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71595391
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Valid as of version
01.00.zz (Device firmware)

Description of Device Parameters
Proline Cubemass 300

Coriolis flowmeter
PROFINET with Ethernet-APL

ethernet-apl™
advanced physical layer

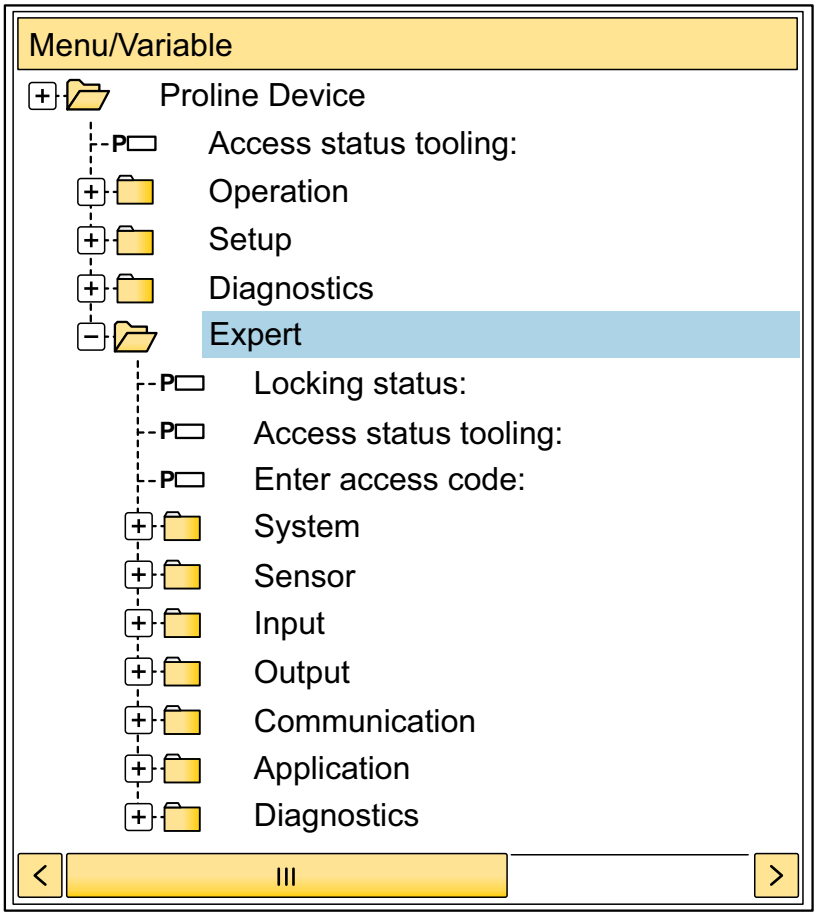

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Table of contents

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 Expert operating menu.

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

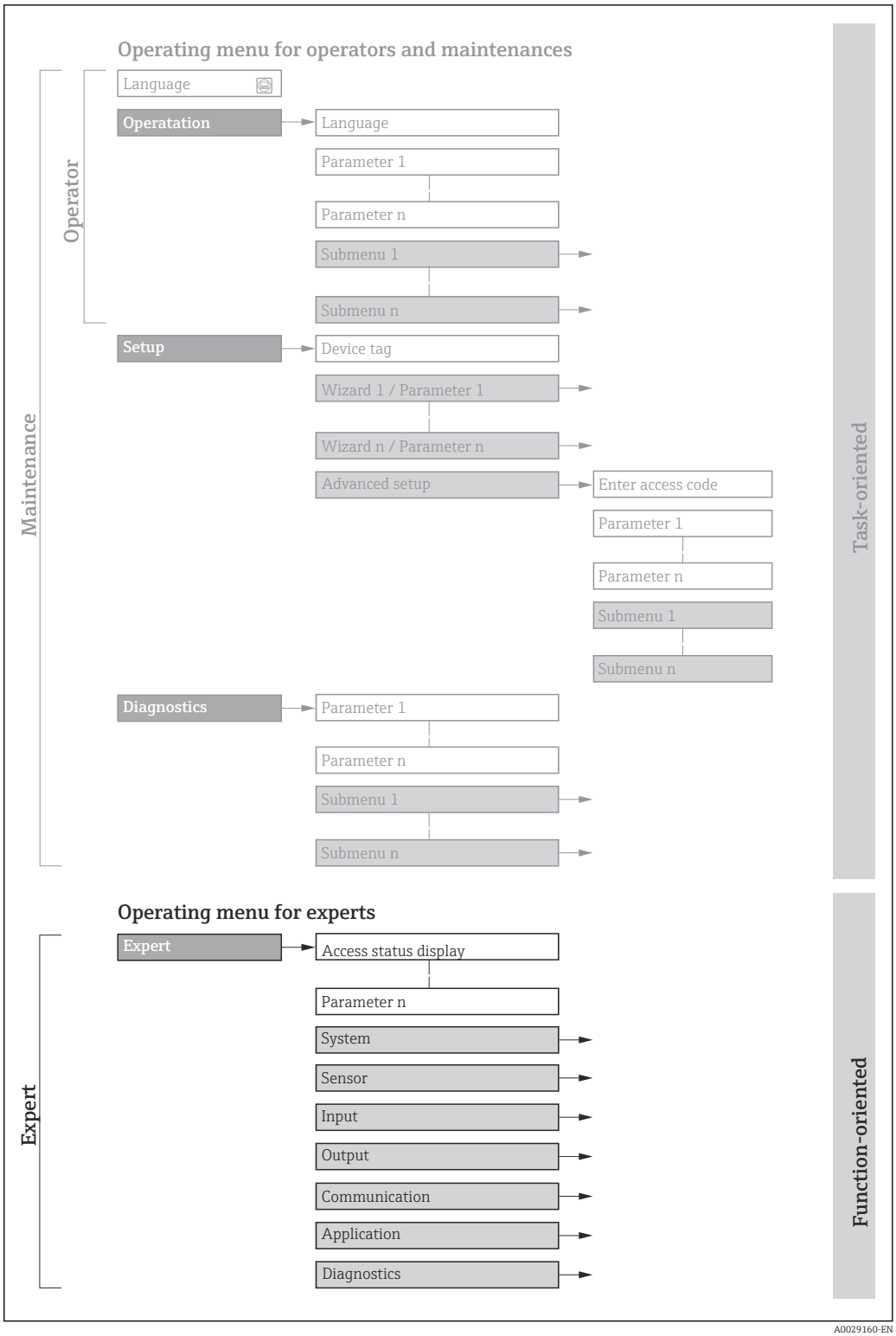
1.2 Target group

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

1.3 Using this document

1.3.1 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) or web browser
Navigation path to the parameter via the operating tool
The names of the menus, submenus and parameters are abbreviated to the form in which they appear on the display and in the operating tool.

Prerequisite
The parameter is only available under these specific conditions

Description
Description of the parameter function

Selection
List of the individual options for the parameter
- Option 1
- Option 2

User entry
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
Cubemass C 300	BA02109D

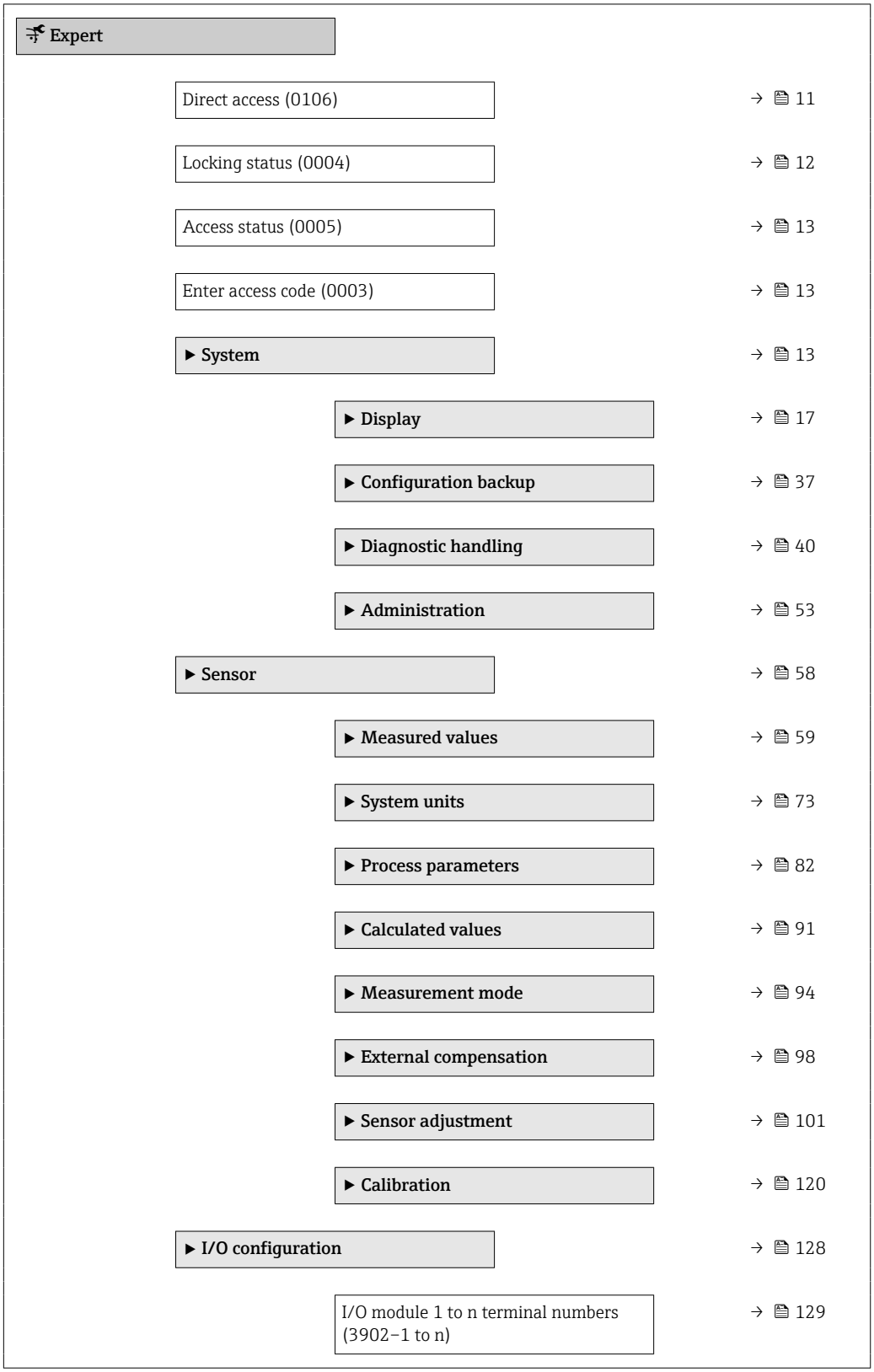
1.5.2 Supplementary device-dependent documentation

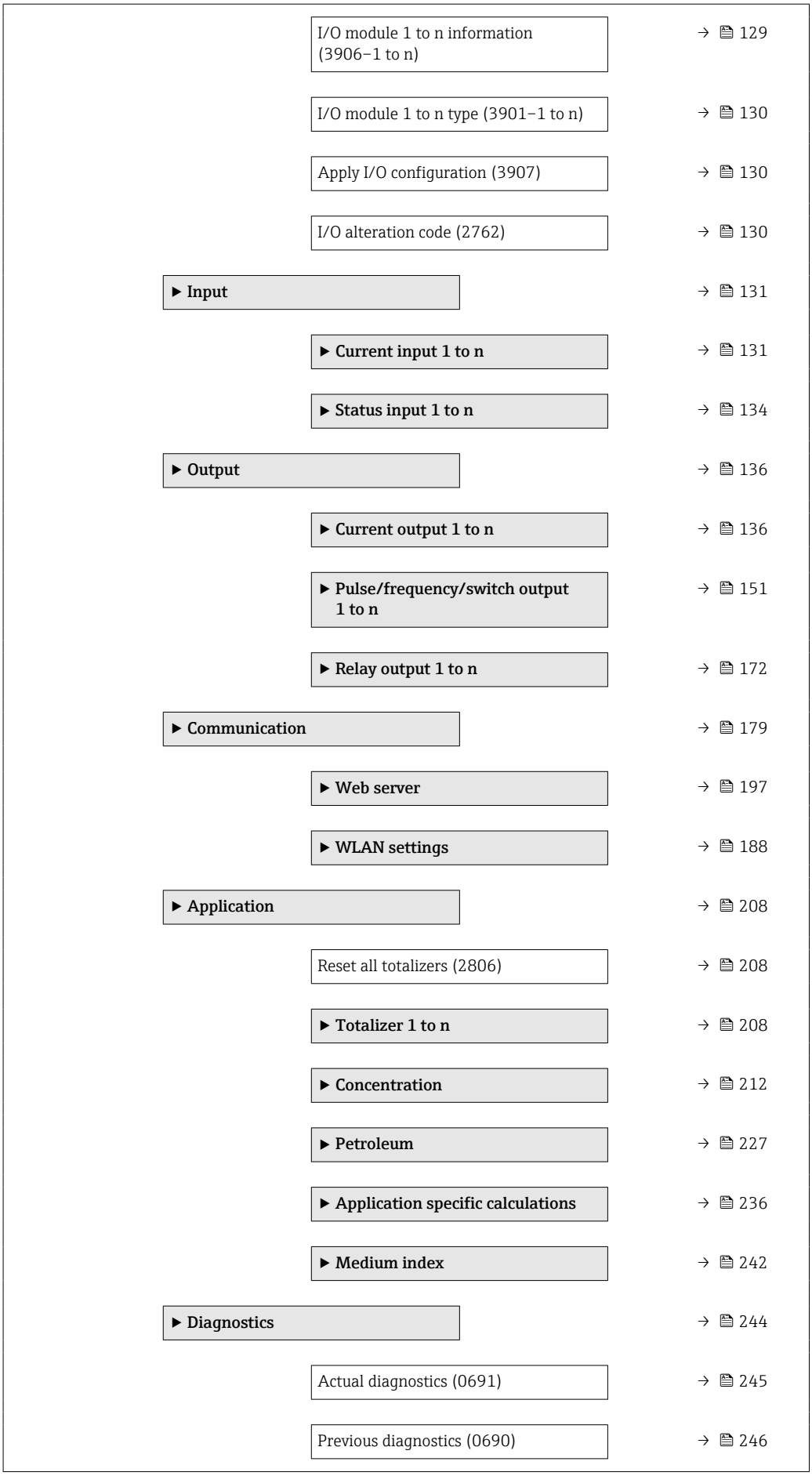
Special Documentation

Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Remote display and operating module DKX001	SD01763D
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
Web server	SD02760D
Heartbeat Technology	SD02729D
Concentration measurement	SD02737D

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.




I/O module 1 to n information (3906–1 to n) → 129
I/O module 1 to n type (3901–1 to n) → 130
Apply I/O configuration (3907) → 130
I/O alteration code (2762) → 130
▶ Input → 131
▶ Current input 1 to n → 131
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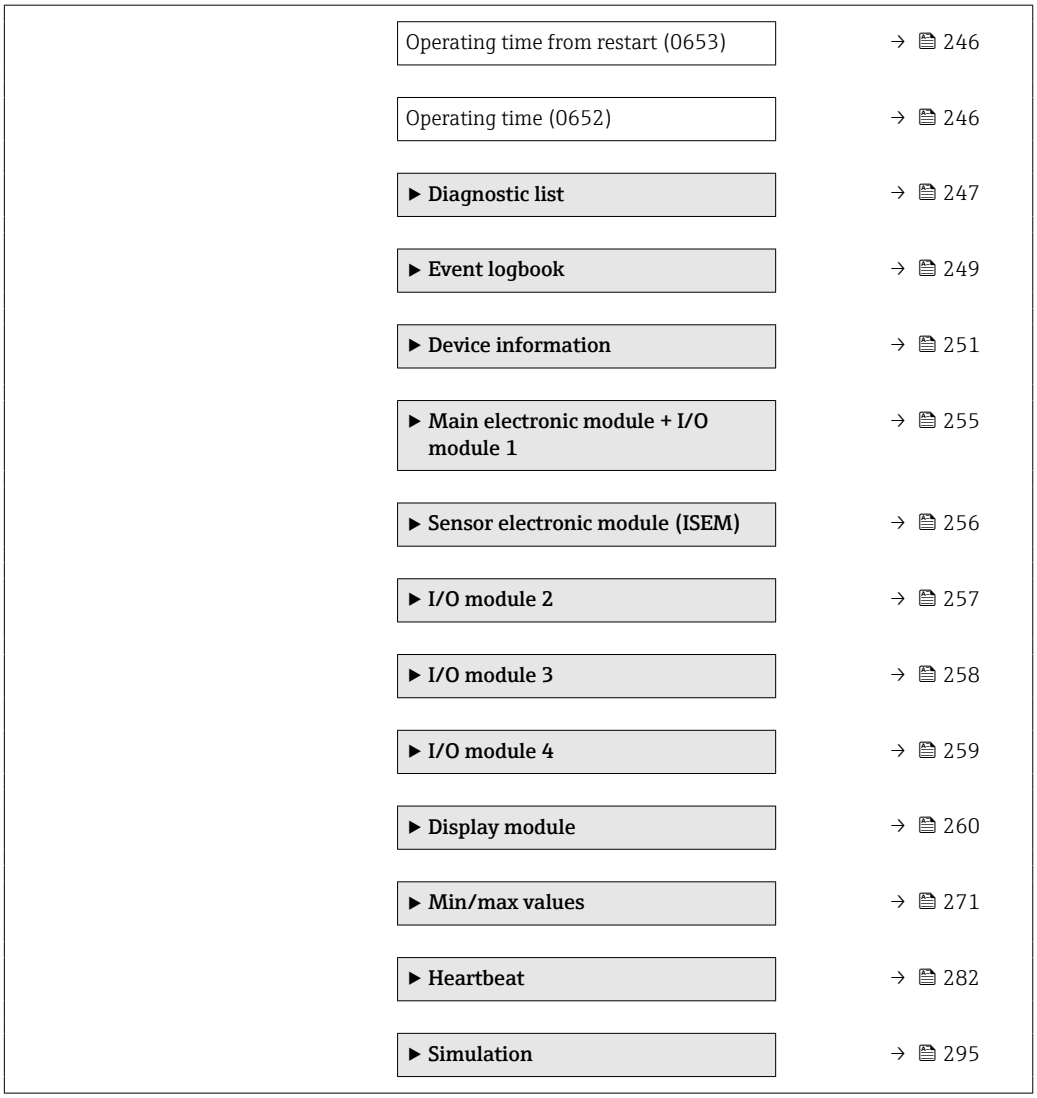
▶ Pulse/frequency/switch output 1 to n → 151
▶ Relay output 1 to n → 172
▶ Communication → 179
▶ Web server → 197
▶ WLAN settings → 188
▶ Application → 208
Reset all totalizers (2806) → 208
▶ Totalizer 1 to n → 208
▶ Concentration → 212
▶ Petroleum → 227
▶ Application specific calculations → 236
▶ Medium index → 242
▶ Diagnostics → 244
Actual diagnostics (0691) → 245
Previous diagnostics (0690) → 246


Operating time from restart (0653)
→ 246
Operating time (0652)
→ 246
▶ Diagnostic list
→ 247
▶ Event logbook
→ 249
▶ Device information
→ 251
▶ Main electronic module + I/O module 1
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▶ Sensor electronic module (ISEM)
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▶ Display module
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▶ Simulation
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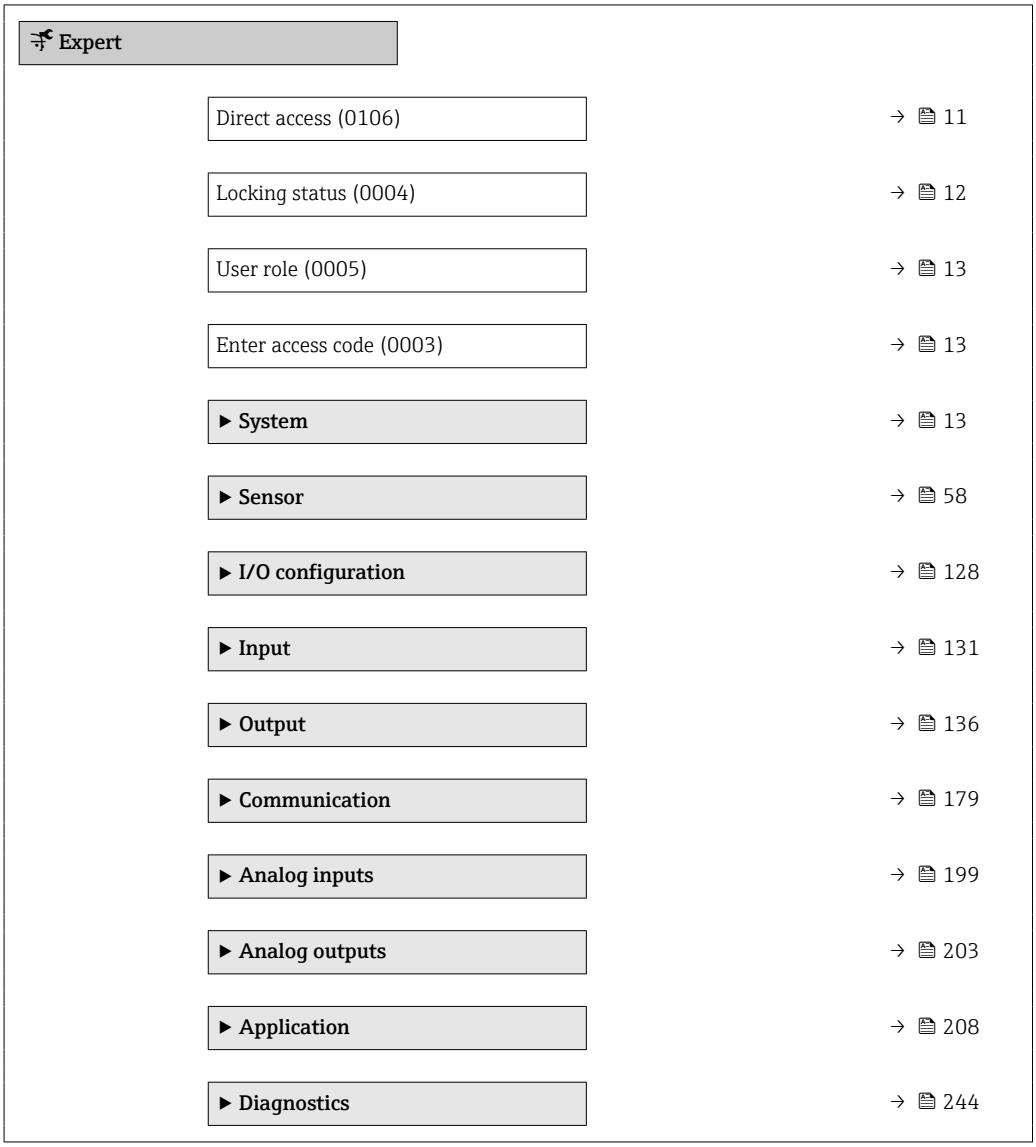
3 Description of device parameters

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



Direct access

Navigation Expert → Direct access (0106)

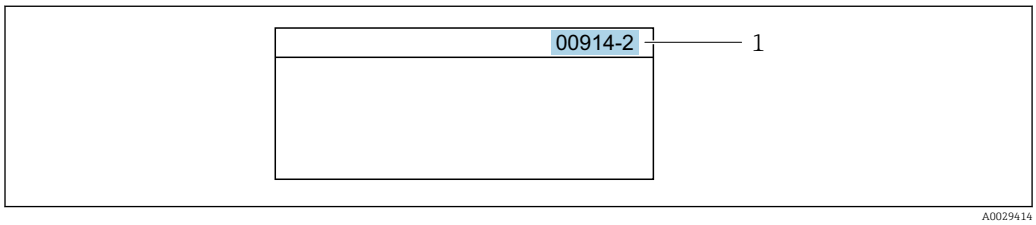
Description Use this function to enter the access code to enable direct access to the desired parameter via the local display. A parameter number is assigned to each parameter for this purpose.

User entry 0 to 65 535

Additional information

User entry

The direct access code consists of a 5-digit number (at maximum) and the channel number, which identifies the channel of a process variable: e.g. 00914-2. In the navigation view, this appears on the right-hand side in the header of the selected parameter.



1 Direct access code

Note the following when entering the direct access code:
- The leading zeros in the direct access code do not have to be entered.
  Example: Enter **"914"** instead of **"00914"**
- If no channel number is entered, channel 1 is opened automatically.
  Example: Enter **00914** → **Assign process variable** parameter
- If a different channel is opened: Enter the direct access code with the corresponding channel number.
  Example: Enter **00914-2** → **Assign process variable** parameter

Locking status

Navigation

Expert → Locking status (0004)

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 → 7

Selection

Options	Description
None	The access authorization displayed in the **Access status** parameter (→ 13) applies . Only appears on local display.
Hardware locked (priority 1)	The DIP switch for hardware locking is activated on the PCB board. 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 (0005)

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

User interface
- Maintenance
- Service

Factory setting Maintenance

Additional information *Description*

Access authorization can be modified via the **Enter access code** parameter (→ 13).

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 → 7

Enter access code

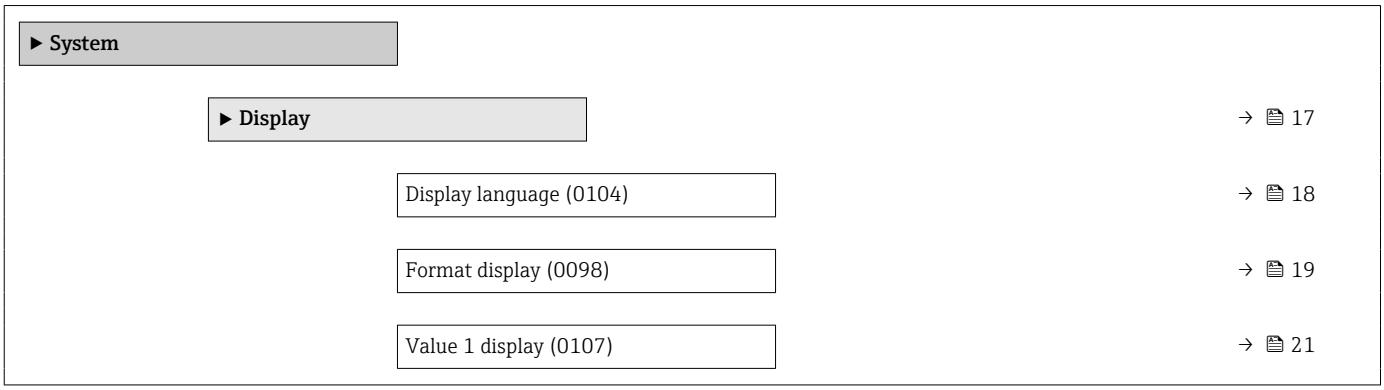
Navigation Expert → Ent. access code (0003)

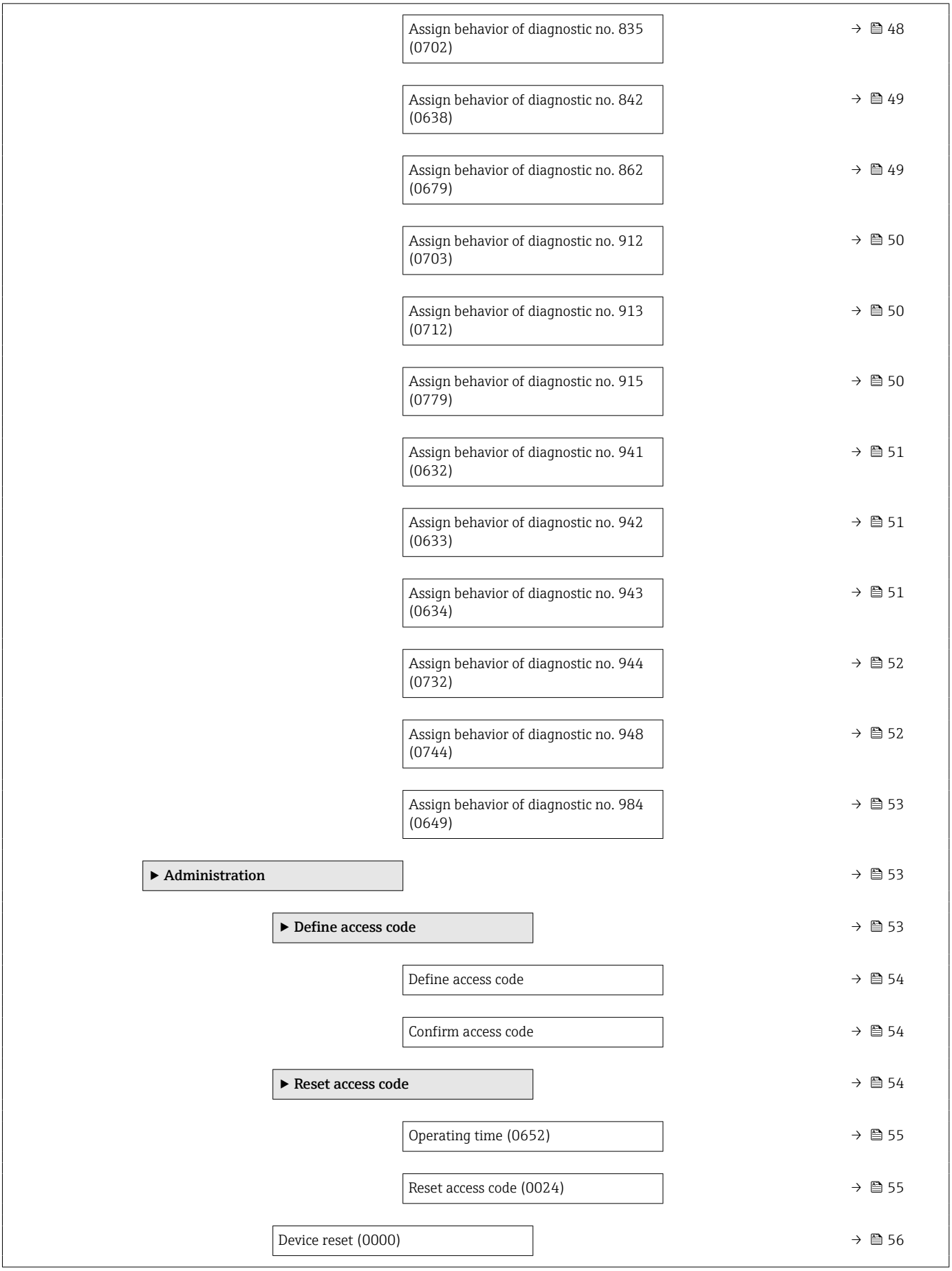
Description Use this function to enter the user-specific release code to remove parameter write protection.

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

3.1 "System" submenu

Navigation Expert → System




Assign behavior of diagnostic no. 835 (0702) → 48
Assign behavior of diagnostic no. 842 (0638) → 49
Assign behavior of diagnostic no. 862 (0679) → 49
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Assign behavior of diagnostic no. 942 (0633) → 51
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Assign behavior of diagnostic no. 944 (0732) → 52
Assign behavior of diagnostic no. 948 (0744) → 52
Assign behavior of diagnostic no. 984 (0649) → 53
▶ Administration → 53
▶ Define access code → 53
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Confirm access code → 54
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Reset access code (0024) → 55
Device reset (0000) → 56

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3.1.1 "Display" submenu

Navigation Setup → Advanced setup → Display

Navigation Expert → System → Display

► **Display**	
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Value 1 display (0107)	→ 21
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100% bargraph value 1 (0125)	→ 23
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Value 3 display (0110)	→ 25
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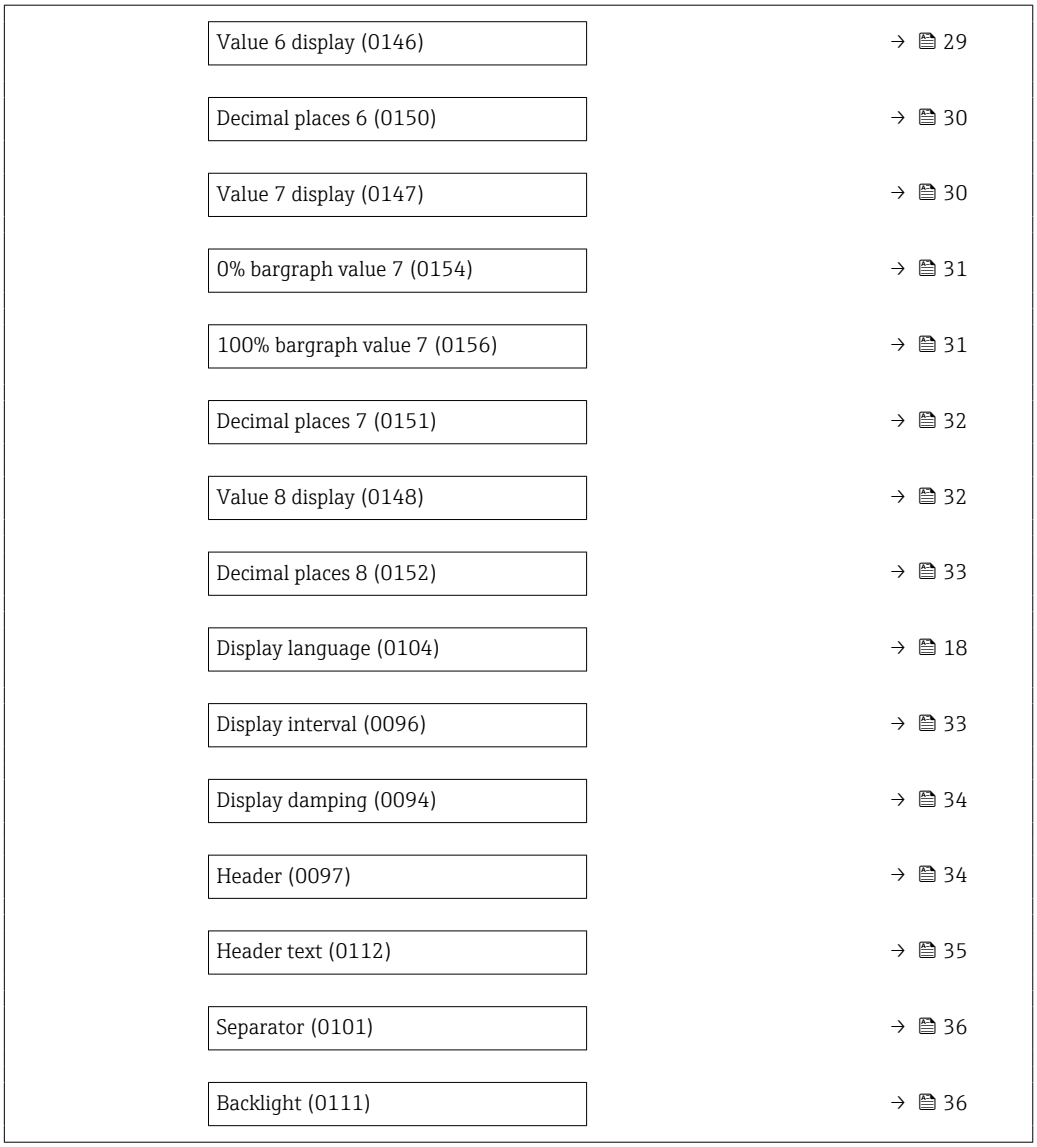
Value 5 display (0145)	→ 28
0% bargraph value 5 (0153)	→ 28
100% bargraph value 5 (0155)	→ 29
Decimal places 5 (0149)	→ 29



Display language

Navigation

Expert → System → Display → Display language (0104)

Setup → Advanced setup → Display → Display language (0104)

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)

Format display

Navigation
Expert → System → Display → Format display (0098)
Setup → Advanced setup → Display → Format display (0098)

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 8) can be configured. This setting only applies to normal operation.

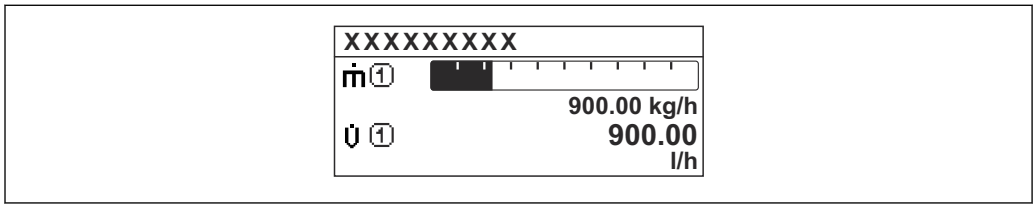
- The **Value 1 display** parameter (→ 🖹 21)...**Value 8 display** parameter (→ 🖹 32) are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device display. The display time until the next change is configured using the **Display interval** parameter (→ 🖹 33).

Possible measured values shown on the local display:

"1 value, max. size" option

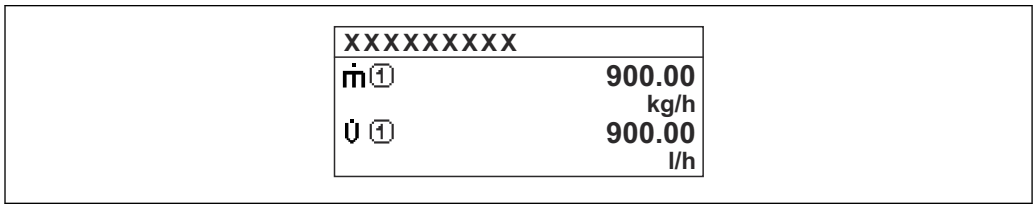
A0013099

"1 bargraph + 1 value" option



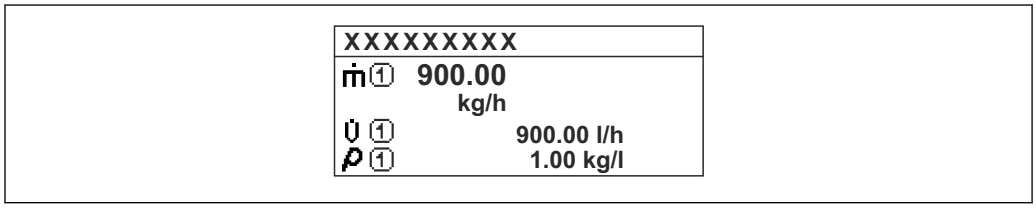
A0013098

"2 values" option



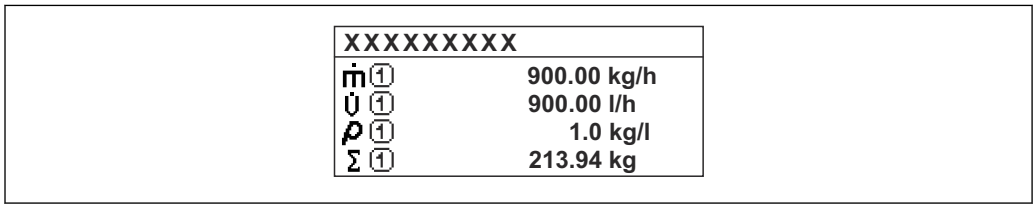
A0013100

"1 value large + 2 values" option



A0013102

"4 values" option



A0013103

Value 1 display

Navigation
Expert → System → Display → Value 1 display (0107)
Setup → Advanced setup → Display → Value 1 display (0107)

Prerequisite
A local display is provided.

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

Selection
- Mass flow
- Volume flow
- Corrected volume flow *
- Density
- Reference density *
- Density 2 *
- Time period signal frequency (TPS) *
- Time period signal (TPS) *
- Temperature
- Pressure
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Concentration *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Application specific output 0 *
- Application specific output 1 *
- Inhomogeneous medium index
- Suspended bubbles index *
- HBSI *
- Raw value mass flow
- Exciter current 0
- Oscillation damping 0
- Oscillation damping fluctuation 0 *
- Oscillation frequency 0
- Frequency fluctuation 0 *
- Oscillation amplitude 0 *
- Signal asymmetry
- Torsion signal asymmetry *
- Carrier pipe temperature *
- Electronics temperature
- Sensor index coil asymmetry
- Test point 0
- Test point 1
- Current output 1
- Current output 2 *
- Current output 3 *
- Current output 4 *

Factory setting
Mass flow

* Visibility depends on order options or device settings

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 (→ 19) 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 (→ 73).

Selection

- **Oscillation frequency** option
  Displays the current oscillation frequency of the measuring tubes. This frequency depends on the density of the medium.
- **Oscillation amplitude** option
  Displays the relative oscillation amplitude of the measuring tubes in relation to the preset value. This value is 100 % under optimum conditions.
- **Oscillation damping** option
  Displays the current oscillation damping. Oscillation damping is an indicator of the sensor's current need for excitation power.
- **Signal asymmetry** option
  Displays the relative difference between the oscillation amplitude at the inlet and outlet of the sensor. The measured value is the result of production tolerances of the sensor coils and should remain constant over the life time of a sensor.

0% bargraph value 1

Navigation

Expert → System → Display → 0% bargraph 1 (0123)

Setup → Advanced setup → Display → 0% bargraph 1 (0123)

Prerequisite

A local display is provided.

Description

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

User entry

Signed floating-point number

Factory setting

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

Additional information

Description

The **Format display** parameter (→ 19) 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 (→ 73).

100% bargraph value 1

Navigation

Expert → System → Display → 100% bargraph 1 (0125)

Setup → Advanced setup → Display → 100% bargraph 1 (0125)

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 → 328

Additional information

Description

The **Format display** parameter (→ 19) 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 (→ 73).

Decimal places 1

Navigation

Expert → System → Display → Decimal places 1 (0095)

Setup → Advanced setup → Display → Decimal places 1 (0095)

Prerequisite

A measured value is specified in the **Value 1 display** parameter (→ 21).

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
- x.xxxxx
- x.xxxxxx

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 (0108)
Setup → Advanced setup → Display → Value 2 display (0108)

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 (→ 21)

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 (→ 19) 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 (→ 73).

Decimal places 2

Navigation
Expert → System → Display → Decimal places 2 (0117)
Setup → Advanced setup → Display → Decimal places 2 (0117)

Prerequisite
A measured value is specified in the **Value 2 display** parameter (→ 24).

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
- x.xxxxx
- x.xxxxxx

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 (0110)
Setup → Advanced setup → Display → Value 3 display (0110)

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 (→ 21)

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 (→ 19) 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 (→ 73).

0% bargraph value 3

Navigation
Expert → System → Display → 0% bargraph 3 (0124)
Setup → Advanced setup → Display → 0% bargraph 3 (0124)

Prerequisite
A selection was made in the **Value 3 display** parameter (→ 25).

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 kg/h
- 0 lb/min

Additional information
Description

The **Format display** parameter (→ 19) 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 (→ 73).

100% bargraph value 3

Navigation
Expert → System → Display → 100% bargraph 3 (0126)
Setup → Advanced setup → Display → 100% bargraph 3 (0126)

Prerequisite
A selection was made in the **Value 3 display** parameter (→ 25).

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 (→ 19) 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 (→ 73).

Decimal places 3

Navigation
Expert → System → Display → Decimal places 3 (0118)
Setup → Advanced setup → Display → Decimal places 3 (0118)

Prerequisite
A measured value is specified in the **Value 3 display** parameter (→ 25).

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
- x.xxxxx
- x.xxxxxx

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 (0109)
Setup → Advanced setup → Display → Value 4 display (0109)

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 (→ 21)

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 (→ 19) 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 (→ 73).

Decimal places 4

Navigation
Expert → System → Display → Decimal places 4 (0119)
Setup → Advanced setup → Display → Decimal places 4 (0119)

Prerequisite
A measured value is specified in the **Value 4 display** parameter (→ 27).

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
- x.xxxxx
- x.xxxxxx

Factory setting
x.xx

Additional information
Description

This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 5 display

Navigation Setup → Advanced setup → Display → Value 5 display (0145)

Prerequisite A local display is provided.

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

Selection For the picklist, see the **Value 1 display** parameter (→ 21)

Factory setting None

Additional information

Description

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

The **Format display** parameter (→ 19) 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 (→ 73).

0% bargraph value 5

Navigation Setup → Advanced setup → Display → 0% bargraph 5 (0153)

Prerequisite An option was selected in the **Value 5 display** parameter (→ 28).

Description Use this function to enter the 0% bar graph value to be shown on the display for the measured value 5.

User entry Signed floating-point number

Factory setting Depends on country:
- 0 kg/h
- 0 lb/min

Additional information

Description

The **Format display** parameter (→ 19) 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 (→ 73).

100% bargraph value 5

Navigation Setup → Advanced setup → Display → 100% bargraph 5 (0155)

Prerequisite An option was selected in the **Value 5 display** parameter (→ 28).

Description Use this function to enter the 100% bar graph value to be shown on the display for the measured value 5.

User entry Signed floating-point number

Factory setting 0

Additional information

Description

The **Format display** parameter (→ 19) 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 (→ 73).

Decimal places 5

Navigation Setup → Advanced setup → Display → Decimal places 5 (0149)

Prerequisite A measured value is specified in the **Value 5 display** parameter (→ 28).

Description Use this function to select the number of decimal places for measured value 5.

Selection

- x
- x.x
- x.xx
- x.xxx
- x.xxxx
- x.xxxxx
- x.xxxxxx

Factory setting x.xx

Additional information

Description

This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 6 display

Navigation Setup → Advanced setup → Display → Value 6 display (0146)

Prerequisite A local display is provided.

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

Selection For the picklist, see the **Value 1 display** parameter (→ 21)

Factory setting None

Additional information *Description*

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

The **Format display** parameter (→ 19) 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 (→ 73).

Decimal places 6

Navigation Setup → Advanced setup → Display → Decimal places 6 (0150)

Prerequisite A measured value is specified in the **Value 6 display** parameter (→ 29).

Description Use this function to select the number of decimal places for measured value 6.

Selection
- x
- x.x
- x.xx
- x.xxx
- x.xxxx
- x.xxxxx
- x.xxxxxx

Factory setting x.xx

Additional information *Description*

This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 7 display

Navigation Setup → Advanced setup → Display → Value 7 display (0147)

Prerequisite A local display is provided.

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

Selection For the picklist, see the **Value 1 display** parameter (→ 21)

Factory setting None

Additional information *Description*

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

The **Format display** parameter (→ 19) 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 (→ 73).

0% bargraph value 7

Navigation Setup → Advanced setup → Display → 0% bargraph 7 (0154)

Prerequisite An option was selected in the **Value 7 display** parameter (→ 30).

Description Use this function to enter the 0% bar graph value to be shown on the display for the measured value 7.

User entry Signed floating-point number

Factory setting Depends on country:
- 0 kg/h
- 0 lb/min

Additional information *Description*

The **Format display** parameter (→ 19) 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 (→ 73).

100% bargraph value 7

Navigation Setup → Advanced setup → Display → 100% bargraph 7 (0156)

Prerequisite An option was selected in the **Value 7 display** parameter (→ 30).

Description Use this function to enter the 100% bar graph value to be shown on the display for the measured value 7.

User entry Signed floating-point number

Factory setting 0

Additional information *Description*

The **Format display** parameter (→ 19) 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 (→ 73).

Decimal places 7

Navigation Setup → Advanced setup → Display → Decimal places 7 (0151)

Prerequisite A measured value is specified in the **Value 7 display** parameter (→ 30).

Description Use this function to select the number of decimal places for measured value 7.

Selection
- x
- x.x
- x.xx
- x.xxx
- x.xxxx
- x.xxxxx
- x.xxxxxx

Factory setting x.xx

Additional information *Description*

This setting does not affect the accuracy of the device for measuring or calculating the value.

Value 8 display

Navigation Setup → Advanced setup → Display → Value 8 display (0148)

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 (→ 21)

Factory setting None

Additional information

Description

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

The **Format display** parameter (→ 19) 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 (→ 73).

Decimal places 8

Navigation Setup → Advanced setup → Display → Decimal places 8 (0152)

Prerequisite A measured value is specified in the **Value 8 display** parameter (→ 32).

Description Use this function to select the number of decimal places for measured value 8.

Selection

- x
- x.x
- x.xx
- x.xxx
- x.xxxx
- x.xxxxx
- x.xxxxxx

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 (0096)

Setup → Advanced setup → Display → Display interval (0096)

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 (→ 21)...**Value 8 display** parameter (→ 32) 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 (→ 19).

Display damping

Navigation
Expert → System → Display → Display damping (0094)
Setup → Advanced setup → Display → Display damping (0094)

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 0.0 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 (0097)
Setup → Advanced setup → Display → Header (0097)

Prerequisite A local display is provided.

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

Selection
- Device tag
- Free text

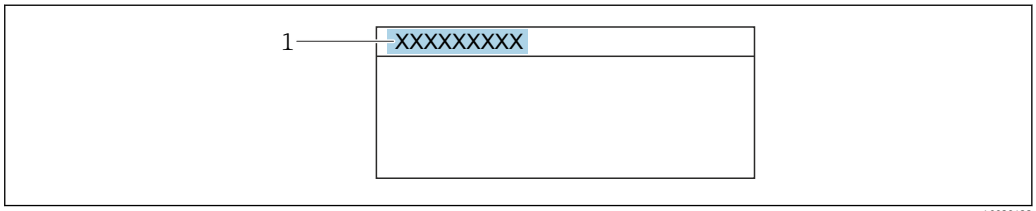
Factory setting Device tag

1) proportional transmission behavior with first order delay

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 (→ 35).

Header text

Navigation

Expert → System → Display → Header text (0112)
Setup → Advanced setup → Display → Header text (0112)

Prerequisite

The **Free text** option is selected in the **Header** parameter (→ 34).

Description

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

User entry

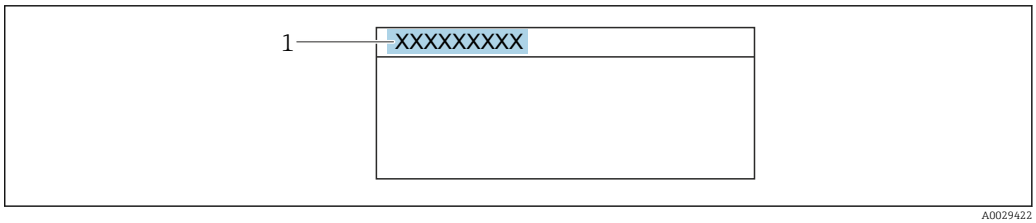
Max. 12 characters, such as letters, numbers or special characters (e.g. @, %, /)

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 (0101)
Setup → Advanced setup → Display → Separator (0101)

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 (0105)

Prerequisite
A local display is provided.

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

User entry
20 to 80 %

Factory setting
Depends on the display

Backlight

Navigation
Expert → System → Display → Backlight (0111)
Setup → Advanced setup → Display → Backlight (0111)

Prerequisite
One of the following conditions is met:
- Order code for "Display; operation", option **F** "4-line, illum.; touch control"
- Order code for "Display; operation", option **G** "4-line, illum.; touch control +WLAN"
- Order code for "Display; operation", option **O** "Remote display 4-line illuminated; 10m/ 30ft cable; touch control"

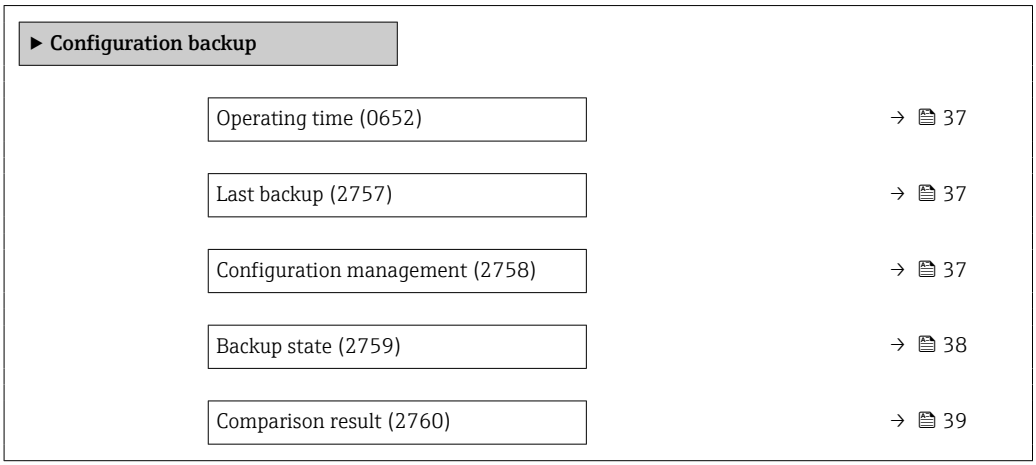
Description
Use this function to switch the backlight of the local display on and off.

Selection
- Disable
- Enable

Factory setting
Enable

3.1.2 "Configuration backup" submenu

Navigation Expert → System → Config. backup



Operating time

Navigation Expert → System → Config. backup → Operating time (0652)

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.

Last backup

Navigation Expert → System → Config. backup → Last backup (2757)

Description Displays the time since a backup copy of the data was last saved to the device memory.

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

Configuration management

Navigation Expert → System → Config. backup → Config. managem. (2758)

Description Use this function to select an action to save the data to the device memory.

Selection
- Cancel
- Execute backup
- Restore *
- Compare *
- Clear backup data

Factory setting
Cancel

Additional information
Selection

Options	Description
Cancel	No action is executed and the user exits the parameter.
Execute backup	A backup copy of the current device configuration is saved from the HistoROM backup to the memory of the device. The backup copy includes the transmitter data of the device. The following message appears on local display: Backup active, please wait!
Restore	The last backup copy of the device configuration is restored from the device memory to the device's HistoROM backup. The backup copy includes the transmitter data of the device. The following message appears on local display: Restore active! Do not interrupt power supply!
Compare	The device configuration saved in the device memory is compared with the current device configuration of the HistoROM backup. The following message appears on local display: Comparing files The result can be viewed in **Comparison result** parameter.
Clear backup data	The backup copy of the device configuration is deleted from the memory of the device. The following message appears on local display: Deleting file

HistoROM

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

Backup state

Navigation
Expert → System → Config. backup → Backup state (2759)

Description
Displays the status of the data backup process.

User interface
- None
- Backup in progress
- Restoring in progress
- Delete in progress
- Compare in progress
- Restoring failed
- Backup failed

Factory setting
None

* Visibility depends on order options or device settings

Comparison result

Navigation Expert → System → Config. backup → Compar. result (2760)

Description Displays the last result of the comparison of the data records in the device memory and in the HistoROM.

User interface
- Settings identical
- Settings not identical
- No backup available
- Backup settings corrupt
- Check not done
- Dataset incompatible

Factory setting Check not done

Additional information

Description

The comparison is started via the **Compare** option in the **Configuration management** parameter (→ 37).

Selection

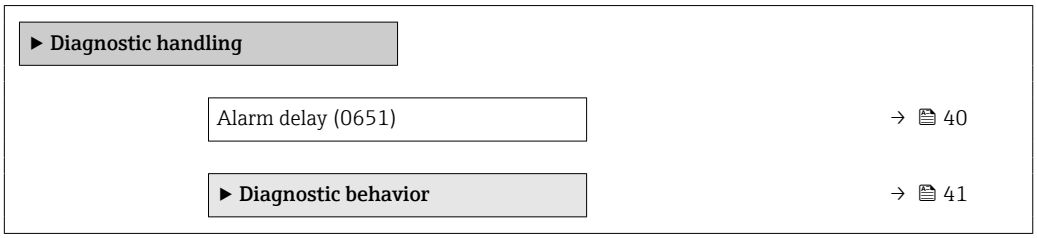
Options	Description
Settings identical	The current device configuration of the HistoROM is identical to the backup copy in the device memory. If the transmitter configuration of another device has been transmitted to the device via HistoROM in the **Configuration management** parameter, the current device configuration of the HistoROM is only partially identical to the backup copy in the device memory: The settings for the transmitter are not identical.
Settings not identical	The current device configuration of the HistoROM is not identical to the backup copy in the device memory.
No backup available	There is no backup copy of the device configuration of the HistoROM in the device memory.
Backup settings corrupt	The current device configuration of the HistoROM is corrupt or not compatible with the backup copy in the device memory.
Check not done	The device configuration of the HistoROM has not yet been compared to the backup copy in the device memory.
Dataset incompatible	The backup copy in the device memory is not compatible with the device.

HistoROM

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

3.1.3 "Diagnostic handling" submenu

Navigation Expert → System → Diagn. handling



Alarm delay

Navigation Expert → System → Diagn. handling → Alarm delay (0651)

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

The diagnostic message is reset without a time delay.

