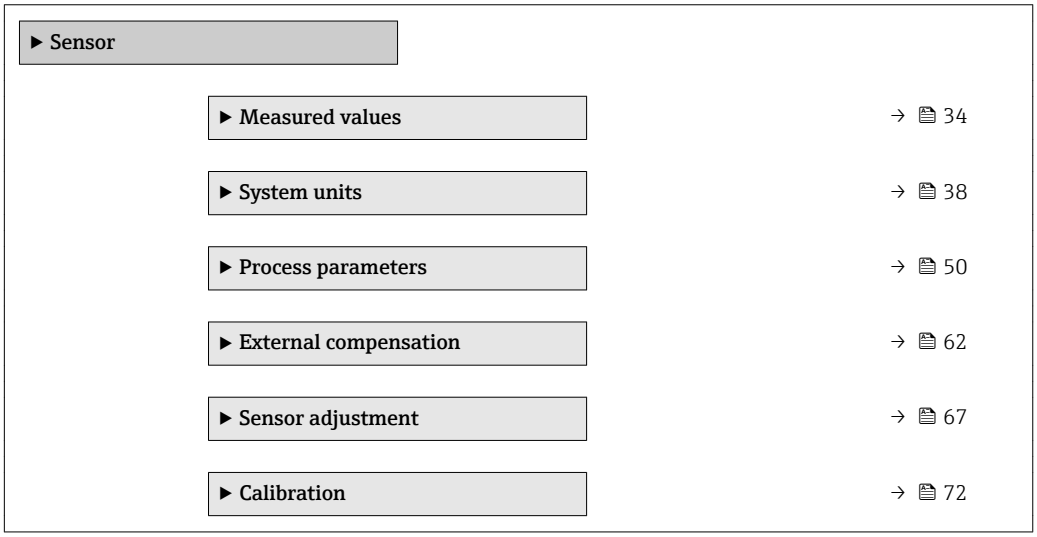
Order code for "Application package", option EC "ECC electrode cleaning"

"Heartbeat Verification" option and "Heartbeat Monitoring" option

Order code for "Application package", option EB "Heartbeat Verification + Monitoring"

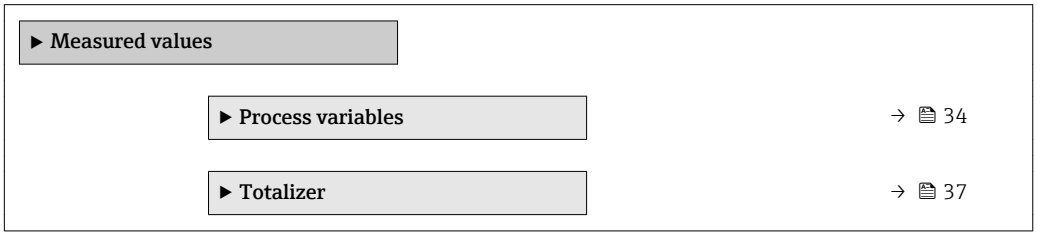
3.2 "Sensor" submenu

Navigation Expert → Sensor



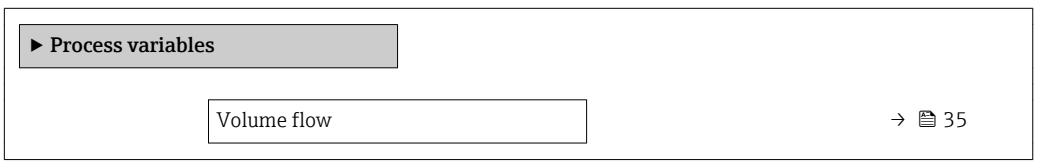
3.2.1 "Measured values" submenu

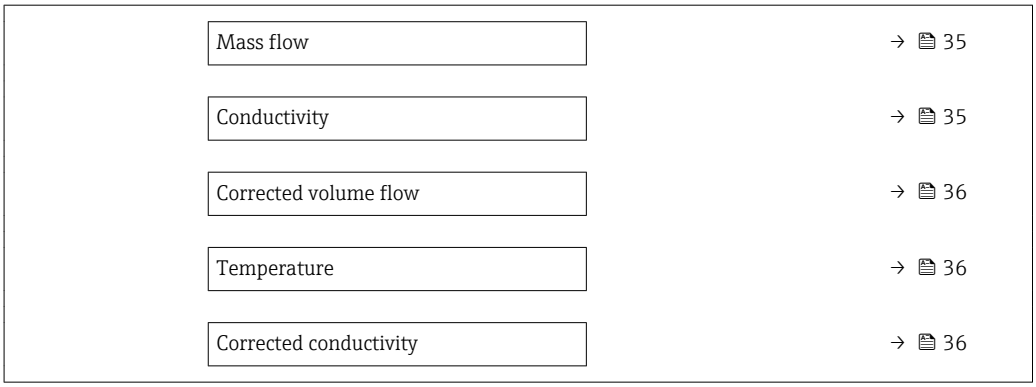
Navigation Expert → Sensor → Measured val.



"Process variables" submenu

Navigation Expert → Sensor → Measured val. → Process variab.





Volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → Volume flow

Description Displays the volume flow currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 39)

Mass flow

Navigation Expert → Sensor → Measured val. → Process variab. → Mass flow

Description Displays the mass flow currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Mass flow unit** parameter (→ 42)

Conductivity

Navigation Expert → Sensor → Measured val. → Process variab. → Conductivity

Prerequisite In the **Conductivity measurement** parameter (→ 53), the **On** option is selected.

Description Displays the conductivity currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Conductivity unit** parameter (→ 41)

Corrected volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → Correct.vol.flow

Description Displays the corrected volume flow currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Corrected volume flow unit** parameter (→ 44)

Temperature

Navigation Expert → Sensor → Measured val. → Process variab. → Temperature

Prerequisite For the following order code:
"Sensor Option", option CI "Fluid temperature probe"

Description Displays the temperature currently calculated.

User interface Positive floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 42)

Corrected conductivity

Navigation Expert → Sensor → Measured val. → Process variab. → CorrConductivity

Prerequisite One of the following conditions is satisfied:
- Order code for "Sensor Option", option CI "Fluid temperature probe"
  or
- The temperature is read into the flowmeter from an external device.

Description Displays the conductivity currently corrected.

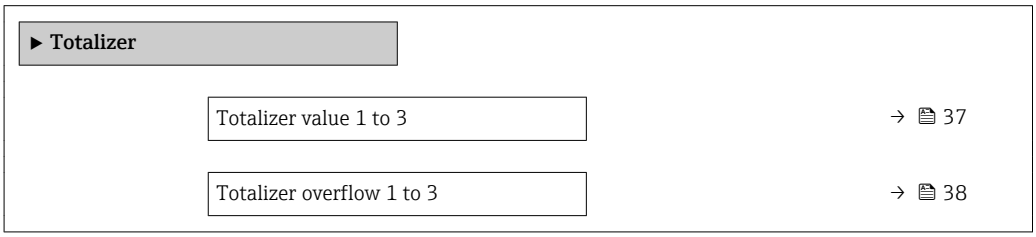
User interface Positive floating-point number

Additional information *Dependency*

The unit is taken from the **Conductivity unit** parameter (→ 41)

"Totalizer" submenu

Navigation Expert → Sensor → Measured val. → Totalizer



Totalizer value 1 to 3

Navigation Expert → Sensor → Measured val. → Totalizer → Totalizer val. 1 to 3

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 80) of the **Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

Description Displays the current totalizer reading.

User interface Signed floating-point number

Additional information *Description*

As it is only possible to display a maximum of 7 digits, the current counter value is the sum of the totalizer value and the overflow value from the **Totalizer overflow 1 to 3** parameter if the display range is exceeded.

In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (→ 83).

Display

The value of the process variable totalized since measuring began can be positive or negative. This depends on the settings in the **Totalizer operation mode** parameter (→ 81).

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 80).

Example

Calculation of the current totalizer reading when the value exceeds the 7-digit display range:
- Value in the **Totalizer value 1** parameter: 196 845.7 m^3
- Value in the **Totalizer overflow 1** parameter: $1 \cdot 10^6$ (1 overflow) = 1 000 000 [m^3]
- Current totalizer reading: 1 196 845.7 m^3

Totalizer overflow 1 to 3

Navigation Expert → Sensor → Measured val. → Totalizer → Tot. overflow 1 to 3

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 80) of the **Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

Description Displays the current totalizer overflow.

User interface Integer with sign

Additional information

Description

If the current reading has more than 7 digits, which is the maximum value range that can be displayed, the value above this range is given as an overflow. The current totalizer value is therefore the sum of the overflow value and the totalizer value from the **Totalizer value 1 to 3** parameter

Display

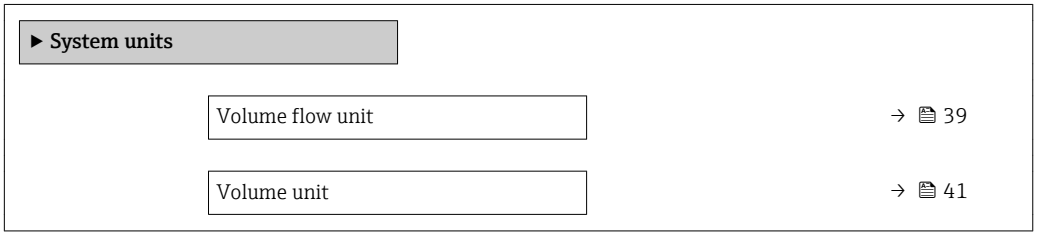
The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 80).

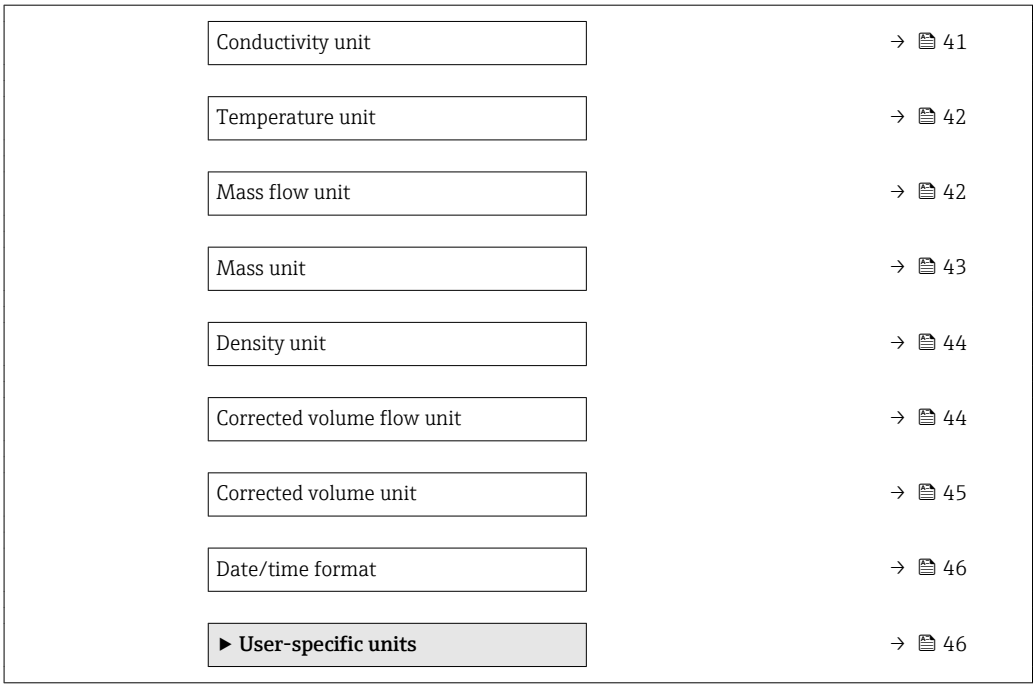
Example

Calculation of the current totalizer reading when the value exceeds the 7-digit display range:
- Value in the **Totalizer value 1** parameter: 196 845.7 m^3
- Value in the **Totalizer overflow 1** parameter: $2 \cdot 10^6$ (2 overflows) = 2 000 000 [m^3]
- Current totalizer reading: 2 196 845.7 m^3

3.2.2 "System units" submenu

Navigation Expert → Sensor → System units





Volume flow unit

Navigation Expert → Sensor → System units → Volume flow unit

Description Use this function to select the unit for the volume flow.

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
- 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)
- kgal/s (us)
- kgal/min (us)
- kgal/h (us)
- kgal/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)

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)

Custom-specific units
- User vol./s
- User vol./min
- User vol./h
- User vol./d

Factory setting

Country-specific:
- l/h
- gal/min (us)

Additional information

Result

The selected unit applies for:
Volume flow parameter (→ 35)

Selection

For an explanation of the abbreviated units: → 107

Volume unit

Navigation Expert → Sensor → System units → Volume unit

Description Use this function to select the unit for the volume.

Selection

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

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

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

Custom-specific units
User vol.

