

Description of Device Parameters

Proline Cubemass 300

Coriolis flowmeter
HART

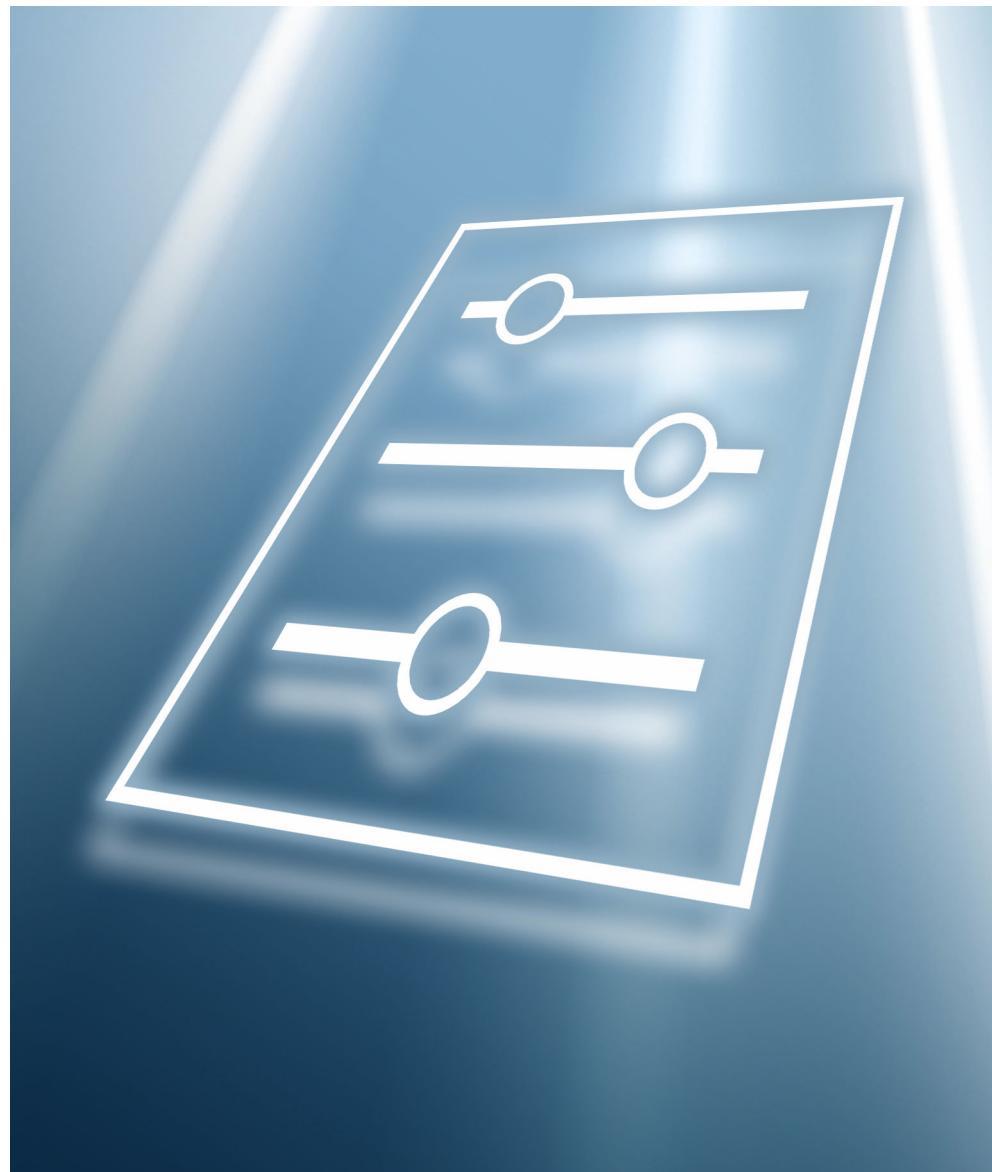


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1 About this document

1.1 Document function

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

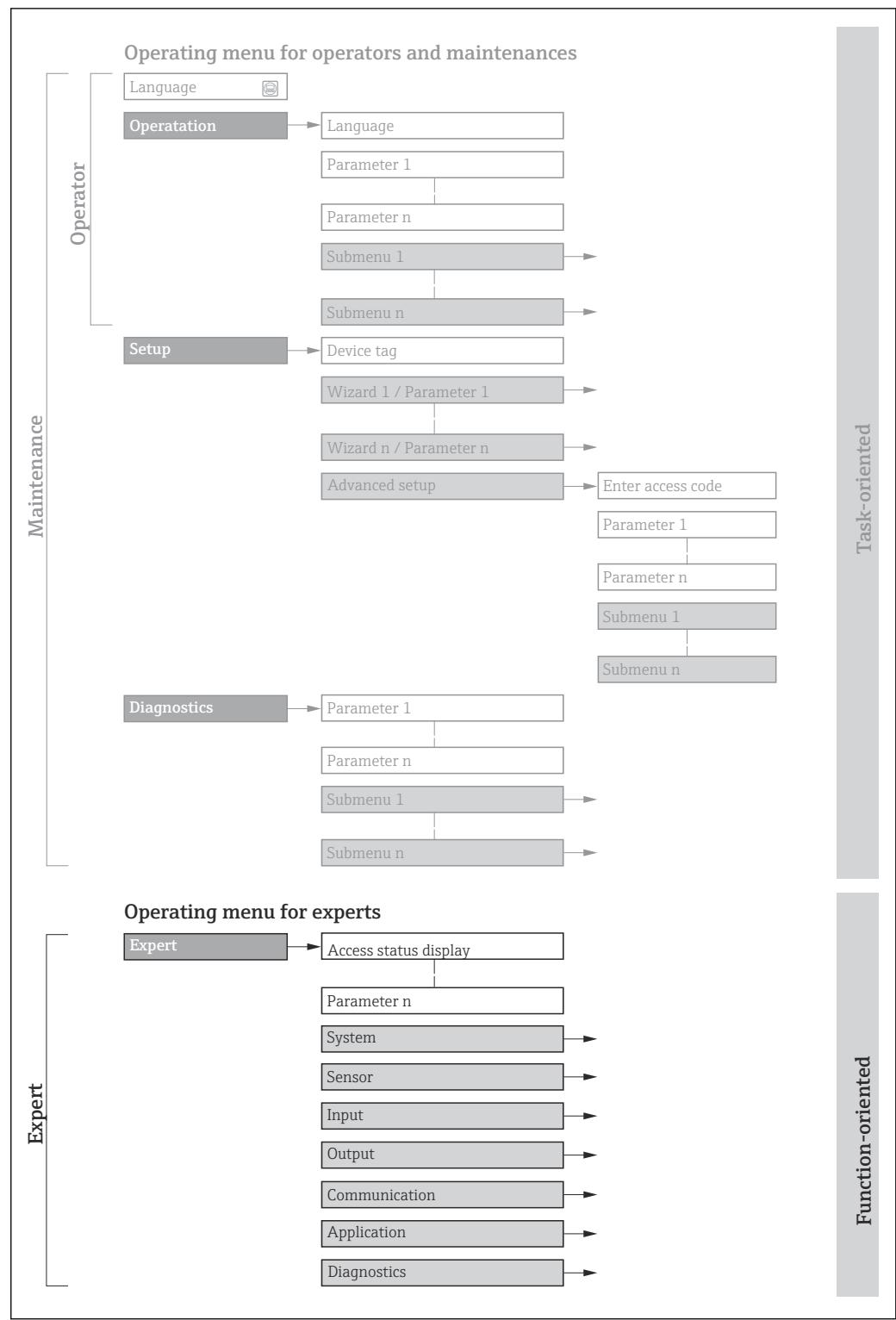
1.2 Target group

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 <ul style="list-style-type: none"> ▪ 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): <ul style="list-style-type: none"> ▪ On individual options ▪ On display values/data ▪ On the input range ▪ On the factory setting ▪ On the parameter function

1.4 Symbols used

1.4.1 Symbols for certain types of information

Symbol	Meaning
	Tip Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
	Operation via local display <small>A0028662</small>
	Operation via operating tool <small>A0028663</small>
	Write-protected parameter <small>A0028665</small>

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	BA01483D

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	SD01670D
OPC-UA Server	SD02041D
Heartbeat Technology	SD01692D
Concentration measurement	SD01713D

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.

