GP01170D/06/EN/01.22-00
71590217
2024-06-19

Valid as of version
01.00.zz (Device firmware)

Description of Device Parameters
Proline Prowirl 200

Vortex flowmeter
PROFINET with Ethernet-APL

ethernet-apl™
advanced physical layer

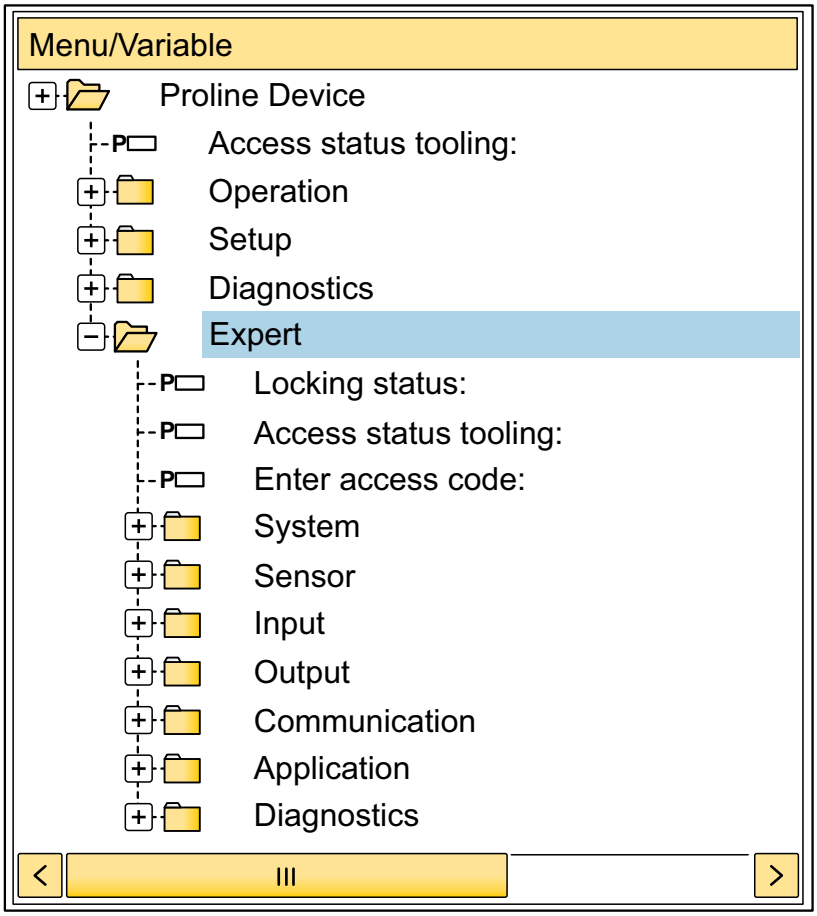

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Table of contents

1 About this document

1.1 Document function

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

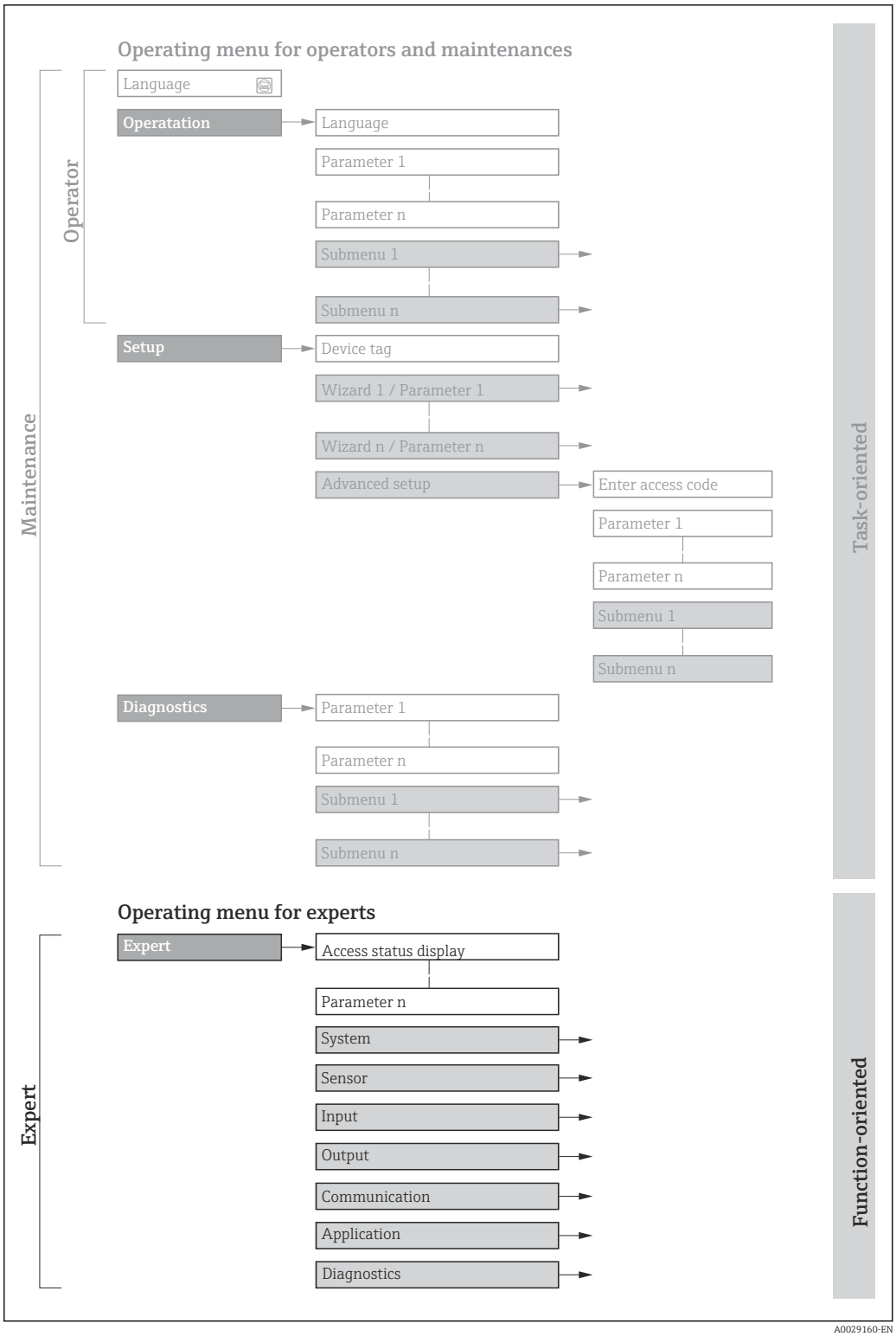
1.2 Target group

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

The document lists the submenus and their parameters according to the structure from the **Expert** menu (→ 🖹 8), which is displayed when the **"Maintenance" user role** is enabled.



1 *Sample graphic for the schematic layout of the operating menu*

Additional information regarding:
- The arrangement of the parameters according to the menu structure of the **Operation** menu, **Setup** menu, **Diagnostics** menu with a brief description: Operating Instructions → 7
- Operating concept of the operating menus: Operating Instructions → 7

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)
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
Parameter entry range

User interface
Display value/data of 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
A0028662	Operation via local display
A0028663	Operation via operating tool
A0028665	Write-protected parameter

1.4.2 Symbols in graphics

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

1.5 Documentation

1.5.1 Standard documentation

Operating Instructions

Measuring device	Documentation code
Prowirl D 200	BA02133D
Prowirl F 200	BA02132D
Prowirl O 200	BA02134D
Prowirl R 200	BA02135D

1.5.2 Supplementary device-dependent documentation

Special Documentation

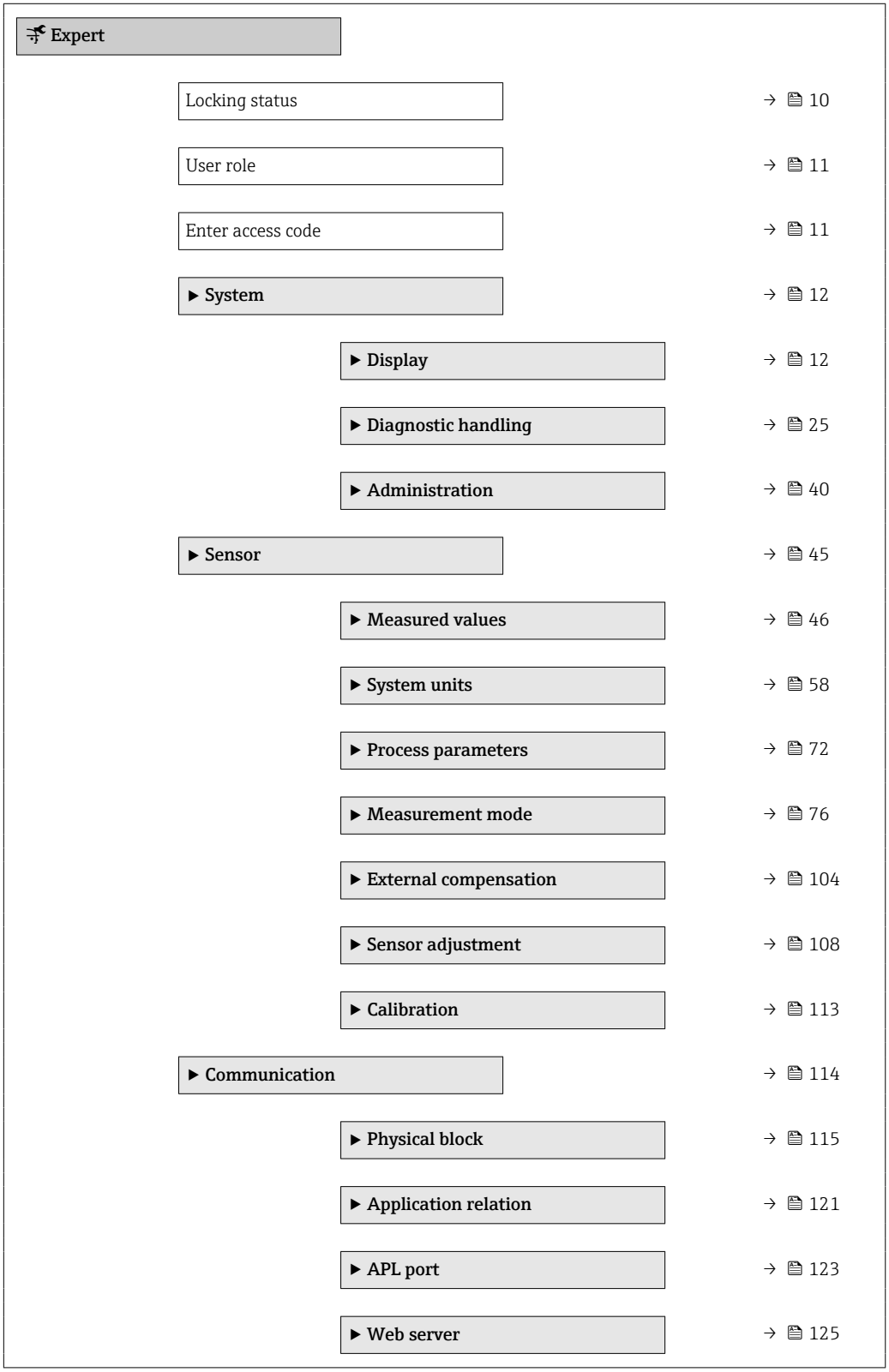
Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D

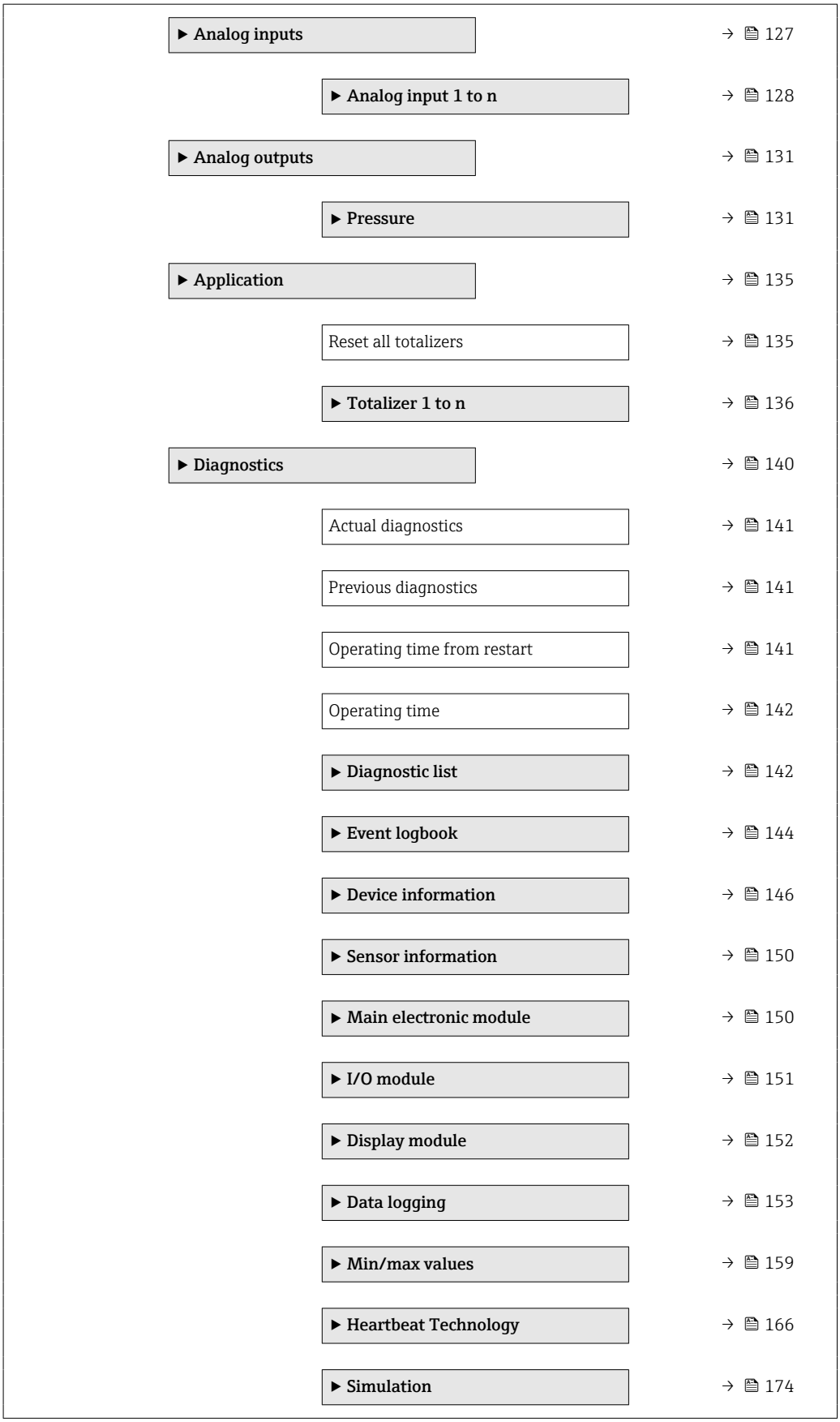
Contents	Documentation code
Heartbeat Technology	SD02759D
Wet steam detection	SD02743D
Wet steam measurement	SD02744D

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.

Navigation Expert




▶ Analog inputs → 127
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▶ Analog outputs → 131
▶ Pressure → 131
▶ Application → 135
Reset all totalizers → 135
▶ Totalizer 1 to n → 136
▶ Diagnostics → 140
Actual diagnostics → 141
Previous diagnostics → 141
Operating time from restart → 141
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▶ Diagnostic list → 142
▶ Event logbook → 144
▶ Device information → 146
▶ Sensor information → 150
▶ Main electronic module → 150
▶ I/O module → 151
▶ Display module → 152
▶ Data logging → 153
▶ Min/max values → 159
▶ Heartbeat Technology → 166
▶ Simulation → 174

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.

Locking status

Navigation Expert → Locking status

Description Displays the active write protection.

User interface
- Hardware locked
- Temporarily locked

Additional information

User interface

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.

Detailed 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

Selection

Options	Description
None	The access authorization displayed in the **Access status display** parameter (→ 25) applies . Only appears on local display.
Hardware locked (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) .
Temporarily locked	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.

User role

Navigation Expert → User role

Description Displays the access authorization to the parameters via the operating tool.

User interface

- Operator
- Maintenance

Factory setting Maintenance

Additional information

Description

The access authorization can be modified via the **Enter access code** parameter.

If additional write protection is active, this restricts the current access authorization even further.

User interface

Detailed 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 in the operating tool.

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

3.1 "System" submenu

Navigation Expert → System

▶ **System**	
▶ **Display**	→ 12
▶ **Diagnostic handling**	→ 25
▶ **Administration**	→ 40

3.1.1 "Display" submenu

Navigation Expert → System → Display

▶ **Display**	
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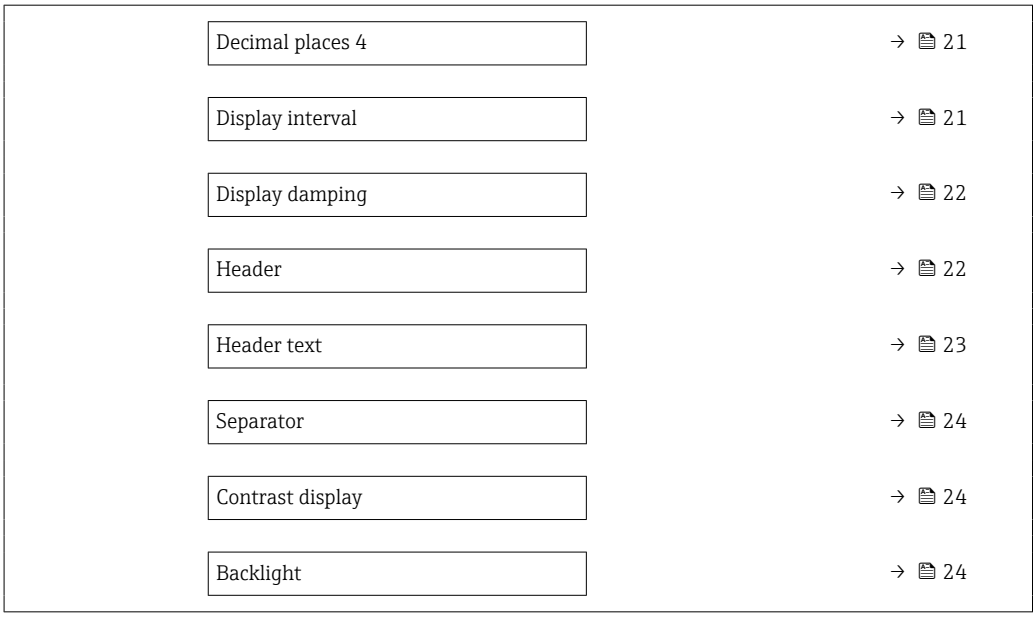
0% bargraph value 3	→ 19
100% bargraph value 3	→ 20
Decimal places 3	→ 20
Value 4 display	→ 21



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) *
- 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.

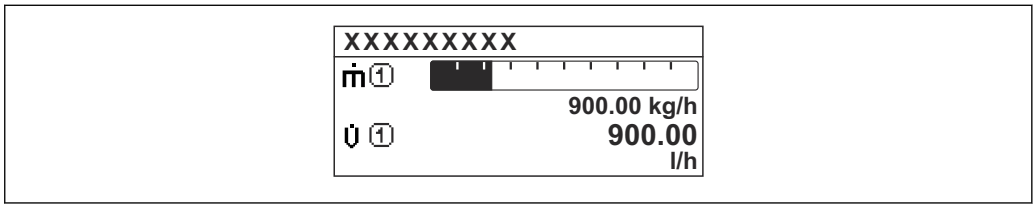
- The **Value 1 display** parameter (→ 16)...**Value 4 display** parameter (→ 21) are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device display.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

Possible measured values shown on the local display:

"1 value, max. size" option

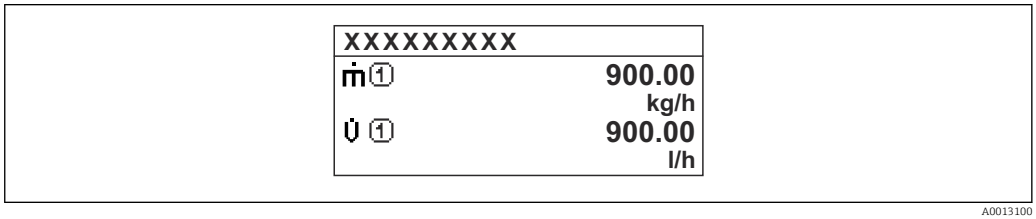
A0016529

"1 bargraph + 1 value" option



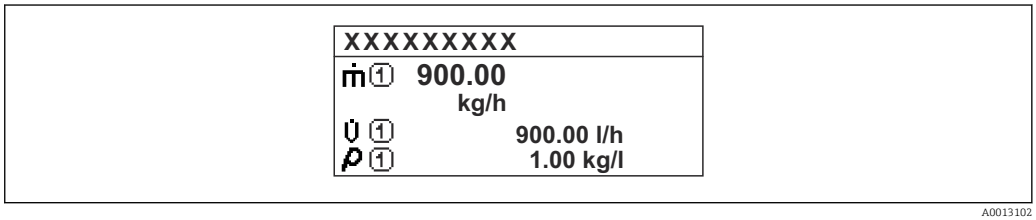
A0013098

"2 values" option



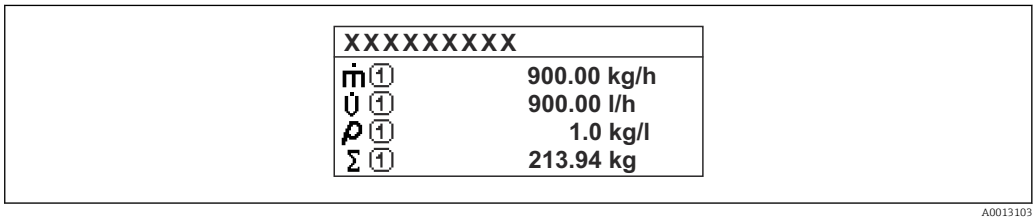
A0013100

"1 value large + 2 values" option



A0013102

"4 values" option



A0013103

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 shown on the local display.

Selection
- Volume flow
- Corrected volume flow
- Mass flow
- Flow velocity
- Temperature
- Vortex frequency
- Vortex kurtosis
- Vortex amplitude
- Calculated saturated steam pressure *
- Steam quality *
- Total mass flow *
- Condensate mass flow *
- Energy flow *
- Heat flow difference *
- Reynolds number *
- Density *
- Pressure *
- Specific volume *
- Degrees of superheat *
- Totalizer 1
- Totalizer 2
- Totalizer 3

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 (→ 14) is used to specify how many measured values are displayed simultaneously and how.

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 58).

0% bargraph value 1

Navigation Expert → System → Display → 0% bargraph 1

Prerequisite A local display is provided.

* Visibility depends on order options or device settings

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 m^3/h
- 0 ft^3/h

Additional information *Description*

The **Format display** parameter (→ 14) 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 (→ 58).

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 → 177

Additional information *Description*

The **Format display** parameter (→ 14) 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 (→ 58).

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 accuracy of the device for measuring or calculating the value.

Value 2 display

Navigation Expert → System → Display → Value 2 display

Prerequisite A local display is provided.

Description Use this function to select a measured value that is 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 (→ 14) is used to specify how many measured values are displayed simultaneously and how.

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 58).

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 accuracy of the device for measuring or calculating the value.

Value 3 display

Navigation Expert → System → Display → Value 3 display

Prerequisite A local display is provided.

Description Use this function to select a measured value that is 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 third value to be displayed. The value is only displayed during normal operation.

The **Format display** parameter (→ 14) 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 (→ 58).

0% bargraph value 3

Navigation Expert → System → Display → 0% bargraph 3

Prerequisite A selection was 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 m^3/h
- 0 ft^3/h

Additional information *Description*

The **Format display** parameter (→ 14) 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 (→ 58).

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 (→ 14) 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 (→ 58).

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 accuracy of the device for measuring or calculating the value.

Value 4 display

Navigation Expert → System → Display → Value 4 display

Prerequisite A local display is provided.

Description Use this function to select a measured value that is 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 fourth value to be displayed. The value is only displayed during normal operation.

The **Format display** parameter (→ 14) 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 (→ 58).

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 accuracy of the device for measuring or calculating the value.

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)...**Value 4 display** parameter (→ 21) are used to specify which measured values are shown on the local display.
- The display format for the measured values displayed is defined in the **Format display** parameter (→ 14).

Display damping

Navigation Expert → System → Display → Display damping

Prerequisite A local display is provided.

Description Use this function to enter a time constant for 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 5.0 s

Additional information *User entry*

Use this function to enter a time constant (PT1 element [1]) for display damping:
- 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.

Damping is switched off if **0** is entered (factory setting).

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.

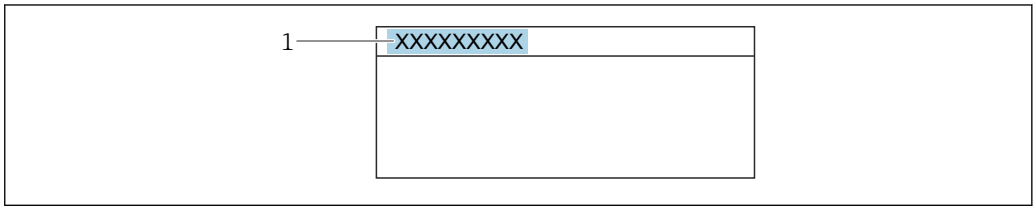
1) proportional transmission behavior with first order delay

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 (→ 22).

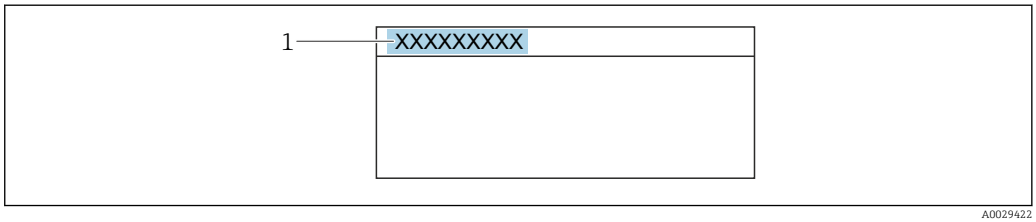
Description Use this function to enter a customer-specific text for the header of the local display.

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

Additional information *Set the contrast via the push-buttons:*
- Brighter: Press and hold down the ⊟ E keys simultaneously.
- Darker: Press and hold down the ⊞ E keys simultaneously.

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 Disable

Access status display

Navigation Expert → System → Display → Access stat.disp (0091)

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.

The access authorization can be modified via the **Enter access code** parameter.

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

If additional write protection is active, this restricts the current access authorization even further.