Factory setting Country-specific:
- m^3
- gal (us)

Additional information *Selection*

For an explanation of the abbreviated units: → 107

Conductivity unit

Navigation Expert → Sensor → System units → Conductiv. unit

Prerequisite In the **Conductivity measurement** parameter (→ 53), the **On** option is selected.

Description Use this function to select the unit for the conductivity.

Selection

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

Factory setting µS/cm

Additional information

Result

The selected unit applies for:
- **Conductivity** parameter (→ 35)
- **Corrected conductivity** parameter (→ 36)

Selection

For an explanation of the abbreviated units: → 107

Temperature unit

Navigation Expert → Sensor → System units → Temperature unit

Description Use this function to select the unit for the temperature.

Selection

SI units
- °C
- K

US units
- °F
- °R

Factory setting

Country-specific:
- °C
- °F

Additional information

Result

The selected unit applies for:
- **Temperature** parameter (→ 36)
- **Maximum value** parameter (→ 99)
- **Minimum value** parameter (→ 98)
- **External temperature** parameter (→ 63)
- **Maximum value** parameter (→ 100)
- **Minimum value** parameter (→ 99)
- **Fail safe value of external temperature** parameter (→ 64)

Selection

For an explanation of the abbreviated units: → 107

Mass flow unit

Navigation Expert → Sensor → System units → Mass flow unit

Description Use this function to select the unit for the mass flow.

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

Custom-specific units
- User mass/s
- User mass/min
- User mass/h
- User mass/d

Factory setting

Country-specific:
- kg/h
- lb/min

Additional information

Result

The selected unit applies for:
Mass flow parameter (→ 35)

Selection

For an explanation of the abbreviated units: → 107

Mass unit

Navigation

Expert → Sensor → System units → Mass unit

Description

Use this function to select the unit for the mass.

Selection

SI units
- g
- kg
- t

US units
- oz
- lb
- STon

Custom-specific units
User mass

Factory setting

Country-specific:
- kg
- lb

Additional information

Selection

For an explanation of the abbreviated units: → 107

Density unit

Navigation Expert → Sensor → System units → Density unit

Description Use this function to select the unit for the density.

Selection

SI units
- g/cm³
- g/m³
- kg/dm³
- kg/l
- 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)

Factory setting Country-specific:
- kg/l
- lb/ft³

Additional information

Result

The selected unit applies for:
- **External density** parameter (→ 65)
- **Fixed density** parameter (→ 65)

Selection

- SD = 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).
- SG = 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).

For an explanation of the abbreviated units: → 107

Corrected volume flow unit

Navigation Expert → Sensor → System units → Cor.volflow unit

Description Use this function to select the unit for the corrected volume flow.

Selection

SI units
- Nl/s
- Nl/min
- Nl/h
- Nl/d
- Nm³/s
- Nm³/min
- Nm³/h
- Nm³/d
- Sm³/s
- Sm³/min
- Sm³/h
- Sm³/d

US units
- Sft³/s
- Sft³/min
- Sft³/h
- Sft³/d
- Sgal/s (us)
- Sgal/min (us)
- Sgal/h (us)
- Sgal/d (us)
- Sbbl/s (us;liq.)
- Sbbl/min (us;liq.)
- Sbbl/h (us;liq.)
- Sbbl/d (us;liq.)

Imperial units
- Sgal/s (imp)
- Sgal/min (imp)
- Sgal/h (imp)
- Sgal/d (imp)

Custom-specific units
- UserCrVol./s
- UserCrVol./min
- UserCrVol./h
- UserCrVol./d

Factory setting

Country-specific:
- Nl/h
- Sft³/h

Additional information

Result

The selected unit applies for:
Corrected volume flow parameter (→ 36)

Selection

For an explanation of the abbreviated units: → 107

Corrected volume unit

Navigation

Expert → Sensor → System units → Corr. vol. unit

Description

Use this function to select the unit for the corrected volume.

Selection

SI units
- Nl
- Nm³
- Sm³

US units
- Sft³
- Sgal (us)
- Sbbl (us;liq.)

Imperial units
Sgal (imp)

Custom-specific units
UserCrVol.

Factory setting

Country-specific:
- Nm³
- Sft³

Additional information

Selection

For an explanation of the abbreviated units: → 107

Date/time format

Navigation Expert → Sensor → System units → Date/time format

Description Use this function to select the desired time format for calibration history.

Selection
- dd.mm.yy hh:mm
- dd.mm.yy hh:mm am/pm
- mm/dd/yy hh:mm
- mm/dd/yy hh:mm am/pm

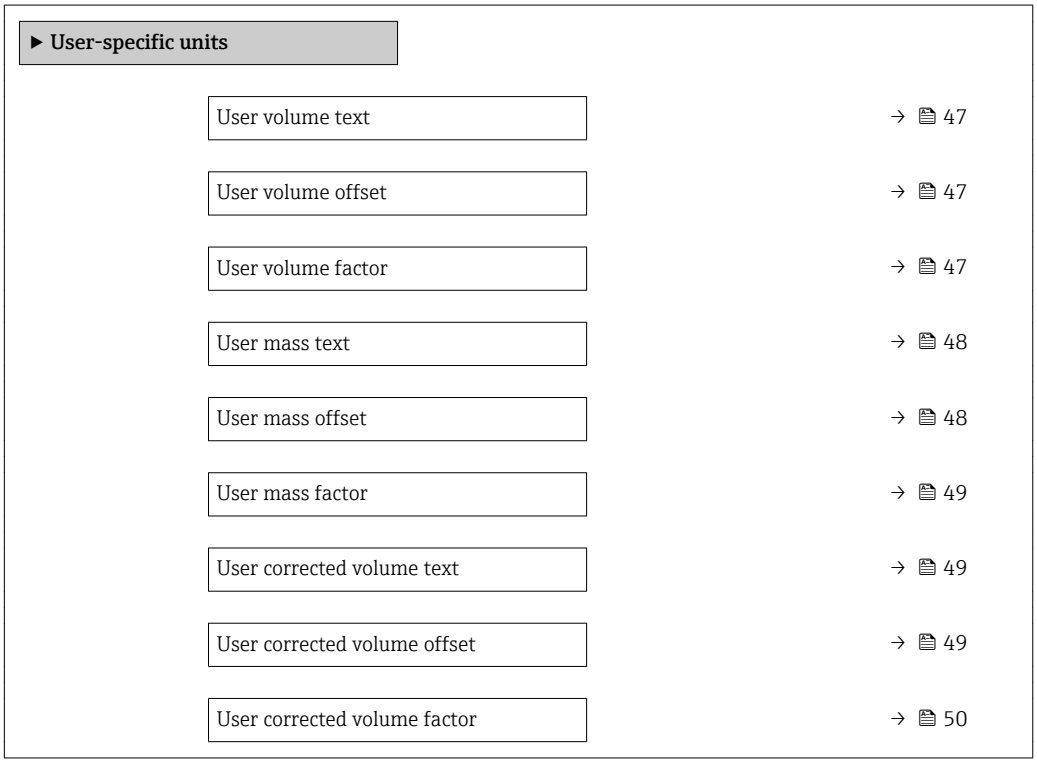
Factory setting dd.mm.yy hh:mm

Additional information *Selection*

For an explanation of the abbreviated units: → 107

"User-specific units" submenu

Navigation Expert → Sensor → System units → User-spec. units



User volume text

Navigation Expert → Sensor → System units → User-spec. units → Volume text

Description Use this function to enter a text for the user-specific unit of volume and volume flow. The corresponding time units (s, min, h, d) for volume flow are generated automatically.

User entry Max. 10 characters such as letters, numbers or special characters (@, %, /)

Factory setting User vol.

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Volume flow unit** parameter (→ 39)
- **Volume unit** parameter (→ 41)

Example

If the text GLAS is entered, the choose list of the **Volume flow unit** parameter (→ 39) shows the following options:
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

User volume offset

Navigation Expert → Sensor → System units → User-spec. units → Volume offset

Description Use this function to enter the offset for adapting the user-specific volume unit and volume flow unit (without time).

User entry Signed floating-point number

Factory setting 0

Additional information *Description*

Value in user-specific unit = (factor × value in base unit) + offset

User volume factor

Navigation Expert → Sensor → System units → User-spec. units → Volume factor

Description Use this function to enter a quantity factor (without time) for the user-specific volume and volume flow unit.

User entry Signed floating-point number

Factory setting 1.0

User mass text

Navigation Expert → Sensor → System units → User-spec. units → Mass text

Description Use this function to enter a text for the user-specific unit of mass and mass flow. The corresponding time units (s, min, h, d) for mass flow are generated automatically.

User entry Max. 10 characters such as letters, numbers or special characters (@, %, /)

Factory setting User mass

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Mass flow unit** parameter (→ 42)
- **Mass unit** parameter (→ 43)

Example

If the text GLAS is entered, the following options are displayed in the picklist for the **Mass flow unit** parameter (→ 42):
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

User mass offset

Navigation Expert → Sensor → System units → User-spec. units → Mass offset

Description Use this function to enter the offset for adapting the user-specific mass unit and mass flow unit (without time).

User entry Signed floating-point number

Factory setting 0

Additional information *Description*

Value in user-specific unit = (factor × value in base unit) + offset

User mass factor

Navigation Expert → Sensor → System units → User-spec. units → Mass factor

Description Use this function to enter a quantity factor (without time) for the user-specific mass and mass flow unit.

User entry Signed floating-point number

Factory setting 1.0

User corrected volume text

Navigation Expert → Sensor → System units → User-spec. units → Corr. vol. text

Description Use this function to enter a text for the user-specific unit of the corrected volume and corrected volume flow. The corresponding time units (s, min, h, d) for mass flow are generated automatically.

User entry Max. 10 characters such as letters, numbers or special characters (@, %, /)

Factory setting UserCrVol.

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Corrected volume flow unit** parameter (→ 44)
- **Corrected volume unit** parameter (→ 45)

Example

If the text GLAS is entered, the choose list of the **Corrected volume flow unit** parameter (→ 44) shows the following options:
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

User corrected volume offset

Navigation Expert → Sensor → System units → User-spec. units → Corr vol. offset

Description Use this function to enter the offset for adapting the user-specific corrected volume unit and corrected volume flow unit (without time).

Value in user-specific unit = (factor × value in base unit) + offset

User entry Signed floating-point number

Factory setting 0

User corrected volume factor

Navigation Expert → Sensor → System units → User-spec. units → Cor.vol. factor

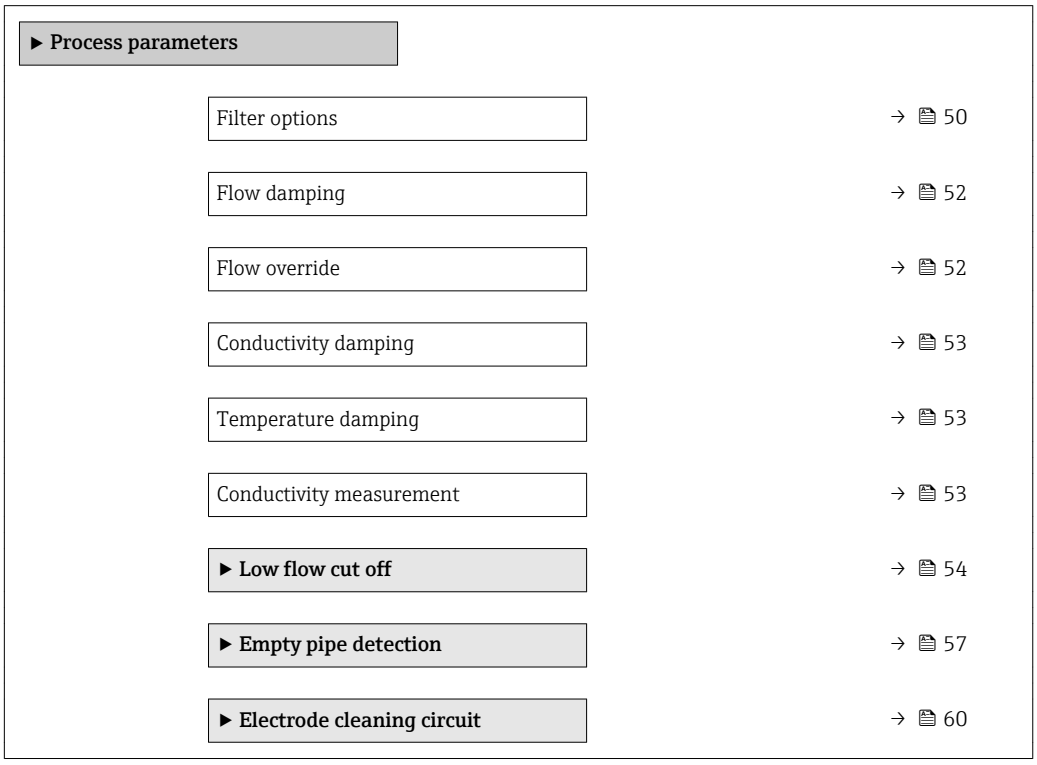
Description Use this function to enter a quantity factor (without time) for the user-specific corrected volume unit and corrected volume flow unit.