Expert	
Direct access (0106)	→ 11
Locking status (0004)	→ 12
User role (0005)	→ 13
Enter access code (0003)	→ 13
▶ System	→ 13
▶ Display	→ 14
▶ Configuration backup	→ 31
▶ Diagnostic handling	→ 34
▶ Administration	→ 48
▶ Sensor	→ 54
▶ Measured values	→ 54
▶ System units	→ 69
▶ Process parameters	→ 79
▶ Calculated values	→ 93
▶ Measurement mode	→ 87
▶ External compensation	→ 90
▶ Sensor adjustment	→ 96
▶ Calibration	→ 114
▶ Testpoints	→ 116
▶ I/O configuration	→ 123
I/O module 1 to n terminal numbers (3902-1 to n)	→ 123

I/O module 1 to n information (3906-1 to n)	→ 124
I/O module 1 to n type (3901-1 to n)	→ 124
Apply I/O configuration (3907)	→ 125
I/O alteration code (2762)	→ 125
► Input	→ 125
► Current input 1 to n	→ 125
► Status input 1 to n	→ 129
► Output	→ 131
► Current output 1 to n	→ 131
► Pulse/frequency/switch output 1 to n	→ 145
► Relay output 1 to n	→ 166
► Double pulse output	→ 173
► Communication	→ 178
► HART input	→ 179
► HART output	→ 184
► Diagnostic configuration	→ 205
► Web server	→ 218
► WLAN settings	→ 222
► OPC-UA configuration	→ 228
► Application	→ 229
Reset all totalizers (2806)	→ 229
► Totalizer 1 to n	→ 229
► Concentration	→ 234

▶ Application specific calculations	→ 234
▶ Medium index	→ 240
▶ Diagnostics	→ 243
Actual diagnostics (0691)	→ 244
Previous diagnostics (0690)	→ 245
Operating time from restart (0653)	→ 245
Operating time (0652)	→ 246
▶ Diagnostic list	→ 246
▶ Event logbook	→ 250
▶ Device information	→ 252
▶ Main electronic module + I/O module 1	→ 256
▶ Sensor electronic module (ISEM)	→ 257
▶ I/O module 2	→ 258
▶ I/O module 3	→ 259
▶ Display module	→ 261
▶ Data logging	→ 262
▶ Min/max values	→ 272
▶ Heartbeat Technology	→ 278
▶ Simulation	→ 291

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.

Expert	
Direct access (0106)	→ 11
Locking status (0004)	→ 12
User role (0005)	→ 13
Enter access code (0003)	→ 13
▶ System	→ 13
▶ Sensor	→ 54
▶ I/O configuration	→ 123
▶ Input	→ 125
▶ Output	→ 131
▶ Communication	→ 178
▶ Application	→ 229
▶ Diagnostics	→ 243

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.

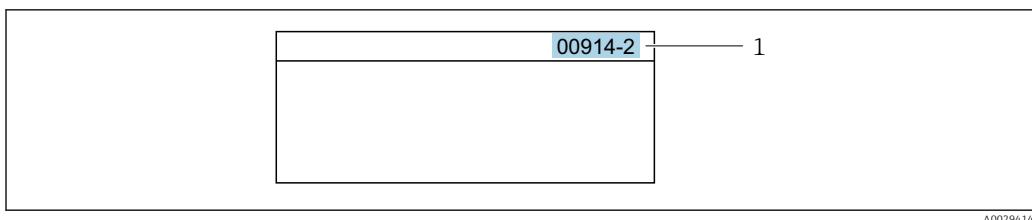
User entry

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
- SIL locked
- CT active - all parameters
- 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).
SIL locked (priority 2)	The SIL mode is enabled. This locks write access to the parameters (e.g. via local display or operating tool).
Temporarily locked (priority 3)	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.