User interface

Detailed 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

▶ **Diagnostic handling**		
	Alarm delay	→ 26
	▶ **Diagnostic behavior**	→ 26
	▶ **Diagnostic limits**	→ 38

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 *Description*

This setting affects the following diagnostic messages:
- 046 Sensor limit exceeded
- 828 Ambient temperature too low
- 829 Ambient temperature too high
- 832 Electronics temperature too high
- 833 Electronics temperature too low
- 834 Process temperature too high
- 835 Process temperature too low
- 841 Flow velocity too high
- 844 Sensor range exceeded
- 870 Measuring inaccuracy increased
- 871 Near steam saturation limit
- 872 Wet steam detected
- 945 Sensor range exceeded
- 946 Vibration detected
- 947 Vibration exceeded

"Diagnostic behavior" submenu

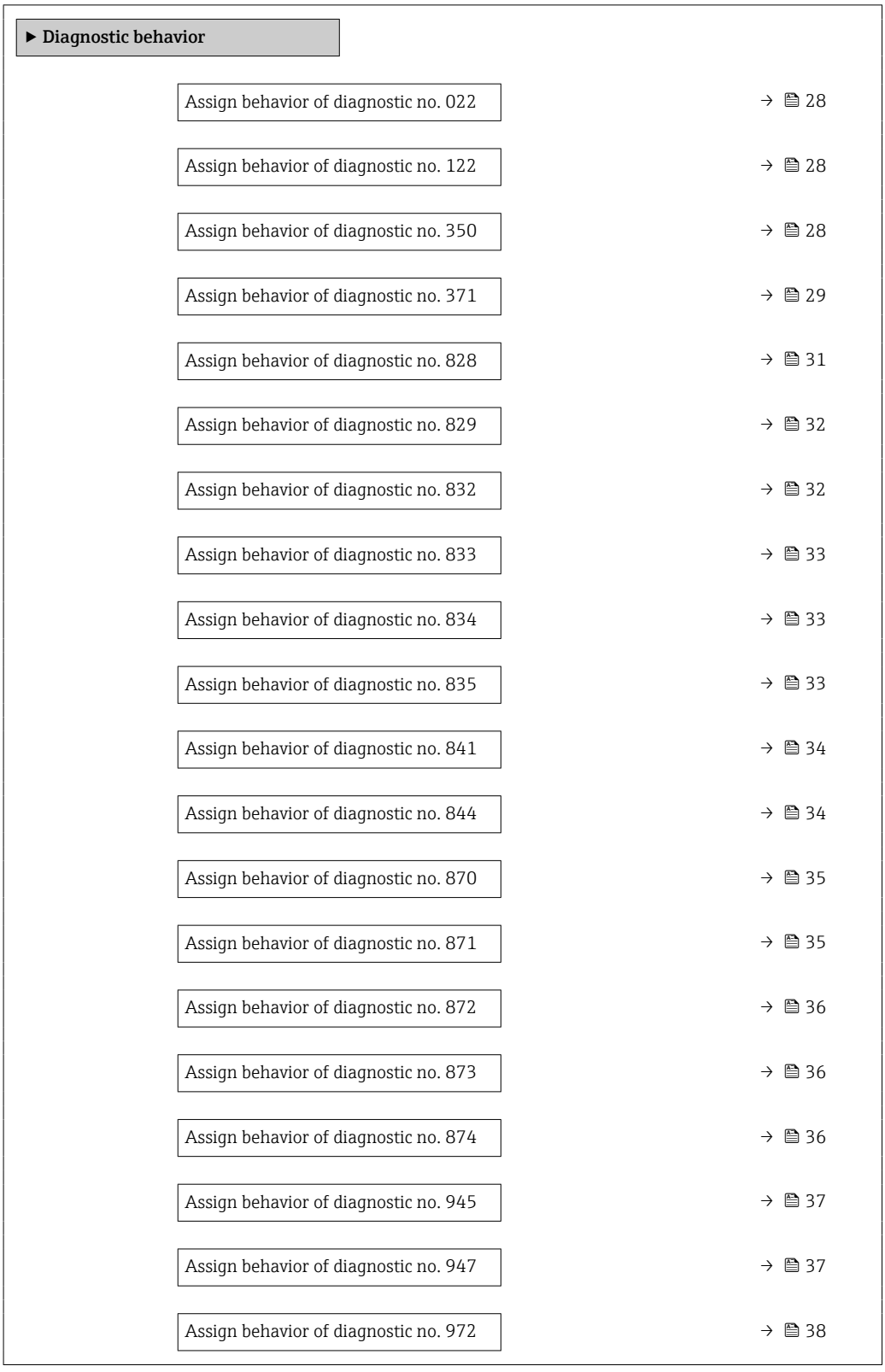
Each item of diagnostic information is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic information in the **Diagnostic behavior** submenu (→ 26).

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

Options	Description
Alarm	For local display with touch control: the background lighting changes to red.
Warning	
Logbook entry only	The device continues to measure. The diagnostic message is displayed only in the **Event logbook** submenu (→ 144) (**Event list** submenu (→ 145)) and is not displayed 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



Assign behavior of diagnostic no. 022 (Temperature sensor defective)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 022

Prerequisite With order code for "Sensor version":
"Mass (integrated temperature measurement)" option

Description Use this function to change the diagnostic behavior of the **022 Temperature sensor defective** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 122 (Temperature sensor defective)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 122

Prerequisite With order code for "Sensor version":
"Mass (integrated temperature measurement)" option

Description Use this function to change the diagnostic behavior of the **122 Temperature sensor defective** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 350 (Pre-amplifier defective)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 350

Description Use this function to change the diagnostic behavior of the **350 Pre-amplifier defective** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 371 (Temperature sensor defective)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 371

Description Use this function to change the diagnostic behavior of the **371 Temperature sensor defective** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 441 (Current output 1 to n)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 441 (0657)

Description Use this function to change the diagnostic behavior of the **441 Current output 1 to n** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 442 (Frequency output)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 442 (0658)

Prerequisite The measuring device has a pulse/frequency/switch output.

Description Use this function to change the diagnostic behavior of the **442 Frequency output** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 443 (Pulse output)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 443 (0659)

Prerequisite The measuring device has a pulse/frequency/switch output.

Description Use this function to change the diagnostic behavior of the **443 Pulse output** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 444 (Current input 1)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 444 (0655)

Prerequisite The device has one current input (I/O module 218).

Description Use this function to change the diagnostic behavior of the **444 Current input 1** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 801 (Supply voltage too low)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 801 (0660)

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 801 (0660)

Description Use this function to change the diagnostic behavior of the **801 Supply voltage too low** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 828 (Ambient temperature too low)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 828

Description Use this function to change the diagnostic behavior of the **828 Ambient temperature too low** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information

Description

The ambient temperature of the pre-amplifier is too low.

Selection

For a detailed description of the options available:

Assign behavior of diagnostic no. 829 (Ambient temperature too high)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 829

Description Use this function to change the diagnostic behavior of the **829 Ambient temperature too high** diagnostic message.

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information

Description

The ambient temperature of the pre-amplifier is too high.

Selection

For a detailed description of the options available:

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

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

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

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information

Description

The electronics temperature of the transmitter is too high.

Selection

For a detailed description of the options available:

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information

Description

The electronics temperature of the transmitter is too low.

Selection

For a detailed description of the options available:

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 **834 Process temperature too high** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information

Description

The process temperature is too high.

Selection

For a detailed description of the options available:

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 **835 Process temperature too low** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Description*

The process temperature is too low.

Selection

For a detailed description of the options available:

Assign behavior of diagnostic no. 841 (Flow velocity too high)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 841

Description Use this function to change the diagnostic behavior of the **841 Flow velocity too high** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Description*

The flow velocity is too high.

Selection

For a detailed description of the options available:

Assign behavior of diagnostic no. 844 (Sensor range exceeded)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 844

Description Use this function to change the diagnostic behavior of the **844 Sensor range exceeded** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Description*

The sensor range has been exceeded: "overspeeding".

Selection

For a detailed description of the options available:

Assign behavior of diagnostic no. 870 (Measuring inaccuracy increased)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 870

Description Use this function to change the diagnostic behavior of the **870 Measuring inaccuracy increased** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Description*

The Reynolds number is too low.

Selection

For a detailed description of the options available:

Assign behavior of diagnostic no. 871 (Near steam saturation limit)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 871

Prerequisite In the **Select medium** parameter (→ 77), the **Steam** option is selected.

Description Use this function to change the diagnostic behavior of the **871 Near steam saturation limit** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Off

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 872 (Wet steam detected)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 872

Prerequisite The **Wet Steam Detection** application package has been enabled.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 44).

Description Use this function to change the diagnostic behavior of the **872 Wet steam detected** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 873 (Water detected)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 873

Prerequisite In the **Select medium** parameter (→ 77), the **Steam** option is selected.

Description Use this function to change the diagnostic behavior of the **873 Water detected** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Off

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 874 (X% spec invalid)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 874

Prerequisite In the **Select medium** parameter (→ 77), the **Steam** option is selected.

Description Use this function to change the diagnostic behavior of the **874 X% spec invalid** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Off

Additional information

Description

The conditions for calculating the steam quality are not met.

Selection

For a detailed description of the options available:

Assign behavior of diagnostic no. 945 (Sensor range exceeded)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 945

Prerequisite With order code for "Sensor version":
"Mass (integrated temperature measurement)" option

Description Use this function to change the diagnostic behavior of the **945 Sensor range exceeded** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information

Description

The sensor range is outside the pressure-temperature curve of the measuring tube.

Selection

For a detailed description of the options available:

Assign behavior of diagnostic no. 947 (Vibration exceeded)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 947

Description Use this function to change the diagnostic behavior of the **947 Vibration exceeded** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

Additional information *Selection*

For a detailed description of the options available:

Assign behavior of diagnostic no. 972 (Degrees of superheat limit exceeded)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 972

Prerequisite If the **Steam** option is selected in the **Select medium** parameter (→ 77).

Description Use this function to change the diagnostic behavior of the **972 Degrees of superheat limit exceeded** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Off

Additional information *Description*

The upper limit for superheated steam was exceeded.

Selection

For a detailed description of the options available:

"Diagnostic limits" submenu

Navigation Expert → System → Diagn. handling → Diagn. limits

▶ Diagnostic limits	
Reynolds number limit	→ 39
Steam quality limit	→ 39
Degrees of superheat limit	→ 39

Reynolds number limit

Navigation Expert → System → Diagn. handling → Diagn. limits → Re number limit

Prerequisite With order code for "Sensor version":
Option "Mass (integrated temperature measurement)"

Description Use this function to enter the lower limit value for the Reynolds number. If the Reynolds number falls short of this limit value, the **870 Measuring inaccuracy increased** diagnostic message is triggered.

User entry 4 000 to 100 000

Factory setting 5 000

Additional information *Limit value*

If the Reynolds number falls short of the limit value configured here, the diagnostic behavior selected in the **Assign behavior of diagnostic no. 870** parameter (→ 35) is triggered.

Steam quality limit

Navigation Expert → System → Diagn. handling → Diagn. limits → SteamQualLimit

Prerequisite The following conditions are met:
- The **Steam** option is selected in the **Select medium** parameter (→ 77) parameter.
- The **Calculated value** option is selected in the **Steam quality** parameter (→ 78) parameter.

Description Use this function to enter the threshold value for the steam quality which, if undershot, triggers the ⚠**S872 Wet steam detected** diagnostic message.

User entry 0 to 100 %

Factory setting 80 %

Additional information *Limit value*

This limit value has a hysteresis of 5 %, i.e. the diagnostic message is reset at a threshold value of +5 % or if 100 % is reached (at 85 % for the factory setting of 80 %).

If the steam quality has dropped below the limit value configured here, the diagnostic behavior selected in the **Assign behavior of diagnostic no. 872** parameter (0746) (→ 36) is triggered.

Degrees of superheat limit

Navigation Expert → System → Diagn. handling → Diagn. limits → Degr.superh.lim.

Prerequisite In the **Select medium** parameter (→ 77), the **Steam** option is selected.

Description Use this function to enter the threshold value for the degree of superheat which, if exceeded, triggers the **972 Degrees of superheat limit exceeded** diagnostic message.

User entry 0 to 500 K

Factory setting 5 K

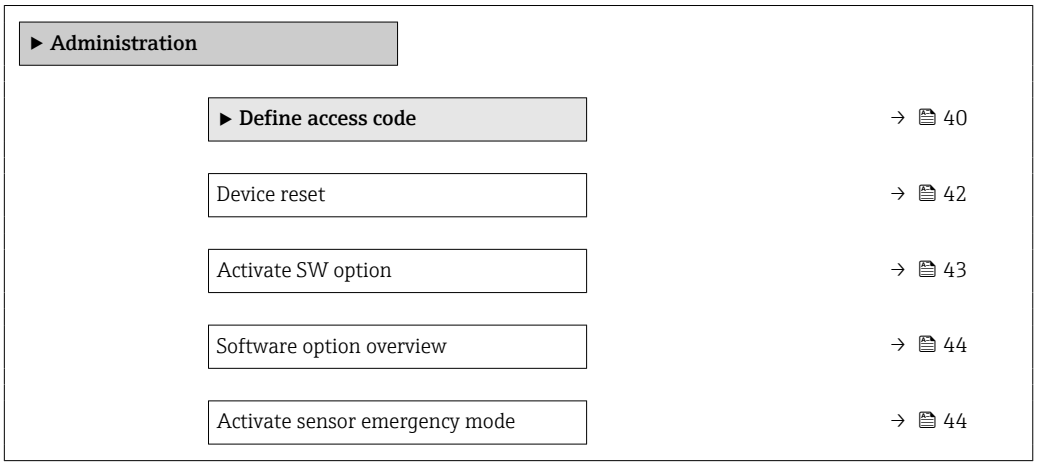
Additional information *Limit value*

This limit value has a hysteresis of 1 K, i.e. the diagnostic message is triggered if the threshold value +1 K is reached and is reset again when the value drops below the threshold value.

If the degree of superheat has exceeded the limit value configured here, the diagnostic behavior selected in the **Assign behavior of diagnostic no. 972** parameter (→ 38) is triggered.

3.1.3 "Administration" submenu

Navigation Expert → System → Administration

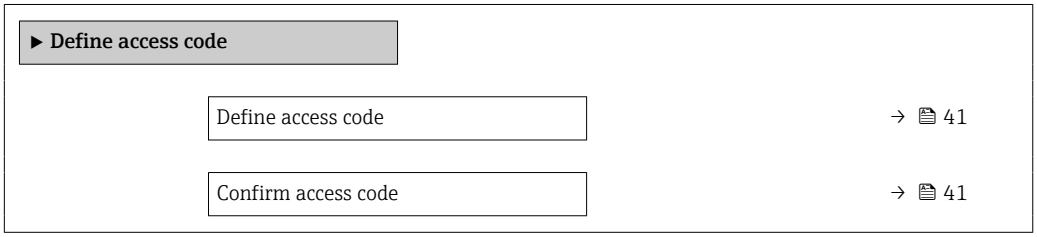


"Define access code" wizard

The **Define access code** wizard (→ 40) is only available when operating via the local display.

If operating via the operating tool, the **Define access code** parameter (→ 42) 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.

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.

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.

If you lose the access code, please contact your Endress+Hauser sales organization.

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.

If you lose the access code, please contact your Endress+Hauser sales organization.

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

Selection
- Cancel
- To delivery settings
- Restart device

Factory setting Cancel

Additional information *Options*

Options	Description
Cancel	No action is executed and the user exits the parameter.
To factory defaults	Every parameter is reset to its factory setting.

Options	Description
To delivery settings	Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting. This option is not visible if no customer-specific settings have been ordered.
Restart device	The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.

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 Depends on the software option ordered

Additional information

Description

If a measuring device was ordered with an additional software option, the activation code is programmed in the device at the factory.

The activation code is documented in the parameter protocol supplied.

User entry

To activate a software option subsequently, please contact your Endress+Hauser sales organization.

NOTE!

The activation code is linked to the serial number of the measuring device and varies according to the device and software option.

If an incorrect or invalid code is entered, this results in the loss of software options that have already been activated.

▸ Before you enter a new activation code, make a note of the current activation code from the parameter protocol.

▸ Enter the new activation code provided by Endress+Hauser when the new software option was ordered.

▸ Once the activation code has been entered, check if the new software option is displayed in the **Software option overview** parameter (→ 44).

↳ The new software option is active if it is displayed.

↳ If the new software option is not displayed or all software options have been deleted, the code entered was either incorrect or invalid.

▸ If the code entered is incorrect or invalid, enter the old activation code from the parameter protocol.

▸ Have your Endress+Hauser sales organization check the new activation code remembering to specify the serial number or ask for the code again.

Example for a software option

Order code for "Application package", option **EA** "Extended HistoROM"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 44).

Software option overview

Navigation Expert → System → Administration → SW option overv.

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

User interface
- Extended HistoROM
- Mass flow
- Natural gas
- Air + industrial gas
- Wet steam detection
- Wet steam measurement
- Heartbeat Verification

Additional information

Description

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

"Extended HistoROM" option

Order code for "Application package", option EA "Extended HistoROM"

"Mass flow" option, "Natural gas" option, "Air + industrial gas" option

Order code for "Sensor version":
"Mass (integrated temperature measurement)" option

"Wet steam detection" option

Only available for Prowirl F.

Order code for "Application package", option **ES** "Wet steam detection"

"Heartbeat Verification" option

Order code for "Application package", option **EB** "Heartbeat Verification"

Activate sensor emergency mode

Navigation Expert → System → Administration → Sens. emerg.mode

Prerequisite The device has identified an error during verification of the characteristics in the sensor data storage or electronics module. A diagnostic message of status type ⊗**F** is output.

Description Use this function to switch on the emergency mode of the sensor to use the backup of the sensor characteristics or main electronics characteristics stored in the HistoROM.

Selection
- Cancel
- Ok

Factory setting Cancel

Additional information *Description*

This parameter becomes visible if the data in the S-DAT or on-board memory cannot be read on account of a defect or error. There is a copy of the data on the HistoROM (FT10). If the emergency mode is activated, this copy is used and the device measure correctly again at least up until the next device switch-off/switch-on. After switch-on/switch-off, the emergency mode would have to be reactivated again. This ensures that the client can operate the device until a new spare part arrives.

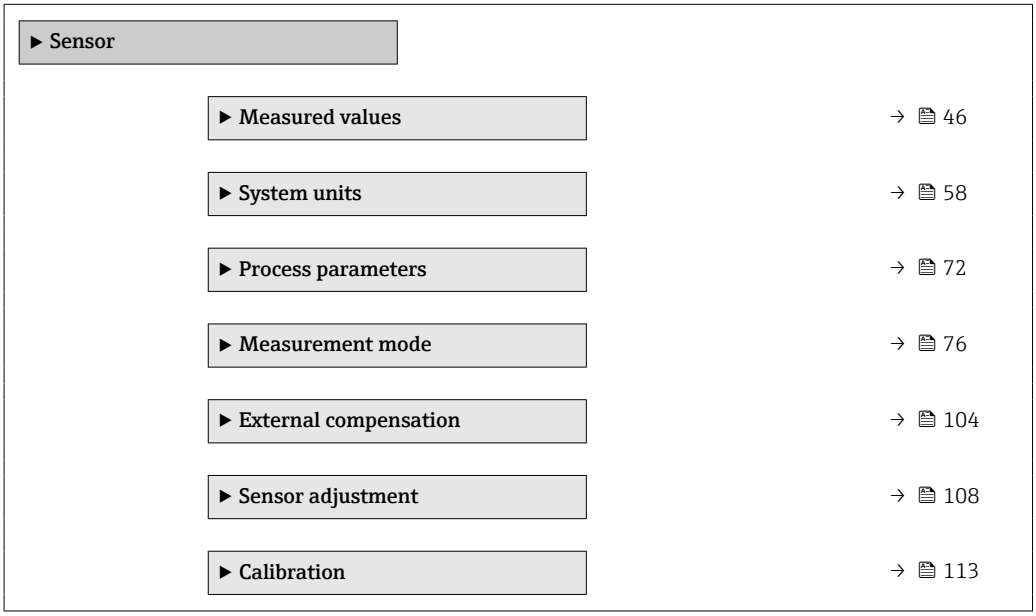
The status signal of the output diagnostic message changes from **F** (failure) to **M** (maintenance required), the diagnostic behavior changes from Alarm to Warning: ⚠**M**. The diagnostic message is output until the characteristics in the sensor data storage are again correct.

Information on what is causing the diagnostic message, and remedy measures, can be viewed by pressing the E-button.

Information on status signals and diagnostic behavior: Operating Instructions about the device, "Diagnostic message" chapter

3.2 "Sensor" submenu

Navigation Expert → Sensor



3.2.1 "Measured values" submenu

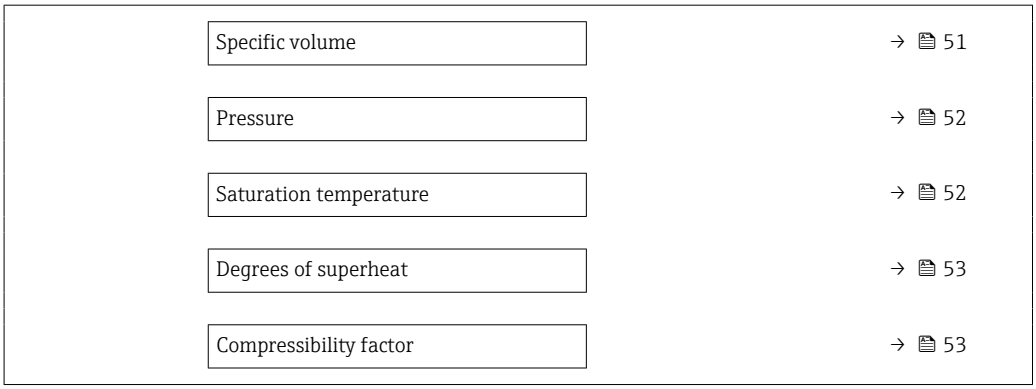
Navigation Expert → Sensor → Measured val.

▶ **Measured values**	
▶ **Process variables**	→ 46
▶ **Totalizer**	→ 57

"Process variables" submenu

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

▶ **Process variables**	
Volume flow	→ 47
Corrected volume flow	→ 47
Mass flow	→ 48
Flow velocity	→ 48
Temperature	→ 48
Vortex frequency	→ 53
Vortex kurtosis	→ 48
Vortex amplitude	→ 49
Calculated saturated steam pressure	→ 49
Steam quality	→ 49
Total mass flow	→ 50
Condensate mass flow	→ 50
Energy flow	→ 50
Heat flow difference	→ 50
Reynolds number	→ 51
Density	→ 51



Volume flow

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

Description Use this function to view the volume flow currently measured.

User interface Signed floating-point number

Additional information

Description

The volume flow is calculated from the measured mass flow and the measured density.

Dependency

The unit is taken from the **Volume flow unit** parameter (→ 59)

Corrected volume flow

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

Description Use this function to view the corrected volume flow currently calculated.

User interface Signed floating-point number

Additional information

Description

The corrected volume flow is derived from the measured mass flow and the reference density of the fluid (density at reference temperature, measured or fixed entry).

Dependency

The unit is taken from the **Corrected volume flow unit** parameter (→ 63)

Mass flow

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

Description Use this function to view the mass flow currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Mass flow unit** parameter (→ 61)

Flow velocity

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

Description Shows the flow velocity currently calculated.

User interface Signed floating-point number

Factory setting 1 m/s

Temperature

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

Description Use this function to view the temperature currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

Vortex kurtosis

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

Description Displays the statistical variable kurtosis for appraising the signal quality (without a unit).

User interface 0 to 10

Additional information *Description*

This parameter is used in the **Wet steam detection/measurement** application package for calculating the steam quality.

In single-phase and two-phase media, the kurtosis values can only reasonably be in the range from 1.5 to 3.

Values outside the range indicate unstable flow.

The values 0 or 8 indicate that it is not possible to calculate the kurtosis value.

Vortex amplitude

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

Description Displays the average vortex amplitude (without a unit).

User interface 0 to 1

Additional information *Description*

The vortex amplitude is used by the system for flow detection/measurement. If there is no flow, the amplitude should be 0 or even slightly negative. If an amplitude > 0 is displayed and a frequency simultaneously measured even though there is no flow, this is an indication of vibration problems.

- Limit values depend on the medium, nominal diameter and flow velocity
- Definition of a limit value not possible
- Considered based on the individual application

Calculated saturated steam pressure

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

Description Shows the saturated steam pressure currently calculated.

User interface Signed floating-point number

Factory setting 1E-05 bar

Steam quality

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

Description Shows the current steam quality.

User interface Signed floating-point number

Factory setting 1 %

Total mass flow

Navigation Expert → Sensor → Measured val. → Process variab. → Total mass flow

Description Shows the total mass flow (steam and condensate) currently calculated.

User interface Signed floating-point number

Factory setting 3 599.99999999971 kg/h

Condensate mass flow

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

Description Shows the condensate mass flow currently calculated.

User interface Signed floating-point number

Factory setting 3 599.99999999971 kg/h

Energy flow

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

Description Shows the energy flow currently calculated.

User interface Signed floating-point number

Factory setting 0.001 kW

Heat flow difference

Navigation Expert → Sensor → Measured val. → Process variab. → Heat flow diff.

Description Shows the heat flow difference currently calculated.

User interface Signed floating-point number

Factory setting 0.001 kW

Reynolds number

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

Description Shows the Reynolds number currently calculated.

User interface Signed floating-point number

Factory setting 1

Density

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

Prerequisite With order code for "Sensor version":
Option "Mass (integrated temperature measurement)"

Description Displays the density currently calculated.

User interface Positive floating-point number

Additional information *Description*

Depending on the selected medium the density is calculated with pressure and temperature and the corresponding method (e.g. IAPWS, NEL40...).

Dependency

The unit is taken from the **Density unit** parameter (→ 69)

Specific volume

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

Prerequisite With order code for "Sensor version":
Option "Mass (integrated temperature measurement)"

Description Displays the current value for the specific volume.

User interface Positive floating-point number

Additional information *Description*

The specific volume is a process variable that is common in steam applications.

For the calculation: reciprocal value of the density (**Density** parameter (→ 51))

Dependency

The unit is taken from the **Specific volume unit** parameter (→ 69).

Pressure

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

Prerequisite
One of the following conditions is met:
- Order code for "Sensor version",
  - Option "Mass (integrated temperature measurement)"
  - or
- The **Pressure** option is selected in the **External value** parameter (→ 105) parameter.

Description Displays the current process pressure.

User interface 0 to 250 bar

Additional information

Description

The value of the pressure which is read in (e.g. via the current input module) is displayed.

If the **Pressure** option is not selected as the external value in the **External value** parameter (→ 105), the input value for the fixed process pressure (**Fixed process pressure** parameter (→ 108)) is displayed.

Dependency

The unit is taken from the **Pressure unit** parameter (→ 64)

Saturation temperature

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

Prerequisite The **Steam** option is selected in the **Select medium** parameter (→ 77) parameter.

Description Displays the saturation temperature currently calculated.

User interface
Country-specific:
- °C
- °F

Additional information The saturation temperature describes the temperature limit at which steam begins to condense. This value is calculated using the current process pressure (**Pressure** parameter (→ 52)) according to IAPWS-IF97.

Dependency

The unit is taken from the **Temperature unit** parameter (→ 65)

Degrees of superheat

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

Prerequisite In the **Select medium** parameter (→ 77), the **Steam** option is selected.

Description Displays the degree of superheating currently calculated.

User interface 0 to 500 K

Additional information *Description*

The degree of superheating describes the difference between the temperature (**Temperature** parameter) and the saturation temperature (**Saturation temperature** parameter (→ 52)). If the temperature is below the current saturation temperature, the degree of superheating has the value **0**.

Compressibility factor

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

Prerequisite The following conditions are met:
Order code for "Sensor version"
Option "Mass (integrated temperature measurement)"

The **Gas** option or the **Steam** option is selected in the **Select medium** parameter (→ 77).

Description Displays the compressibility factor currently calculated.

User interface 0 to 2

Additional information *Description*

The compressibility factor describes the deviation of the medium from the ideal behavior under the current process conditions. If the medium is a user-specific gas/liquid, the compressibility factor is entered as the Z-factor (**Z-factor** parameter (→ 87)).

Vortex frequency

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

Description Displays the measured variable for the flow in the measuring tube which is recorded directly with the DSC sensor.

User interface **Measuring range depending on the nominal diameter:**
0.1 to 3 100 Hz

Additional information

Description

The filter settings specify the measuring range of the vortex frequency depending on the nominal diameter.