User entry Signed floating-point number

Factory setting 1.0

3.2.3 "Process parameters" submenu

Navigation Expert → Sensor → Process param.



Filter options

Navigation Expert → Sensor → Process param. → Filter options

Description Use this function to select a filter option.

Selection

- Standard
- Standard CIP on
- Dynamic
- Dynamic CIP on
- Binomial filter

Factory setting

Standard

Additional information

Description

The user can choose from a range of filter combinations which can optimize the measurement result depending on the application. Each change in the filter setting affects the output signal of the measuring device. The response time of the output signal increases as the filter depth increases.

Selection

- **Standard**
  - Strong flow damping with a short output signal response time.
  - Some time is needed before a stable output signal can be generated.
  - Not suitable for pulsating flow as the average flow can be different here.
- **Dynamic**
  - Average flow damping with a delayed output signal response time.
  - The average flow is displayed correctly over a measuring interval determined over a long period.
- **Binominal**
  - Weak flow damping with a short output signal response time.
  - The average flow is displayed correctly over a measuring interval determined over a long period.
- **CIP**
  - This filter is also available for the **Standard** and **Dynamic** filter options.
  - If the CIP filter has detected a change in the medium (abrupt increase in the noise level, e.g. quickly changing medium conductivity values during CIP cleaning), flow damping is greatly increased and the raw value (before flow damping) is limited by the mean value (delimiter). This eliminates extremely high measured errors (up to several 100 m/s).
  - If the CIP filter is enabled, the response time of the entire measuring system increases and the output signal is delayed accordingly.

Examples

Possible applications for the filters

Application	Standard	Standard CIP	Dynamic	Dynamic CIP	Binomial
Pulsating flow (flow is negative intermittently)	−−−	−−−	++	−−	++
Flow changes frequently (flow is dynamic)	−	−−	++	−	++
Clear signal, quick control loop (< 1 s)	−−	−−	+ [1)]		++
Poor signal, slow control loop (response time of a few seconds)	++	−	−−	−−−	−−−
Permanently bad signal	++	−−	−	−−−	−
Short and severe signal distortion after a while		++		++	
Promag 50/53 replacement: Promag 100 system damping = 0.5 * Promag 50/53					+++

Application	Standard	Standard CIP	Dynamic	Dynamic CIP	Binomial
Promag 10 replacement: Promag 100 system damping = Promag 10 + 2			+++		
For a stable flow signal (no other requirements)	+++				

1) Flow damping value < 6

Flow damping

Navigation Expert → Sensor → Process param. → Flow damping

Description Use this function to enter flow damping. Reduction of the variability of the flow measured value (in relation to interference). For this purpose, the depth of the flow filter is adjusted: when the filter setting increases, the reaction time of the device also increases.

User entry 0 to 15

Factory setting 7

Additional information

User entry

- Value = 0: no damping
- Value > 0: damping is increased

- 0 is a weak damping and 15 a strong one.
- A damping of 0 is not recommended, as the measuring signal is then so noisy that it is almost impossible to carry out a measurement.
- The damping depends on the measuring period and the filter type selected.
- An increase or decrease in the damping depends on the application.

Effect

The damping affects the following variables of the device:
- Outputs
- Low flow cut off → 54
- Totalizers → 79

Flow override

Navigation Expert → Sensor → Process param. → Flow override

Description Use this function to select whether to interrupt the evaluation of measured values. This is useful for the cleaning processes of a pipeline, for example.

Selection
- Off
- On

Factory setting Off

Additional information

Result

This setting affects all the functions and outputs of the measuring device.

Description

Flow override is active
- The diagnostic message diagnostic message ⚠**C453 Flow override** is displayed.
- Output values
  - Output: Value at zero flow
  - Temperature: proceeding output
  - Totalizers 1-3: Stop being totalized

Conductivity damping

Navigation Expert → Sensor → Process param. → Conduct. damping

Prerequisite In the **Conductivity measurement** parameter (→ 53), the **On** option is selected.

Description Use this function to enter the time constant for conductivity damping.

User entry 0 to 999.9 s

Factory setting 0 s

Temperature damping

Navigation Expert → Sensor → Process param. → Temp. damping

Prerequisite For the following order code:
"Sensor Option", option CI "Fluid temperature probe"

Description Use this function to enter the time constant for temperature damping.

User entry 0 to 999.9 s

Factory setting 0 s

Conductivity measurement

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

Description Use this function to enable and disable conductivity measurement.

Selection
- Off
- On

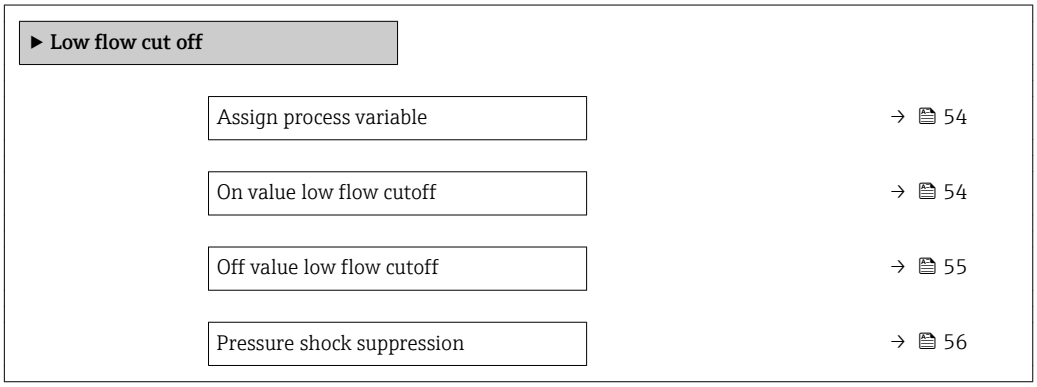
Factory setting Off

Additional information *Description*

For conductivity measurement to work, the medium must have a minimum conductivity of 5 µS/cm.

"Low flow cut off" submenu

Navigation Expert → Sensor → Process param. → Low flow cut off



Assign process variable

Navigation Expert → Sensor → Process param. → Low flow cut off → Assign variable

Description Use this function to select the process variable for low flow cutoff detection.

Selection
- Off
- Volume flow
- Mass flow
- Corrected volume flow

Factory setting Volume flow

On value low flow cutoff

Navigation Expert → Sensor → Process param. → Low flow cut off → On value

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 54):
- Volume flow
- Mass flow
- Corrected volume flow

Description Use this function to enter a switch-on value for low flow cut off. Low flow cut off is activated if the value entered is not equal to 0 → 🖹 55.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter → 🖹 104

Additional information *Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 🖹 54).

Off value low flow cutoff

Navigation Expert → Sensor → Process param. → Low flow cut off → Off value

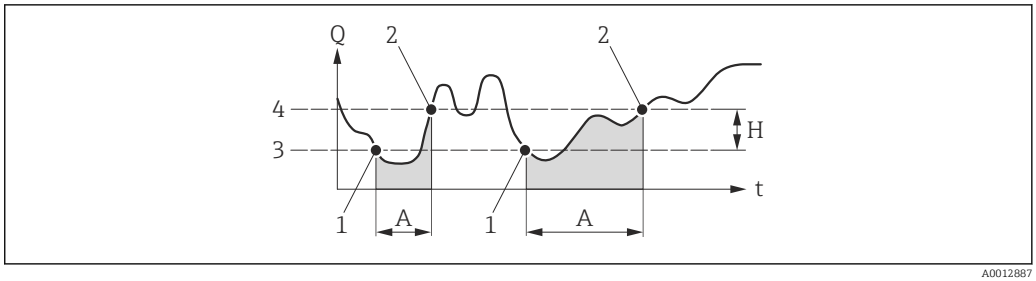
Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 🖹 54):
- Volume flow
- Mass flow
- Corrected volume flow

Description Use this function to enter a switch-off value for low flow cut off. The off value is entered as a positive hysteresis from the on value→ 🖹 54.

User entry 0 to 100.0 %

Factory setting 50 %

Additional information *Example*



A0012887

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

Pressure shock suppression

Navigation Expert → Sensor → Process param. → Low flow cut off → Pres. shock sup.

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 54):
- Volume flow
- Mass flow
- Corrected volume flow

Description Use this function to enter the time interval for signal suppression (= active pressure shock suppression).

User entry 0 to 100 s

Factory setting 0 s

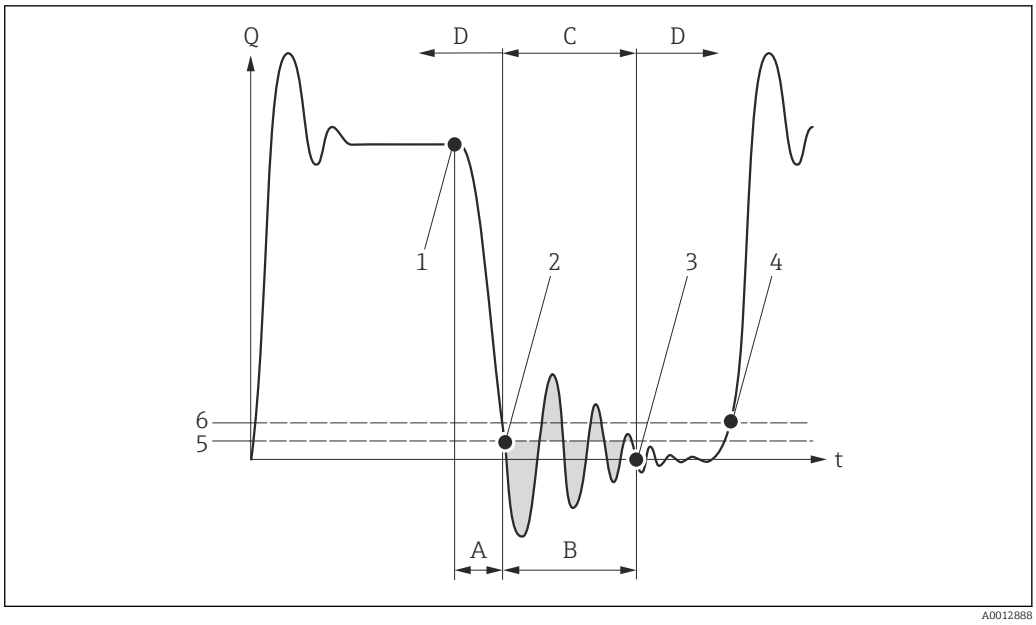
Additional information *Description*

Pressure shock suppression is enabled
- Prerequisite:
  Flow rate < on-value of low flow cut off
- Output values
  - Flow displayed: 0
  - Totalizer: the totalizers are pegged at the last correct value

Pressure shock suppression is disabled
- Prerequisite: the time interval set in this function has elapsed.
- If the flow also exceeds the switch-off value for low flow cut off, the device starts processing the current flow value again and displays it.

Example

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

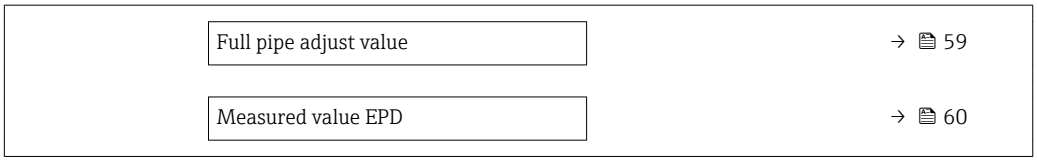


Q Flow
t Time
A Drip
B Pressure shock
C Pressure shock suppression active as specified by the time entered
D Pressure shock suppression inactive
1 Valve closes
2 Flow falls below the on-value of the low flow cut off: pressure shock suppression is activated
3 The time entered has elapsed: pressure shock suppression is deactivated
4 The actual flow value is now displayed and output
5 On value for low flow cut off
6 Off value for low flow cut off

"Empty pipe detection" submenu

Navigation Expert → Sensor → Process param. → Empty pipe det.

► Empty pipe detection	
Empty pipe detection	→ 58
Switch point empty pipe detection	→ 58
Response time empty pipe detection	→ 58
New adjustment	→ 59
Progress	→ 59
Empty pipe adjust value	→ 59



Empty pipe detection

Navigation Expert → Sensor → Process param. → Empty pipe det. → Empty pipe det.

Description Use this function to switch empty pipe detection on and off.

Selection
- Off
- On

Factory setting Off

Switch point empty pipe detection

Navigation Expert → Sensor → Process param. → Empty pipe det. → Switch point EPD

Prerequisite The **On** option is selected in the **Empty pipe detection** parameter (→ 58).

Description Use this function to enter the percentage threshold value of the resistance in relation to the adjustment values.

User entry 0 to 100 %

Factory setting 10 %

Response time empty pipe detection

Navigation Expert → Sensor → Process param. → Empty pipe det. → Response time

Prerequisite In the **Empty pipe detection** parameter (→ 58), the **On** option is selected.