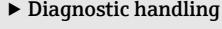
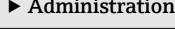
User role

Navigation	  Expert → User role (0005)
Description	Displays the access authorization to the parameters via the local display, Web browser or operating tool.
User interface	<ul style="list-style-type: none"> ▪ Maintenance ▪ Service
Factory setting	Maintenance
Additional information	<p><i>Description</i></p> <p> Access authorization can be modified via the Enter access code parameter (→ 13).</p> <p> If additional write protection is active, this restricts the current access authorization even further.</p> <p><i>User interface</i></p> <p> 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</p>

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

<i>Navigation</i>	  Expert → System
 System	
 Display	→ 14
 Configuration backup	→ 31
 Diagnostic handling	→ 34
 Administration	→ 48

3.1.1 "Display" submenu

Navigation

Expert → System → Display

► Display	
Display language (0104)	→ 15
Format display (0098)	→ 15
Value 1 display (0107)	→ 18
0% bargraph value 1 (0123)	→ 19
100% bargraph value 1 (0125)	→ 20
Decimal places 1 (0095)	→ 20
Value 2 display (0108)	→ 20
Decimal places 2 (0117)	→ 21
Value 3 display (0110)	→ 21
0% bargraph value 3 (0124)	→ 22
100% bargraph value 3 (0126)	→ 22
Decimal places 3 (0118)	→ 23
Value 4 display (0109)	→ 23
Decimal places 4 (0119)	→ 24
Value 5 display (0145)	→ 24
Decimal places 5 (0149)	→ 25
Value 6 display (0146)	→ 25
Decimal places 6 (0150)	→ 26
Value 7 display (0147)	→ 26
Decimal places 7 (0151)	→ 27
Value 8 display (0148)	→ 27
Decimal places 8 (0152)	→ 28

Display interval (0096)	→ 28
Display damping (0094)	→ 29
Header (0097)	→ 29
Header text (0112)	→ 30
Separator (0101)	→ 30
Contrast display (0105)	→ 31
Backlight (0111)	→ 31

Display language

Navigation

Expert → System → 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)

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

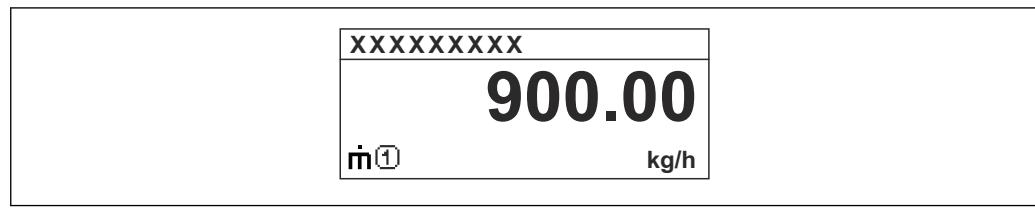
Additional information *Description*

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.

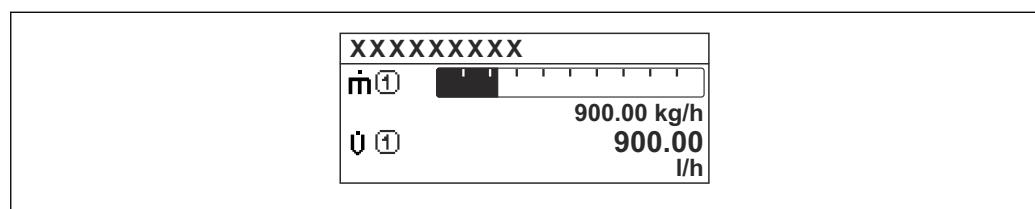
-  ▪ The **Value 1 display** parameter (→ 18)...**Value 8 display** parameter (→ 27) are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device display. The display time until the next change is configured using the **Display interval** parameter (→ 28).

Possible measured values shown on the local display:

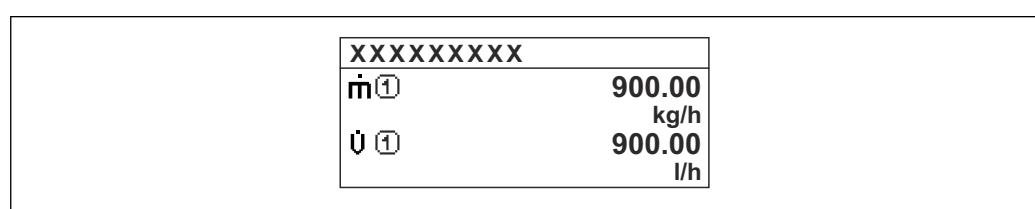
"1 value, max. size" option



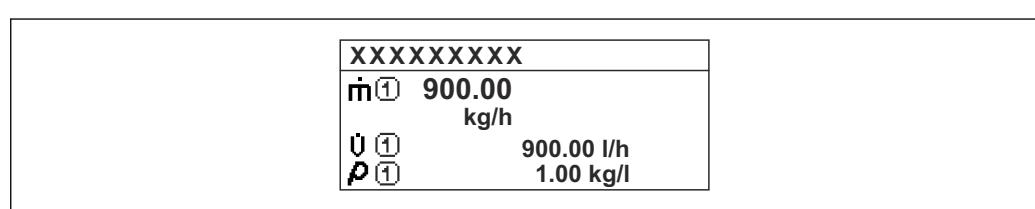
"1 bargraph + 1 value" option



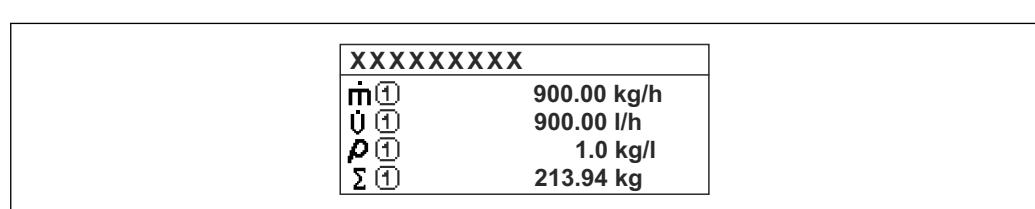
"2 values" option



"1 value large + 2 values" option



"4 values" option



Value 1 display**Navigation**

Expert → System → 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 (→ 15) 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 (→ 69).

*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)

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 (→ 15) is used to specify that the measured value is to be displayed as a bar graph.

User entry

-  The unit of the displayed measured value is taken from the **System units** submenu (→ 69).

100% bargraph value 1



Navigation

Expert → System → 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 → 302

Additional information

Description

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

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 69).

Decimal places 1



Navigation

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

Prerequisite

A measured value is specified in the **Value 1 display** parameter (→ 18).

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)

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 (→ 18)

Factory setting None

Additional information *Description*

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

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

Dependency

 The unit of the displayed measured value is taken from the **System units** submenu (→ 69).

Decimal places 2



Navigation  Expert → System → Display → Decimal places 2 (0117)

Prerequisite A measured value is specified in the **Value 2 display** parameter (→ 20).

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)

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 (→ 18)

Factory setting	None
Additional information	<p><i>Description</i></p> <p>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.</p> <p>i The Format display parameter (→ 15) is used to specify how many measured values are displayed simultaneously and how.</p> <p><i>Selection</i></p> <p>i The unit of the displayed measured value is taken from the System units submenu (→ 69).</p>

0% bargraph value 3	
Navigation	Expert → System → Display → 0% bargraph 3 (0124)
Prerequisite	A selection was made in the Value 3 display parameter (→ 21).
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: <ul style="list-style-type: none">■ 0 kg/h■ 0 lb/min
Additional information	<p><i>Description</i></p> <p>i The Format display parameter (→ 15) is used to specify that the measured value is to be displayed as a bar graph.</p> <p><i>User entry</i></p> <p>i The unit of the displayed measured value is taken from the System units submenu (→ 69).</p>

100% bargraph value 3	
Navigation	Expert → System → Display → 100% bargraph 3 (0126)
Prerequisite	A selection was made in the Value 3 display parameter (→ 21).
Description	Use this function to enter the 100% bar graph value to be shown on the display for the measured value 3.
User entry	Signed floating-point number
Factory setting	0

Additional information*Description*

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

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 69).

Decimal places 3**Navigation**

Expert → System → Display → Decimal places 3 (0118)

Prerequisite

A measured value is specified in the **Value 3 display** parameter (→ 21).

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)

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 (→ 18)

Factory setting

None

Additional information*Description*

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

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

Selection

 The unit of the displayed measured value is taken from the **System units** submenu (→ 69).