Filter settings for liquids

Prowirl D

Nominal diameter	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} 1) [Hz]	f_{vmax} [Hz]
DN 15 (½")	11.5	666.5
DN 25 (1")	6.7	388.8
DN 40 (1½")	3.9	224.3
DN 50 (2")	3.0	172.8
DN 80 (3")	2.1	122.8
DN 100 (4")	1.7	101.4
DN 150 (6")	1.1	66.6

1) For factory setting **Turn down** parameter (7755) (→ 🖹 74)

Prowirl F

Nominal diameter	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} 1) [Hz]	f_{vmax} [Hz]
DN 15 (½")	8.9	570
DN 25 (1")	5.1	330
DN 40 (1½")	3.2	210
DN 50 (2")	2.5	160
DN 80 (3")	1.7	110
DN 100 (4")	1.3	82
DN 150 (6")	0.84	54
DN 200 (8")	0.64	41
DN 250 (10")	0.51	33
DN 300 (12")	0.43	27

1) For factory setting **Turn down** parameter (7755) (→ 🖹 74)

Prowirl O

Nominal diameter	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} 1) [Hz]	f_{vmax} [Hz]
DN 15 (½")	12.0	570
DN 25 (1")	6.9	330
DN 40 (1½")	4.9	230
DN 50 (2")	3.9	180
DN 80 (3")	2.5	119
DN 100 (4")	1.9	91

Nominal diameter	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} [1] [Hz]	f_{vmax} [Hz]
DN 150 (6")	1.3	60
DN 200 (8")	0.92	43
DN 250 (10")	0.73	34
DN 300 (12")	0.61	29

1) For factory setting **Turn down** parameter (7755) (→ 74)

Prowirl R

Nominal diameter	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} [1] [Hz]	f_{vmax} [Hz]
DN 25 (1") > DN 15 (½") DN 40 (1½") >> DN 15 (½")	12.0	570
DN 40 (1½") > DN 25 (1") DN 50 (2") >> DN 25 (1")	6.9	330
DN 50 (2") > DN 40 (1½") DN 80 (3") >> DN 40 (1½")	4.4	210
DN 80 (3") > DN 50 (2") DN 100 (4") >> DN 50 (2")	3.4	160
DN 100 (4") > DN 80 (3") DN 150 (6") >> DN 80 (3")	2.3	110
DN 150 (6") > DN 100 (4") DN 200 (8") >> DN 100 (4")	1.7	82
DN 200 (8") > DN 150 (6") DN 250 (10") >> DN 150 (6")	1.1	54

1) For factory setting **Turn down** parameter (7755) (→ 74)

Filter settings for gases/steam

Prowirl D

DN [mm (in)]	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} [1] [Hz]	f_{vmax} [Hz]
DN 15 (½")	209.9	3 100
DN 25 (1")	67.1	3 100
DN 40 (1½")	13.7	1869.1
DN 50 (2")	10.5	2303.8
DN 80 (3")	7.5	1636.9
DN 100 (4")	6.2	1352.3
DN 150 (6")	4.1	888.6

1) For factory setting **Turn down** parameter (7755) (→ 74)

Prowirl F

DN [mm (in)]	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} [1] [Hz]	f_{vmax} [Hz]
DN 15 (½")	45	2 900
DN 25 (1")	26	2 700
DN 40 (1½")	16	1 700
DN 50 (2")	13	2 100
DN 80 (3")	8.5	1 400
DN 100 (4")	6.4	1 100
DN 150 (6")	4.3	720
DN 200 (8")	3.2	540
DN 250 (10")	2.6	430
DN 300 (12")	2.2	370

1) For factory setting **Turn down** parameter (7755) (→ 🖹 74)

Prowirl O

DN [mm (in)]	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} [1] [Hz]	f_{vmax} [Hz]
DN 15 (½")	60	2 900
DN 25 (1")	34	2 700
DN 40 (1½")	25	1 900
DN 50 (2")	19	2 500
DN 80 (3")	13	1 600
DN 100 (4")	9.6	1 200
DN 150 (6")	6.3	800
DN 200 (8")	4.6	580
DN 250 (10")	3.6	460
DN 300 (12")	3.1	390

1) For factory setting **Turn down** parameter (7755) (→ 🖹 74)

Prowirl R

DN [mm (in)]	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} [1] [Hz]	f_{vmax} [Hz]
DN 25 (1") > DN 15 (½") DN 40 (1½") >> DN 15 (½")	60	2 900
DN 40 (1½") > DN 25 (1") DN 50 (2") >> DN 25 (1")	34	2 700
DN 50 (2") > DN 40 (1½") DN 80 (3") >> DN 40 (1½")	22	1 700
DN 80 (3") > DN 50 (2") DN 100 (4") >> DN 50 (2")	17	2 100
DN 100 (4") > DN 80 (3") DN 150 (6") >> DN 80 (3")	11	1 400

DN [mm (in)]	Minimum vortex frequency	Maximum vortex frequency
	f_{vmin} 1) [Hz]	f_{vmax} [Hz]
DN 150 (6") > DN 100 (4") DN 200 (8") >> DN 100 (4")	8.6	1 100
DN 200 (8") > DN 150 (6") DN 250 (10") >> DN 150 (6")	5.7	720

1) For factory setting **Turn down** parameter (7755) (→ 🖹 74)

Enthalpy

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

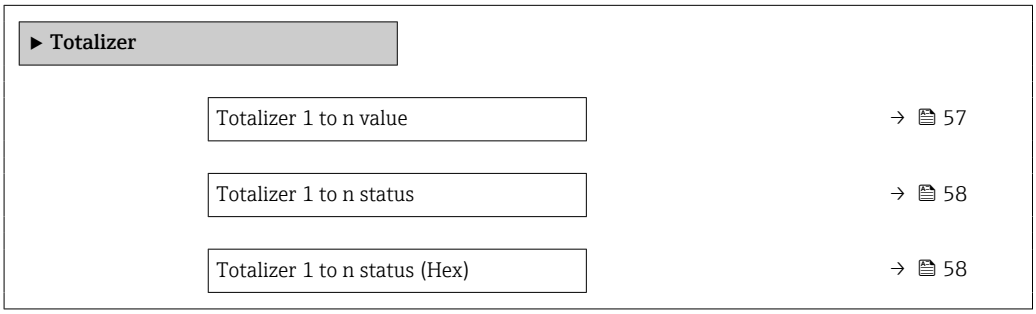
Prerequisite
With order code for "Sensor version":
- Option "Mass (integrated temperature measurement)"
  or
- Option "Mass (integrated pressure/temperature measurement)"

Description Displays the enthalpy.

User interface The unit is taken from the **Specific enthalpy unit** parameter.

"Totalizer" submenu

Navigation Expert → Sensor → Measured val. → Totalizer



Totalizer 1 to n value

Navigation Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n value

Description Shows the totalizer value reported to the controller for further processing.

User interface Signed floating-point number

Factory setting 0 m^3

Totalizer 1 to n status

Navigation Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n status

Description Shows the status of the totalizer value reported to the controller for further processing ('Good', 'Uncertain', 'Bad').

User interface
- Good
- Uncertain
- Bad

Factory setting Good

Totalizer 1 to n status (Hex)

Navigation Expert → Sensor → Measured val. → Totalizer → Status 1 to n (Hex)

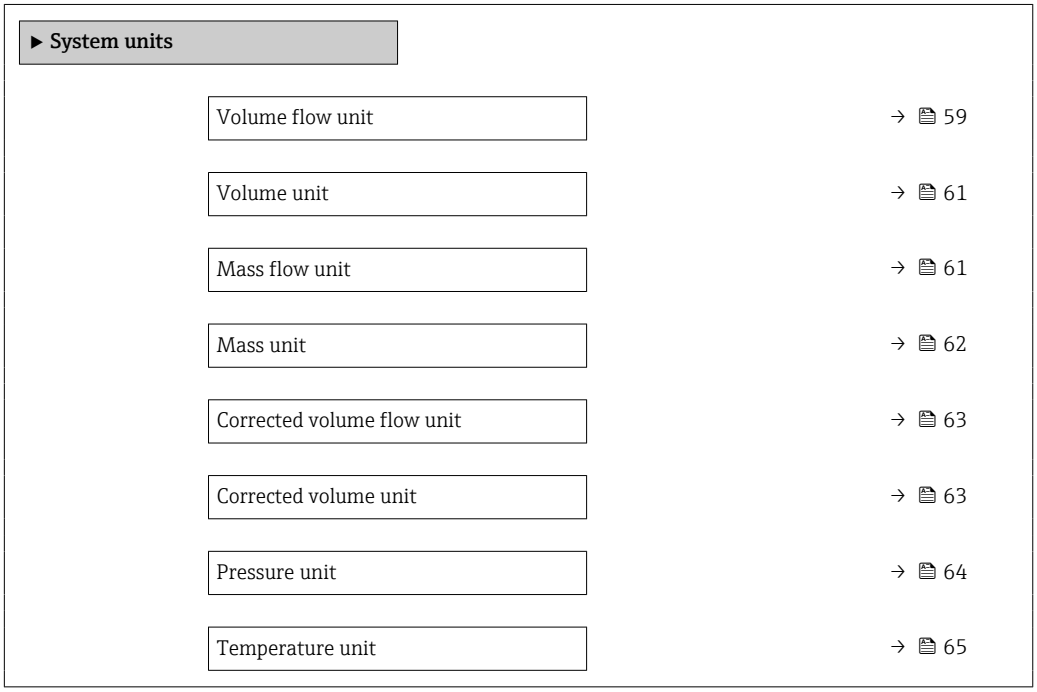
Description Shows the status of the totalizer value reported to the controller for further processing (Hex).

User interface 0 to 255

Factory setting 128

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

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

Factory setting

Depends on country:
- m^3/h
- ft^3/min

Additional information

Effect

The selected unit applies for:
Volume flow parameter

Selection

For an explanation of the abbreviated units: → 181

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
- Mft^3
- Mft^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)

Factory setting Country-specific:
- m^3
- ft^3

Additional information

Selection

For an explanation of the abbreviated units: → 181

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

Factory setting

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

Additional information

Effect

The selected unit applies for:
- **Mass flow** parameter
- **Total mass flow** parameter
- **Condensate mass flow** parameter

Selection

For an explanation of the abbreviated units: → 181

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

Factory setting

Country-specific:
- kg
- lb

Additional information

Selection

For an explanation of the abbreviated units: → 181

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
- Nhl/s
- Nhl/min
- Nhl/h
- Nhl/d
- Nm^3/s
- Nm^3/min
- Nm^3/h
- Nm^3/d
- Sl/s
- Sl/min
- Sl/h
- Sl/d
- Sm^3/s
- Sm^3/min
- Sm^3/h
- Sm^3/d

US units
- Sft^3/s
- Sft^3/min
- Sft^3/h
- Sft^3/d
- $MSft^3/s$
- $MSft^3/min$
- $MSft^3/h$
- $MSft^3/D$
- $MMSft^3/s$
- $MMSft^3/min$
- $MMSft^3/h$
- $MMSft^3/d$
- Sbbl/s (us;oil)
- Sbbl/min (us;oil)
- Sbbl/h (us;oil)
- Sbbl/d (us;oil)

Factory setting Country-specific:
- Nm^3/h
- Sft^3/h

Additional information

Result

The selected unit applies for:
Corrected volume flow parameter

Selection

For an explanation of the abbreviated units: → 181

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
- Nhl
- Nm^3
- Sl
- Sm^3

US units
- Sft^3
- $MSft^3$
- $MMSft^3$
- Sbbl (us;oil)

Factory setting

Country-specific:
- Nm^3
- Sft^3

Additional information

Selection

For an explanation of the abbreviated units: → 181

Pressure unit

Navigation

Expert → Sensor → System units → Pressure unit

Prerequisite

With order code for "Sensor version":
option "Mass (integrated temperature measurement)"

Description

Use this function to select the unit for the pipe pressure.

Selection

SI units
- MPa
- kPa
- Pa
- bar
- mbar a
- torr
- atm
- kgf/cm^2
- gf/cm^2

US units
- psi

Other units
- inH2O (4°C)
- inH2O (68°F)
- mmH2O (4°C)
- mmH2O (68°F)
- ftH2O (68°F)
- inHg (0°C)
- mmHg (0°C)

Factory setting

Country-specific:
- bar
- psi

Additional information

Result

The unit is taken from:
- **Calculated saturated steam pressure** parameter
- **Atmospheric pressure** parameter (→ 105)
- **Maximum value** parameter (→ 164)
- **Fixed process pressure** parameter (→ 108)
- **Pressure** parameter (→ 52)
- **Reference pressure** parameter (→ 84)

Selection

For an explanation of the abbreviated units: → 181

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

Effect

The selected unit applies for:
- **Temperature** parameter
- **Maximum value** parameter (→ 161)
- **Minimum value** parameter (→ 161)
- **Average value** parameter (→ 161)
- **Maximum value** parameter (→ 162)
- **Minimum value** parameter (→ 162)
- **Maximum value** parameter (→ 163)
- **Minimum value** parameter (→ 163)
- **2nd temperature delta heat** parameter (→ 107)
- **Fixed temperature** parameter (→ 107)
- **Reference combustion temperature** parameter (→ 83)
- **Reference temperature** parameter (→ 84)
- **Saturation temperature** parameter (→ 52)

Selection

For an explanation of the abbreviated units: → 181

Energy flow unit

Navigation Expert → Sensor → System units → Energy flow unit

Prerequisite With order code for "Sensor version":
option "Mass (integrated temperature measurement)"

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

Selection

SI units
- kW
- MW
- GW
- kJ/s
- kJ/min
- kJ/h
- kJ/d
- MJ/s
- MJ/h
- MJ/min
- MJ/d
- GJ/s
- GJ/min
- GJ/h
- GJ/d
- kcal/s
- kcal/min
- kcal/h
- kcal/d
- Mcal/s
- Mcal/min
- Mcal/h
- Mcal/d
- Gcal/s
- Gcal/min
- Gcal/h
- Gcal/d

Imperial units
- Btu/s
- Btu/min
- Btu/h
- Btu/day
- MBtu/s
- MBtu/min
- MBtu/h
- MBtu/d
- MMBtu/s
- MMBtu/min
- MMBtu/h
- MMBtu/d

Factory setting

Country-specific:
- kW
- Btu/h

Additional information

Result

The selected unit applies for:
- **Heat flow difference** parameter
- **Energy flow** parameter

Selection

For an explanation of the abbreviated units: → 181

Energy unit

Navigation

Expert → Sensor → System units → Energy unit

Prerequisite

With order code for "Sensor version":
option "Mass (integrated temperature measurement)"

Description

Use this function to select the unit for energy.

Selection

SI units
- kWh
- MWh
- GWh
- kJ
- MJ
- GJ
- kcal
- Mcal
- Gcal

Imperial units
- Btu
- MBtu
- MMBtu

Factory setting

Country-specific:
- kWh
- Btu

Additional information

Selection

For an explanation of the abbreviated units: → 181

Calorific value unit

Navigation

Expert → Sensor → System units → Cal. value unit

Prerequisite

The following conditions are met:
- Order code for "Sensor version", option "Mass (integrated temperature measurement)"
- The **Gross calorific value volume** option or the **Net calorific value volume** option is selected in the **Calorific value type** parameter (→ 82).

Description

Use this function to select the unit for the calorific value.

Selection

SI units
- kJ/Nm³
- MJ/Nm³
- kWh/Nm³
- MWh/Sm³
- kJ/Sm³
- MJ/Sm³
- kWh/Sm³
- MWh/Nm³

Imperial units
- Btu/Sm³
- MBtu/Sm³
- Btu/Sft³
- MBtu/Sft³

Factory setting

Country-specific:
- kJ/Nm³
- Btu/Sft³

Additional information

Result

The selected unit applies for:
Reference gross calorific value parameter (→ 83)

Selection

For an explanation of the abbreviated units: → 181

Calorific value unit (Mass)

Navigation Expert → Sensor → System units → Cal. value unit

Prerequisite
The following conditions are met:
- Order code for "Sensor version", Option "Mass (integrated temperature measurement)"
- The **Gross calorific value mass** option or the **Net calorific value mass** option is selected in the **Calorific value type** parameter (→ 82).

Description Use this function to select the unit for the calorific value (mass).

Selection

SI units	*US units*	*Imperial units*
▪ kJ/kg	▪ kJ/lb	▪ Btu/lb
▪ MJ/kg	▪ MJ/lb	▪ MBtu/lb
▪ kWh/kg	▪ kWh/lb	
▪ MWh/kg	▪ MWh/lb	

Factory setting
Country-specific:
- kJ/kg
- Btu/lb

Additional information *Selection*

For an explanation of the abbreviated units: → 181

Velocity unit

Navigation Expert → Sensor → System units → Velocity unit

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

Selection

SI units	*US units*
m/s	ft/s

Factory setting
Country-specific:
- m/s
- ft/s

Additional information *Effect*

The selected unit applies for:
- **Flow velocity** parameter
- **Maximum value** parameter (→ 164)

Selection

For an explanation of the abbreviated units: → 181

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
- kg/l
- kg/dm³
- kg/m³
- 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/m³
- lb/ft³

Additional information

Effect

The selected unit applies for:
- **Density** parameter (→ 51)
- **Fixed density** parameter (→ 106)
- **Reference density** parameter (→ 83)

Selection

- SD = specific density
  The specific density is the ratio of the medium density to the water density 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 medium density to the water density at a water temperature of +4 °C (+39 °F), +15 °C (+59 °F), +20 °C (+68 °F).

For an explanation of the abbreviated units: → 181

Specific volume unit

Navigation Expert → Sensor → System units → Spec. vol. unit

Prerequisite With order code for "Sensor version":
Option "Mass (integrated temperature measurement)"

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

Selection

Other units
- m³/kg
- ft3/lb

Factory setting Country-specific:
- m³/kg
- ft³/lb

Additional information *Result*

The selected unit applies for:
Specific volume parameter (→ 51)

Additional information *Selection*

For an explanation of the abbreviated units: → 181

Dynamic viscosity unit

Navigation Expert → Sensor → System units → Dyn. visc. unit

Description Use this function to select the unit for dynamic viscosity.

Selection *SI units*
- cP
- Pa s
- P

Factory setting Pa s

Additional information *Result*

The selected unit applies for:
- **Dynamic viscosity** parameter (→ 88) (gases)
- **Dynamic viscosity** parameter (→ 88) (liquids)

Additional information *Selection*

For an explanation of the abbreviated units: → 181

Specific heat capacity unit

Navigation Expert → Sensor → System units → SpecHeatCapaUnit

Prerequisite The following conditions are met:
- Selected medium:
  - The **User-specific gas** option is selected in the **Select gas type** parameter (→ 79) parameter.
    Or
  - The **User-specific liquid** option is selected in the **Liquid type** parameter (→ 80) parameter.
- The **Heat** option is selected in the **Enthalpy type** parameter (→ 82) parameter.

Description Use this function to select the unit for the specific heat capacity.

Selection

SI units
- kJ/(kgK)
- MJ/(kgK)
- kWh/(kgK)
- kcal/(kgK)

Imperial units
- Btu/(lb˚R)

Factory setting

kJ/(kgK)

Additional information

Result

The selected unit applies for:
Specific heat capacity parameter (→ 86)

Selection

For an explanation of the abbreviated units: → 181

Length unit

Navigation

Expert → Sensor → System units → Length unit

Description

Use this function to select the unit of length for the nominal diameter.

Selection

SI units
- mm
- m

US units
- in
- ft

Factory setting

Country-specific:
- mm
- in

Additional information

Result

The selected unit applies for:
- **Inlet run** parameter (→ 109)
- **Mating pipe diameter** parameter (→ 109)

Selection

For an explanation of the abbreviated units: → 181

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

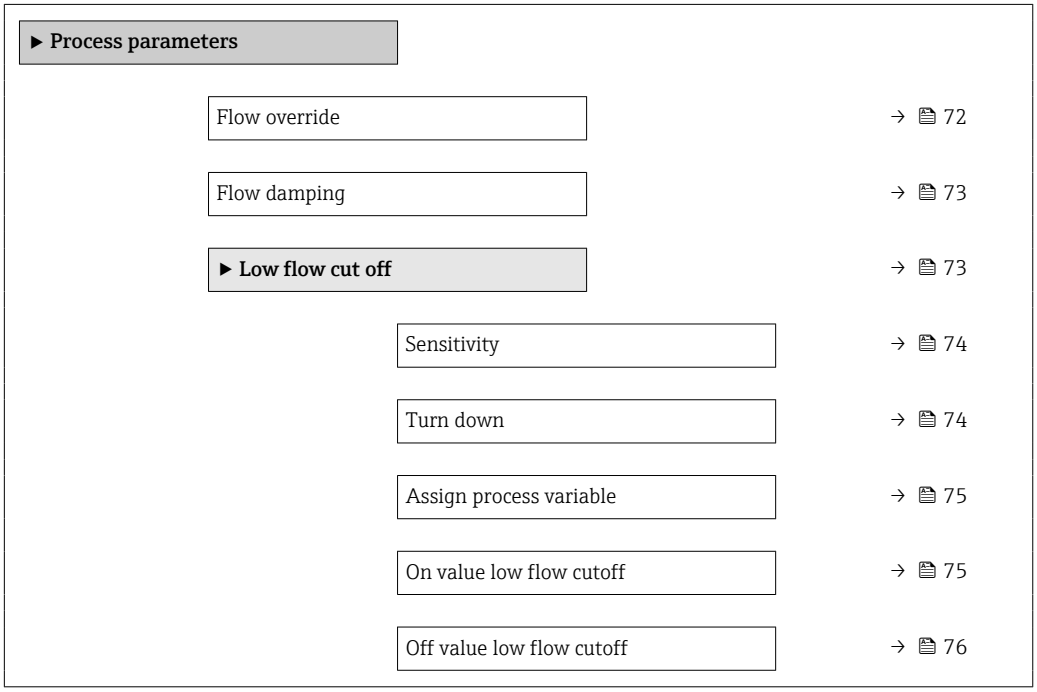
Factory setting dd.mm.yy hh:mm

Additional information *Selection*

For an explanation of the abbreviated units: → 181

3.2.3 "Process parameters" submenu

Navigation Expert → Sensor → Process param.



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

Effect

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

Description

Flow override is active
- The **453 Flow override** diagnostic message is output.
- Output values
  - Output: value at zero flow
  - Temperature: continues to be output
  - Totalizer 1...3: stop being totalized

The **Flow override** option can also be activated in the **Status input** submenu: **Assign status input** parameter.

Flow damping

Navigation Expert → Sensor → Process param. → Flow damping

Description Use this function to enter a value for 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 999.9 s

Factory setting 5 s

Additional information

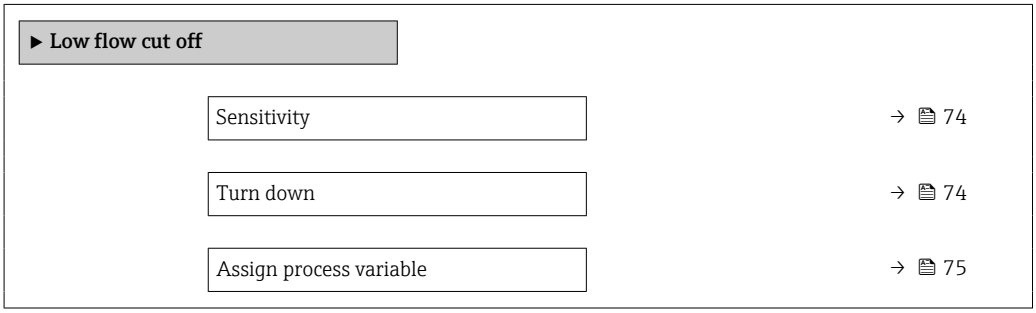
User entry
- Value = 0: no damping
- Value > 0: damping is increased

Result

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

"Low flow cut off" submenu

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



On value low flow cutoff	→ 75
Off value low flow cutoff	→ 76

Sensitivity

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

Description Use this function to enter a value to control the device sensitivity in the lower flow range.

User entry 1 to 9

Factory setting 5

Additional information

Description

The measuring signal must have a certain minimum signal amplitude so that the signals can be evaluated without any errors. Using the nominal diameter, the corresponding flow can also be derived from this amplitude. The minimum signal amplitude depends on the setting for the sensitivity of the DSC sensor (s), the steam quality (x) and the force of the vibrations present (a). The value mf corresponds to the lowest measurable flow velocity without vibration (no wet steam) at a density of 1 kg/m^3 (0.0624 lbm/ft^3). The value mf can be set in the range from 6 to 20 m/s (1.8 to 6 ft/s) (factory setting 12 m/s (3.7 ft/s)) with the **Sensitivity** parameter (value range 1 to 9, factory setting 5).

The lowest flow velocity that can be measured on account of the signal amplitude v_{AmpMin} is derived from the **Sensitivity** parameter and the steam quality (x) or from the force of vibrations present (a).

User entry

Increasing the sensitivity makes it possible to measure smaller flow signals. Reducing the sensitivity improves performance in relation to interference in the lower flow range.

Turn down

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

Description Use this function to enter a setting for the turndown.

User entry 50 to 100 %

Factory setting 100 %

Additional information *Description*

The measuring range can be limited with this parameter, if necessary. The upper end of the measuring range is not affected. The start of the low end of the measuring range can be changed to a higher flow value, making it possible to cut off low flows, for example.

User entry

Reducing the turndown limits the lower measuring range in relation to the minimum measurable vortex frequency.

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
- Corrected volume flow
- Mass flow
- Reynolds number *

Factory setting Off

On value low flow cutoff

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

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 75).

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 → 76.

User entry Positive floating-point number

Factory setting 0

Additional information *Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 75).

* Visibility depends on order options or device settings

Off value low flow cutoff

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

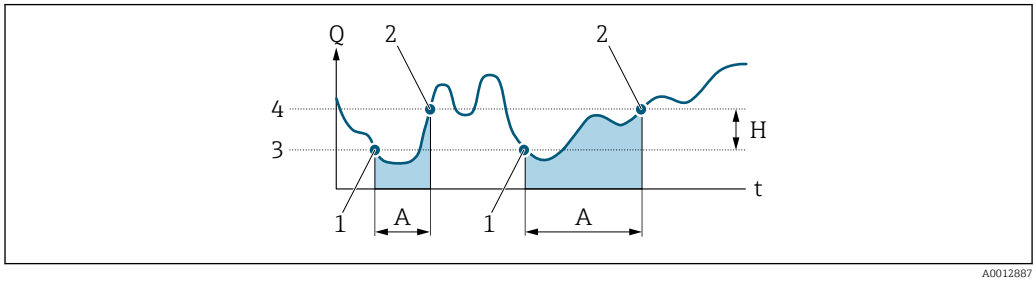
Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 75).

Description Use this function to enter a switch-off value for low flow cut off. The switch-off value is entered as a positive hysteresis from the switch-on value→ 75.

User entry 0 to 100.0 %

Factory setting 50 %

Additional information *Example*



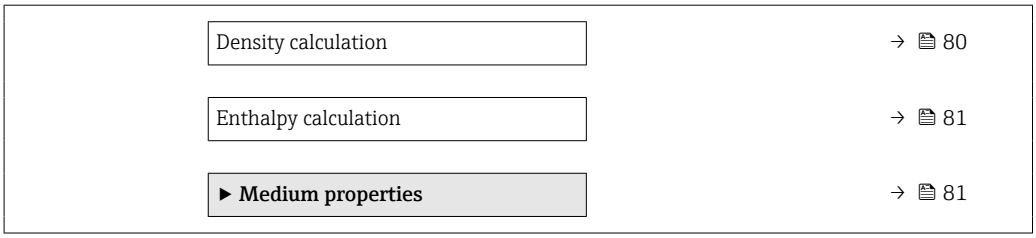
Q Flow
t Time
H Hysteresis
A Low flow cut off active
1 Low flow cut off is activated
2 Low flow cut off is deactivated
3 On value entered
4 Off value entered

3.2.4 "Measurement mode" submenu

Navigation Expert → Sensor → Measurement mode

▶ **Measurement mode**

Select medium	→ 77
Steam calculation mode	→ 77
Steam quality	→ 78
Steam quality value	→ 78
Select gas type	→ 79
Liquid type	→ 80



Select medium

Navigation Expert → Sensor → Measurement mode → Select medium

Description Use this function to select the type of medium for the measuring application.

Selection
- Gas
- Liquid
- Steam

Factory setting Steam

Steam calculation mode

Navigation Expert → Sensor → Measurement mode → Steam calc. mode

Prerequisite The **Steam** option is selected in the **Select medium** parameter (→ 77) parameter.