User entry 0 to 60 s

Factory setting 0 s

Additional information *Effect*

This setting affects the following diagnostic messages:
- 046 Sensor limit exceeded
- 140 Sensor signal asymmetrical
- 142 Sensor index coil asymmetry too high
- 311 Sensor electronics (ISEM) faulty
- 599 Custody transfer logbook full
- 830 Sensor temperature too high
- 831 Sensor temperature too low
- 832 Electronics temperature too high
- 833 Electronics temperature too low
- 834 Process temperature too high
- 835 Process temperature too low
- 843 Process limit
- 862 Partly filled pipe
- 912 Medium inhomogeneous
- 913 Medium unsuitable
- 944 Monitoring failed
- 984 Condensation risk

"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 (→ 41).

For a list of all the diagnostic events, see the Operating Instructions for the device → 7

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

Assign behavior of diagnostic no. 140 (Sensor signal asymmetrical)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 140 (0708)

Description Use this function to change the diagnostic behavior of the **140 Sensor signal asymmetrical** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 046 (Sensor limit exceeded)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 046 (0709)

Description Use this function to change the diagnostic behavior of the **046 Sensor limit exceeded** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 142 (Sensor index coil asymmetry too high)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 142 (0778)

Description Change behavior of diagnostic event with diagnostic number 142 'Sensor index coil asymmetry too high'.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Logbook entry only

Assign behavior of diagnostic no. 144 (Measurement error too high)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 144 (0731)

Description Change behavior of diagnostic event with diagnostic number 144 'Measurement error too high'.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 374 (Sensor electronics (ISEM) faulty)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 374 (0710)

Description Use this function to change the diagnostic behavior of the **374 Sensor electronics (ISEM) faulty** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 302 (0739)

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

Selection
- Off
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 304

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 304 (0635)

Description Change behavior of diagnostic event with diagnostic number 304 'Device verification failed'.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

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 For a detailed description of the options available:

Assign behavior of diagnostic no. 442 (Frequency output 1 to n)

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 1 to n** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 443 (Pulse output 1 to n)

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 1 to n** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 444 (0740)

Prerequisite The device has one current input.

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 599 (Custody transfer logbook full)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 599 (0644)

Description Use this function to select the diagnostic behavior of the ⚠**S599 Custody transfer logbook full** diagnostic message

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Assign behavior of diagnostic no. 830 (Sensor temperature too high)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 830 (0800)

Description Use this function to change the diagnostic behavior of the **830 Sensor temperature too high** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 831 (Sensor temperature too low)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 831 (0641)

Description Use this function to change the diagnostic behavior of the **831 Sensor temperature too low** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information 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 (0681)

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 Logbook entry only

Additional information 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 (0682)

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 Logbook entry only

Additional information 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 (0700)

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 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 (0702)

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 For a detailed description of the options available:

Assign behavior of diagnostic no. 842 (Process limit)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 842 (0638)

Description Use this function to change the diagnostic behavior of the **842 Process limit** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Off

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 862 (Empty pipe)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 862 (0679)

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 912 (Medium inhomogeneous)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 912 (0703)

Description Use this function to change the diagnostic behavior of the **912 Medium inhomogeneous** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 913 (Medium unsuitable)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 913 (0712)

Description Use this function to change the diagnostic behavior of the **913 Medium unsuitable** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 915 (Viscosity ouf of specification)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 915 (0779)

Description Change behavior of diagnostic event with diagnostic number 915 'Viscosity ouf of specification'.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Logbook entry only

Assign behavior of diagnostic no. 941 (API/ASTM temperature outside specification)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 941 (0632)

Prerequisite For the following order code:
"Application package", option EJ "Petroleum"

Description Use this function to change the diagnostic behavior of the diagnostic message 'API/ASTM temperature outside specification' .

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 942 (API/ASTM density out of specification)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 942 (0633)

Prerequisite For the following order code:
"Application package", option EJ "Petroleum"

Description Use this function to change the diagnostic behavior of 'API/ASTM temperature outside specification'.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 943 (API/ASTM pressure outside specification)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 943 (0634)

Prerequisite For the following order code:
"Application package", option EJ "Petroleum"

Description Use this function to change the diagnostic behavior of 'API/ASTM pressure outside specification'.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 944 (Monitoring failed)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 944 (0732)

Description Use this function to change the diagnostic behavior of the **944 Monitoring failed** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 948 (Oscillation damping too high)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 948 (0744)

Description Use this function to change the diagnostic behavior of the **948 Oscillation damping too high** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available:

Assign behavior of diagnostic no. 984 (Condensation risk)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 984 (0649)

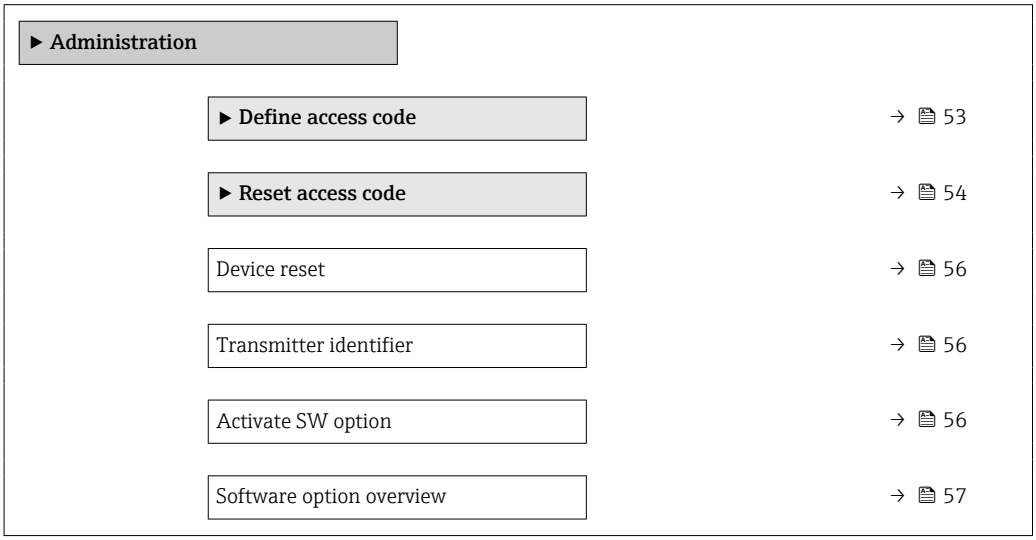
Description Change behavior of diagnostic event with diagnostic number 984 'Condensation risk'.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

3.1.4 "Administration" submenu

Navigation Expert → System → Administration

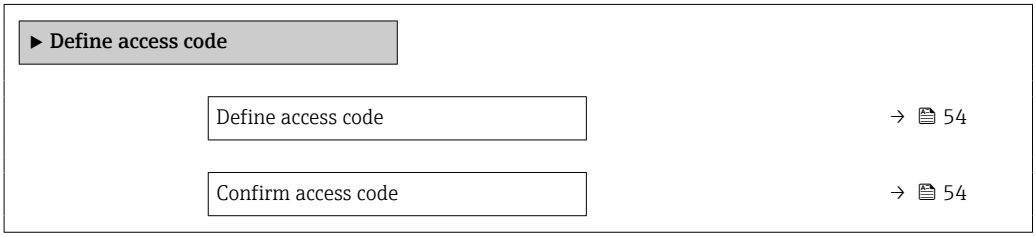


"Define access code" wizard

The **Define access code** wizard (→ 53) is only available when operating via the local display or Web browser.

If operating via the operating tool, the **Define access code** parameter 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 device configuration against any inadvertent modifications via the local display, Web browser, FieldCare or DeviceCare (via CDI-RJ45 service interface).

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

Additional information

Description

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

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

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

Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the **Enter access code** parameter (→ 13).

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

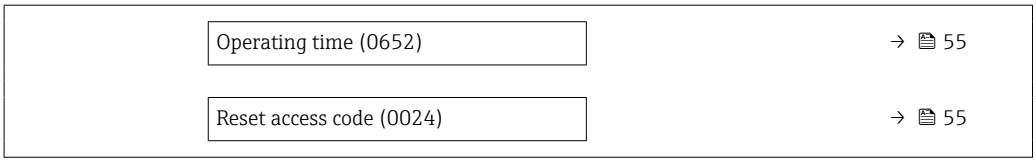
Description Enter the defined release code a second time to confirm the release code.

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

"Reset access code" submenu

Navigation Expert → System → Administration → Reset acc. code

▶ Reset access code



Operating time

Navigation Expert → System → Administration → Reset acc. code → Operating time (0652)

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.

Reset access code

Navigation Expert → System → Administration → Reset acc. code → Reset acc. code (0024)

Description Use this function to enter a reset code to reset the user-specific access codes to the factory setting .

User entry Character string comprising numbers, letters and special characters

Factory setting 0x00

Additional information *Description*

For a reset code, contact your Endress+Hauser service organization.

User entry

The reset code can only be entered via:
- Web browser
- DeviceCare, FieldCare (via CDI RJ45 interface)
- Fieldbus

Additional parameters in the "Administration" submenu

Device reset

Navigation Expert → System → Administration → Device reset (0000)

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

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

Factory setting Cancel

Additional information *Options*

Options	Description
Cancel	No action is executed and the user exits the parameter.
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.
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.

Transmitter identifier

Navigation Expert → System → Administration → Transm. identif. (2765)

Description Select transmitter identifier.

User interface
- Unknown
- 500
- 300

Factory setting Unknown

Activate SW option

Navigation Expert → System → Administration → Activate SW opt. (0029)

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

* Visibility depends on order options or device settings

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.

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 .

▸ 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 (→ 57).

↳ 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 .

▸ 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 (→ 57).

Web browser

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

Software option overview

Navigation Expert → System → Administration → SW option overv. (0015)

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

User interface

- Extended HistoROM *
- Viscosity/Hydrocarbon viscosity monitor.
- Application specific calculations

* Visibility depends on order options or device settings

- Heartbeat Monitoring *
- Heartbeat Verification *
- Concentration *
- Extended density function

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"

"Heartbeat Verification" option and "Heartbeat Monitoring" option

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

"Concentration" option

Order code for "Application package", option ED "Concentration"

"Extended density function" option

Only available for Promass Q DN25 to DN100.

Order code for "Application package", option EH "Extended density function"

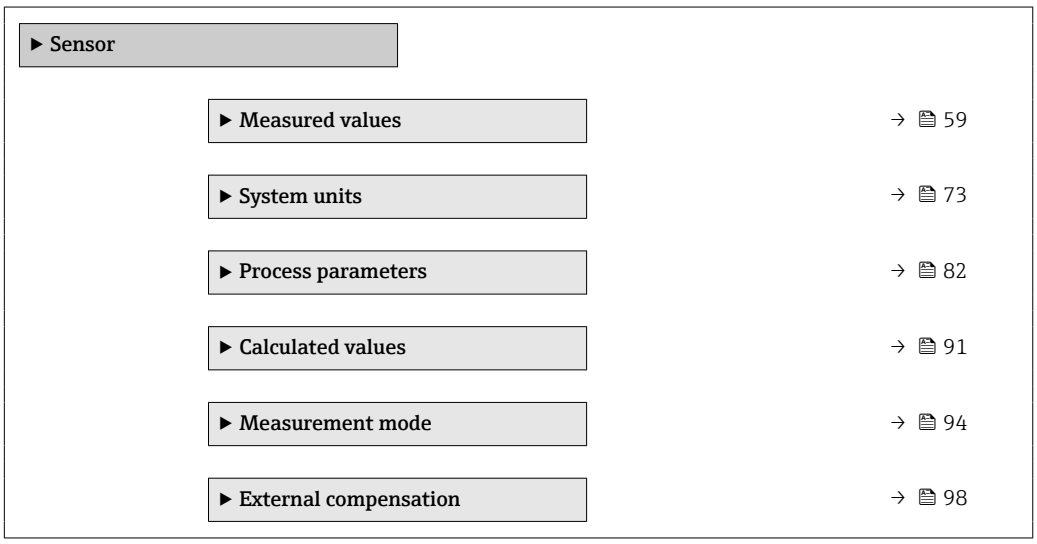
Option "Premium density + Extended density function"

Only available for Promass Q DN25.

Order code for "Application package", option EI "Premium density, ±0.1 kg/m^3 + Extended density function"

3.2 "Sensor" submenu

Navigation Expert → Sensor



* Visibility depends on order options or device settings

▶ **Sensor adjustment**	→ 101
▶ **Calibration**	→ 120
▶ **Testpoints**	→ 122

3.2.1 "Measured values" submenu

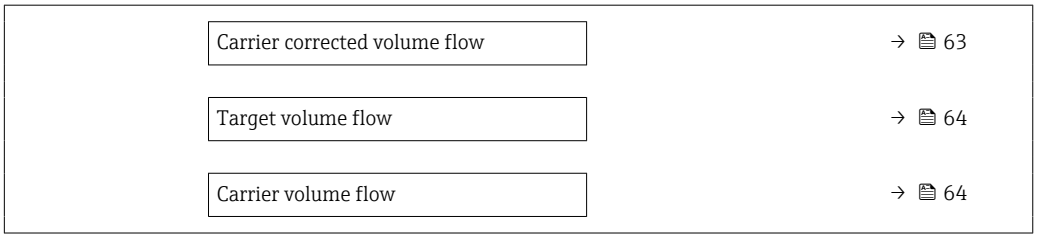
Navigation Expert → Sensor → Measured val.

▶ **Measured values**	
▶ **Process variables**	→ 59
▶ **Totalizer**	→ 66
▶ **Input values**	→ 68
▶ **Output values**	→ 69

"Process variables" submenu

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

▶ **Process variables**	
Mass flow	→ 60
Volume flow	→ 60
Corrected volume flow	→ 60
Density	→ 61
Reference density	→ 61
Temperature	→ 61
Pressure	→ 62
Concentration	→ 62
Target mass flow	→ 62
Carrier mass flow	→ 63
Target corrected volume flow	→ 63



Mass flow

Navigation Expert → Sensor → Measured val. → Process variab. → Mass flow (1838)

Description Displays the mass flow that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Mass flow unit** parameter (→ 73)

Volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → Volume flow (1847)

Description Displays the volume flow that is currently calculated.

User interface Signed floating-point number

Additional information *Description*

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

Dependency

The unit is taken from the **Volume flow unit** parameter (→ 75)

Corrected volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → CorrecVolumeFlow (1851)

Description Displays the corrected volume flow that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Corrected volume flow unit** parameter (→ 77)

Density

Navigation Expert → Sensor → Measured val. → Process variab. → Density (1850)

Description Displays the density that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Density unit** parameter (→ 78)

Reference density

Navigation Expert → Sensor → Measured val. → Process variab. → Ref.density (1852)

Description Displays the reference density that is currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Reference density unit** parameter (→ 79)

Temperature

Navigation Expert → Sensor → Measured val. → Process variab. → Temperature (1853)

Description Displays the medium temperature that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 81)

Pressure

Navigation Expert → Sensor → Measured val. → Process variab. → Pressure (6129)

Description Displays the fixed or external pressure value.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Pressure unit** parameter (→ 81)

Concentration

Navigation Expert → Sensor → Measured val. → Process variab. → Concentration (1887)

Prerequisite For the following order code:
Order code for "Application package", option **ED** "Concentration"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

Description Displays the concentration that is currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Concentration unit** parameter (0613) (→ 220).

Target mass flow

Navigation Expert → Sensor → Measured val. → Process variab. → Target mass flow (1864)

Prerequisite With the following conditions:
Order code for "Application package", option **ED** "Concentration"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

Description Displays the mass flow that is currently measured for the target medium.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Mass flow unit** parameter (→ 73)

Carrier mass flow

Navigation Expert → Sensor → Measured val. → Process variab. → Carrier mass fl. (1865)

Prerequisite With the following conditions:
Order code for "Application package", option **ED** "Concentration"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

Description Displays the mass flow of the carrier medium that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Mass flow unit** parameter (→ 73)

Target corrected volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → Targ.corr.vol.fl (1893)

Prerequisite With the following conditions:
- Order code for "Application package", option **ED** "Concentration"
- The **Ethanol in water** option or **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

Description Displays the corrected volume flow that is currently measured for the target fluid.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 75)

Carrier corrected volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → Carr.corr.vol.fl (1894)

Prerequisite With the following conditions:
- Order code for "Application package", option **ED** "Concentration"
- In the **Liquid type** parameter (→ 215), the **Ethanol in water** option or **%mass / %volume** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

Description Displays the corrected volume flow currently measured for the carrier fluid.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 75)

Target volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → Target vol. flow (1895)

Prerequisite With the following conditions:
- Order code for "Application package", option **ED** "Concentration"
- The **Ethanol in water** option or **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).
- The **%vol** option is selected in the **Concentration unit** parameter (→ 220).

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

Description Displays the volume flow currently measured for the target medium.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 75)

Carrier volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → Carrier vol. fl. (1896)

Prerequisite With the following conditions:
- Order code for "Application package", option **ED** "Concentration"
- The **Ethanol in water** option or **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).
- The **%vol** option is selected in the **Concentration unit** parameter (→ 220).

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

Description Use this function to display the volume flow currently measured for the carrier medium.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 75)

CTPL alternative

Navigation Expert → Sensor → Measured val. → Process variab. → CTPL alternative (4173)

Prerequisite

For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter (→ 228), the **API referenced correction** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

Description

Displays the combined correction factor which represents the effect of temperature and pressure on the fluid. This is used to convert the measured volume flow and the measured density to values at the alternative reference temperature and the alternative reference pressure.

User interface

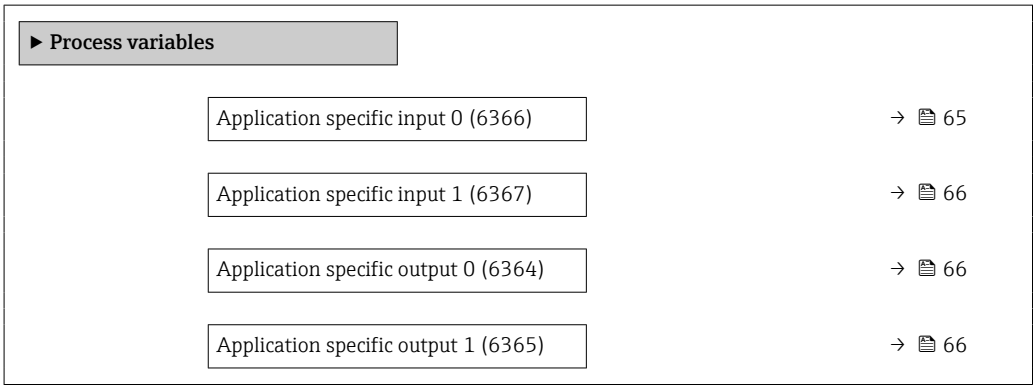
Positive floating-point number

Factory setting

1

"Process variables" submenu

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



Application specific input 0

Navigation Expert → Sensor → Measured val. → Process variab. → Process variab. → Spec. input 0 (6366)

Description

Shows the application specific input value 0 used for the application specific calculation.

User interface

Signed floating-point number

Factory setting

0

Application specific input 1

Navigation Expert → Sensor → Measured val. → Process variab. → Process variab. → Spec. input 1 (6367)

Description Shows the application specific input value 1 used for the application specific calculation.

User interface Signed floating-point number

Factory setting 0

Application specific output 0

Navigation Expert → Sensor → Measured val. → Process variab. → Process variab. → Spec. output 0 (6364)

Description Shows the calculated application specific output value 0.

User interface Signed floating-point number

Factory setting 0

Application specific output 1

Navigation Expert → Sensor → Measured val. → Process variab. → Process variab. → Spec. output 1 (6365)

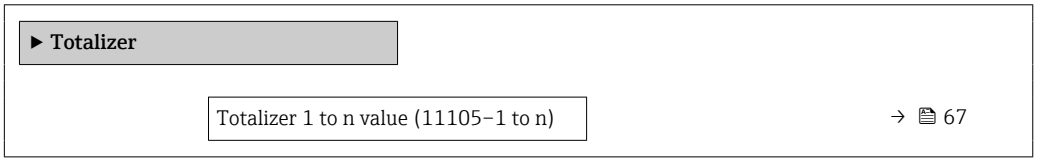
Description Shows the calculated specific output value 1.

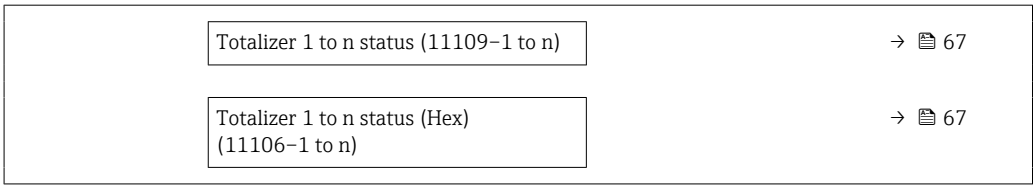
User interface Signed floating-point number

Factory setting 0

"Totalizer" submenu

Navigation Expert → Sensor → Measured val. → Totalizer





Totalizer 1 to n value

Navigation Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n value (11105–1 to n)

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

User interface Signed floating-point number

Factory setting 0 kg

Totalizer 1 to n status

Navigation Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n status (11109–1 to n)

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) (11106–1 to n)

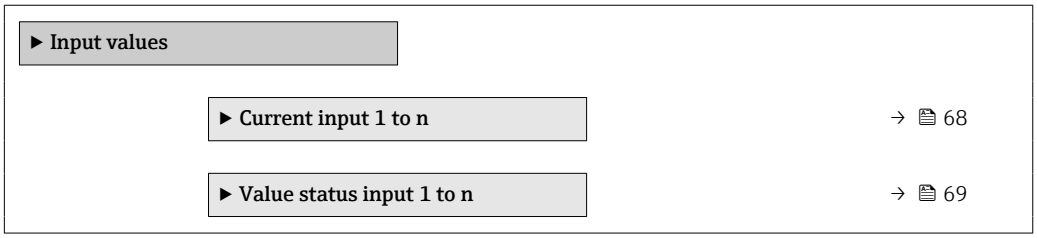
Description Shows the status of the totalizer value reported to the controller for further processing (Hex).

User interface 0 to 255

Factory setting 128

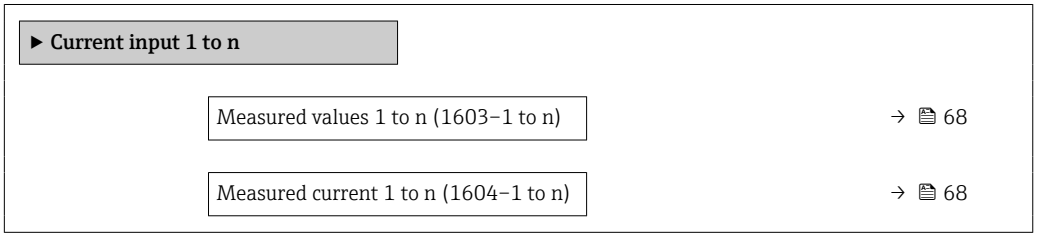
"Input values" submenu

Navigation Expert → Sensor → Measured val. → Input values



"Current input 1 to n" submenu

Navigation Expert → Sensor → Measured val. → Input values → Current input 1 to n



Measured values 1 to n

Navigation Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measured val. 1 to n (1603–1 to n)

Description Displays the current input value.

User interface Signed floating-point number

Measured current 1 to n

Navigation Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measur. curr. 1 to n (1604–1 to n)

Description Displays the current value of the current input.

User interface 0 to 22.5 mA

"Value status input 1 to n" submenu

Navigation Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n

▶ **Value status input 1 to n**		
	Value status input (1353–1 to n)	→ 69

Value status input

Navigation Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n → Val.stat.inp. (1353–1 to n)

Description Displays the current input signal level.

User interface
- High
- Low

"Output values" submenu

Navigation Expert → Sensor → Measured val. → Output values

▶ **Output values**		
	▶ **Value current output 1 to n**	→ 69
	▶ **Pulse/frequency/switch output 1 to n**	→ 70
	▶ **Relay output 1 to n**	→ 72

"Value current output 1 to n" submenu

Navigation Expert → Sensor → Measured val. → Output values → Val. curr.outp 1 to n

▶ **Value current output 1 to n**		
	Output current (0361–1 to n)	→ 70
	Measured current (0366–1 to n)	→ 70

Output current

Navigation Expert → Sensor → Measured val. → Output values → Val. curr.outp 1 to n → Output curr. (0361–1 to n)

Description Displays the current value currently calculated for the current output.

User interface 0 to 22.5 mA

Measured current

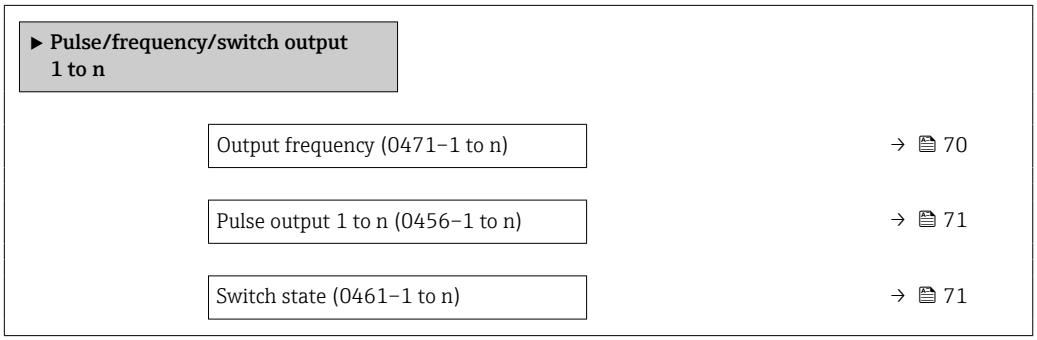
Navigation Expert → Sensor → Measured val. → Output values → Val. curr.outp 1 to n → Measur. curr. (0366–1 to n)

Description Displays the actual measured value of the output current.

User interface 0 to 30 mA

"Pulse/frequency/switch output 1 to n" submenu

Navigation Expert → Sensor → Measured val. → Output values → PFS output 1 to n



Output frequency

Navigation Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Output freq. (0471–1 to n)

Prerequisite In the **Operating mode** parameter (→ 153), the **Frequency** option is selected.

Description Displays the actual value of the output frequency which is currently measured.

User interface 0.0 to 12 500.0 Hz

Pulse output 1 to n

Navigation Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Pulse output 1 to n (0456–1 to n)

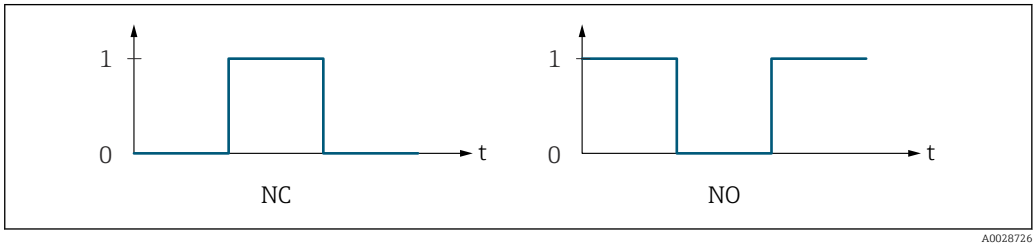
Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 153) parameter.

Description Displays the pulse frequency currently output.

User interface Positive floating-point number

Additional information *Description*

- The pulse output is an open collector output.
- This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented.



0 Non-conductive
1 Conductive
NC NC contact (normally closed)
NO NO contact (normally open)

The output behavior can be reversed via the **Invert output signal** parameter (→ 172) i.e. the transistor does not conduct for the duration of the pulse.

In addition, the behavior of the output in the event of a device alarm (**Failure mode** parameter (→ 157)) can be configured.

Switch state

Navigation Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Switch state (0461–1 to n)

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 153).

Description Displays the current switch status of the status output.

User interface

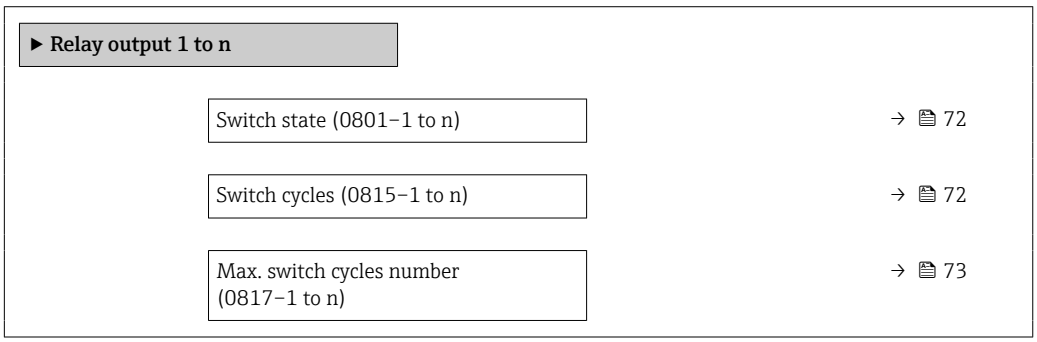
- Open
- Closed

Additional information *User interface*

- Open
  The switch output is not conductive.
- Closed
  The switch output is conductive.

"Relay output 1 to n" submenu

Navigation Expert → Sensor → Measured val. → Output values → Relay output 1 to n



Switch state

Navigation Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Switch state (0801–1 to n)

Description Displays the current status of the relay output.

User interface

- Open
- Closed

Additional information *User interface*

- Open
  The relay output is not conductive.
- Closed
  The relay output is conductive.

Switch cycles

Navigation Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Switch cycles (0815–1 to n)

Description Displays all the switch cycles performed.

User interface Positive integer

Max. switch cycles number

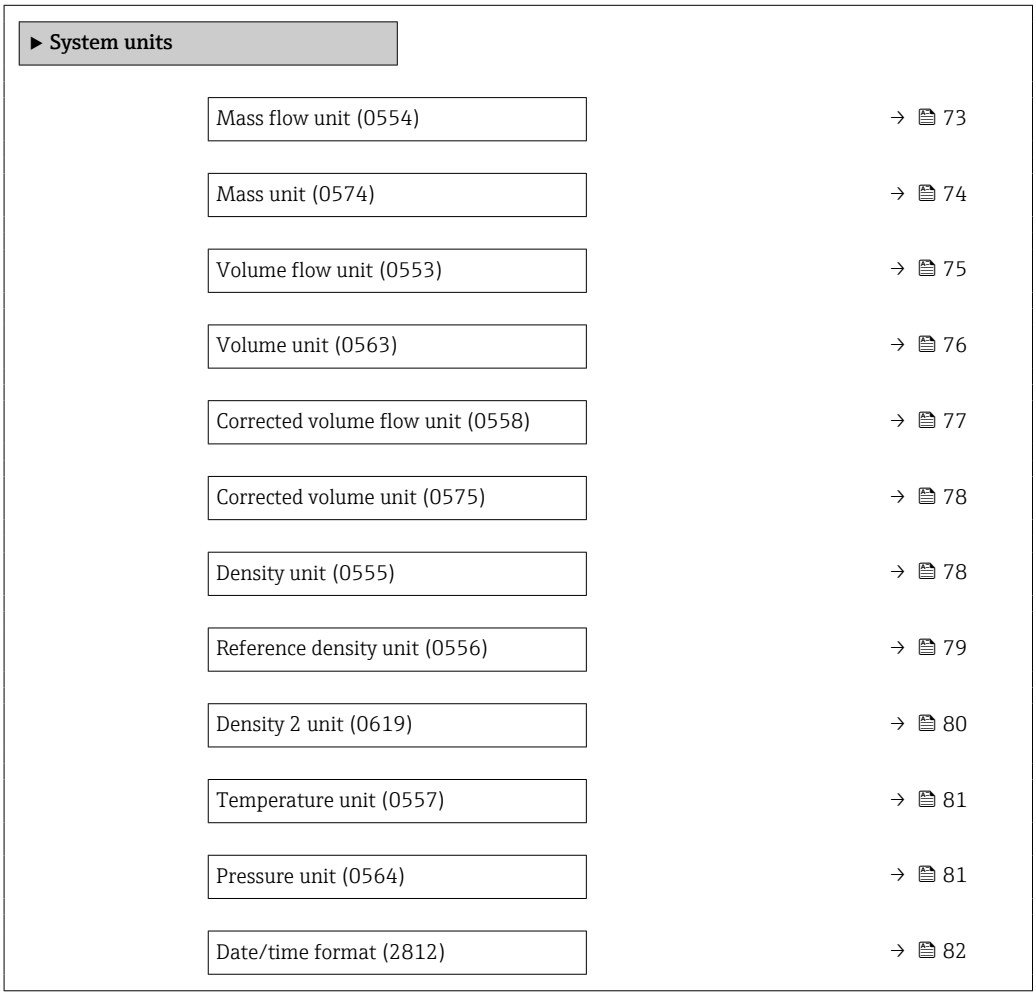
Navigation Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Max. cycles no. (0817–1 to n)

Description Displays the maximum number of guaranteed switch cycles.

User interface Positive integer

3.2.2 "System units" submenu

Navigation Expert → Sensor → System units



Mass flow unit

Navigation Expert → Sensor → System units → Mass flow unit (0554)

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:
- **Target mass flow** parameter (→ 62)
- **Carrier mass flow** parameter (→ 63)
- **Mass flow** parameter (→ 60)

Selection

For an explanation of the abbreviated units: → 331

Mass unit

Navigation

Expert → Sensor → System units → Mass unit (0574)

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: → 331

Volume flow unit

Navigation Expert → Sensor → System units → Volume flow unit (0553)

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;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;oil)
- bbl/min (imp;oil)
- bbl/h (imp;oil)
- bbl/d (imp;oil)

or

US units
- 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) *

Imperial units
- bbl/s (imp;beer) *
- bbl/min (imp;beer) *
- bbl/h (imp;beer) *
- bbl/d (imp;beer) *

* Visibility depends on order options or device settings

Factory setting

Depends on country:
- l/h
- gal/min (us)

Additional information

Effect

The selected unit applies for:
Volume flow parameter (→ 60)

Selection

For an explanation of the abbreviated units: → 331

Volume unit

Navigation

Expert → Sensor → System units → Volume unit (0563)

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;tank)

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

or

US units
- bbl (us;liq.) *
- bbl (us;beer) *

Imperial units
bbl (imp;beer) *

* Visibility depends on order options or device settings

Factory setting

Country-specific:
- l
- gal (us)

Additional information *Selection*

For an explanation of the abbreviated units: → 331

Corrected volume flow unit

Navigation Expert → Sensor → System units → Cor.volflow unit (0558)

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
- $MSft^3/s$
- $MSft^3/min$
- $MSft^3/h$
- $MSft^3/D$
- $MMSft^3/s$
- $MMSft^3/min$
- $MMSft^3/h$
- $MMSft^3/d$
- Sgal/s (us)
- Sgal/min (us)
- Sgal/h (us)
- Sgal/d (us)
- Sbbl/s (us;liq.)
- Sbbl/min (us;liq.)
- Sbbl/h (us;liq.)
- Sbbl/d (us;liq.)
- Sbbl/s (us;oil)
- Sbbl/min (us;oil)
- Sbbl/h (us;oil)
- Sbbl/d (us;oil)

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

Factory setting Country-specific:
- Nl/h
- Sft^3/min

Additional information *Result*

The selected unit applies for:
Corrected volume flow parameter (→ 60)

Selection

For an explanation of the abbreviated units: → 331

Corrected volume unit

Navigation Expert → Sensor → System units → Corr. vol. unit (0575)

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
- $MSft^3$
- $MMSft^3$
- Sgal (us)
- Sbbl (us;liq.)
- Sbbl (us;oil)

Imperial units
Sgal (imp)

Factory setting Country-specific:
- Nl
- Sft^3

Additional information *Selection*

For an explanation of the abbreviated units: → 331

Density unit

Navigation Expert → Sensor → System units → Density unit (0555)

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

Selection

SI units
- g/cm^3
- g/m^3
- g/ml
- g/l
- kg/l
- kg/dm^3
- kg/m^3
- SG4°C
- SG15°C
- SG20°C

US units
- lb/ft^3
- lb/gal (us)
- lb/bbl (us;oil)
- lb/bbl (us;tank)
- lb/in^3
- $STon/yd^3$

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

Other units
°API

or

US units
SG60°F *

* Visibility depends on order options or device settings

or

US units	*Imperial units*
▪ lb/bbl (us;liq.) *	lb/bbl (imp;beer) *
▪ lb/bbl (us;beer) *	

* Visibility depends on order options or device settings

Factory setting

Country-specific:
- kg/l
- lb/ft³

Additional information

Effect

The selected unit applies for:
- **Density setpoint 1** parameter (→ 110)
- **Density setpoint 2** parameter (→ 111)
- **Density** parameter (→ 61)

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: → 331

Reference density unit

Navigation

Expert → Sensor → System units → Ref. dens. unit (0556)

Description

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

Selection

SI units	*US units*	*Other units*
▪ kg/Nm³	▪ lb/Sft³	°APIbase
▪ kg/Nl	▪ RD60°F	
▪ g/Scm³		
▪ kg/Sm³		
▪ RD15°C		
▪ RD20°C		

Factory setting

Country-dependent
- kg/Nl
- lb/Sft³

Additional information

Result

The selected unit applies for:
- **External reference density** parameter (→ 92)
- **Fixed reference density** parameter (→ 92)
- **Reference density** parameter (→ 61)

Selection

For an explanation of the abbreviated units: → 331

Density 2 unit

Navigation Expert → Sensor → System units → Density 2 unit (0619)

Description Select second density unit.

Selection

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

US units
- lb/ft³
- lb/gal (us)
- lb/bbl (us;oil)
- lb/bbl (us;tank)
- lb/in³
- STon/yd³

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

Other units
°API

or

US units
SG60°F *

*	Visibility depends on order options or device settings

or

US units
- lb/bbl (us;liq.) *
- lb/bbl (us;beer) *

Imperial units
lb/bbl (imp;beer) *

*	Visibility depends on order options or device settings

Factory setting Depends on country:
- kg/l
- lb/ft³

Additional information *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: → 331

Temperature unit

Navigation Expert → Sensor → System units → Temperature unit (0557)

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:
- **Maximum value** parameter (→ 272)
- **Minimum value** parameter (→ 272)
- **Maximum value** parameter (→ 275)
- **Minimum value** parameter (→ 275)
- **Maximum value** parameter (→ 276)
- **Minimum value** parameter (→ 275)
- **External temperature** parameter (→ 100)
- **Temperature** parameter (→ 61)
- **Reference temperature** parameter (→ 93)

Selection

For an explanation of the abbreviated units: → 331

Pressure unit

Navigation Expert → Sensor → System units → Pressure unit (0564)

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

Selection

SI units
- MPa a
- MPa g
- kPa a
- kPa g
- Pa a
- Pa g
- bar
- bar g

US units
- psi a
- psi g

Factory setting Country-specific:
- bar a
- psi a

Additional information *Result*

The unit is taken from:
- **Pressure value** parameter (→ 99)
- **External pressure** parameter (→ 99)
- **Pressure value** parameter (→ 62)

Selection

For an explanation of the abbreviated units: → 331

Date/time format

Navigation Expert → Sensor → System units → Date/time format (2812)

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

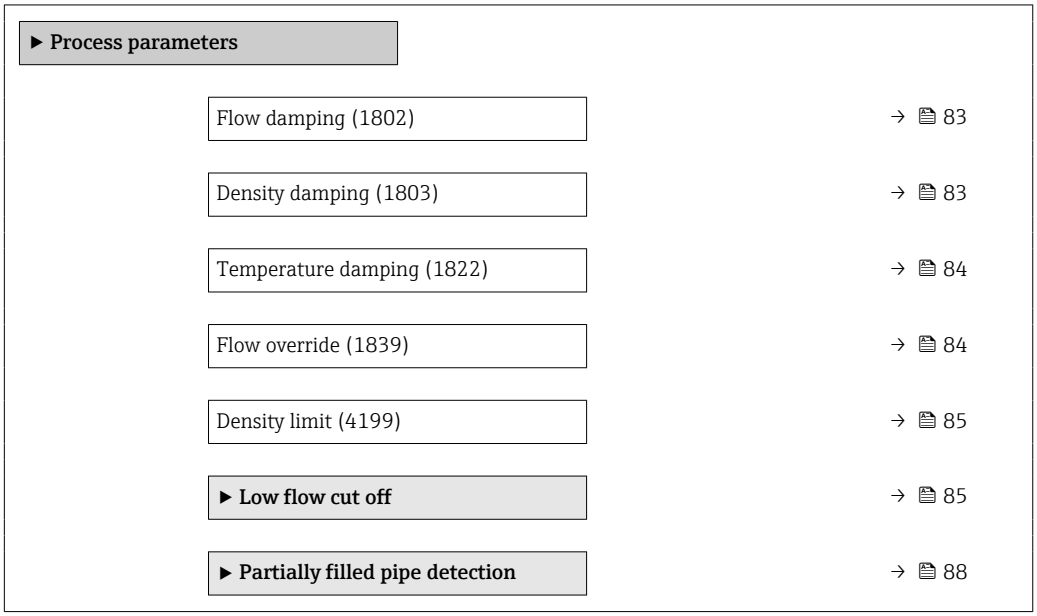
Factory setting dd.mm.yy hh:mm

Additional information *Selection*

For an explanation of the abbreviated units: → 331

3.2.3 "Process parameters" submenu

Navigation Expert → Sensor → Process param.



Flow damping

Navigation Expert → Sensor → Process param. → Flow damping (1802)

Description Use this function to enter a time constant for flow damping (PT1 element). 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 100.0 s

Factory setting 0 s

Additional information

Description

The damping is performed by a PT1 element [2].

User entry

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

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

Effect

The damping affects the following variables of the device:
- Outputs → 136
- Low flow cut off → 85
- Totalizers

Density damping

Navigation Expert → Sensor → Process param. → Density damping (1803)

Description Use this function to enter a time constant for the damping (PT1 element) of the density measured value.

User entry 0 to 999.9 s

Factory setting 0 s

2) Proportional behavior with first-order lag

Additional information

Description

The damping is performed by a PT1 element [3].

User entry

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

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

Temperature damping

Navigation Expert → Sensor → Process param. → Temp. damping (1822)

Description Use this function to enter a time constant for the damping (PT1 element) of the temperature measured value.

User entry 0 to 999.9 s

Factory setting 0 s

Additional information

Description

The damping is performed by a PT1 element [4].

User entry

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

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

Flow override

Navigation Expert → Sensor → Process param. → Flow override (1839)

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

3) Proportional behavior with first-order lag
4) Proportional behavior with first-order lag

Additional information *Description*

Flow override is active
- The **453 Flow override** diagnostic message is output.
- Output values
  - 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 (→ 135).

Density limit

Navigation Expert → Sensor → Process param. → Density limit (4199)

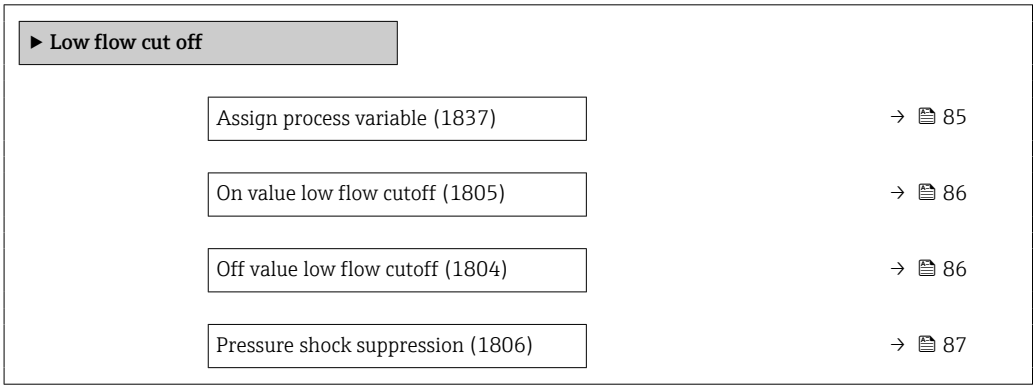
Description Enter limit value for the observed oil density. For higher °API values or lower kg/m³ values this limit value will be output.

User entry Positive floating-point number

Factory setting 0 kg/l

"Low flow cut off" submenu

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



Assign process variable

Navigation Expert → Sensor → Process param. → Low flow cut off → Assign variable (1837)

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

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

Factory setting Mass flow

On value low flow cutoff

Navigation Expert → Sensor → Process param. → Low flow cut off → On value (1805)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 85).

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 → 86.

User entry Positive floating-point number

Factory setting Depends on country and nominal diameter → 329

Additional information *Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 85).

Off value low flow cutoff

Navigation Expert → Sensor → Process param. → Low flow cut off → Off value (1804)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 85).

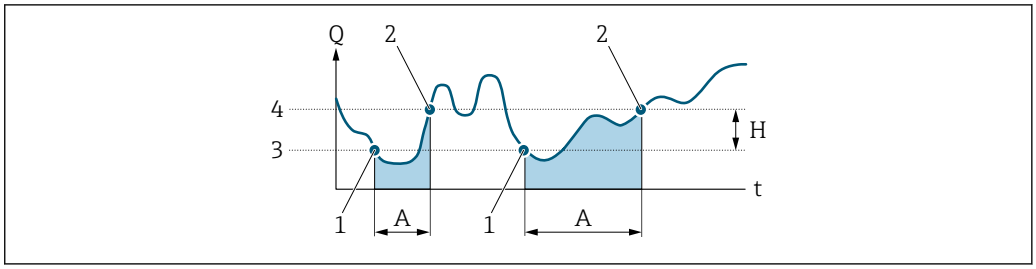
Description Use this function to enter a switch-off value for low flow cut off. The switch-off value is entered as a positive hysteresis from the switch-on value→ 86.

User entry 0 to 100.0 %

Factory setting 50 %

* Visibility depends on order options or device settings

Additional information *Example*



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

Pressure shock suppression

Navigation Expert → Sensor → Process param. → Low flow cut off → Pres. shock sup. (1806)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 85).

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

User entry 0 to 100 s

Factory setting 0 s

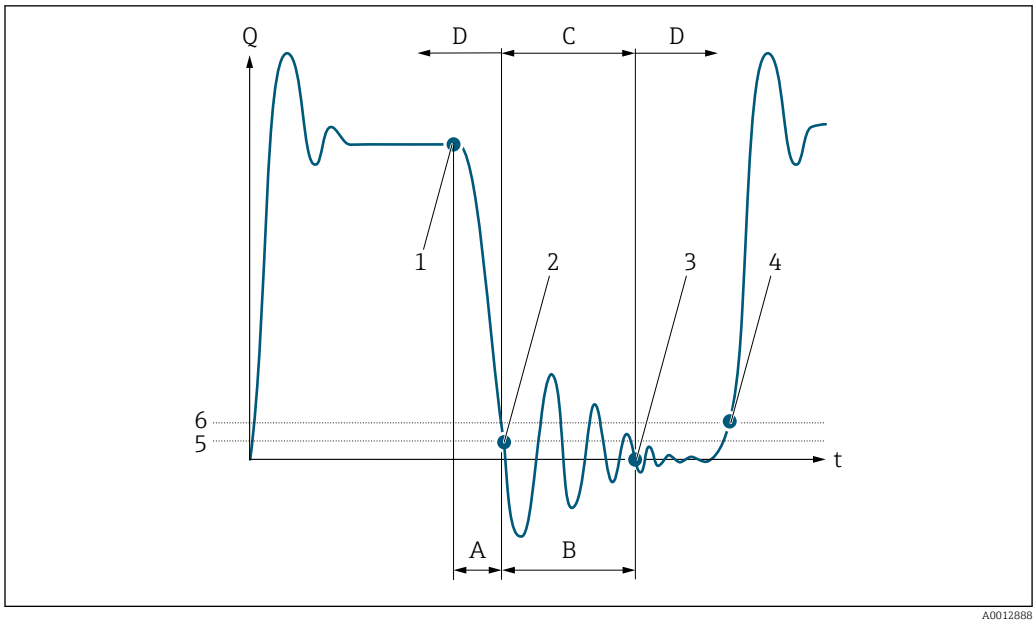
Additional information *Description*

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

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

Example

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



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

"Partially filled pipe detection" submenu

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

▶ Partially filled pipe detection	
Assign process variable (1860)	→ 89
Low value partial filled pipe detection (1861)	→ 89
High value partial filled pipe detection (1858)	→ 89
Response time part. filled pipe detect. (1859)	→ 90
Maximum damping partial filled pipe det. (6040)	→ 90

Assign process variable

Navigation Expert → Sensor → Process param. → Partial pipe det → Assign variable (1860)

Description Use this function to select a process variable to detect empty or partially filled measuring tubes.

For gas measurement: Deactivate monitoring due to low gas density.

Selection
- Off
- Density
- Calculated reference density

Factory setting Off

Low value partial filled pipe detection

Navigation Expert → Sensor → Process param. → Partial pipe det → Low value (1861)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 89).

Description Use this function to enter a lower limit value to enable detection of empty or partially filled measuring tubes. If the measured density falls below this value, monitoring is enabled.

User entry Signed floating-point number

Factory setting Depends on country:
- 200 kg/m³
- 12.5 lb/ft³

Additional information *User entry*

The lower limit value must be less than the upper limit value defined in the **High value partial filled pipe detection** parameter (→ 89).

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 89).

Limit value

If the displayed value is outside the limit value, the measuring device displays the **862 Partly filled pipe** diagnostic message.

High value partial filled pipe detection

Navigation Expert → Sensor → Process param. → Partial pipe det → High value (1858)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 89).

Description Use this function to enter an upper limit value to enable detection of empty or partially filled measuring tubes. If the measured density exceeds this value, detection is enabled.

User entry Signed floating-point number

Factory setting Depends on country:
- 6 000 kg/m³
- 374.6 lb/ft³

Additional information *User entry*

The upper limit value must be greater than the lower limit value defined in the **Low value partial filled pipe detection** parameter (→ 89).

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 89).

Limit value

If the displayed value is outside the limit value, the measuring device displays the **862 Partly filled pipe** diagnostic message.

Response time part. filled pipe detect.

Navigation Expert → Sensor → Process param. → Partial pipe det → Response time (1859)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 89).

Description Use this function to enter the minimum time (hold time) the signal must be present before diagnostic message S962 "Pipe only partly filled" is triggered in the event of a partially filled or empty measuring pipe.

User entry 0 to 100 s

Factory setting 1 s

Maximum damping partial filled pipe det.

Navigation Expert → Sensor → Process param. → Partial pipe det → Max. damping (6040)

Description Use this function to enter a damping value to enable detection of empty or partially filled measuring tubes.

User entry Positive floating-point number

Factory setting 0

Additional information *Description*

If oscillation damping exceeds the specified value, the measuring device presumes that the pipe is partially filled and the flow signal is set to **0**. The measuring device displays the

⚠**S862 Partly filled pipe** diagnostic message. In the case of non-homogeneous media or air pockets, the damping of the measuring tubes increases.

User entry

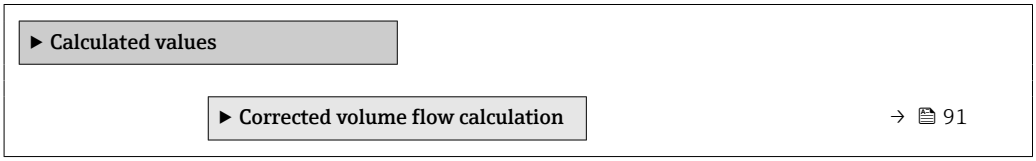
- Damping is disabled if **0** is entered (factory setting).
- Damping is enabled if the value entered is greater than **0**.
- The value entered depends on application-specific influence variables, such as the medium, nominal diameter, sensor etc.

Example

- If the pipe is filled normally the value of the oscillation damping is 500.
- If the pipe is partially filled the value of the oscillation damping is > 5000.
- A practical damping value would then be 2000: enter 2000 as the value.

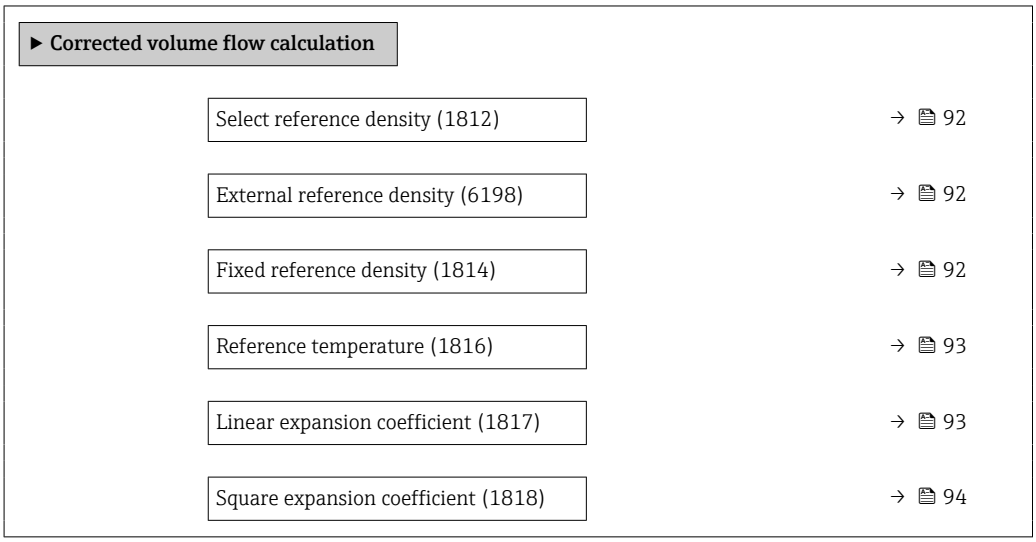
3.2.4 "Calculated values" submenu

Navigation Expert → Sensor → Calculated value



"Corrected volume flow calculation" submenu

Navigation Expert → Sensor → Calculated value → Corr. vol.flow.



Select reference density

Navigation Expert → Sensor → Calculated value → Corr. vol.flow. → Select ref. dens (1812)

Description Use this function to select the reference density for calculating the corrected volume flow.

Selection
- Fixed reference density
- Calculated reference density
- External reference density
- Current input 1 *
- Current input 2 *

Factory setting Calculated reference density

Additional information *Selection*

The **Reference density by API table 53** option is suitable only for applications involving LPG [5], where the flow rate is measured on the basis of the corrected volume flow.

Selecting this option means that the reference density is used, taking into account the values in table 53 E of API MPMS section 11.2. Temperature measurement (measured internally or read into the device from an external source→ 98→ 98) and density measurement take place during operation while the medium is flowing. The mass flow is divided by the reference density to give the corrected volume flow and is issued as an output signal.

External reference density

Navigation Expert → Sensor → Calculated value → Corr. vol.flow. → Ext. ref.density (6198)

Description Displays the reference density which is read in externally, e.g. via the current input.

User interface Floating point number with sign

Additional information *Dependency*

The unit is taken from the **Reference density unit** parameter (→ 79)

Fixed reference density

Navigation Expert → Sensor → Calculated value → Corr. vol.flow. → Fix ref.density (1814)

Prerequisite The **Fixed reference density** option is selected in the **Corrected volume flow calculation** parameter (→ 92) parameter.

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

* Visibility depends on order options or device settings
5) liquefied petroleum gas

User entry Positive floating-point number

Factory setting 1 kg/Nl

Additional information *Dependency*

The unit is taken from the **Reference density unit** parameter (→ 79)

Reference temperature

Navigation Expert → Sensor → Calculated value → Corr. vol.flow. → Ref. temperature (1816)

Prerequisite The **Calculated reference density** option is selected in the **Corrected volume flow calculation** parameter (→ 92) parameter.

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

User entry −273.15 to 99 999 °C

Factory setting Country-specific:
- +20 °C
- +68 °F

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 81)

Reference density calculation

$$\rho_n = \rho \cdot (1 + \alpha \cdot \Delta t + \beta \cdot \Delta t^2)$$

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- ρ_N: reference density
- ρ: fluid density currently measured
- t: fluid temperature currently measured
- t_N: reference temperature at which the reference density is calculated (e.g. 20 °C)
- Δt: t - t_N
- α: linear expansion coefficient of the fluid, unit = [1/K]; K = Kelvin
- β: square expansion coefficient of the fluid, unit = [1/K^2]

Linear expansion coefficient

Navigation Expert → Sensor → Calculated value → Corr. vol.flow. → Linear exp coeff (1817)

Prerequisite The **Calculated reference density** option is selected in the **Corrected volume flow calculation** parameter (→ 92) parameter.

Description Use this function to enter a linear, fluid-specific expansion coefficient for calculating the reference density.

User entry Signed floating-point number

Factory setting 0.0 1/K

Square expansion coefficient

Navigation Expert → Sensor → Calculated value → Corr. vol.flow. → Square exp coeff (1818)

Prerequisite The **Calculated reference density** option is selected in the **Corrected volume flow calculation** parameter (→ 92) parameter.