Description Enter the minimum length of time (debouncing time) the signal must be present for the diagnostic message ⚠**S862 Empty pipe** to be triggered if the measuring pipe is empty or partially full.

User entry 0 to 100 s

Factory setting 1 s

New adjustment

Navigation Expert → Sensor → Process param. → Empty pipe det. → New adjustment

Prerequisite The **On** option is selected in the **Empty pipe detection** parameter (→ 58).

Description For selecting whether to perform an empty pipe or full pipe adjustment.

Selection
- Cancel
- Empty pipe adjust
- Full pipe adjust

Factory setting Cancel

Progress

Navigation Expert → Sensor → Process param. → Empty pipe det. → Progress

Prerequisite The **On** option is selected in the **Empty pipe detection** parameter (→ 58).

Description Use this function to view the progress.

User interface
- Ok
- Busy
- Not ok

Empty pipe adjust value

Navigation Expert → Sensor → Process param. → Empty pipe det. → Empty pipe value

Prerequisite
- In the **Empty pipe detection** parameter (→ 58), the **On** option is selected.
- Adjustment value > full pipe value.

Description Displays the adjustment value when the measuring pipe is empty.

User interface Positive floating-point number

Full pipe adjust value

Navigation Expert → Sensor → Process param. → Empty pipe det. → Full pipe value

Prerequisite
- In the **Empty pipe detection** parameter (→ 58), the **On** option is selected.
- Adjustment value < empty pipe value.

Description Displays the adjustment value when the measuring pipe is full.

User interface Positive floating-point number

Measured value EPD

Navigation Expert → Sensor → Process param. → Empty pipe det. → Meas. value EPD

Prerequisite In the **Empty pipe detection** parameter (→ 58), the **On** option is selected.

Description Displays the current measured value.

User interface Positive floating-point number

"Electrode cleaning circuit" submenu

Navigation Expert → Sensor → Process param. → ECC

▶ Electrode cleaning circuit	
Electrode cleaning circuit	→ 60
ECC duration	→ 61
ECC recovery time	→ 61
ECC cleaning cycle	→ 61
ECC Polarity	→ 62

Electrode cleaning circuit

Navigation Expert → Sensor → Process param. → ECC → ECC

Prerequisite For the following order code:
"Application package", option EC "ECC electrode cleaning"

Description Use this function to enable and disable cyclic electrode cleaning.

Selection
- Off
- On

Factory setting Off

ECC duration

Navigation Expert → Sensor → Process param. → ECC → ECC duration

Prerequisite For the following order code:
"Application package", option EC "ECC electrode cleaning"

Description Use this function to enter the duration of electrode cleaning in seconds.

User entry 0.01 to 30 s

Factory setting 2 s

ECC recovery time

Navigation Expert → Sensor → Process param. → ECC → ECC recov. time

Prerequisite For the following order code:
"Application package", option EC "ECC electrode cleaning"

Description Use this function to enter the recovery time after electrode cleaning to prevent signal output interference. The current output values are frozen in the meanwhile.

User entry Positive floating-point number

Factory setting 60 s

ECC cleaning cycle

Navigation Expert → Sensor → Process param. → ECC → ECC clean. cycle

Prerequisite For the following order code:
"Application package", option EC "ECC electrode cleaning"

Description Use this function to enter the pause duration until the next electrode cleaning.

User entry 0.5 to 168 h

Factory setting 0.5 h

ECC Polarity

Navigation Expert → Sensor → Process param. → ECC → ECC Polarity

Prerequisite For the following order code:
"Application package", option EC "ECC electrode cleaning"

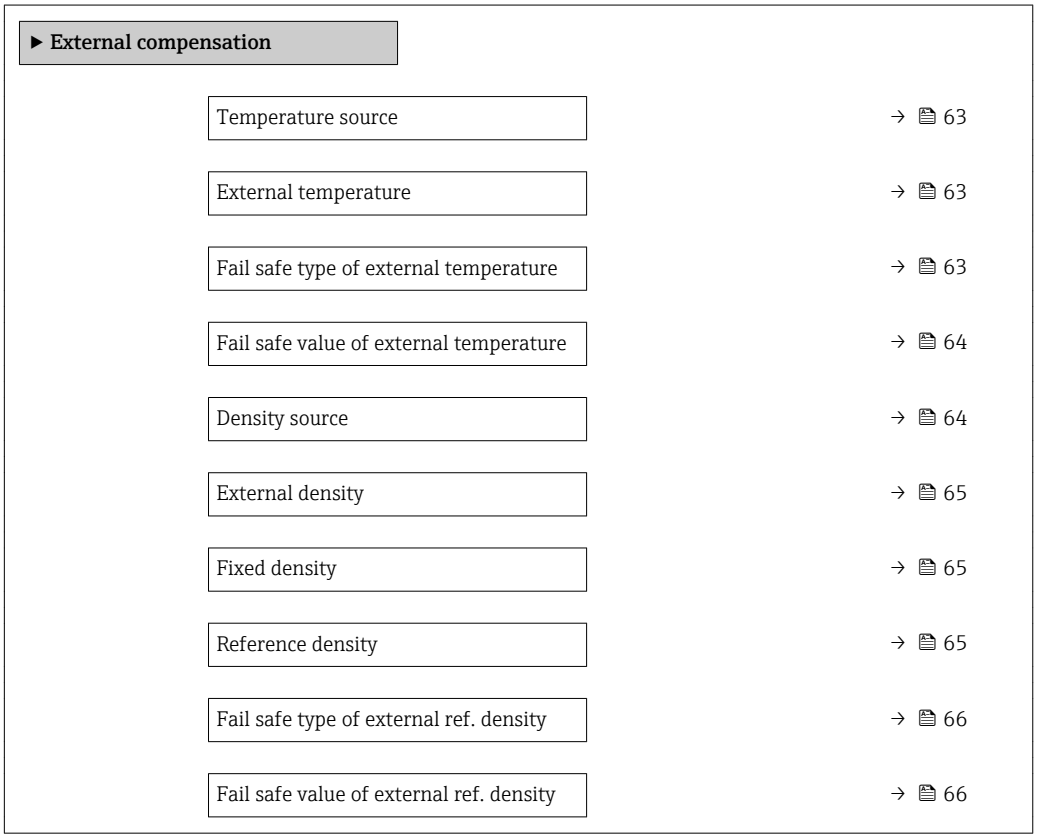
Description Displays the polarity of the electrode cleaning circuit.

User interface
- Positive
- Negative

Factory setting Depends on the electrode material:
- Platinum: **Negative** option
- Tantalum, Alloy C22, stainless steel: **Positive** option

3.2.4 "External compensation" submenu

Navigation Expert → Sensor → External comp.



Temperature source

Navigation Expert → Sensor → External comp. → Temp. source

Description Use this function to select the temperature source.

Selection
- Internal temperature sensor
- Off
- External value

Factory setting Off

Additional information *Selection*

Use this function to select the type of temperature compensation. When selecting the **External value** option, the temperature value of the cyclical PROFINET communication is used. In addition, the "External temperature" compensation value must be incorporated into the analog output module.

For additional information, see the Operating Instructions, "Cyclical data transmission" section

External temperature

Navigation Expert → Sensor → External comp. → External temp.

Prerequisite The **External value** option is selected in the **Temperature source** parameter (→ 63).

Description Displays the temperature read in by the external device.

User interface Floating point number with sign

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 42)

Fail safe type of external temperature

Navigation Expert → Sensor → External comp. → FailSafeTypeTemp

Description Use this function to select the failsafe mode for the external temperature value.

Selection
- Fail safe value
- Fallback value
- Off

Factory setting Off

Additional information

Description

If the status of the input or simulation value is BAD, the failsafe mode defined here is used.

Selection

- Fail safe value
  A substitute value is used. The substitute value is defined in the **Fail safe value of external temperature** parameter (→ 64).
- Fallback value
  The last valid value is used.
- Off
  The invalid value continues to be used.

Fail safe value of external temperature

Navigation Expert → Sensor → External comp. → FailSaValExtTemp

Prerequisite The **Fail safe value** option is selected in the **Fail safe type of external temperature** parameter (→ 63).

Description Use this function to enter a fixed temperature value that is used for the external pressure in the event of a device alarm.

User entry Signed floating-point number

Factory setting 0 °C

Additional information

Description

In the event of a device alarm, the temperature value is displayed as an output value in the **Temperature** parameter (→ 36).

Density source

Navigation Expert → Sensor → External comp. → Density source

Description Use this function to select the density source.

Selection

- Fixed density
- External density

Factory setting Fixed density

Additional information

Selection

Use this function to select the type of density compensation. When selecting the **External density** option, the density value of the cyclical PROFINET communication is used. In addition, the "External density" compensation value must be incorporated into the analog output module.

Additional information: Operating Instructions, "Cyclical data transmission" section

External density

Navigation Expert → Sensor → External comp. → External density

Description Displays the density read in from the external device.

User interface Positive floating-point number

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 44)

Fixed density

Navigation Expert → Sensor → External comp. → Fixed density

Description Use this function to enter a fixed value for the density.

User entry Positive floating-point number

Factory setting Country-specific:
- 1 000 kg/l
- 1 000 lb/ft³

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 44)

Reference density

Navigation Expert → Sensor → External comp. → Ref.density

Description Use this function to enter a fixed value for the reference density.

User entry Positive floating-point number

Factory setting Country-specific:
- 1 kg/l
- 1 lb/ft³

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 44)

Fail safe type of external ref. density

Navigation Expert → Sensor → External comp. → FailSaTypRefDens

Description Use this function to select the failsafe mode for the external reference density value.

Selection
- Fail safe value
- Fallback value
- Off

Factory setting Off

Additional information

Description

If the status of the input or simulation value is BAD, the failsafe mode defined here is used.

Selection

- Fail safe value
  A substitute value is used. The substitute value is defined in the **Fail safe value of external ref. density** parameter (→ 66).
- Fallback value
  The last valid value is used.
- Off
  The invalid value continues to be used.

Fail safe value of external ref. density

Navigation Expert → Sensor → External comp. → FailSaValRefDens

Prerequisite The **Fail safe value** option is selected in the **Fail safe type of external ref. density** parameter (→ 66).

Description Use this function to enter a fixed density value that is used for the external density in the event of a device alarm.

User entry Signed floating-point number

Factory setting 0 kg/l

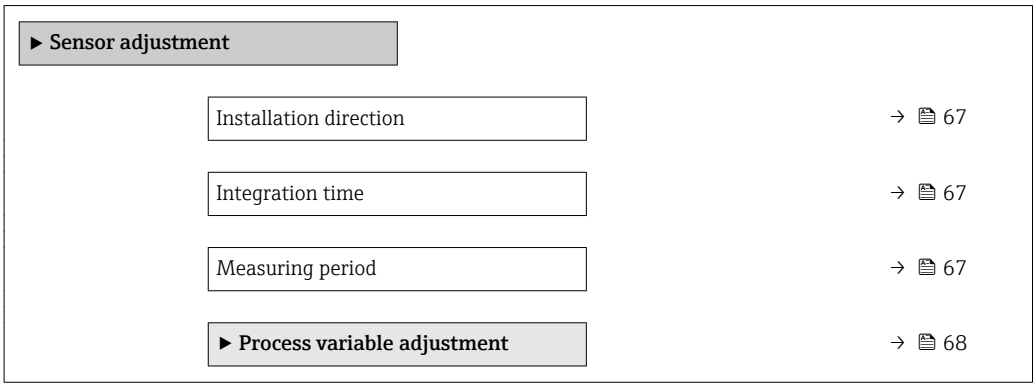
Additional information

Description

In the event of a device alarm, the density value is displayed as an output value in the **Density** parameter (→ 35).

3.2.5 "Sensor adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm.



Installation direction

Navigation Expert → Sensor → Sensor adjustm. → Install. direct.

Description Use this function to change the sign of the medium flow direction.

Selection
- Flow in arrow direction
- Flow against arrow direction

Factory setting Flow in arrow direction

Additional information *Description*

Before changing the sign: ascertain the actual direction of fluid flow with reference to the direction indicated by the arrow on the sensor nameplate.

Integration time

Navigation Expert → Sensor → Sensor adjustm. → Integration time

Description Display the duration of an integration cycle.