Description Use this function to select the steam calculation mode for saturated steam measurement.

Selection
- Saturated steam (T-compensated)
- Automatic (p-/T-compensated)

Factory setting Saturated steam (T-compensated)

Additional information *Selection*
- Saturated steam (T-compensated)
  Temperature-compensated
- Automatic (p-/T-compensated)
  Pressure/temperature-compensated

Steam quality

Navigation Expert → Sensor → Measurement mode → Steam quality

Prerequisite

The following conditions are met:
- Order code for "Application package":
  - Option ES "Wet steam detection"
  - Option EU "Wet steam measurement"
- The **Steam** option is selected in the **Select medium** parameter (→ 77) parameter.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 44).

Description

Use this function to select the compensation mode for the steam quality.

Selection

- Fixed value
- Calculated value

Factory setting

Fixed value

Additional information

Selection

For detailed information on setting the parameter in steam applications, see the Special Documentation for the **Wet Steam Detection** and **Wet Steam Measurement** application package → 7

Steam quality value

Navigation Expert → Sensor → Measurement mode → Steam qual. val.

Prerequisite

The following conditions are met:
- The **Steam** option is selected in the **Select medium** parameter (→ 77) parameter.
- The **Fixed value** option is selected in the **Steam quality** parameter (→ 78) parameter.

Description

Use this function to enter a fixed value for the steam quality.

User entry

0 to 100 %

Factory setting

100 %

Additional information

User entry

For detailed information on setting the parameter in steam applications, see the Special Documentation for the **Wet Steam Detection** and **Wet Steam Measurement** application package → 7

Select gas type

Navigation Expert → Sensor → Measurement mode → Select gas type

Prerequisite The following conditions are met:
- Order code for "Sensor version", Option "Mass (integrated temperature measurement)"
- The **Gas** option is selected in the **Select medium** parameter (→ 77) parameter.

Description Use this function to select the type of gas for the measuring application.

Selection
- Single gas *
- Gas mixture *
- Air *
- Natural gas *
- User-specific gas

Factory setting User-specific gas

Additional information *"User-specific gas" option*

Applications: calculation of the mass flow of a user-specific gas

Calculated variables: the mass flow, the density, the corrected volume flow and the heat quantity are calculated from the measured volume flow and the measured temperature. Either the specific thermal capacity or the calorific value must be entered for calculating the heat quantity.

Formulae for calculation:
- Mass flow: $m = q \cdot \rho\ (T)$
- Density: $\rho = \rho_1\ (T_1) / (1 + \beta_p \cdot [T - T_1])$
- Corrected volume flow: $v_n = q \cdot (\rho\ (T) / \rho_{ref})$
- Heat quantity in the case of delta heat: $E = q \cdot \rho\ (T) \cdot c_p \cdot \Delta T$
- Heat quantity in the case of combustion: $E = q \cdot \rho\ (T) \cdot h$

m = Mass flow

q = Volume flow (measured)

v_n = Corrected volume flow

T = Process temperature (measured)

T_1 = Temperature at which the value for ρ_1 applies.

ρ = Density

ρ_{ref} = Reference density

= Density (→ 51) at which the value for T_1 applies.

β_p = Linear expansion coefficient (→ 85) of the liquid at T_1

Possible combinations of these values: **Linear expansion coefficient** parameter (→ 85)

* Visibility depends on order options or device settings

Liquid type

Navigation Expert → Sensor → Measurement mode → Liquid type

Prerequisite
The following conditions are met:
- Order code for "Sensor version", Option "Mass (integrated temperature measurement)"
- The **Liquid** option is selected in the **Select medium** parameter (→ 77) parameter.

Description
Use this function to select the type of liquid for the measuring application.

Selection
- Water
- LPG (Liquefied Petroleum Gas)
- User-specific liquid

Factory setting
Water

Additional information
"User-specific liquid" option

Applications: calculation of the mass flow of a user-specific liquid, such as thermal oil.

Calculated variables: the mass flow, the density, the corrected volume flow and the heat quantity are calculated from the measured volume flow and the measured temperature. Either the specific thermal capacity or the calorific value must be entered for calculating the heat quantity.

Formulae for calculation:
- Mass flow: $m = q \cdot \rho\ (T)$
- Density: $\rho = \rho_1\ (T_1) / (1 + \beta_p \cdot |T - T_1|)$
- Corrected volume flow: $v_n = q \cdot (\rho\ (T) / \rho_{ref})$
- Heat quantity in the case of delta heat: $E = q \cdot \rho\ (T) \cdot c_p \cdot \Delta T$
- Heat quantity in the case of combustion: $E = q \cdot \rho\ (T) \cdot h$

m = Mass flow

q = Volume flow (measured)

v_n = Corrected volume flow

T = Process temperature (measured)

T_1 = Temperature at which the value for ρ_1 applies.

ρ = Density

ρ_{ref} = Reference density

= Density (→ 51) at which the value for T_1 applies.

β_p = Linear expansion coefficient (→ 85) of the liquid at T_1

Possible combinations of these values: **Linear expansion coefficient** parameter (→ 85)

Density calculation

Navigation Expert → Sensor → Measurement mode → Density calc.

Prerequisite
The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.

Description Use this function to select the standard on the basis of which the density is calculated.

Selection
- AGA Nx19
- ISO 12213- 2
- ISO 12213- 3

Factory setting AGA Nx19

Enthalpy calculation

Navigation Expert → Sensor → Measurement mode → Enthalpy calc.

Prerequisite The following conditions are met:
- Order code for "Sensor version", Option "Mass (integrated temperature measurement)"
- In the **Select medium** parameter (→ 77), the **Gas** option is selected and in the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.

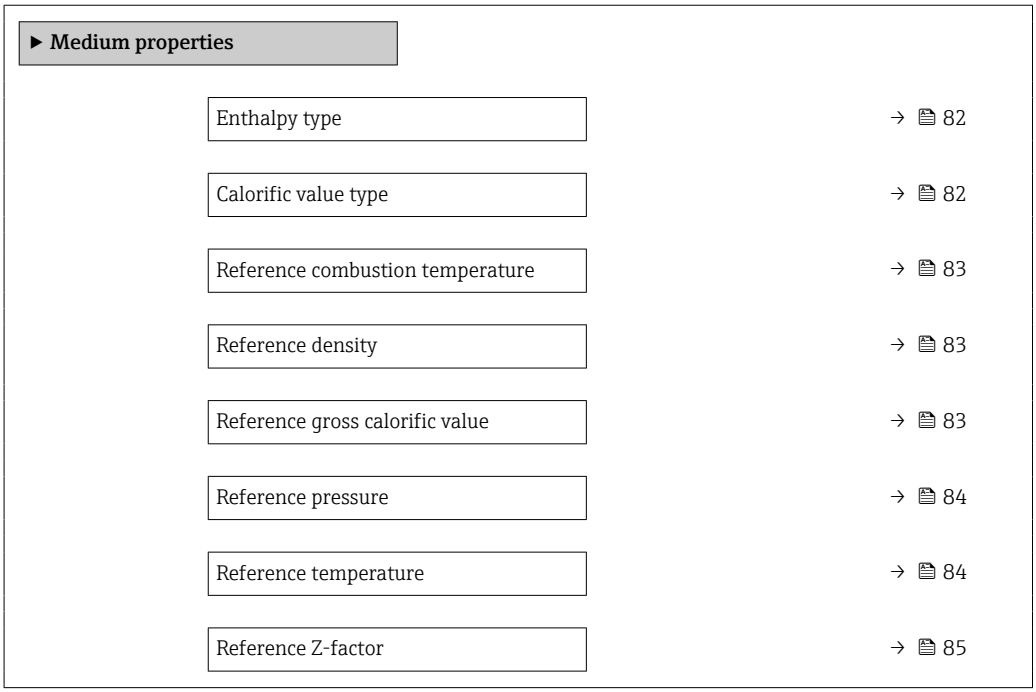
Description Use this function to select the standard on the basis of which the enthalpy is calculated.

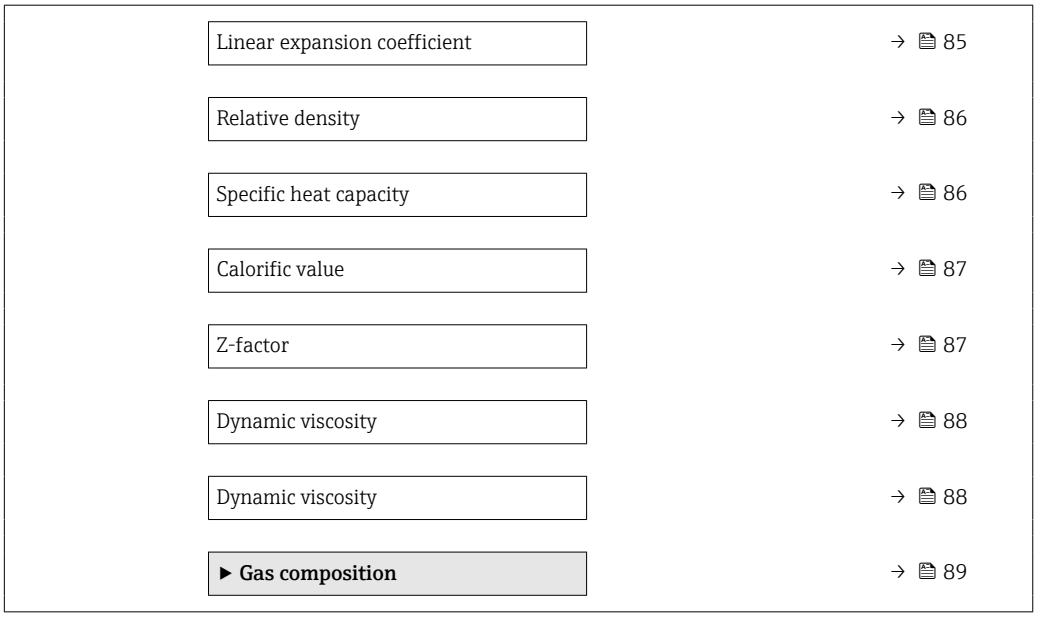
Selection
- AGA5
- ISO 6976

Factory setting AGA5

"Medium properties" submenu

Navigation Expert → Sensor → Measurement mode → Medium property





Enthalpy type

Navigation Expert → Sensor → Measurement mode → Medium property → Enthalpy type

Prerequisite The following conditions are met:
- In the **Select gas type** parameter (→ 79), the **User-specific gas** option is selected.
  Or
- In the **Liquid type** parameter (→ 80), the **User-specific liquid** option is selected.

Description Use this function to select the type of enthalpy.

Selection
- Heat
- Calorific value

Factory setting Heat

Calorific value type

Navigation Expert → Sensor → Measurement mode → Medium property → Cal. value type

Prerequisite The **Calorific value type** parameter (→ 82) is visible.

Description Use this function to select whether the net calorific value or the gross calorific value is used as the basis for calculation.

Selection
- Gross calorific value volume
- Net calorific value volume
- Gross calorific value mass
- Net calorific value mass

Factory setting Gross calorific value mass

Reference combustion temperature

Navigation Expert → Sensor → Measurement mode → Medium property → Ref. comb. temp.

Prerequisite The **Reference combustion temperature** parameter (→ 83) is visible.

Description Use this function to enter the reference combustion temperature for calculating the natural gas energy value.

User entry −200 to 450 °C

Factory setting 20 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

Reference density

Navigation Expert → Sensor → Measurement mode → Medium property → Ref.density

Prerequisite The following conditions are met:
- In the **Select gas type** parameter (→ 79), the **User-specific gas** option is selected.
  Or
- In the **Liquid type** parameter (→ 80), the **Water** option or **User-specific liquid** option is selected.

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

User entry 0.01 to 15 000 kg/m³

Factory setting 1 000 kg/m³

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 69)

Reference gross calorific value

Navigation Expert → Sensor → Measurement mode → Medium property → Ref. GrossCalVal

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.
- In the **Density calculation** parameter (→ 80), the **ISO 12213- 3** option is selected.

Description Use this function to enter the reference gross calorific value of the natural gas.

User entry Positive floating-point number

Factory setting 50 000 kJ/Nm³

Additional information *Dependency*

The unit is taken from the **Calorific value unit** parameter (→ 67)

Reference pressure

Navigation Expert → Sensor → Measurement mode → Medium property → Ref. pressure

Prerequisite The following conditions are met:
- Order code for "Sensor version", Option "Mass (integrated temperature measurement)"
- The **Gas** option is selected in the **Select medium** parameter (→ 77) parameter.

Description Use this function to enter the reference pressure for calculating the reference density.

User entry 0 to 250 bar

Factory setting 1.01325 bar

Additional information *Dependency*

The unit is taken from the **Pressure unit** parameter (→ 64)

Reference temperature

Navigation Expert → Sensor → Measurement mode → Medium property → Ref. temperature

Prerequisite The following conditions are met:
- The **Gas** option is selected in the **Select medium** parameter (→ 77).
  Or
- The **Liquid** option is selected in the **Select medium** parameter (→ 77).

Description Use this function to enter the reference temperature for calculating the reference density.

User entry −200 to 450 °C

Factory setting 20 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

Reference Z-factor

Navigation Expert → Sensor → Measurement mode → Medium property → Ref. Z-factor

Prerequisite In the **Select gas type** parameter (→ 79), the **User-specific gas** option is selected.

Description Use this function to enter the real gas constant Z for gas under reference conditions.

User entry 0.1 to 2

Factory setting 1

Linear expansion coefficient

Navigation Expert → Sensor → Measurement mode → Medium property → Linear exp coeff

Prerequisite The following conditions are met:
- The **Liquid** option is selected in the **Select medium** parameter (→ 77).
- The **User-specific liquid** option is selected in the **Liquid type** parameter (→ 80).

Description Use this function to enter the linear, medium-specific expansion coefficient for calculating the reference density for user-specific liquids.

User entry $1.0 \cdot 10^{-6}$ to $2.0 \cdot 10^{-3}$

Factory setting $2.06 \cdot 10^{-4}$

Additional information *User entry*

- If the value in this parameter is changed, it is advisable to reset the totalizer.
- The expansion coefficient can be determined using the Applicator.
- If two density and temperature value pairs are known (density ρ_1 at temperature T_1 and density ρ_2 at temperature T_2), the expansion coefficient can be calculated according to the following formula:
  $\beta_p = ((\rho_1/\rho_2) - 1)/(T_1 - +T_2)$

Sample values

The closer the process temperature is to the specific temperature value, the better the calculation of the density for application-specific liquids. If the process temperature deviates greatly from the value indicated, the expansion coefficient should be calculated according to the formula (see above).

Medium (liquid)	Temperature value [K]	Density value [kg/m³]	Expansion coefficient [10^{-4} 1/K]
Air	123.15	594	18.76
Ammonia	298.15	602	25
Argon	133.15	1028	111.3
n-butane	298.15	573	20.7
Carbon dioxide	298.15	713	106.6
Chlorine	298.15	1398	21.9

Medium (liquid)	Temperature value [K]	Density value [kg/m³]	Expansion coefficient [10⁻⁴ 1/K]
Cyclohexane	298.15	773	11.6
n-decane	298.15	728	10.2
Ethane	298.15	315	175.3
Ethylene	298.15	386	87.7
n-heptane	298.15	351	12.4
n-hexane	298.15	656	13.8
Hydrogen chloride	298.15	796	70.9
i-butane	298.15	552	22.5
Methane	163.15	331	73.5
Nitrogen	93.15	729	75.3
n-octane	298.15	699	11.1
Oxygen	133.15	876	95.4
n-pentane	298.15	621	16.2
Propane	298.15	493	32.1
Vinyl chloride	298.15	903	19.3
Table values according to Carl L. Yaws (2001): Matheson Gas Data Book, 7th edition			

Relative density

Navigation Expert → Sensor → Measurement mode → Medium property → Relative density

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.
- In the **Density calculation** parameter (→ 80), the **ISO 12213- 3** option is selected.

Description Use this function to enter the relative density of the natural gas.

User entry 0.55 to 0.9

Factory setting 0.664

Specific heat capacity

Navigation Expert → Sensor → Measurement mode → Medium property → Spec. heat cap.

Prerequisite The following conditions are met:
- Selected medium:
  - In the **Select gas type** parameter (→ 79), the **User-specific gas** option is selected.
  Or
  - In the **Liquid type** parameter (→ 80), the **User-specific liquid** option is selected.
- In the **Enthalpy type** parameter (→ 82), the **Heat** option is selected.

Description Use this function to enter the specific heat capacity of the medium.

User entry 0 to 50 kJ/(kgK)

Factory setting 4.187 kJ/(kgK)

Additional information *Dependency*

The unit is taken from the **Specific heat capacity unit** parameter (→ 70)

Calorific value

Navigation Expert → Sensor → Measurement mode → Medium property → Calorific value

Prerequisite The following conditions are met:
- Selected medium:
  - In the **Select gas type** parameter (→ 79), the **User-specific gas** option is selected.
  Or
  - In the **Liquid type** parameter (→ 80), the **User-specific liquid** option is selected.
- In the **Enthalpy type** parameter (→ 82), the **Calorific value** option is selected.
- In the **Calorific value type** parameter (→ 82), the **Gross calorific value volume** option or **Gross calorific value mass** option is selected.

Description Use this function to enter the calorific value for calculating the energy flow.

User entry Positive floating-point number

Factory setting 50 000 kJ/kg

Z-factor

Navigation Expert → Sensor → Measurement mode → Medium property → Z-factor

Prerequisite In the **Select gas type** parameter (→ 79), the **User-specific gas** option is selected.

Description Use this function to enter the real gas constant Z for gas under operating conditions.

User entry 0.1 to 2.0

Factory setting 1

Dynamic viscosity (Liquids)

Navigation Expert → Sensor → Measurement mode → Medium property → Dynam. viscosity

Prerequisite

The following conditions are met:
- Order code for "Sensor version",
  - Option "Volume"
    or
  - Option "Volume high temperature"
- The **Liquid** option is selected in the **Select medium** parameter (→ 77) parameter.
  or
- The **User-specific liquid** option is selected in the **Liquid type** parameter (→ 80).

Description

Use this function to enter a fixed value for the dynamic viscosity for a liquid.

User entry

Positive floating-point number

Factory setting

1 cP

Additional information

Description

The viscosity entered is used to linearize the measured error in the lower Reynolds number range if the calculated viscosity is not available e.g. "Volume flow" sensor version or the fluid is a user-specific liquid (see table).

Dependencies

Sensor version	Medium	Dyn. viscosity
Volume flow	All	x
Mass flow	All except [1]	–
	[1]	x
x	Dynamic viscosity as the input value	

1) User-specific liquid

Dependency

The unit is taken from the **Dynamic viscosity unit** parameter (→ 70).

Dynamic viscosity (Gases)

Navigation Expert → Sensor → Measurement mode → Medium property → Dynam. viscosity

Prerequisite

The following conditions are met:
- Order code for "Sensor version",
  - Option "Volume"
    or
  - Option "Volume high temperature"
- The **Gas** option or the **Steam** option is selected in the **Select medium** parameter (→ 77).
  or
- The **User-specific gas** option is selected in the **Select gas type** parameter (→ 79).

Description Use this function to enter a fixed value for the dynamic viscosity for a gas or steam.

User entry Positive floating-point number

Factory setting 0.015 cP

Additional information

Description

The viscosity entered is used to linearize the measured error in the lower Reynolds number range if the calculated viscosity is not available e.g. "Volume flow" sensor version or the fluid is a user-specific gas (see table).

Dependencies

Sensor version	Medium	Dyn. viscosity
Volume flow	All	x
Mass flow	All except [1]	–
	[1]	x
x	Dynamic viscosity as the input value	

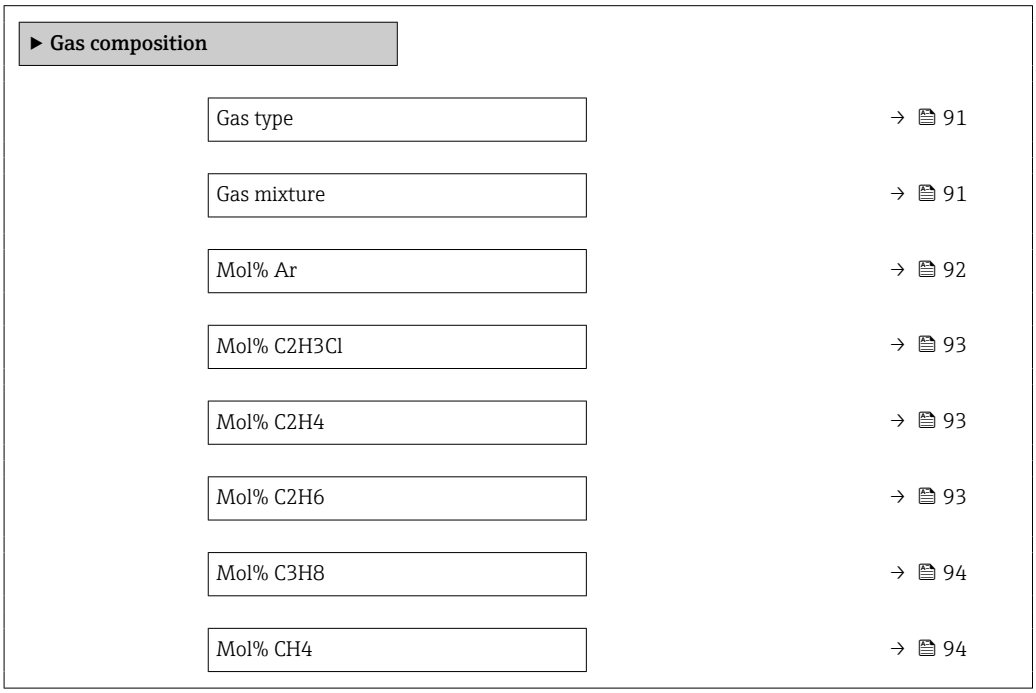
1) User-specific gas

Dependency

The unit is taken from the **Dynamic viscosity unit** parameter (→ 70).

"Gas composition" submenu

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition



Mol% Cl2	→ 95
Mol% CO	→ 95
Mol% CO2	→ 95
Mol% H2	→ 96
Mol% H2O	→ 96
Mol% H2S	→ 97
Mol% HCl	→ 97
Mol% He	→ 97
Mol% i-C4H10	→ 98
Mol% i-C5H12	→ 98
Mol% Kr	→ 98
Mol% N2	→ 99
Mol% n-C10H22	→ 99
Mol% n-C4H10	→ 100
Mol% n-C5H12	→ 100
Mol% n-C6H14	→ 100
Mol% n-C7H16	→ 101
Mol% n-C8H18	→ 101
Mol% n-C9H20	→ 101
Mol% Ne	→ 102
Mol% NH3	→ 102
Mol% O2	→ 103
Mol% SO2	→ 103
Mol% Xe	→ 103

Mol% other gas	→ 104
Relative humidity	→ 104

Gas type

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Gas type

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Single gas** option is selected.

Description Use this function to select the type of gas for the measuring application.

Selection
- Hydrogen H2
- Helium He
- Neon Ne
- Argon Ar
- Krypton Kr
- Xenon Xe
- Nitrogen N2
- Oxygen O2
- Chlorine Cl2
- Ammonia NH3
- Carbon monoxide CO
- Carbon dioxide CO2
- Sulfur dioxide SO2
- Hydrogen sulfide H2S
- Hydrogen chloride HCl
- Methane CH4
- Ethane C2H6
- Propane C3H8
- Butane C4H10
- Ethylene C2H4
- Vinyl chloride C2H3Cl

Factory setting Methane CH4

Gas mixture

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Gas mixture

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected.

Description Use this function to select the gas mixture for the measuring application.

Selection

- Air
- Hydrogen H2
- Helium He
- Neon Ne
- Argon Ar
- Krypton Kr
- Xenon Xe
- Nitrogen N2
- Oxygen O2
- Chlorine Cl2
- Ammonia NH3
- Carbon monoxide CO
- Carbon dioxide CO2
- Sulfur dioxide SO2
- Hydrogen sulfide H2S
- Hydrogen chloride HCl
- Methane CH4
- Propane C3H8
- Ethane C2H6
- Butane C4H10
- Ethylene C2H4
- Vinyl chloride C2H3Cl
- Water
- Other

Factory setting

Methane CH4

Mol% Ar

Navigation

Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% Ar

Prerequisite

The following conditions are met:
In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected and in the **Gas mixture** parameter (→ 91), the **Argon Ar** option is selected.
  Or
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected and in the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description

Use this function to enter the amount of the gas constituent in the gas mixture.

User entry

0 to 100 %

Factory setting

0 %

Mol% C2H3Cl

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% C2H3Cl

Prerequisite
The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected.
- In the **Gas mixture** parameter (→ 91), the **Vinyl chloride C2H3Cl** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% C2H4

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% C2H4

Prerequisite
The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected.
- In the **Gas mixture** parameter (→ 91), the **Ethylene C2H4** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% C2H6

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% C2H6

Prerequisite
The following conditions are met:
In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected and in the **Gas mixture** parameter (→ 91), the **Ethane C2H6** option is selected.
  Or
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected and in the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% C3H8

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% C3H8

Prerequisite The following conditions are met:
In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected and in the **Gas mixture** parameter (→ 91), the **Propane C3H8** option is selected.
  Or
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected and in the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% CH4

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% CH4

Prerequisite The following conditions are met:
In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected and in the **Gas mixture** parameter (→ 91), the **Methane CH4** option is selected.
  Or
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 100 %

Mol% Cl2

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% Cl2

Prerequisite
The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected.
- In the **Gas mixture** parameter (→ 91), the **Chlorine Cl2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% CO

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% CO

Prerequisite
The following conditions are met:
In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected and in the **Gas mixture** parameter (→ 91), the **Carbon monoxide CO** option is selected.
  Or
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected and in the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% CO2

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% CO2

Prerequisite
The following conditions are met:
In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected and in the **Gas mixture** parameter (→ 91), the **Carbon dioxide CO2** option is selected.
  Or
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% H2

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% H2

Prerequisite The following conditions are met:
In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected and in the **Gas mixture** parameter (→ 91), the **Hydrogen H2** option is selected.
  Or
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected and in the **Density calculation** parameter (→ 80), the **AGA Nx19** option is **not** selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% H2O

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% H2O

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.
- In the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% H2S

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% H2S

Prerequisite The following conditions are met:
In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected and in the **Gas mixture** parameter (→ 91), the **Hydrogen sulfide H2S** option is selected.
  Or
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected and in the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% HCl

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% HCl

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected.
- In the **Gas mixture** parameter (→ 91), the **Hydrogen chloride HCl** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% He

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% He

Prerequisite The following conditions are met:
In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected and in the **Gas mixture** parameter (→ 91), the **Helium He** option is selected.
  Or
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected and in the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% i-C4H10

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% i-C4H10

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.
- In the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% i-C5H12

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% i-C5H12

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.
- In the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% Kr

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% Kr

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected.
- In the **Gas mixture** parameter (→ 91), the **Krypton Kr** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% N2

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% N2

Prerequisite The following conditions are met:
In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected and in the **Gas mixture** parameter (→ 91), the **Nitrogen N2** option is selected.
  Or
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected and in the **Density calculation** parameter (→ 80), the **AGA Nx19** option or the **ISO 12213-2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% n-C10H22

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C10H22

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.
- In the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% n-C4H10

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C4H10

Prerequisite
The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
  - In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected and in the **Gas mixture** parameter (→ 91), the **Butane C4H10** option is selected.
    Or
  - In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected and in the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.
- Or
  In the **Select medium** parameter (→ 77), the **Liquid** option is selected and in the **Liquid type** parameter (→ 80), the **LPG** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% n-C5H12

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C5H12

Prerequisite
The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.
- In the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% n-C6H14

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C6H14

Prerequisite
The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.
- In the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% n-C7H16

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C7H16

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.
- In the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% n-C8H18

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C8H18

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.
- In the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% n-C9H20

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% n-C9H20

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected.
- In the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% Ne

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% Ne

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected.
- In the **Gas mixture** parameter (→ 91), the **Neon Ne** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% NH3

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% NH3

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected.
- In the **Gas mixture** parameter (→ 91), the **Ammonia NH3** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% O2

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% O2

Prerequisite The following conditions are met:
In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected and in the **Gas mixture** parameter (→ 91), the **Oxygen O2** option is selected.
  Or
- In the **Select gas type** parameter (→ 79), the **Natural gas** option is selected and in the **Density calculation** parameter (→ 80), the **ISO 12213- 2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% SO2

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% SO2

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected.
- In the **Gas mixture** parameter (→ 91), the **Sulfur dioxide SO2** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% Xe

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% Xe

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected.
- In the **Gas mixture** parameter (→ 91), the **Xenon Xe** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Mol% other gas

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Mol% other gas

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Gas mixture** option is selected.
- In the **Gas mixture** parameter (→ 91), the **Other** option is selected.