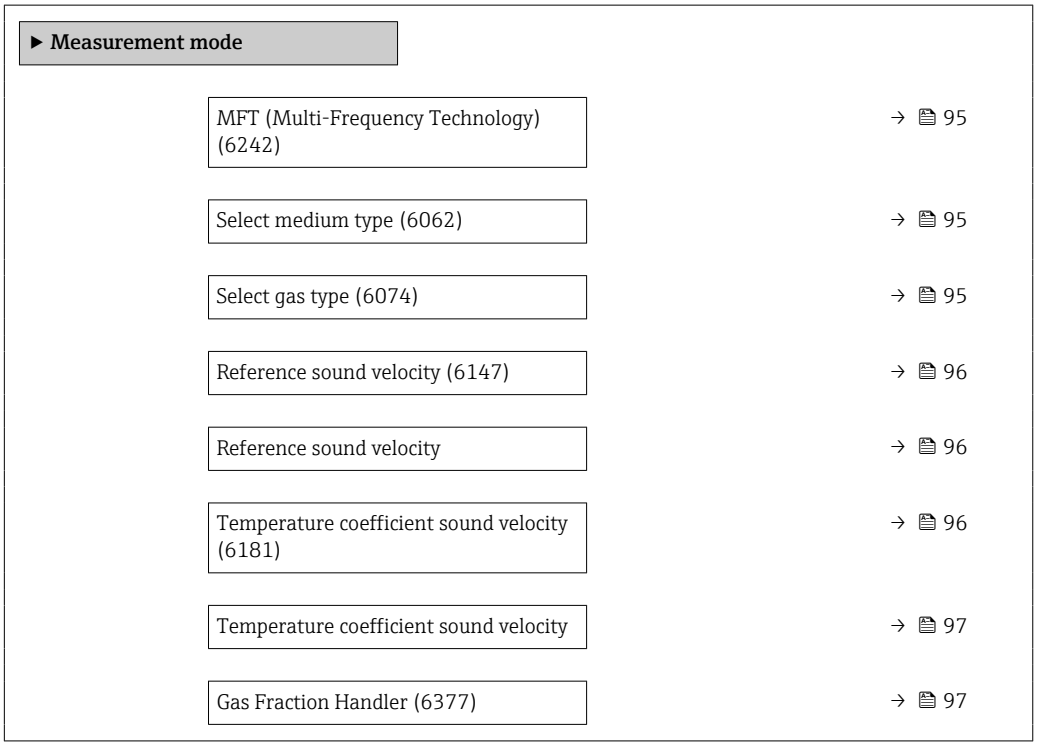
Description For fluid with a non-linear expansion pattern: use this function to enter a quadratic, fluid-specific expansion coefficient for calculating the reference density.

User entry Signed floating-point number

Factory setting 0.0 1/K²

3.2.5 "Measurement mode" submenu

Navigation Expert → Sensor → Measurement mode



MFT (Multi-Frequency Technology)

Navigation Expert → Sensor → Measurement mode → MFT (6242)

Description Enable/disable multi-frequency technology to increase the measuring accuracy in the event of microbubbles in the medium.

Selection
- No
- Yes

Factory setting Yes

Additional information Multi-frequency technology increases the measuring accuracy in the event of microbubbles in the medium (e.g. when measuring ice-cream, cream cheese, milk, honey, jam, viscous heavy oils, gas-saturated media etc.).

Select medium type

Navigation Expert → Sensor → Measurement mode → SelectMediumType (6062)

Description Use this function to select the type of medium: "Gas" or "Liquid". Select the "Other" option in exceptional cases in order to enter the properties of the medium manually (e.g. for highly compressive liquids such as sulfuric acid).

Selection
- Liquid
- Gas
- Other

Factory setting Liquid

Select gas type

Navigation Expert → Sensor → Measurement mode → Select gas type (6074)

Prerequisite In the **Medium selection** submenu, the **Gas** option is selected.

Description Select measured gas type.

Selection
- Air
- Ammonia NH3
- Argon Ar
- Sulfur hexafluoride SF6
- Oxygen O2
- Ozone O3
- Nitrogen oxide NOx
- Nitrogen N2
- Nitrous oxide N2O
- Methane CH4
- Methane CH4 + 10% Hydrogen H2

- Methane CH4 + 20% Hydrogen H2
- Methane CH4 + 30% Hydrogen H2
- Hydrogen H2
- Helium He
- Hydrogen chloride HCl
- Hydrogen sulfide H2S
- Ethylene C2H4
- Carbon dioxide CO2
- Carbon monoxide CO
- Chlorine Cl2
- Butane C4H10
- Propane C3H8
- Propylene C3H6
- Ethane C2H6
- Other

Factory setting Methane CH4

Reference sound velocity

Navigation Expert → Sensor → Measurement mode → Sound velocity (6147)

Prerequisite In the **Select gas type** parameter (→ 95), the **Other** option is selected.

Description Enter sound velocity of the gas at 0 °C (32 °F).

User entry 1 to 99 999.9999 m/s

Factory setting 415.0 m/s

Reference sound velocity

Navigation Expert → Sensor → Measurement mode → Sound velocity

Prerequisite In the **Select medium type** parameter (→ 95), the **Other** option is selected.

Description Enter sound velocity of the medium at 0 °C (32 °F).

User entry Signed floating-point number

Factory setting 1 456 m/s

Temperature coefficient sound velocity

Navigation Expert → Sensor → Measurement mode → Temp. coeff. SV (6181)

Prerequisite In the **Select gas type** parameter (→ 95), the **Other** option is selected.

Description Enter the temperature coefficient for the gas sound velocity.

User entry Positive floating point number

Factory setting 0.87 (m/s)/K

Temperature coefficient sound velocity

Navigation Expert → Sensor → Measurement mode → Temp. coeff. SV

Prerequisite In the **Select medium type** parameter (→ 95), the **Other** option is selected.

Description Enter temperature coefficient for the medium sound velocity.

User entry Signed floating-point number

Factory setting 1.3 (m/s)/K

Gas Fraction Handler

Navigation Expert → Sensor → Measurement mode → Gas Frac Handler (6377)

Description Activates the Gas Fraction Handler function for two phase media.

Selection
- Off
- Moderate
- Powerful

Factory setting Moderate

Additional information
- When a second phase is detected, large fluctuations in the flow and density will occur.
- The Gas Fraction Handler stabilizes the output values and enables better readability for operators and easier interpretation by the distributed control system.
- The level of smoothing is adjusted according to the severity of the disturbances introduced by the second phase.

The influence of the disturbances can be configured in two steps via this switch:

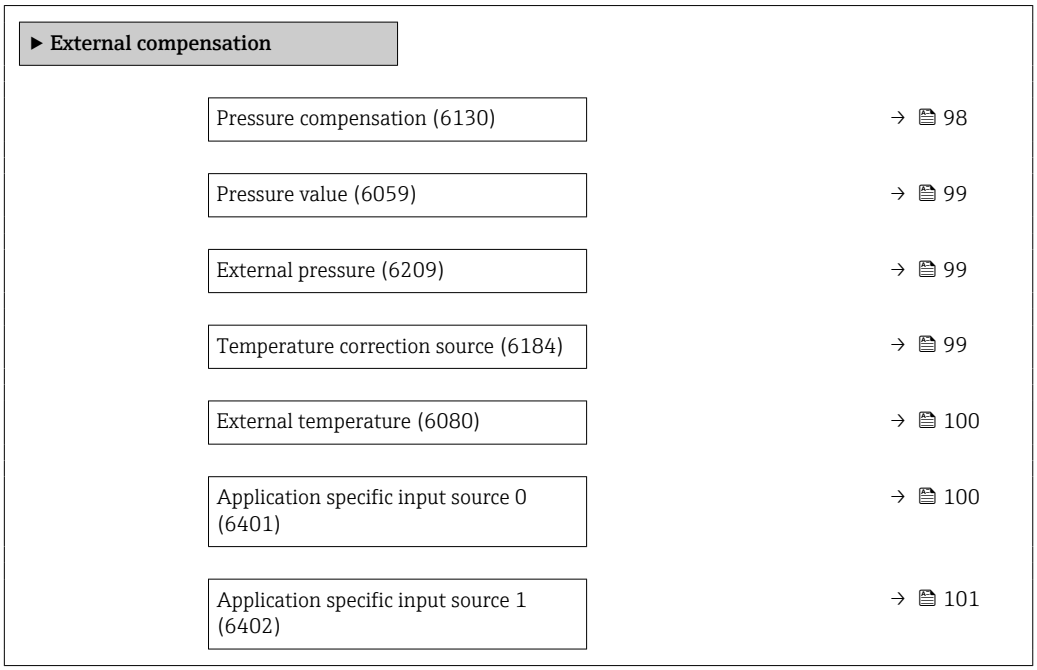
- **Off** option: Deactivates the Gas Fraction Handler. When a second phase is present, large fluctuations of flow and density will occur.
- **Moderate** option: Use for applications with low level or intermittent levels of second phase.
- **Powerful** option: Use for applications with very significant levels of second phase.

The Gas Fraction Handler is cumulative to any fixed damping constants applied to flow and density that are set elsewhere in the instrument parameterization.

Additional information in the **Medium index** submenu (→ 242)

3.2.6 "External compensation" submenu

Navigation Expert → Sensor → External comp.



Pressure compensation

Navigation Expert → Sensor → External comp. → Pressure compen. (6130)

Description Use this function to select the type of pressure compensation.

Selection
- Off
- Fixed value
- External value
- Current input 1 *
- Current input 2 *

Factory setting Off

Additional information *Selection*
- Fixed value
  A fixed pressure value is used for compensation: **Pressure value** parameter (→ 99)
- Current input 1
  The pressure value read in via the current input is used for compensation.

* Visibility depends on order options or device settings

Pressure value

Navigation Expert → Sensor → External comp. → Pressure value (6059)

Prerequisite In the **Pressure compensation** parameter (→ 98), the **Fixed value** option is selected.

Description Use this function to enter a value for the process pressure that is used for pressure correction.

User entry Positive floating-point number

Factory setting 1.01325 bar

Additional information *Dependency*

The unit is taken from the **Pressure unit** parameter (→ 81)

External pressure

Navigation Expert → Sensor → External comp. → External press. (6209)

Prerequisite In the **Pressure compensation** parameter (→ 98), the **External value** option or the **Current input 1…n** option is selected.

Description Displays the external pressure value.

Additional information *Dependency*

The unit is taken from the **Pressure unit** parameter (→ 81)

Temperature correction source

Navigation Expert → Sensor → External comp. → Temp.corr.source (6184)

Description Use this function to select the temperature mode.

Selection
- Internal measured value
- External value
- Current input 1 *
- Current input 2 *
- Current input 3 *

Factory setting Internal measured value

* Visibility depends on order options or device settings

Additional information

Description

Use this function to select the type of temperature compensation.

Selection

All the options available for selection are used for measured value compensation.

- Internal measured value
  The temperature value measured internally (temperature sensor of the measuring sensor) is used for compensation.
- **Current input 1** option, Visibility depends on order options or device settings.
  The temperature value read in via the current input is used for compensation.

External temperature

Navigation Expert → Sensor → External comp. → External temp. (6080)

Prerequisite In the **Temperature mode** parameter (→ 99), the **External value** option or the **Current input 1...n** option is selected.

Description Displays the external temperature.

Additional information

Dependency

The unit is taken from the **Temperature unit** parameter (→ 81)

Application specific input source 0

Navigation Expert → Sensor → External comp. → Spec. source 0 (6401)

Prerequisite Only if application-specific calculation has been ordered as a special option.

Description Select source for input value 0 used for the application specific calculation.

Selection

- Off
- External value
- Current input 1 *
- Current input 2 *
- Current input 3 *

Factory setting Off

* Visibility depends on order options or device settings

Application specific input source 1

Navigation Expert → Sensor → External comp. → Spec. source 1 (6402)

Prerequisite Only if application-specific calculation has been ordered as a special option.

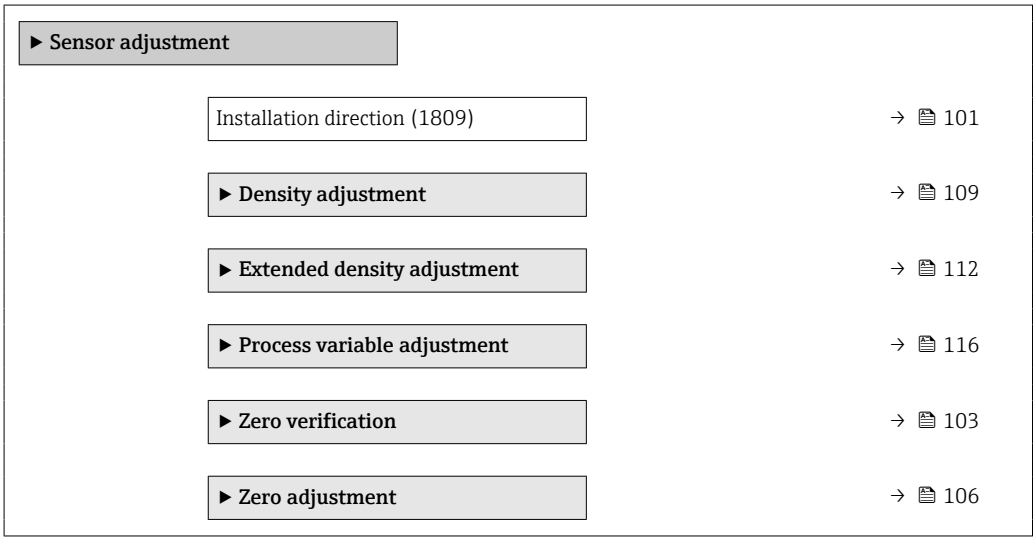
Description Select source for the input value 1 used for the application specific calculation.

Selection
- Off
- External value
- Current input 1 *
- Current input 2 *
- Current input 3 *

Factory setting Off

3.2.7 "Sensor adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm.



Installation direction

Navigation Expert → Sensor → Sensor adjustm. → Install. direct. (1809)

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

Selection
- Forward flow
- Reverse flow

* Visibility depends on order options or device settings

Factory setting Forward flow

Additional information *Description*

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

Installation angle roll

Navigation Expert → Sensor → Sensor adjustm. → Inst. angle roll (6282)

Prerequisite Available only with Promass Q.

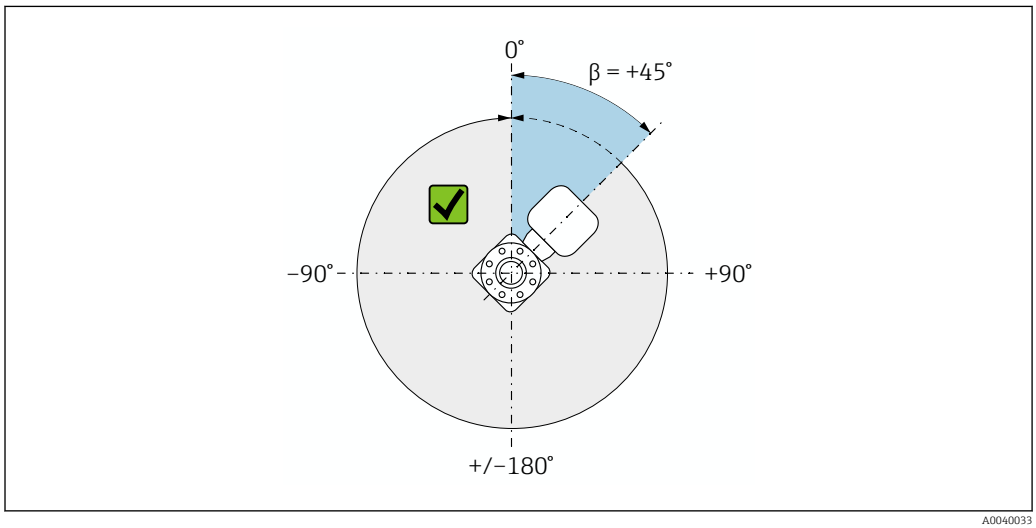
Description Use this function to enter the roll angle in degrees to improve measuring accuracy.

User entry −180 to 180 °

Factory setting 0 °

Additional information The technically relevant roll angle is the angle shaded gray = −180 to +180 °.

Example (blue): Installation of the device with a roll angle β = +45 °



2 *Top view in flow direction*

Installation angle pitch

Navigation Expert → Sensor → Sensor adjustm. → Inst.angle pitch (6236)

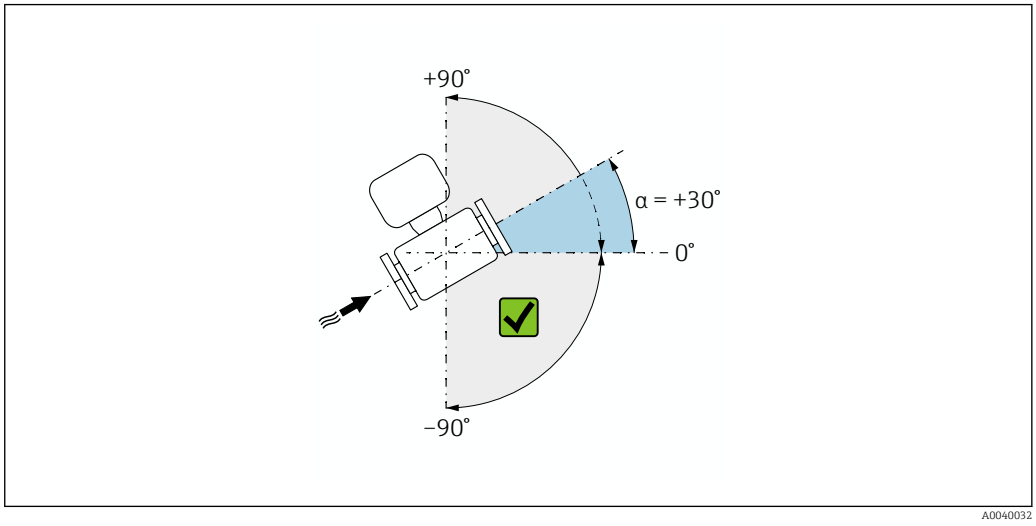
Prerequisite Available only with Promass Q.

Description Use this function to enter the pitch angle in degrees to improve measuring accuracy.

User entry −90 to +90 °

Factory setting 0 °

Additional information The technically relevant pitch angle is the angle shaded gray = −90 to +90 °.
Example (blue): Installation of the device with a pitch angle α = +30 °



3 *Side view with flow direction from left to right.*

"Zero verification" wizard

Navigation Expert → Sensor → Sensor adjustm. → ZeroVerification

► Zero verification	
Process conditions	→ 104
Progress (2808)	→ 104
Status (6253)	→ 104
Additional information	→ 104
Recommendation: (6000)	→ 105
Root cause (6444)	→ 105
Abort cause	→ 105
Zero point measured (5999)	→ 105
Zero point standard deviation (5996)	→ 106

Process conditions

Navigation Expert → Sensor → Sensor adjustm. → ZeroVerification → Process condit.

Description Ensure process conditions as follows.

Selection
- Tubes are completely filled
- Process operational pressure applied
- No-flow conditions (closed valves)
- Process and ambient temperatures stable

Factory setting –

Progress

Navigation Expert → Sensor → Sensor adjustm. → ZeroVerification → Progress (2808)

Description The progress of the process is indicated.

User interface 0 to 100 %

Status

Navigation Expert → Sensor → Sensor adjustm. → ZeroVerification → Status (6253)

Description Shows the status of the process.

User interface
- Busy
- Failed
- Done

Factory setting –

Additional information

Navigation Expert → Sensor → Sensor adjustm. → ZeroVerification → Additional info.

Description Indicate whether to display additional information.

Selection
- Hide
- Show

Factory setting Hide

Recommendation:

Navigation Expert → Sensor → Sensor adjustm. → ZeroVerification → Recommendation: (6000)

Description Indicates whether an adjustment is recommended. Only recommended if the measured zero point deviates significantly from the current zero point.

User interface
- Do not adjust zero point
- Adjust zero point

Factory setting –

Root cause

Navigation Expert → Sensor → Sensor adjustm. → ZeroVerification → Root cause (6444)

Description Shows the diagnostic and remedy.

User interface
- Zero point too high. Ensure no-flow.
- Zero point is unstable. Ensure no-flow.
- Fluctuation high. Avoid 2-phase medium.

Factory setting –

Abort cause

Navigation Expert → Sensor → Sensor adjustm. → ZeroVerification → Abort cause

Description Indicates why the wizard was aborted.

User interface
- Check process conditions!
- A technical issue has occurred

Factory setting –

Zero point measured

Navigation Expert → Sensor → Sensor adjustm. → ZeroVerification → ZeroPointMeasur. (5999)

Description Shows the zero point measured for the adjustment.

User interface Signed floating-point number

Factory setting –

Zero point standard deviation

Navigation Expert → Sensor → Sensor adjustm. → ZeroVerification → ZeroStdDev (5996)

Description Shows the standard deviation of the zero point measured.

User interface Positive floating-point number

Factory setting –

"Zero adjustment" wizard

Navigation Expert → Sensor → Sensor adjustm. → Zero adjustment

▶ **Zero adjustment**	
Process conditions	→ 107
Progress (2808)	→ 107
Status (6253)	→ 107
Root cause (6444)	→ 107
Abort cause	→ 108
Root cause (6444)	→ 107
Reliability of measured zero point (5982)	→ 108
Additional information	→ 108
Reliability of measured zero point (5982)	→ 108
Zero point measured (5999)	→ 108
Zero point standard deviation (5996)	→ 109
Select action (5995)	→ 109

Process conditions

Navigation Expert → Sensor → Sensor adjustm. → Zero adjustment → Process condit.

Description Ensure process conditions as follows.

Selection
- Tubes are completely filled
- Process operational pressure applied
- No-flow conditions (closed valves)
- Process and ambient temperatures stable

Factory setting –

Progress

Navigation Expert → Sensor → Sensor adjustm. → Zero adjustment → Progress (2808)

Description The progress of the process is indicated.

User interface 0 to 100 %

Status

Navigation Expert → Sensor → Sensor adjustm. → Zero adjustment → Status (6253)

Description Shows the status of the process.

User interface
- Busy
- Failed
- Done

Factory setting –

Root cause

Navigation Expert → Sensor → Sensor adjustm. → Zero adjustment → Root cause (6444)

Description Shows the diagnostic and remedy.

User interface
- Zero point too high. Ensure no-flow.
- Zero point is unstable. Ensure no-flow.
- Fluctuation high. Avoid 2-phase medium.

Abort cause

Navigation Expert → Sensor → Sensor adjustm. → Zero adjustment → Abort cause

Description Indicates why the wizard was aborted.

User interface
- Check process conditions!
- A technical issue has occurred

Factory setting –

Reliability of measured zero point

Navigation Expert → Sensor → Sensor adjustm. → Zero adjustment → ZeroReliability (5982)

Description Indicates the reliability of the zero point measured.

User interface
- Not done
- Good
- Uncertain

Factory setting –

Additional information

Navigation Expert → Sensor → Sensor adjustm. → Zero adjustment → Additional info.

Description Indicate whether to display additional information.

Selection
- Hide
- Show

Factory setting Hide

Zero point measured

Navigation Expert → Sensor → Sensor adjustm. → Zero adjustment → ZeroPointMeasur. (5999)

Description Shows the zero point measured for the adjustment.

User interface Signed floating-point number

Factory setting –

Zero point standard deviation

Navigation Expert → Sensor → Sensor adjustm. → Zero adjustment → ZeroStdDev (5996)

Description Shows the standard deviation of the zero point measured.

User interface Positive floating-point number

Factory setting 0

Select action

Navigation Expert → Sensor → Sensor adjustm. → Zero adjustment → Select action (5995)

Description Select the zero point value to apply.

Selection
- Restore
- Keep current zero point
- Apply zero point measured
- Apply factory zero point *

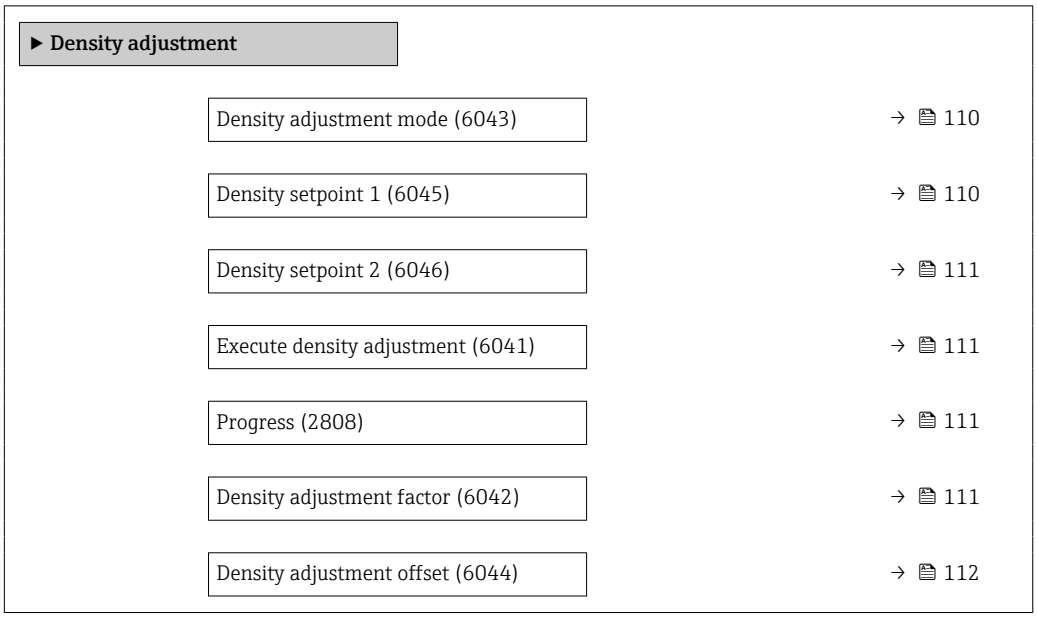
Factory setting Keep current zero point

"Density adjustment" submenu

Note the following before performing the adjustment:
- A density adjustment only makes sense if there is little variation in the operating conditions and the density adjustment is performed under the operating conditions.
- The density adjustment scales the internally computed density value with a user-specific slope and offset.
- A 1-point or 2-point density adjustment can be performed.
- For a 2-point density adjustment, there must be a difference of at least 0.2 kg/l between the two target density values.
- The reference media must be gas-free or pressurized so that any gas they contain is compressed.
- The reference density measurements must be performed at the same medium temperature that prevails in the process, as otherwise the density adjustment will not be accurate.
- The correction resulting from the density adjustment can be deleted with the **Restore original** option.

* Visibility depends on order options or device settings

Navigation Expert → Sensor → Sensor adjustm. → Density adjustm.



Density adjustment mode

Navigation Expert → Sensor → Sensor adjustm. → Density adjustm. → Adjustment mode (6043)

Description Displays the method for field density adjustment.

Selection
- 1 point adjustment
- 2 point adjustment

Factory setting 1 point adjustment

Density setpoint 1

Navigation Expert → Sensor → Sensor adjustm. → Density adjustm. → Density setpt 1 (6045)

Description Displays the existing density value.

User entry The entry depends on the unit selected in the **Density unit** parameter (0555) (→ 78).

Factory setting 1 kg/l

Density setpoint 2

Navigation Expert → Sensor → Sensor adjustm. → Density adjustm. → Density setpt 2 (6046)

Prerequisite In the **Density adjustment mode** parameter, the **2 point adjustment** option is selected.

Description Displays the second density setpoint.

User entry The entry depends on the unit selected in the **Density unit** parameter (0555) (→ 78).

Factory setting 1 kg/l

Execute density adjustment

Navigation Expert → Sensor → Sensor adjustm. → Density adjustm. → Density adjustm. (6041)

Description Select the next step to be performed for the density adjustment.

Selection
- Cancel *
- Busy *
- Ok *
- Density adjust failure *
- Measure density 1 *
- Measure density 2 *
- Calculate *
- Restore original *

Factory setting Ok

Progress

Navigation Expert → Sensor → Sensor adjustm. → Density adjustm. → Progress (2808)

Description The progress of the process is indicated.

User interface 0 to 100 %

Density adjustment factor

Navigation Expert → Sensor → Sensor adjustm. → Density adjustm. → Dens. adj factor (6042)

Description Displays the current correction factor for the density.

* Visibility depends on order options or device settings

User interface Signed floating-point number

Factory setting 1

Additional information Manual adjustment of the value: **Density factor** parameter (→ 118)

Density adjustment offset

Navigation Expert → Sensor → Sensor adjustm. → Density adjustm. → Dens. adj offset (6044)

Description Shows the calculated correction offset for the density.

User interface Signed floating-point number

Factory setting 0

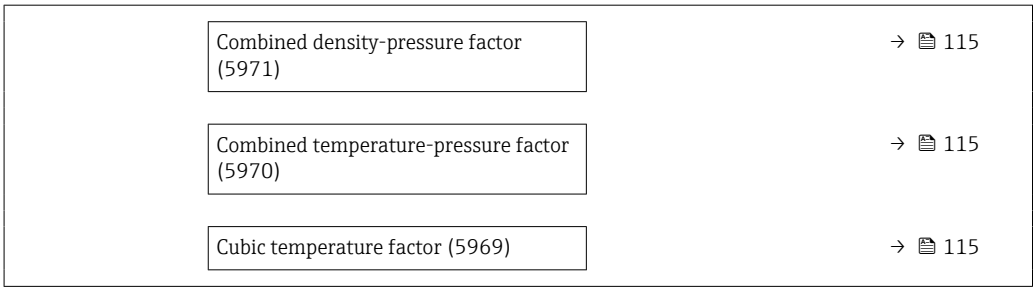
Additional information Manual adjustment of the value: **Density offset** parameter (→ 118)

"Extended density adjustment" submenu

For detailed information on the parameter descriptions of the "Extended density adjustment" application package, see the Special Documentation for the device → 7

Navigation Expert → Sensor → Sensor adjustm. → ExtendDensAdjust

▶ Extended density adjustment	
Constant offset (5968)	→ 113
Linear density factor (5967)	→ 113
Linear temperature factor (5966)	→ 113
Linear pressure factor (5965)	→ 114
Quadratic density factor (5964)	→ 114
Quadratic temperature factor (5963)	→ 114
Quadratic pressure factor (5962)	→ 114
Combined density-temperature factor (5961)	→ 115



Constant offset

Navigation Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → ConstantOffset (5968)

Description Shows the constant offset.

User entry Signed floating-point number

Factory setting 0 kg/m³

Linear density factor

Navigation Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → LinearDensFactor (5967)

Description Shows the linear density factor.

User entry Signed floating-point number

Factory setting 1

Linear temperature factor

Navigation Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → LinearTempFactor (5966)

Description Shows the linear temperature factor.

User entry Signed floating-point number

Factory setting 0 (kg/m³)/°C

Linear pressure factor

Navigation Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → LinearPressFact (5965)

Description Shows the linear pressure factor.

User entry Signed floating-point number

Factory setting 0 (kg/m³)/bara

Quadratic density factor

Navigation Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → QuadrDensFactor (5964)

Description Shows the quadratic density factor.

User entry Signed floating-point number

Factory setting 0 1/(kg/m³)

Quadratic temperature factor

Navigation Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → QuadrTempFactor (5963)

Description Shows the quadratic temperature factor.

User entry Signed floating-point number

Factory setting 0 (kg/m³)/°C²

Quadratic pressure factor

Navigation Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → QuadrPressFactor (5962)

Description Shows the quadratic pressure factor.

User entry Signed floating-point number

Factory setting 0 (kg/m³)/bara²

Combined density-temperature factor

Navigation Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → DensTempFactor (5961)

Description Shows the combined density-temperature factor.

User entry Signed floating-point number

Factory setting 0 1/°C

Combined density-pressure factor

Navigation Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → DensPressFactor (5971)

Description Shows the combined density-pressure factor.

User entry Signed floating-point number

Factory setting 0 1/bara

Combined temperature-pressure factor

Navigation Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → TempPressFactor (5970)

Description Shows the combined temperature-pressure factor.

User entry Signed floating-point number

Factory setting 0 (kg/m³)/(°C bara)

Cubic temperature factor

Navigation Expert → Sensor → Sensor adjustm. → ExtendDensAdjust → CubicTempFactor (5969)

Description Shows the cubic temperature factor.

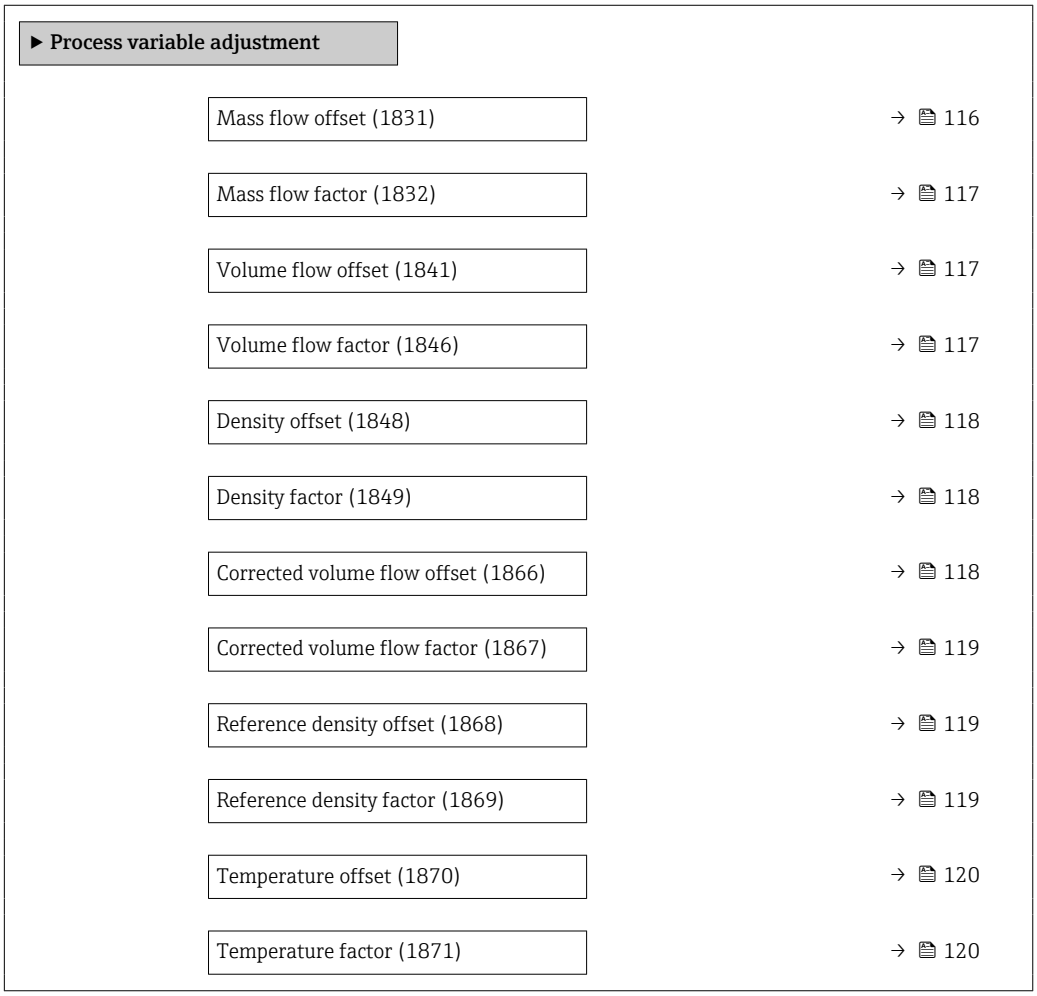
User entry Signed floating-point number

Factory setting 0 (kg/m³)/°C³

"Process variable adjustment" submenu

The adjustments to the offsets and factors in the **Process variable adjustment** submenu (→ 116) do not affect the calculated values, such as concentration, NSV.

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust



Mass flow offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow offset (1831)

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

User entry Signed floating-point number

Factory setting 0 kg/s

Additional information *Description*

Corrected value = (factor × value) + offset

Mass flow factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow factor (1832)

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Volume flow offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow offset (1841)

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

User entry Signed floating-point number

Factory setting 0 m^3/s

Additional information *Description*

Corrected value = (factor × value) + offset

Volume flow factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Vol. flow factor (1846)

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Density offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Density offset (1848)

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

User entry Signed floating-point number

Factory setting 0 kg/m^3

Additional information *Description*

Corrected value = (factor × value) + offset

Density factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Density factor (1849)

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Corrected volume flow offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Corr. vol offset (1866)

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

User entry Signed floating-point number

Factory setting 0 Nm^3/s

Additional information *Description*

Corrected value = (factor × value) + offset

Corrected volume flow factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Corr. vol factor (1867)

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Reference density offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Ref.dens. offset (1868)

Description Use this parameter to enter the zero point shift for the reference density trim. The reference density unit on which the shift is based is 1 kg/Nm³.

User entry Signed floating-point number

Factory setting 0 kg/Nm³

Additional information *Description*

Corrected value = (factor × value) + offset

Reference density factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Ref.dens. factor (1869)

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. offset (1870)

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

User entry Signed floating-point number

Factory setting 0 K

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor (1871)

Description Use this function to enter a quantity factor for the temperature. In each case, this factor refers to the temperature in K.

User entry Positive floating-point number

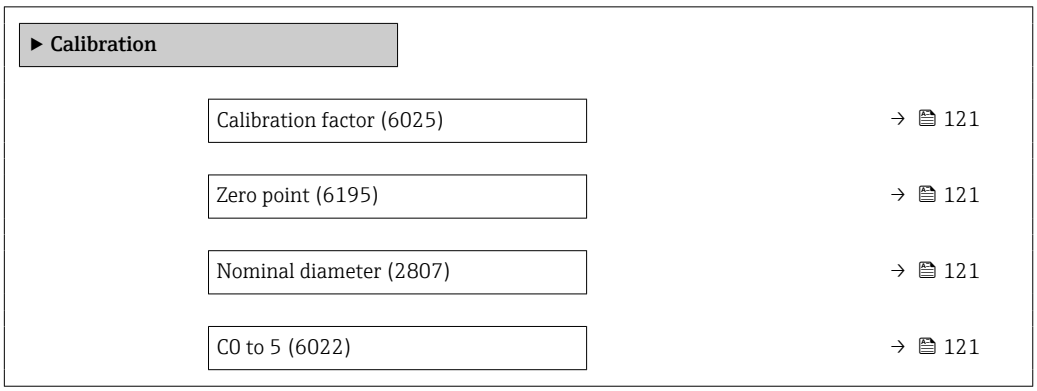
Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

3.2.8 "Calibration" submenu

Navigation Expert → Sensor → Calibration



Calibration factor

Navigation Expert → Sensor → Calibration → Cal. factor (6025)

Description Displays the current calibration factor for the sensor.

User interface Signed floating-point number

Factory setting Depends on nominal diameter and calibration.

Zero point

Navigation Expert → Sensor → Calibration → Zero point (6195)

Description Use this function to enter the zero point correction value for the sensor.

User entry Signed floating-point number

Factory setting Depends on nominal diameter and calibration.

Nominal diameter

Navigation Expert → Sensor → Calibration → Nominal diameter (2807)

Description Displays the nominal diameter of the sensor.

User interface DNxx / x"

Factory setting Depends on the size of the sensor

Additional information *Description*

The value is also specified on the sensor nameplate.

C0 to 5

Navigation Expert → Sensor → Calibration → C0 to 5 (6022)

Description Displays the current density coefficients C0 to 5 of the sensor.

User interface Signed floating-point number

Factory setting Depends on nominal diameter and calibration.

3.2.9 "Testpoints" submenu

The **Testpoints** submenu (→ 122) is used to test the measuring device or the application.

Navigation Diagnostics → Testpoints

Navigation Expert → Sensor → Testpoints

▶ **Testpoints**	
Raw value mass flow	→ 123
Oscillation frequency 0 to 1	→ 123
Frequency fluctuation 0 to 1	→ 123
Oscillation amplitude 0 to 1	→ 124
Oscillation damping 0 to 1	→ 124
Oscillation damping fluctuation 0 to 1	→ 125
Signal asymmetry 0	→ 125
Torsion signal asymmetry	→ 125
Sensor electronics temperature (ISEM)	→ 126
Carrier pipe temperature	→ 126
Casing pipe temperature	→ 126
Exciter current 0 to 1	→ 127
Test point 0	→ 127
Test point 1	→ 127
Temperature difference measuring tube	→ 127
Temperat. difference meas. tube-carrier	→ 128
Sensor index coil asymmetry	→ 128
Sensor index coil asymmetry reliability	→ 128

Raw value mass flow

Navigation Expert → Sensor → Testpoints → Raw mass flow (6140)

Description Shows the current measured raw value of the mass flow.

User interface Signed floating-point number

Additional information

Description

Displays the mass flow value before offset and factor correction, damping, low flow cut off and monitoring of a partially filled pipe. This value can be used to check the current zero point; similar to the zero point verification function.

Dependency

The unit is taken from the **Mass flow unit** parameter (→ 73)

Oscillation frequency 0 to 1

Navigation Expert → Sensor → Testpoints → Osc. freq. 0 to 1 (6067)

Prerequisite

- Oscillation frequency 0 is available for all Promass sensors.
- Oscillation frequency 1 is only available for the Promass I and Promass Q sensors.

Description Shows the current oscillation frequency of the measuring tubes. The frequency depends on the medium density.

User interface Positive floating point number

Frequency fluctuation 0 to 1

Navigation Expert → Sensor → Testpoints → Freq. fluct. 0 to 1 (6175)

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

- Frequency fluctuation 0 is available for all Promass sensors.
- Frequency fluctuation 1 is only available for the Promass I and Promass Q sensors.

Description Shows the current fluctuation of the oscillation frequency.

User interface Signed floating-point number

Oscillation amplitude 0 to 1

Navigation Expert → Sensor → Testpoints → Osc. ampl. 0 to 1 (6006)

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

- Oscillation amplitude 0 is available for all Promass sensors.
- Oscillation amplitude 1 is only available for the Promass I and Promass Q sensors.

Description Use this function to display the relative oscillation amplitude of the sensor in relation to the optimum value.

User interface Signed floating-point number

Additional information *Description*

This value is 100 % under optimum conditions. The value can fall in the case of complex media (two-phase, high viscosity or high gas velocity).

Limit values

5 %

If the displayed value is outside the limit value, the measuring device displays the following diagnostic messages:

- ⚠**S913 Medium unsuitable** diagnostic message, associated service ID **205 Osc Amp Limit**
  Explanation: The measured oscillation amplitude has dropped below the xMin limit value.
- ⚠**S912 Medium inhomogeneous** diagnostic message, associated service ID **196 Fluid Inhomogeneous Amp**
  - Explanation: The fluctuation (standard deviation) of the amplitude is too high.
  - Possible cause: Air or suspended solids in the medium (multiphase)

Oscillation damping 0 to 1

Navigation Expert → Sensor → Testpoints → Osc. damping 0 to 1 (6038)

Prerequisite

- Oscillation damping 0 is available for all Promass sensors.
- Oscillation damping 1 is only available for the Promass I and Promass Q sensors.

Description Displays the current oscillation damping.

User interface Positive floating-point number

Additional information *Description*

Oscillation damping is an indicator of the sensor's current need for excitation power.

Limit values

The damping depends on the transmitter type and model and changes with the type of medium (differences between models: approx. ±30 %). The minimum value is reached when the sensor is empty. The value can reach several 1 000 in the case of viscous media,

and even several 10 000 in the case of multi-phase media. In such cases, the relative oscillation amplitude should also be used for diagnosis.

If the displayed value is outside the limit value, the measuring device displays the following diagnostic message:
⚠**S862 Partly filled pipe** diagnostic message, associated service ID **146 Density Monitoring**

Oscillation damping fluctuation 0 to 1

Navigation Expert → Sensor → Testpoints → Osc.damp.fluct0 to 1 (6172)

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

- Tube damping fluctuation 0 is available for all Promass sensors.
- Tube damping fluctuation 1 is only available for the Promass I and Promass Q sensors.

Description Shows the current fluctuation of the oscillation damping.

User interface Signed floating-point number

Signal asymmetry 0

Navigation Expert → Sensor → Testpoints → Signal asymm. 0 (6013)

Description Displays the relative difference between the oscillation amplitude measured at the inlet and outlet of the sensor.

User interface Signed floating-point number

Additional information *Description*

The measured value is the result of production tolerances of the sensor coils and should remain constant over the life time of a sensor.

Torsion signal asymmetry

Navigation Expert → Sensor → Testpoints → Tors.sig.asymm. (6289)

Prerequisite This parameter is only available: with the order code for "Application package", option EB "Heartbeat Verification + Monitoring" and the Promass I or Promass Q sensor.

Description Shows the relative difference of the signal amplitudes of the inlet sensor and outlet sensor of the second oscillation mode.

User interface Signed floating-point number

Sensor electronics temperature (ISEM)

Navigation Expert → Sensor → Testpoints → Sensor elec.temp (6053)

Description Displays the current temperature inside the main electronics.

User interface Signed floating-point number

Additional information

NOTE!

Stay within the specified ambient temperature range.

Dependency

The unit is taken from the **Temperature unit** parameter (→ 81)

Carrier pipe temperature

Navigation Expert → Sensor → Testpoints → Carr. pipe temp. (6027)

Prerequisite

- Order code for "Application package", option EB "Heartbeat Verification + Monitoring"
- If the carrier tube temperature is provided:
  Cubemass C

Description Use this function to display the current temperature of the measuring tube housing.
Displays the 2nd measured temperature for compensation.

User interface Signed floating-point number

Additional information

Limit values

In thermally insulated sensors, the carrier tube temperature can reach the temperature of the medium.

Dependency

The unit is taken from the **Temperature unit** parameter (0557)

Casing pipe temperature

Navigation Expert → Sensor → Testpoints → CasingPipeTemp. (6411)

Prerequisite This parameter is only available: with the order code for "Application package", option EB "Heartbeat Verification + Monitoring" and the Promass I sensor

Description Displays the temperature of the casing pipe.

User interface Signed floating-point number

Exciter current 0 to 1

Navigation Expert → Sensor → Testpoints → Exc. current 0 to 1 (6055)

Prerequisite
- Exciter current 0 is available for all Promass sensors.
- Exciter current 1 is only available for the Promass I and Promass Q sensors.

Description Rms value of the exciter current.

User interface Signed floating-point number

Additional information

NOTE!

The maximum available excitation current has been reached when the oscillation amplitude shown is less than 100 %.

Test point 0

Navigation Expert → Sensor → Testpoints → Test point 0 (6425)

Description Shows the value for the selected test point. Can only be configured by Endress+Hauser.

Factory setting 0

Test point 1

Navigation Expert → Sensor → Testpoints → Test point 1 (6426)

Description Shows the value for the selected test point. Can only be configured by Endress+Hauser.

Factory setting 0

Temperature difference measuring tube

Navigation Expert → Sensor → Testpoints → TempDiffMeasTube (6344)

Prerequisite This parameter is only available for the Promass Q sensor.

Description Shows the temperature difference between the outlet and the inlet of the measuring tube.

User interface Signed floating-point number

Temperat. difference meas. tube-carrier

Navigation Expert → Sensor → Testpoints → TempDiffTubeCarr

Description Shows the temperature difference between the measuring tube and the carrier pipe.

User interface Signed floating-point number

Factory setting 0 K

Sensor index coil asymmetry

Navigation Expert → Sensor → Testpoints → SensIndCoilAsym. (5951)

Description Shows the sensor index coil asymmetry (SICA) currently measured.

User interface Signed floating-point number

Factory setting 0 %

Sensor index coil asymmetry reliability

Navigation Expert → Sensor → Testpoints → SensIndCoilAReli (5952)

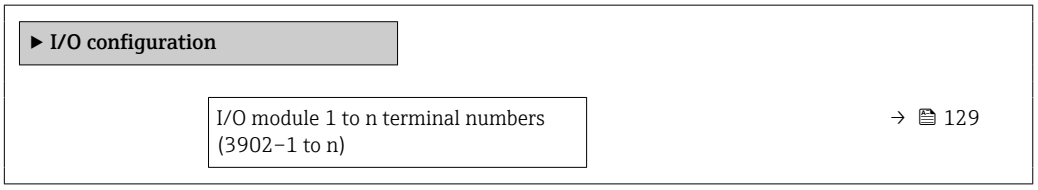
Description Indicates the reliability of the sensor index coil asymmetry value (SICA) currently measured.

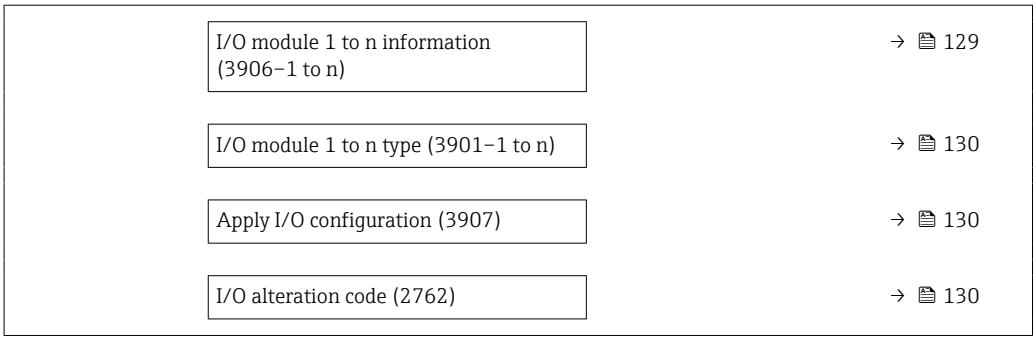
User interface
- Good
- Uncertain
- Bad

Factory setting Bad

3.3 "I/O configuration" submenu

Navigation Expert → I/O config.





I/O module 1 to n terminal numbers

Navigation Expert → I/O config. → I/O 1 to n terminals (3902–1 to n)

Description Displays the terminal numbers used by the I/O module.

User interface
- Not used
- 26-27 (I/O 1)
- 24-25 (I/O 2)
- 22-23 (I/O 3)

I/O module 1 to n information

Navigation Expert → I/O config. → I/O 1 to n info (3906–1 to n)

Description Displays information about the plugged in I/O module.

User interface
- Not plugged
- Invalid
- Not configurable
- Configurable
- PROFINET

Additional information *"Not plugged" option*

The I/O module is not plugged in.

"Invalid" option

The I/O module is not plugged correctly.

"Not configurable" option

The I/O module is not configurable.

"Configurable" option

The I/O module is configurable.

The I/O module is configured for .

I/O module 1 to n type

Navigation Expert → I/O config. → I/O 1 to n type (3901–1 to n)

Prerequisite For the following order code:
"Output; input 2", option **D** "Configurable I/O initial setting off"

Description Use this function to select the I/O module type for the configuration of the I/O module.

Selection
- Off
- Current output *
- Current input *
- Status input *
- Pulse/frequency/switch output *
- Double pulse output *
- Relay output *

Factory setting Off

Apply I/O configuration

Navigation Expert → I/O config. → Apply I/O config (3907)

Description Use this function to activate the newly configured I/O module type.

Selection
- No
- Yes

Factory setting No

I/O alteration code

Navigation Expert → I/O config. → I/O alterat.code (2762)

Description Use this function to enter the ordered activation code to activate the I/O configuration change.

User entry Positive integer

Factory setting 0

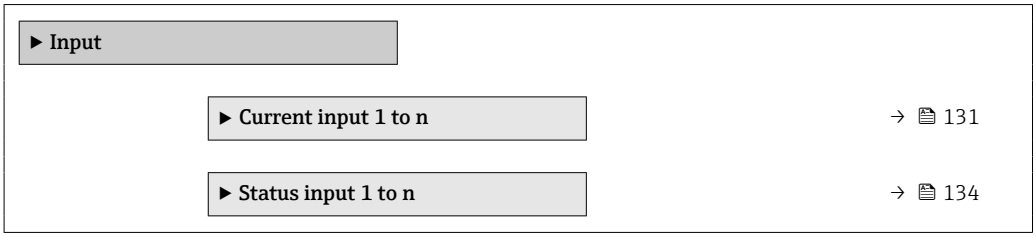
Additional information *Description*

The I/O configuration is changed in the **I/O module type** parameter (→ 130).

* Visibility depends on order options or device settings

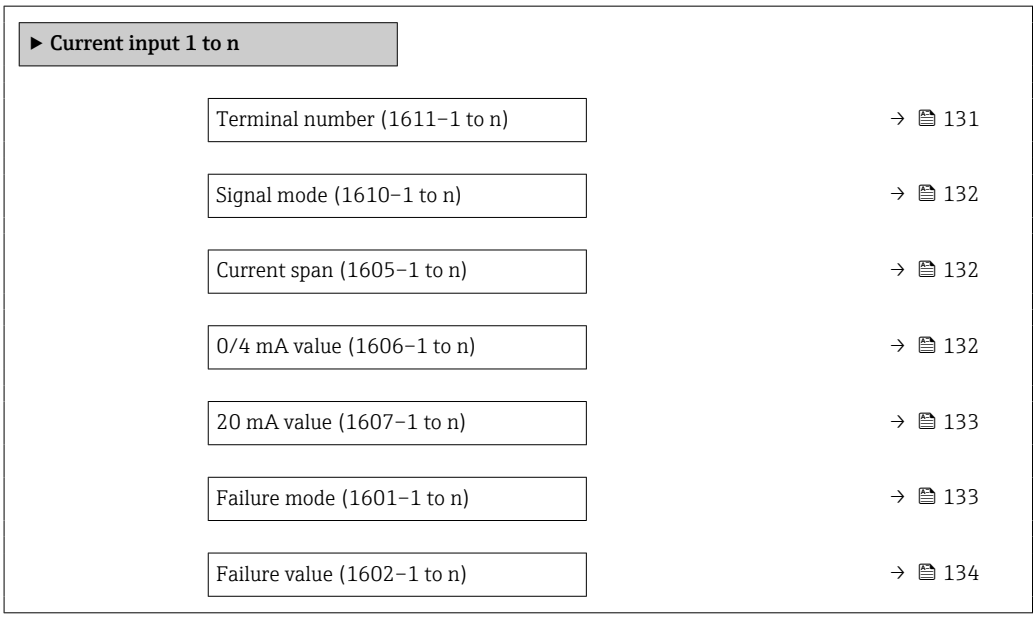
3.4 "Input" submenu

Navigation Expert → Input



3.4.1 "Current input 1 to n" submenu

Navigation Expert → Input → Current input 1 to n



Terminal number

Navigation Expert → Input → Current input 1 to n → Terminal no. (1611–1 to n)

Description Displays the terminal numbers used by the current input module.

User interface
- Not used
- 24-25 (I/O 2)
- 22-23 (I/O 3)

Additional information *"Not used" option*

The current input module does not use any terminal numbers.

Signal mode

Navigation Expert → Input → Current input 1 to n → Signal mode (1610–1 to n)

Prerequisite The measuring device is **not** approved for use in the hazardous area with type of protection Ex-i.

Description Use this function to select the signal mode for the current input.

Selection
- Passive
- Active *

Factory setting Active

Current span

Navigation Expert → Input → Current input 1 to n → Current span (1605–1 to n)

Description Use this function to select the current range for the process value output and the upper and lower level for signal on alarm.

Selection
- 4...20 mA (4... 20.5 mA)
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 0...20 mA (0... 20.5 mA)

Factory setting Country-specific:
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)

Additional information *Examples*

Sample values for the current range: **Current span** parameter (→ 139)

0/4 mA value

Navigation Expert → Input → Current input 1 to n → 0/4 mA value (1606–1 to n)

Description Use this function to enter a value for the 4 mA current.

User entry Signed floating-point number

Factory setting 0

* Visibility depends on order options or device settings

Additional information

Current input behavior

The current input behaves differently depending on the settings configured in the following parameters:
- Current span (→ 132)
- Failure mode (→ 133)

Configuration examples

Pay attention to the configuration examples for **4 mA value** parameter (→ 141).

20 mA value

Navigation Expert → Input → Current input 1 to n → 20 mA value (1607–1 to n)

Description Use this function to enter a value for the 20 mA current.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter

Additional information

Configuration examples

Pay attention to the configuration examples for **4 mA value** parameter (→ 141).

Failure mode

Navigation Expert → Input → Current input 1 to n → Failure mode (1601–1 to n)

Description Use this function to select the input behavior when measuring a current outside the configured **Current span** parameter (→ 132).

Selection
- Alarm
- Last valid value
- Defined value

Factory setting Alarm

Additional information

Options

- Alarm
  An error message is set.
- Last valid value
  The last valid measured value is used.
- Defined value
  A user-defined measured value is used (**Failure value** parameter (→ 134)).

Failure value

Navigation Expert → Input → Current input 1 to n → Failure value (1602–1 to n)

Prerequisite In the **Failure mode** parameter (→ 133), the **Defined value** option is selected.