User interface 1 to 65 ms

Measuring period

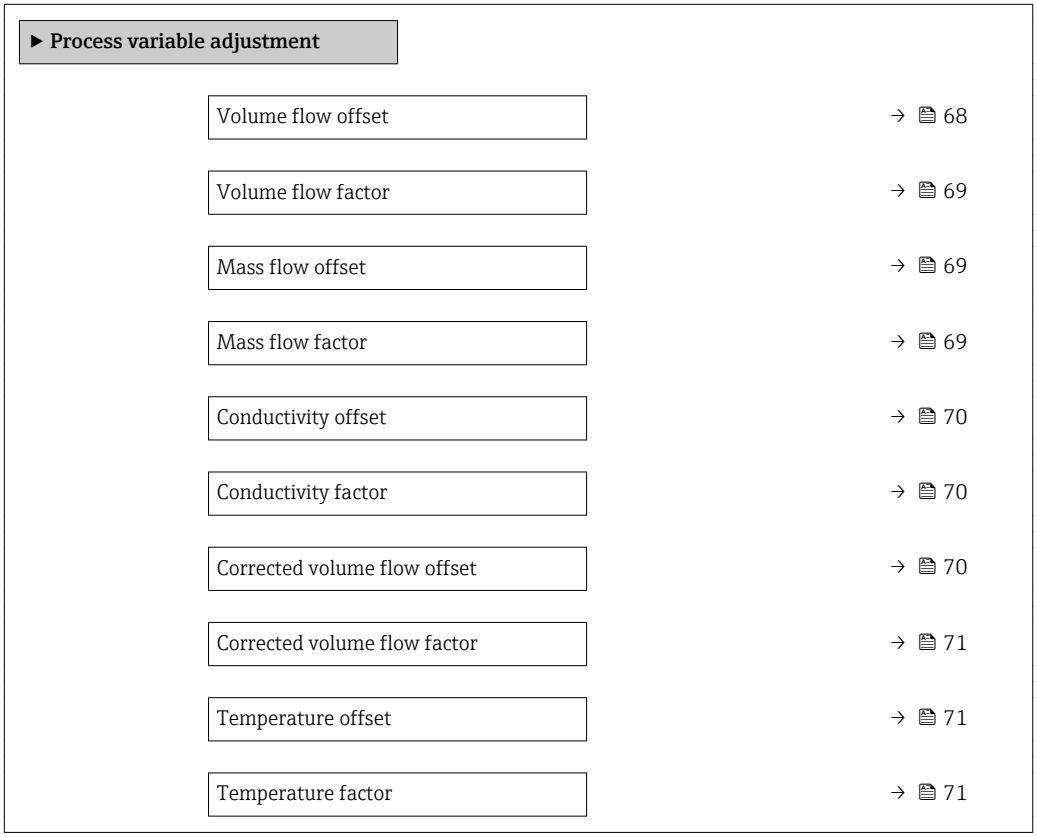
Navigation Expert → Sensor → Sensor adjustm. → Measuring period

Description Display the time of a full measuring period.

User interface 50 to 1 000 ms

"Process variable adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust



Volume flow offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow offset

Description Use this function to enter the zero point shift for the volume flow trim. The volume flow unit on which the shift is based is m^3/s.

User entry Signed floating-point number

Factory setting 0 m^3/s

Additional information *Description*

Corrected value = (factor × value) + offset

Volume flow factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow factor

Description Use this function to enter a quantity factor (without time) for the volume flow. This multiplication factor is applied over the volume flow range.

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Mass flow offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow offset

Description Use this function to enter the zero point shift for the mass flow trim. The mass flow unit on which the shift is based is kg/s.

User entry Signed floating-point number

Factory setting 0 kg/s

Additional information *Description*

Corrected value = (factor × value) + offset

Mass flow factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow factor

Description Use this function to enter a quantity factor (without time) for the mass flow. This multiplication factor is applied over the mass flow range.

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Conductivity offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Conduct. offset

Prerequisite In the **Conductivity measurement** parameter (→ 53), the **On** option is selected.

Description Use this function to enter the zero point shift for the conductivity trim. The conductivity unit on which the shift is based is S/m

User entry Signed floating-point number

Factory setting 0 S/m

Additional information *Description*

Corrected value = (factor × value) + offset

Conductivity factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Conduct. factor

Prerequisite In the **Conductivity measurement** parameter (→ 53), the **On** option is selected.

Description Use this function to enter a quantity factor for the conductivity. This multiplication factor is applied over the conductivity range.

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Corrected volume flow offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Corr. vol offset

Description Use this function to enter the zero point shift for the corrected volume flow trim. The corrected volume flow unit on which the shift is based is 1 Nm^3/s.

User entry Signed floating-point number

Factory setting 0 Nm^3/s

Additional information *Description*

Corrected value = (factor × value) + offset

Corrected volume flow factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Corr. vol factor

Description Use this function to enter a quantity factor (without time) for the corrected volume flow. This multiplication factor is applied over the corrected volume flow range.

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. offset

Prerequisite For the following order code:
"Sensor Option", option CI "Fluid temperature probe"

Description Use this function to enter the zero point shift for the temperature trim. The temperature unit on which the shift is based is 1 K.

User entry Signed floating-point number

Factory setting 0 K

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor

Prerequisite For the following order code:
"Sensor Option", option CI "Fluid temperature probe"

Description Use this function to enter a quantity factor (without time) for the temperature. This multiplication factor is applied over the temperature range.

User entry Positive floating-point number

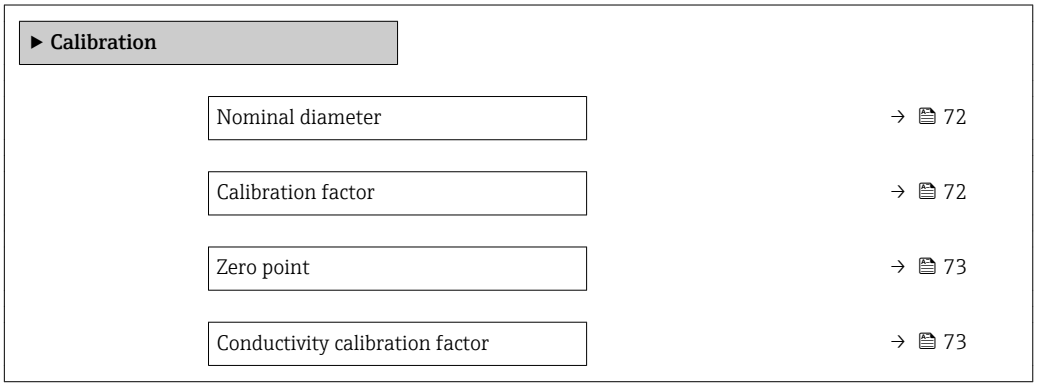
Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

3.2.6 "Calibration" submenu

Navigation Expert → Sensor → Calibration



Nominal diameter

Navigation Expert → Sensor → Calibration → Nominal diameter

Description Displays the nominal diameter of the sensor.

User interface DNxx / x"

Factory setting Depends on the size of the sensor

Additional information *Description*

The value is also specified on the sensor nameplate.

Calibration factor

Navigation Expert → Sensor → Calibration → Cal. factor

Description Displays the current calibration factor for the sensor.

User interface Positive floating-point number

Factory setting Depends on nominal diameter and calibration.

Zero point

Navigation Expert → Sensor → Calibration → Zero point

Description This function shows the zero point correction value for the sensor.

User interface Signed floating-point number

Factory setting Depends on nominal diameter and calibration

Conductivity calibration factor

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

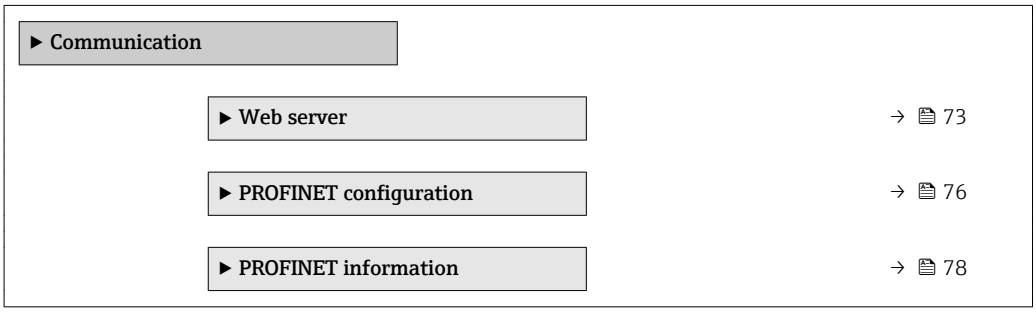
Prerequisite In the **Conductivity measurement** parameter (→ 53), the **On** option is selected.

Description Displays the calibration factor for the conductivity measurement.

User interface 0 to 10 000

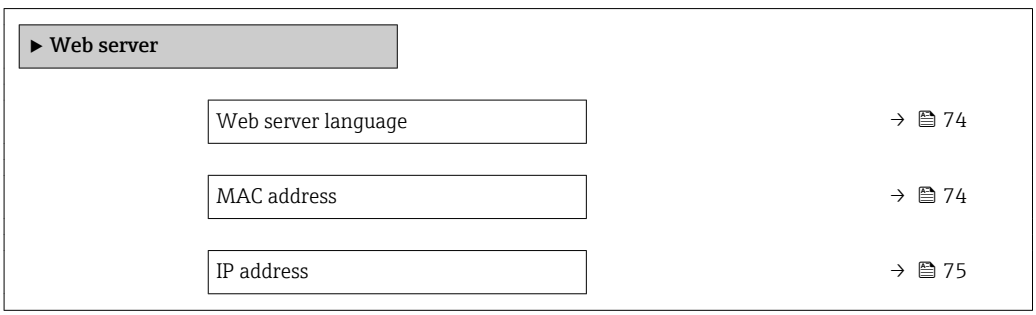
3.3 "Communication" submenu

Navigation Expert → Communication



3.3.1 "Web server" submenu

Navigation Expert → Communication → Web server



Subnet mask	→ 75
Default gateway	→ 75
Web server functionality	→ 75
Login page	→ 76

Web server language

Navigation Expert → Communication → Web server → Webserv.language

Description Use this function to select the web server language setting.

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

Factory setting English

MAC address

Navigation Expert → Communication → Web server → MAC Address

Description Displays the MAC [1] address of the measuring device.

User interface Unique 12-digit character string comprising letters and numbers

Factory setting Each measuring device is given an individual address.

* Visibility depends on order options or device settings
1) Media Access Control

Additional information *Example*

For the display format
00:07:05:10:01:5F

IP address

Navigation Expert → Communication → Web server → IP address

Description Displays the IP address of the device's web server.

User interface 4 octet: 0 to 255 (in the particular octet)

Factory setting 0.0.0.0

Subnet mask

Navigation Expert → Communication → Web server → Subnet mask

Description Displays the subnet mask.

User interface 4 octet: 0 to 255 (in the particular octet)

Factory setting 0.0.0.0

Default gateway

Navigation Expert → Communication → Web server → Default gateway

Description Displays the default gateway.

User interface 4 octet: 0 to 255 (in the particular octet)

Factory setting 0.0.0.0

Web server functionality

Navigation Expert → Communication → Web server → Webserver funct.

Description Use this function to switch the Web server on and off.

Selection
- Off
- HTML Off
- On

Factory setting On

Additional information *Description*

Once disabled, the Web server functionality can be re-enabled only via the local display or the FieldCare operating tool.

Selection

- Off
  - The web server is completely disabled.
  - Port 80 is locked.
- HTML Off
  The HTML version of the web server is not available.
- On
  - The complete functionality of the web server is available.
  - JavaScript is used.
  - The password is transferred in an encrypted state.
  - Any change to the password is also transferred in an encrypted state.

Login page

Navigation Expert → Communication → Web server → Login page

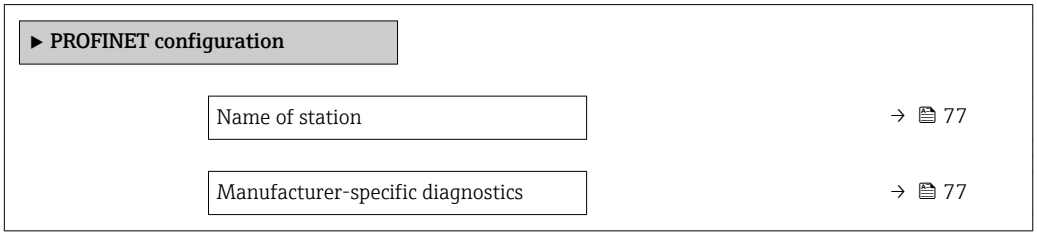
Description Use this function to select the format of the login page.

Selection
- Without header
- With header

Factory setting With header

3.3.2 "PROFINET configuration" submenu

Navigation Expert → Communication → PROFINET config.



Name of station

Navigation Expert → Communication → PROFINET config. → Name of station

Description Displays a unique name for the measuring point so it can be identified quickly within the plant.

User interface Max. 240 characters such as lower-case letter or numbers

Factory setting eh-promag100-xxxxx

Additional information

Description

The device tag corresponds to the device name ("Name Of Station" of PROFINET specification) The device name can be adjusted via DIP switch or the automation system.

Factory setting

Structure of the device tag:
eh-promag100-xxxxx
- eh: Endress+Hauser
- promag: Instrument family
- 100: Transmitter
- xxxxx: Serial number of the device

Manufacturer-specific diagnostics

Navigation Expert → Communication → PROFINET config. → Man. spec. diag.

Description Use this function to enable the transfer of manufacturer-specific diagnostic events.