Description Use this function to enter the amount of the gas constituent in the gas mixture.

User entry 0 to 100 %

Factory setting 0 %

Relative humidity

Navigation Expert → Sensor → Measurement mode → Medium property → Gas composition → Rel. humidity

Prerequisite The following conditions are met:
- In the **Select medium** parameter (→ 77), the **Gas** option is selected.
- In the **Select gas type** parameter (→ 79), the **Air** option is selected.

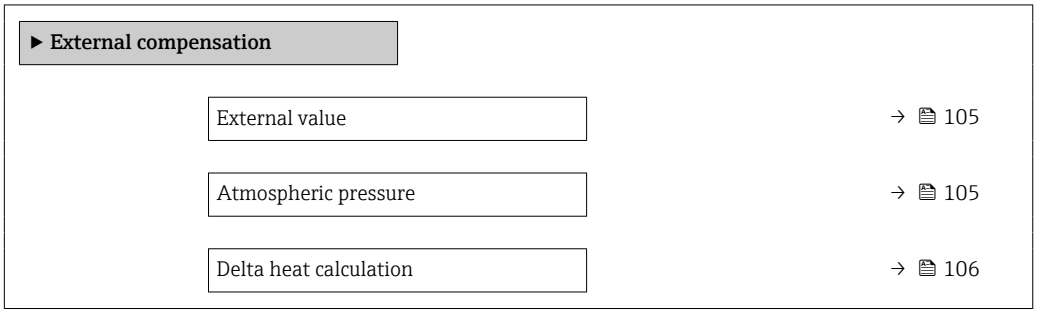
Description Use this function to enter the humidity content of the air in %.

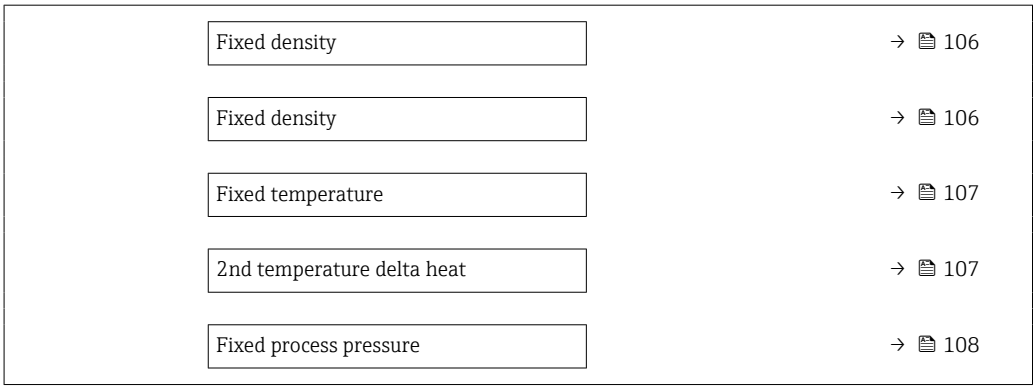
User entry 0 to 100 %

Factory setting 0 %

3.2.5 "External compensation" submenu

Navigation Expert → Sensor → External comp.





External value

Navigation Expert → Sensor → External comp. → External value

Prerequisite With order code for "Sensor version":
"Mass (integrated temperature measurement)" option

Description Use this function to select the process variable which is taken from an external device.

For detailed information on setting the parameter in steam applications, see the Special Documentation for the **Wet Steam Detection** and **Wet Steam Measurement** application package → 7

Selection
- Off
- Pressure
- Gauge pressure
- Density
- 2nd temperature delta heat

Factory setting Off

Atmospheric pressure

Navigation Expert → Sensor → External comp. → Atmosph. press.

Prerequisite In the **External value** parameter (→ 105), the **Gauge pressure** option is selected.

Description Use this function to enter the value for the ambient pressure to be used for pressure correction.

User entry 0 to 250 bar

Factory setting 1.01325 bar

Additional information *Dependency*

The unit is taken from the **Pressure unit** parameter (→ 64)

Delta heat calculation

Navigation Expert → Sensor → External comp. → Delta heat calc.

Prerequisite The **Delta heat calculation** parameter (→ 106) is visible.

Description Use this function to select the option for calculating the heat transferred via a heat exchanger (=delta heat).

Selection
- Off
- Device on cold side
- Device on warm side

Factory setting Device on warm side

Fixed density

Navigation Expert → Sensor → External comp. → Fixed density

Prerequisite With order code for "Sensor version":
- Option "Volume"
  or
- Option "Volume high temperature"

Description Use this function to enter a fixed value for the density if the medium is a liquid.

User entry 0.01 to 15 000 kg/m³

Factory setting 1 000 kg/m³

Additional information *Description*

The density entered is used to linearize the measured error in the lower Reynolds number range if the calculated density is not available e.g. "Volume flow" sensor version or the fluid is a user-specific gas (see table).

Dependency

The unit is taken from the **Density unit** parameter (→ 69)

Fixed density

Navigation Expert → Sensor → External comp. → Fixed density

Prerequisite With order code for "Sensor version":
- Option "Volume"
  or
- Option "Volume high temperature"

Description Use this function to enter a fixed value for the density if the medium is gas or steam.

User entry 0.01 to 15 000 kg/m³

Factory setting 5 kg/m³

Additional information *Description*

The density entered is used to linearize the measured error in the lower Reynolds number range if the calculated density is not available e.g. "Volume flow" sensor version or the fluid is a user-specific gas (see table).

Dependency

The unit is taken from the **Density unit** parameter (→ 69)

Fixed temperature

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

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

User entry −200 to 450 °C

Factory setting 20 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

2nd temperature delta heat

Navigation Expert → Sensor → External comp. → 2ndTempDeltaHeat

Prerequisite The **2nd temperature delta heat** parameter (→ 107) is visible.

Description Use this function to enter the second temperature value for calculating the delta heat.

User entry −200 to 450 °C

Factory setting 20 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

Fixed process pressure

Navigation Expert → Sensor → External comp. → Fix. proc.press.

Prerequisite
The following conditions are met:
- Order code for "Sensor version", Option "Mass flow (integrated temperature measurement)"
- In the **External value** parameter (→ 105) the **Pressure** option is not selected.

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

User entry 0 to 250 bar abs.

Factory setting 0 bar abs.

Additional information

User entry

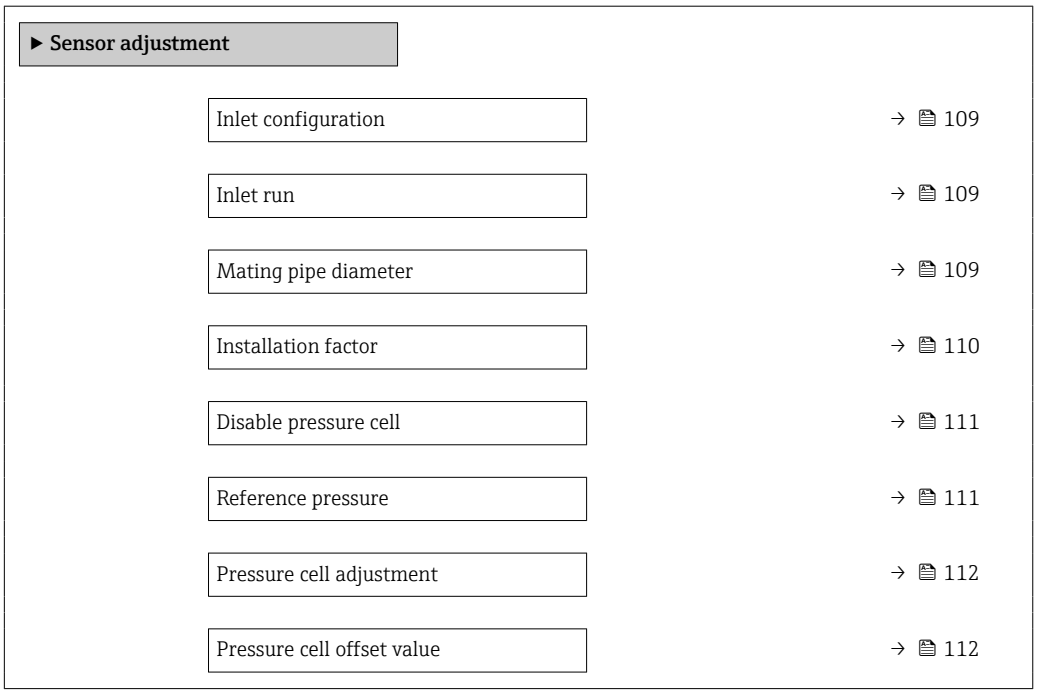
For detailed information on setting the parameter in steam applications, see the Special Documentation for the **Wet Steam Detection** and **Wet Steam Measurement** application package → 7

Dependency

The unit is taken from the **Pressure unit** parameter (→ 64)

3.2.6 "Sensor adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm.



Inlet configuration

Navigation Expert → Sensor → Sensor adjustm. → Inlet config.

Prerequisite
The **inlet run correction** feature:
- Is a standard feature and can only be used in Prowirl F 200.
- Can be used for the following pressure ratings and nominal diameters:
  DN 15 to 150 (1 to 6")
  - EN (DIN)
  - ASME B16.5, Sch. 40/80

Description Use this function to select the inlet configuration.

Selection
- Off
- Single elbow
- Double elbow
- Double elbow 3D
- Reduction

Factory setting Off

Inlet run

Navigation Expert → Sensor → Sensor adjustm. → Inlet run

Prerequisite
The **inlet run correction** feature:
- Is a standard feature and can only be used in Prowirl F 200.
- Can be used for the following pressure ratings and nominal diameters:
  DN 15 to 150 (1 to 6")
  - EN (DIN)
  - ASME B16.5, Sch. 40/80

Description Use this function to enter the length of the straight inlet run.

User entry 0 to 20 m

Factory setting 0 m

Additional information *Dependency*

The unit is taken from the **Length unit** parameter (→ 71)

Mating pipe diameter

Navigation Expert → Sensor → Sensor adjustm. → D mating pipe

Description Use this function to enter the diameter of the mating pipe to enable diameter mismatch correction.

User entry 0 to 1 m (0 to 3 ft)

Factory setting Country-specific:
- 0 m
- 0 ft

Additional information *Description*

The device has diameter mismatch correction. This can be enabled by entering the actual internal diameter of the mating pipe in the **Mating pipe diameter** parameter.

User entry

If the value entered is **0**, diameter mismatch correction is disabled. If the standard internal diameter of the ordered process connection differs from the internal diameter of the mating pipe, an additional measuring uncertainty of up to 2 % must be expected if diameter mismatch correction is disabled.

Limit values

Diameter mismatch correction should be enabled only within the following limit values:

Flange connection:
- DN 15 (½"): ±20 % of the internal diameter
- DN 25 (1"): ±15 % of the internal diameter
- DN 40 (1½"): ±12 % of the internal diameter
- DN ≥ 50 (2"): ±10 % of the internal diameter

Disc (wafer version):
- DN 15 (½"): ±15 % of the internal diameter
- DN 25 (1"): ±12 % of the internal diameter
- DN 40 (1½"): ±9 % of the internal diameter
- DN ≥ 50 (2"): ±8 % of the internal diameter

Dependency

The unit is taken from the **Length unit** parameter (→ 71)

Installation factor

Navigation Expert → Sensor → Sensor adjustm. → Install. factor

Description Use this function to enter the factor to adjust installation conditions.

User entry Positive floating-point number

Factory setting 1.0

Additional information *Description*

The calculated volume flow and all measured variables derived from this are multiplied by the installation factor.

Disable pressure cell

Navigation Expert → Sensor → Sensor adjustm. → Disable pr. cell

Prerequisite

With order code for "Sensor version":
- Option "Mass steam (integrated pressure/temperature measurement)"
- Option "Mass gas/liquid (integrated pressure/temperature measurement)"

Only available for Prowirl F, R, O.

Description

Use this function to deactivate integrated pressure measurement.

Selection

- No
- Yes

Factory setting

No

Additional information

Description

If pressure measurement is disabled, the measuring device calculates with the value from the **Fixed process pressure** parameter (→ 108) or with the value from the **External value** parameter (→ 105). This makes it possible to replace the pressure cell with minimum impact on the output variable. The setting is not stored persistently and is reset to the factory setting following a restart.

Selection

- No
  Pressure cell is not disabled.
- Yes
  Pressure cell is disabled.

Reference pressure

Navigation Expert → Sensor → Sensor adjustm. → Ref. pressure

Prerequisite

With order code for "Sensor version":
- Option "Mass steam (integrated pressure/temperature measurement)"
- Option "Mass gas/liquid (integrated pressure/temperature measurement)"

Only available for Prowirl F, R, O.

Description

Use this function to enter the reference pressure for determining the offset value for integrated pressure measurement.

User entry

Positive floating-point number

Factory setting

1.01325 bar

Additional information

Dependency

The unit is taken from the **Pressure unit** parameter (→ 64)

Pressure cell adjustment

Navigation Expert → Sensor → Sensor adjustm. → Press. cell adj.

Prerequisite
With order code for "Sensor version":
- Option "Mass steam (integrated pressure/temperature measurement)"
- Option "Mass gas/liquid (integrated pressure/temperature measurement)"

Only available for Prowirl F, R, O.

Description
Description: adjustment process for an offset correction of the integrated pressure measurement.

Selection
- Cancel
- Yes
- Discard offset

Factory setting
Cancel

Additional information
Selection
- Cancel
  Cancel the offset adjustment and keep the current offset value
- Yes
  Accept the current values for reference pressure and measured pressure for calculating the offset value
- Discard offset
  Reset the existing offset value to **0**

Pressure cell offset value

Navigation Expert → Sensor → Sensor adjustm. → p cell offs.val

Prerequisite
With order code for "Sensor version":
- Option "Mass steam (integrated pressure/temperature measurement)"
- Option "Mass gas/liquid (integrated pressure/temperature measurement)"

Only available for Prowirl F, R, O.

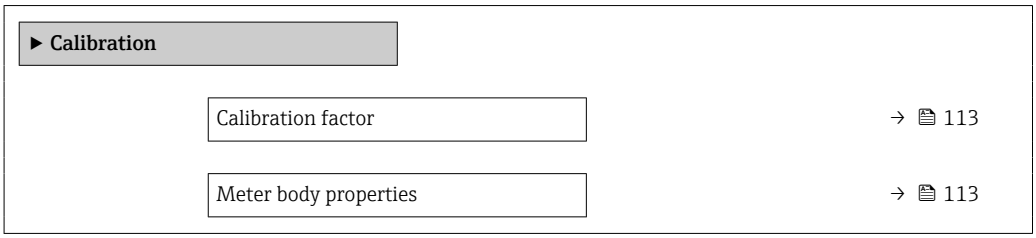
Description
Displays the current offset value that the measuring device uses to correct the internal pressure measured value.

User interface
Signed floating-point number

Additional information
Dependency
The unit is taken from the **Pressure unit** parameter (→ 64)

3.2.7 "Calibration" submenu

Navigation Expert → Sensor → Calibration



Calibration factor

Navigation Expert → Sensor → Calibration → Cal. factor

Description Displays the calibration factor. The calibration factor is determined during device calibration.

User interface Positive floating-point number

Factory setting This value is always > **0** when the device is delivered from the factory.

Additional information *Description*

Factor by which the measured vortex frequency must be divided in order to calculate the volume flow.

Unit

In $1/m^3$, or vortex pulses per cubic meter

Meter body properties

Navigation Expert → Sensor → Calibration → Meter body prop.

Description Displays informative text about the measuring tube.

User interface Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)

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

Additional information *Description*

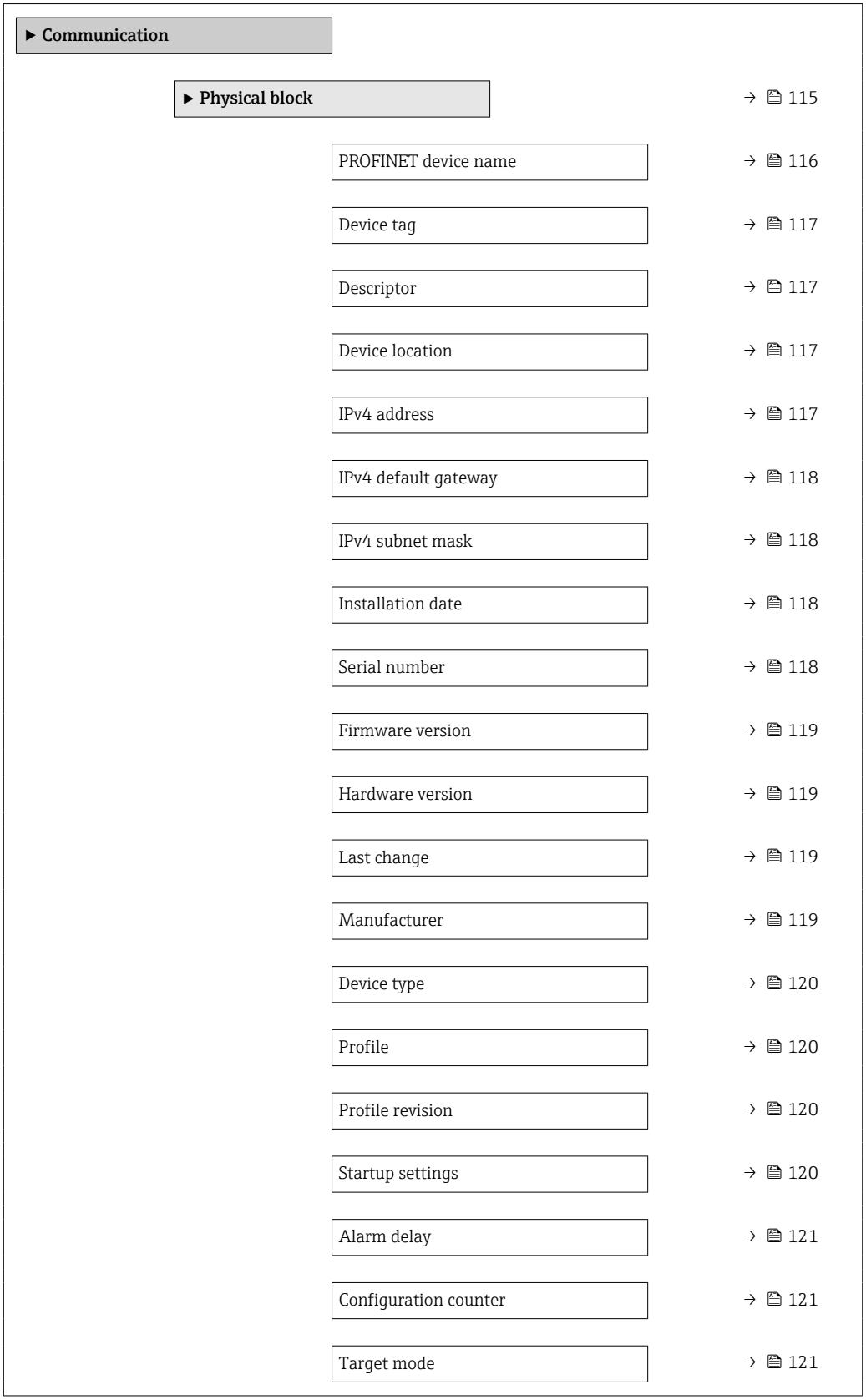
Summarized information about the meter body.

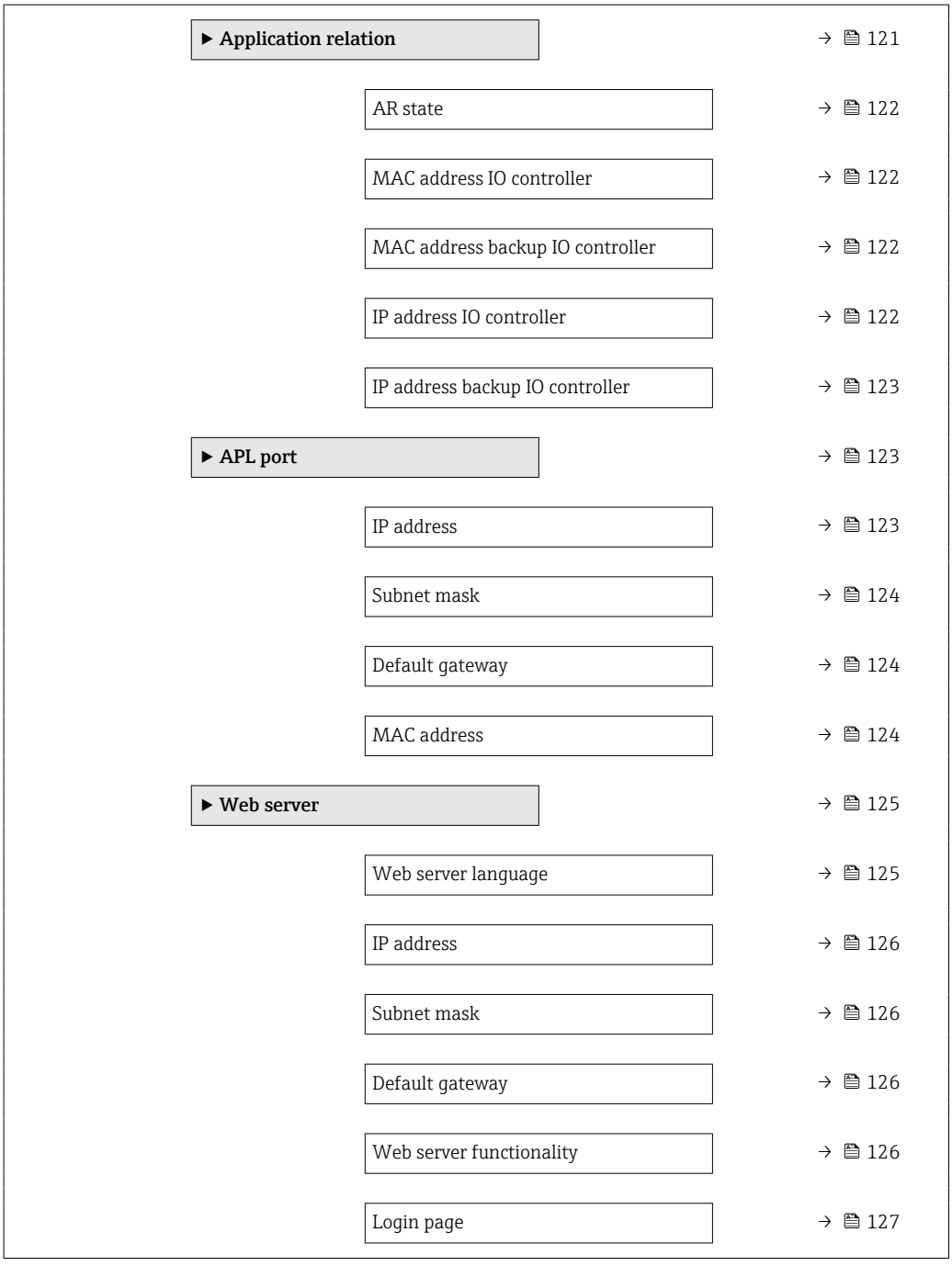
Example

DN25F-PN40: nominal diameter DN25, flange type, pressure rating 40 bar

3.3 "Communication" submenu

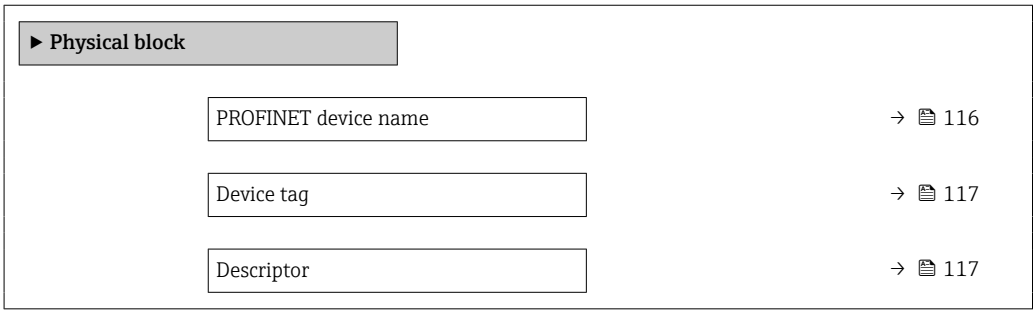
Navigation Expert → Communication

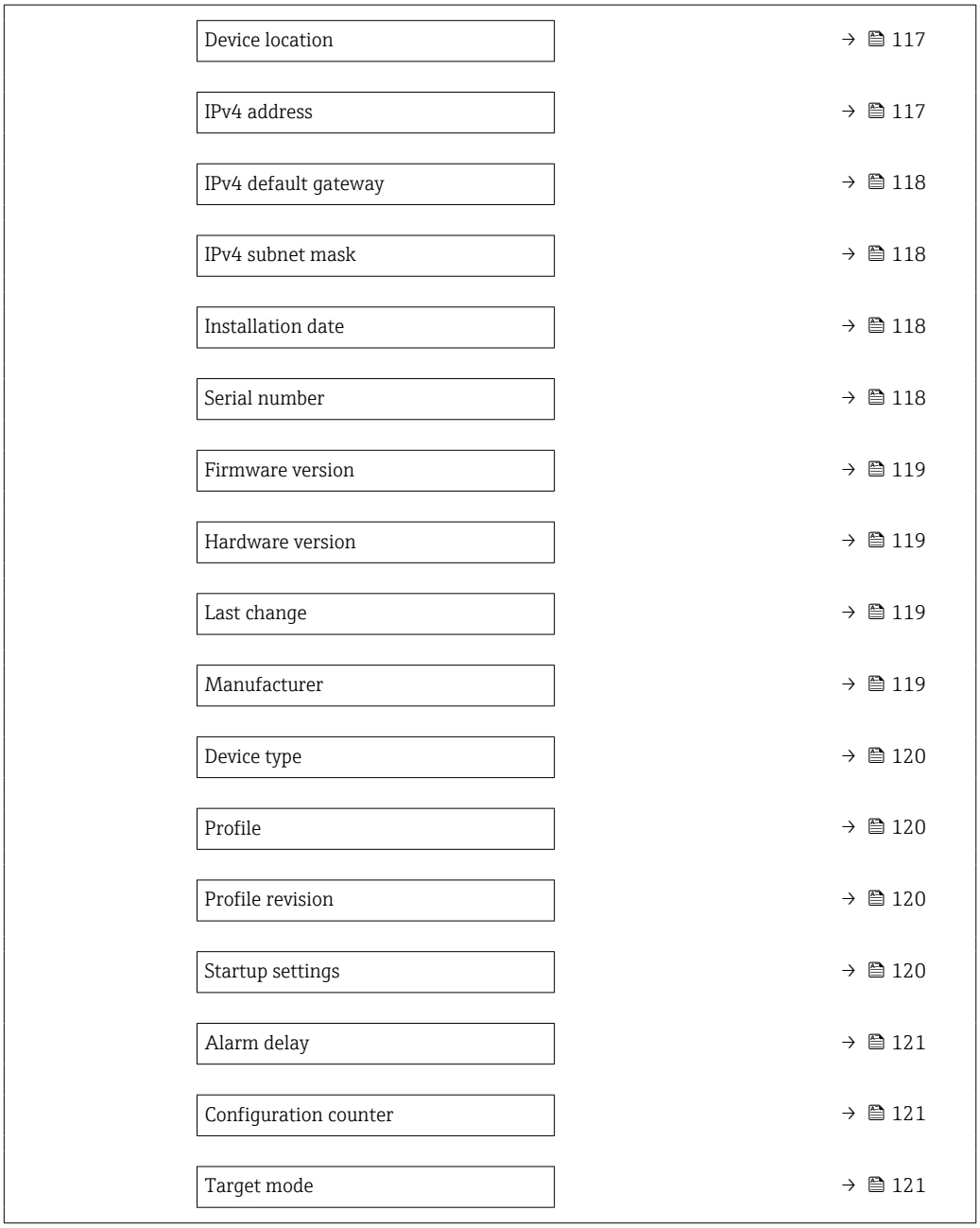




3.3.1 "Physical block" submenu

Navigation Expert → Communication → Physical block





PROFINET device name

Navigation Expert → Communication → Physical block → PROFINET DevName

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

User entry Max. 240 characters such as lower-case letters or numbers

Additional information

Description

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

Factory setting

Structure of the device tag:

Device tag

Navigation Expert → Communication → Physical block → Device tag

Description Enter a name for the measuring point to identify the measuring device in the plant.