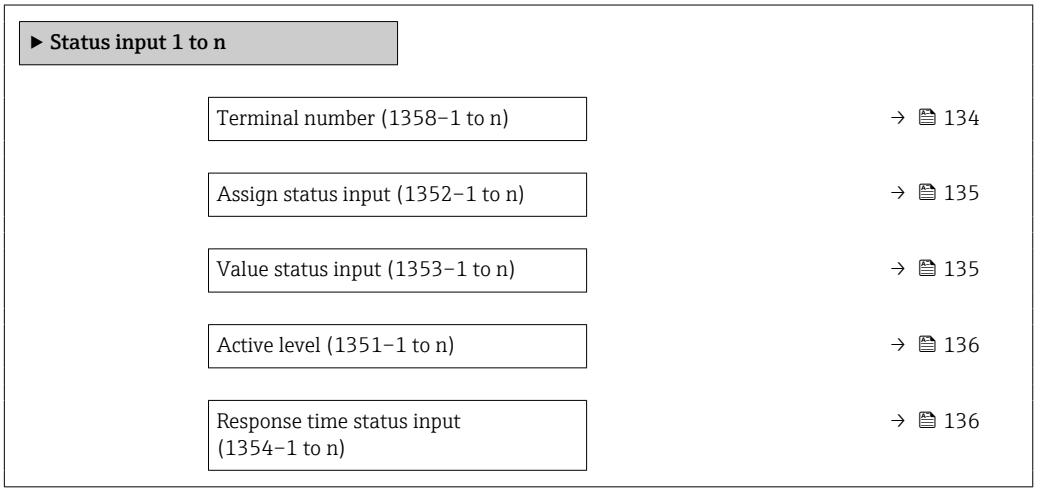
Description Use this function to enter the value that the device uses if it does not receive an input signal from the external device, or if the input signal is invalid.

User entry Signed floating-point number

Factory setting 0

3.4.2 "Status input 1 to n" submenu

Navigation Expert → Input → Status input 1 to n



Terminal number

Navigation Expert → Input → Status input 1 to n → Terminal no. (1358–1 to n)

Description Displays the terminal numbers used by the status input module.

User interface
- Not used
- 24-25 (I/O 2)
- 22-23 (I/O 3)

Additional information *"Not used" option*

The status input module does not use any terminal numbers.

Assign status input

Navigation Expert → Input → Status input 1 to n → Assign stat.inp. (1352–1 to n)

Description Use this function to select the function for the status input.

Selection
- Off
- Reset totalizer 1
- Reset totalizer 2
- Reset totalizer 3
- Reset all totalizers
- Flow override
- Zero adjustment
- Reset weighted averages *
- Reset weighted averages + totalizer 3 *

Factory setting Off

Additional information *Selection*
- Off
  The status input is switched off.
- Reset totalizer 1…3
  The individual totalizers are reset.
- Reset all totalizers
  All totalizers are reset.
- Flow override
  The Flow override (→ 84) is activated.

Note on the Flow override (→ 84):
- The Flow override (→ 84) is enabled as long as the level is at the status input (continuous signal).
- All other assignments react to a change in level (pulse) at the status input.

Value status input

Navigation Expert → Input → Status input 1 to n → Val.stat.inp. (1353–1 to n)

Description Displays the current input signal level.

User interface
- High
- Low

* Visibility depends on order options or device settings

Active level

Navigation Expert → Input → Status input 1 to n → Active level (1351–1 to n)

Description Use this function to determine the input signal level at which the assigned function is activated.

Selection
- High
- Low

Factory setting High

Response time status input

Navigation Expert → Input → Status input 1 to n → Response time (1354–1 to n)

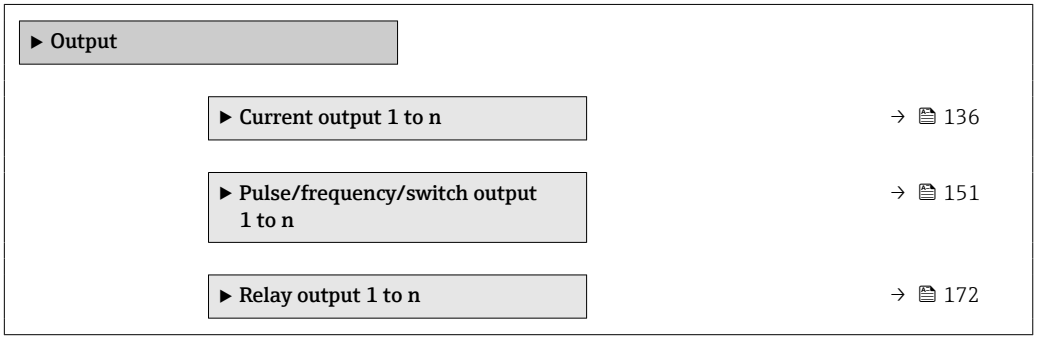
Description Use this function to enter the minimum time period for which the input signal level must be present before the selected function is activated.

User entry 5 to 200 ms

Factory setting 50 ms

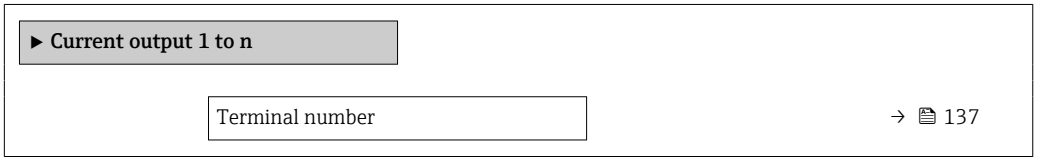
3.5 "Output" submenu

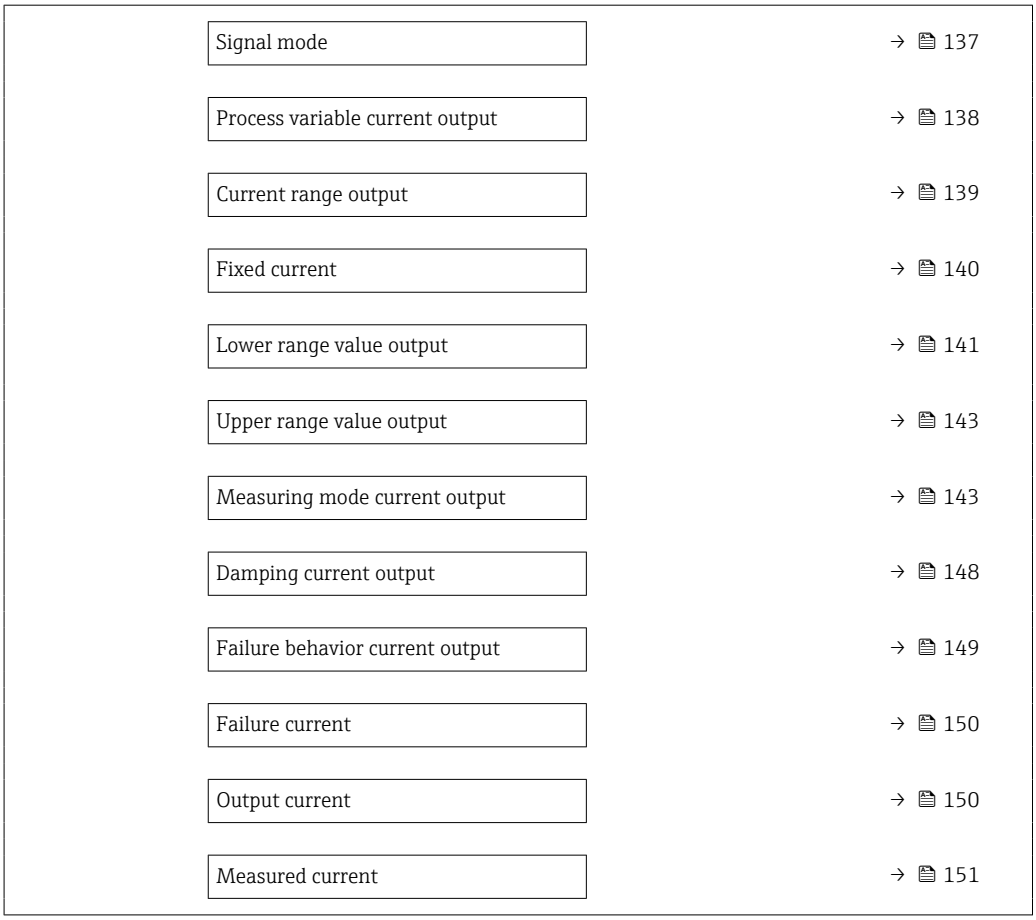
Navigation Expert → Output



3.5.1 "Current output 1 to n" submenu

Navigation Expert → Output → Curr.output 1 to n





Terminal number

Navigation Expert → Output → Curr.output 1 to n → Terminal no. (0379–1 to n)

Description Displays the terminal numbers used by the current output module.

User interface
- Not used
- 26-27 (I/O 1)
- 24-25 (I/O 2)
- 22-23 (I/O 3)

Additional information *"Not used" option*

The current output module does not use any terminal numbers.

Signal mode

Navigation Expert → Output → Curr.output 1 to n → Signal mode (0377–1 to n)

Description Use this function to select the signal mode for the current output.

Selection
- Active *
- Passive *

Factory setting Active

Process variable current output

Navigation Expert → Output → Curr.output 1 to n → Proc.var. outp (0359–1 to n)

Description Use this function to select a process variable for the current output.

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 21)

Selection
- Off *
- Mass flow
- Volume flow
- Corrected volume flow *
- Density
- Reference density *
- Temperature
- Pressure
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Reference density alternative *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Concentration *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Reference density alternative *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *

* Visibility depends on order options or device settings

- Oil corrected volume flow *
- Water corrected volume flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Application specific output 0 *
- Application specific output 1 *
- Inhomogeneous medium index
- Suspended bubbles index *
- Raw value mass flow
- Exciter current 0
- Oscillation damping 0
- Oscillation damping fluctuation 0 *
- Oscillation frequency 0
- Frequency fluctuation 0 *
- Signal asymmetry
- Torsion signal asymmetry *
- Carrier pipe temperature *
- Frequency fluctuation 0 *
- Oscillation amplitude 0 *
- Oscillation damping fluctuation 0 *
- Electronics temperature
- Sensor index coil asymmetry
- Test point 0
- Test point 1

Factory setting Mass flow

Current range output

Navigation Expert → Output → Curr.output 1 to n → Curr.range out (0353−1 to n)

Description Select current range for process value output and upper/lower level for alarm signal.

Selection
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)
- Fixed value

Factory setting Depends on country:
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)

* Visibility depends on order options or device settings

Additional information

Description

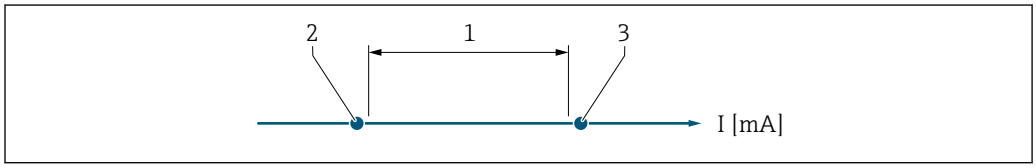
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→ 149).
- If the measured value is outside the measuring range, the ⚠**S441 Current output 1 to n** diagnostic message is displayed.
- The measuring range is specified via the **Lower range value output** parameter (→ 141) and **Upper range value output** parameter (→ 143).

"Fixed current" option

The current value is set via the **Fixed current** parameter (→ 140).

Example

Shows the relationship between the current range for the output of the process value and the two signal on alarm levels:



1 *Current range for process value*
2 *Lower level for signal on alarm*
3 *Upper level for signal on alarm*

Selection

Selection	1	2	3
4...20 mA NE (3.8...20.5 mA)	3.8 to 20.5 mA	< 3.6 mA	> 21.95 mA
4...20 mA US (3.9...20.8 mA)	3.9 to 20.8 mA US	< 3.6 mA	> 21.95 mA
4...20 mA (4... 20.5 mA)	4 to 20.5 mA	< 3.6 mA	> 21.95 mA
0...20 mA (0... 20.5 mA)	0 to 20.5 mA	0 mA	> 21.95 mA

If the flow exceeds or falls below the upper or lower signal on alarm level, the ⚠**S441 Current output 1 to n** diagnostic message is displayed.

Fixed current

Navigation Expert → Output → Curr.output 1 to n → Fixed current (0365-1 to n)

Prerequisite The **Fixed current** option is selected in the **Current span** parameter (→ 139).

Description Use this function to enter a constant current value for the current output.

User entry 0 to 22.5 mA

Factory setting 22.5 mA

Lower range value output

Navigation Expert → Output → Curr.output 1 to n → Low.range outp (0367–1 to n)

Prerequisite One of the following options is selected in the **Current span** parameter (→ 139):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description Use this function to enter a value for the start of measuring range.

User entry Signed floating-point number

Factory setting Depends on country:
- 0 kg/h
- 0 lb/min

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 138). In addition, the value can be greater than or smaller than the value assigned for the 20 mA current in the **Upper range value output** parameter (→ 143).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 138).

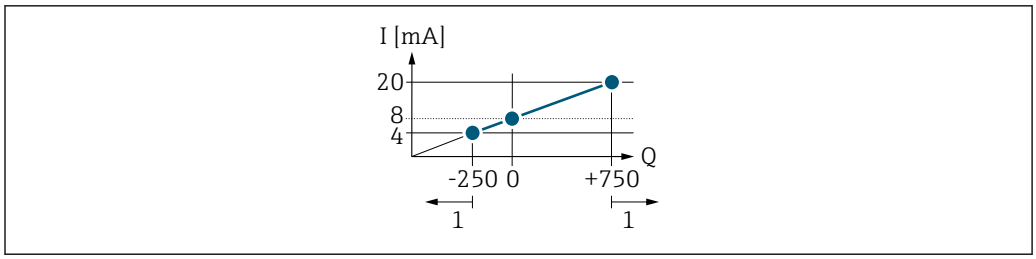
Current output behavior

The current output behaves differently depending on the settings configured in the following parameters:
- Current span (→ 139)
- Failure mode (→ 149)

Configuration examples

Some examples of parameter settings and their effect on the current output are given in the following section.

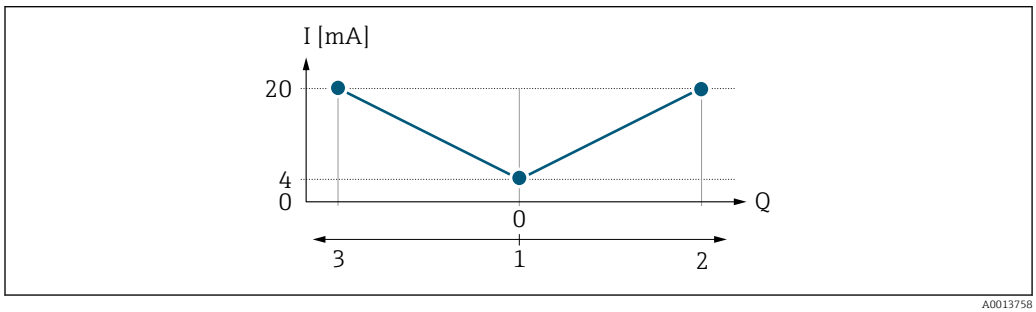
Configuration example A
Measurement mode with **Forward flow** option
- **Lower range value output** parameter (→ 141) = not equal to zero flow (e.g. −250 m^3/h)
- **Upper range value output** parameter (→ 143) = not equal to zero flow (e.g. +750 m^3/h)
- Calculated current value = 8 mA at zero flow



Q Flow
I Current
1 Measuring range is exceeded or undershot

The operational range of the measuring device is defined by the values entered for the **Lower range value output** parameter (→ 141) and **Upper range value output** parameter (→ 143). If the effective flow exceeds or falls below this operational range, the ⚠**S441 Current output 1 to n** diagnostic message is output.

Configuration example B
Measurement mode with **Forward/Reverse flow** option



I Current
Q Flow
1 Start of measuring range output (0/4 mA)
2 Forward flow
3 Reverse flow

The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **Lower range value output** parameter (→ 141) and **Upper range value output** parameter (→ 143) must have the same algebraic sign. The value for the **Upper range value output** parameter (→ 143) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 143) (e.g. forward flow).

Configuration example C
Measurement mode with **Reverse flow compensation** option
If flow is characterized by severe fluctuations (e.g. when using reciprocating pumps), flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s → 143.

Upper range value output

Navigation Expert → Output → Curr.output 1 to n → Upp.range outp (0372–1 to n)

Prerequisite One of the following options is selected in the **Current span** parameter (→ 139):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description Use this function to enter a value for the end of measuring range.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter → 328

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 138). In addition, the value can be greater than or smaller than the value assigned for the 0/4 mA current in the **Lower range value output** parameter (→ 141).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 138).

Example

- Value assigned to 0/4 mA = −250 m^3/h
- Value assigned to 20 mA = +750 m^3/h
- Calculated current value = 8 mA (at zero flow)

If the **Forward/Reverse flow** option is selected in the **Measuring mode** parameter (→ 143), different algebraic signs cannot be entered for the values for the **Lower range value output** parameter (→ 141) and **Upper range value output** parameter (→ 143). The ⚠**S441 Current output 1 to n** diagnostic message is displayed.

Configuration examples

Pay attention to the configuration examples for the **Lower range value output** parameter (→ 141).

Measuring mode current output

Navigation Expert → Output → Curr.output 1 to n → Meas.mode outp (0351–1 to n)

Prerequisite One of the following options is selected in the **Assign current output** parameter (→ 138):
- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *

* Visibility depends on order options or device settings

- Carrier mass flow *
- Density
- Reference density
- Concentration *
- Temperature
- Carrier pipe temperature *
- Electronics temperature
- Oscillation frequency 0
- Oscillation amplitude 0 *
- Frequency fluctuation 0
- Oscillation damping 0
- Oscillation damping fluctuation 0
- Signal asymmetry
- Exciter current 0

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 21)

One of the following options is selected in the **Current span** parameter (→ 139):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description

Use this function to select the measuring mode for the current output.

Selection

- Forward flow
- Forward/Reverse flow *
- Reverse flow compensation

Factory setting

Forward flow

Additional information

Description

The process variable that is assigned to the current output via the **Assign current output** parameter (→ 138) is displayed below the parameter.

"Forward flow" option

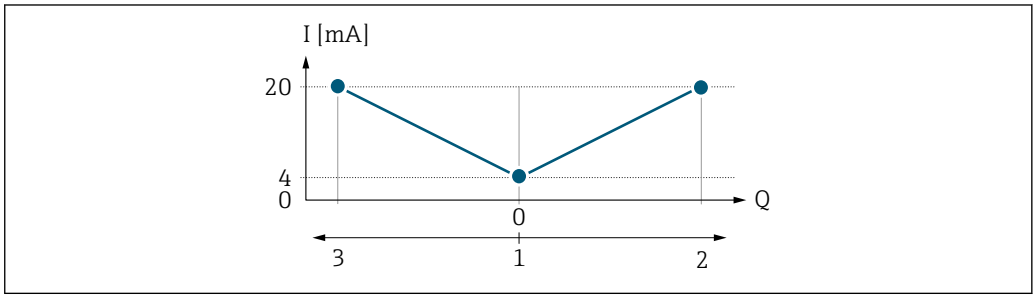
The current output signal is proportional to the process variable assigned. The measuring range is defined by the values that are assigned to the **Lower range value output** parameter (→ 141) and the **Upper range value output** parameter (→ 143).

* Visibility depends on order options or device settings

The flow components outside the scaled measuring range are taken into account for signal output as follows:

- Both values are defined such that they are not equal to zero flow e.g.:
  - start of measuring range = −5 m^3/h
  - end of measuring range = 10 m^3/h
- If the effective flow exceeds or falls below this measuring range, the ⚠**S441 Current output 1 to n** diagnostic message is output.

"Forward/Reverse flow" option



I Current
Q Flow
1 Start of measuring range output (0/4 mA)
2 Forward flow
3 Reverse flow

- The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **Lower range value output** parameter (→ 🖹 141) and **Upper range value output** parameter (→ 🖹 143) must have the same algebraic sign.
- The value for the **Upper range value output** parameter (→ 🖹 143) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 🖹 143) (e.g. forward flow).

"Reverse flow compensation" option

The **Reverse flow compensation** option is primarily used to compensate for intermittent backflow that can arise with displacement pumps due to wear or high-viscosity medium. The reverse flow is recorded in a buffer memory and offset against the next forward flow.

If buffering cannot be processed within approx. 60 s, the ⚠**S441 Current output 1 to n** diagnostic message is displayed.

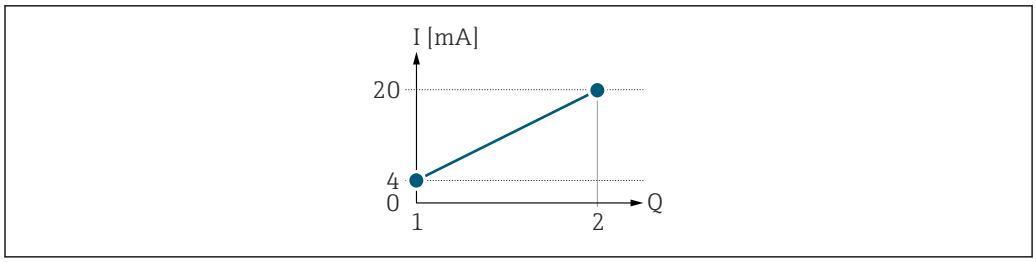
In the event of prolonged and undesired reverse flow, flow values can accumulate in the buffer memory. Due to the configuration of the current output, these values are not factored in, however, i.e. there is no compensation for the reverse flow.

If this option is set, the measuring device does not smoothen the flow signal. The flow signal is not attenuated.

Examples of how the current output behaves

Example 1

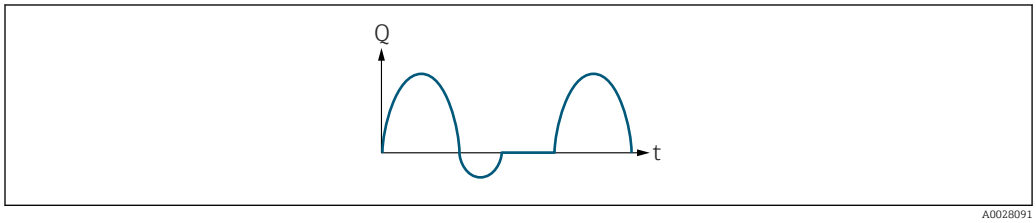
Defined measuring range: lower range value and upper range value with the **same** sign



4 Measuring range

I Current
Q Flow
1 Lower range value (Start of measuring range output)
2 Upper range value (end of measuring range output)

With the following flow response:

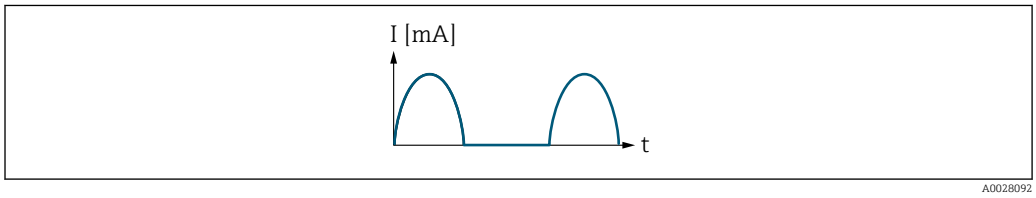


5 Flow response

Q Flow
t Time

With **Forward flow** option

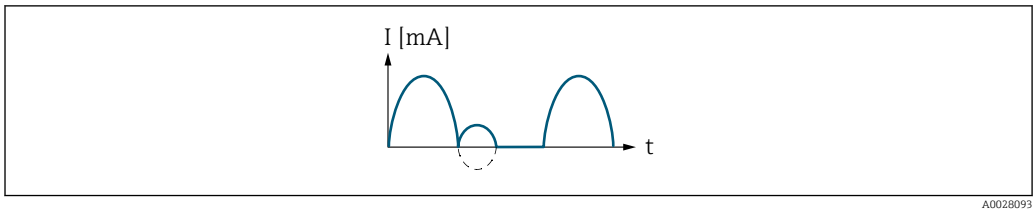
The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output:.



I Current
t Time

With **Forward/Reverse flow** option

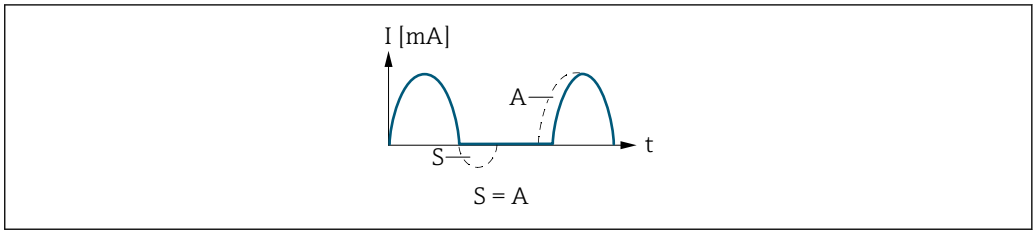
The current output signal is independent of the direction of flow.



I Current
t Time

With **Reverse flow compensation** option

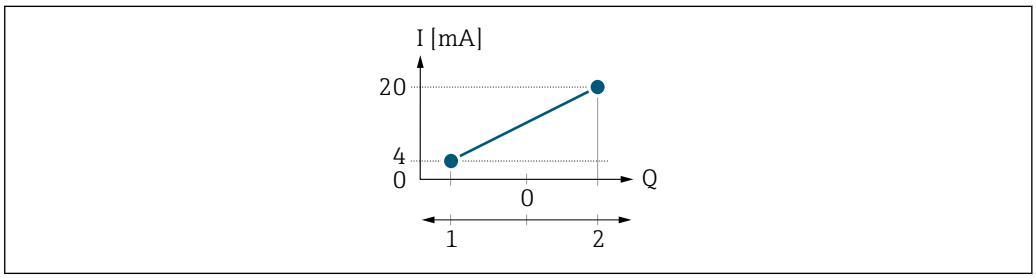
Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.



I *Current*
t *Time*
S *Flow components saved*
A *Balancing of saved flow components*

Example 2

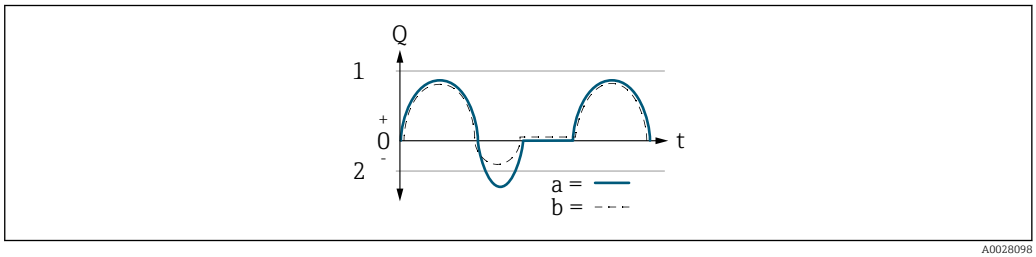
Defined measuring range: lower range value and upper range value with **different** signs



6 *Measuring range*

I *Current*
Q *Flow*
1 *Lower range value (Start of measuring range output)*
2 *Upper range value (end of measuring range output)*

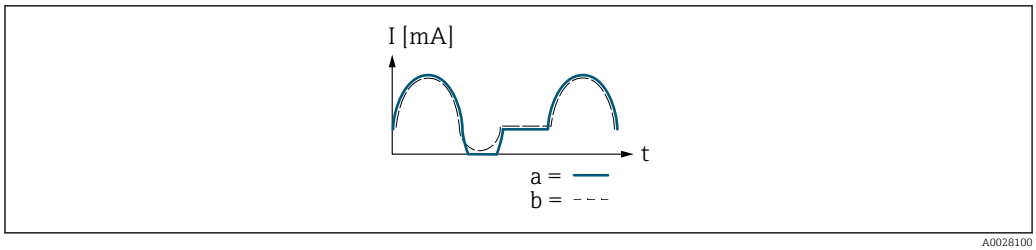
With flow a (–) outside, b (- -) inside the measuring range



Q *Flow*
t *Time*
1 *Lower range value (Start of measuring range output)*
2 *Upper range value (end of measuring range output)*

With **Forward flow** option

- a (–): The flow components outside the scaled measuring range cannot be taken into account for signal output.
  The ⚠**S441 Current output 1 to n** diagnostic message is output.
- b (- -): The current output signal is proportional to the process variable assigned.



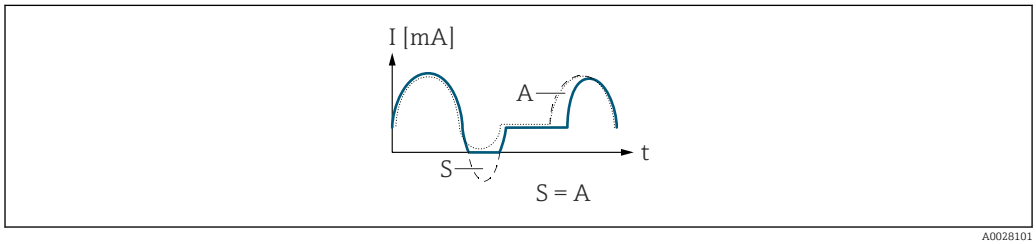
I *Current*
t *Time*

With **Forward/Reverse flow** option

This option cannot be selected here since the values for the **Lower range value output** parameter (→ 141) and **Upper range value output** parameter (→ 143) have different algebraic signs.

With **Reverse flow compensation** option

Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.



I *Current*
t *Time*
S *Flow components saved*
A *Balancing of saved flow components*

Damping current output

Navigation Expert → Output → Curr.output 1 to n → Damp.curr.outp (0363–1 to n)

Prerequisite A process variable is selected in the **Assign current output** parameter (→ 138) and one of the following options is selected in the **Current span** parameter (→ 139):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description Use this function to enter a time constant for the reaction time of the current output signal to fluctuations in the measured value caused by process conditions.

User entry 0.0 to 999.9 s

Factory setting 1.0 s

Additional information *User entry*

Use this function to enter a time constant (PT1 element [6]) for current output damping:
- If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables.
- On the other hand, the current output reacts more slowly if a high time constant is entered.

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

Failure behavior current output

Navigation Expert → Output → Curr.output 1 to n → Fail.behav.out (0364–1 to n)

Prerequisite A process variable is selected in the **Assign current output** parameter (→ 138) and one of the following options is selected in the **Current span** parameter (→ 139):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description Use this function to select the value of the current output in the event of a device alarm.

Selection
- Min.
- Max.
- Last valid value
- Actual value
- Fixed value

Factory setting Max.

6) proportional transmission behavior with first order delay

Additional information

Description

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

"Min." option

The current output adopts the value of the lower level for signal on alarm.

The signal on alarm level is defined via the **Current span** parameter (→ 139).

"Max." option

The current output adopts the value of the upper level for signal on alarm.

The signal on alarm level is defined via the **Current span** parameter (→ 139).

"Last valid value" option

The current output adopts the last measured value that was valid before the device alarm occurred.

"Actual value" option

The current output adopts the measured value on the basis of the current flow measurement; the device alarm is ignored.

"Defined value" option

The current output adopts a defined measured value.

The measured value is defined via the **Failure current** parameter (→ 150).

Failure current

Navigation Expert → Output → Curr.output 1 to n → Fail. current (0352–1 to n)

Prerequisite The **Defined value** option is selected in the **Failure mode** parameter (→ 149).

Description Use this function to enter a fixed value that the current output adopts in the event of a device alarm.

User entry 0 to 22.5 mA

Factory setting 22.5 mA

Output current

Navigation Expert → Output → Curr.output 1 to n → Output curr. (0361–1 to n)

Description Displays the current value currently calculated for the current output.

User interface 3.59 to 22.5 mA

Measured current

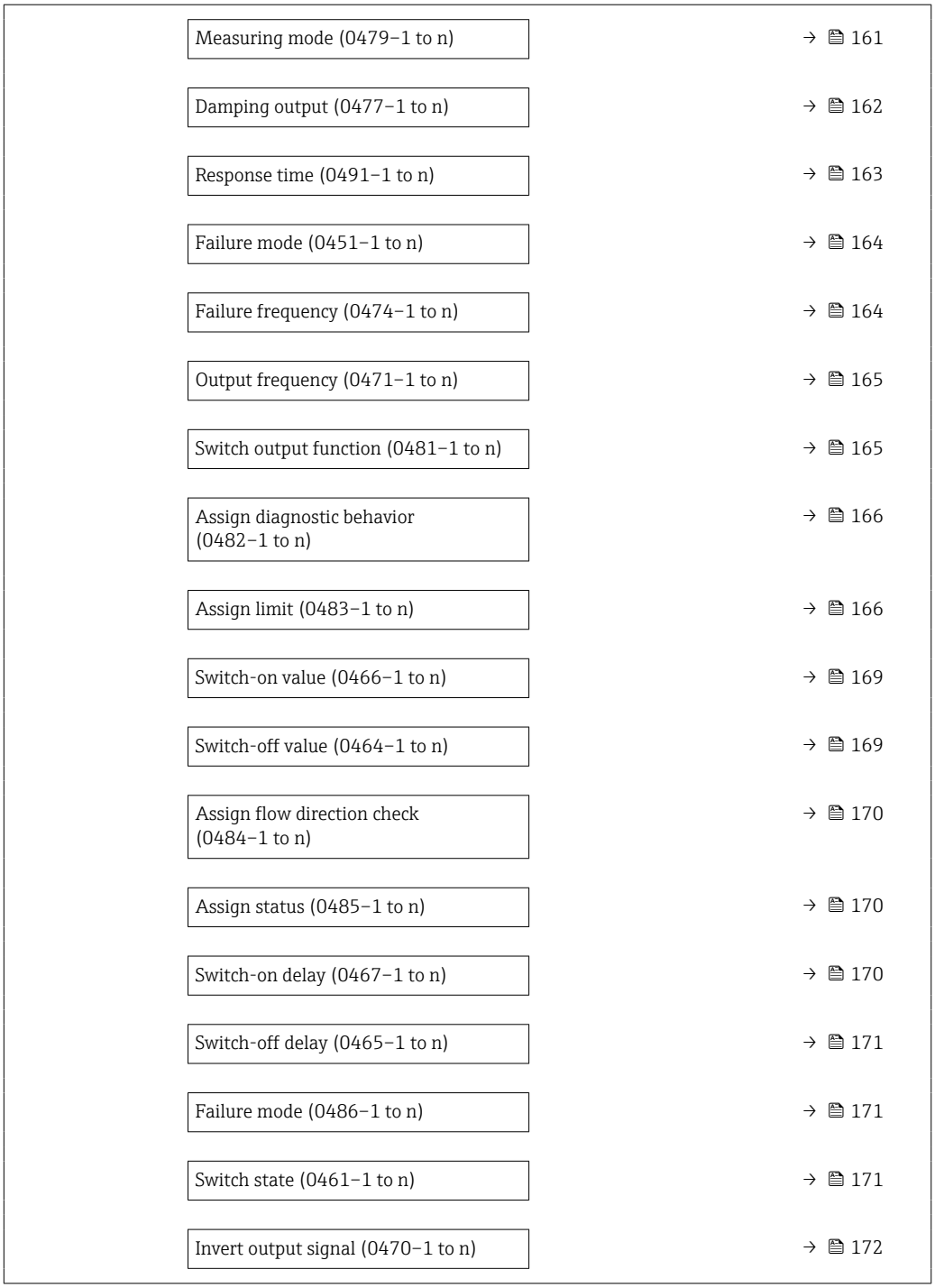
Navigation Expert → Output → Curr.output 1 to n → Measur. curr. (0366–1 to n)

Description Displays the actual measured value of the output current.

User interface 0 to 30 mA

3.5.2 "Pulse/frequency/switch output 1 to n" submenu

Navigation Expert → Output → PFS output 1 to n



Terminal number

Navigation Expert → Output → PFS output 1 to n → Terminal no. (0492–1 to n)

Description Displays the terminal numbers used by the pulse/frequency/switch output module.

User interface
- Not used
- 24-25 (I/O 2)
- 22-23 (I/O 3)

Additional information *"Not used" option*

The pulse/frequency/switch output module does not use any terminal numbers.

Signal mode

Navigation Expert → Output → PFS output 1 to n → Signal mode (0490–1 to n)

Description Use this function to select the signal mode for the pulse/frequency/switch output.

Selection
- Passive
- Active *
- Passive NE

Factory setting Passive

Operating mode

Navigation Expert → Output → PFS output 1 to n → Operating mode (0469–1 to n)

Description Use this function to select the operating mode of the output as a pulse, frequency or switch output.

Selection
- Pulse
- Frequency
- Switch

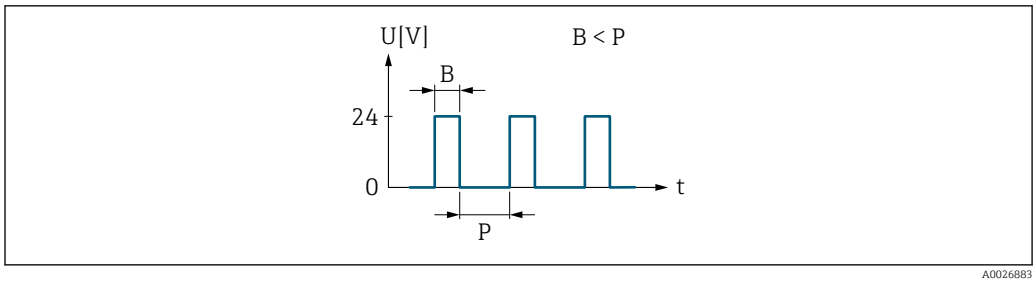
Factory setting Pulse

Additional information *"Pulse" option*

Quantity-dependent pulse with configurable pulse width
- Whenever a specific mass, volume, corrected volume, target mass or carrier mass is reached (pulse value), a pulse is output, the duration of which was set previously (pulse width).
- The pulses are never shorter than the set duration.

Example
- Flow rate approx. 100 g/s
- Pulse value 0.1 g
- Pulse width 0.05 ms
- Pulse rate 1 000 Impuls/s

* Visibility depends on order options or device settings



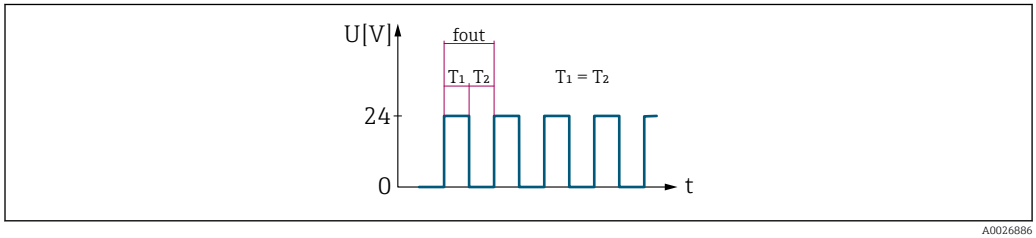
7 Quantity-proportional pulse (pulse value) with pulse width to be configured

B Pulse width entered
P Pauses between the individual pulses

"Frequency" option

Flow-proportional frequency output with on/off ratio of 1:1
An output frequency is output that is proportional to the value of a process variable, such as mass flow, volume flow, corrected volume flow, target mass flow, carrier mass flow, density, reference density, concentration, temperature, carrier tube temperature, electronics temperature, oscillation frequency, frequency fluctuation, oscillation amplitude, oscillation damping, oscillation damping fluctuation, signal asymmetry or excitation current.

Example
- Flow rate approx. 100 g/s
- Max. frequency 10 kHz
- Flow rate at max. frequency 1 000 g/s
- Output frequency approx. 1 000 Hz

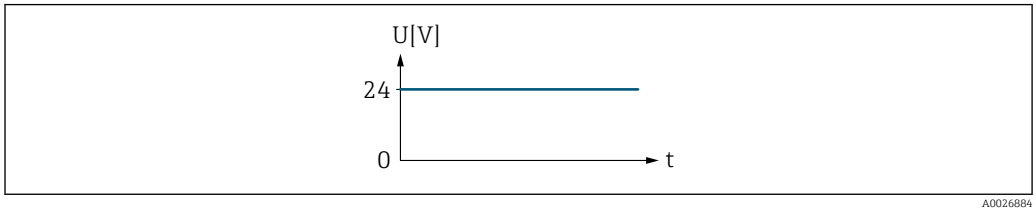


8 Flow-proportional frequency output

"Switch" option

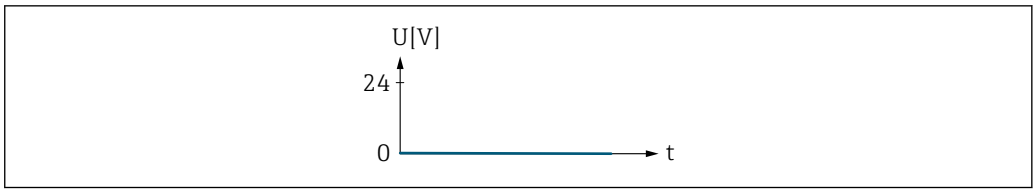
Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)

Example
Alarm response without alarm



9 No alarm, high level

Example
Alarm response in case of alarm



10 Alarm, low level

Assign pulse output

Navigation Expert → Output → PFS output 1 to n → Assign pulse (0460–1 to n)

Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 153).

Description Use this function to select the process variable for the pulse output.

Selection
- Off
- Mass flow
- Volume flow
- Corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *

Factory setting Off

Pulse scaling

Navigation Expert → Output → PFS output 1 to n → Pulse scaling (0455–1 to n)

Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 153) and a process variable is selected in the **Assign pulse output** parameter (→ 155).

Description Use this function to enter the value for the measured value that a pulse is equivalent to.

* Visibility depends on order options or device settings

User entry Positive floating point number

Factory setting Depends on country and nominal diameter→ 328

Additional information *User entry*

Weighting of the pulse output with a quantity.

The lower the pulse value, the
- better the resolution.
- the higher the frequency of the pulse response.

Pulse width

Navigation Expert → Output → PFS output 1 to n → Pulse width (0452–1 to n)

Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 153) and a process variable is selected in the **Assign pulse output** parameter (→ 155).

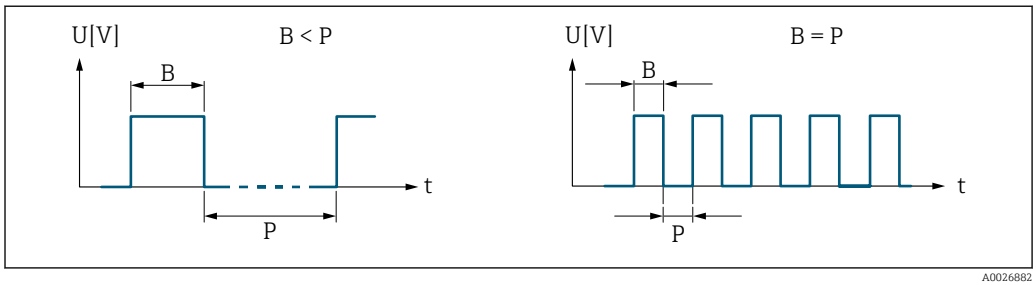
Description Use this function to enter the duration of the output pulse.

User entry 0.05 to 2 000 ms

Factory setting 100 ms

Additional information *Description*

- Define how long a pulse is (duration).
- The maximum pulse rate is defined by f_{max} = 1 / (2 × pulse width).
- The interval between two pulses lasts at least as long as the set pulse width.
- The maximum flow is defined by Q_{max} = f_{max} × pulse value.
- If the flow exceeds these limit values, the measuring device displays the **443 Pulse output 1 to n** diagnostic message.



B Pulse width entered
P Pauses between the individual pulses

Example

- Pulse value: 0.1 g
- Pulse width: 0.1 ms
- f_{max}: 1 / (2 × 0.1 ms) = 5 kHz
- Q_{max}: 5 kHz × 0.1 g = 0.5 kg/s

Measuring mode

Navigation Expert → Output → PFS output 1 to n → Measuring mode (0457–1 to n)

Prerequisite In the **Operating mode** parameter (→ 153), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse output** parameter (→ 155):
- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *
- Carrier mass flow *

Description Use this function to select the measuring mode for the pulse output.

Selection
- Forward flow
- Forward/Reverse flow
- Reverse flow
- Reverse flow compensation

Factory setting Forward flow

Additional information *Selection*
- Forward flow
  Positive flow is output, negative flow is not output.
- Forward/Reverse flow
  Positive and negative flow are output (absolute value), but a distinction is not made between positive and negative flow.
- Reverse flow
  Negative flow is output, positive flow is not output.
- Reverse flow compensation
  The flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s.

For a detailed description of the options available, see the **Measuring mode** parameter (→ 143)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 143)

Failure mode

Navigation Expert → Output → PFS output 1 to n → Failure mode (0480–1 to n)

Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 153) and a process variable is selected in the **Assign pulse output** parameter (→ 155).

Description Use this function to select the failure mode of the pulse output in the event of a device alarm.

* Visibility depends on order options or device settings

Selection
- Actual value
- No pulses

Factory setting
No pulses

Additional information
Description

The dictates of safety render it advisable to ensure that the pulse output shows a predefined behavior in the event of a device alarm.

Selection
- Actual value
  In the event of a device alarm, the pulse output continues on the basis of the current flow measurement. The fault is ignored.
- No pulses
  In the event of a device alarm, the pulse output is "switched off".

NOTICE! A device alarm is a measuring device error that must be taken seriously. It can affect the measurement quality such that the quality can no longer be guaranteed. The **Actual value** option is only recommended if it can be guaranteed that all possible alarm conditions will not affect the measurement quality.

Pulse output 1 to n

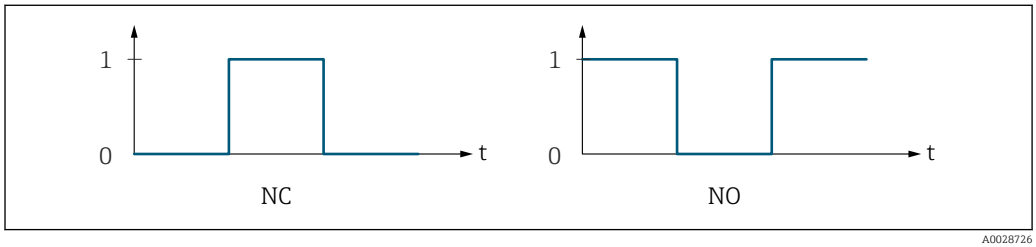
Navigation
Expert → Output → PFS output 1 to n → Pulse output 1 to n (0456–1 to n)

Prerequisite
The **Pulse** option is selected in the **Operating mode** parameter (→ 153) parameter.

Description
Displays the pulse frequency currently output.

User interface
Positive floating-point number

Additional information
Description
- The pulse output is an open collector output.
- This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented.



0 Non-conductive
1 Conductive
NC NC contact (normally closed)
NO NO contact (normally open)

The output behavior can be reversed via the **Invert output signal** parameter (→ 172) i.e. the transistor does not conduct for the duration of the pulse.

In addition, the behavior of the output in the event of a device alarm (**Failure mode** parameter (→ 157)) can be configured.

Assign frequency output

Navigation Expert → Output → PFS output 1 to n → Assign freq. (0478–1 to n)

Prerequisite In the **Operating mode** parameter (→ 153), the **Frequency** option is selected.

Description Use this function to select the process variable for the frequency output.

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 21)

Selection

- Off
- Mass flow
- Volume flow
- Corrected volume flow *
- Density
- Reference density *
- Time period signal frequency (TPS) *
- Temperature
- Pressure
- Concentration *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Application specific output 0 *
- Application specific output 1 *
- Inhomogeneous medium index
- Suspended bubbles index *
- HBSI *
- Raw value mass flow
- Exciter current 0
- Oscillation damping 0
- Oscillation damping fluctuation 0 *
- Oscillation frequency 0
- Frequency fluctuation 0 *
- Oscillation amplitude 0 *
- Signal asymmetry
- Torsion signal asymmetry *
- Carrier pipe temperature *
- Electronics temperature
- Sensor index coil asymmetry
- Test point 0
- Test point 1

Factory setting Off

* Visibility depends on order options or device settings

Minimum frequency value

Navigation Expert → Output → PFS output 1 to n → Min. freq. value (0453–1 to n)

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 153) and a process variable is selected in the **Assign frequency output** parameter (→ 159).

Description Use this function to enter the minimum frequency.

User entry 0.0 to 10 000.0 Hz

Factory setting 0.0 Hz

Maximum frequency value

Navigation Expert → Output → PFS output 1 to n → Max. freq. value (0454–1 to n)

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 153) and a process variable is selected in the **Assign frequency output** parameter (→ 159).

Description Use this function to enter the end value frequency.

User entry 0.0 to 10 000.0 Hz

Factory setting 10 000.0 Hz

Measuring value at minimum frequency

Navigation Expert → Output → PFS output 1 to n → Val. at min.freq (0476–1 to n)

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 153) and a process variable is selected in the **Assign frequency output** parameter (→ 159).

Description Use this function to enter the measured value for the start value frequency.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter

Additional information *Dependency*

The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 159).

Measuring value at maximum frequency

Navigation Expert → Output → PFS output 1 to n → Val. at max.freq (0475–1 to n)

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 153) and a process variable is selected in the **Assign frequency output** parameter (→ 159).

Description Use this function to enter the measured value for the end value frequency.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter

Additional information

Description

Use this function to enter the maximum measured value at the maximum frequency. The selected process variable is output as a proportional frequency.

Dependency

The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 159).

Measuring mode

Navigation Expert → Output → PFS output 1 to n → Measuring mode (0479–1 to n)

Prerequisite In the **Operating mode** parameter (→ 153), the **Frequency** option is selected, and one of the following options is selected in the **Assign frequency output** parameter (→ 159):

- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *
- Carrier mass flow *
- Density
- Reference density
- Concentration *
- Temperature
- Carrier pipe temperature *
- Electronics temperature
- Oscillation frequency 0
- Frequency fluctuation 0
- Oscillation amplitude 0 *
- Oscillation damping 0
- Oscillation damping fluctuation 0
- Signal asymmetry
- Exciter current 0

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 21)

* Visibility depends on order options or device settings

Description Use this function to select the measuring mode for the frequency output.

Selection
- Forward flow
- Forward/Reverse flow
- Reverse flow compensation

Factory setting Forward flow

Additional information

Selection

For a detailed description of the options available, see the **Measuring mode** parameter (→ 143)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 143)

Damping output

Navigation Expert → Output → PFS output 1 to n → Damping out. (0477–1 to n)

Prerequisite In the **Operating mode** parameter (→ 153), the **Frequency** option is selected, and one of the following options is selected in the **Assign frequency output** parameter (→ 159):
- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *
- Carrier mass flow *
- Density
- Reference density
- Concentration *
- Temperature
- Carrier pipe temperature *
- Electronics temperature
- Oscillation frequency 0
- Frequency fluctuation 0
- Oscillation amplitude 0 *
- Oscillation damping 0
- Oscillation damping fluctuation 0
- Signal asymmetry
- Exciter current 0

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 21)

Description Use this function to enter a time constant for the reaction time of the output signal to fluctuations in the measured value.

User entry 0 to 999.9 s

Factory setting 0.0 s

* Visibility depends on order options or device settings

Additional information *User entry*

Use this function to enter a time constant (PT1 element [7]) for frequency output damping:
- If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables.
- On the other hand, the current output reacts more slowly if a high time constant is entered.

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

The frequency output is subject to separate damping that is independent of all preceding time constants.

Response time

Navigation Expert → Output → PFS output 1 to n → Response time (0491–1 to n)

Prerequisite In the **Operating mode** parameter (→ 153), the **Frequency** option is selected, and one of the following options is selected in the **Assign frequency output** parameter (→ 159):
- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *
- Carrier mass flow *
- Density
- Reference density
- Concentration *
- Temperature
- Carrier pipe temperature *
- Electronics temperature
- Oscillation frequency 0
- Frequency fluctuation 0
- Oscillation amplitude 0 *
- Oscillation damping 0
- Oscillation damping fluctuation 0
- Signal asymmetry
- Exciter current 0

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 21)

Description Displays the response time. This specifies how quickly the pulse/frequency/switch output reaches the measured value change of 63 % of 100 % of the measured value change.

User interface Positive floating-point number

7) proportional transmission behavior with first order delay
* Visibility depends on order options or device settings

Additional information *Description*

The response time is made up of the time specified for the following dampings:
- Damping of pulse/frequency/switch output → 148
  and
- Depending on the measured variable assigned to the output.
  - Flow damping
    or
  - Density damping
    or
  - Temperature damping

Failure mode

Navigation Expert → Output → PFS output 1 to n → Failure mode (0451–1 to n)

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 153) and a process variable is selected in the **Assign frequency output** parameter (→ 159).

Description Use this function to select the failure mode of the frequency output in the event of a device alarm.

Selection
- Actual value
- Defined value
- 0 Hz

Factory setting 0 Hz

Additional information *Selection*
- Actual value
  In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The device alarm is ignored.
- Defined value
  In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure frequency (→ 164) replaces the current measured value, making it possible to bypass the device alarm. The actual measurement is switched off for the duration of the device alarm.
- 0 Hz
  In the event of a device alarm, the frequency output is "switched off".

NOTICE! A device alarm is a measuring device error that must be taken seriously. It can affect the measurement quality such that the quality can no longer be guaranteed. The **Actual value** option is only recommended if it can be guaranteed that all possible alarm conditions will not affect the measurement quality.

Failure frequency

Navigation Expert → Output → PFS output 1 to n → Failure freq. (0474–1 to n)

Prerequisite In the **Operating mode** parameter (→ 153), the **Frequency** option is selected, in the **Assign frequency output** parameter (→ 159) a process variable is selected, and in the **Failure mode** parameter (→ 164), the **Defined value** option is selected.

Description Use this function to enter the value for the frequency output in the event of a device alarm in order to bypass the alarm.

User entry 0.0 to 12 500.0 Hz

Factory setting 0.0 Hz

Output frequency

Navigation Expert → Output → PFS output 1 to n → Output freq. (0471–1 to n)

Prerequisite In the **Operating mode** parameter (→ 153), the **Frequency** option is selected.

Description Displays the actual value of the output frequency which is currently measured.

User interface 0.0 to 12 500.0 Hz

Switch output function

Navigation Expert → Output → PFS output 1 to n → Switch out funct (0481–1 to n)

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 153).

Description Use this function to select a function for the switch output.

Selection
- Off
- On
- Diagnostic behavior
- Limit
- Flow direction check
- Status

Factory setting Off

Additional information *Selection*
- Off
  The switch output is permanently switched off (open, non-conductive).
- On
  The switch output is permanently switched on (closed, conductive).
- Diagnostic behavior
  Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level.

- Limit
  Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level.
- Flow direction check
  Indicates the flow direction (forward or reverse flow).
- Status
  Displays the device status depending on whether empty pipe detection or low flow cut off is selected.

Assign diagnostic behavior

Navigation Expert → Output → PFS output 1 to n → Assign diag. beh (0482–1 to n)

Prerequisite
- In the **Operating mode** parameter (→ 153), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 165), the **Diagnostic behavior** option is selected.

Description Use this function to select the diagnostic event category that is displayed for the switch output.

Selection
- Alarm
- Alarm or warning
- Warning

Factory setting Alarm

Additional information

Description

If no diagnostic event is pending, the switch output is closed and conductive.

Selection
- Alarm
  The switch output signals only diagnostic events in the alarm category.
- Alarm or warning
  The switch output signals diagnostic events in the alarm and warning category.
- Warning
  The switch output signals only diagnostic events in the warning category.

Assign limit

Navigation Expert → Output → PFS output 1 to n → Assign limit (0483–1 to n)

Prerequisite
- In the **Operating mode** parameter (→ 153), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 165), the **Limit** option is selected.

Description Use this function to select a process variable for the limit function.