Selection
- Not active
- Active

Factory setting Active

Additional information

Description

- Active
  In addition to the PROFINET standard alarms, active manufacturing-specific diagnostic events are also transferred to the automation system. The diagnostic number and the error text of the respective diagnostic event are displayed.
- Not active
  Only the PROFINET standard alarms are transferred to the automation system.

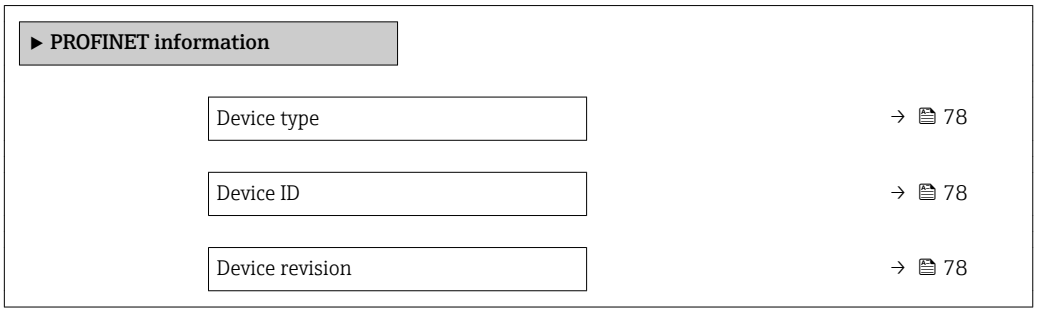
Selection

This selection affects PROFINET communication only.

Diagnostic events are displayed in the DTM or web server regardless of the selection made in this parameter. The PROFINET standard alarms (diagnosis and process) for the stack are also unaffected by the selected made.

3.3.3 "PROFINET information" submenu

Navigation Expert → Communication → PROFINET info



Device type

Navigation Expert → Communication → PROFINET info → Device type

Description Use this function to display the device type (device type code).

User interface Max. 16 characters, such as letters, numbers or special characters (e.g. @, %, /).

Factory setting Promag 100

Device ID

Navigation Expert → Communication → PROFINET info → Device ID

Description Use this function to display the device ID.

User interface 0 to 65 535

Device revision

Navigation Expert → Communication → PROFINET info → Device revision

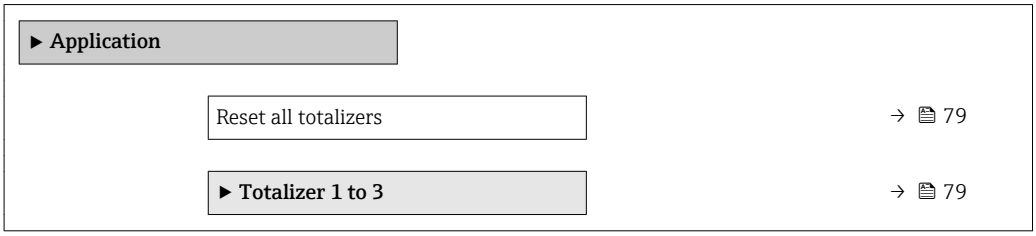
Description Use this function to display the device revision.

User interface 0 to 65 535

Additional information *Description*
The device revision enables the correct assignment of device drivers to the device.

3.4 "Application" submenu

Navigation Expert → Application



Reset all totalizers

Navigation Expert → Application → Reset all tot.

Description Use this function to reset all totalizers to the value **0** and restart the totaling process. This deletes all the flow values previously totalized.

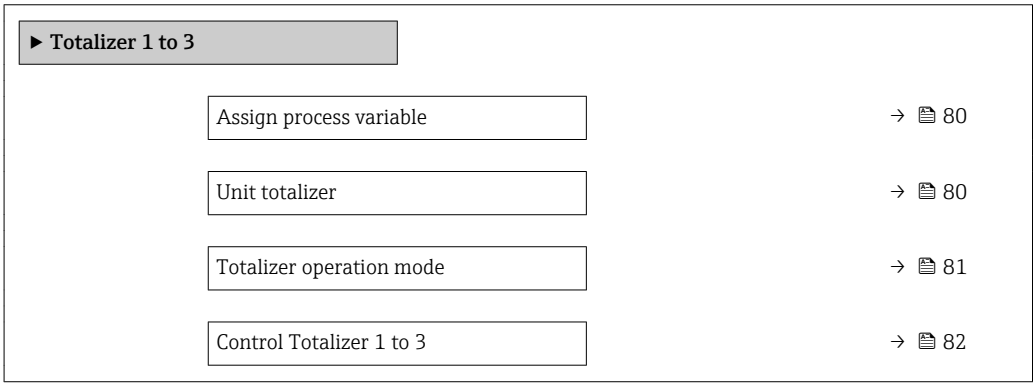
Selection
- Cancel
- Reset + totalize

Factory setting Cancel

Additional information *Selection*
- Cancel
  No action is executed and the user exits the parameter.
- Reset + totalize
  All totalizers are reset to 0 and the totaling process is restarted.

3.4.1 "Totalizer 1 to 3" submenu

Navigation Expert → Application → Totalizer 1 to 3



Preset value 1 to 3	→ 83
Failure mode	→ 83

Assign process variable

Navigation Expert → Application → Totalizer 1 to 3 → Assign variable

Description Use this function to select a process variable for the Totalizer 1 to 3.

Selection
- Off
- Volume flow
- Mass flow
- Corrected volume flow

Factory setting Volume flow

Additional information

Description

If the option selected is changed, the device resets the totalizer to 0.

Selection

If the **Off** option is selected, only **Assign process variable** parameter (→ 80) is still displayed in the **Totalizer 1 to 3** submenu. All other parameters in the submenu are hidden.

Unit totalizer

Navigation Expert → Application → Totalizer 1 to 3 → Unit totalizer

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 80) of the **Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

Description Use this function to select the unit for the process variable of totalizer 1-3.

Selection

SI units
- g
- kg
- t

US units
- oz
- lb
- STon

Custom-specific units
User mass

or

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

US units
- af
- ft^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)

Custom-specific units
User vol.

or

SI units
- Nl
- Nm^3
- Sm^3

US units
- Sft^3
- Sgal (us)
- Sbbl (us;liq.)

Imperial units
Sgal (imp)

Custom-specific units
UserCrVol.

Factory setting

Country-specific:
- l
- gal (us)

Additional information

Description

The unit is selected separately for each totalizer. The unit is independent of the option selected in the **System units** submenu (→ 38).

Selection

The selection depends on the process variable selected in the **Assign process variable** parameter (→ 80).

Totalizer operation mode

Navigation

Expert → Application → Totalizer 1 to 3 → Operation mode

Prerequisite

One of the following options is selected in the **Assign process variable** parameter (→ 80) of the **Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

Description

Use this function to select how the totalizer summates the flow.

Selection
- Net flow total
- Forward flow total
- Reverse flow total

Factory setting

Net flow total

Additional information *Selection*

- Net flow total
  Positive and negative flow values are totalized and balanced against one another. Net flow is registered in the flow direction.
- Forward flow total
  Only the flow in the forward flow direction is totalized.
- Reverse flow total
  Only the flow against the forward flow direction is totalized (= reverse flow total).

Control Totalizer 1 to 3

Navigation Expert → Application → Totalizer 1 to 3 → Control Tot. 1 to 3

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 80) of the **Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

Description Use this function to select the control of totalizer value 1-3.

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

Factory setting Totalize

Additional information *Selection*

- Totalize
  The totalizer is started or continues totalizing with the current counter reading.
- Reset + hold
  The totaling process is stopped and the totalizer is reset to 0.
- Preset + hold
  The totaling process is stopped and the totalizer is set to its defined start value from the **Preset value** parameter (→ 83).
- Reset + totalize
  The totalizer is reset to 0 and the totaling process is restarted.
- Preset + totalize
  The totalizer is set to the defined start value in the **Preset value** parameter (→ 83) and the totaling process is restarted.

Preset value 1 to 3

Navigation Expert → Application → Totalizer 1 to 3 → Preset value 1 to 3

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 80) of the **Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

Description Use this function to enter a start value for totalizer 1-3.

User entry Signed floating-point number

Factory setting 0 l

Additional information *User entry*

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 80).

Example

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

Failure mode

Navigation Expert → Application → Totalizer 1 to 3 → Failure mode

Prerequisite One of the following options is selected in the **Assign process variable** parameter (→ 80) of the **Totalizer 1 to 3** submenu:
- Volume flow
- Mass flow
- Corrected volume flow

Description Use this function to select how a totalizer behaves in the event of a device alarm.

Selection
- Stop
- Actual value
- Last valid value

Factory setting Stop

Additional information *Description*

This setting does not affect the failsafe mode of other totalizers and the outputs. This is specified in separate parameters.

Selection

- Stop
  Totalizing is stopped when a device alarm occurs.
- Actual value
  The totalizer continues to count based on the current measured value; the device alarm is ignored.
- Last valid value
  The totalizer continues to count based on the last valid measured value before the device alarm occurred.

3.5 "Diagnostics" submenu

Navigation Expert → Diagnostics

▶ **Diagnostics**	
Actual diagnostics	→ 85
Previous diagnostics	→ 85
Operating time from restart	→ 86
Operating time	→ 86
▶ **Diagnostic list**	→ 87
▶ **Event logbook**	→ 90
▶ **Device information**	→ 93
▶ **I/O module**	→ 96
▶ **Sensor electronic module**	→ 97
▶ **Display module**	→ 97
▶ **Min/max values**	→ 98
▶ **Heartbeat**	→ 100
▶ **Simulation**	→ 100

Actual diagnostics

Navigation Expert → Diagnostics → Actual diagnos.

Prerequisite A diagnostic event has occurred.

Description Displays the current diagnostic message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.

User interface Symbol for diagnostic behavior, diagnostic code and short message.

Additional information *Display*

Additional pending diagnostic messages can be viewed in the **Diagnostic list** submenu (→ 87).

Example

For the display format:
⊗F271 Main electronic failure

Timestamp

Navigation Expert → Diagnostics → Timestamp

Description Displays the operating time when the current diagnostic message occurred.

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

Additional information *Display*

The diagnostic message can be viewed via the **Actual diagnostics** parameter (→ 85).

Example

For the display format:
24d12h13m00s

Previous diagnostics

Navigation Expert → Diagnostics → Prev.diagnostics

Prerequisite Two diagnostic events have already occurred.

Description Displays the diagnostic message that occurred before the current message.

User interface Symbol for diagnostic behavior, diagnostic code and short message.

Additional information *Example*

For the display format:
⊗F271 Main electronic failure

Timestamp

Navigation Expert → Diagnostics → Timestamp

Description Displays the operating time when the last diagnostic message before the current message occurred.

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

Additional information *Display*

The diagnostic message can be viewed via the **Previous diagnostics** parameter (→ 85).

Example

For the display format:
24d12h13m00s

Operating time from restart

Navigation Expert → Diagnostics → Time fr. restart

Description Use this function to display the time the device has been in operation since the last device restart.

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

Operating time

Navigation Expert → Diagnostics → Operating time

Description Use this function to display the length of time the device has been in operation.

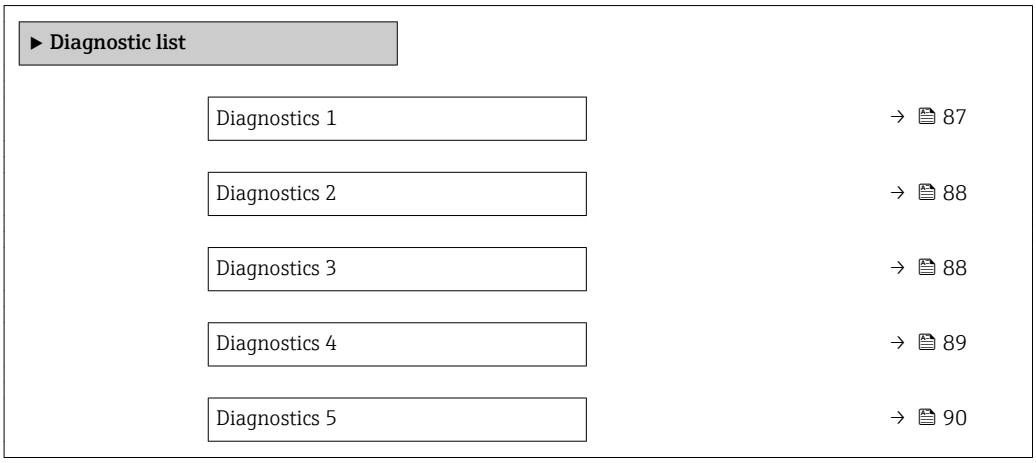
User interface Days (d), hours (h), minutes (m) and seconds (s)

Additional information *User interface*

The maximum number of days is 9999, which is equivalent to 27 years.

3.5.1 "Diagnostic list" submenu

Navigation Expert → Diagnostics → Diagnostic list



Diagnostics 1

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 1

Description Displays the current diagnostics message with the highest priority.

User interface Symbol for diagnostic behavior, diagnostic code and short message.

Additional information *Examples*

For the display format:
- ⊗F271 Main electronic failure
- ⊗F276 I/O module failure

Timestamp

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

Description Displays the operating time when the diagnostic message with the highest priority occurred.