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

Factory setting

Descriptor

Navigation Expert → Communication → Physical block → Descriptor

Description Enter a description for the measuring point.

User entry Character string comprising numbers, letters and special characters (54)

Factory setting

Device location

Navigation Expert → Communication → Physical block → Device location

Description Enter the location of the measuring point.

User entry Character string comprising numbers, letters and special characters (22)

Factory setting

IPv4 address

Navigation Expert → Communication → Physical block → IPv4 address

Description Shows the APL port IP address of the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting 000.000.000.000

IPv4 default gateway

Navigation Expert → Communication → Physical block → IPv4 gateway

Description Shows the IP address of the default gateway for the APL port of the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting 000.000.000.000

IPv4 subnet mask

Navigation Expert → Communication → Physical block → IPv4 subnet mask

Description Shows the subnet mask for the APL port of the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting 000.000.000.000

Installation date

Navigation Expert → Communication → Physical block → InstallationDate

Description Enter date, e. g. date when the device was installed or commissioned.

User entry Character string comprising numbers, letters and special characters (16)

Factory setting

Serial number

Navigation Expert → Communication → Physical block → Serial number

Description Shows the serial number of the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting

Firmware version

Navigation Expert → Communication → Physical block → Firmware version

Description Shows the device firmware version installed.

User interface Character string comprising numbers, letters and special characters

Factory setting 00.00.00

Hardware version

Navigation Expert → Communication → Physical block → Hardware version

Description Shows the hardware version of the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting 00.00.00

Last change

Navigation Expert → Communication → Physical block → Last change

Description Enter the date when static parameters (e.g. configuration parameters) were last changed.

User entry Character string comprising numbers, letters and special characters (16)

Factory setting

Manufacturer

Navigation Expert → Communication → Physical block → Manufacturer

Description Shows the manufacturer of the measuring device.

User interface 0 to 65 535

Factory setting 17

Device type

Navigation Expert → Communication → Physical block → Device type

Description Shows the device type assigned by the manufacturer to the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting Prowirl 200

Profile

Navigation Expert → Communication → Physical block → Profile

Description Shows the profile ID of the PA profile.

User interface 0 to 65 535

Factory setting 38 656

Profile revision

Navigation Expert → Communication → Physical block → Profile revision

User interface 0 to 65 535

Factory setting 1 026

Startup settings

Navigation Expert → Communication → Physical block → Startup settings

Description Indicates which configuration settings (factory settings unless otherwise specified by the controller) are applied on startup.

Selection
- None applied
- Only units applied
- All applied

Factory setting None applied

Alarm delay

Navigation Expert → Communication → Physical block → Alarm delay

Description Enter a delay to suppress momentarily pending diagnostic messages.

User entry 0 to 60

Factory setting 0

Configuration counter

Navigation Expert → Communication → Physical block → Config. counter

Description Shows the number of changes made to static parameters (e.g. configuration parameters).

User interface 0 to 65 535

Factory setting 0

Target mode

Navigation Expert → Communication → Physical block → Target mode

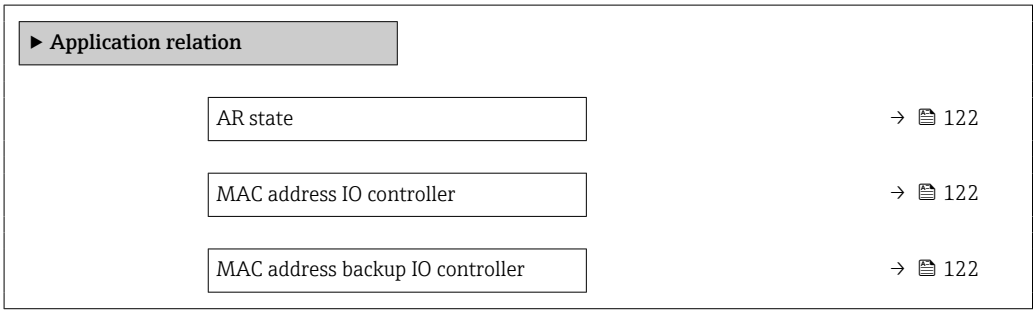
Description Select the target mode. The selected mode applies to all output function blocks.

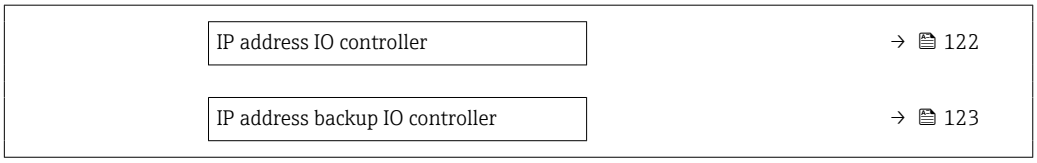
Selection
- Automatic
- Out of service

Factory setting Automatic

3.3.2 "Application relation" submenu

Navigation Expert → Communication → Applicat. relat.





AR state

Navigation Expert → Communication → Applicat. relat. → AR state

Description Displays whether an active AR (Application Relation) connection has been established.

User interface
- Active
- Not active
- Redundancy 1AR active
- Redundancy 2AR active

Factory setting Not active

MAC address IO controller

Navigation Expert → Communication → Applicat. relat. → MAC IO contr.

Description Shows the MAC address of the only or of the primary IO controller.

User interface Character string comprising numbers, letters and special characters

Factory setting 0x00

MAC address backup IO controller

Navigation Expert → Communication → Applicat. relat. → MAC backup IO c.

Description Shows the MAC adress of the backup IO controller.

User interface Character string comprising numbers, letters and special characters

Factory setting 0x00

IP address IO controller

Navigation Expert → Communication → Applicat. relat. → IP IO controller

Description Shows the IP address of the only or of the primary IO controller.

User interface Character string comprising numbers, letters and special characters

Factory setting 0x00

IP address backup IO controller

Navigation Expert → Communication → Applicat. relat. → IP backup IO c.

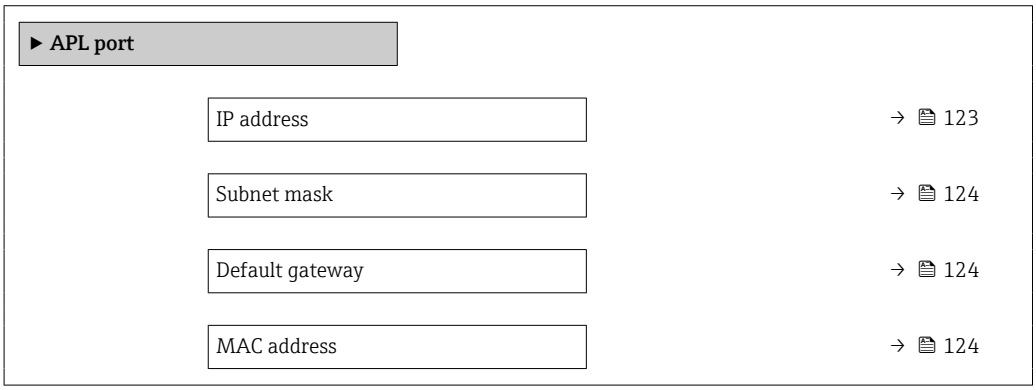
Description Shows the IP adress of the backup IO controller.

User interface Character string comprising numbers, letters and special characters

Factory setting 0x00

3.3.3 "APL port" submenu

Navigation Expert → Communication → APL port



IP address

Navigation Expert → Communication → APL port → IP address

Description Display or enter the IP address of the Web server integrated in the measuring device.

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

Factory setting 0.0.0.0

Subnet mask

Navigation Expert → Communication → APL port → Subnet mask

Description Display or enter the subnet mask.

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

Factory setting 255.255.255.0

Default gateway

Navigation Expert → Communication → APL port → Default gateway

Description Display or enter the Default gateway (→ 124).

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

Factory setting 0.0.0.0

MAC address

Navigation Expert → Communication → APL port → MAC Address

Description Displays the MAC [2] 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.

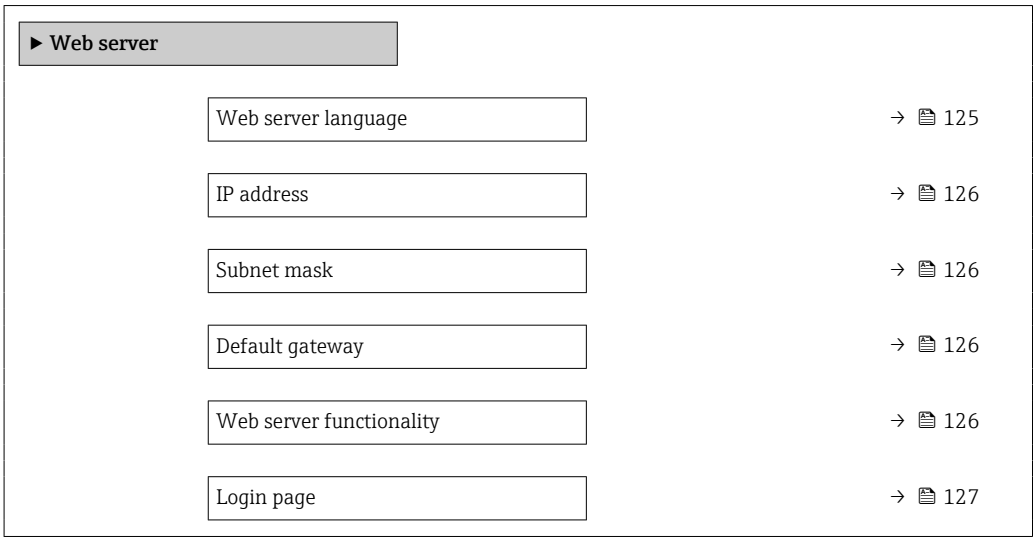
Additional information *Example*

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

2) Media Access Control

3.3.4 "Web server" submenu

Navigation Expert → Communication → Web server



Web server language

Navigation Expert → Communication → Web server → Webserv.language

Description Set web server language.

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

Factory setting English

* Visibility depends on order options or device settings

IP address

Navigation Expert → Communication → Web server → IP address

Description Display or enter the IP address of the Web server integrated in the measuring device.

User entry 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 Display or enter the subnet mask.

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

Factory setting 255.255.255.0

Default gateway

Navigation Expert → Communication → Web server → Default gateway

Description Display or enter the Default gateway (→ 124).

User entry 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
- On

Factory setting On

Additional information *Description*

Once disabled, the Web server functionality can only be enabled again via the FieldCare operating tool or the DeviceCare operating tool.

Selection

Option	Description
Off	▪ The Web server is completely disabled. ▪ Port 80 is locked.
On	▪ The complete Web server functionality 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

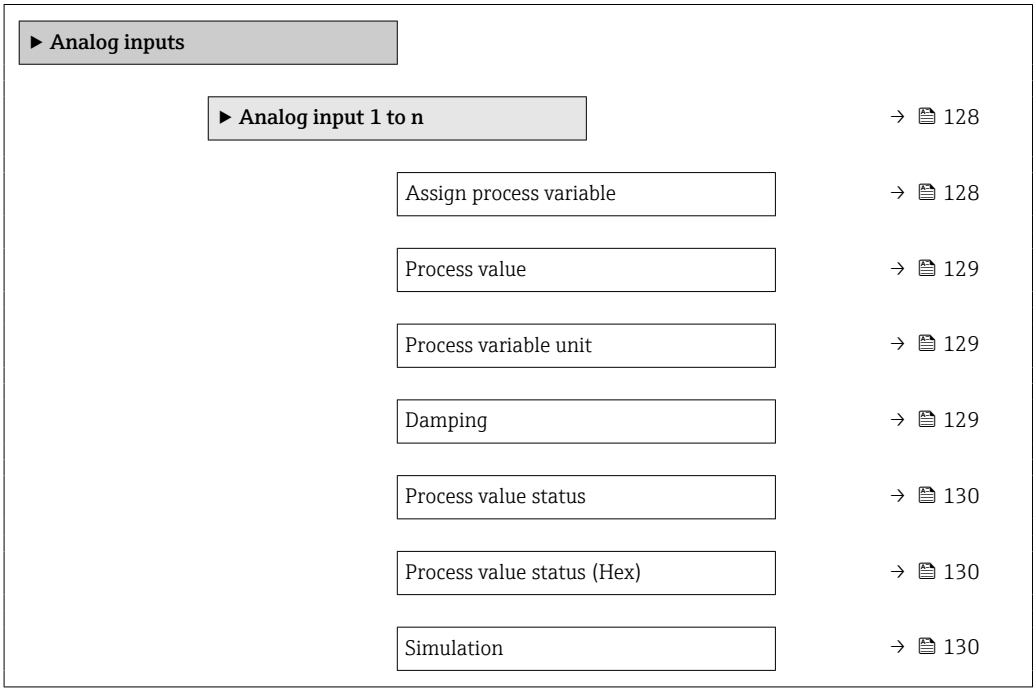
Description Use this function to select the format of the login page.

Selection
- Without header
- With header

Factory setting With header

3.4 "Analog inputs" submenu

Navigation Expert → Analog inputs



Simulation value	→ 130
Simulated status	→ 131

3.4.1 "Analog inputs" submenu

Navigation Expert → Analog inputs → Analog input 1 to n

▶ **Analog input 1 to n**	
Assign process variable	→ 128
Process value	→ 129
Process variable unit	→ 129
Damping	→ 129
Process value status	→ 130
Process value status (Hex)	→ 130
Simulation	→ 130
Simulation value	→ 130
Simulated status	→ 131

Assign process variable

Navigation Expert → Analog inputs → Analog input 1 to n → Assign variable

Description Select a process variable.

User interface
- Mass flow
- Volume flow
- Density
- Temperature
- Pressure
- Specific volume
- Degrees of superheat
- Electronics temperature
- Vortex frequency
- Vortex kurtosis
- Vortex amplitude
- Calculated saturated steam pressure
- Steam quality
- Total mass flow

- Condensate mass flow
- Energy flow
- Heat flow difference
- Reynolds number
- Flow velocity
- Corrected volume flow

Factory setting Volume flow

Process value

Navigation Expert → Analog inputs → Analog input 1 to n → Process value

Description Shows the process value reported to the controller for further processing.

User interface Signed floating-point number

Factory setting 0 m^3/h

Process variable unit

Navigation Expert → Analog inputs → Analog input 1 to n → ProcVariableUnit

Description Shows the unit of the process variable.

User interface 0 to 65 535

Factory setting 1 997

Damping

Navigation Expert → Analog inputs → Analog input 1 to n → Damping

Description Enter time constant for input damping (PT1 element). Damping reduces the effect of fluctuations in the measured value on the output signal.

User entry Positive floating-point number

Factory setting 1.0 s

Process value status

Navigation Expert → Analog inputs → Analog input 1 to n → Proc.ValueStatus

Description Shows the status of the process value reported to the controller for further processing ('Good', 'Uncertain', 'Bad').

User interface
- Good
- Uncertain
- Bad

Factory setting Good

Process value status (Hex)

Navigation Expert → Analog inputs → Analog input 1 to n → ProcValStatusHex

Description Shows the status of the process value reported to the controller for further processing (Hex).

User interface 0 to 255

Factory setting 128

Simulation

Navigation Expert → Analog inputs → Analog input 1 to n → Simulation

Description Switch simulation of the analog input on or off (Off = 0, On <> 0).

User entry 0 to 255

Factory setting 0

Simulation value

Navigation Expert → Analog inputs → Analog input 1 to n → Simulation value

Description Enter the simulation value for the selected process variable.

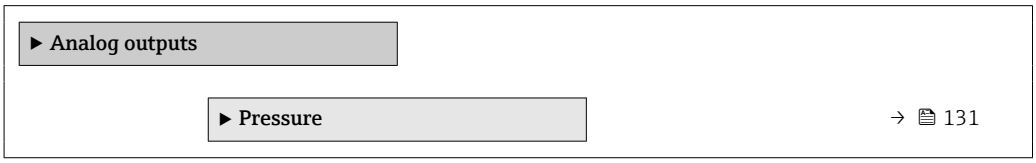
User entry Signed floating-point number

Factory setting 0 m^3/h

Simulated status	
Navigation	Expert → Analog inputs → Analog input 1 to n → Simulated status
Description	Specify the status of the simulated process value (Hex).
User entry	0 to 255
Factory setting	60

3.5 "Analog outputs" submenu

Navigation Expert → Analog outputs



3.5.1 "Pressure" submenu

Navigation Expert → Analog outputs → Pressure

Parent class

Navigation Expert → Analog outputs → Pressure → Parent class

User interface
- Pressure
- AO Density
- Temperature

Factory setting Pressure

Process value

Navigation Expert → Analog outputs → Pressure → Process value

Description Shows the process value reported by the controller for further processing.

User entry Signed floating-point number

Factory setting 0 bar

Process value status (Hex)

Navigation Expert → Analog outputs → Pressure → ProcValStatusHex

Description Shows the status of the process value reported by the controller (Hex).

User entry 0 to 255

Factory setting 128

Process value status

Navigation Expert → Analog outputs → Pressure → Proc.ValueStatus

Description Shows the status of the process value reported by the controller ('Good', 'Uncertain', 'Bad').

User interface
- Good
- Uncertain
- Bad

Factory setting Good

Process variable unit

Navigation Expert → Analog outputs → Pressure → ProcVariableUnit

Description Shows the unit of the process variable.

Selection

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

US units
- SG60°F *
- 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) *

Other units
°API *

* Visibility depends on order options or device settings

or

SI units
- °C *
- K *

US units
- °F *
- °R *

* Visibility depends on order options or device settings

or

SI units
- MPa *
- kPa *
- Pa *
- bar *
- mbar a *
- torr *
- atm *
- kgf/cm² *
- gf/cm² *

US units
psi *

Other units
- inH2O (4°C) *
- inH2O (68°F) *
- mmH2O (4°C) *
- mmH2O (68°F) *
- ftH2O (68°F) *
- inHg (0°C) *
- mmHg (0°C) *

* Visibility depends on order options or device settings

Factory setting bar

Failure behavior delay

Navigation Expert → Analog outputs → Pressure → FailBehavDelay

Description Enter a delay until in the event of a failure (value with status 'Bad') the failure behavior specified applies.

User entry Positive floating-point number

Factory setting 0 s

Failure behavior

Navigation Expert → Analog outputs → Pressure → Failure behavior

Description Select failure behavior in the event of a failure (value with status 'Bad').

Selection
- Fixed value
- Last valid value
- Actual value

Factory setting Actual value

Fixed value

Navigation Expert → Analog outputs → Pressure → Fixed value

Description Enter value to report in the event of a failure (value with status 'Bad').

User entry Signed floating-point number

Factory setting 0 bar

AO block output value

Navigation Expert → Analog outputs → Pressure → AOBlockOutValue

Description Shows the external process value reported to the measuring device for further processing.

User entry Signed floating-point number

Factory setting 0 bar

AO block output value status (Hex)

Navigation Expert → Analog outputs → Pressure → OutValStatusHex

Description Shows the status of the external process value reported to the measuring device for further processing (Hex).

User entry 0 to 255

Factory setting 128

AO block output value status

Navigation Expert → Analog outputs → Pressure → OutValueStatus

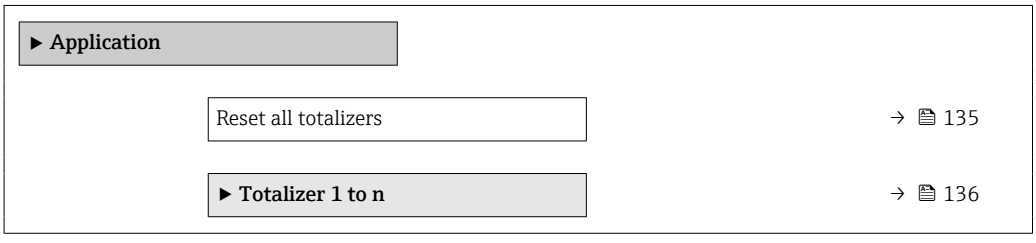
Description Shows the status of the external process value reported to the measuring device for further processing ('Good', 'Uncertain', 'Bad').

User interface
- Good
- Uncertain
- Bad

Factory setting Good

3.6 "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

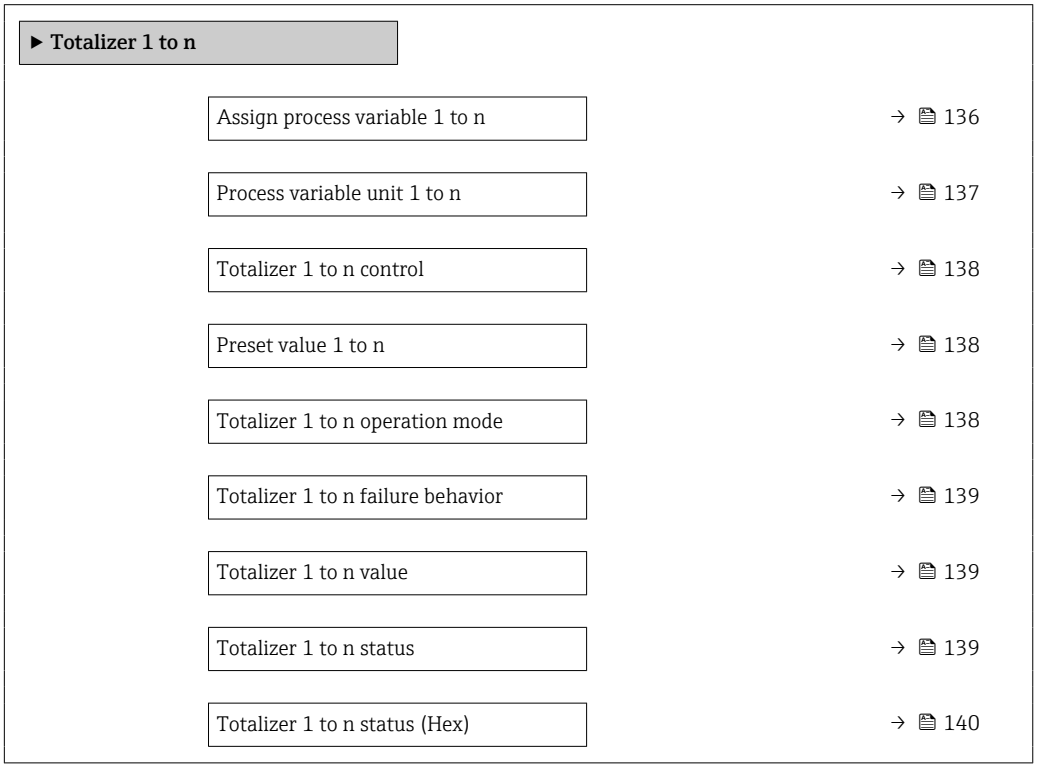
Factory setting Cancel

Additional information *Selection*

Options	Description
Cancel	No action is executed and the user exits the parameter.
Reset + totalize	Resets all totalizers to 0 and restarts the totaling process. This deletes all the flow values previously totalized.

3.6.1 "Totalizer 1 to n" submenu

Navigation Expert → Application → Totalizer 1 to n



Assign process variable 1 to n

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

Description Select process variable for totalizer.

Selection
- Mass flow
- Volume flow
- Corrected volume flow
- Total mass flow *

* Visibility depends on order options or device settings

- Condensate mass flow *
- Energy flow *
- Heat flow difference *

Factory setting Volume flow

Process variable unit 1 to n

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

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

Selection

SI units
- g *
- kg *
- t *

US units
- oz *
- lb *
- STon *

* Visibility depends on order options or device settings

or

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

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

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

* Visibility depends on order options or device settings

or

SI units
- Nl *
- Nhl *
- Nm³ *
- Sl *
- Sm³ *

US units
- Sft³ *
- MSft³ *
- MMSft³ *
- Sgal (us) *
- Sbbl (us;liq.) *
- Sbbl (us;oil) *

Imperial units
Sgal (imp) *

* Visibility depends on order options or device settings

or

* Visibility depends on order options or device settings

SI units
- kWh *
- MWh *
- GWh *
- kJ *
- MJ *
- GJ *
- kcal *
- Mcal *
- Gcal *

Imperial units
- Btu *
- MBtu *
- MMBtu *

* Visibility depends on order options or device settings

Factory setting m^3

Totalizer 1 to n control

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

Description Operate the totalizer.

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

Factory setting Totalize

Preset value 1 to n

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

Description Specify start value for totalizer.

User entry Signed floating-point number

Factory setting 0 m^3

Totalizer 1 to n operation mode

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

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

Selection
- Net
- Forward
- Reverse

Factory setting Forward

Totalizer 1 to n failure behavior

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

Description Select totalizer behavior in the event of a device alarm.

Selection
- Hold
- Continue
- Last valid value + continue

Factory setting Continue

Totalizer 1 to n value

Navigation Expert → Application → Totalizer 1 to n → Tot. 1 to n value

Description Shows the totalizer value reported to the controller for further processing.

User interface Signed floating-point number

Factory setting 0 m^3

Totalizer 1 to n status

Navigation Expert → Application → Totalizer 1 to n → Tot. 1 to n status

Description Shows the status of the totalizer value reported to the controller for further processing ('Good', 'Uncertain', 'Bad').