Selection

- Mass flow
- Volume flow
- Corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Density
- Reference density *
- Reference density alternative *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Concentration *
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Oscillation damping
- Pressure
- Application specific output 0 *
- Application specific output 1 *
- Inhomogeneous medium index
- Suspended bubbles index *

Factory setting

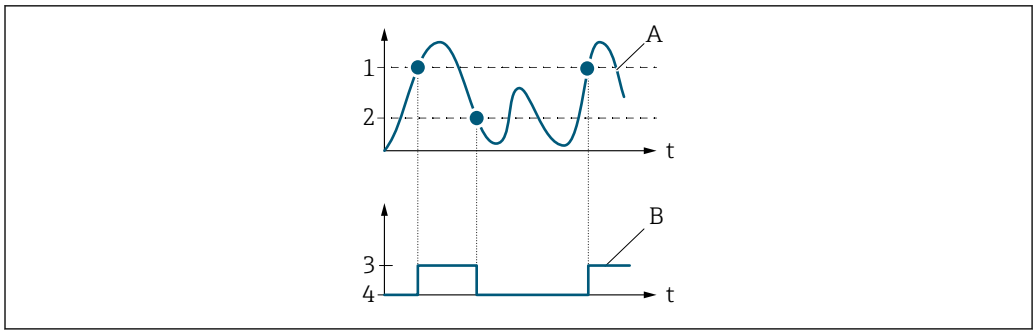
Volume flow

Additional information

Description

Behavior of status output when Switch-on value > Switch-off value:
- Process variable > Switch-on value: transistor is conductive
- Process variable < Switch-off value: transistor is non-conductive

* Visibility depends on order options or device settings



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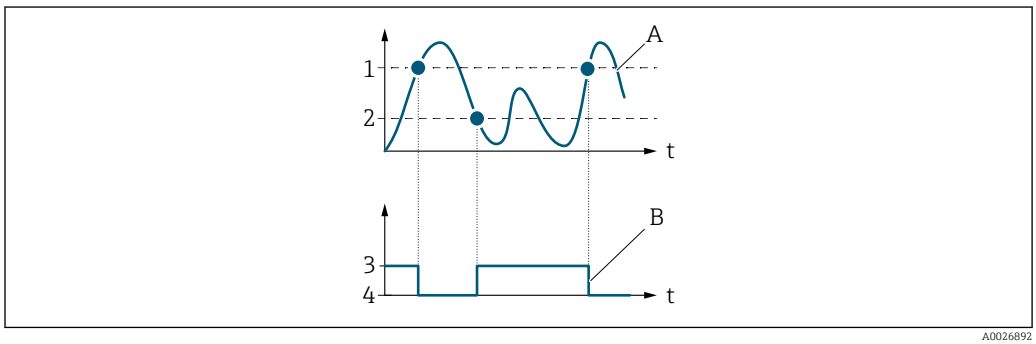
1 Switch-on value
2 Switch-off value
3 Conductive
4 Non-conductive
A Process variable
B Status output

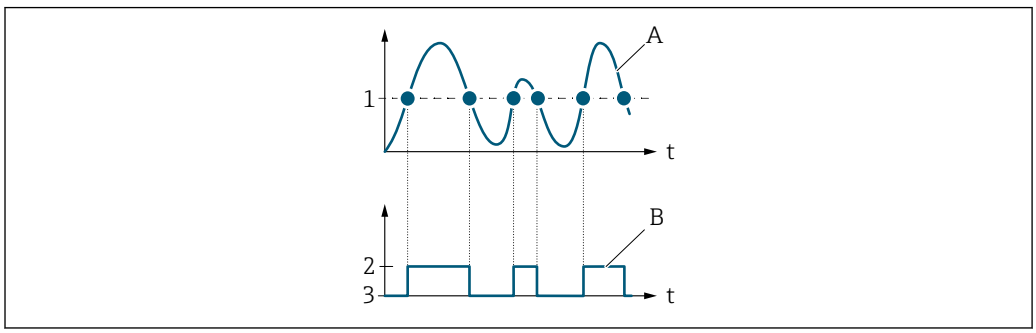
Behavior of status output when Switch-on value < Switch-off value:
- Process variable < Switch-on value: transistor is conductive
- Process variable > Switch-off value: transistor is non-conductive



A0026892

1 Switch-off value
2 Switch-on value
3 Conductive
4 Non-conductive
A Process variable
B Status output

Behavior of status output when Switch-on value = Switch-off value:
- Process variable > Switch-on value: transistor is conductive
- Process variable < Switch-off value: transistor is non-conductive



A0026893

1 Switch-on value = Switch-off value
2 Conductive
3 Non-conductive
A Process variable
B Status output

Switch-on value

Navigation Expert → Output → PFS output 1 to n → Switch-on value (0466–1 to n)

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 153).
- The **Limit** option is selected in the **Switch output function** parameter (→ 165).

Description Use this function to enter the measured value for the switch-on point.

User entry Signed floating-point number

Factory setting Country-specific:
- 0 kg/h
- 0 lb/min

Additional information

Description

Use this function to enter the limit value for the switch-on value (process variable > switch-on value = closed, conductive).

When using a hysteresis: Switch-on value > Switch-off value.

Dependency

The unit depends on the process variable selected in the **Assign limit** parameter (→ 166).

Switch-off value

Navigation Expert → Output → PFS output 1 to n → Switch-off value (0464–1 to n)

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 153).
- The **Limit** option is selected in the **Switch output function** parameter (→ 165).

Description Use this function to enter the measured value for the switch-off point.

User entry Signed floating-point number

Factory setting Country-specific:
- 0 kg/h
- 0 lb/min

Additional information

Description

Use this function to enter the limit value for the switch-off value (process variable < switch-off value = open, non-conductive).

When using a hysteresis: Switch-on value > Switch-off value.

Dependency

The unit depends on the process variable selected in the **Assign limit** parameter (→ 166).

Assign flow direction check

Navigation Expert → Output → PFS output 1 to n → Assign dir.check (0484–1 to n)

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 153).
- The **Flow direction check** option is selected in the **Switch output function** parameter (→ 165).

Description Use this function to select a process variable for monitoring the flow direction.

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

Factory setting Mass flow

Assign status

Navigation Expert → Output → PFS output 1 to n → Assign status (0485–1 to n)

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 153).
- The **Status** option is selected in the **Switch output function** parameter (→ 165).

Description Use this function to select a device status for the switch output.

Selection
- Partially filled pipe detection
- Low flow cut off
- Binary output *
- Binary output *
- Binary output *

Factory setting Partially filled pipe detection

Additional information *Selection*

If empty pipe detection or low flow cut off are active, the output is conductive. Otherwise, the switch output is non-conductive.

Switch-on delay

Navigation Expert → Output → PFS output 1 to n → Switch-on delay (0467–1 to n)

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 153).
- The **Limit** option is selected in the **Switch output function** parameter (→ 165).

Description Use this function to enter a delay time for switching on the switch output.

* Visibility depends on order options or device settings

User entry 0.0 to 100.0 s

Factory setting 0.0 s

Switch-off delay

Navigation Expert → Output → PFS output 1 to n → Switch-off delay (0465–1 to n)

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 153).
- The **Limit** option is selected in the **Switch output function** parameter (→ 165).

Description Use this function to enter a delay time for switching off the switch output.

User entry 0.0 to 100.0 s

Factory setting 0.0 s

Failure mode

Navigation Expert → Output → PFS output 1 to n → Failure mode (0486–1 to n)

Description Use this function to select a failsafe mode for the switch output in the event of a device alarm.

Selection
- Actual status
- Open
- Closed

Factory setting Open

Additional information *Options*
- Actual status
  In the event of a device alarm, faults are ignored and the current behavior of the input value is output by the switch output. The **Actual status** option behaves in the same way as the current input value.
- Open
  In the event of a device alarm, the switch output's transistor is set to **non-conductive**.
- Closed
  In the event of a device alarm, the switch output's transistor is set to **conductive**.

Switch state

Navigation Expert → Output → PFS output 1 to n → Switch state (0461–1 to n)

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 153).

Description Displays the current switch status of the status output.

User interface
- Open
- Closed

Additional information *User interface*
- Open
  The switch output is not conductive.
- Closed
  The switch output is conductive.

Invert output signal

Navigation Expert → Output → PFS output 1 to n → Invert outp.sig. (0470–1 to n)

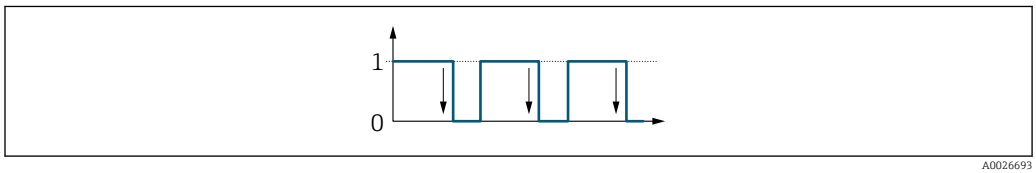
Description Use this function to select whether to invert the output signal.

Selection
- No
- Yes

Factory setting No

Additional information *Selection*

No option (passive - negative)



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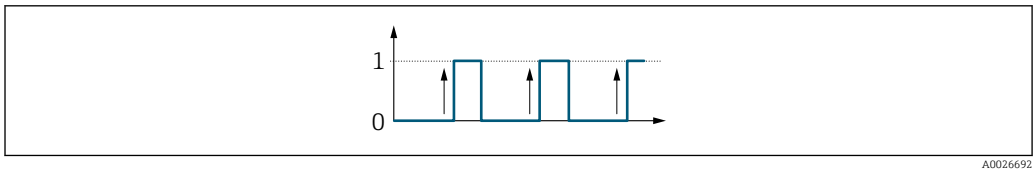
Yes option (passive - positive)



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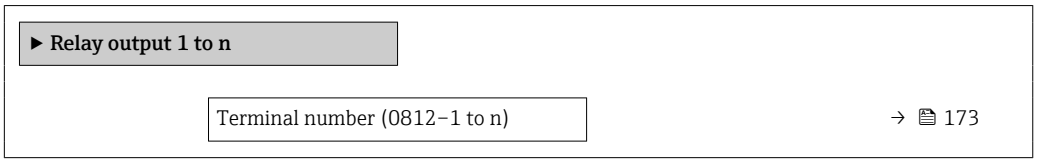
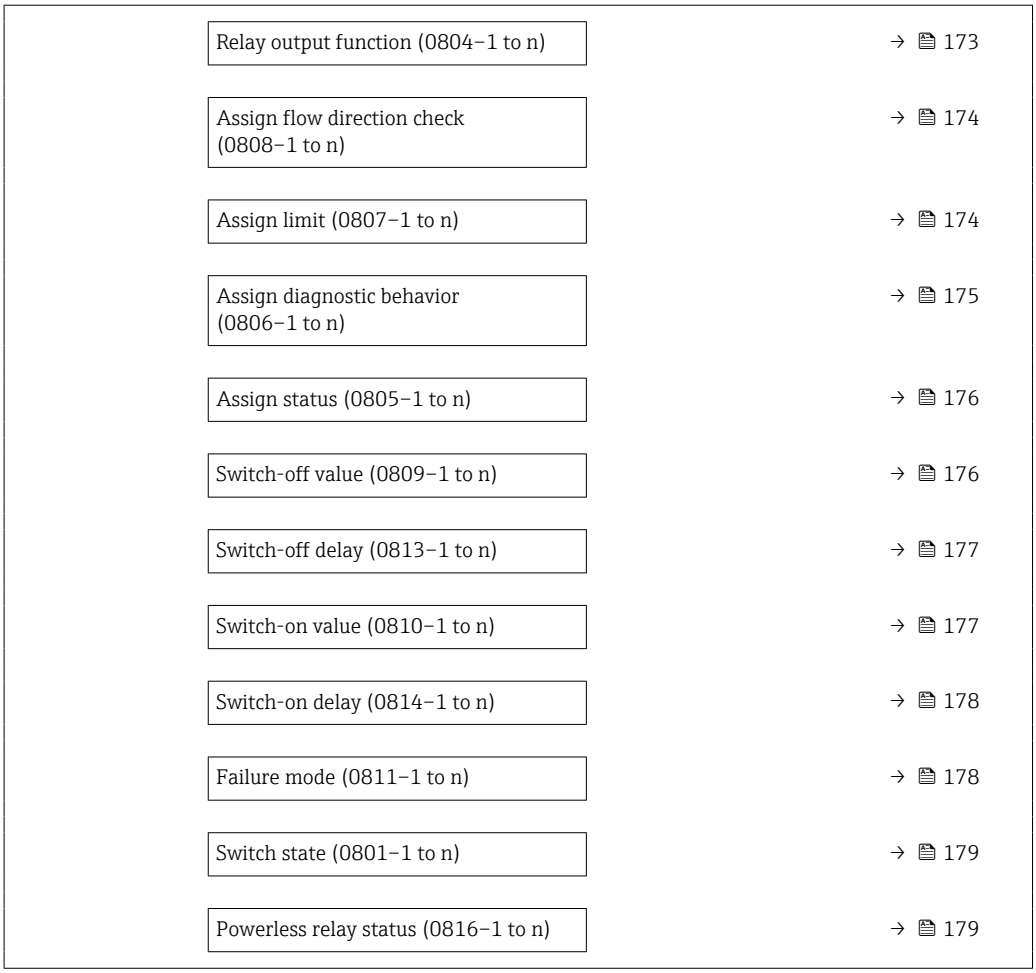
3.5.3 "Relay output 1 to n" submenu

Navigation Expert → Output → Relay output 1 to n





Terminal number

Navigation Expert → Output → Relay output 1 to n → Terminal no. (0812–1 to n)

Description Displays the terminal numbers used by the relay output module.

User interface
- Not used
- 24-25 (I/O 2)
- 22-23 (I/O 3)

Additional information *"Not used" option*

The relay output module does not use any terminal numbers.

Relay output function

Navigation Expert → Output → Relay output 1 to n → Relay outp.func. (0804–1 to n)

Description Use this function to select an output function for the relay output.

Selection
- Closed
- Open
- Diagnostic behavior
- Limit
- Flow direction check
- Status

Factory setting Closed

Additional information *Selection*
- Closed
  The relay output is permanently switched on (closed, conductive).
- Open
  The relay output is permanently switched off (open, non-conductive).
- Diagnostic behavior
  Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level.
- Limit
  Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level.
- Flow direction check
  Indicates the flow direction (forward or reverse flow).
- Digital Output
  Indicates the device status depending on whether empty pipe detection or low flow cut off is selected.

Assign flow direction check

Navigation Expert → Output → Relay output 1 to n → Assign dir.check (0808–1 to n)

Prerequisite The **Flow direction check** option is selected in the **Relay output function** parameter (→ 173).

Description Use this function to select a process variable for monitoring the flow direction.

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

Factory setting Mass flow

Assign limit

Navigation Expert → Output → Relay output 1 to n → Assign limit (0807–1 to n)

Prerequisite The **Limit** option is selected in the **Relay output function** parameter (→ 173).

* Visibility depends on order options or device settings

Description Use this function to select a process variable for the limit value function.

Selection
- Mass flow
- Volume flow
- Corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Density
- Reference density *
- Reference density alternative *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Concentration *
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Oscillation damping
- Pressure
- Application specific output 0 *
- Application specific output 1 *
- Inhomogeneous medium index
- Suspended bubbles index *

Factory setting Mass flow

Assign diagnostic behavior

Navigation Expert → Output → Relay output 1 to n → Assign diag. beh (0806–1 to n)

Prerequisite In the **Relay output function** parameter (→ 173), the **Diagnostic behavior** option is selected.

Description Use this function to select the category of the diagnostic events that are displayed for the relay output.

* Visibility depends on order options or device settings

Selection
- Alarm
- Alarm or warning
- Warning

Factory setting
Alarm

Additional information
Description

If no diagnostic event is pending, the relay output is closed and conductive.

Selection
- Alarm
  The relay output signals only diagnostic events in the alarm category.
- Alarm or warning
  The relay output signals diagnostic events in the alarm and warning category.
- Warning
  The relay output signals only diagnostic events in the warning category.

Assign status

Navigation
Expert → Output → Relay output 1 to n → Assign status (0805–1 to n)

Prerequisite
In the **Relay output function** parameter (→ 173), the **Digital Output** option is selected.

Description
Use this function to select the device status for the relay output.

Selection
- Partially filled pipe detection
- Low flow cut off
- Binary output *
- Binary output *
- Binary output *

Factory setting
Partially filled pipe detection

Switch-off value

Navigation
Expert → Output → Relay output 1 to n → Switch-off value (0809–1 to n)

Prerequisite
In the **Relay output function** parameter (→ 173), the **Limit** option is selected.

Description
Use this function to enter the measured value for the switch-off point.

User entry
Signed floating-point number

* Visibility depends on order options or device settings

Factory setting

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

Additional information

Description

Use this function to enter the limit value for the switch-off value (process variable < switch-off value = open, non-conductive).

When using a hysteresis: Switch-on value > Switch-off value.

Dependency

The unit is dependent on the process variable selected in the **Assign limit** parameter (→ 174).

Switch-off delay

Navigation Expert → Output → Relay output 1 to n → Switch-off delay (0813–1 to n)

Prerequisite In the **Relay output function** parameter (→ 173), the **Limit** option is selected.

Description Use this function to enter a delay time for switching off the switch output.

User entry 0.0 to 100.0 s

Factory setting 0.0 s

Switch-on value

Navigation Expert → Output → Relay output 1 to n → Switch-on value (0810–1 to n)

Prerequisite The **Limit** option is selected in the **Relay output function** parameter (→ 173).

Description Use this function to enter the measured value for the switch-on point.

User entry Signed floating-point number

Factory setting

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

Additional information

Description

Use this function to enter the limit value for the switch-on value (process variable > switch-on value = closed, conductive).

When using a hysteresis: Switch-on value > Switch-off value.

Dependency

The unit is dependent on the process variable selected in the **Assign limit** parameter (→ 174).

Switch-on delay

Navigation Expert → Output → Relay output 1 to n → Switch-on delay (0814–1 to n)

Prerequisite In the **Relay output function** parameter (→ 173), the **Limit** option is selected.

Description Use this function to enter a delay time for switching on the switch output.

User entry 0.0 to 100.0 s

Factory setting 0.0 s

Failure mode

Navigation Expert → Output → Relay output 1 to n → Failure mode (0811–1 to n)

Description Use this function to select the failure mode of the relay output in the event of a device alarm.

Selection
- Actual status
- Open
- Closed

Factory setting Open

Additional information

Selection

- Actual status
  In the event of a device alarm, faults are ignored and the current behavior of the input value is output by the relay output. The **Actual status** option behaves in the same way as the current input value.
- Open
  In the event of a device alarm, the relay output's transistor is set to **non-conductive**.
- Closed
  In the event of a device alarm, the relay output's transistor is set to **conductive**.

Switch state

Navigation Expert → Output → Relay output 1 to n → Switch state (0801–1 to n)

Description Displays the current status of the relay output.

User interface
- Open
- Closed

Additional information *User interface*
- Open
  The relay output is not conductive.
- Closed
  The relay output is conductive.

Powerless relay status

Navigation Expert → Output → Relay output 1 to n → Powerless relay (0816–1 to n)

Description Use this function to select the quiescent state for the relay output.

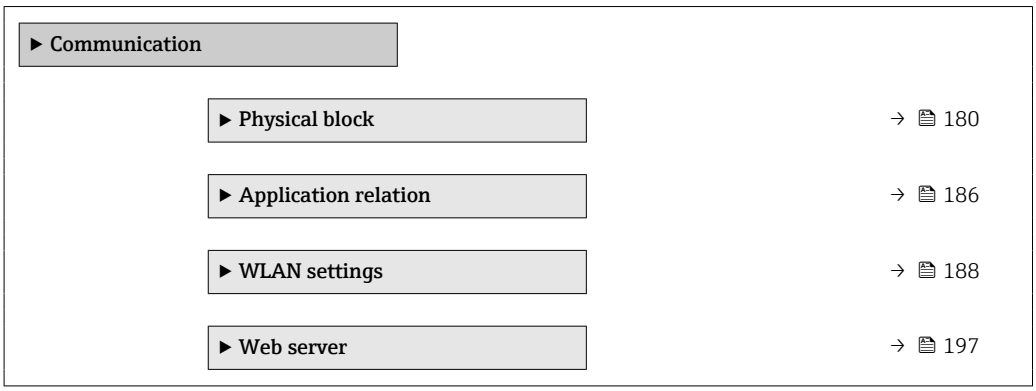
Selection
- Open
- Closed

Factory setting Open

Additional information *Selection*
- Open
  The relay output is not conductive.
- Closed
  The relay output is conductive.

3.6 "Communication" submenu

Navigation Expert → Communication



3.6.1 "Physical block" submenu

Navigation Expert → Communication → Physical block

▶ **Physical block**

PROFINET device name (2071)	→ 181
Device tag (4301)	→ 181
Descriptor (4311)	→ 181
Device location (4308)	→ 182
IPv4 address (4316)	→ 182
IPv4 default gateway (4318)	→ 182
IPv4 subnet mask (4317)	→ 182
Installation date (4312)	→ 183
Serial number (4307)	→ 183
Firmware version (4304)	→ 183
Hardware version (4303)	→ 183
Last change (4315)	→ 184
Manufacturer (4305)	→ 184
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Profile (4310)	→ 184
Profile revision (4319)	→ 185
Startup settings (4313)	→ 185
Alarm delay (4314)	→ 185
Configuration counter (4309)	→ 185
Target mode (4302)	→ 186

PROFINET device name

Navigation Expert → Communication → Physical block → PROFINET DevName (2071)

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

Factory setting eh-cubemass300-xxxxx

Additional information *Description*

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

Factory setting

Structure of the device tag:
eh-cubemass300-xxxxx
- eh: Endress+Hauser
- cubemass: Instrument family
- 300: Transmitter
- xxxxx: Serial number of the device

Device tag

Navigation Expert → Communication → Physical block → Device tag (4301)

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 (4311)

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 (4308)

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 (4316)

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 (4318)

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 (4317)

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 (4312)

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 (4307)

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 (4304)

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 (4303)

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 (4315)

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 (4305)

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 (4306)

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 Promass 300 500

Profile

Navigation Expert → Communication → Physical block → Profile (4310)

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 (4319)

User interface 0 to 65 535

Factory setting 1026

Startup settings

Navigation Expert → Communication → Physical block → Startup settings (4313)

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 (4314)

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 (4309)

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 (4302)

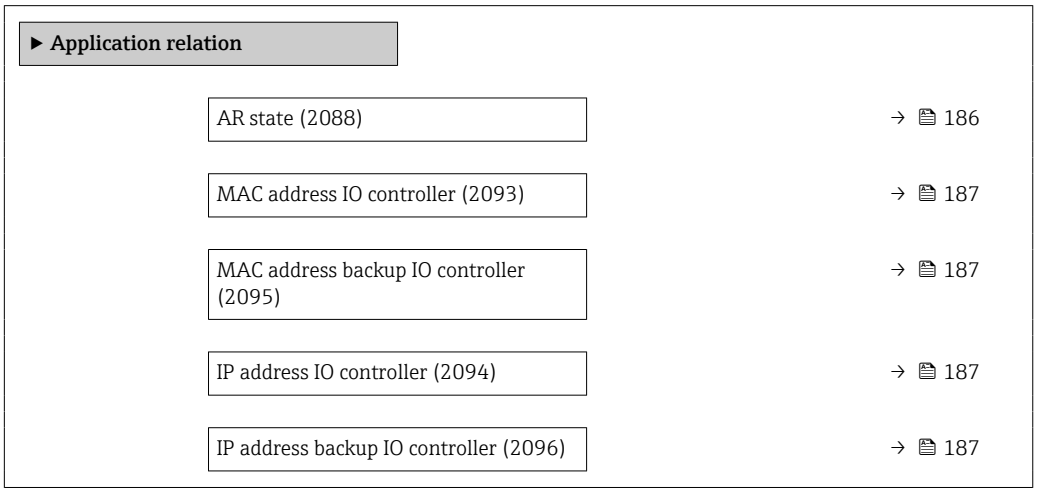
Description Select the target mode. The selected mode applies toall output function blocks.

Selection
- Automatic
- Out of service

Factory setting Automatic

3.6.2 "Application relation" submenu

Navigation Expert → Communication → Applicat. relat.



AR state

Navigation Expert → Communication → Applicat. relat. → AR state (2088)

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. (2093)

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. (2095)

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 (2094)

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. (2096)

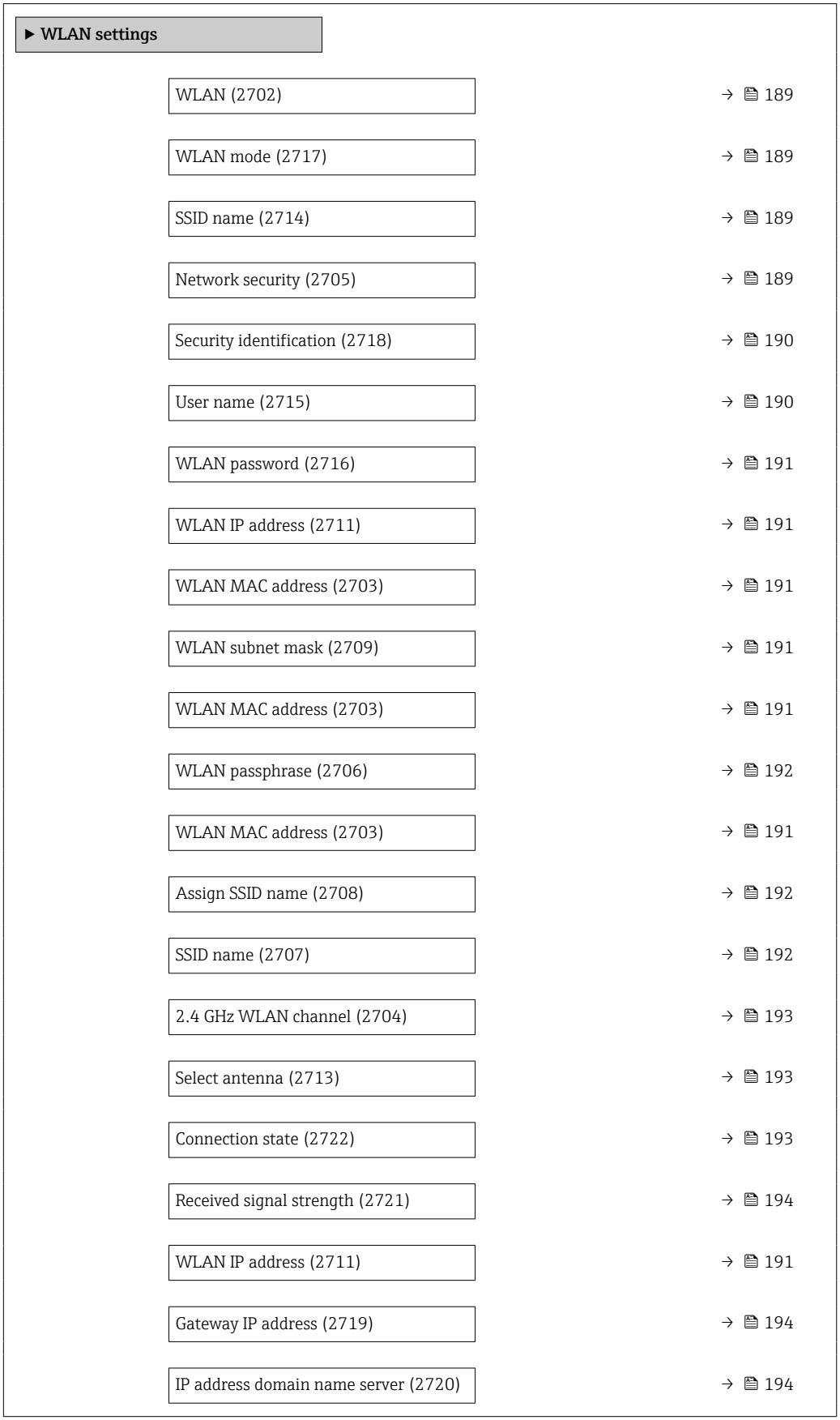
Description Shows the IP adress of the backup IO controller.

User interface Character string comprising numbers, letters and special characters

Factory setting 0x00

3.6.3 "WLAN settings" wizard

Navigation Expert → Communication → WLAN settings



WLAN

Navigation Expert → Communication → WLAN settings → WLAN (2702)

Description Use this function to enable and disable the WLAN connection.

Selection
- Disable
- Enable

Factory setting Enable

WLAN mode

Navigation Expert → Communication → WLAN settings → WLAN mode (2717)

Description Use this function to select the WLAN mode.

Selection
- WLAN access point
- WLAN Client

Factory setting WLAN access point

SSID name

Navigation Expert → Communication → WLAN settings → SSID name (2714)

Prerequisite The client is activated.

Description Use this function to enter the user-defined SSID name (max. 32 characters) of the WLAN network.

User entry –

Factory setting –

Network security

Navigation Expert → Communication → WLAN settings → Network security (2705)

Description Use this function to select the type of security for the WLAN interface.

Selection
- Unsecured
- WPA2-PSK
- EAP-PEAP with MSCHAPv2 *
- EAP-PEAP MSCHAPv2 no server authentic. *
- EAP-TLS *

Factory setting WPA2-PSK

Additional information *Selection*
- Unsecured
  Access the WLAN connection without identification.
- WPA2-PSK
  Access the WLAN connection with a network key.
- EAP-PEAP with MSCHAPv2
  Access the WLAN connection with a password-based authentication protocol.
- EAP-PEAP MSCHAPv2 no server authentic.
  Access the WLAN connection with a password-based protocol without server authentication.
- EAP-TLS
  Access the WLAN connection with a certificate-based, two-way authentication of the client and network.

Security identification

Navigation Expert → Communication → WLAN settings → Sec. identific. (2718)

Description Use this function to select the security settings (download via the menu: Data Management > Security > Download WLAN).

User interface
- Trusted issuer certificate
- Device certificate
- Device private key

User name

Navigation Expert → Communication → WLAN settings → User name (2715)

Description Use this function to enter the username of the WLAN network.

User entry –

Factory setting –

* Visibility depends on order options or device settings

WLAN password

Navigation Expert → Communication → WLAN settings → WLAN password (2716)

Description Use this function to enter the WLAN password for the WLAN network.

User entry –

Factory setting –

WLAN IP address

Navigation Expert → Communication → WLAN settings → WLAN IP address (2711)

Description Use this function to enter the IP address of the measuring device's WLAN connection.

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

Factory setting 192.168.1.212

WLAN MAC address

Navigation Expert → Communication → WLAN settings → WLAN MAC address (2703)

Description Displays the MAC [8] 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

WLAN subnet mask

Navigation Expert → Communication → WLAN settings → WLAN subnet mask (2709)

Description Use this function to enter the subnet mask.

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

8) Media Access Control

Factory setting 255.255.255.0

WLAN passphrase

Navigation Expert → Communication → WLAN settings → WLAN passphrase (2706)

Prerequisite The **WPA2-PSK** option is selected in the **Security type** parameter (→ 189).

Description Use this function to enter the network key.

User entry 8 to 32-digit character string comprising numbers, letters and special characters (without spaces)

Factory setting Serial number of the measuring device (e.g. L100A802000)

Assign SSID name

Navigation Expert → Communication → WLAN settings → Assign SSID name (2708)

Description Use this function to select which name is used for the SSID [9].

Selection
- Device tag
- User-defined

Factory setting User-defined

Additional information *Selection*
- Device tag
  The device tag name is used as the SSID.
- User-defined
  A user-defined name is used as the SSID.

SSID name

Navigation Expert → Communication → WLAN settings → SSID name (2707)

Prerequisite
- The **User-defined** option is selected in the **Assign SSID name** parameter (→ 192).
- The **WLAN access point** option is selected in the **WLAN mode** parameter (→ 189).

Description Use this function to enter a user-defined SSID name.

User entry Max. 32-digit character string comprising numbers, letters and special characters

9) Service Set Identifier

Factory setting EH_device designation_last 7 digits of the serial number (e.g. EH_Cubemass_300_A802000)

2.4 GHz WLAN channel

Navigation Expert → Communication → WLAN settings → WLAN channel (2704)

Description Use this function to enter the 2.4 GHz WLAN channel.

User entry 1 to 11

Factory setting 6

Additional information *Description*

- It is only necessary to enter a 2.4 GHz WLAN channel if multiple WLAN devices are in use.
- If just one measuring device is in use, it is recommended to keep the factory setting.

Select antenna

Navigation Expert → Communication → WLAN settings → Select antenna (2713)

Description Use this function to select whether the external or internal antenna is used for reception.

Selection
- External antenna
- Internal antenna

Factory setting Internal antenna

Connection state

Navigation Expert → Communication → WLAN settings → Connection state (2722)

Description The connection status is displayed.

User interface
- Connected
- Not connected

Factory setting Not connected

Received signal strength

Navigation Expert → Communication → WLAN settings → Rec.sig.strength (2721)

Description Displays the signal strength received.

User interface
- Low
- Medium
- High

Factory setting High

Gateway IP address

Navigation Expert → Communication → WLAN settings → Gateway IP addr. (2719)

Description Use this function to enter the IP address of the gateway.

User interface Character string comprising numbers, letters and special characters

Factory setting 192.168.1.212

IP address domain name server

Navigation Expert → Communication → WLAN settings → IP address DNS (2720)

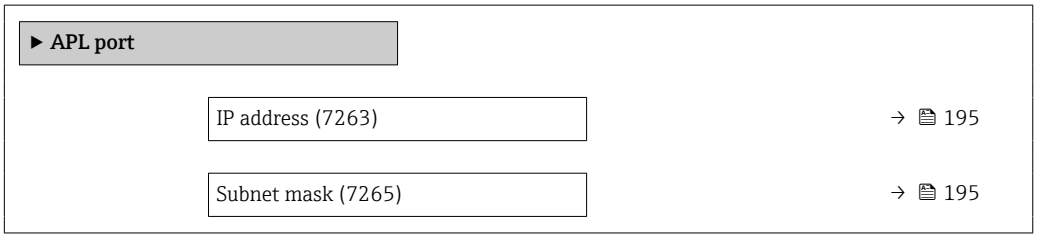
Description Use this function to enter the IP address of the domain name server.

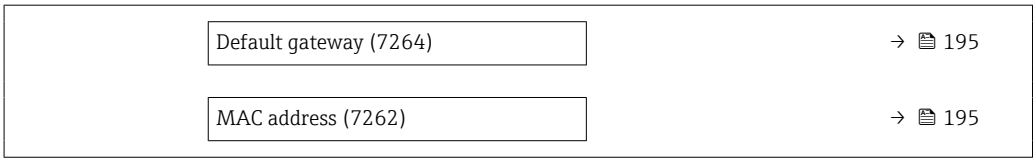
User interface Character string comprising numbers, letters and special characters

Factory setting 192.168.1.212

3.6.4 "APL port" submenu

Navigation Setup → Communication → APL port





IP address

Navigation Setup → Communication → APL port → IP address (7263)

Description Enter the IP address of the measuring device.

User entry Character string comprising numbers, letters and special characters (15)

Factory setting 0.0.0.0

Default gateway

Navigation Setup → Communication → APL port → Default gateway (7264)

Description Enter IP address for the default gateway of the measuring device.

User entry Character string comprising numbers, letters and special characters (15)

Factory setting 0.0.0.0

Subnet mask

Navigation Setup → Communication → APL port → Subnet mask (7265)

Description Enter subnet mask of the measuring device.

User entry Character string comprising numbers, letters and special characters (15)

Factory setting 255.255.255.0

MAC address

Navigation Setup → Communication → APL port → MAC Address (7262)

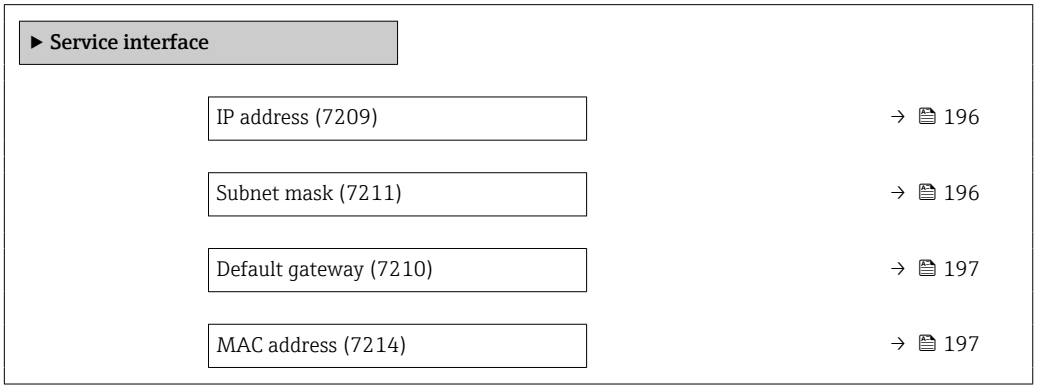
Description Shows the MAC address of the measuring device.

User interface Character string comprising numbers, letters and special characters

Factory setting

3.6.5 "Service interface" submenu

Navigation Setup → Communication → ServiceInterface



IP address

Navigation Setup → Communication → ServiceInterface → IP address (7209)

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 192.168.1.212

Subnet mask

Navigation Setup → Communication → ServiceInterface → Subnet mask (7211)

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 Setup → Communication → ServiceInterface → Default gateway (7210)

Description Display or enter the Default gateway (→ 197).

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

Factory setting 0.0.0.0

MAC address

Navigation Setup → Communication → ServiceInterface → MAC Address (7214)

Description Displays the MAC [10] address of the measuring device.

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

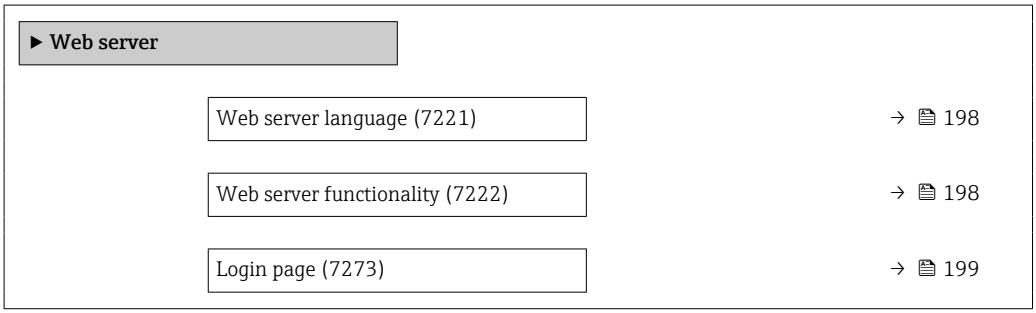
Factory setting Each measuring device is given an individual address.

Additional information *Example*

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

3.6.6 "Web server" submenu

Navigation Expert → Communication → Web server



10) Media Access Control

Web server language

Navigation Expert → Communication → Web server → Webserv.language (7221)

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

Web server functionality

Navigation Expert → Communication → Web server → Webserver funct. (7222)

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

Selection
- Off
- HTML Off
- On

Factory setting On

* Visibility depends on order options or device settings

Additional information *Description*

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

Selection

Option	Description
Off	▪ The Web server is completely disabled. ▪ Port 80 is locked.
HTML Off	The HTML version of the Web server is not available.
On	▪ The complete 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 (7273)

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

Selection
- Without header
- With header

Factory setting With header

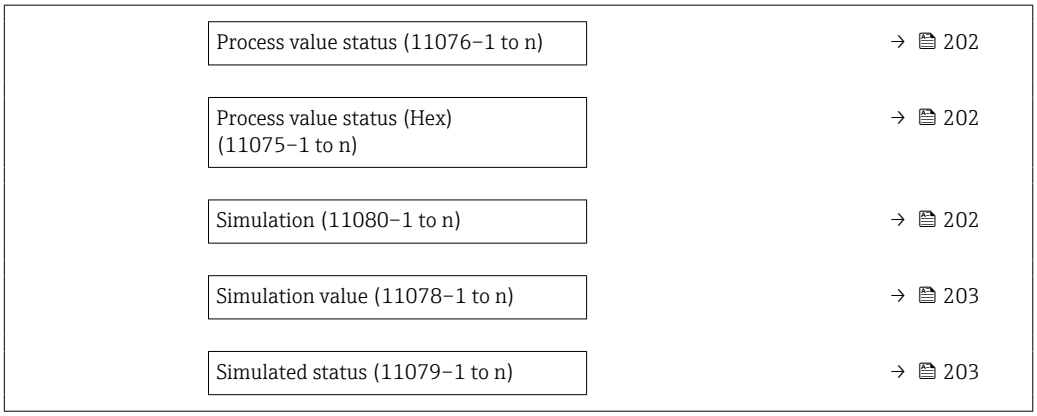
3.7 "Analog inputs" submenu

Navigation Expert → Analog inputs

3.7.1 "Analog inputs" submenu

Navigation Expert → Analog inputs → Mass flow

▶ Analog input 1 to n	
Assign process variable (11074–1 to n)	→ 200
Process value (11071–1 to n)	→ 201
Process variable unit (11072–1 to n)	→ 201
Damping (11073–1 to n)	→ 202



Assign process variable

Navigation Expert → Analog inputs → Mass flow → Assign variable (11074)

Description Select a process variable.

User interface
- Mass flow
- Volume flow
- Density
- Temperature
- Carrier pipe temperature
- Electronics temperature
- Oscillation frequency 0
- Oscillation frequency 1
- Oscillation amplitude 0
- Oscillation amplitude 1
- Frequency fluctuation 0
- Frequency fluctuation 1
- Oscillation damping 0
- Oscillation damping 1
- Oscillation damping fluctuation 0
- Oscillation damping fluctuation 1
- Signal asymmetry
- Torsion signal asymmetry *
- Exciter current 0
- Exciter current 1
- HBSI
- Current input 1
- Current input 2
- Current input 3
- Application specific output 0
- Application specific output 1
- Inhomogeneous medium index
- Suspended bubbles index
- Test point 0
- Test point 1
- Sensor index coil asymmetry
- Raw value mass flow
- Corrected volume flow

* Visibility depends on order options or device settings

- Target mass flow
- Carrier mass flow
- Target volume flow
- Carrier volume flow
- Target corrected volume flow
- Carrier corrected volume flow
- Reference density
- Reference density alternative
- GSV flow
- GSV flow alternative
- NSV flow
- NSV flow alternative *
- S&W volume flow
- Water cut *
- Oil density
- Water density
- Oil mass flow
- Water mass flow
- Oil volume flow
- Water volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Concentration
- Dynamic viscosity
- Kinematic viscosity
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity

Factory setting Mass flow

Process value

Navigation Expert → Analog inputs → Mass flow → Process value (11071)

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

User interface Signed floating-point number

Factory setting 0 kg/h

Process variable unit

Navigation Expert → Analog inputs → Mass flow → ProcVariableUnit (11072)

Description Shows the unit of the process variable.

User interface 0 to 65 535

* Visibility depends on order options or device settings

Factory setting 1997

Damping

Navigation Expert → Analog inputs → Mass flow → Damping (11073)

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 → Mass flow → Proc.ValueStatus (11076)

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 → Mass flow → ProcValStatusHex (11075)

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 → Mass flow → Simulation (11080)

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 → Mass flow → Simulation value (11078)

Description Enter the simulation value for the selected process variable.

User entry Signed floating-point number

Factory setting 0 kg/h

Simulated status

Navigation Expert → Analog inputs → Mass flow → Simulated status (11079)

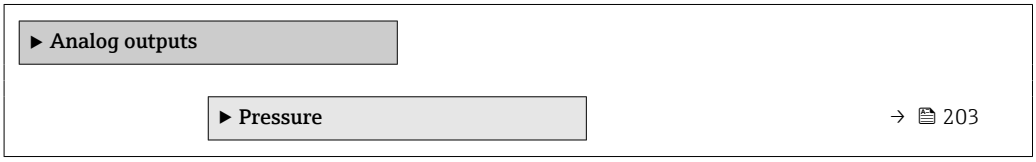
Description Specify the status of the simulated process value (Hex).

User entry 0 to 255

Factory setting 60

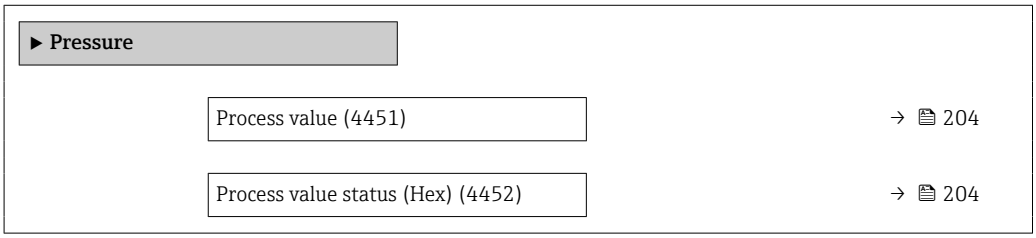
3.8 "Analog outputs" submenu

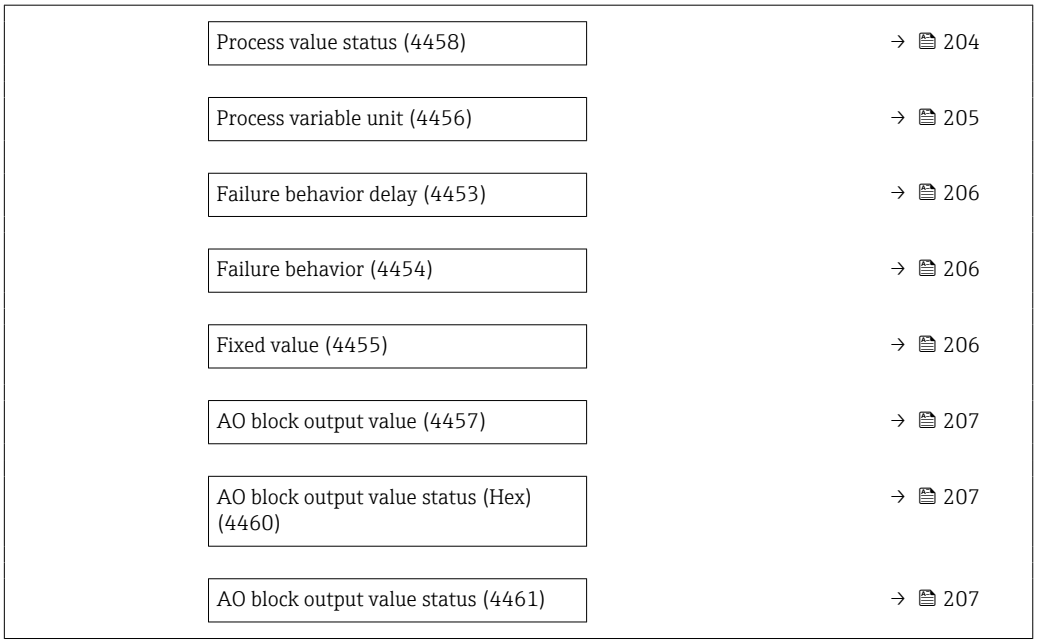
Navigation Expert → Analog outputs



3.8.1 "Pressure" submenu

Navigation Expert → Analog outputs → Pressure





Process value

Navigation Expert → Analog outputs → Pressure → Process value (4451)

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 (4452)

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 (4458)

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 (4456)

Description Shows the unit of the process variable.

Selection

Other units
None *

*	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
% *

*	Visibility depends on order options or device settings

or

SI units
- kg/Nm³ *
- kg/Nl *
- g/Scm³ *
- kg/Sm³ *
- RD15°C *
- RD20°C *

US units
- lb/Sft³ *
- RD60°F *

*	Visibility depends on order options or device settings

or

Other units
°APIbase *

*	Visibility depends on order options or device settings

or

SI units
- MPa a *
- MPa g *
- kPa a *
- kPa g *
- Pa a *
- Pa g *
- bar *
- bar g *

US units
- psi a *
- psi g *

* Visibility depends on order options or device settings

Factory setting bar

Failure behavior delay

Navigation Expert → Analog outputs → Pressure → FailBehavDelay (4453)

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 (4454)

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 (4455)

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 (4457)

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 (4460)

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 (4461)

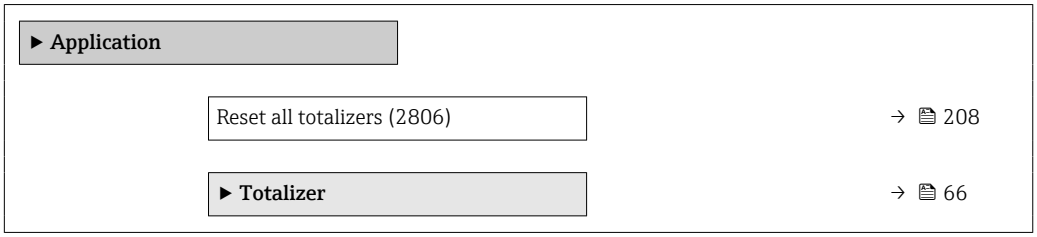
Description Shows the status of the external process value reported to the measuring device for further processing ('Good', 'Uncertain', 'Bad').

User interface
- Good
- Uncertain
- Bad

Factory setting Good

3.9 "Application" submenu

Navigation Expert → Application



Reset all totalizers

Navigation Expert → Application → Reset all tot. (2806)

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

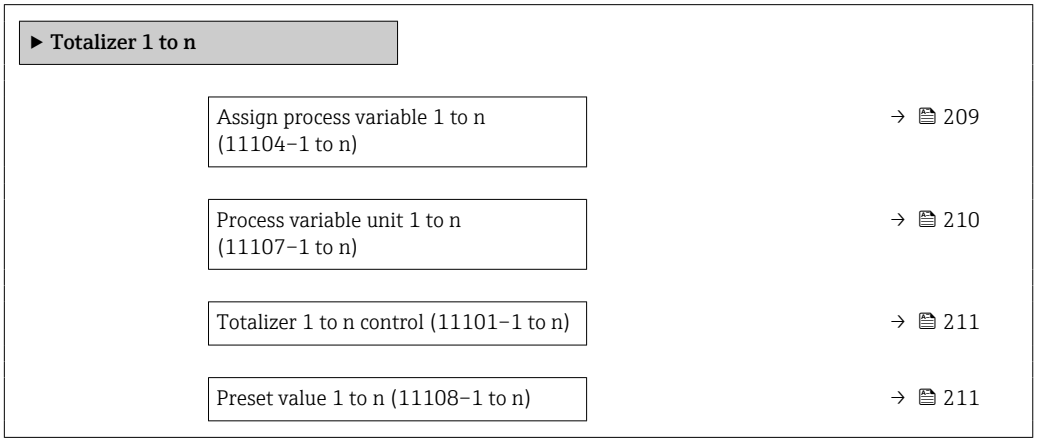
Factory setting Cancel

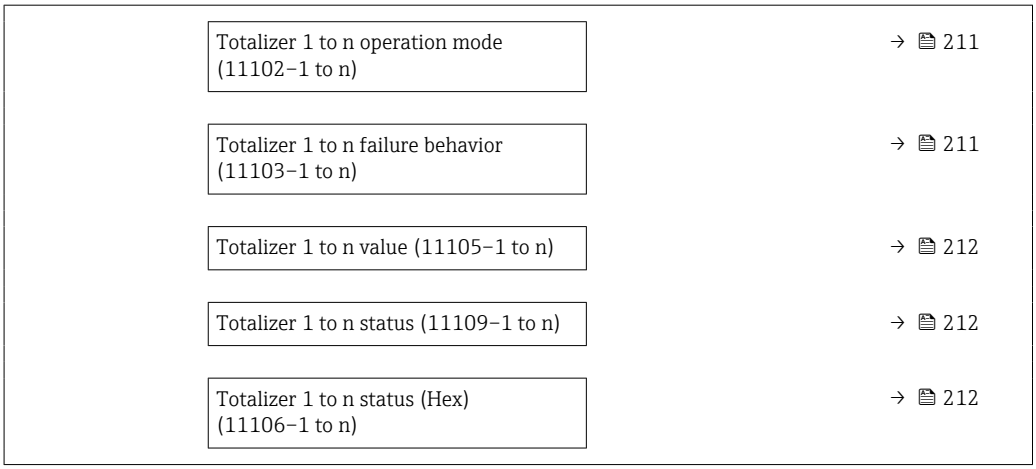
Additional information *Selection*

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.

3.9.1 "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 (11104–1 to n)

Description Select process variable for totalizer.

Selection
- Mass flow
- Volume flow
- Corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Raw value mass flow

Factory setting Mass flow

* Visibility depends on order options or device settings

Process variable unit 1 to n

Navigation Expert → Application → Totalizer 1 to n → VariableUnit 1 to n (11107–1 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
- 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;tank) *

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

* Visibility depends on order options or device settings

or

US units
- bbl (us;liq.) *
- bbl (us;beer) *

Imperial units
- bbl (imp;beer) *

* Visibility depends on order options or device settings

or

SI units
- Nl *
- Nhl *
- Nm^3 *
- Sl *
- Sm^3 *

US units
- Sft^3 *
- $MSft^3$ *
- $MMSft^3$ *
- Sgal (us) *
- Sbbl (us;liq.) *
- Sbbl (us;oil) *

Imperial units
- Sgal (imp) *

* Visibility depends on order options or device settings

Factory setting kg

Totalizer 1 to n control

Navigation Expert → Application → Totalizer 1 to n → Tot. 1 to n control (11101–1 to n)

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 (11108–1 to n)

Description Specify start value for totalizer.