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 1** parameter (→ 87).

Example

For the display format:
24d12h13m00s

Diagnostics 2

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 2

Description Displays the current diagnostics message with the second-highest priority.

User interface Symbol for diagnostic behavior, diagnostic code and short message.

Additional information *Examples*

For the display format:
- ⊗F271 Main electronic failure
- ⊗F276 I/O module failure

Timestamp

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

Description Displays the operating time when the diagnostic message with the second-highest priority occurred.

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 88).

Example

For the display format:
24d12h13m00s

Diagnostics 3

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 3

Description Displays the current diagnostics message with the third-highest priority.

User interface Symbol for diagnostic behavior, diagnostic code and short message.

Additional information *Examples*

For the display format:
- ⊗F271 Main electronic failure
- ⊗F276 I/O module failure

Timestamp

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

Description Displays the operating time when the diagnostic message with the third-highest priority occurred.

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 3** parameter (→ 88).

Example

For the display format:
24d12h13m00s

Diagnostics 4

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 4

Description Displays the current diagnostics message with the fourth-highest priority.

User interface Symbol for diagnostic behavior, diagnostic code and short message.

Additional information *Examples*

For the display format:
- ⊗F271 Main electronic failure
- ⊗F276 I/O module failure

Timestamp

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

Description Displays the operating time when the diagnostic message with the fourth-highest priority occurred.

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 4** parameter (→ 89).

Example

For the display format:
24d12h13m00s

Diagnostics 5

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 5

Description Displays the current diagnostics message with the fifth-highest priority.

User interface Symbol for diagnostic behavior, diagnostic code and short message.

Additional information *Examples*

For the display format:
- ⊗F271 Main electronic failure
- ⊗F276 I/O module failure

Timestamp

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

Description Displays the operating time when the diagnostic message with the fifth-highest priority occurred.

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

Additional information *Display*

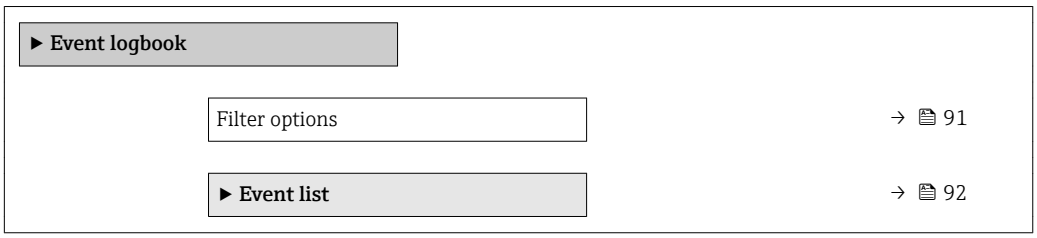
The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ 90).

Example

For the display format:
24d12h13m00s

3.5.2 "Event logbook" submenu

Navigation Expert → Diagnostics → Event logbook



Filter options

Navigation Expert → Diagnostics → Event logbook → Filter options

Description Use this function to select the category whose event messages are displayed in the event list of the local display.

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

Factory setting All

Additional information *Description*

The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107:
- F = Failure
- C = Function Check
- S = Out of Specification
- M = Maintenance Required

Filter options

Navigation Expert → Diagnostics → Event logbook → Filter options

Description Use this function to select the category whose event messages are displayed in the event list of the operating tool.

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

Factory setting All

Additional information *Description*

The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107:
- F = Failure
- C = Function Check
- S = Out of Specification
- M = Maintenance Required

"Event list" submenu

The **Event list** submenu is only displayed if operating via the local display.

If operating via the FieldCare operating tool, the event list can be read out with a separate FieldCare module.

If operating via the Web browser, the event messages can be found directly in the **Event logbook** submenu.

Navigation Expert → Diagnostics → Event logbook → Event list

Event list

Navigation Expert → Diagnostics → Event logbook → Event list

Description Displays the history of event messages of the category selected in the **Filter options** parameter (→ 91).

User interface
- For a "Category I" event message
  Information event, short message, symbol for event recording and operating time when error occurred
- For a "Category F, C, S, M" event message (status signal)
  Diagnostics code, short message, symbol for event recording and operating time when error occurred

Additional information

Description

A maximum of 20 event messages are displayed in chronological order.

If the advanced HistoROM function is enabled in the device, the event list can contain up to 100 entries.

The following symbols indicate whether an event has occurred or has ended:
- ⊖: Occurrence of the event
- ⊕: End of the event

Examples

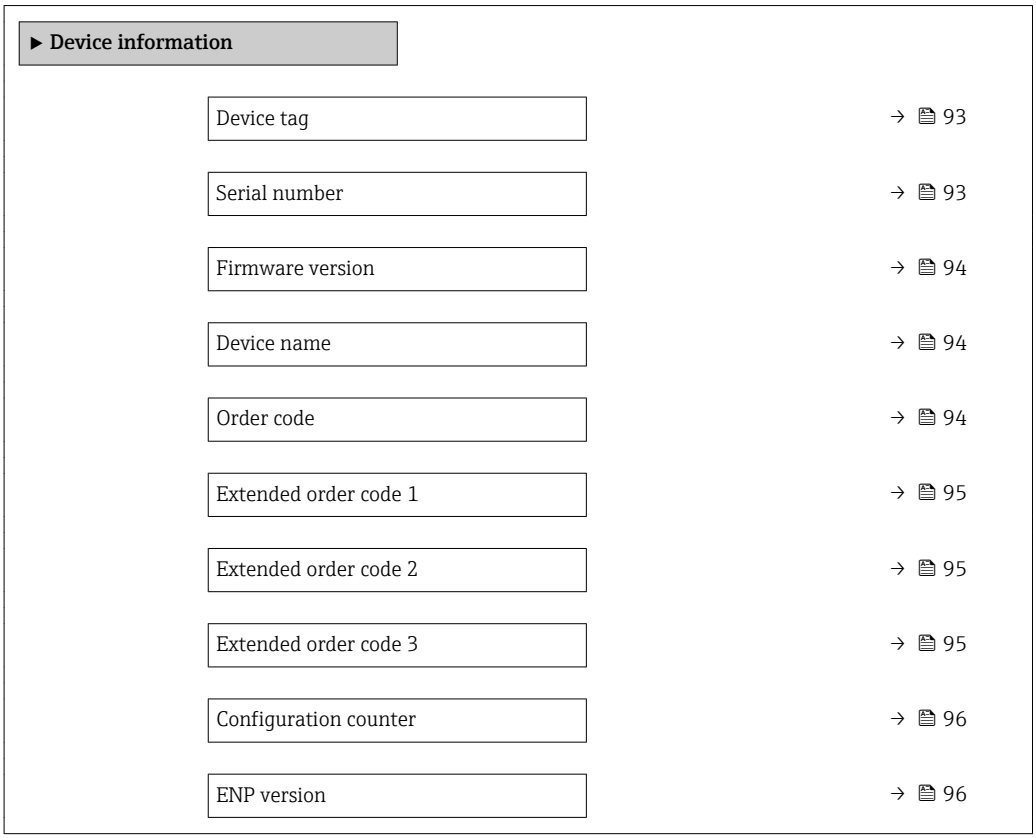
For the display format:
- I1091 Configuration modified
  ⊖ 24d12h13m00s
- ⊗F271 Main electronic failure
  ⊖ 01d04h12min30s

HistoROM

A HistoROM is a "non-volatile" device memory in the form of an EEPROM.

3.5.3 "Device information" submenu

Navigation Expert → Diagnostics → Device info



Device tag

Navigation Expert → Diagnostics → Device info → Device tag

Description Displays a unique name for the measuring point so it can be identified quickly within the plant.

User interface Max. 32 characters such as lower-case letter or numbers

Factory setting eh-promag100-xxxxx

Serial number

Navigation Expert → Diagnostics → Device info → Serial number

Description Displays the serial number of the measuring device.

The number can be found on the nameplate of the sensor and transmitter.

User interface A maximum of 11-digit character string comprising letters and numbers.

Additional information *Description*

Uses of the serial number
- To identify the measuring device quickly, e.g. when contacting Endress+Hauser.
- To obtain specific information on the measuring device using the Device Viewer: www.endress.com/deviceviewer

Firmware version

Navigation Expert → Diagnostics → Device info → Firmware version

Description Displays the device firmware version installed.

User interface Character string in the format xx.yy.zz

Additional information *Display*

The Firmware version is also located:
- On the title page of the Operating instructions
- On the transmitter nameplate

Device name

Navigation Expert → Diagnostics → Device info → Device name

Description Displays a unique name for the measuring point so it can be identified quickly within the plant.

User interface Max. 32 characters such as lower-case letter or numbers

Factory setting eh-promag100-xxxxx

Order code

Navigation Expert → Diagnostics → Device info → Order code

Description Displays the device order code.

User interface Character string composed of letters, numbers and certain punctuation marks (e.g. /).

Additional information *Description*

The order code can be found on the nameplate of the sensor and transmitter in the "Order code" field.

The order code is generated from the extended order code through a process of reversible transformation. The extended order code indicates the attributes for all the device features in the product structure. The device features are not directly readable from the order code.

Uses of the order code
- To order an identical spare device.
- To identify the device quickly and easily, e.g. when contacting Endress+Hauser.

Extended order code 1

Navigation Expert → Diagnostics → Device info → Ext. order cd. 1

Description Displays the first part of the extended order code.

On account of length restrictions, the extended order code is split into a maximum of 3 parameters.

User interface Character string

Additional information *Description*

The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device.

The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field.

Extended order code 2

Navigation Expert → Diagnostics → Device info → Ext. order cd. 2

Description For displaying the second part of the extended order code.

User interface Character string

Additional information For additional information, see **Extended order code 1** parameter (→ 95)

Extended order code 3

Navigation Expert → Diagnostics → Device info → Ext. order cd. 3

Description For displaying the third part of the extended order code.

User interface Character string

Additional information For additional information, see **Extended order code 1** parameter (→ 95)

Configuration counter

Navigation Expert → Diagnostics → Device info → Config. counter

Description Displays the number of parameter modifications for the device. When the user changes a parameter setting, this counter is incremented.

User interface 0 to 65 535

ENP version

Navigation Expert → Diagnostics → Device info → ENP version

Description Displays the version of the electronic nameplate.

User interface Character string

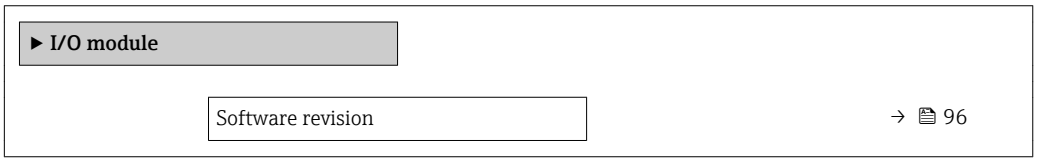
Factory setting 2.02.00

Additional information *Description*

This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device.

3.5.4 "I/O module" submenu

Navigation Expert → Diagnostics → I/O module



Software revision

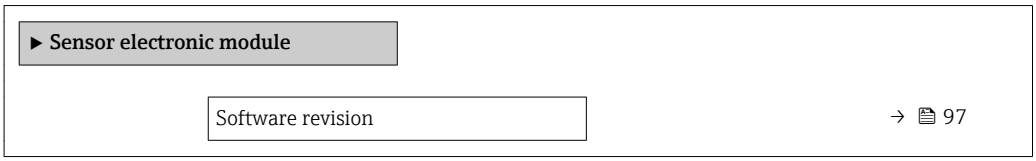
Navigation Expert → Diagnostics → I/O module → Software rev.

Description Use this function to display the software revision of the module.

User interface Positive integer

3.5.5 "Sensor electronic module" submenu

Navigation Expert → Diagnostics → Sens. electronic



Software revision

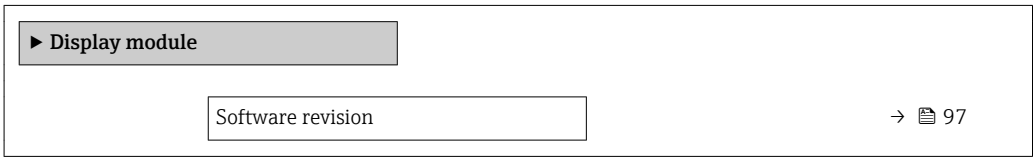
Navigation Expert → Diagnostics → Sens. electronic → Software rev.

Description Use this function to display the software revision of the module.