User interface
- Good
- Uncertain
- Bad

Factory setting Good

Totalizer 1 to n status (Hex)

Navigation Expert → Application → Totalizer 1 to n → Status 1 to n (Hex)

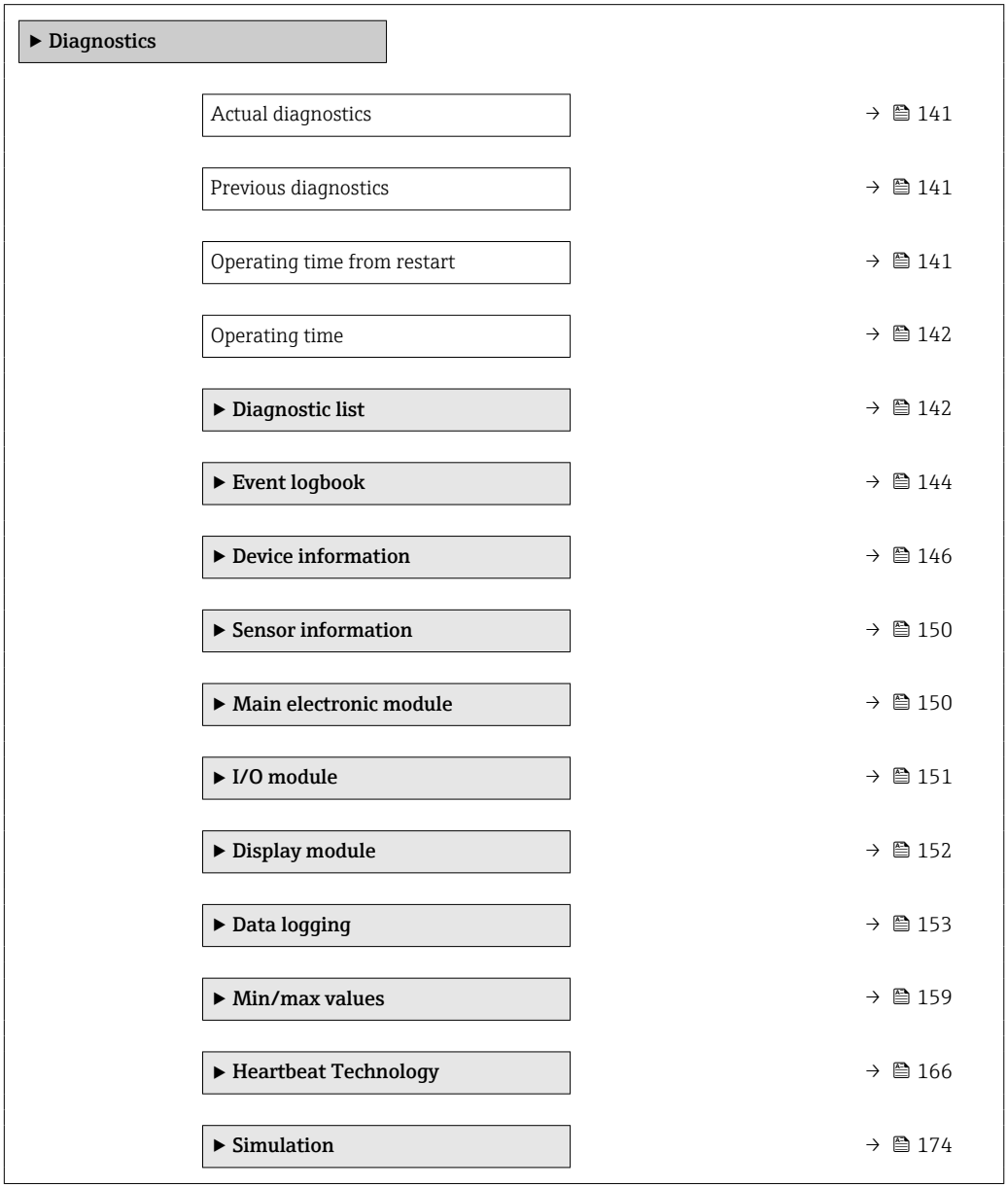
Description Shows the status of the totalizer value reported to the controller for further processing (Hex).

User interface 0 to 255

Factory setting 128

3.7 "Diagnostics" submenu

Navigation Expert → Diagnostics



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 (→ 142).

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the E key.

Example

For the display format:
⊗F271 Main electronic failure

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 *Display*

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the E key.

Example

For the display format:
⊗F271 Main electronic failure

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.

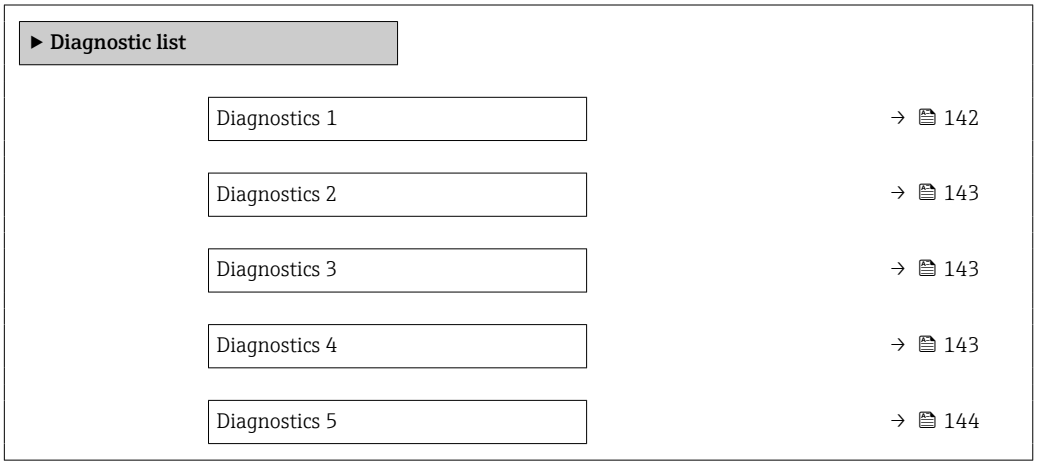
User interface Days (d), hours (h), minutes (m) and seconds (s)

Additional information *User interface*

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

3.7.1 "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 *Display*

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the E key.

Examples

For the display format:
- ⚠S442 Frequency output
- ⊗F276 I/O module failure

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 *Display*

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the E key.

Examples

For the display format:
- ⚠S442 Frequency output
- ⊗F276 I/O module failure

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 *Display*

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the E key.

Examples

For the display format:
- ⚠S442 Frequency output
- ⊗F276 I/O module failure

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 *Display*

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the E key.

Examples

For the display format:
- ⚠S442 Frequency output
- ⊗F276 I/O module failure

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 *Display*

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the E key.

Examples

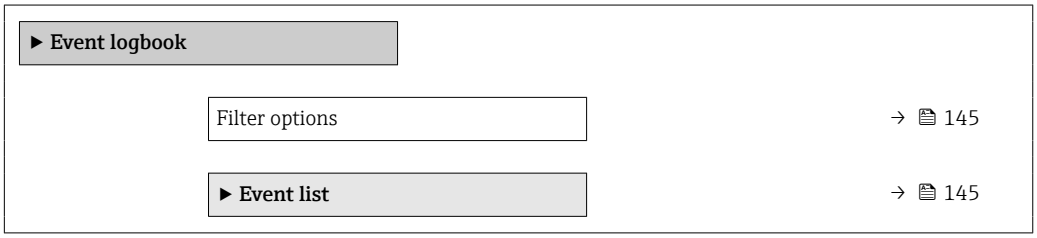
For the display format:
- ⚠S442 Frequency output
- ⊗F276 I/O module failure

3.7.2 "Event logbook" submenu

Viewing event messages

Event messages are displayed in chronological order. The event history includes both diagnostic events and information events. The symbol in front of the timestamp indicates whether the event has started or ended.

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

"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.

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 (→ 145).

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 **Extended HistoROM** application package (order option) 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
- ⚠S442 Frequency output
  ⊕ 01d04h12min30s

Additional information, such as remedial measures, can be retrieved via the E key.

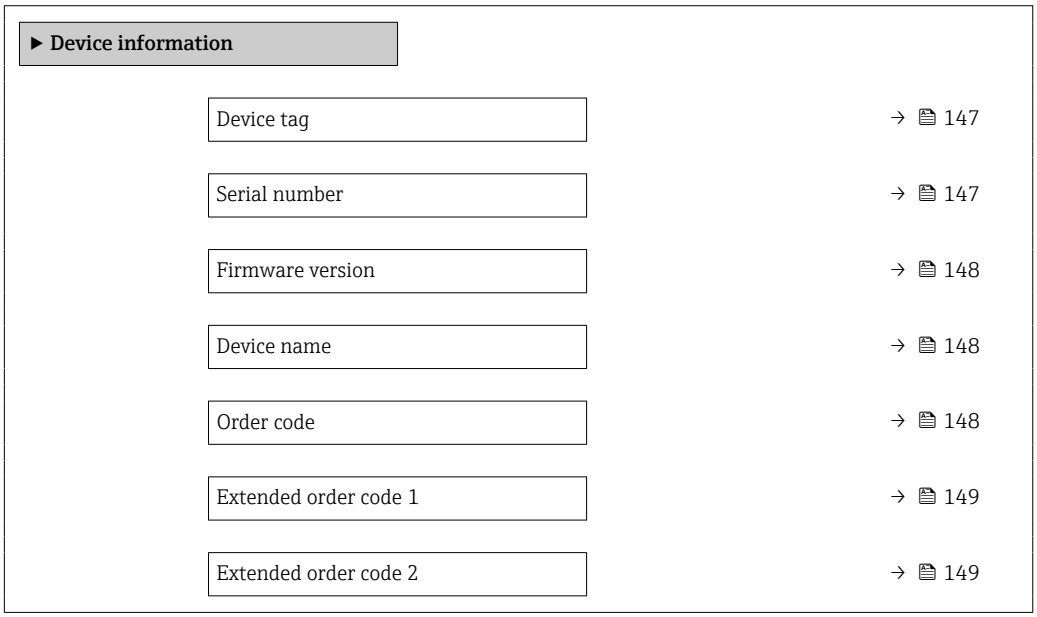
HistoROM

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

To order the **Extended HistoROM** application package, see the "Application packages" section of the "Technical Information" document

3.7.3 "Device information" submenu

Navigation Expert → Diagnostics → Device info



Extended order code 3	→ 149
ENP version	→ 149

Device tag

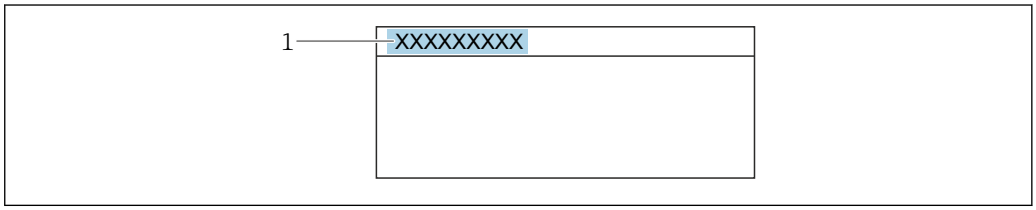
Navigation Expert → Diagnostics → Device info → Device tag

Description Displays a unique name for the measuring point so it can be identified quickly within the plant. It is displayed in the header.

User interface Character string comprising numbers, letters and special characters

Factory setting - none -

Additional information *User interface*



1 Position of the header text on the display

The number of characters displayed depends on the characters used.

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 Max. 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 Shows the name of the transmitter.

The name can be found on the nameplate of the transmitter.

User interface Character string comprising numbers, letters and special characters

Factory setting Prowirl200APL

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 Displays the second part of the extended order code.

User interface Character string

Additional information For additional information, see **Extended order code 1** parameter (→ 149)

Extended order code 3

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

Description Displays the third part of the extended order code.

User interface Character string

Additional information For additional information, see **Extended order code 1** parameter (→ 149)

ENP version

Navigation Expert → Diagnostics → Device info → ENP version

Description Displays the version of the electronic nameplate.

User interface Character string

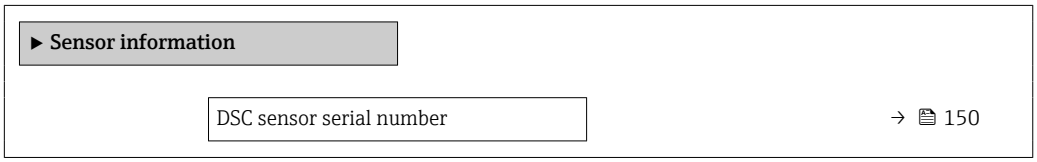
Factory setting 2.02.00

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.

3.7.4 "Sensor information" submenu

Navigation Expert → Diagnostics → Sensor info



DSC sensor serial number

Navigation Expert → Diagnostics → Sensor info → DSC serial no.

Description Displays the serial number of the DSC sensor that is used in the measuring tube.

User interface Character string

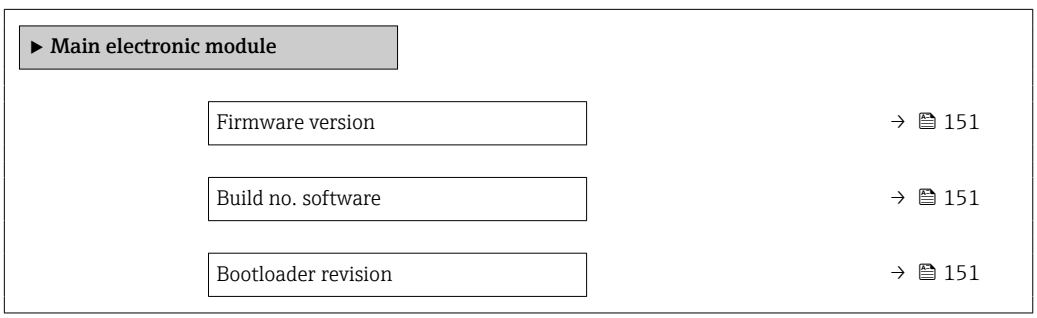
Additional information *Description*

The serial number and other individual values of the DSC sensor, such as temperature range and reference values, are stored on the S-DAT.

If the DSC sensor is replaced, the S-DAT must also always be replaced.

3.7.5 "Main electronic module + I/O module 1" submenu

Navigation Expert → Diagnostics → Main elec. mod.



Firmware version

Navigation Expert → Diagnostics → Main elec. mod. → Firmware version

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

User interface Positive integer

Build no. software

Navigation Expert → Diagnostics → Main elec. mod. → Build no. softw.

Description Use this function to display the software build number of the module.

User interface Positive integer

Bootloader revision

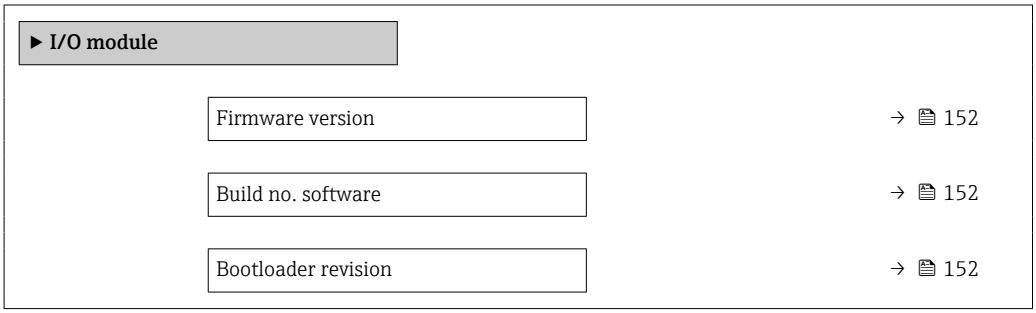
Navigation Expert → Diagnostics → Main elec. mod. → Bootloader rev.

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

User interface Positive integer

3.7.6 "I/O module" submenu

Navigation Expert → Diagnostics → I/O module



Firmware version

Navigation Expert → Diagnostics → I/O module → Firmware version

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

User interface Positive integer

Build no. software

Navigation Expert → Diagnostics → I/O module → Build no. softw.

Description Use this function to display the software build number of the module.

User interface Positive integer

Bootloader revision

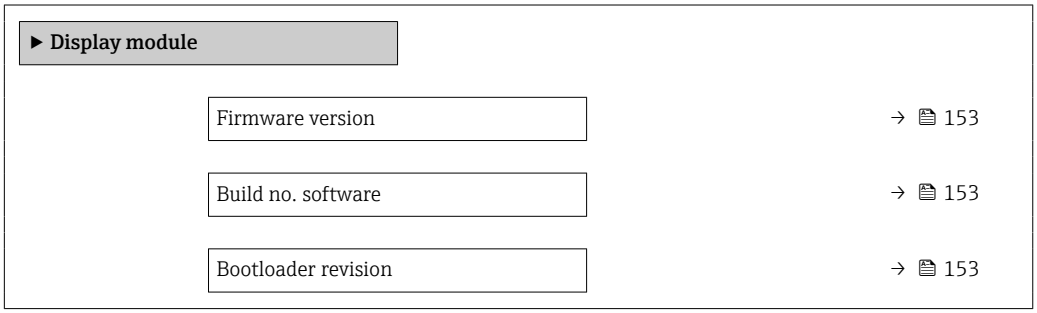
Navigation Expert → Diagnostics → I/O module → Bootloader rev.

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

User interface Positive integer

3.7.7 "Display module" submenu

Navigation Expert → Diagnostics → Display module



Firmware version

Navigation Expert → Diagnostics → Display module → Firmware version

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

User interface Positive integer

Build no. software

Navigation Expert → Diagnostics → Display module → Build no. softw.

Description Use this function to display the software build number of the module.

User interface Positive integer

Bootloader revision

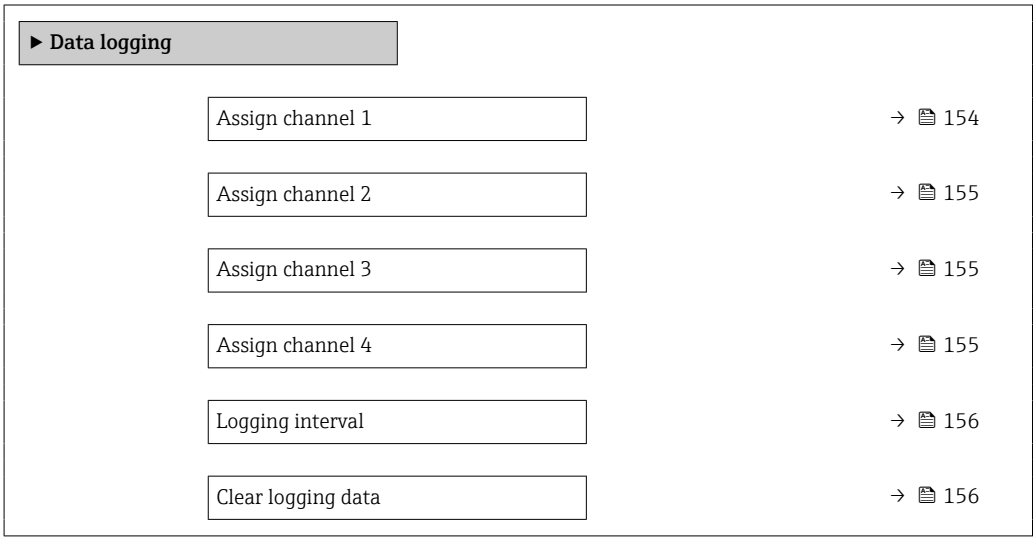
Navigation Expert → Diagnostics → Display module → Bootloader rev.

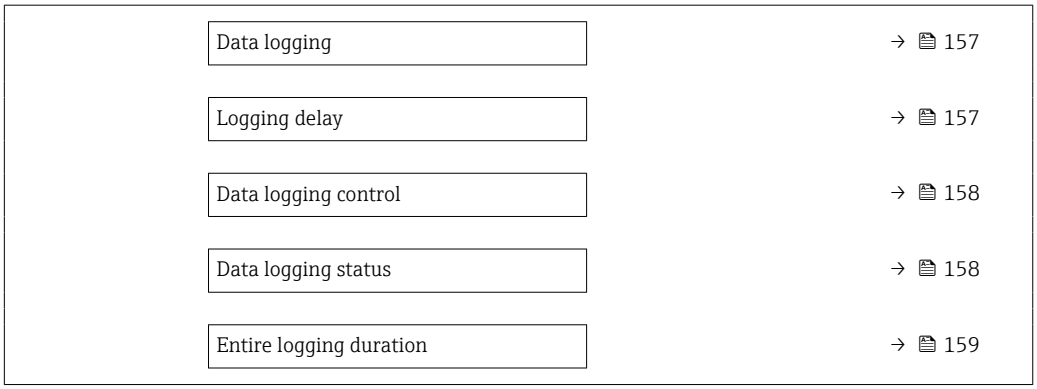
Description Use this function to display the bootloader revision of the software.

User interface Positive integer

3.7.8 "Data logging" submenu

Navigation Expert → Diagnostics → Data logging





Assign channel 1

Navigation Expert → Diagnostics → Data logging → Assign chan. 1

Prerequisite The **Extended HistoROM** application package is available.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 44).

Description Use this function to select a process variable for the data logging channel.

Selection
- Off
- Volume flow
- Corrected volume flow
- Mass flow
- Flow velocity
- Temperature
- Vortex frequency
- Calculated saturated steam pressure *
- Steam quality *
- Total mass flow *
- Condensate mass flow *
- Energy flow *
- Heat flow difference *
- Reynolds number *
- Density *
- Pressure *
- Specific volume *
- Degrees of superheat *
- Electronics temperature

Factory setting Off

Additional information *Description*

A total of 1000 measured values can be logged. This means:
- 1000 data points if 1 logging channel is used
- 500 data points if 2 logging channels are used
- 333 data points if 3 logging channels are used
- 250 data points if 4 logging channels are used

* Visibility depends on order options or device settings

Once the maximum number of data points is reached, the oldest data points in the data log are cyclically overwritten in such a way that the last 1000, 500, 333 or 250 measured values are always in the log (ring memory principle).

The log contents are cleared if the option selected is changed.

Assign channel 2

Navigation Expert → Diagnostics → Data logging → Assign chan. 2

Prerequisite The **Extended HistoROM** application package is available.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 44).

Description Use this function to select a process variable for the data logging channel.

Selection For the picklist, see the **Assign channel 1** parameter (→ 154)

Factory setting Off

Assign channel 3

Navigation Expert → Diagnostics → Data logging → Assign chan. 3

Prerequisite The **Extended HistoROM** application package is available.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 44).

Description Use this function to select a process variable for the data logging channel.

Selection For the picklist, see the **Assign channel 1** parameter (→ 154)

Factory setting Off

Assign channel 4

Navigation Expert → Diagnostics → Data logging → Assign chan. 4

Prerequisite The **Extended HistoROM** application package is available.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 44).

Description Use this function to select a process variable for the data logging channel.

Selection For the picklist, see the **Assign channel 1** parameter (→ 154)

Factory setting Off

Logging interval

Navigation Expert → Diagnostics → Data logging → Logging interval

Prerequisite The **Extended HistoROM** application package is available.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 44).

Description Use this function to enter the logging interval T_{log} for data logging.

User entry 1.0 to 3 600.0 s

Factory setting 1.0 s

Additional information *Description*

This defines the interval between the individual data points in the data log, and thus the maximum loggable process time T_{log}:
- If 1 logging channel is used: $T_{log} = 1000 \times t_{log}$
- If 2 logging channels are used: $T_{log} = 500 \times t_{log}$
- If 3 logging channels are used: $T_{log} = 333 \times t_{log}$
- If 4 logging channels are used: $T_{log} = 250 \times t_{log}$

Once this time elapses, the oldest data points in the data log are cyclically overwritten such that a time of T_{log} always remains in the memory (ring memory principle).

The log contents are cleared if the length of the logging interval is changed.

Example

If 1 logging channel is used:
- $T_{log} = 1000 \times 1$ s = 1 000 s ≈15 min
- $T_{log} = 1000 \times 10$ s = 10 000 s ≈ 3 h
- $T_{log} = 1000 \times 80$ s = 80 000 s ≈ 1 d
- $T_{log} = 1000 \times 3\,600$ s = 3 600 000 s ≈ 41 d

Clear logging data

Navigation Expert → Diagnostics → Data logging → Clear logging

Prerequisite The **Extended HistoROM** application package is available.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 44).

Description Use this function to clear the entire logging data.

Selection
- Cancel
- Clear data

Factory setting Cancel

Additional information *Selection*

- Cancel
  The data is not cleared. All the data is retained.
- Clear data
  The logging data is cleared. The logging process starts from the beginning.

Data logging

Navigation Expert → Diagnostics → Data logging → Data logging

Description Use this function to select the data logging method.

Selection

- Overwriting
- Not overwriting

Factory setting Overwriting

Additional information *Selection*

- Overwriting
  The device memory applies the FIFO principle.
- Not overwriting
  Data logging is canceled if the measured value memory is full (single shot).

Logging delay

Navigation Expert → Diagnostics → Data logging → Logging delay

Prerequisite In the **Data logging** parameter (→ 157), the **Not overwriting** option is selected.

Description Use this function to enter the time delay for measured value logging.

User entry 0 to 999 h

Factory setting 0 h

Additional information *Description*

Once data logging has been started with the **Data logging control** parameter (→ 158), the device does not save any data for the duration of the delay time entered.

Data logging control

Navigation Expert → Diagnostics → Data logging → Data log.control

Prerequisite In the **Data logging** parameter (→ 157), the **Not overwriting** option is selected.

Description Use this function to start and stop measured value logging.

Selection
- None
- Delete + start
- Stop

Factory setting None

Additional information *Selection*
- None
  Initial measured value logging status.
- Delete + start
  All the measured values recorded for all the channels are deleted and measured value logging starts again.
- Stop
  Measured value logging is stopped.

Data logging status

Navigation Expert → Diagnostics → Data logging → Data log. status

Prerequisite In the **Data logging** parameter (→ 157), the **Not overwriting** option is selected.

Description Displays the measured value logging status.

User interface
- Done
- Delay active
- Active
- Stopped

Factory setting Done

Additional information *Selection*
- Done
  Measured value logging has been performed and completed successfully.
- Delay active
  Measured value logging has been started but the logging interval has not yet elapsed.
- Active
  The logging interval has elapsed and measured value logging is active.
- Stopped
  Measured value logging is stopped.

Entire logging duration

Navigation Expert → Diagnostics → Data logging → Logging duration

Prerequisite In the **Data logging** parameter (→ 157), the **Not overwriting** option is selected.

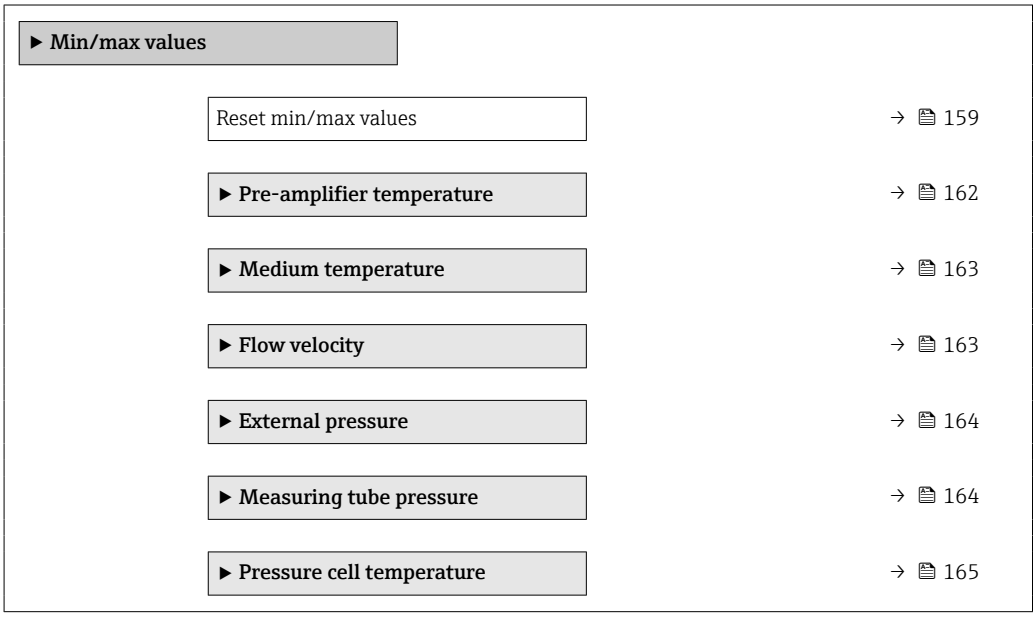
Description Displays the total logging duration.

User interface Positive floating-point number

Factory setting 0 s

3.7.9 "Min/max values" submenu

Navigation Expert → Diagnostics → Min/max val.



Reset min/max values

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

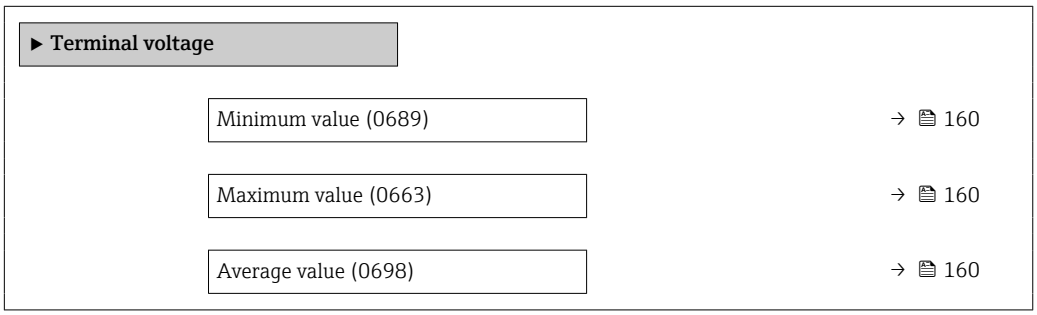
Description Use this function to select measured variables whose minimum, maximum and average measured values are to be reset.