User entry Signed floating-point number

Factory setting 0 kg

Totalizer 1 to n operation mode

Navigation Expert → Application → Totalizer 1 to n → Operat. mode 1 to n (11102–1 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 (11103–1 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 (11105–1 to n)

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

User interface Signed floating-point number

Factory setting 0 kg

Totalizer 1 to n status

Navigation Expert → Application → Totalizer 1 to n → Tot. 1 to n status (11109–1 to n)

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) (11106–1 to n)

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

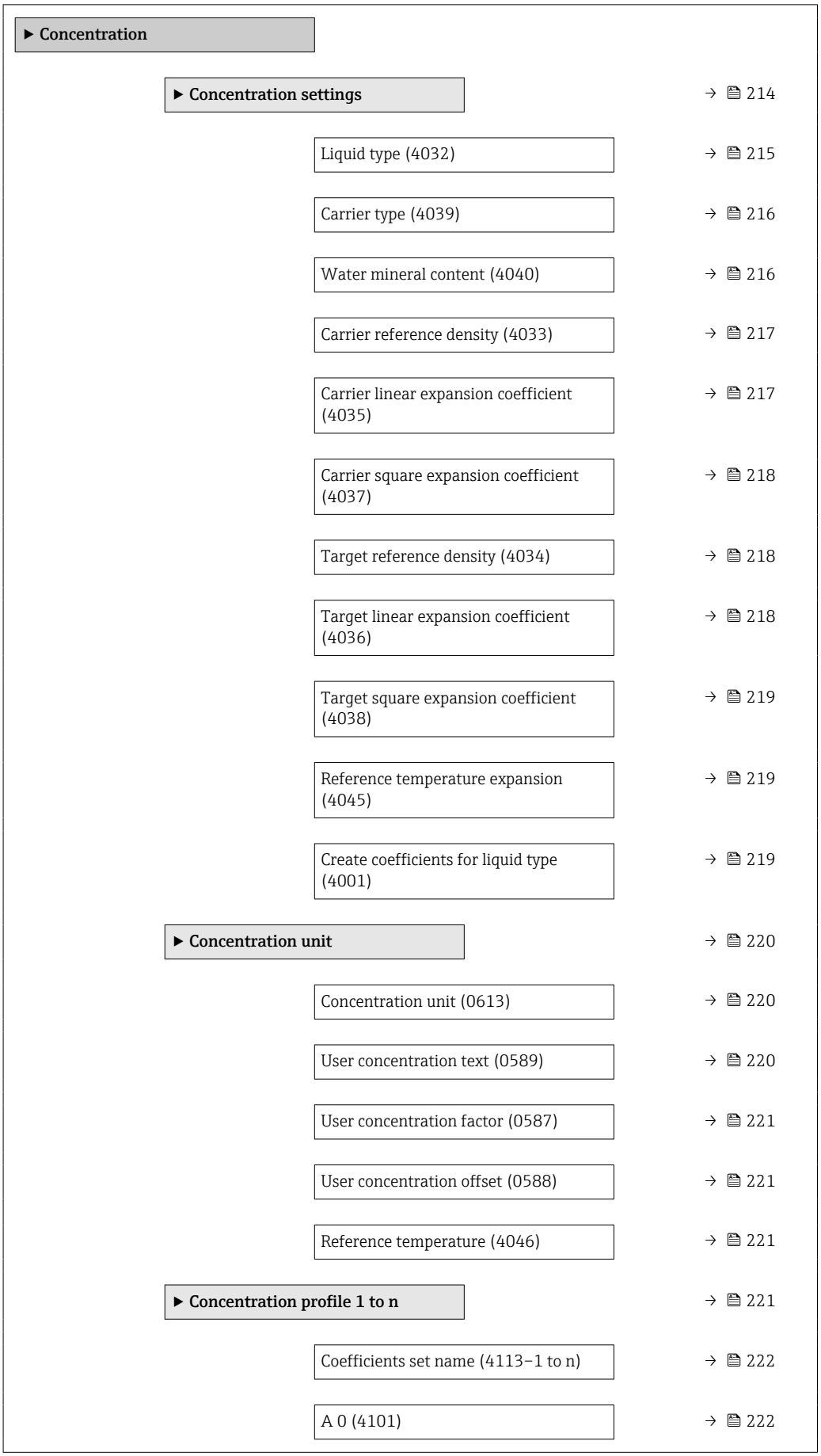
User interface 0 to 255

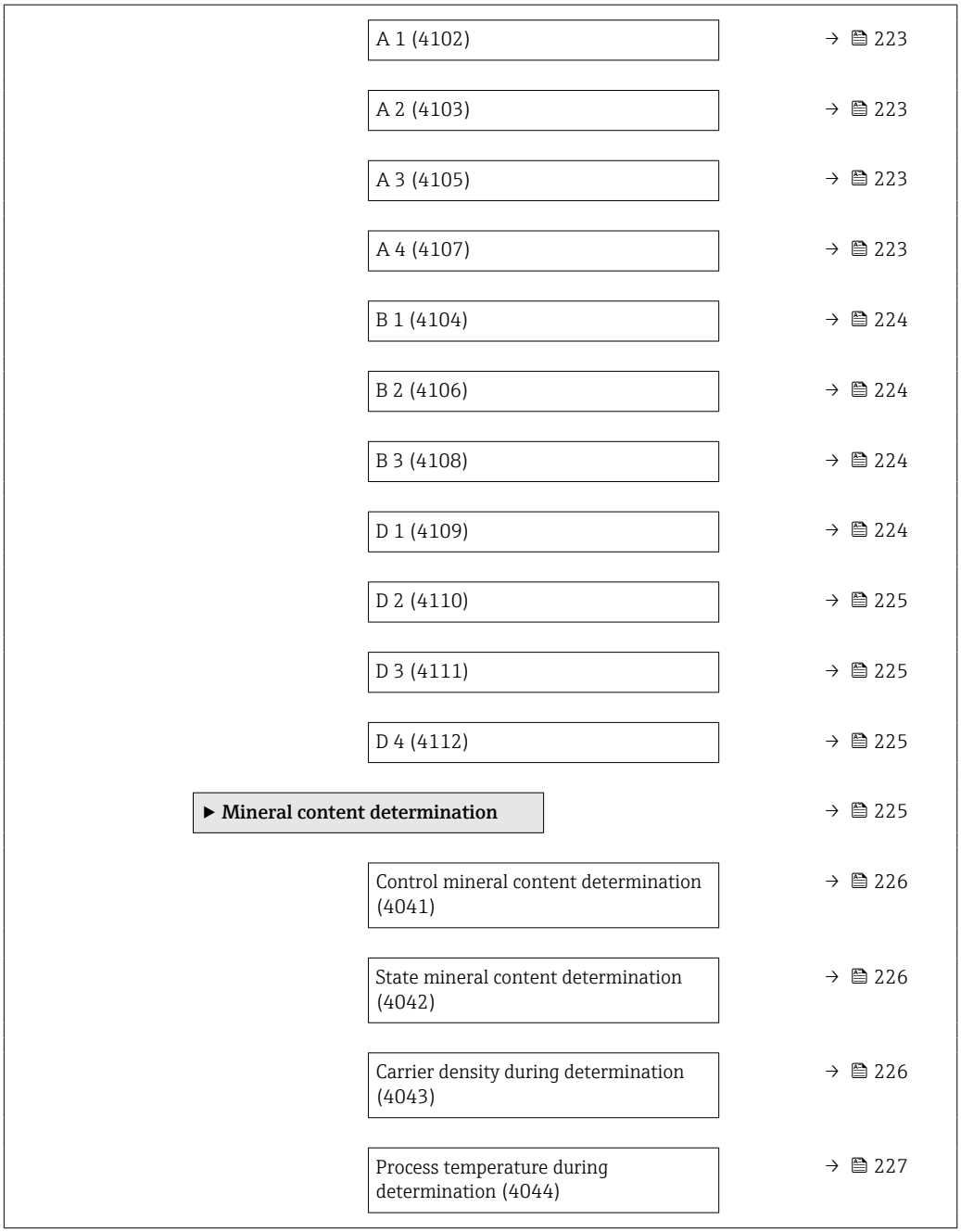
Factory setting 128

3.9.2 "Concentration" submenu

For detailed information on the parameter descriptions for the **Concentration** application package,refer to the Special Documentation for the device → 7

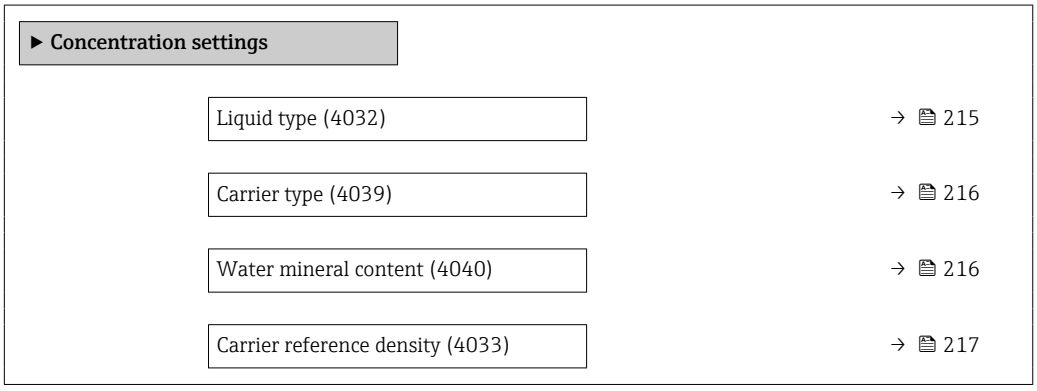
Navigation Expert → Application → Concentration

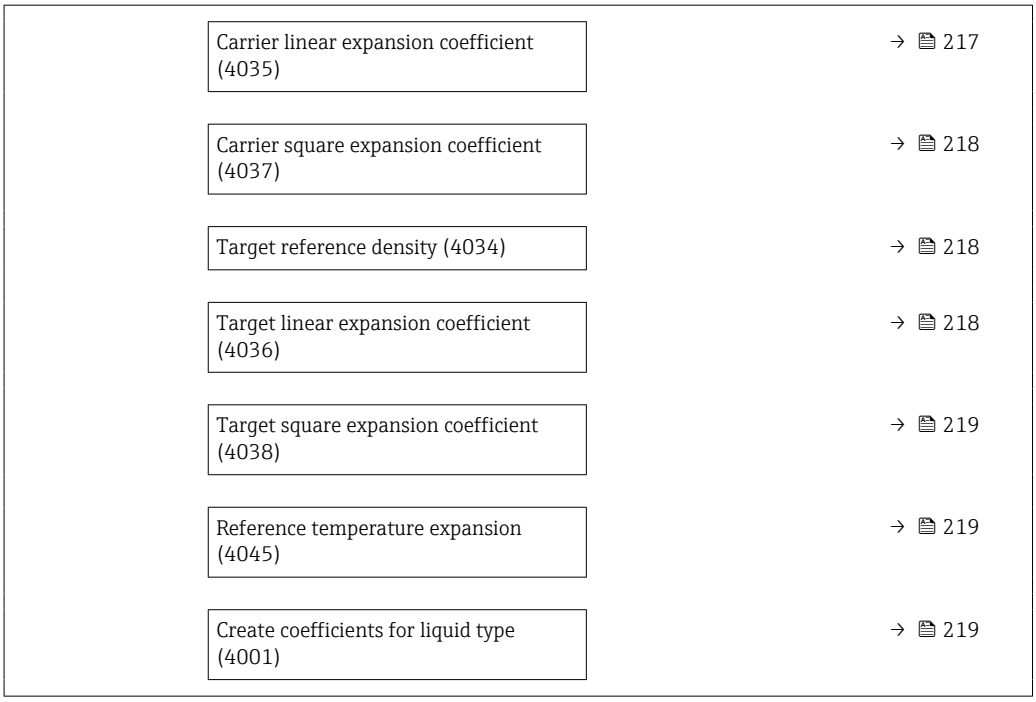




"Concentration settings" submenu

Navigation Expert → Application → Concentration → Concentr. sett.





Liquid type

Navigation Expert → Application → Concentration → Concentr. sett. → Liquid type (4032)

Description

Select liquid type.

The measuring device already contains the density/concentration correlation for a range of binary mixtures. Please refer to table for information on the validity ranges with regard to temperature and concentration and for standard deviations of the approximation model for converting density to concentration.

3 sets of coefficients are available for user-defined media. The coefficients are determined from table values via FieldCare

Selection

- Off
- Sucrose in water
- Glucose in water
- Fructose in water
- Invert sugar in water
- HFCS42
- HFCS55
- HFCS90
- Wort
- Whey (Total Solids)
- Ethanol in water (OIML)
- Methanol in water
- Hydrogen peroxide in water
- Hydrochloric acid
- Sulfuric acid
- Nitric acid
- Phosphoric acid
- Sodium hydroxide
- Potassium hydroxide
- Ammonia in water

- Ammonium hydroxide in water
- Ammonium nitrate in water
- Iron(III)chloride in water
- Sodium chloride in water
- %mass / %volume
- Coef Set
- Coef Set
- Coef Set

Factory setting Off

Carrier type

Navigation Expert → Application → Concentration → Concentr. sett. → Carrier type (4039)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).

Description Select carrier medium type.

For the **%mass / %volume** option, it is possible to choose whether the carrier medium is water. If "water-based" is selected, the **"Carrier reference density" parameter (→ 217), Carrier linear expansion coefficient (→ 217)** and **Carrier square expansion coefficient (→ 218)** are not available. Instead, the density characteristic of water is determined using Kell's formula (ITS-90).

Selection
- Water based
- Not water based

Factory setting Water based

Water mineral content

Navigation Expert → Application → Concentration → Concentr. sett. → Water mineral.c. (4040)

Prerequisite The following options are selected in the **Liquid type** parameter (→ 215):

One of the following options is selected in the **Liquid type** parameter (→ 215):
- Sucrose in water
- Glucose in water
- Fructose in water
- Invert sugar in water
- HFCS42
- HFCS55
- HFCS90
- Wort
- Methanol in water
- Hydrogen peroxide in water
- Hydrochloric acid
- Sulfuric acid
- Nitric acid
- Phosphoric acid
- Sodium hydroxide

- Ammonium nitrate in water
- Iron(III)chloride in water
- %mass / %volume

Description Enter mineral content for water based carriers.

It is generally presumed that water is present as a carrier medium in pure form, i.e. fully demineralized. If the water contains minerals, these affect the density of the carrier medium and therefore the density of the mixture. This effect can be taken into consideration by entering the mineral content in the device.

If the mineral content is to be calculated, this is performed in a separate menu

User entry Positive floating-point number

Factory setting 0 mg/l

Carrier reference density

Navigation Expert → Application → Concentration → Concentr. sett. → Carr. ref. dens. (4033)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215) and the **Not water based** option is selected in the **Carrier type** parameter (→ 216).

Description Enter reference density for carrier.

Density of the carrier medium at reference temperature if the **%mass / %volume** option is selected.

User entry Positive floating-point number

Factory setting 1 kg/Nl

Carrier linear expansion coefficient

Navigation Expert → Application → Concentration → Concentr. sett. → Carr.lin.exp.co. (4035)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215) and the **Not water based** option is selected in the **Carrier type** parameter (→ 216).

Description Enter linear expansion coefficient for the carrier.

Coefficient of the linear term for approximating the thermal expansion of the carrier medium.

User entry Signed floating-point number

Factory setting 0.0 1/K

Carrier square expansion coefficient

Navigation Expert → Application → Concentration → Concentr. sett. → Carr.sq.exp.coe. (4037)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215) and the **Not water based** option is selected in the **Carrier type** parameter (→ 216).

Description Enter square expansion coefficient for the carrier.

Coefficient of the quadratic term for approximating the thermal expansion of the carrier medium.

User entry Signed floating-point number

Factory setting 0.0 $1/K^2$

Target reference density

Navigation Expert → Application → Concentration → Concentr. sett. → Targ.ref.density (4034)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).

Description Enter reference density for target.

Density of the target medium at reference temperature if the **%mass / %volume** option is selected.

User entry Positive floating-point number

Factory setting 1 kg/Nl

Target linear expansion coefficient

Navigation Expert → Application → Concentration → Concentr. sett. → Targ.lin.exp.co. (4036)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).

Description Enter linear expansion coefficient for the target.

Coefficient of the linear term for approximating the thermal expansion of the target medium.

User entry Signed floating-point number

Factory setting 0.0 1/K

Target square expansion coefficient

Navigation Expert → Application → Concentration → Concentr. sett. → Targ.sq.exp.coe. (4038)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).

Description Enter square expansion coefficient for the targe.

Coefficient of the quadratic term for approximating the thermal expansion of the target medium.

User entry Signed floating-point number

Factory setting 0.0 $1/K^2$

Reference temperature expansion

Navigation Expert → Application → Concentration → Concentr. sett. → Ref.temp.expan. (4045)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).

Description Enter the temperature at which the specified reference densities of the carrier and target media are valid.

User entry −273.15 to 99 999 °C

Factory setting 20 °C

Create coefficients for liquid type

Navigation Expert → Application → Concentration → Concentr. sett. → Create coeff. (4001)

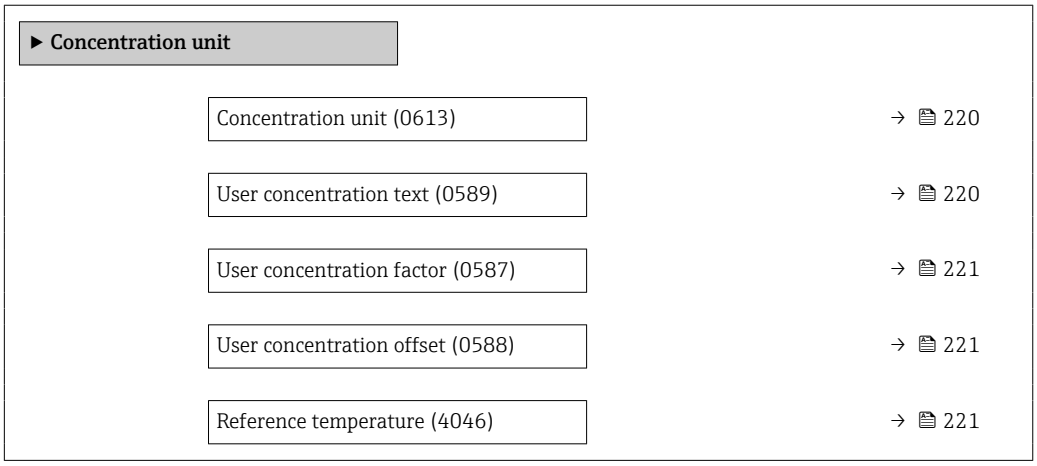
Description Create coefficient set for selected liquid type. Adjust concentration values via user concentration factor and user concentration offset.

Selection
- Cancel
- Coefficient set 1
- Coefficient set 2
- Coefficient set 3

Factory setting Cancel

"Concentration unit" submenu

Navigation Expert → Application → Concentration → Concentr. unit



Concentration unit

Navigation Expert → Application → Concentration → Concentr. unit → Concentr. unit (0613)

Description Select concentration unit.

Selection

Factory setting °Brix

User concentration text

Navigation Expert → Application → Concentration → Concentr. unit → Concentr. text (0589)

Prerequisite The **Coef Set 1...3** option is selected in the **Liquid type** parameter (→ 215) and the **User conc.** option is selected in the **Concentration unit** parameter (→ 220).

Description Enter text for the user specific unit of the concentration.

User entry Character string comprising numbers, letters and special characters (10)

Factory setting User conc.

User concentration factor

Navigation Expert → Application → Concentration → Concentr. unit → Concentr. factor (0587)

Prerequisite The **Coef Set 1...3** option is selected in the **Liquid type** parameter (→ 215) and the **User conc.** option is selected in the **Concentration unit** parameter (→ 220).

Description With user-specific unit: Enter a factor which is multiplicated with the measured concentration value.

User entry Signed floating-point number

Factory setting 1.0

User concentration offset

Navigation Expert → Application → Concentration → Concentr. unit → Concentr. offset (0588)

Prerequisite The **Coef Set 1...3** option is selected in the **Liquid type** parameter (→ 215) and the **User conc.** option is selected in the **Concentration unit** parameter (→ 220).

Description With user-specific unit: Enter zero point shift which is added or subtracted to/from the measured concentration value.

User entry Signed floating-point number

Factory setting 0

Reference temperature

Navigation Expert → Application → Concentration → Concentr. unit → Ref. temperature (4046)

Description Enter reference temperature for calculating the reference density.

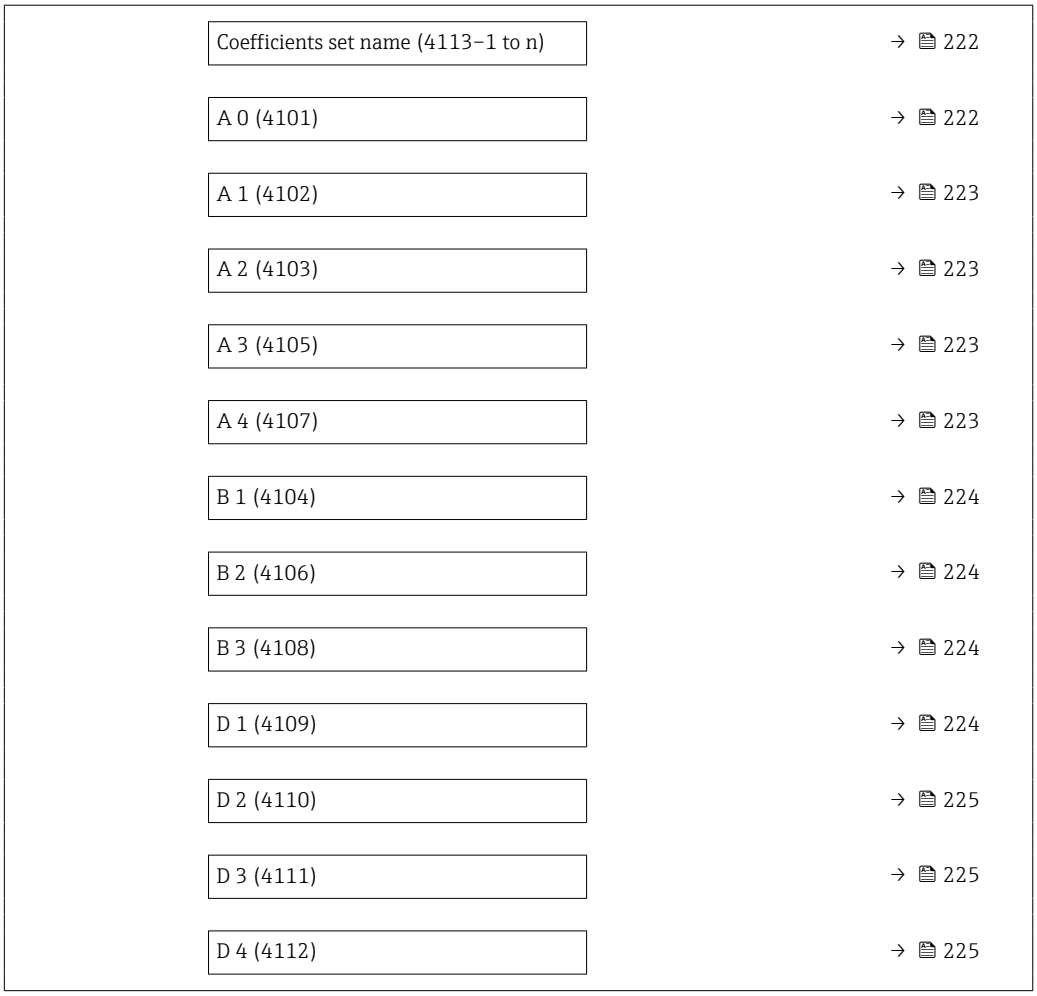
User entry −273.15 to 99 999 °C

Factory setting 20 °C

"Concentration profile 1 to n" submenu

Navigation Expert → Application → Concentration → Conc. profile 1 to n

▶ **Concentration profile 1 to n**



Coefficients set name

Navigation Expert → Application → Concentration → Conc. profile 1 to n → Coeff. set name (4113–1 to n)

Description Enter name for coefficients set.

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

Factory setting Coef Set No.

A 0

Navigation Expert → Application → Concentration → Conc. profile 1 to n → A 0 (4101)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting −7.2952

A 1

Navigation Expert → Application → Concentration → Conc. profile 1 to n → A 1 (4102)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting 15.1555

A 2

Navigation Expert → Application → Concentration → Conc. profile 1 to n → A 2 (4103)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting −11.6756

A 3

Navigation Expert → Application → Concentration → Conc. profile 1 to n → A 3 (4105)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting 4.4759

A 4

Navigation Expert → Application → Concentration → Conc. profile 1 to n → A 4 (4107)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting −0.6615

B 1

Navigation Expert → Application → Concentration → Conc. profile 1 to n → B 1 (4104)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $0.7220 \cdot 10^{-3}$ E-3

B 2

Navigation Expert → Application → Concentration → Conc. profile 1 to n → B 2 (4106)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $38.9126 \cdot 10^{-6}$ E-6

B 3

Navigation Expert → Application → Concentration → Conc. profile 1 to n → B 3 (4108)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $-1.6739 \cdot 10^{-9}$ E-9

D 1

Navigation Expert → Application → Concentration → Conc. profile 1 to n → D 1 (4109)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $-0.0975 \cdot 10^{-2}$ E-2

D 2

Navigation Expert → Application → Concentration → Conc. profile 1 to n → D 2 (4110)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $-0.3731 \cdot 10^{-4}$ E-4

D 3

Navigation Expert → Application → Concentration → Conc. profile 1 to n → D 3 (4111)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $0.2957 \cdot 10^{-3}$ E-3

D 4

Navigation Expert → Application → Concentration → Conc. profile 1 to n → D 4 (4112)

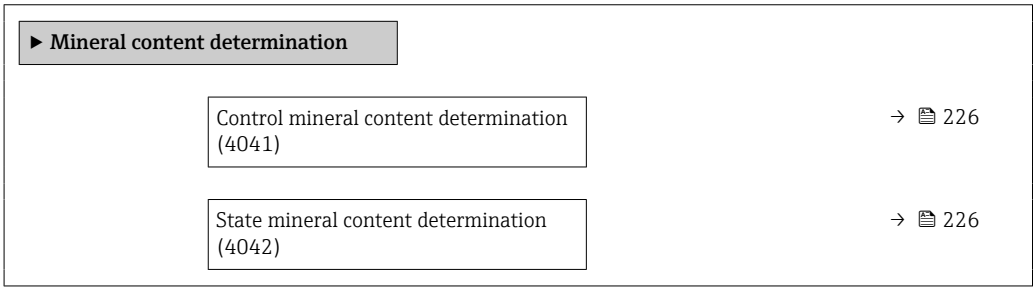
Description Enter the coefficient.

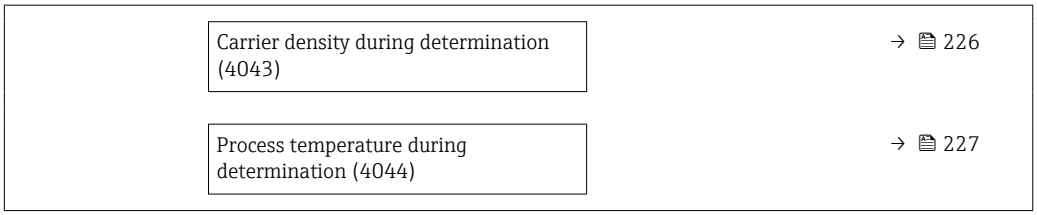
User entry Signed floating-point number

Factory setting $-0.1721 \cdot 10^{-5}$ E-5

"Mineral content determination" submenu

Navigation Expert → Application → Concentration → Mineral content





Control mineral content determination

Navigation Expert → Application → Concentration → Mineral content → Contr.min.determ (4041)

Description Use this function to start or cancel mineral content determination.

Select the **Use result** option to take the mineral content into consideration.

Selection
- Cancel
- Start
- Use result *

Factory setting Cancel

State mineral content determination

Navigation Expert → Application → Concentration → Mineral content → State determ. (4042)

Description Displays the current status of mineral content determination.

User interface
- In progress
- Failed
- Not done
- Done

Factory setting Not done

Carrier density during determination

Navigation Expert → Application → Concentration → Mineral content → Carrier density (4043)

Description Displays the current measured density of the water with minerals under process conditions.

Dependency

The unit is taken from the **Density unit** parameter (→ 78).

* Visibility depends on order options or device settings

User interface Signed floating-point number

Factory setting 0 kg/l

Process temperature during determination

Navigation Expert → Application → Concentration → Mineral content → Process temp. (4044)

Description Displays the measured process temperature.

Dependency

The unit is taken from the **Temperature unit** parameter (→ 81).

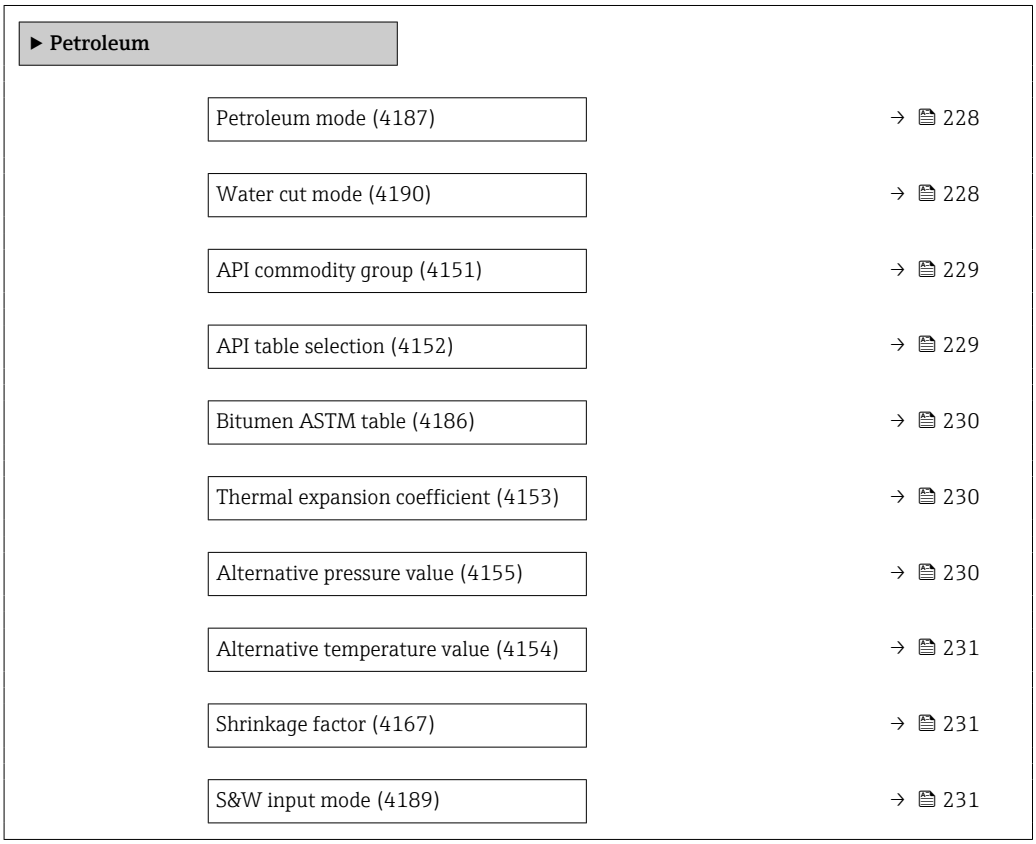
User interface −273.15 to 99 726.8499 °C

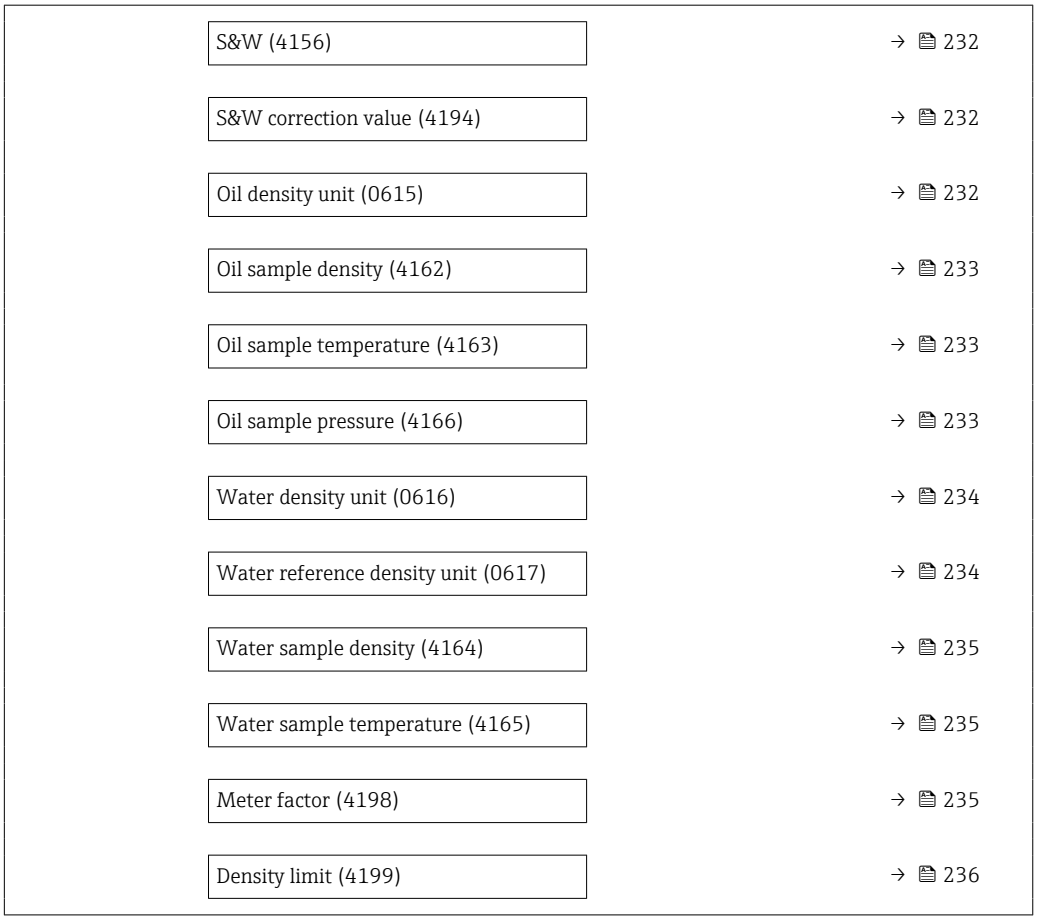
Factory setting −273.15 °C

3.9.3 "Petroleum" submenu

For detailed information on the parameter descriptions for the **Petroleum** application package,refer to the Special Documentation for the device → 7

Navigation Expert → Application → Petroleum





Petroleum mode

Navigation Expert → Application → Petroleum → Petroleum mode (4187)

Description Select petroleum mode.

Selection
- Off
- API referenced correction
- Net oil & water cut
- ASTM D4311

Factory setting Off

Water cut mode

Navigation Expert → Application → Petroleum → Water cut mode (4190)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Select water cut mode.

Selection
- Calculated value
- External value
- Current input 1 *
- Current input 2 *
- Current input 3 *

Factory setting Calculated value

API commodity group

Navigation Expert → Application → Petroleum → API comm. group (4151)

Prerequisite The following options are available if the **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228):
- A - crude oil
- C - special applications

Description Select API commodity group of the measured medium.

Selection
- A - crude oil
- B - refined products *
- C - special applications
- D - lubricating oils *
- E - NGL / LPG *

Factory setting A - crude oil

API table selection

Navigation Expert → Application → Petroleum → API tab. select. (4152)

Description Select reference density by API table.

Selection
- API table 5/6 *
- API table 23/24
- API table 53/54
- API table 59/60

Factory setting API table 53/54

* Visibility depends on order options or device settings

Bitumen ASTM table

Navigation Expert → Application → Petroleum → ASTM table (4186)

Description Select calculation table for density and specific gravity.

Selection
- >= 966kg/m3 (15°C)
- 850-965kg/m3 (15°C)
- >= 0.967 (60°F)
- 0.850-0.966 (60°F)

Factory setting >= 966kg/m3 (15°C)

Thermal expansion coefficient

Navigation Expert → Application → Petroleum → Therm.exp.coeff. (4153)

Prerequisite The **C - special applications** option is selected in the **API commodity group** parameter (→ 229) parameter

Description Enter the thermal expansion coefficient of the measured medium.

User entry $414 \cdot 10^{-6}$ to $1\,674 \cdot 10^{-6}$ 1/K

Factory setting $414 \cdot 10^{-6}$ 1/K

Alternative pressure value

Navigation Expert → Application → Petroleum → Alternat. press. (4155)

Prerequisite The **API referenced correction** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter an alternative user-defined pressure value.

User entry 1.01325 to 104.43460935 bar

Factory setting 1.01325 bar

Additional information The unit is taken from the **Pressure unit** parameter (→ 81)

Alternative temperature value

Navigation Expert → Application → Petroleum → Alternativ.temp. (4154)

Prerequisite The **API referenced correction** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter an alternative user-defined temperature value.

User entry −46 to 93 °C

Factory setting 29.5 °C

Shrinkage factor

Navigation Expert → Application → Petroleum → Shrinkage factor (4167)

Description Enter shrinkage factor.

User entry Positive floating-point number

Factory setting 1.0

S&W input mode

Navigation Expert → Application → Petroleum → S&W input mode (4189)

Prerequisite The **API referenced correction** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Select input mode for sediment and water.

Selection
- Off
- Fixed value
- External value
- Current input 1 *
- Current input 2 *
- Current input 3 *

Factory setting Off

* Visibility depends on order options or device settings

S&W

Navigation Expert → Application → Petroleum → S&W (4156)

Prerequisite The **Fixed value** option is selected in the **S&W input mode** parameter (→ 231) parameter

Description Enter a value for sediment and water in percent.

Use this function to enter a percentage to factor in a reduction in the volume flow due to the presence of sediment and water in the fluid.

User entry 0 to 100 %

Factory setting 0 %

S&W correction value

Navigation Expert → Application → Petroleum → S&W correction (4194)

Prerequisite For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **S&W input mode** parameter (→ 231), the **External value** option or the **Current input 1...n** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

Description Shows the correction value for sediment and water.

User interface Positive floating-point number

Factory setting –

Oil density unit

Navigation Expert → Application → Petroleum → Oil density unit (0615)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Select unit for the density of oil.

Selection

SI units
- kg/m³
- kg/l
- g/cm³
- g/l
- SG15°C
- SG20°C

US units
- SG60°F
- lb/ft³
- lb/gal (us)
- lb/bbl (us;oil)
- lb/in³
- STon/yd³

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

Other units
°API

Factory setting kg/m³

Oil sample density

Navigation Expert → Application → Petroleum → Oil sample dens. (4162)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter the value for the density of the oil sample.

User entry 470 to 1 210 kg/m³

Factory setting 850 kg/m³

Oil sample temperature

Navigation Expert → Application → Petroleum → Oil sample temp. (4163)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter the value for the temperature of the oil sample.

User entry −273.15 to 99 726.8499 °C

Factory setting 15 °C

Oil sample pressure

Navigation Expert → Application → Petroleum → Oil samp. press. (4166)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter the value for the pressure of the oil sample.

User entry Positive floating-point number

Factory setting 1.01325 bar

Water density unit

Navigation Expert → Application → Petroleum → Water dens. unit (0616)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Select unit for the density of the water.

Selection

SI units
- kg/m³
- kg/l
- g/cm³
- g/l
- SG15°C
- SG20°C

US units
- SG60°F
- lb/ft³
- lb/gal (us)
- lb/in³
- STon/yd³

Imperial units
lb/gal (imp)

Other units
°API

Factory setting kg/m³

Water reference density unit

Navigation Expert → Application → Petroleum → Water ref. dens. (0617)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Select unit for reference density of the water.

Selection

SI units
- kg/Nm³
- kg/Nl
- kg/Sm³
- g/Scm³
- RD15°C
- RD20°C

US units
- lb/Sft³
- RD60°F

Factory setting kg/Nm³

Water sample density

Navigation Expert → Application → Petroleum → Water samp. dens (4164)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter the value for the density of the water sample.

User entry 900 to 1 200 kg/m³

Factory setting 999.2 kg/m³

Water sample temperature

Navigation Expert → Application → Petroleum → Water samp. temp (4165)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter the value for the temperature of the water sample.

User entry −273.15 to 99 726.8499 °C

Factory setting 15 °C

Meter factor

Navigation Expert → Application → Petroleum → Meter factor (4198)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Displays the current calibration factor for correcting the volume flow. The correction is required due to inaccuracies in the measuring device.

User entry Signed floating-point number

Factory setting 1.0

Density limit

Navigation Expert → Application → Petroleum → Density limit (4199)

Description Enter limit value for the observed oil density. For higher °API values or lower kg/m³ values this limit value will be output.

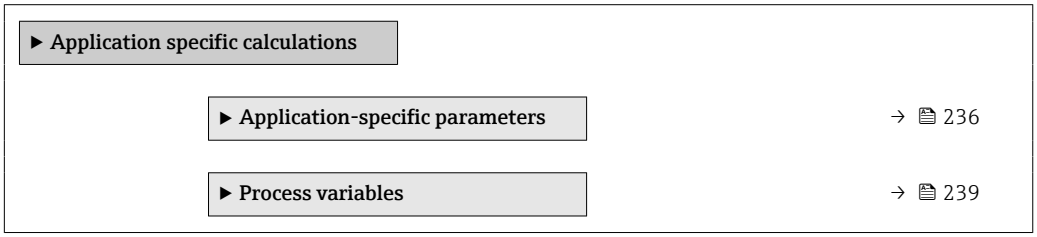
User entry Positive floating-point number

Factory setting 0 kg/l

3.9.4 "Application specific calculations" submenu

Only available if "Application-specific calculations" has been ordered.

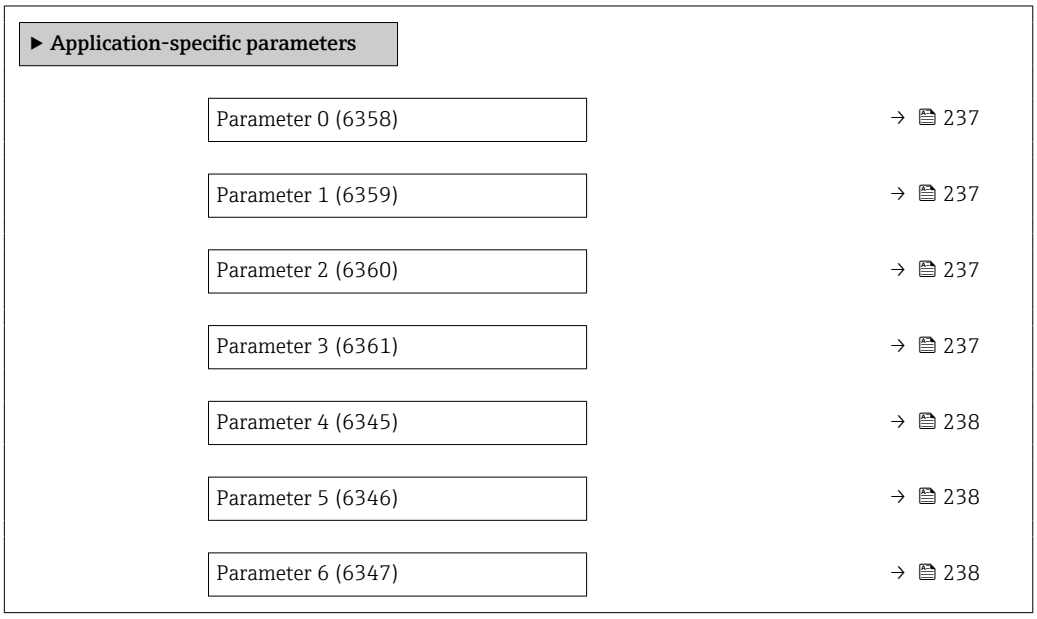
Navigation Expert → Application → Appl.spec. calc.

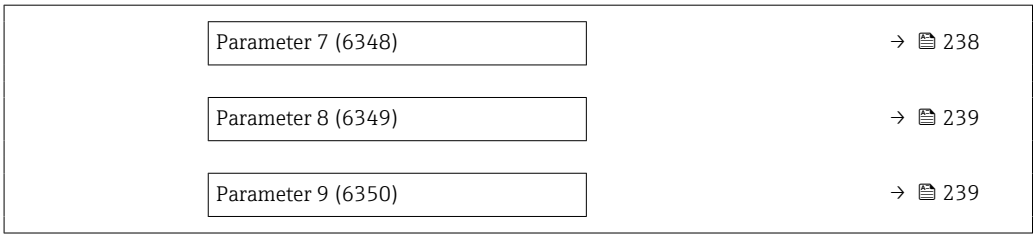


"Application-specific parameters" submenu

Only available if "Application-specific calculations" has been ordered.

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param.





Parameter 0

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 0 (6358)

Description Enter application specific value 0 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 1

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 1 (6359)

Description Enter application specific value 1 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 2

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 2 (6360)

Description nter application specific value 2 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 3

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 3 (6361)

Description Enter application specific value 3 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 4

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 4 (6345)

Description Enter application specific value 4 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 5

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 5 (6346)

Description Enter application specific value 5 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 6

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 6 (6347)

Description Enter application specific value 6 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 7

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 7 (6348)

Description Enter application specific value 7 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 8

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 8 (6349)

Description Enter application specific value 8 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 9

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 9 (6350)

Description Enter application specific value 9 for application specific calculation.

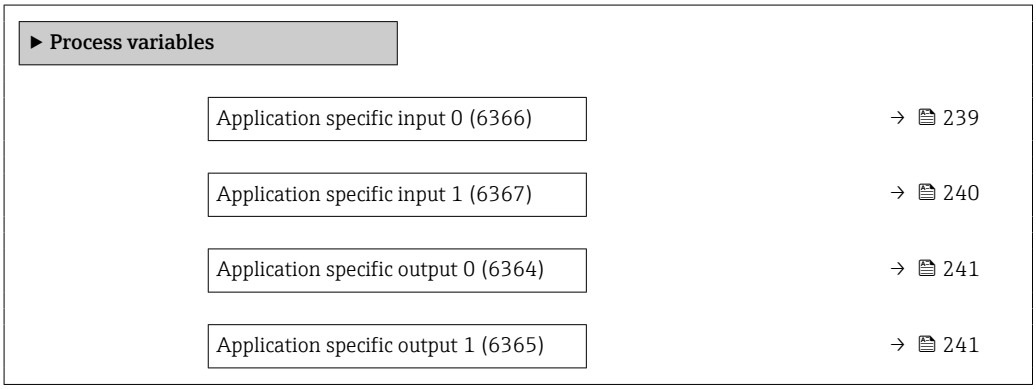
User entry Signed floating-point number

Factory setting 0

"Process variables" submenu

Only available if "Application-specific calculations" has been ordered.

Navigation Expert → Application → Appl.spec. calc. → Process variab.



Application specific input 0

Navigation Expert → Application → Appl.spec. calc. → Process variab. → Spec. input 0 (6366)

Description Shows the application specific input value 0 used for the application specific calculation.

User interface Signed floating-point number

Factory setting 0

Fail-safe type application specific 0

Navigation Expert → Application → Appl.spec. calc. → Process variab. → FSTypeAppSpec 0 (2098)

Description Use this function to select the failsafe mode for the application-specific input value 0.

Selection
- Fail-safe value
- Fallback value
- Off

Factory setting Off

Fail-safe value application specific 0

Navigation Expert → Application → Appl.spec. calc. → Process variab. → FSValueAppSpec 0 (2099)

Description Use this function to enter the failsafe value for the application-specific input value 0.

User entry Signed floating-point number

Factory setting 0

Application specific input 1

Navigation Expert → Application → Appl.spec. calc. → Process variab. → Spec. input 1 (6367)

Description Shows the application specific input value 1 used for the application specific calculation.

User interface Signed floating-point number

Factory setting 0

Fail-safe type application specific 1

Navigation Expert → Application → Appl.spec. calc. → Process variab. → FSTypeAppSpec 1 (2100)

Description Use this function to select the failsafe mode for the application-specific input value 1.

Selection
- Fail-safe value
- Fallback value
- Off

Factory setting Off

Fail-safe value application specific 1

Navigation Expert → Application → Appl.spec. calc. → Process variab. → FSValueAppSpec 1 (65535)

Description Use this function to enter the failsafe value for the application-specific input value 1.

User entry Signed floating-point number

Factory setting 0

Application specific output 0

Navigation Expert → Application → Appl.spec. calc. → Process variab. → Spec. output 0 (6364)

Description Shows the calculated application specific output value 0.

User interface Signed floating-point number

Factory setting 0

Application specific output 1

Navigation Expert → Application → Appl.spec. calc. → Process variab. → Spec. output 1 (6365)

Description Shows the calculated specific output value 1.

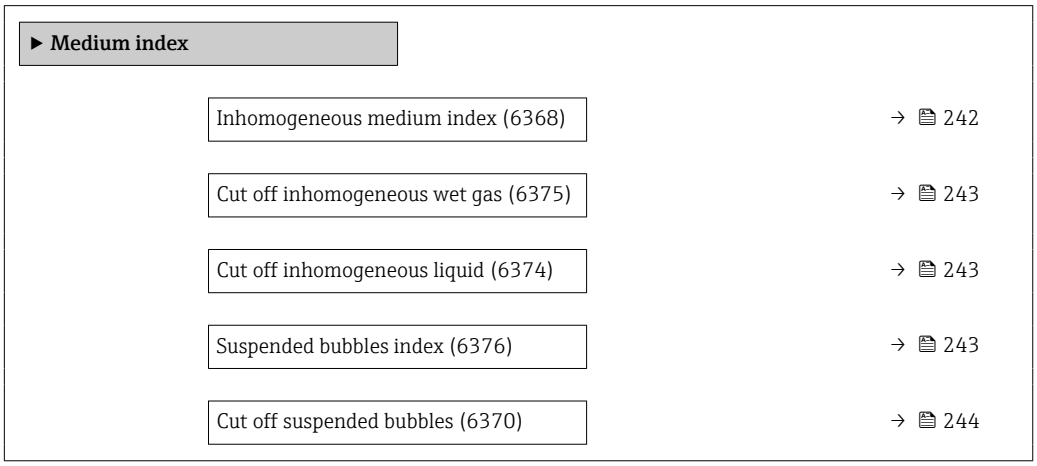
User interface Signed floating-point number

Factory setting 0

3.9.5 "Medium index" submenu

The following additional parameters and settings are part of the Gas Fraction Handler function. Due to its use of two operating frequencies (MFT - Multi-Frequency-Technology), Promass Q can provide additional diagnostic information about entrained gas that is suspended in the process liquid and the measured density is > 400 kg/m^3. The gas typically occurs in viscous liquids in the form of microbubbles or small bubbles.

Navigation Expert → Application → Medium index



Inhomogeneous medium index

Navigation Expert → Application → Medium index → InhomogMedIndex (6368)

Description Shows the degree of inhomogeneity of the medium.

User interface Signed floating-point number

Additional information
- The 'Index inhomogeneous medium' diagnostic indicates the overall scale of two-phase flow associated with free bubbles.
- If the liquid does not contain entrained gas, the value is 0. For very high levels of gas content (e.g. associated with slug flow), the value is over 10.
- The diagnostic index generally increases with an increasing gas volume content. The index will not saturate with an excessive second phase.
- Although the index shows a qualitative correlation to the severity of gas entrainment, it should not be understood on a one-to-one basis as the gas volume content.
- The 'Index inhomogeneous medium' is reproducible under the same entrained gas conditions and can help to better understand the process conditions and the level of gas entrainment in relative terms.
- Similarly, the diagnostic index can also be used to describe the relative share of solids in a liquid application or the relative share of a liquid phase in a wet gas application.

Cut off inhomogeneous wet gas

Navigation Expert → Application → Medium index → Cut off inh. gas (6375)

Description Enter cut off value for wet gas applications. Below this value the 'Inhomogeneous medium index' is set to 0.

User entry Positive floating-point number

Factory setting 0.25

Additional information This parameter is used for wet gas applications. If the 'Index inhomogeneous medium' drops below this value and the measured density is < 400 kg/m^3, the 'Index inhomogeneous medium' is reported as zero.

Cut off inhomogeneous liquid

Navigation Expert → Application → Medium index → Cut off liquid (6374)

Description Enter cut off value for liquid applications. Below this value the 'Inhomogeneous medium index' is set to 0.

User entry Positive floating-point number

Factory setting 0.05

Additional information This parameter is used for entrained gas in liquid applications or for solids in liquid applications. If the 'Index inhomogeneous medium' drops below this value and the measured density is < 400 kg/m^3, the 'Index inhomogeneous medium' is reported as zero.

Suspended bubbles index

Navigation Expert → Application → Medium index → SuspBubblesIndex (6376)

Prerequisite The diagnostic index is only available for Promass Q.

Description Shows the relative amount of suspended bubbles in the medium.

User interface Signed floating-point number

Additional information

- This diagnostic index value describes the relative amount of microbubbles or small suspended bubbles in a process medium.
- If there is no entrained gas in the form of suspended bubbles in a liquid, the value is 0 or nearly 0, and for very high levels of suspended gas the value exceeds 10.
- The diagnostic index generally increases with increasing gas volumes, but the scaling is not linear in relation to the percentage gas content.
- The index will not saturate with an excessive second phase.
- The 'Index inh. medium' can help to better understand the process conditions and the level of gas entrainment in relative terms, but the index values cannot be interpreted on an absolute basis.

Cut off suspended bubbles

Navigation Expert → Application → Medium index → Cut off bubbles (6370)

Prerequisite The parameter is only available for Promass Q.

Description Enter the cut off value for suspended bubbles. Below this value the 'Index for suspended bubbles' is set to 0.

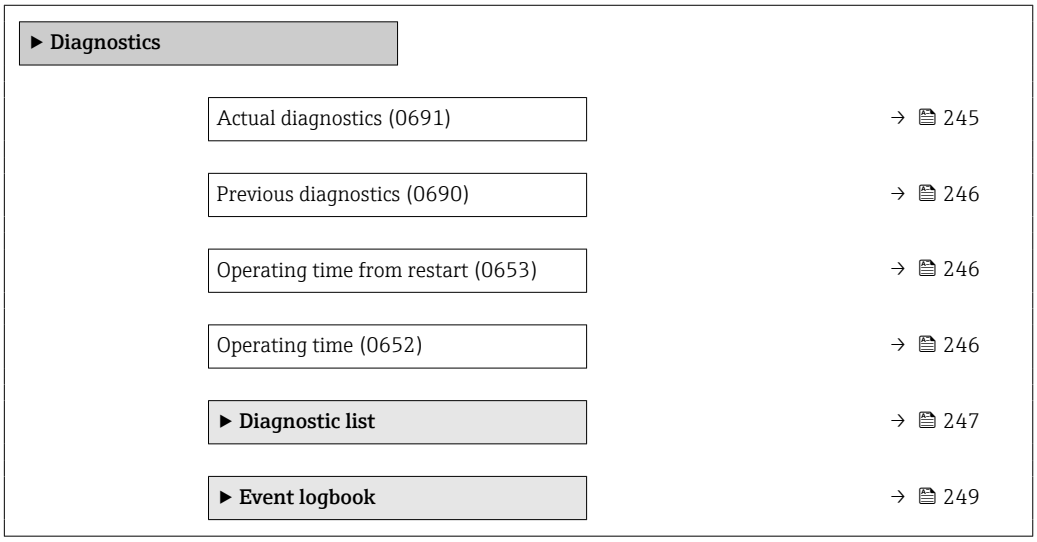
User entry Positive floating-point number

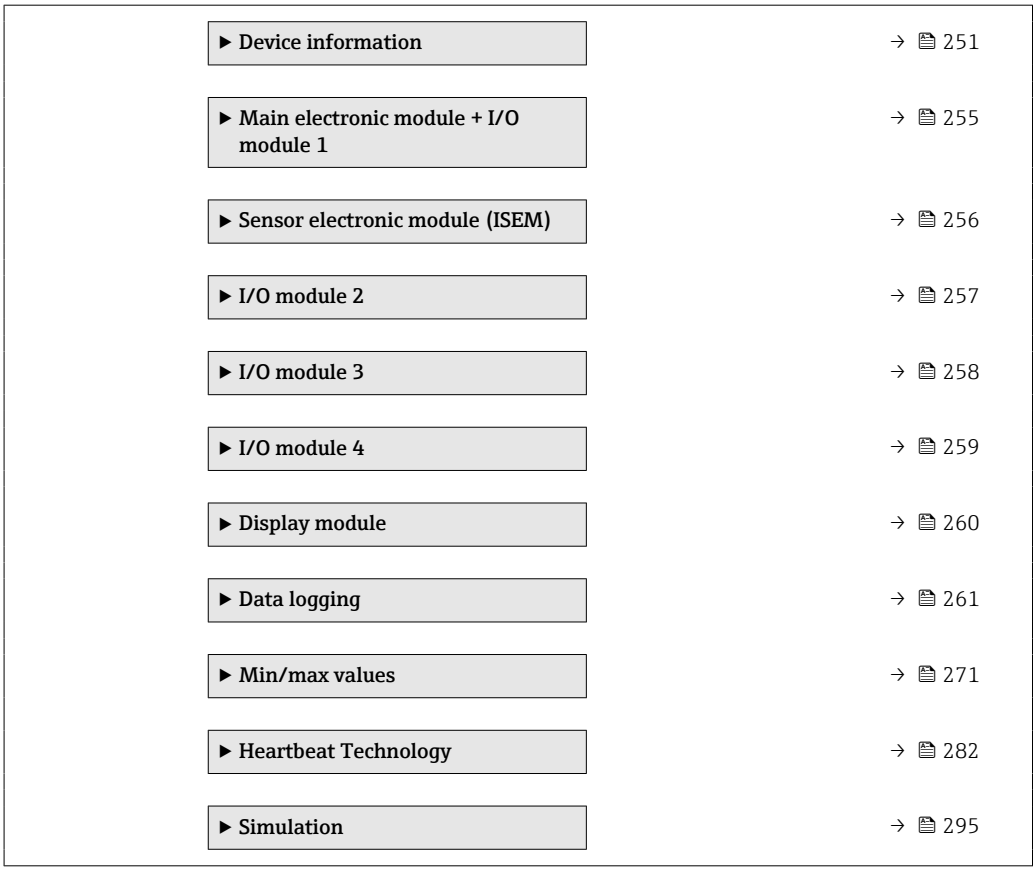
Factory setting 0.05

Additional information This parameter is used for gas entrained in liquid applications in the form of suspended bubbles. If the 'Index inhomogeneous medium' drops below this value, the 'Index inhomogeneous medium' is reported as zero.

3.10 "Diagnostics" submenu

Navigation Expert → Diagnostics





Actual diagnostics

Navigation Expert → Diagnostics → Actual diagnos. (0691)

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 (→ 247).

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 (0690)

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 (0653)

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 (0652)

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

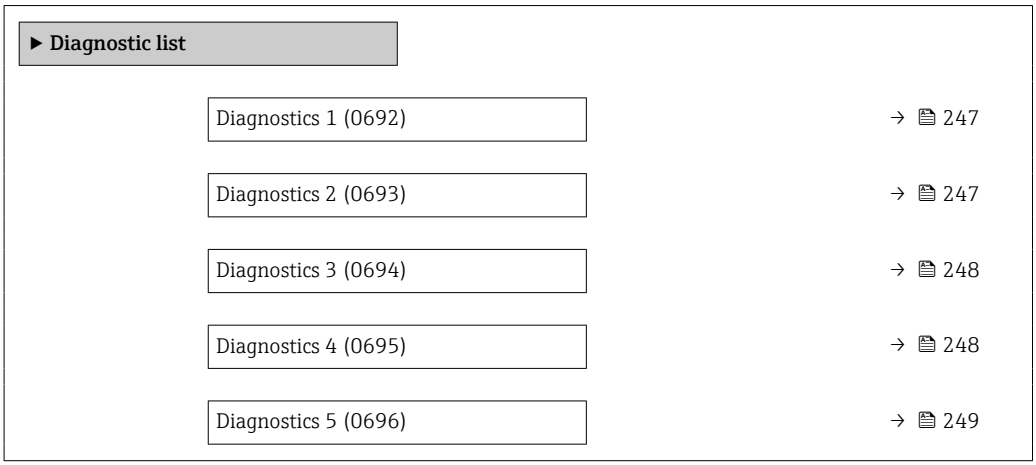
User interface Days (d), hours (h), minutes (m) and seconds (s)

Additional information *User interface*

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

3.10.1 "Diagnostic list" submenu

Navigation Expert → Diagnostics → Diagnostic list



Diagnostics 1

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 1 (0692)

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:
- ⊗F271 Main electronic failure
- ⊗F276 I/O module failure

Diagnostics 2

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 2 (0693)

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:
- ⊗F271 Main electronic failure
- ⊗F276 I/O module failure

Diagnostics 3

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 3 (0694)

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:
- ⊗F271 Main electronic failure
- ⊗F276 I/O module failure

Diagnostics 4

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 4 (0695)

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:
- ⊗F271 Main electronic failure
- ⊗F276 I/O module failure

Diagnostics 5

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 5 (0696)

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

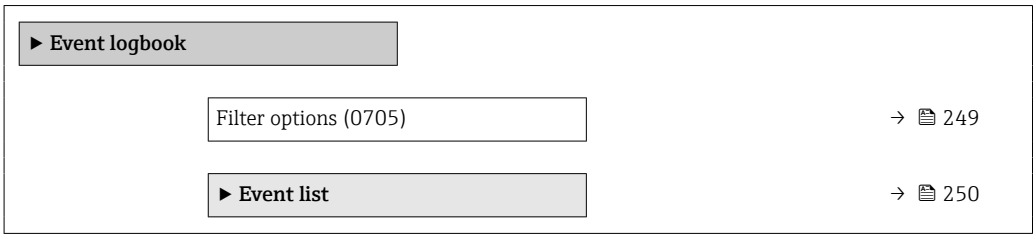
For the display format:
- ⊗F271 Main electronic failure
- ⊗F276 I/O module failure

3.10.2 "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 (0705)

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.