User interface Positive integer

3.5.6 "Display module" submenu

Navigation Expert → Diagnostics → Display module



Software revision

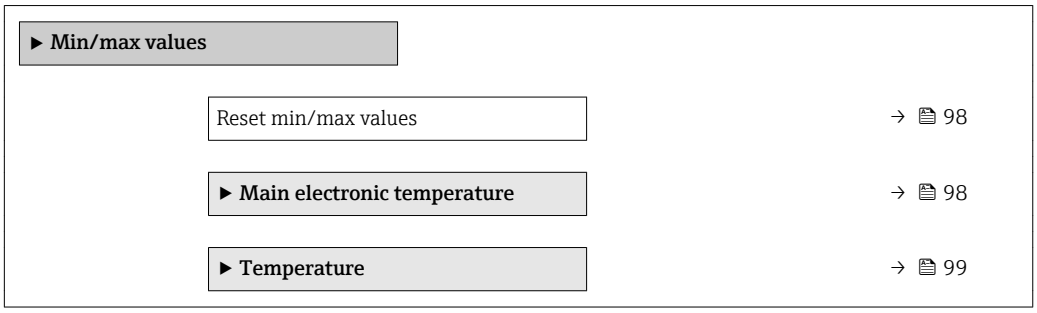
Navigation Expert → Diagnostics → Display module → Software rev.

Description Use this function to display the software revision of the module.

User interface Positive integer

3.5.7 "Min/max values" submenu

Navigation Expert → Diagnostics → Min/max val.



Reset min/max values

Navigation Expert → Diagnostics → Min/max val. → Reset min/max

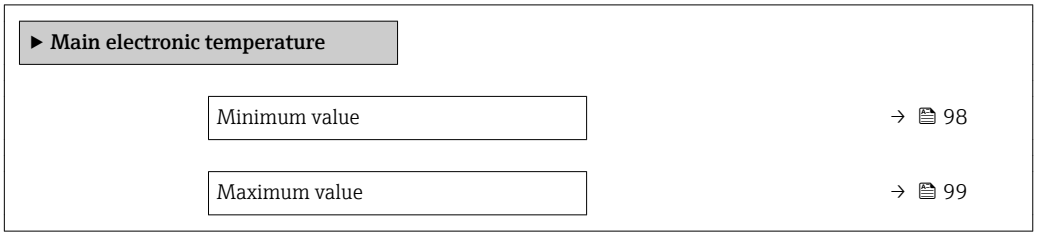
Description Use this function to select measured variables whose minimum, maximum and average measured values are to be reset.

Selection Cancel

Factory setting Cancel

"Main electronic temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp. → Minimum value

Description Displays the lowest previously measured temperature value of the main electronics module.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 42)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp. → Maximum value

Description Displays the highest previously measured temperature value of the main electronics module.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 42)

"Temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Temperature

▶ **Temperature**		
	Minimum value	→ 99
	Maximum value	→ 100

Minimum value

Navigation Expert → Diagnostics → Min/max val. → Temperature → Minimum value

Prerequisite For the following order code:
"Sensor Option", option CI "Fluid temperature probe"

Description Displays the lowest previously measured medium temperature value.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 42)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Temperature → Maximum value

Prerequisite For the following order code:
"Sensor Option", option CI "Fluid temperature probe"

Description Displays the highest previously measured medium temperature value.

User interface Signed floating-point number

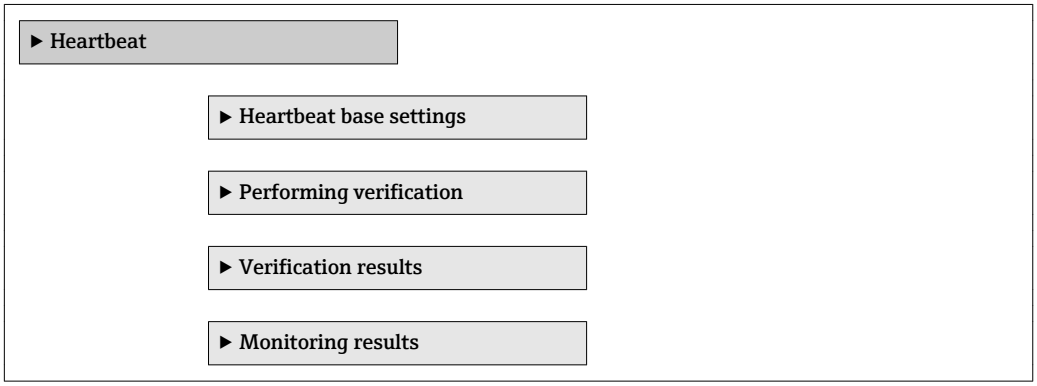
Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 42)

3.5.8 "Heartbeat" submenu

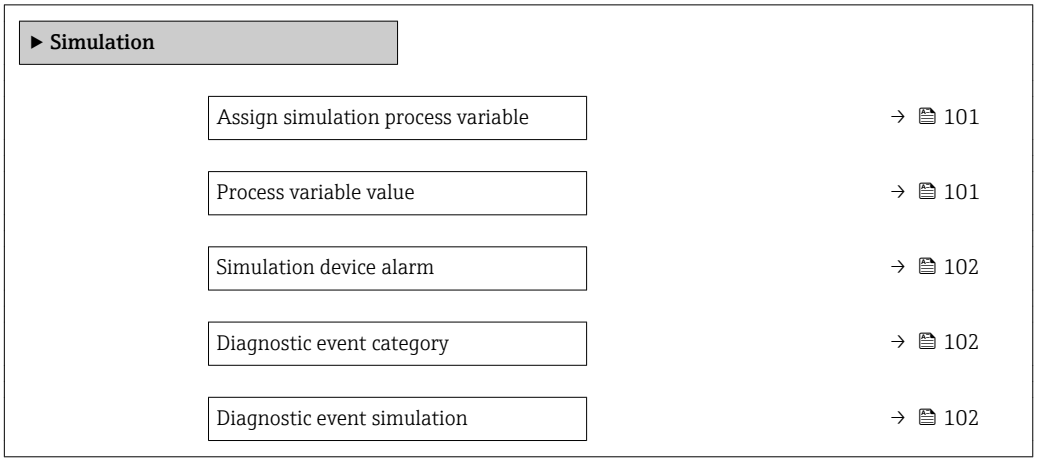
For detailed information on the parameter descriptions of the **Heartbeat Verification** application package, see the Special Documentation for the device

Navigation Expert → Diagnostics → Heartbeat



3.5.9 "Simulation" submenu

Navigation Expert → Diagnostics → Simulation



Assign simulation process variable

Navigation Expert → Diagnostics → Simulation → Assign proc.var.

Description Use this function to select a process variable for the simulation process that is activated. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

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

Factory setting Off

Additional information *Description*

The simulation value of the process variable selected is defined in the **Process variable value** parameter (→ 101).

Process variable value

Navigation Expert → Diagnostics → Simulation → Proc. var. value

Prerequisite One of the following options is selected in the **Assign simulation process variable** parameter (→ 101):
- Volume flow
- Mass flow
- Corrected volume flow
- Conductivity *
- Corrected conductivity *
- Temperature *

Description Use this function to enter a simulation value for the selected process variable. Subsequent measured value processing and the signal output use this simulation value. In this way, users can verify whether the measuring device has been configured correctly.

User entry Depends on the process variable selected

Factory setting 0

Additional information *User entry*

The unit of the displayed measured value is taken from the **System units** submenu (→ 38).

* Visibility depends on order options or device settings

Simulation device alarm

Navigation Expert → Diagnostics → Simulation → Sim. alarm

Description Use this function to switch the device alarm on and off.

Selection
- Off
- On

Factory setting Off

Additional information *Description*

The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Diagnostic event category

Navigation Expert → Diagnostics → Simulation → Event category

Description Use this function to select the category of the diagnostic events that are displayed for the simulation in the **Diagnostic event simulation** parameter (→ 102).

Selection
- Sensor
- Electronics
- Configuration
- Process

Factory setting Process

Diagnostic event simulation

Navigation Expert → Diagnostics → Simulation → Diag. event sim.

Description Use this function to select a diagnostic event for the simulation process that is activated.

Selection
- Off
- Diagnostic event picklist (depends on the category selected)

Factory setting Off

Additional information *Description*

For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event category** parameter (→ 102).

4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

Volume flow	l/h
Volume	m³
Conductivity	µS/cm
Temperature	°C
Mass flow	kg/h
Mass	kg
Density	kg/l
Corrected volume flow	Nl/h
Corrected volume	Nm³

4.1.2 Full scale values

The factory settings applie to the following parameters:
100% bar graph value 1

Nominal diameter [mm]	(v ~ 2.5 m/s) [dm³/min]
2	0.5
4	2
8	8
15	25
25	75
32	125
40	200
50	300
65	500
80	750
100	1200
125	1850
150	150 m³/h
200	300 m³/h
250	500 m³/h
300	750 m³/h
350	1000 m³/h
400	1200 m³/h
450	1500 m³/h

Nominal diameter [mm]	(v ~ 2.5 m/s) [dm³/min]
500	2 000 m³/h
600	2 500 m³/h

4.1.3 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

Nominal diameter [mm]	(v ~ 0.04 m/s) [m³/h]
2	0.01
4	0.05
8	0.1
15	0.5
25	1
32	2
40	3
50	5
65	8
80	12
100	20
125	30
150	2.5
200	5
250	7.5
300	10
350	15
400	20
450	25
500	30
600	40

4.2 US units

Only valid for USA and Canada.

4.2.1 System units

Volume flow	gal/min (us)
Volume	gal (us)
Temperature	°F
Mass flow	lb/min
Mass	lb
Density	lb/ft³

Corrected volume flow	Sft^3/h
Corrected volume	Sft^3

4.2.2 Full scale values

The factory settings applie to the following parameters:
100% bar graph value 1

Nominal diameter [in]	(v ~ 2.5 m/s) [gal/min]
1/12	0.1
1/8	0.5
3/8	2
½	6
1	18
1½	50
2	75
3	200
4	300
5	450
6	600
8	1200
10	1500
12	2400
14	3600
16	4800
18	6000
20	7500
24	10500

4.2.3 On value low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

Nominal diameter [in]	(v ~ 0.04 m/s) [gal/min]
1/12	0.002
1/8	0.008
3/8	0.025
½	0.15
1	0.25
1½	0.75
2	1.25
3	2.5
4	4
5	7

Nominal diameter [in]	(v ~ 0.04 m/s) [gal/min]
6	12
8	15
10	30
12	45
14	60
16	60
18	90
20	120
24	180

5 Explanation of abbreviated units

5.1 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).
Conductivity	µS/mm	Microsiemens/length unit
	nS/cm, µS/cm, mS/cm, S/cm	Nano- Micro- , Milli- , Siemens/length unit
	µS/m, mS/m, S/m, kS/m, MS/m	Micro- , Milli- , Siemens, Kilo-, Megasiemens/length unit
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
Corrected volume	Nl, Nm³, Sm³	Normal liter, normal cubic meter, standard cubic meter
Corrected volume flow	Nl/s, Nl/min, Nl/h, Nl/d	Normal liter/time unit
	Nm³/s, Nm³/min, Nm³/h, Nm³/d	Normal cubic meter/time unit
	Sm³/s, Sm³/min, Sm³/h, Sm³/d	Standard cubic meter/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
Volume flow	cm³/s, cm³/min, cm³/h, cm³/d	Cubic centimeter/time unit
	dm³/s, dm³/min, dm³/h, dm³/d	Cubic decimeter/time unit
	m³/s, m³/min, m³/h, m³/d	Cubic meter/time unit
	ml/s, ml/min, ml/h, ml/d	Milliliter/time unit
	l/s, l/min, l/h, l/d	Liter/time unit
	hl/s, hl/min, hl/h, hl/d	Hectoliter/time unit
	Ml/s, Ml/min, Ml/h, Ml/d	Megaliter/time unit
Time	s, m, h, d, y	Second, minute, hour, day, year

5.2 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

Process variable	Units	Explanation
	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	STon/s, STon/min, STon/h, STon/d	Standard ton/time unit
Corrected volume	Sft^3, Sgal (us), Sbbl (us;liq.)	Standard cubic foot, standard gallon, standard barrel
Corrected volume flow	Sft^3/s, Sft^3/min, Sft^3/h, Sft^3/d	Standard cubic foot/time unit
	Sgal/s (us), Sgal/min (us), Sgal/h (us), Sgal/d (us)	Standard gallon/time unit
	Sbbl/s (us;liq.), Sbbl/min (us;liq.), Sbbl/h (us;liq.), Sbbl/d (us;liq.)	Barrel/time unit (normal liquids)
Temperature	°F, °R	Fahrenheit, Rankine
Volume	af	Acre foot
	ft^3	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
	ft^3/s, ft^3/min, ft^3/h, ft^3/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
	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)

5.3 Imperial units

Process variable	Units	Explanation
Density	lb/gal (imp), lb/bbl (imp;beer), lb/bbl (imp;oil)	Pound/volume unit
Corrected volume	Sgal (imp)	Standard gallon
Corrected volume flow	Sgal/s (imp), Sgal/min (imp), Sgal/h (imp), Sgal/d (imp)	Standard gallon/time unit
Volume	gal (imp), Mgal (imp)	Gallon, mega gallon
	bbl (imp;beer), bbl (imp;oil)	Barrel (beer), barrel (petrochemicals)

Process variable	Units	Explanation
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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