Selection
- Cancel
- Flow velocity
- Pressure

Factory setting Cancel

"Terminal voltage" submenu

Navigation Expert → Diagnostics → Min/max val. → Terminal volt.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Terminal volt. → Minimum value (0689)

Description Use this function to display the smallest previously measured terminal voltage value in Volts.

User interface 0.0 to 50.0 V

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Terminal volt. → Maximum value (0663)

Description Use this function to view the largest previously measured terminal voltage value in Volts.

User interface 0.0 to 50.0 V

Average value

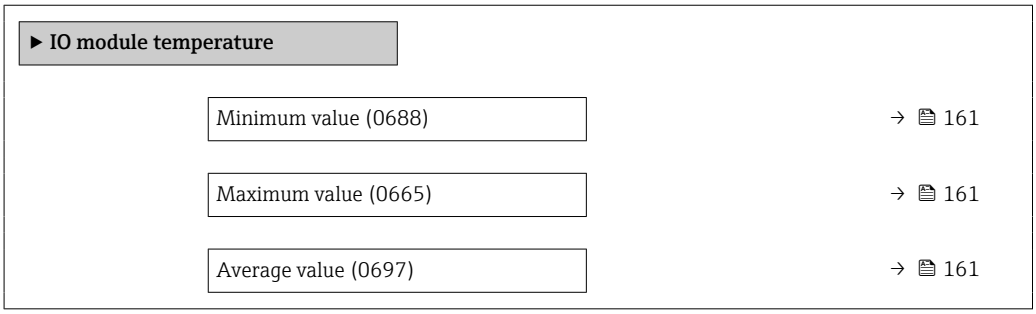
Navigation Expert → Diagnostics → Min/max val. → Terminal volt. → Average value (0698)

Description Use this function to view the average of all previously measured terminal voltage values in Volts.

User interface Signed floating-point number

"IO module temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → IO module temp.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → IO module temp. → Minimum value (0688)

Description Displays the lowest previously measured temperature value of the I/O electronics module.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → IO module temp. → Maximum value (0665)

Description Displays the highest previously measured temperature value of the I/O electronics module.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

Average value

Navigation Expert → Diagnostics → Min/max val. → IO module temp. → Average value (0697)

Description Displays the average value of all previously measured temperature values of the I/O electronics module.

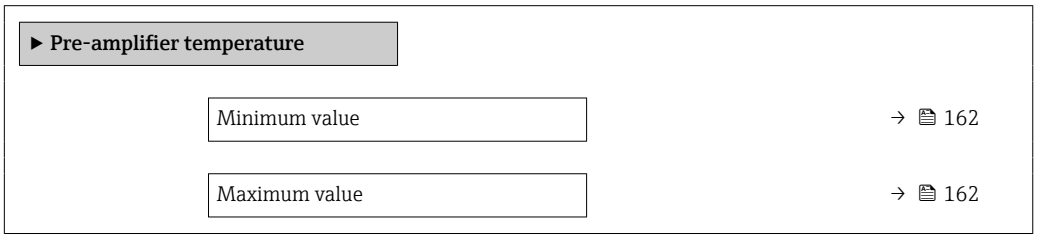
User interface −1 273.15 to 726.85 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

"Pre-amplifier temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Pre-amplif. temp



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Pre-amplif. temp → Minimum value

Description Displays the lowest previously measured temperature value of the pre-amplifier module.

User interface 0 to 1 000 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Pre-amplif. temp → Maximum value

Description Displays the highest previously measured temperature value of the pre-amplifier module.

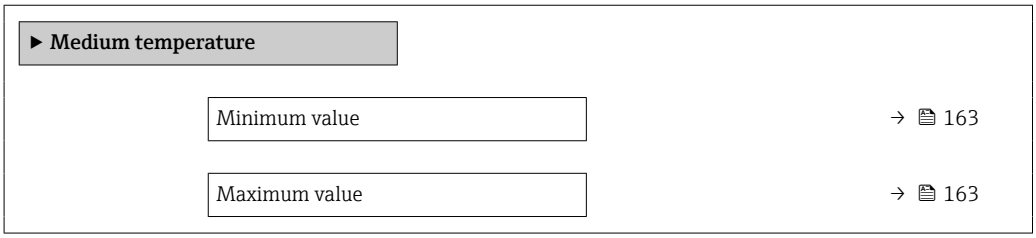
User interface 0 to 1 000 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

"Medium temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Medium temp.



Minimum value

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

Description Displays the lowest previously measured medium temperature.

User interface 0 to 1 000 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

Maximum value

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

Description Displays the highest previously measured medium temperature.

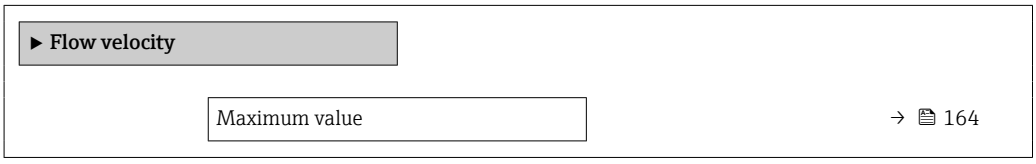
User interface 0 to 1 000 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

"Flow velocity" submenu

Navigation Expert → Diagnostics → Min/max val. → Flow velocity



Maximum value

Navigation Expert → Diagnostics → Min/max val. → Flow velocity → Maximum value

Description Displays the highest previously measured flow velocity.

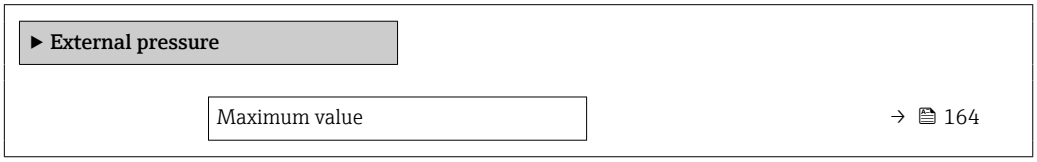
User interface Positive floating-point number

Additional information *Dependency*

The unit is taken from the **Velocity unit** parameter (→ 68)

"External pressure" submenu

Navigation Expert → Diagnostics → Min/max val. → External press.



Maximum value

Navigation Expert → Diagnostics → Min/max val. → External press. → Maximum value

Description Displays the highest previously measured value for external pressure measurement.

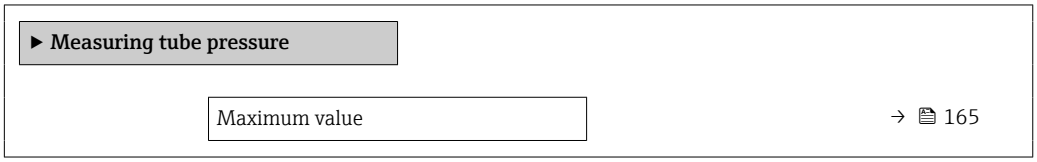
User interface Positive floating-point number

Additional information *Dependency*

The unit is taken from the **Pressure unit** parameter (→ 64)

"Measuring tube pressure" submenu

Navigation Expert → Diagnostics → Min/max val. → Meas.tube press.



Maximum value

Navigation Expert → Diagnostics → Min/max val. → Meas.tube press. → Maximum value

Description Displays the highest previously measured value for internal pressure measurement.

User interface Positive floating-point number

Factory setting 0 bar

Additional information *Dependency*

The unit is taken from the **Pressure unit** parameter (→ 64)

"Pressure cell temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Press.cell temp.

▶ Pressure cell temperature	
Maximum value	→ 165
Minimum value	→ 165

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Press.cell temp. → Maximum value

Description Displays the highest previously measured temperature of the pressure cell.

User interface 0 to 1 000 °C

Factory setting 0 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

Minimum value

Navigation Expert → Diagnostics → Min/max val. → Press.cell temp. → Minimum value

Description Displays the lowest previously measured temperature of the pressure cell.

User interface 0 to 1 000 °C

Factory setting 1 000 °C

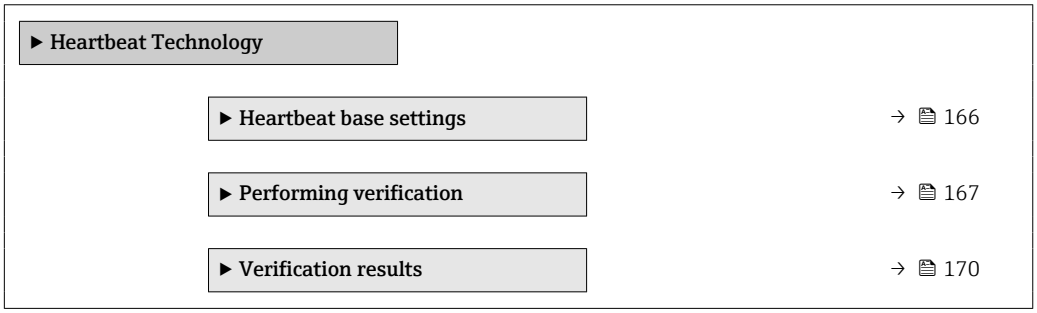
Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 65)

3.7.10 "Heartbeat Technology" submenu

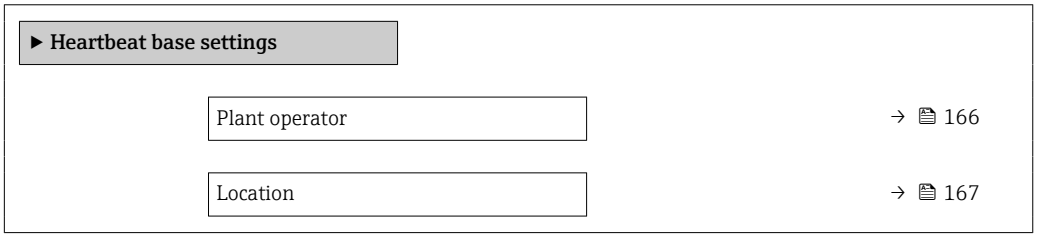
For detailed information on the parameter descriptions for the **Heartbeat Verification**: Special Documentation for the device

Navigation Expert → Diagnostics → Heartbeat Techn.



"Heartbeat base settings" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings



Plant operator

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings → Plant operator

Description Use this function to enter the plant operator.

User entry Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)

Location

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings → Location

Description Use this function to enter the location.

User entry Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)

"Performing verification" wizard

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific.

▶ Performing verification	
Year	→ 167
Month	→ 168
Day	→ 168
Hour	→ 168
AM/PM	→ 169
Minute	→ 169
Start verification	→ 169
Status	→ 170
Verification result	→ 170

Year

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Year

Prerequisite Can be edited if Heartbeat Verification is not active.

Description Use this function to enter the year of recalibration.

User entry 9 to 99

Factory setting 21

Month

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Month

Prerequisite Can be edited if Heartbeat Verification is not active.

Description Use this function to select the month of recalibration.

Selection
- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

Factory setting January

Day

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Day

Prerequisite Can be edited if Heartbeat Verification is not active.

Description Use this function to enter the day of the month of recalibration.

User entry 1 to 31 d

Factory setting 1 d

Hour

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Hour

Prerequisite Can be edited if Heartbeat Verification is not active.

Description Use this function to enter the hour of recalibration.

User entry 0 to 23 h

Factory setting 12 h

AM/PM

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → AM/PM

Prerequisite Can be edited if Heartbeat Verification is not active.

The **dd.mm.yy hh:mm am/pm** option or the **mm/dd/yy hh:mm am/pm** option is selected in the **Date/time format** parameter (2812) (→ 71).

Description Use this function to select the time entry in the morning (**AM** option) or afternoon (**PM** option) in the case of 12-hour notation.

Selection
- AM
- PM

Factory setting AM

Minute

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Minute

Prerequisite Can be edited if Heartbeat Verification is not active.

Description Use this function to enter the minutes of recalibration.

User entry 0 to 59 min

Factory setting 0 min

Start verification

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Start verificat.

Description Start the verification.

To carry out a complete verification, select the selection parameters individually. Once the external measured values have been recorded, verification is started using the **Start** option.

Selection
- Cancel
- Start

Factory setting Cancel

Progress

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Progress

Description The progress of the process is indicated.

User interface 0 to 100 %

Status

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Status

Description Displays the current status of the verification.

User interface
- Done
- 0%
- Failed
- Not done

Verification result

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verific. result

Description Displays the overall result of the verification.

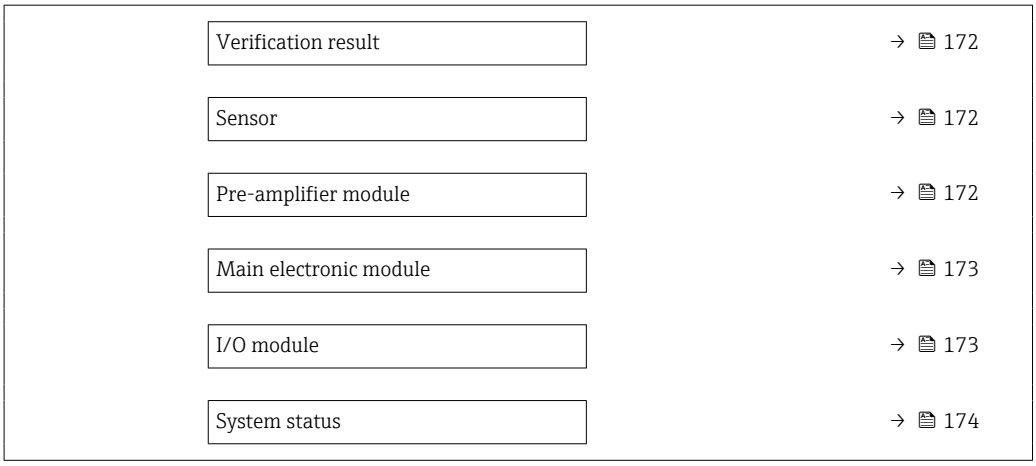
Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

"Verification results" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results

▶ Verification results	
Date/time	→ 171
Verification ID	→ 171
Operating time	→ 171



Date/time

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Date/time

Prerequisite The verification has been performed.

Description Date and time.

User interface dd.mmmm.yyyy; hh:mm

Factory setting 1 January 2010; 12:00

Verification ID

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verification ID

Prerequisite The verification has been performed.

Description Displays consecutive numbering of the verification results in the measuring device.

User interface 0 to 65 535

Factory setting 0

Operating time

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Operating time

Prerequisite The verification has been performed.

Description Indicates how long the device has been in operation up to the verification.

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

Factory setting –

Verification result

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verific. result

Description Displays the overall result of the verification.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Sensor

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sensor

Prerequisite The **Failed** option is shown in the **Overall result** parameter (→ 170).

Description Displays the result for the sensor.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

Pre-amplifier module

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Pre-amplifier

Prerequisite The **Failed** option is shown in the **Overall result** parameter (→ 170).

Description Displays the result for the sensor electronics module (ISEM).

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

Main electronic module

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Main elec. mod.

Prerequisite In the **Overall result** parameter (→ 170), the **Failed** option was displayed.

Description Displays the result for the main electronics module.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

I/O module

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → I/O module

Prerequisite The **Failed** option is shown in the **Overall result** parameter (→ 170).

Description Displays the result for I/O module monitoring of the I/O module.
- For pulse output: Accuracy of the pulses (for external verification only)
- For frequency output: Accuracy of the frequency (for external verification only)

Heartbeat Verification does not check the digital inputs and outputs and does not output any result for them.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

System status

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → System status

Prerequisite The **Failed** option is shown in the **Overall result** parameter (→ 170).

Description Displays the system condition. Tests the measuring device for active errors.

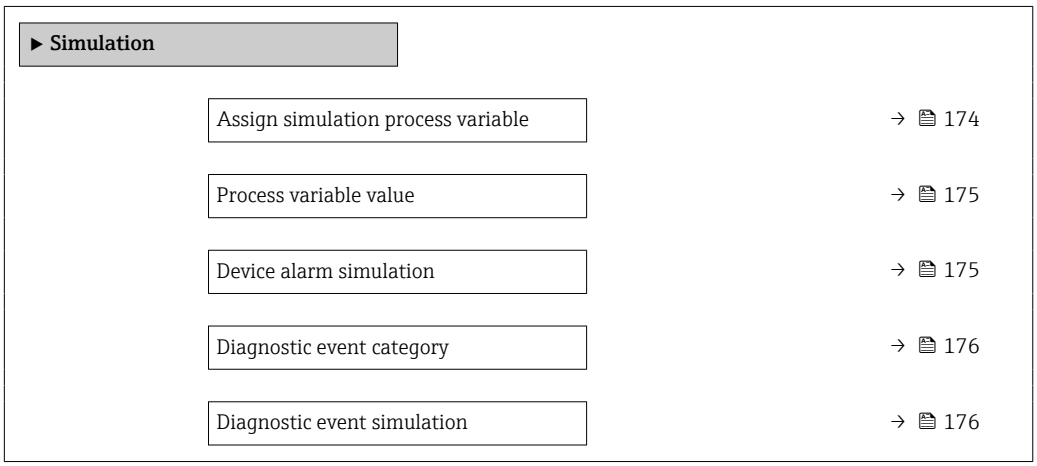
Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

3.7.11 "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
- Corrected volume flow
- Mass flow
- Flow velocity

- Temperature
- Calculated saturated steam pressure *
- Steam quality *
- Total mass flow *
- Condensate mass flow *
- Energy flow
- Heat flow difference *
- Reynolds number

Factory setting Off

Additional information *Description*

The simulation value of the process variable selected is defined in the **Process variable value** parameter (→ 175).

Process variable value

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

Prerequisite A process variable is selected in the **Assign simulation process variable** parameter (→ 174).

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 (→ 58).

Device alarm simulation

Navigation Expert → Diagnostics → Simulation → Dev. alarm sim.

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

Selection
- Off
- On

Factory setting Off

* Visibility depends on order options or device settings

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 (→ 176).

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 (→ 176).

4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

Volume flow	**m^3/h** option
Volume	**m^3** option
Mass flow	**kg/h** option
Mass	**kg** option
Corrected volume flow	**Nm^3/h** option
Corrected volume	**Nm^3** option
Pressure	**bar** option
Temperature	**°C** option
Energy flow	**kW** option
Energy	**kWh** option
Calorific value (volume)	**kJ/Nm^3** option
Calorific value (mass)	**kJ/kg** option
Velocity	**m/s** option
Density	**kg/m^3** option
Dynamic viscosity	**Pa s** option
Specific heat capacity	**kJ/(kgK)** option
Length	**mm** option

4.1.2 Full scale values

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

Nominal diameter [mm]	[m^3/h]
15 25 > 15 40 >> 15	25
25 40 > 25 50 >> 25	125
40 50 > 40 80 >> 40	308
50 80 > 50 100 >> 50	513
80 100 > 80 150 >> 80	1 152

Nominal diameter [mm]	[m³/h]
100 150 > 100 200 >> 100	1995
150 200 > 150 250 >> 150	4539
200 250 > 200 300 >> 200	8713
250 300 > 250 350 >> 250	13735
300 350 > 300 400 >> 300	19701

4.1.3 Pulse value

Nominal diameter	Volume flow	Mass flow
[mm]	(~ 2 pulse/s) [m³/pulse]	(~ 2 pulse/s) [kg/pulse]
15 25 > 15 40 >> 15	0.00067	0.0034
25 40 > 25 50 >> 25	0.0035	0.018
40 50 > 40 80 >> 40	0.0085	0.044
50 80 > 50 100 >> 50	0.023	0.12
80 100 > 80 150 >> 80	0.051	0.26
100 150 > 100 200 >> 100	0.089	0.46
150 200 > 150 250 >> 150	0.20	1.04
200 250 > 200 300 >> 200	0.39	1.99
250 300 > 250 350 >> 250	0.61	3.14
300 350 > 300 400 >> 300	0.88	4.51

4.2 US units

Only valid for USA and Canada.

4.2.1 System units

Volume flow	**ft³/min** option
Volume	**ft³** option
Mass flow	**lb/min** option
Mass	**lb** option
Corrected volume flow	**Sft³/min** option
Corrected volume	**Sft³** option
Pressure	**psi** option
Temperature	**°F** option
Energy flow	**Btu/h** option
Energy	**Btu** option
Calorific value (volume)	**Btu/Sft³** option
Calorific value (mass)	**Btu/lb** option
Velocity	**ft/s** option
Density	**lb/ft³** option
Length	**in** option

4.2.2 Full scale values

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

Nominal diameter [in]	[ft³/h]
½ 1 > ½ 1½ >> ½	882
1 1½ > 1 2 >> 1	4414
1½ 2 > 1½ 3 >> 1½	10876
2 3 > 2 4 >> 2	18116
3 4 > 3 6 >> 3	40682
4 6 > 4 8 >> 4	70452
6 8 > 6 10 >> 6	160293

Nominal diameter [in]	[ft³/h]
8 10 > 8 12 >> 8	307 696
10 12 > 10 14 >> 10	485 046
12 14 > 12 16 >> 12	695 734

4.2.3 Pulse value

Nominal diameter	Volume flow	Volume flow
[in]	~ 2 pulse/s [gal/pulse]	~ 2 pulse/s [lb/pulse]
½ 1 > ½ 1½ >> ½	0.18	0.0076
1 1½ > 1 2 >> 1	0.92	0.039
1½ 2 > 1½ 3 >> 1½	2.25	0.097
2 3 > 2 4 >> 2	6.02	0.26
3 4 > 3 6 >> 3	13.50	0.58
4 6 > 4 8 >> 4	23.42	1.01
6 8 > 6 10 >> 6	53.29	2.29
8 10 > 8 12 >> 8	102.29	4.40
10 12 > 10 14 >> 10	161.26	6.93
12 14 > 12 16 >> 12	231.30	9.94

5 Explanation of abbreviated units

5.1 SI units

Process variable	Units	Explanation
Calorific value (volume)	kWh/Nm³, MWh/Nm³, kJ/Nm³, MJ/Nm³	Kilowatt hour, megawatt hour, kilojoule, megajoule/ standard cubic meter
	kWh/Sm³, MWh/Sm³, kJ/Sm³, MJ/Sm³	Kilowatt hour, megawatt hour, kilojoule, megajoule/ standard cubic meter
Calorific value (mass)	kWh/kg,MWh/kg, kJ/kg, MJ/kg	Kilowatt hour, megawatt hour, kilojoule, megajoule/ kilogram
Density	g/cm³	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 fluid density to the water density 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 fluid density to the water density at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
Pressure	Pa a, kPa a, MPa a	Pascal, kilopascal, megapascal
	mbar a	Millibar (absolute)
	bar, torr, atm	Bar, torr, physical atmosphere
	gf/cm², kgf/cm²	Gram force, kilogram force/square centimeter
Dynamic viscosity	Pa s	Pascal second
	cP, P	Centipoise, poise
Energy	kWh, MWh, GWh	Kilowatt hour, megawatt hour, gigawatt hour
	kJ, MJ, GJ	Kilojoule, megajoule, gigajoule
	kcal, Mcal, Gcal	Kilocalories, megacalories, gigacalories
Energy flow	kW, MW, GW	Kilowatt, megawatt
	kJ/s, kJ/min, kJ/h, kJ/d	Kilojoule/time unit
	MJ/s, MJ/min, MJ/h, MJ/d	Megajoule/time unit
	GJ/s, GJ/min, GJ/h, GJ/d	Gigajoule/time unit
	kcal/s, kcal/min, kcal/h, kcal/d	Kilocalories/time unit
	Mcal/s, Mcal/min, Mcal/h, Mcal/d	Megacalories/time unit
	Gcal/s, Gcal/min, Gcal/h, Gcal/d	Gigacalories/time unit
Velocity	m/s	Meter/time unit
Length	mm, m	Millimeter, meter
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

Process variable	Units	Explanation
Specific heat capacity	kJ/(kgK), MJ/(kgK)	Kilojoule, megajoule/kilogram Kelvin
	kWh/(kgK)	Kilowatt hour/kilogram Kelvin
	kcal/(kgK)	Kilocalories/kilogram Kelvin
Temperature	°C , K	Celsius, Kelvin
Volume	cm^3, dm^3, m^3	Cubic centimeter, cubic decimeter, cubic meter
	ml, l	Milliliter, liter
Volume flow	cm^3/s, cm^3/min, cm^3/h, cm^3/d	Cubic centimeter/time unit
	dm^3/s, dm^3/min, dm^3/h, dm^3/d	Cubic decimeter/time unit
	m^3/s, m^3/min, m^3/h, m^3/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
Time	s, m, h, d, y	Second, minute, hour, day, year

5.2 US units

Process variable	Units	Explanation
Calorific value (mass)	kWh/lb, MWh/lb, kJ/lb, MJ/lb	Kilowatt hour, kilojoule, British thermal unit, thousand British thermal units/pound
Density	lb/ft^3, 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
Pressure	psi	Psi
Velocity	ft/s	Foot/time unit
Length	in, ft	Inch, foot
Mass	oz, lb, STon	Ounce, pound, standard ton
Mass flow	oz/s, oz/min, oz/h, oz/d	Ounce/time unit
	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	STon/s, STon/min, STon/h, STon/d	Standard ton/time unit
Corrected volume	Sft^3	Standard cubic foot
Corrected volume flow	Sft^3/s, Sft^3/min, Sft^3/h, Sft^3/d	Standard cubic foot/time unit
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

Process variable	Units	Explanation
	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
Calorific value (volume)	Btu/Sm³, MBtu/Sm³	British thermal unit, thousand British thermal units/ standard cubic meter
	Btu/Sft³, MBtu/Sft³	British thermal unit, thousand British thermal units/ standard cubic foot
Calorific value (mass)	Btu/lb, MBtu/lb	British thermal unit, thousand British thermal units/ pound
Density	lb/gal (imp), lb/bbl (imp;beer), lb/bbl (imp;oil)	Pound/volume unit
Energy	Btu, MBtu, MMBtu	British thermal unit, thousand British thermal units, million British thermal units
Energy flow	Btu/s, Btu/min, Btu/h, Btu/day	British thermal unit/time unit
	MBtu/s, MBtu/min, MBtu/h, MBtu/d	Thousand British thermal units/time unit
	MMBtu/s, MMBtu/min, MMBtu/h, MMBtu/d	Million British thermal units/time unit
Specific heat capacity	Btu/(lb°R)	British thermal unit/pound degree Rankine
Volume	gal (imp), Mgal (imp)	Gallon, mega gallon
	bbl (imp;beer), bbl (imp;oil)	Barrel (beer), barrel (petrochemicals)
Volume flow	gal/s (imp), gal/min (imp), gal/h (imp), gal/d (imp)	Gallon/time unit
	Mgal/s (imp), Mgal/min (imp), Mgal/h (imp), Mgal/d (imp)	Mega gallon/time unit
	bbl/s (imp;beer), bbl/min (imp;beer), bbl/h (imp;beer), bbl/d (imp;beer)	Barrel /time unit (beer) Beer: 36.0 gal/bbl
	bbl/s (imp;oil), bbl/min (imp;oil), bbl/h (imp;oil), bbl/d (imp;oil)	Barrel/time unit (petrochemicals) Petrochemicals: 34.97 gal/bbl
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

5.4 Other units

Process variable	Units	Explanation
Pressure	mmH2O (4°C)	Millimeter of water column (4 °C)
	mmH2O (68°F)	Millimeter of water column (68 °F)
	mmHg (0°C)	Millimeter of mercury column (0 °C)
	inH2O (4°C)	Inch of water column (4 °C)
	inH2O (68°F)	Inch of water column (68 °F)
	ftH2O (68°F)	Foot of water column (68 °F)
	inHg (0°C)	Inch of mercury (0 °C)

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