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

Navigation Expert → Diagnostics → Event logbook → Event list

Event list

Navigation Expert → Diagnostics → Event logbook → Event list

Description Displays the history of event messages of the category selected in the **Filter options** parameter (→ 249).

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

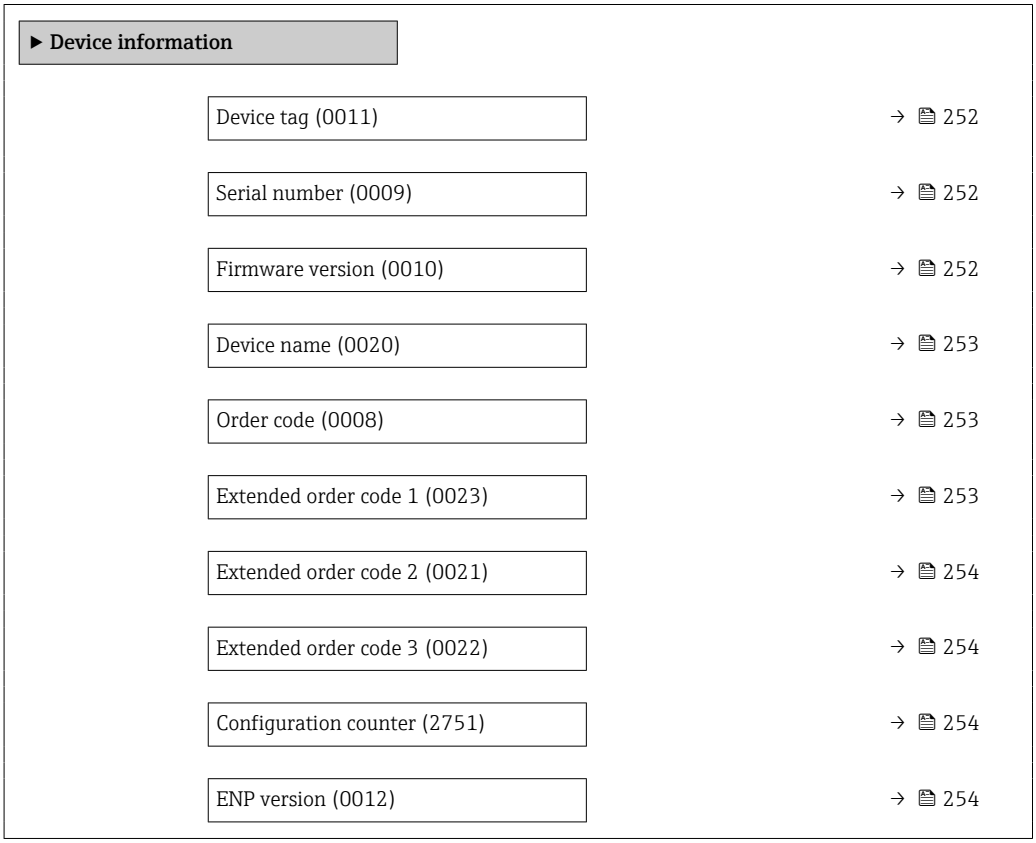
For the display format:
- I1091 Configuration modified
  ⊕ 24d12h13m00s
- ⊗F271 Main electronic failure
  ⊕ 01d04h12min30s

HistoROM

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

3.10.3 "Device information" submenu

Navigation Expert → Diagnostics → Device info



Device tag

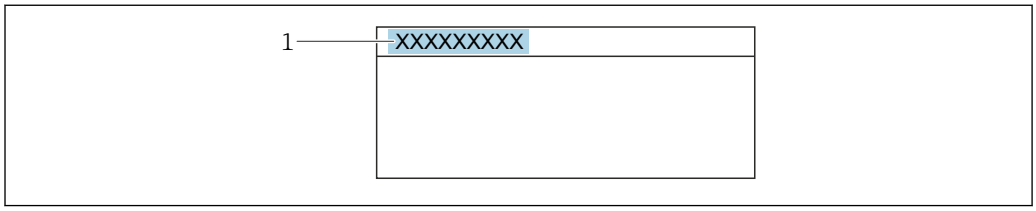
Navigation Expert → Diagnostics → Device info → Device tag (0011)

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 Promass

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 (0009)

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 (0010)

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 (0020)

Description Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.

User interface Cubemass 300/500

Order code

Navigation Expert → Diagnostics → Device info → Order code (0008)

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 (0023)

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 (0021)

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 (→ 253)

Extended order code 3

Navigation Expert → Diagnostics → Device info → Ext. order cd. 3 (0022)

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 (→ 253)

Configuration counter

Navigation Expert → Diagnostics → Device info → Config. counter (2751)

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

User interface 0 to 65 535

ENP version

Navigation Expert → Diagnostics → Device info → ENP version (0012)

Description Displays the version of the electronic nameplate.

User interface Character string

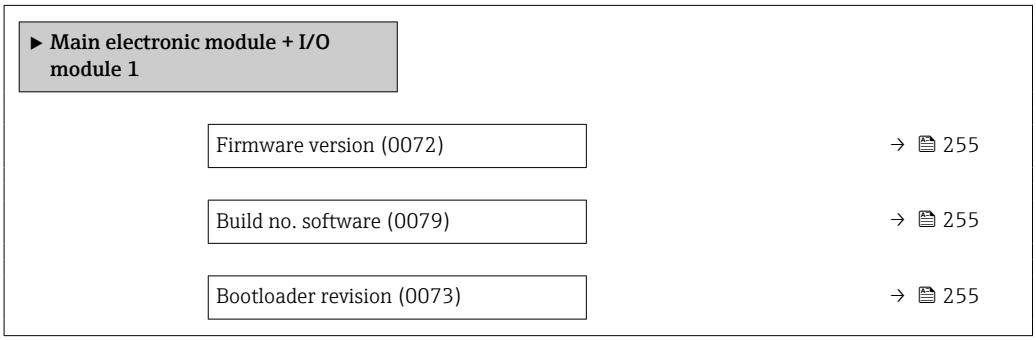
Factory setting 2.02.00

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.

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

Navigation Expert → Diagnostics 1 → Main elec.+I/O1



Firmware version

Navigation Expert → Diagnostics → Main elec.+I/O1 → Firmware version (0072)

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

User interface Positive integer

Build no. software

Navigation Expert → Diagnostics → Main elec.+I/O1 → Build no. softw. (0079)

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

User interface Positive integer

Bootloader revision

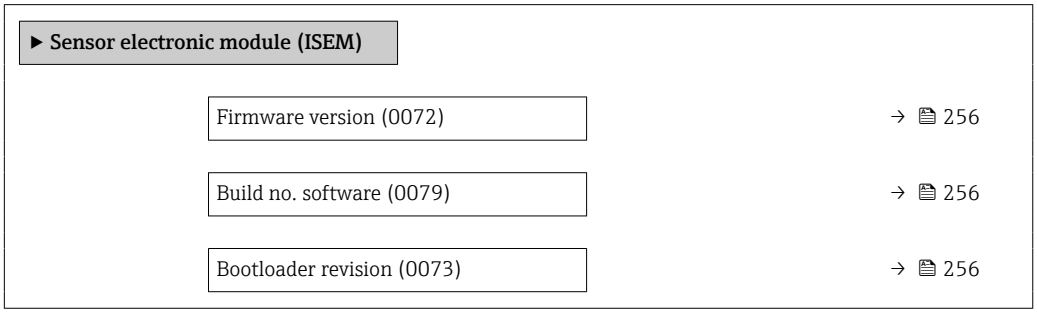
Navigation Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)

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

User interface Positive integer

3.10.5 "Sensor electronic module (ISEM)" submenu

Navigation Expert → Diagnostics → Sens. electronic



Firmware version

Navigation Expert → Diagnostics → Sens. electronic → Firmware version (0072)

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

User interface Positive integer

Build no. software

Navigation Expert → Diagnostics → Sens. electronic → Build no. softw. (0079)

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

User interface Positive integer

Bootloader revision

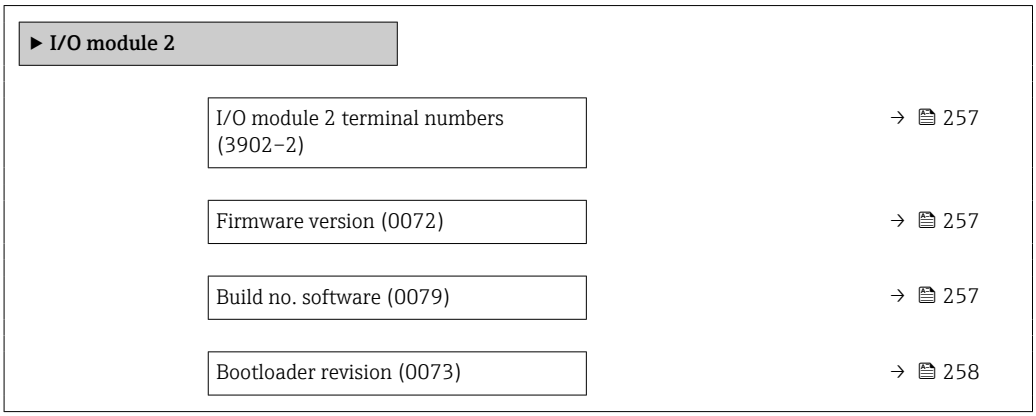
Navigation Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)

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

User interface Positive integer

3.10.6 "I/O module 2" submenu

Navigation Expert → Diagnostics → I/O module 2



I/O module 2 terminal numbers

Navigation Expert → Diagnostics → I/O module 2 → I/O 2 terminals (3902–2)

Description Displays the terminal numbers used by the I/O module.

User interface
- Not used
- 26-27 (I/O 1)
- 24-25 (I/O 2)
- 22-23 (I/O 3)

Firmware version

Navigation Expert → Diagnostics → I/O module 2 → Firmware version (0072)

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 2 → Build no. softw. (0079)

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

User interface Positive integer

Bootloader revision

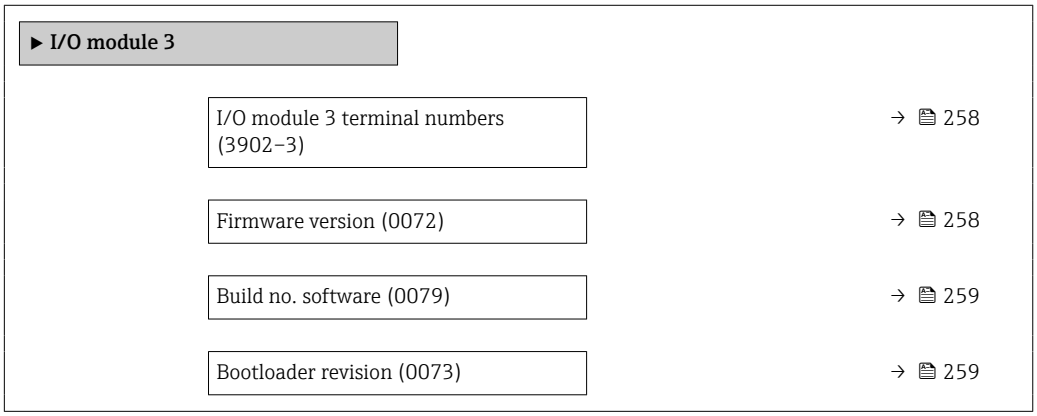
Navigation Expert → Diagnostics → I/O module 2 → Bootloader rev. (0073)

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

User interface Positive integer

3.10.7 "I/O module 3" submenu

Navigation Expert → Diagnostics → I/O module 3



I/O module 3 terminal numbers

Navigation Expert → Diagnostics → I/O module 3 → I/O 3 terminals (3902–3)

Description Displays the terminal numbers used by the I/O module.

User interface
- Not used
- 26-27 (I/O 1)
- 24-25 (I/O 2)
- 22-23 (I/O 3)

Firmware version

Navigation Expert → Diagnostics → I/O module 3 → Firmware version (0072)

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 3 → Build no. softw. (0079)

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

User interface Positive integer

Bootloader revision

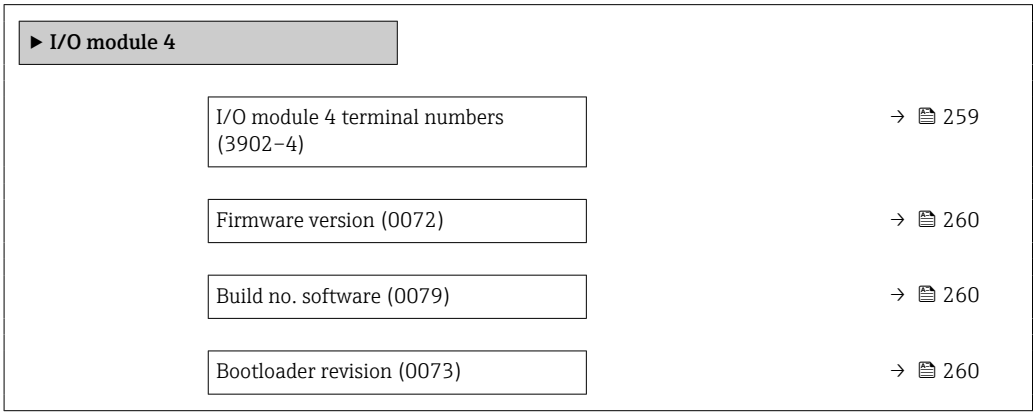
Navigation Expert → Diagnostics → I/O module 3 → Bootloader rev. (0073)

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

User interface Positive integer

3.10.8 "I/O module 4" submenu

Navigation Expert → Diagnostics → I/O module 4



I/O module 4 terminal numbers

Navigation Expert → Diagnostics → I/O module 4 → I/O 4 terminals (3902–4)

Description Displays the terminal numbers used by the I/O module.

User interface
- Not used
- 26-27 (I/O 1)
- 24-25 (I/O 2)
- 22-23 (I/O 3)

Firmware version

Navigation Expert → Diagnostics → I/O module 4 → Firmware version (0072)

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 4 → Build no. softw. (0079)

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

User interface Positive integer

Bootloader revision

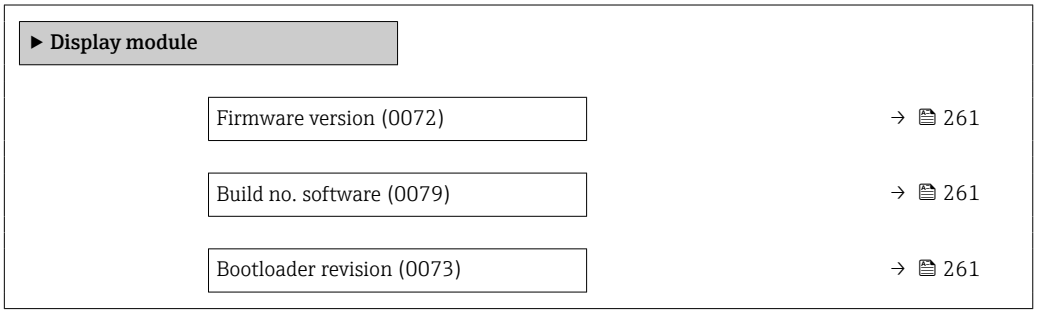
Navigation Expert → Diagnostics → I/O module 4 → Bootloader rev. (0073)

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

User interface Positive integer

3.10.9 "Display module" submenu

Navigation Expert → Diagnostics → Display module



Firmware version

Navigation Expert → Diagnostics → Display module → Firmware version (0072)

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. (0079)

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

User interface Positive integer

Bootloader revision

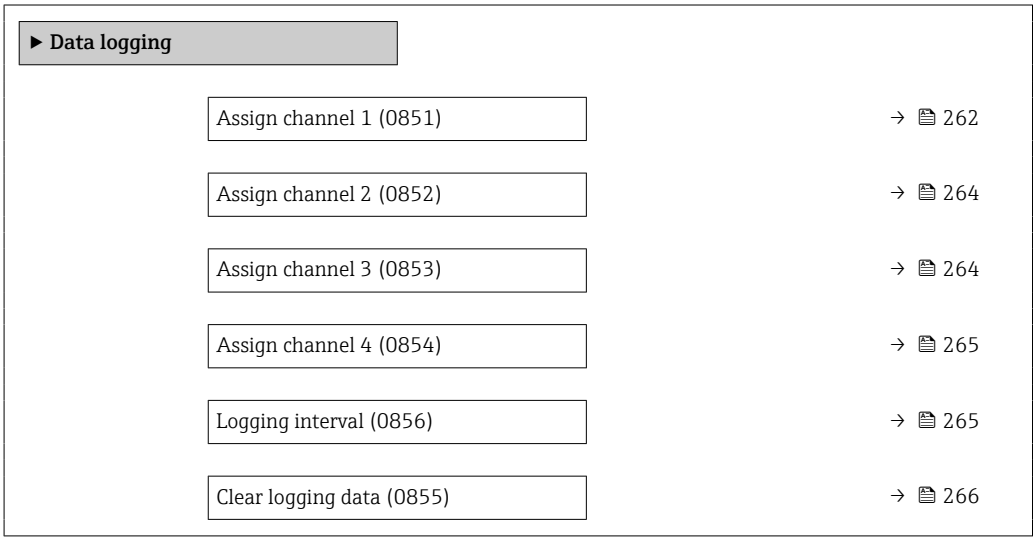
Navigation Expert → Diagnostics → Display module → Bootloader rev. (0073)

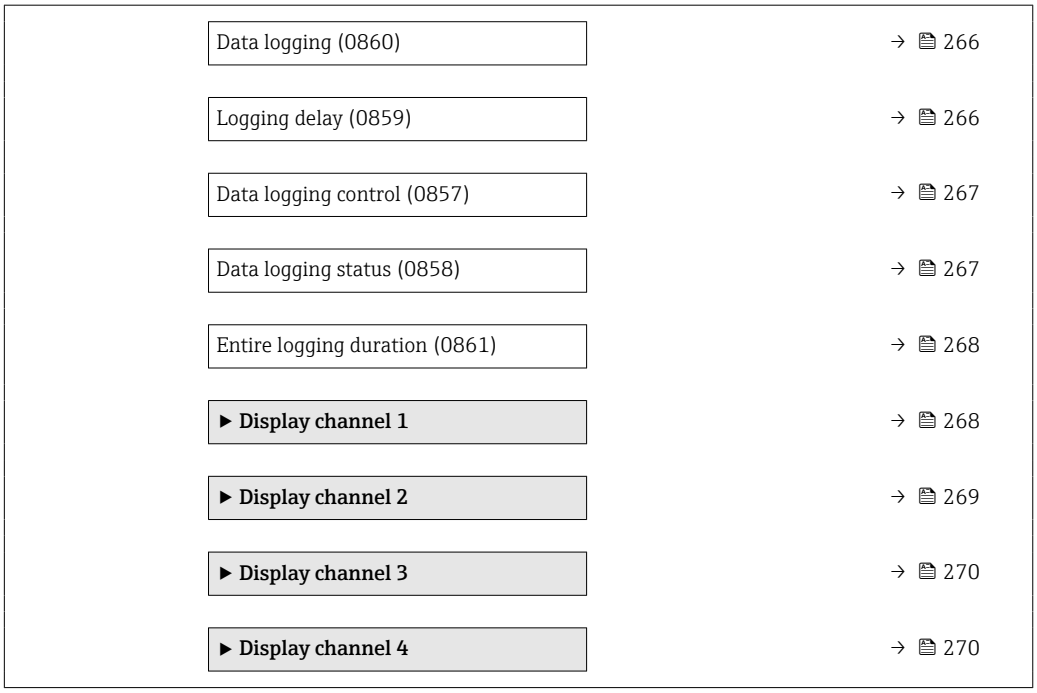
Description Use this function to display the bootloader revision of the software.

User interface Positive integer

3.10.10 "Data logging" submenu

Navigation Expert → Diagnostics → Data logging





Assign channel 1

Navigation Expert → Diagnostics → Data logging → Assign chan. 1 (0851)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

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

Selection
- Off
- Mass flow
- Volume flow
- Corrected volume flow *
- Density
- Reference density *
- Temperature
- Pressure
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Reference density alternative *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *

* Visibility depends on order options or device settings

- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Concentration *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Reference density alternative *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Application specific output 0 *
- Application specific output 1 *
- Inhomogeneous medium index
- Suspended bubbles index *
- HBSI *
- Raw value mass flow
- Exciter current 0
- Oscillation damping 0
- Oscillation damping fluctuation 0 *
- Oscillation frequency 0
- Frequency fluctuation 0 *
- Signal asymmetry
- Torsion signal asymmetry *
- Carrier pipe temperature *
- Frequency fluctuation 0 *
- Oscillation amplitude *
- Oscillation damping fluctuation 0 *
- Electronics temperature
- Sensor index coil asymmetry
- Test point 0
- Test point 1
- Current output 1 *
- Current output 2 *
- Current output 3 *
- Current output 4 *

Factory setting Off

* Visibility depends on order options or device settings

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

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 (0852)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

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

Selection For the picklist, see the **Assign channel 1** parameter (→ 262)

Factory setting Off

Assign channel 3

Navigation Expert → Diagnostics → Data logging → Assign chan. 3 (0853)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

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

Selection For the picklist, see the **Assign channel 1** parameter (→ 262)

Factory setting Off

Assign channel 4

Navigation Expert → Diagnostics → Data logging → Assign chan. 4 (0854)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

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

Selection For the picklist, see the **Assign channel 1** parameter (→ 262)

Factory setting Off

Logging interval

Navigation Expert → Diagnostics → Data logging → Logging interval (0856)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

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

User entry 0.1 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 (0855)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

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 (0860)

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 (0859)

Prerequisite In the **Data logging** parameter (→ 266), 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 (→ 267), 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 (0857)

Prerequisite In the **Data logging** parameter (→ 266), 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 (0858)

Prerequisite In the **Data logging** parameter (→ 266), 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 (0861)

Prerequisite In the **Data logging** parameter (→ 266), the **Not overwriting** option is selected.

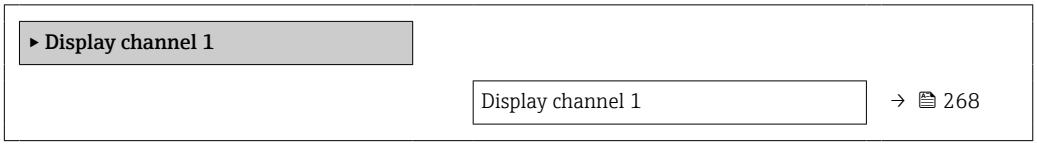
Description Displays the total logging duration.

User interface Positive floating-point number

Factory setting 0 s

"Display channel 1" submenu

Navigation Expert → Diagnostics → Data logging → Displ.channel 1



Display channel 1

Navigation Expert → Diagnostics → Data logging → Displ.channel 1

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

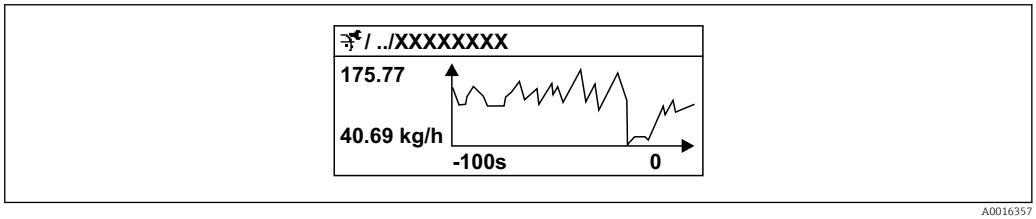
One of the following options is selected in the **Assign channel 1** parameter (→ 262):
- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *

* Visibility depends on order options or device settings

- Carrier mass flow *
- Density
- Reference density
- Concentration *
- Carrier pipe temperature *
- Electronics temperature
- Current output 1
- Oscillation frequency 0
- Frequency fluctuation 0
- Oscillation amplitude *
- Oscillation damping 0
- Oscillation damping fluctuation 0
- Signal asymmetry
- Exciter current 0

Description Displays the measured value trend for the logging channel in the form of a chart.

Additional information *Description*

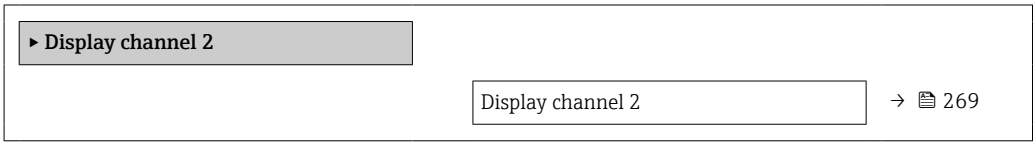


11 Chart of a measured value trend

- x-axis: depending on the number of channels selected displays 250 to 1000 measured values of a process variable.
- y-axis: displays the approximate measured value span and constantly adapts this to the ongoing measurement.

"Display channel 2" submenu

Navigation Expert → Diagnostics → Data logging → Displ.channel 2



Display channel 2

Navigation Expert → Diagnostics → Data logging → Displ.channel 2

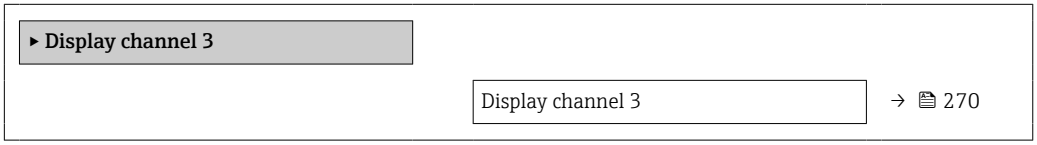
Prerequisite A process variable is specified in the **Assign channel 2** parameter.

* Visibility depends on order options or device settings

Description See the **Display channel 1** parameter → 268

"Display channel 3" submenu

Navigation Expert → Diagnostics → Data logging → Displ.channel 3



Display channel 3

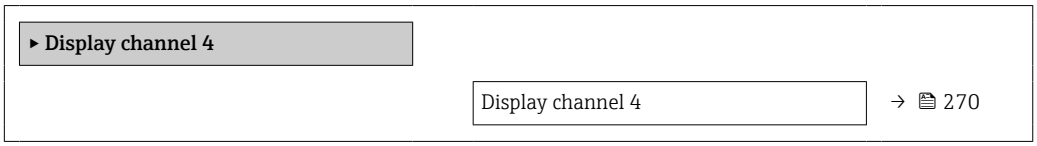
Navigation Expert → Diagnostics → Data logging → Displ.channel 3

Prerequisite A process variable is specified in the **Assign channel 3** parameter.

Description See the **Display channel 1** parameter → 268

"Display channel 4" submenu

Navigation Expert → Diagnostics → Data logging → Displ.channel 4



Display channel 4

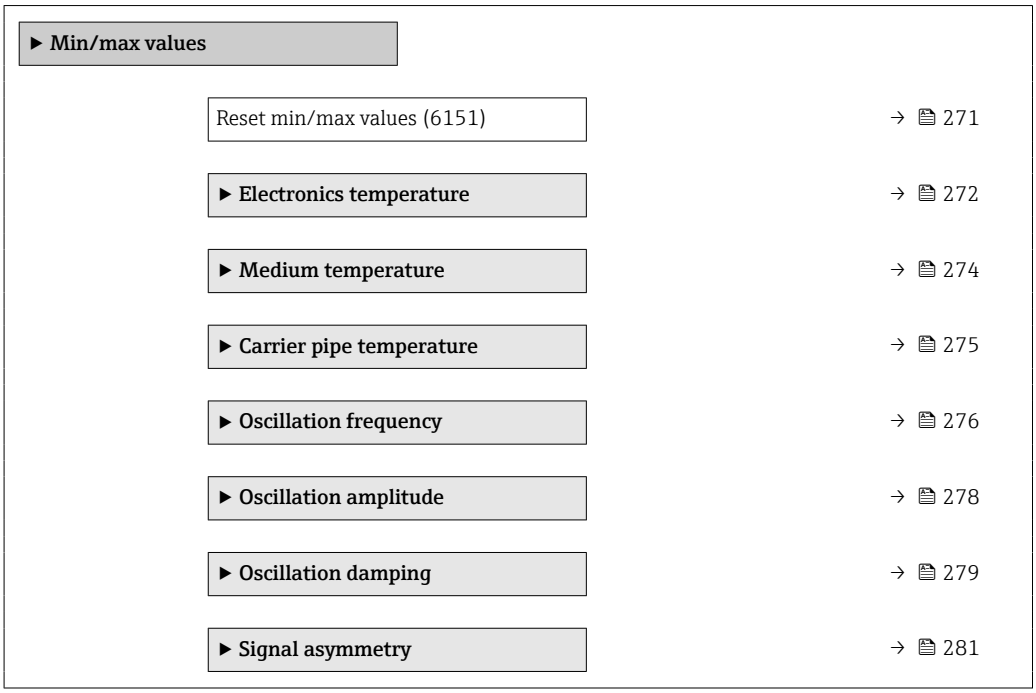
Navigation Expert → Diagnostics → Data logging → Displ.channel 4

Prerequisite A process variable is specified in the **Assign channel 4** parameter.

Description See the **Display channel 1** parameter → 268

3.10.11 "Min/max values" submenu

Navigation Expert → Diagnostics → Min/max val.



Reset min/max values

Navigation Expert → Diagnostics → Min/max val. → Reset min/max (6151)

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

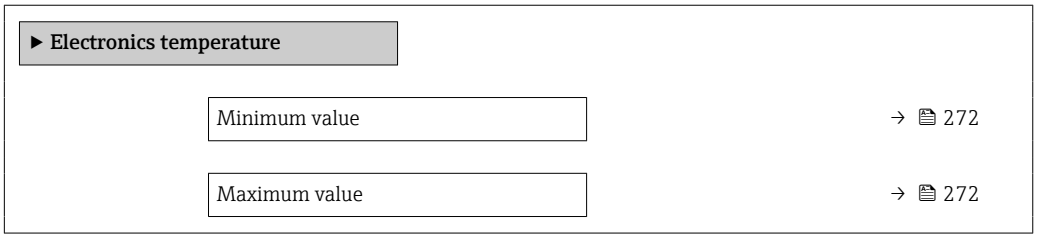
Selection
- Cancel
- Oscillation amplitude *
- Oscillation amplitude 1 *
- Oscillation damping
- Torsion oscillation damping *
- Oscillation frequency
- Torsion oscillation frequency *
- Signal asymmetry
- Torsion signal asymmetry *

Factory setting Cancel

* Visibility depends on order options or device settings

"Electronics temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Electronics temp



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Electronics temp → Minimum value (6052)

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

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 81)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Electronics temp → Maximum value (6051)

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

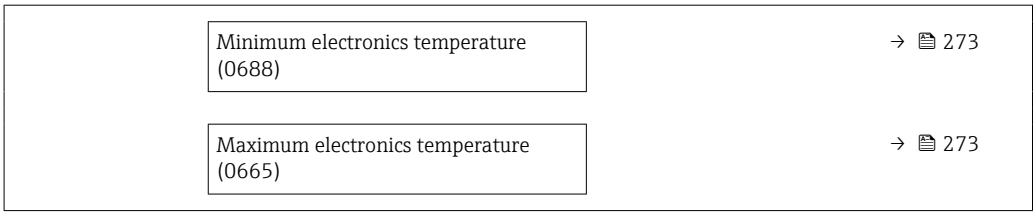
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 81)

"Main electronics temperature" submenu

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



Minimum electronics temperature

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp. → Min.electr.temp. (0688)

Description Shows the lowest previously measured temperature for the main electronic module in the transmitter.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 81)

Maximum electronics temperature

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp. → Max.electr.temp. (0665)

Description Shows the highest previously measured temperature for the main electronic module in the transmitter.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 81)

"Sensor electronics temperature (ISEM)" submenu

Navigation Expert → Diagnostics → Min/max val. → Sensor elec.temp

Minimum value (6052)	→ 274
Maximum value (6051)	→ 274

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Sensor elec.temp → Maximum value (6051)

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

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 81)

Minimum value

Navigation Expert → Diagnostics → Min/max val. → Sensor elec.temp → Minimum value (6052)

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

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 81)

"Medium temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Medium temp.

▶ **Medium temperature**	
Minimum value (6109)	→ 275
Maximum value (6108)	→ 275

Minimum value

Navigation Expert → Diagnostics → Min/max val. → Medium temp. → Minimum value (6109)

Description Displays the lowest previously measured medium temperature value.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 81)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Medium temp. → Maximum value (6108)

Description Displays the highest previously measured medium temperature value.

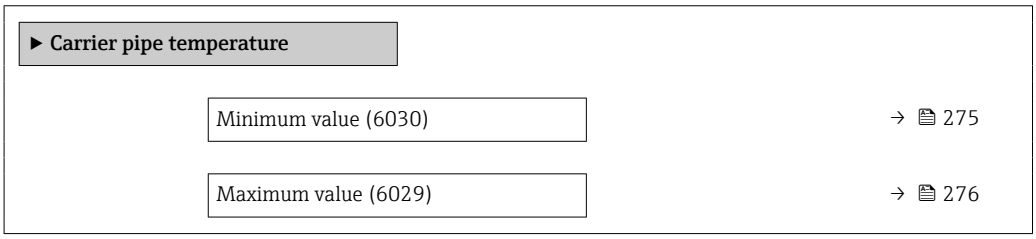
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 81)

"Carrier pipe temperature" submenu

Navigation Expert → Diagnostics → Min/max val. → Carr. pipe temp.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Carr. pipe temp. → Minimum value (6030)

Prerequisite For the following order code
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the lowest previously measured temperature value of the carrier pipe.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 81)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Carr. pipe temp. → Maximum value (6029)

Prerequisite For the following order code
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the highest previously measured temperature value of the carrier pipe.

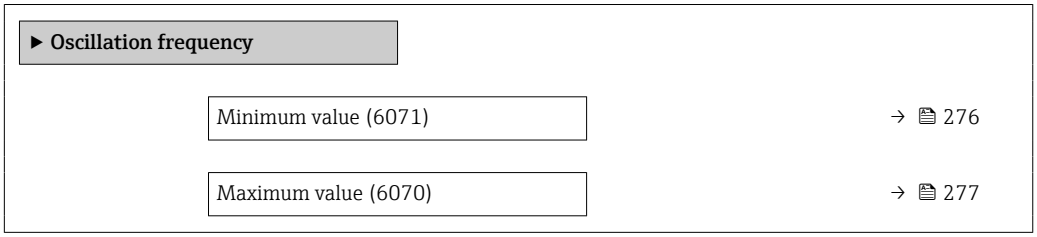
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 81)

"Oscillation frequency" submenu

Navigation Expert → Diagnostics → Min/max val. → Oscil. frequency



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Oscil. frequency → Minimum value (6071)

Description Displays the lowest previously measured oscillation frequency.

User interface Signed floating-point number

Maximum value

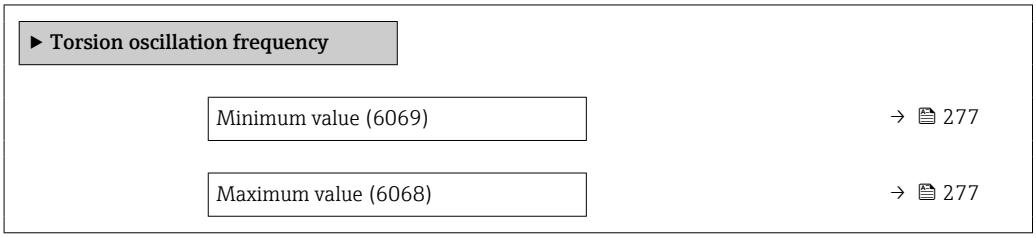
Navigation Expert → Diagnostics → Min/max val. → Oscil. frequency → Maximum value (6070)

Description Displays the highest previously measured oscillation frequency.

User interface Signed floating-point number

"Torsion oscillation frequency" submenu

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.freq.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.freq. → Minimum value (6069)

Prerequisite Only available for Promass I and Q.

For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the lowest previously measured torsion oscillation frequency.

User interface Signed floating-point number

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.freq. → Maximum value (6068)

Prerequisite Only available for Promass I and Q.

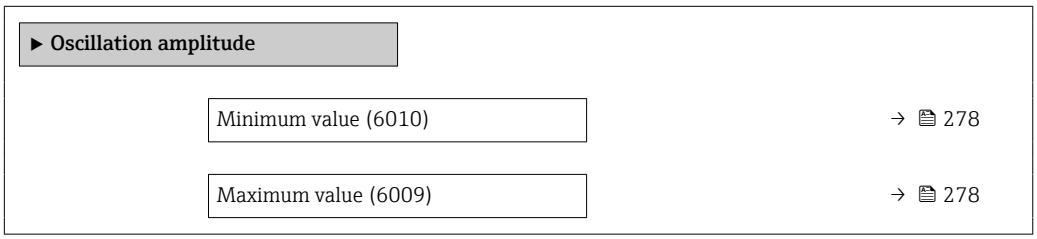
For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the highest previously measured torsion oscillation frequency.

User interface Signed floating-point number

"Oscillation amplitude" submenu

Navigation Expert → Diagnostics → Min/max val. → Oscil. amplitude



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Oscil. amplitude → Minimum value (6010)

Description Displays the lowest previously measured oscillation amplitude.

User interface Signed floating-point number

Maximum value

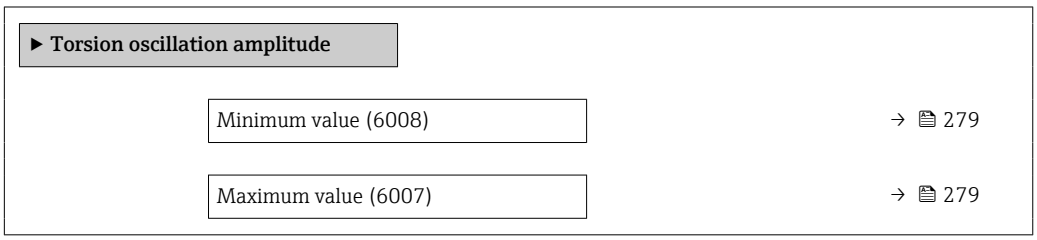
Navigation Expert → Diagnostics → Min/max val. → Oscil. amplitude → Maximum value (6009)

Description Displays the highest previously measured oscillation amplitude.

User interface Signed floating-point number

"Torsion oscillation amplitude" submenu

Navigation Expert → Diagnostics → Min/max val. → Tor. osc. amp.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Tor. osc. amp. → Minimum value (6008)

Prerequisite Only available for Promass I and Q.

For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the lowest previously measured torsion oscillation amplitude.

User interface Signed floating-point number

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Tor. osc. amp. → Maximum value (6007)

Prerequisite Only available for Promass I and Q.

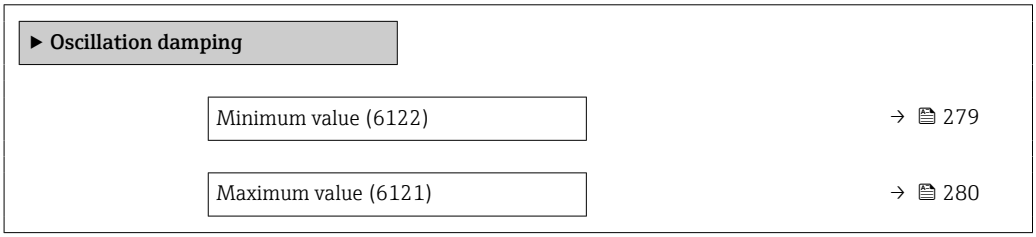
For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the highest previously measured torsion oscillation amplitude.

User interface Signed floating-point number

"Oscillation damping" submenu

Navigation Expert → Diagnostics → Min/max val. → Oscil. damping



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Oscil. damping → Minimum value (6122)

Description Displays the lowest previously measured oscillation damping.

User interface Signed floating-point number

Maximum value

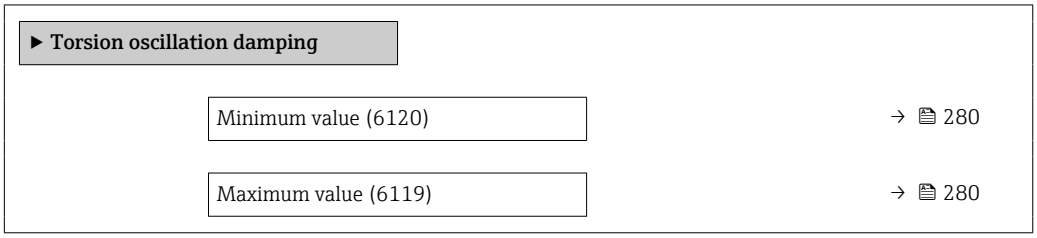
Navigation Expert → Diagnostics → Min/max val. → Oscil. damping → Maximum value (6121)

Description Displays the highest previously measured oscillation damping.

User interface Signed floating-point number

"Torsion oscillation damping" submenu

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.damp.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.damp. → Minimum value (6120)

Prerequisite Only available for Promass I and Q.

For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the lowest previously measured torsion oscillation damping.

User interface Signed floating-point number

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.damp. → Maximum value (6119)

Prerequisite Only available for Promass I and Q.

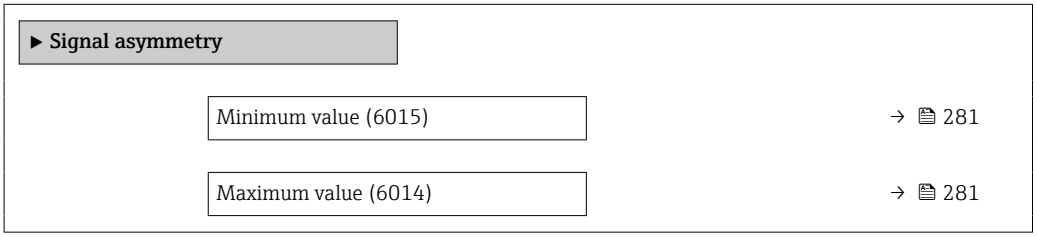
For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the highest previously measured torsion oscillation damping.

User interface Signed floating-point number

"Signal asymmetry" submenu

Navigation Expert → Diagnostics → Min/max val. → Signal asymmetry



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Signal asymmetry → Minimum value (6015)

Description Displays the lowest previously measured signal asymmetry.

User interface Signed floating-point number

Maximum value

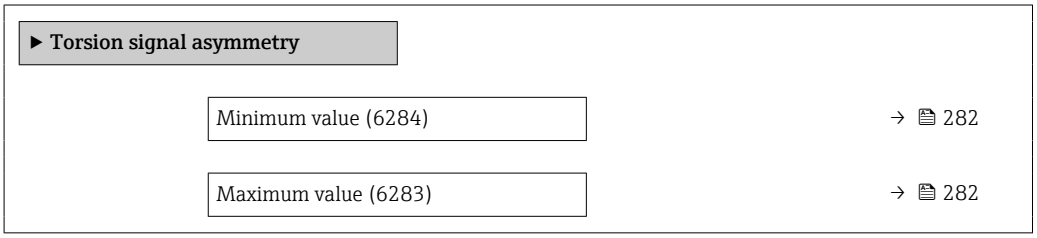
Navigation Expert → Diagnostics → Min/max val. → Signal asymmetry → Maximum value (6014)

Description Displays the highest previously measured signal asymmetry.

User interface Signed floating-point number

"Torsion signal asymmetry" submenu

Navigation Expert → Diagnostics → Min/max val. → Tors.sig.asymm.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Tors.sig.asymm. → Minimum value (6284)

Prerequisite Only available for Promass I and Q.

For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the lowest previously measured torsion signal asymmetry.

User interface Signed floating-point number

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Tors.sig.asymm. → Maximum value (6283)

Prerequisite Only available for Promass I and Q.

For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

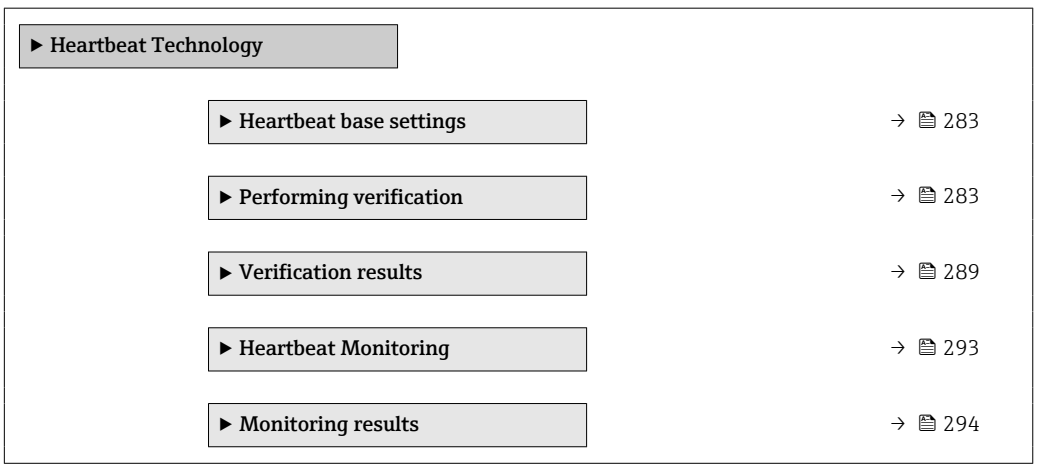
Description Displays the highest previously measured torsion signal asymmetry.

User interface Signed floating-point number

3.10.12 "Heartbeat Technology" submenu

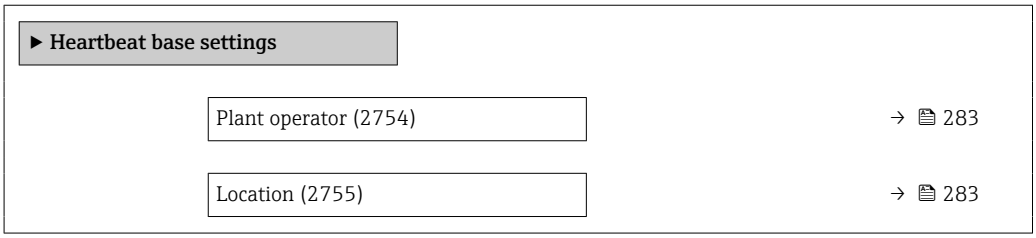
For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring**: Special Documentation for the device → 7

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 (2754)

Description Use this function to enter the plant operator.

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

Location

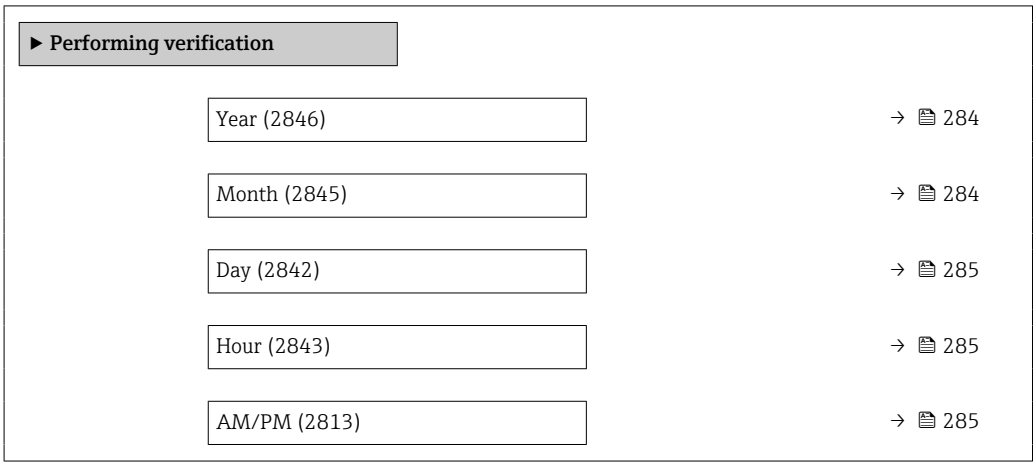
Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings → Location (2755)

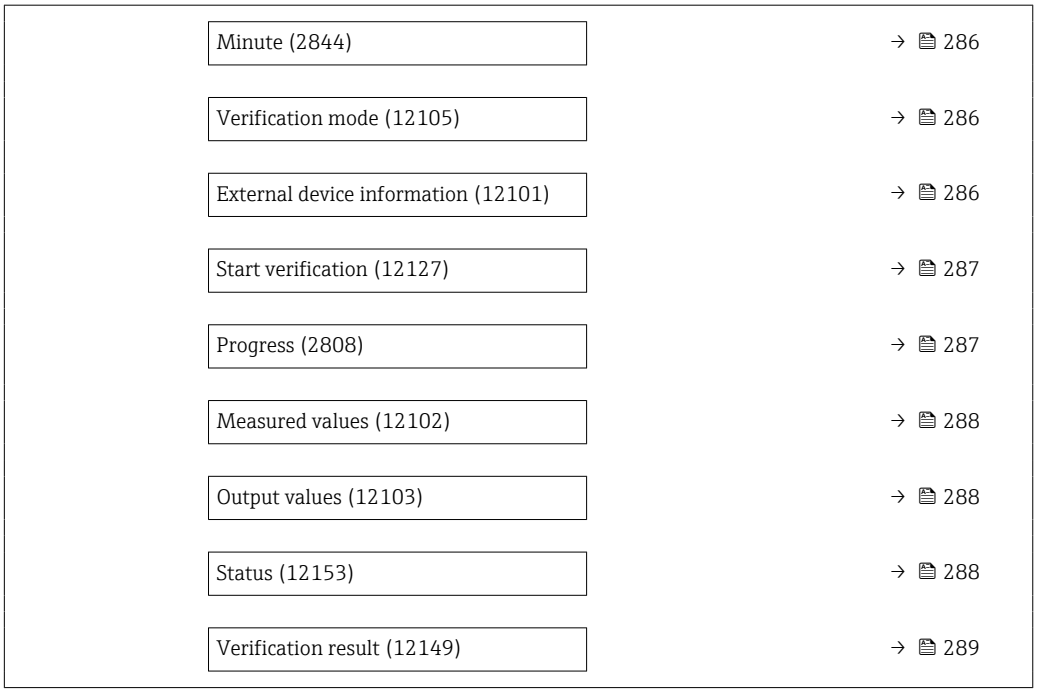
Description Use this function to enter the location.

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

"Performing verification" wizard

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific.





Year

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Year (2846)

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 10

Month

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Month (2845)

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 (2842)

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 (2843)

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 (2813)

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) (→ 82).

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 (2844)

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

Verification mode

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verificat. mode (12105)

Prerequisite Can be edited if verification status is not active.

Description Select verification mode.

Standard verification: Verification is performed automatically by the device and without manual checking of external measured variables.

Extended verification: Similar to internal verification but with the entry of external measured variables (see also "Measured values" parameter).

Selection
- Standard verification
- Extended verification

Factory setting Standard verification

External device information

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Ext. device info (12101)

Prerequisite With the following conditions:
- The **Extended verification** option is selected in the **Verification mode** parameter (→ 286).
- Can be edited if the verification status is not active.

Description Record measuring equipment for extended verification.

User entry Free text entry

Factory setting –

Start verification

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Start verificat. (12127)

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
- Output 1 low value *
- Output 1 high value *
- Output 2 low value *
- Output 2 high value *
- Output 3 low value *
- Output 3 high value *
- Frequency output 1 *
- Pulse output 1 *
- Frequency output 2 *
- Pulse output 2 *
- Double pulse output *
- Start

Factory setting Cancel

Progress

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Progress (2808)

Description The progress of the process is indicated.

User interface 0 to 100 %

* Visibility depends on order options or device settings

Measured values

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Measured val. (12102)

Prerequisite One of the following options is selected in the **Start verification** parameter (→ 287):
- Output 1 low value
- Output 1 high value
- Output 2 low value
- Output 2 high value
- Frequency output 1
- Pulse output 1

Description Use this function to enter the measured values (actual values) for the external measured variables:.
- Current output: Output current in [mA]
- Pulse/frequency output: Output frequency in [Hz]
- Double pulse output: Output frequency in [Hz]

User entry Signed floating-point number

Factory setting 0

Output values

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Output values (12103)

Description Displays the simulated output values (target values) for the external measured variables:.
- Current output: Output current in [mA].
- Pulse/frequency output: Output frequency in [Hz].

User interface Signed floating-point number

Factory setting -

Status

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Status (12153)

Description Displays the current status of the verification.

User interface
- Done
- Busy
- Failed
- Not done

Verification result

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verific. result (12149)

Description Displays the overall result of the verification.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

"Verification results" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results

► Verification results	
Date/time (manually entered) (12142)	→ 290
Verification ID (12141)	→ 290
Operating time (12126)	→ 290
Verification result (12149)	→ 290
Sensor (12152)	→ 291
HBSI (12167)	→ 291
Sensor electronic module (ISEM) (12151)	→ 291
I/O module (12145)	→ 292
System status (12109)	→ 292

Date/time (manually entered)

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Date/time (12142)

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 (12141)

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 (12126)

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 (12149)

Description Displays the overall result of the verification.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

Sensor

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sensor (12152)

Prerequisite The **Failed** option is shown in the **Overall result** parameter (→ 289).

Description Displays the result for the sensor.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

HBSI

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → HBSI (12167)

Prerequisite In the **Overall result** parameter (→ 289), the **Failed** option was displayed.

Description Displays the relative change in the sensor with all the sensor components.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

Sensor electronic module (ISEM)

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sens. electronic (12151)

Prerequisite The **Failed** option is shown in the **Overall result** parameter (→ 289).

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

I/O module

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → I/O module (12145)

Prerequisite The **Failed** option is shown in the **Overall result** parameter (→ 289).

Description Displays the result for I/O module monitoring of the I/O module.
- For current output: Accuracy of the current
- For pulse output: Accuracy of the pulses
- For frequency output: Accuracy of the frequency
- Current input: Accuracy of the current
- Double pulse output: Accuracy of the pulses
- Relay output: Number of switching cycles

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
- Not plugged
- Failed

Factory setting Not done

System status

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → System status (12109)

Prerequisite The **Failed** option is shown in the **Overall result** parameter (→ 289).

Description Displays the system condition. Tests the measuring device for active errors.

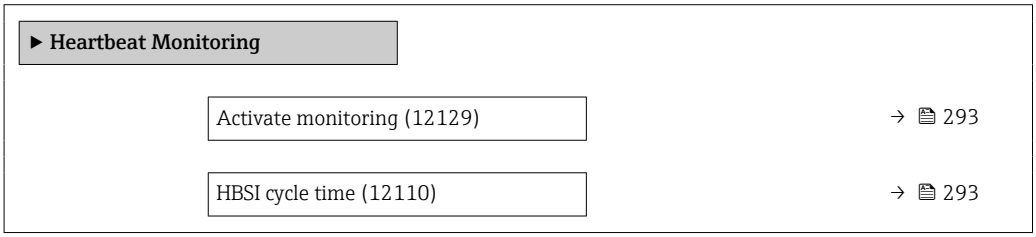
Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

"Heartbeat Monitoring" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Heartbeat Mon.



Activate monitoring

Navigation Expert → Diagnostics → Heartbeat Techn. → Heartbeat Mon. → Act. monitoring (12129)

Description **Time-controlled HBSI** option does not apply for Promass I and Promass Q.

Selection Time-controlled HBSI

Factory setting On

HBSI cycle time

Navigation Expert → Diagnostics → Heartbeat Techn. → Heartbeat Mon. → HBSI cycle time (12110)

Prerequisite In the **Activate monitoring** parameter (→ 293), the **Time-controlled HBSI** option is selected.

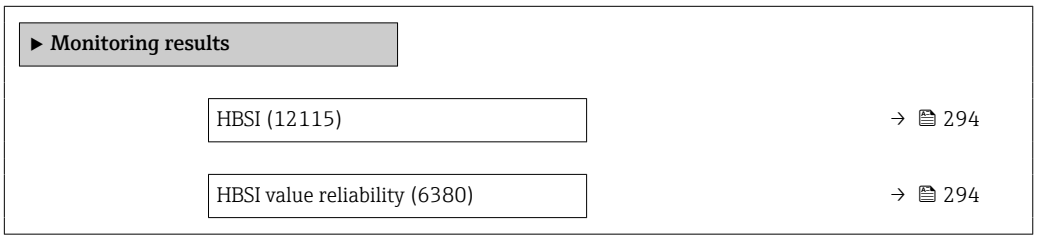
Description Use this function to enter the cycle time for determining the HBSI measured value. The HBSI measured value may only be determined in the configured cycle time in the firmware if the **Activate monitoring** parameter (→ 293) is set to **Scheduled HBSI** option.

User entry 0.5 to 4 320 h

Factory setting 12 h

"Monitoring results" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Monitor. results



HBSI

Navigation Expert → Diagnostics → Heartbeat Techn. → Monitor. results → HBSI (12115)

Description Displays the relative change of the entire sensor, with all its electrical, mechanical and electromechanical components incorporated in the sensor housing (including the measuring tube, electrodynamic pick-ups, excitation system, cables etc.), in % of the reference value.

User interface Signed floating-point number

Factory setting 0...4 %

HBSI value reliability

Navigation Expert → Diagnostics → Heartbeat Techn. → Monitor. results → HBSI val.reliab. (6380)

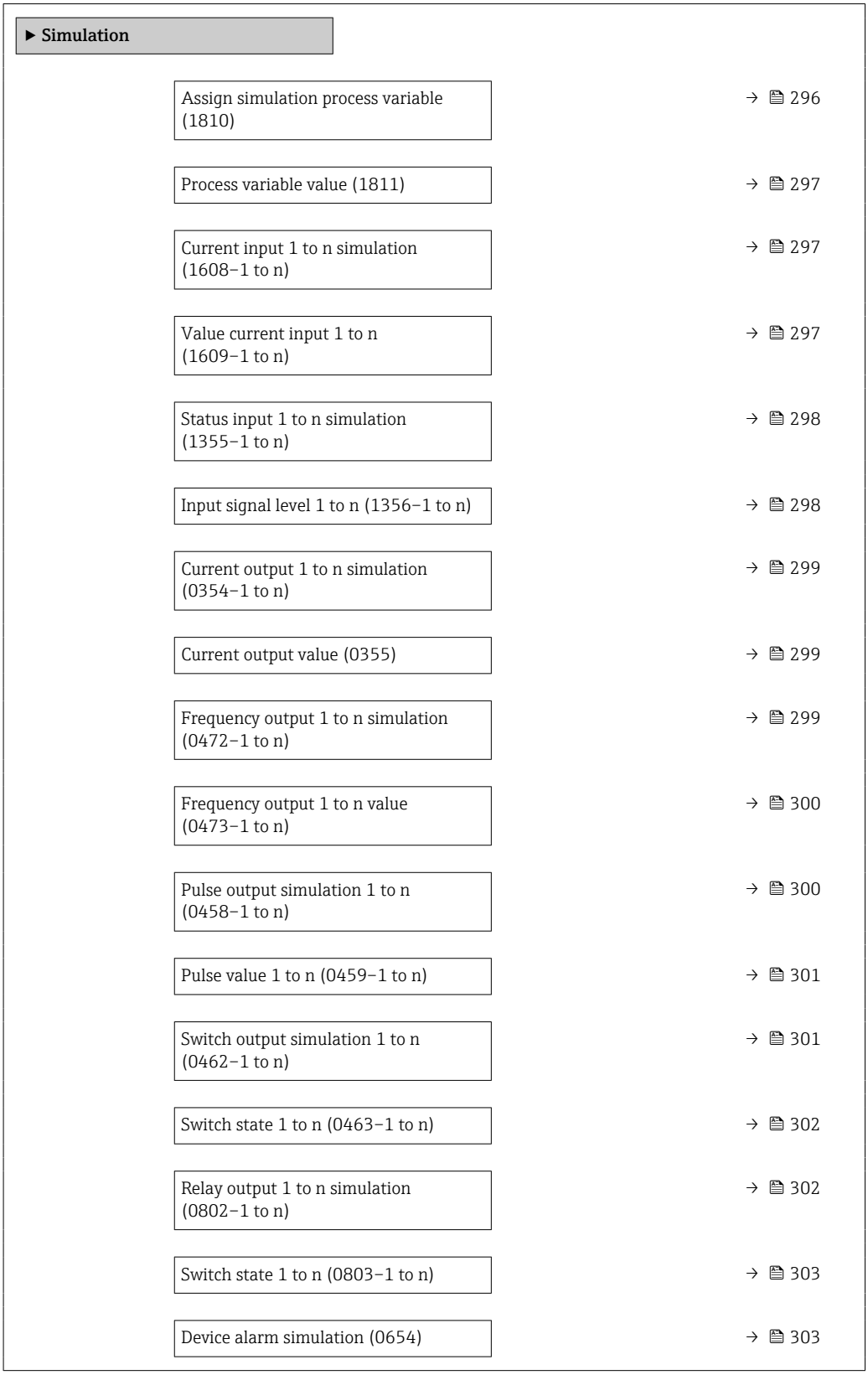
Description Shows the status of the HBSI value. Uncertain or Bad: Due to difficult process conditions over a long time no HBSI value could be determined.

User interface
- Good
- Uncertain
- Bad

Factory setting Uncertain

3.10.13 "Simulation" submenu

Navigation Expert → Diagnostics → Simulation



Diagnostic event category (0738)	→ 304
Diagnostic event simulation (0737)	→ 304

Assign simulation process variable

Navigation Expert → Diagnostics → Simulation → Assign proc.var. (1810)

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
- Mass flow
- Volume flow
- Corrected volume flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Density
- Reference density *
- Reference density alternative *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Temperature
- Concentration *
- Target mass flow *
- Carrier mass flow *
- Time period signal frequency (TPS) *

Factory setting Off

Additional information *Description*

The simulation value of the process variable selected is defined in the **Process variable value** parameter (→ 297).

* Visibility depends on order options or device settings

Process variable value

Navigation Expert → Diagnostics → Simulation → Proc. var. value (1811)

Prerequisite A process variable is selected in the **Assign simulation process variable** parameter (→ 296).

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 (→ 73).

Current input 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Curr.inp 1 to n sim. (1608–1 to n)

Description Option for switching simulation of the current input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

The desired simulation value is defined in the **Value current input 1 to n** parameter.

Selection
- Off
- On

Factory setting Off

Additional information *Selection*
- Off
  Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Current simulation is active.

Value current input 1 to n

Navigation Expert → Diagnostics → Simulation → Value curr.inp 1 to n (1609–1 to n)

Prerequisite In the **Current input 1 to n simulation** parameter, the **On** option is selected.

Description Use this function to enter the current value for the simulation. In this way, users can verify the correct configuration of the current input and the correct function of upstream feed-in units.

User entry 0 to 22.5 mA

Status input 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Status inp 1 to n sim (1355–1 to n)

Description Use this function to switch simulation of the status input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- On

Factory setting Off

Additional information

Description

The desired simulation value is defined in the **Input signal level** parameter (→ 298).

Selection

- Off
  Simulation for the status input is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Simulation for the status input is active.

Input signal level 1 to n

Navigation Expert → Diagnostics → Simulation → Signal level 1 to n (1356–1 to n)

Prerequisite In the **Status input simulation** parameter (→ 298), the **On** option is selected.

Description Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct function of upstream feed-in units.

Selection
- High
- Low

Current output 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Curr.outp 1 to n sim. (0354–1 to n)

Description Use this function to switch simulation of the current output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- On

Factory setting Off

Additional information *Description*

The desired simulation value is defined in the **Value current output 1 to n** parameter.

Selection
- Off
  Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Current simulation is active.

Current output value

Navigation Expert → Diagnostics → Simulation → Curr.outp val. (0355)

Prerequisite In the **Current output 1 to n simulation** parameter, the **On** option is selected.

Description Use this function to enter a current value for the simulation. In this way, users can verify the correct adjustment of the current output and the correct function of downstream switching units.

User entry 3.59 to 22.5 mA

Additional information *Dependency*

The input range is dependent on the option selected in the **Current span** parameter (→ 139).

Frequency output 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Freq.outp 1 to n sim. (0472–1 to n)

Prerequisite In the **Operating mode** parameter (→ 153), the **Frequency** option is selected.

Description Use this function to switch simulation of the frequency output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- On

Factory setting Off

Additional information

Description

The desired simulation value is defined in the **Frequency value 1 to n** parameter.

Selection
- Off
  Frequency simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Frequency simulation is active.

Frequency output 1 to n value

Navigation Expert → Diagnostics → Simulation → Freq.outp 1 to n val. (0473–1 to n)

Prerequisite In the **Frequency simulation 1 to n** parameter, the **On** option is selected.

Description Use this function to enter a frequency value for the simulation. In this way, users can verify the correct adjustment of the frequency output and the correct function of downstream switching units.

User entry 0.0 to 12 500.0 Hz

Pulse output simulation 1 to n

Navigation Expert → Diagnostics → Simulation → Puls.outp.sim. 1 to n (0458–1 to n)

Prerequisite In the **Operating mode** parameter (→ 153), the **Pulse** option is selected.

Description Use this function to switch simulation of the pulse output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- Fixed value
- Down-counting value

Factory setting Off

Additional information

Description

The desired simulation value is defined in the **Pulse value 1 to n** parameter.

Selection

- Off
  Pulse simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Fixed value
  Pulses are continuously output with the pulse width specified in the **Pulse width** parameter (→ 156).
- Down-counting value
  The pulses specified in the **Pulse value** parameter (→ 301) are output.

Pulse value 1 to n

Navigation Expert → Diagnostics → Simulation → Pulse value 1 to n (0459–1 to n)

Prerequisite In the **Pulse output simulation 1 to n** parameter, the **Down-counting value** option is selected.

Description Use this function to enter a pulse value for the simulation. In this way, users can verify the correct adjustment of the pulse output and the correct function of downstream switching units.

User entry 0 to 65 535

Switch output simulation 1 to n

Navigation Expert → Diagnostics → Simulation → Switch sim. 1 to n (0462–1 to n)

Prerequisite In the **Operating mode** parameter (→ 153), the **Switch** option is selected.

Description Use this function to switch simulation of the switch output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- On

Factory setting Off

Additional information *Description*

The desired simulation value is defined in the **Switch state 1 to n** parameter.

Selection

- Off
  Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Switch simulation is active.

Switch state 1 to n

Navigation Expert → Diagnostics → Simulation → Switch state 1 to n (0463–1 to n)

Description Use this function to select a switch value for the simulation. In this way, users can verify the correct adjustment of the switch output and the correct function of downstream switching units.

Selection
- Open
- Closed

Additional information *Selection*

- Open
  Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed
  Switch simulation is active.

Relay output 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Relay out. 1 to n sim (0802–1 to n)

Description Use this function to switch simulation of the relay output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- On

Factory setting Off

Additional information *Description*

The desired simulation value is defined in the **Switch state 1 to n** parameter.

Selection

- Off
  Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Relay simulation is active.

Switch state 1 to n

Navigation Expert → Diagnostics → Simulation → Switch state 1 to n (0803–1 to n)

Prerequisite The **On** option is selected in the **Switch output simulation 1 to n** parameter parameter.

Description Use this function to select a relay value for the simulation. In this way, users can verify the correct adjustment of the relay output and the correct function of downstream switching units.

Selection

- Open
- Closed

Additional information *Selection*

- Open
  Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed
  Relay simulation is active.

Device alarm simulation

Navigation Expert → Diagnostics → Simulation → Dev. alarm sim. (0654)

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

Selection

- Off
- On

Factory setting Off

Additional information *Description*

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

Diagnostic event category

Navigation Expert → Diagnostics → Simulation → Event category (0738)

Description Use this function to select the category of the diagnostic events that are displayed for the simulation in the **Diagnostic event simulation** parameter (→ 304).

Selection
- Sensor
- Electronics
- Configuration
- Process

Factory setting Process

Diagnostic event simulation

Navigation Expert → Diagnostics → Simulation → Diag. event sim. (0737)

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

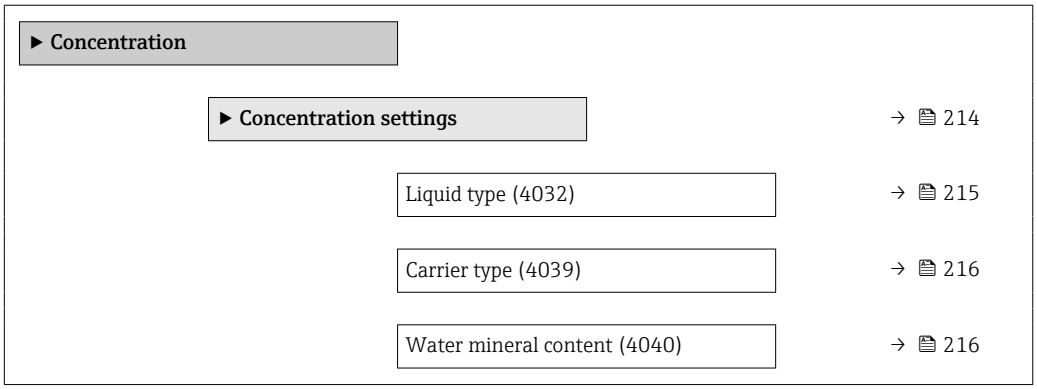
Additional information *Description*

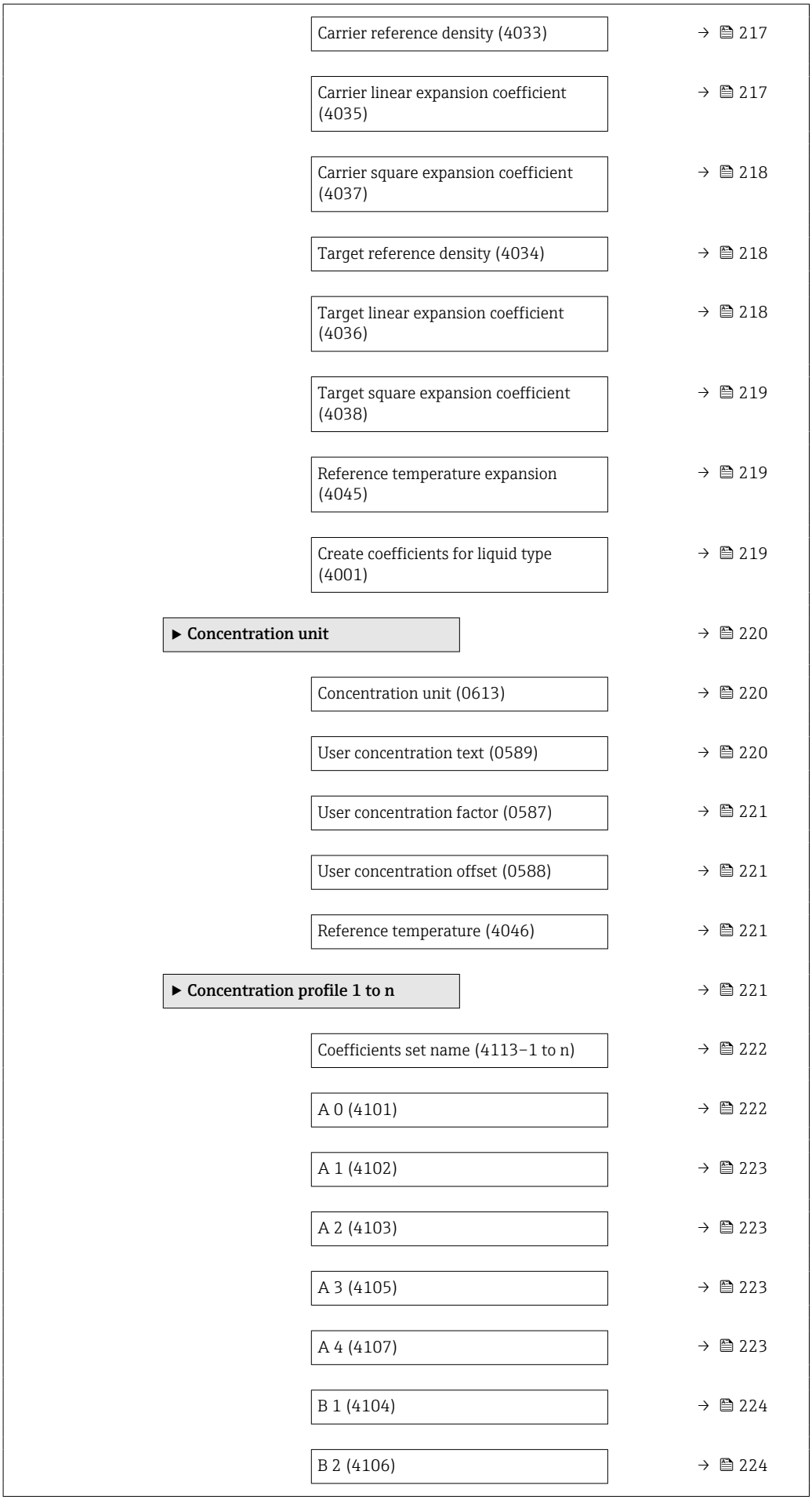
For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event category** parameter (→ 304).

3.11 "Concentration" submenu

For detailed information on the parameter descriptions for the **Concentration** application package,refer to the Special Documentation for the device → 7

Navigation Expert → Application → Concentration




Carrier reference density (4033) → 217
Carrier linear expansion coefficient (4035) → 217
Carrier square expansion coefficient (4037) → 218
Target reference density (4034) → 218
Target linear expansion coefficient (4036) → 218
Target square expansion coefficient (4038) → 219
Reference temperature expansion (4045) → 219
Create coefficients for liquid type (4001) → 219
▶ Concentration unit → 220
Concentration unit (0613) → 220
User concentration text (0589) → 220
User concentration factor (0587) → 221
User concentration offset (0588) → 221
Reference temperature (4046) → 221
▶ Concentration profile 1 to n → 221
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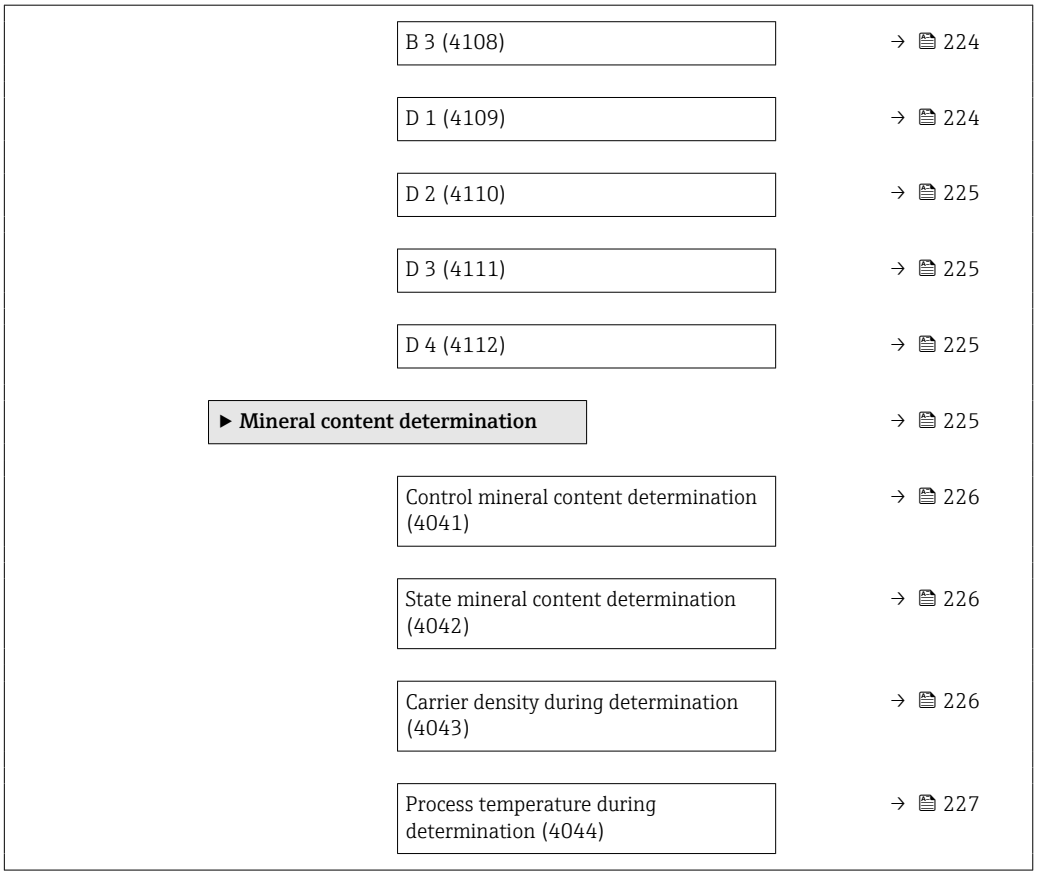
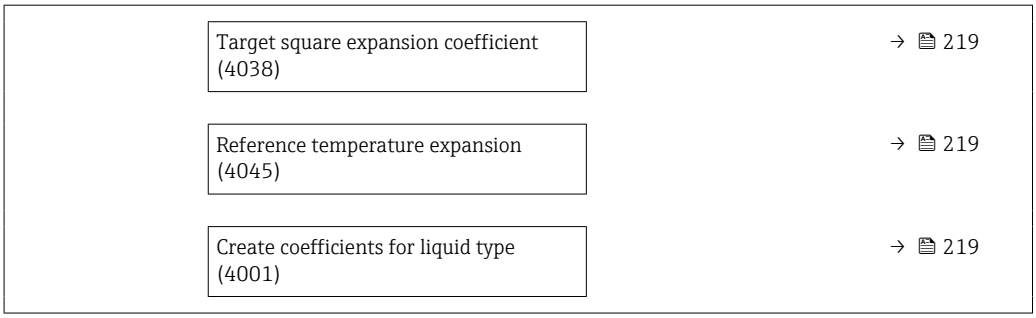
A 4 (4107) → 223
B 1 (4104) → 224
B 2 (4106) → 224



3.11.1 "Concentration settings" submenu

Navigation Expert → Application → Concentration → Concentr. sett.



Liquid type

Navigation Expert → Application → Concentration → Concentr. sett. → Liquid type (4032)

Description

Select liquid type.

The measuring device already contains the density/concentration correlation for a range of binary mixtures. Please refer to table for information on the validity ranges with regard to temperature and concentration and for standard deviations of the approximation model for converting density to concentration.

3 sets of coefficients are available for user-defined media. The coefficients are determined from table values via FieldCare

Selection

- Off
- Sucrose in water
- Glucose in water
- Fructose in water
- Invert sugar in water
- HFCS42
- HFCS55
- HFCS90
- Wort
- Whey (Total Solids)
- Ethanol in water (OIML)
- Methanol in water
- Hydrogen peroxide in water
- Hydrochloric acid
- Sulfuric acid
- Nitric acid
- Phosphoric acid
- Sodium hydroxide
- Potassium hydroxide
- Ammonia in water
- Ammonium hydroxide in water
- Ammonium nitrate in water
- Iron(III)chloride in water
- Sodium chloride in water
- %mass / %volume
- Coef Set
- Coef Set
- Coef Set

Factory setting Off

Carrier type

Navigation Expert → Application → Concentration → Concentr. sett. → Carrier type (4039)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).

Description Select carrier medium type.

For the **%mass / %volume** option, it is possible to choose whether the carrier medium is water. If "water-based" is selected, the **"Carrier reference density" parameter (→ 217), Carrier linear expansion coefficient (→ 217)** and **Carrier square expansion coefficient (→ 218)** are not available. Instead, the density characteristic of water is determined using Kell's formula (ITS-90).

Selection
- Water based
- Not water based

Factory setting Water based

Water mineral content

Navigation Expert → Application → Concentration → Concentr. sett. → Water mineral.c. (4040)

Prerequisite The following options are selected in the **Liquid type** parameter (→ 215):

One of the following options is selected in the **Liquid type** parameter (→ 215):
- Sucrose in water
- Glucose in water
- Fructose in water
- Invert sugar in water
- HFCS42
- HFCS55
- HFCS90
- Wort
- Methanol in water
- Hydrogen peroxide in water
- Hydrochloric acid
- Sulfuric acid
- Nitric acid
- Phosphoric acid
- Sodium hydroxide
- Ammonium nitrate in water
- Iron(III)chloride in water
- %mass / %volume

Description Enter mineral content for water based carriers.

It is generally presumed that water is present as a carrier medium in pure form, i.e. fully demineralized. If the water contains minerals, these affect the density of the carrier medium and therefore the density of the mixture. This effect can be taken into consideration by entering the mineral content in the device.

If the mineral content is to be calculated, this is performed in a separate menu

User entry Positive floating-point number

Factory setting 0 mg/l

Carrier reference density

Navigation Expert → Application → Concentration → Concentr. sett. → Carr. ref. dens. (4033)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215) and the **Not water based** option is selected in the **Carrier type** parameter (→ 216).

Description Enter reference density for carrier.

Density of the carrier medium at reference temperature if the **%mass / %volume** option is selected.

User entry Positive floating-point number

Factory setting 1 kg/Nl

Carrier linear expansion coefficient

Navigation Expert → Application → Concentration → Concentr. sett. → Carr.lin.exp.co. (4035)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215) and the **Not water based** option is selected in the **Carrier type** parameter (→ 216).

Description Enter linear expansion coefficient for the carrier.

Coefficient of the linear term for approximating the thermal expansion of the carrier medium.

User entry Signed floating-point number

Factory setting 0.0 1/K

Carrier square expansion coefficient

Navigation Expert → Application → Concentration → Concentr. sett. → Carr.sq.exp.coe. (4037)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215) and the **Not water based** option is selected in the **Carrier type** parameter (→ 216).

Description Enter square expansion coefficient for the carrier.

Coefficient of the quadratic term for approximating the thermal expansion of the carrier medium.

User entry Signed floating-point number

Factory setting 0.0 1/K²

Target reference density

Navigation Expert → Application → Concentration → Concentr. sett. → Targ.ref.density (4034)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).

Description Enter reference density for target.

Density of the target medium at reference temperature if the **%mass / %volume** option is selected.

User entry Positive floating-point number

Factory setting 1 kg/Nl

Target linear expansion coefficient

Navigation Expert → Application → Concentration → Concentr. sett. → Targ.lin.exp.co. (4036)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).

Description Enter linear expansion coefficient for the target.

Coefficient of the linear term for approximating the thermal expansion of the target medium.

User entry Signed floating-point number

Factory setting 0.0 1/K

Target square expansion coefficient

Navigation Expert → Application → Concentration → Concentr. sett. → Targ.sq.exp.coe. (4038)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).

Description Enter square expansion coefficient for the targe.

Coefficient of the quadratic term for approximating the thermal expansion of the target medium.

User entry Signed floating-point number

Factory setting 0.0 1/K²

Reference temperature expansion

Navigation Expert → Application → Concentration → Concentr. sett. → Ref.temp.expan. (4045)

Prerequisite The **%mass / %volume** option is selected in the **Liquid type** parameter (→ 215).

Description Enter the temperature at which the specified reference densities of the carrier and target media are valid.

User entry −273.15 to 99 999 °C

Factory setting 20 °C

Create coefficients for liquid type

Navigation Expert → Application → Concentration → Concentr. sett. → Create coeff. (4001)

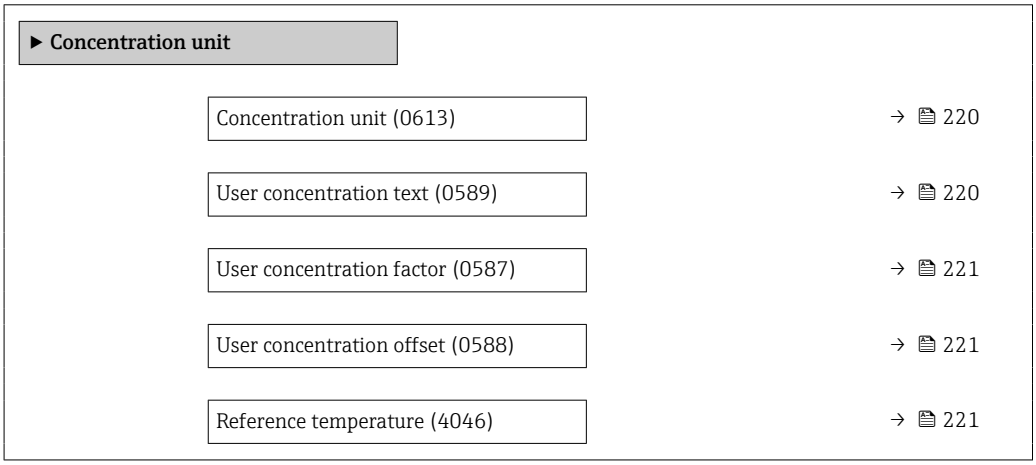
Description Create coefficient set for selected liquid type. Adjust concentration values via user concentration factor and user concentration offset.

Selection
- Cancel
- Coefficient set 1
- Coefficient set 2
- Coefficient set 3

Factory setting Cancel

3.11.2 "Concentration unit" submenu

Navigation Expert → Application → Concentration → Concentr. unit



Concentration unit

Navigation Expert → Application → Concentration → Concentr. unit → Concentr. unit (0613)

Description Select concentration unit.

Selection

Factory setting °Brix

User concentration text

Navigation Expert → Application → Concentration → Concentr. unit → Concentr. text (0589)

Prerequisite The **Coef Set 1...3** option is selected in the **Liquid type** parameter (→ 215) and the **User conc.** option is selected in the **Concentration unit** parameter (→ 220).

Description Enter text for the user specific unit of the concentration.

User entry Character string comprising numbers, letters and special characters (10)

Factory setting User conc.

User concentration factor

Navigation Expert → Application → Concentration → Concentr. unit → Concentr. factor (0587)

Prerequisite The **Coef Set 1...3** option is selected in the **Liquid type** parameter (→ 215) and the **User conc.** option is selected in the **Concentration unit** parameter (→ 220).

Description With user-specific unit: Enter a factor which is multiplicated with the measured concentration value.

User entry Signed floating-point number

Factory setting 1.0

User concentration offset

Navigation Expert → Application → Concentration → Concentr. unit → Concentr. offset (0588)

Prerequisite The **Coef Set 1...3** option is selected in the **Liquid type** parameter (→ 215) and the **User conc.** option is selected in the **Concentration unit** parameter (→ 220).

Description With user-specific unit: Enter zero point shift which is added or subtracted to/from the measured concentration value.

User entry Signed floating-point number

Factory setting 0

Reference temperature

Navigation Expert → Application → Concentration → Concentr. unit → Ref. temperature (4046)

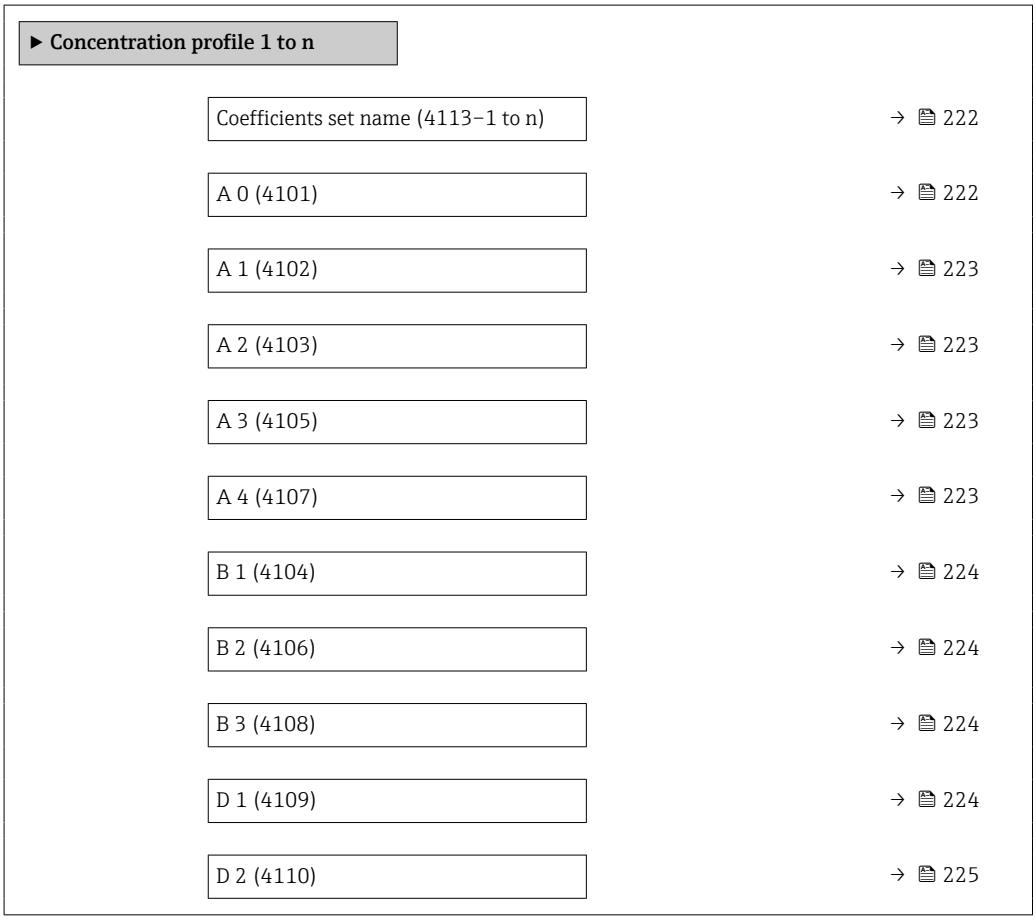
Description Enter reference temperature for calculating the reference density.

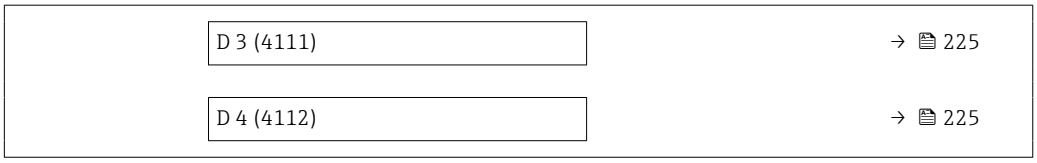
User entry −273.15 to 99 999 °C

Factory setting 20 °C

3.11.3 "Concentration profile 1 to n" submenu

Navigation Expert → Application → Concentration → Conc. profile 1 to n





Coefficients set name

Navigation Expert → Application → Concentration → Conc. profile 1 to n → Coeff. set name (4113–1 to n)

Description Enter name for coefficients set.

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

Factory setting Coef Set No.

A 0

Navigation Expert → Application → Concentration → Conc. profile 1 to n → A 0 (4101)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting –7.2952

A 1

Navigation Expert → Application → Concentration → Conc. profile 1 to n → A 1 (4102)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting 15.1555

A 2

Navigation Expert → Application → Concentration → Conc. profile 1 to n → A 2 (4103)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting −11.6756

A 3

Navigation Expert → Application → Concentration → Conc. profile 1 to n → A 3 (4105)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting 4.4759

A 4

Navigation Expert → Application → Concentration → Conc. profile 1 to n → A 4 (4107)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting −0.6615

B 1

Navigation Expert → Application → Concentration → Conc. profile 1 to n → B 1 (4104)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $0.7220 \cdot 10^{-3}$ E-3

B 2

Navigation Expert → Application → Concentration → Conc. profile 1 to n → B 2 (4106)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $38.9126 \cdot 10^{-6}$ E-6

B 3

Navigation Expert → Application → Concentration → Conc. profile 1 to n → B 3 (4108)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $-1.6739 \cdot 10^{-9}$ E-9

D 1

Navigation Expert → Application → Concentration → Conc. profile 1 to n → D 1 (4109)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $-0.0975 \cdot 10^{-2}$ E-2

D 2

Navigation Expert → Application → Concentration → Conc. profile 1 to n → D 2 (4110)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $-0.3731 \cdot 10^{-4}$ E-4

D 3

Navigation Expert → Application → Concentration → Conc. profile 1 to n → D 3 (4111)

Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $0.2957 \cdot 10^{-3}$ E-3

D 4

Navigation Expert → Application → Concentration → Conc. profile 1 to n → D 4 (4112)

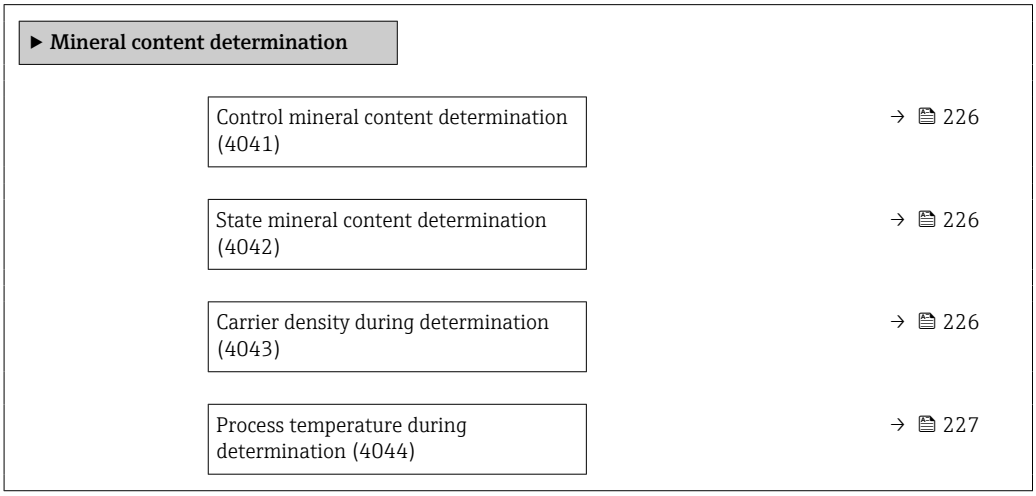
Description Enter the coefficient.

User entry Signed floating-point number

Factory setting $-0.1721 \cdot 10^{-5}$ E-5

3.11.4 "Mineral content determination" submenu

Navigation Expert → Application → Concentration → Mineral content



Control mineral content determination

Navigation Expert → Application → Concentration → Mineral content → Contr.min.determ (4041)

Description Use this function to start or cancel mineral content determination.

Select the **Use result** option to take the mineral content into consideration.

Selection
- Cancel
- Start
- Use result *

Factory setting Cancel

* Visibility depends on order options or device settings

State mineral content determination

Navigation Expert → Application → Concentration → Mineral content → State determ. (4042)

Description Displays the current status of mineral content determination.

User interface
- In progress
- Failed
- Not done
- Done

Factory setting Not done

Carrier density during determination

Navigation Expert → Application → Concentration → Mineral content → Carrier density (4043)

Description Displays the current measured density of the water with minerals under process conditions.

Dependency

The unit is taken from the **Density unit** parameter (→ 78).

User interface Signed floating-point number

Factory setting 0 kg/l

Process temperature during determination

Navigation Expert → Application → Concentration → Mineral content → Process temp. (4044)

Description Displays the measured process temperature.

Dependency

The unit is taken from the **Temperature unit** parameter (→ 81).

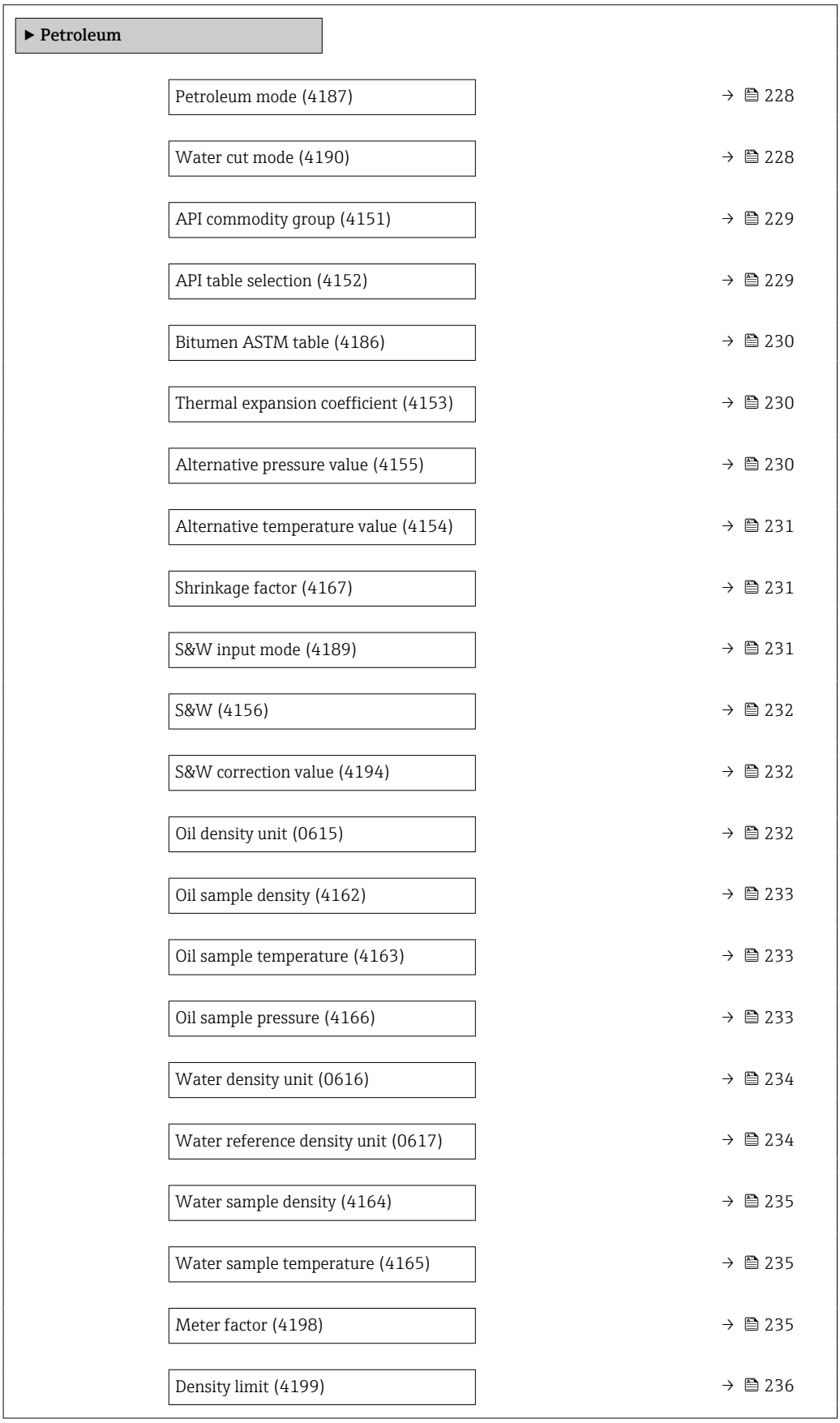
User interface −273.15 to 99 726.8499 °C

Factory setting −273.15 °C

3.12 "Petroleum" submenu

For detailed information on the parameter descriptions for the **Petroleum** application package,refer to the Special Documentation for the device → 7

Navigation Expert → Application → Petroleum



Petroleum mode

Navigation Expert → Application → Petroleum → Petroleum mode (4187)

Description Select petroleum mode.

Selection
- Off
- API referenced correction
- Net oil & water cut
- ASTM D4311

Factory setting Off

Water cut mode

Navigation Expert → Application → Petroleum → Water cut mode (4190)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Select water cut mode.

Selection
- Calculated value
- External value
- Current input 1 *
- Current input 2 *
- Current input 3 *

Factory setting Calculated value

API commodity group

Navigation Expert → Application → Petroleum → API comm. group (4151)

Prerequisite The following options are available if the **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228):
- A - crude oil
- C - special applications

Description Select API commodity group of the measured medium.

Selection
- A - crude oil
- B - refined products *
- C - special applications
- D - lubricating oils *
- E - NGL / LPG *

* Visibility depends on order options or device settings

Factory setting A - crude oil

API table selection

Navigation Expert → Application → Petroleum → API tab. select. (4152)

Description Select reference density by API table.

Selection
- API table 5/6 *
- API table 23/24
- API table 53/54
- API table 59/60

Factory setting API table 53/54

Bitumen ASTM table

Navigation Expert → Application → Petroleum → ASTM table (4186)

Description Select calculation table for density and specific gravity.

Selection
- >= 966kg/m3 (15°C)
- 850-965kg/m3 (15°C)
- >= 0.967 (60°F)
- 0.850-0.966 (60°F)

Factory setting >= 966kg/m3 (15°C)

Thermal expansion coefficient

Navigation Expert → Application → Petroleum → Therm.exp.coeff. (4153)

Prerequisite The **C - special applications** option is selected in the **API commodity group** parameter (→ 229) parameter

Description Enter the thermal expansion coefficient of the measured medium.

User entry $414 \cdot 10^{-6}$ to $1\,674 \cdot 10^{-6}$ 1/K

Factory setting $414 \cdot 10^{-6}$ 1/K

* Visibility depends on order options or device settings

Alternative pressure value

Navigation Expert → Application → Petroleum → Alternat. press. (4155)

Prerequisite The **API referenced correction** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter an alternative user-defined pressure value.

User entry 1.01325 to 104.43460935 bar

Factory setting 1.01325 bar

Additional information The unit is taken from the **Pressure unit** parameter (→ 81)

Alternative temperature value

Navigation Expert → Application → Petroleum → Alternativ.temp. (4154)

Prerequisite The **API referenced correction** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter an alternative user-defined temperature value.

User entry −46 to 93 °C

Factory setting 29.5 °C

Shrinkage factor

Navigation Expert → Application → Petroleum → Shrinkage factor (4167)

Description Enter shrinkage factor.

User entry Positive floating-point number

Factory setting 1.0

S&W input mode

Navigation Expert → Application → Petroleum → S&W input mode (4189)

Prerequisite The **API referenced correction** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Select input mode for sediment and water.

Selection
- Off
- Fixed value
- External value
- Current input 1 *
- Current input 2 *
- Current input 3 *

Factory setting Off

S&W

Navigation Expert → Application → Petroleum → S&W (4156)

Prerequisite The **Fixed value** option is selected in the **S&W input mode** parameter (→ 231) parameter

Description Enter a value for sediment and water in percent.

Use this function to enter a percentage to factor in a reduction in the volume flow due to the presence of sediment and water in the fluid.

User entry 0 to 100 %

Factory setting 0 %

S&W correction value

Navigation Expert → Application → Petroleum → S&W correction (4194)

Prerequisite For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **S&W input mode** parameter (→ 231), the **External value** option or the **Current input 1...n** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 57).

Description Shows the correction value for sediment and water.

User interface Positive floating-point number

Factory setting –

* Visibility depends on order options or device settings

Oil density unit

Navigation Expert → Application → Petroleum → Oil density unit (0615)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Select unit for the density of oil.

Selection

SI units
- kg/m³
- kg/l
- g/cm³
- g/l
- SG15°C
- SG20°C

US units
- SG60°F
- lb/ft³
- lb/gal (us)
- lb/bbl (us;oil)
- lb/in³
- STon/yd³

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

Other units
°API

Factory setting kg/m³

Oil sample density

Navigation Expert → Application → Petroleum → Oil sample dens. (4162)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter the value for the density of the oil sample.

User entry 470 to 1210 kg/m³

Factory setting 850 kg/m³

Oil sample temperature

Navigation Expert → Application → Petroleum → Oil sample temp. (4163)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter the value for the temperature of the oil sample.

User entry −273.15 to 99726.8499 °C

Factory setting 15 °C

Oil sample pressure

Navigation Expert → Application → Petroleum → Oil samp. press. (4166)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter the value for the pressure of the oil sample.

User entry Positive floating-point number

Factory setting 1.01325 bar

Water density unit

Navigation Expert → Application → Petroleum → Water dens. unit (0616)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Select unit for the density of the water.

Selection

SI units
- kg/m³
- kg/l
- g/cm³
- g/l
- SG15°C
- SG20°C

US units
- SG60°F
- lb/ft³
- lb/gal (us)
- lb/in³
- STon/yd³

Imperial units
lb/gal (imp)

Other units
°API

Factory setting kg/m³

Water reference density unit

Navigation Expert → Application → Petroleum → Water ref. dens. (0617)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Select unit for reference density of the water.

Selection

SI units
- kg/Nm³
- kg/Nl
- kg/Sm³
- g/Scm³
- RD15°C
- RD20°C

US units
- lb/Sft³
- RD60°F

Factory setting kg/Nm³

Water sample density

Navigation Expert → Application → Petroleum → Water samp. dens (4164)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter the value for the density of the water sample.

User entry 900 to 1200 kg/m³

Factory setting 999.2 kg/m³

Water sample temperature

Navigation Expert → Application → Petroleum → Water samp. temp (4165)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Enter the value for the temperature of the water sample.

User entry −273.15 to 99726.8499 °C

Factory setting 15 °C

Meter factor

Navigation Expert → Application → Petroleum → Meter factor (4198)

Prerequisite The **Net oil & water cut** option is selected in the **Petroleum mode** parameter (→ 228) parameter.

Description Displays the current calibration factor for correcting the volume flow. The correction is required due to inaccuracies in the measuring device.

User entry Signed floating-point number

Factory setting 1.0

Density limit

Navigation Expert → Application → Petroleum → Density limit (4199)

Description Enter limit value for the observed oil density. For higher °API values or lower kg/m³ values this limit value will be output.

User entry Positive floating-point number

Factory setting 0 kg/l

4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

Process variable	Unit
Mass	kg
Mass flow	kg/h
Volume	l
Volume flow	l/h
Corrected volume	Nl
Corrected volume flow	Nl/h
Density	kg/l
Reference density	kg/Nl
Temperature	°C
Pressure	bar a

4.1.2 Full scale values

The factory settings applie to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

Nominal diameter [mm]	[kg/h]
1	4
2	20
4	90
6	200

4.1.3 Output current span

Output	Current range
Current output 1...n	4 to 20 mA NAMUR

4.1.4 Pulse value

Nominal diameter [mm]	[kg/p]
1	0.001
2	0.01
4	0.01
6	0.1

4.1.5 Switch-on point low flow cut off

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

Nominal diameter [mm]	On-value for liquid [kg/h]
1	0.08
2	0.4
4	1.8
6	4

Nominal diameter [mm]	On-value for gas [kg/h]
1	0.02
2	0.1
4	0.45
6	1

4.2 US units

Only valid for USA and Canada.

4.2.1 System units

Process variable	Unit
Mass	lb
Mass flow	lb/min
Volume	gal (us)
Volume flow	gal/min (us)
Corrected volume	Sft³
Corrected volume flow	Sft³/min
Density	lb/ft³
Reference density	lb/Sft³
Temperature	°F
Pressure	psi a

4.2.2 Full scale values

The factory settings applie to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

Nominal diameter [in]	[lb/min]
1/24	0.15
1/12	0.75

Nominal diameter [in]	[lb/min]
1/8	3.3
1/4	7.4

4.2.3 Output current span

Output	Current range
Current output 1…n	4 to 20 mA US

4.2.4 Pulse value

Nominal diameter [in]	[lb/p]
1/24	0.002
1/12	0.02
1/8	0.02
1/4	0.2

4.2.5 Switch-on point low flow cut off

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

Nominal diameter [in]	On-value for liquid [lb/min]
1/24	0.003
1/12	0.015
1/8	0.066
1/4	0.15

Nominal diameter [in]	On-value for gas [lb/min]
1/24	0.001
1/12	0.004
1/8	0.016
1/4	0.0375

5 Explanation of abbreviated units

5.1 SI units

Process variable	Units	Explanation
Density	g/cm³, g/m³	Gram/volume unit
	kg/dm³, kg/l, kg/m³	Kilogram/volume unit
	SD4°C, SD15°C, SD20°C	Specific density: The specific density is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
	SG4°C, SG15°C, SG20°C	Specific gravity: The specific gravity is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
Pressure	Pa a, kPa a, MPa a	Pascal, kilopascal, megapascal (absolute)
	bar	Bar
	Pa g, kPa g, MPa g	Pascal, kilopascal, megapascal (relative/gauge)
	bar g	Bar (relative/gauge)
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
Reference density	kg/Nm³, kg/Nl, g/Scm³, kg/Sm³	Kilogram, gram/standard volume unit
Corrected volume	Nl, Nm³, Sm³	Normal liter, normal cubic meter, standard cubic meter
Corrected volume flow	Nl/s, Nl/min, Nl/h, Nl/d	Normal liter/time unit
	Nm³/s, Nm³/min, Nm³/h, Nm³/d	Normal cubic meter/time unit
	Sm³/s, Sm³/min, Sm³/h, Sm³/d	Standard cubic meter/time unit
Temperature	°C , K	Celsius, Kelvin
Volume	cm³, dm³, m³	Cubic centimeter, cubic decimeter, cubic meter
	ml, l, hl, Ml Mega	Milliliter, liter, hectoliter, megaliter
Volume flow	cm³/s, cm³/min, cm³/h, cm³/d	Cubic centimeter/time unit
	dm³/s, dm³/min, dm³/h, dm³/d	Cubic decimeter/time unit
	m³/s, m³/min, m³/h, m³/d	Cubic meter/time unit
	ml/s, ml/min, ml/h, ml/d	Milliliter/time unit
	l/s, l/min, l/h, l/d	Liter/time unit
	hl/s, hl/min, hl/h, hl/d	Hectoliter/time unit
	Ml/s, Ml/min, Ml/h, Ml/d	Megaliter/time unit
Time	s, m, h, d, y	Second, minute, hour, day, year

5.2 US units

Process variable	Units	Explanation
Density	lb/ft³, lb/gal (us)	Pound/cubic foot, pound/gallon
	lb/bbl (us;liq.), lb/bbl (us;beer), lb/bbl (us;oil), lb/bbl (us;tank)	Pound/volume unit

Process variable	Units	Explanation
Pressure	psi a	Pounds per square inch (absolute)
	psi g	Pounds per square inch (gauge)
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
Reference density	lb/Sft³	Weight unit/standard volume unit
Corrected volume	Sft³, Sgal (us), Sbbl (us;liq.)	Standard cubic foot, standard gallon, standard barrel
Corrected volume flow	Sft³/s, Sft³/min, Sft³/h, Sft³/d	Standard cubic foot/time unit
	Sgal/s (us), Sgal/min (us), Sgal/h (us), Sgal/d (us)	Standard gallon/time unit
	Sbbl/s (us;liq.), Sbbl/min (us;liq.), Sbbl/h (us;liq.), Sbbl/d (us;liq.)	Barrel/time unit (normal liquids)
Temperature	°F, °R	Fahrenheit, Rankine
Volume	af	Acre foot
	ft³	Cubic foot
	fl oz (us), gal (us), kgal (us), Mgal (us)	Fluid ounce, gallon, kilogallon, million gallon
	bbl (us;liq.), bbl (us;beer), bbl (us;oil), bbl (us;tank)	Barrel (normal liquids), barrel (beer), barrel (petrochemicals), barrel (filling tanks)
Volume flow	af/s, af/min, af/h, af/d	Acre foot/time unit
	ft³/s, ft³/min, ft³/h, ft³/d	Cubic foot/time unit
	fl oz/s (us), fl oz/min (us), fl oz/h (us), fl oz/d (us)	Fluid ounce/time unit
	gal/s (us), gal/min (us), gal/h (us), gal/d (us)	Gallon/time unit
	kgal/s (us), kgal/min (us), kgal/h (us), kgal/d (us)	Kilogallon/time unit
	Mgal/s (us), Mgal/min (us), Mgal/h (us), Mgal/d (us)	Million gallon/time unit
	bbl/s (us;liq.), bbl/min (us;liq.), bbl/h (us;liq.), bbl/d (us;liq.)	Barrel/time unit (normal liquids) Normal liquids: 31.5 gal/bbl
	bbl/s (us;beer), bbl/min (us;beer), bbl/h (us;beer), bbl/d (us;beer)	Barrel /time unit (beer) Beer: 31.0 gal/bbl
	bbl/s (us;oil), bbl/min (us;oil), bbl/h (us;oil), bbl/d (us;oil)	Barrel/time unit (petrochemicals) Petrochemicals: 42.0 gal/bbl
	bbl/s (us;tank), bbl/min (us;tank), bbl/h (us;tank), bbl/d (us;tank)	Barrel/time unit (filling tank) Filling tanks: 55.0 gal/bbl
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

5.3 Imperial units

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

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