Decimal places 4**Navigation**

  Expert → System → Display → Decimal places 4 (0119)

Prerequisite

A measured value is specified in the **Value 4 display** parameter (→ 23).

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**

  Expert → System → 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 (→ 18)

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 (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 69).

Decimal places 5**Navigation**

Expert → System → Display → Decimal places 5 (0149)

Prerequisite

A measured value is specified in the **Value 5 display** parameter (→ 24).

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**

Expert → System → 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 (→ 18)

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 (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Selection

 The unit of the displayed measured value is taken from the **System units** submenu (→ 69).

Decimal places 6**Navigation**

  Expert → System → Display → Decimal places 6 (0150)

Prerequisite

A measured value is specified in the **Value 6 display** parameter (→ 25).

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**

  Expert → System → 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 (→ 18)

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 (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 69).

Decimal places 7**Navigation**

Expert → System → Display → Decimal places 7 (0151)

Prerequisite

A measured value is specified in the **Value 7 display** parameter (→ 26).

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**

Expert → System → 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 (→ 18)

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 (→ 15) is used to specify how many measured values are displayed simultaneously and how.

Selection

 The unit of the displayed measured value is taken from the **System units** submenu (→ 69).

Decimal places 8**Navigation**

  Expert → System → Display → Decimal places 8 (0152)

Prerequisite

A measured value is specified in the **Value 8 display** parameter (→ 27).

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)

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 (→ 18)...**Value 8 display** parameter (→ 27) 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 (→ 15).

Display damping**Navigation**

Expert → System → 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 element¹⁾) 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)

Prerequisite

A local display is provided.

Description

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

Selection

- Device tag
- Free text

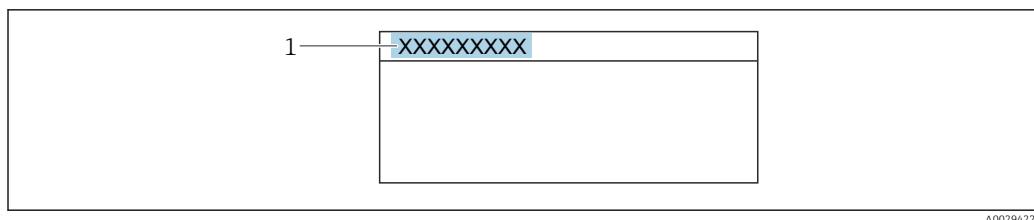
Factory setting

Device tag

Additional information*Description*

The header text only appears during normal operation.

1) proportional transmission behavior with first order delay



A0029422

1 Position of the header text on the display

Selection

- Device tag
Is defined in the **Device tag** parameter (→ 253).
- Free text
Is defined in the **Header text** parameter (→ 30).

Header text



Navigation

Expert → System → Display → Header text (0112)

Prerequisite

The **Free text** option is selected in the **Header** parameter (→ 29).

Description

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

User entry

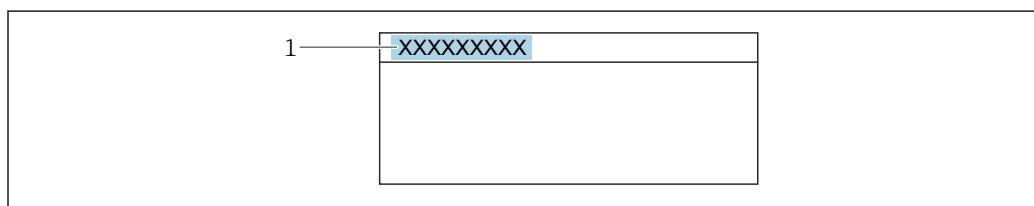
Max. 12 characters, such as letters, numbers or special characters (e.g. @, %, /)

Factory setting

Additional information

Description

The header text only appears during normal operation.



A0029422

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)

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)

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

► Configuration backup

Operating time (0652)

→  32

Last backup (2757)	→ 32
Configuration management (2758)	→ 32
Backup state (2759)	→ 33
Comparison result (2760)	→ 33

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

* Visibility depends on order options or device settings

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

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*

i The comparison is started via the **Compare** option in the **Configuration management** parameter (→ 32).

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.

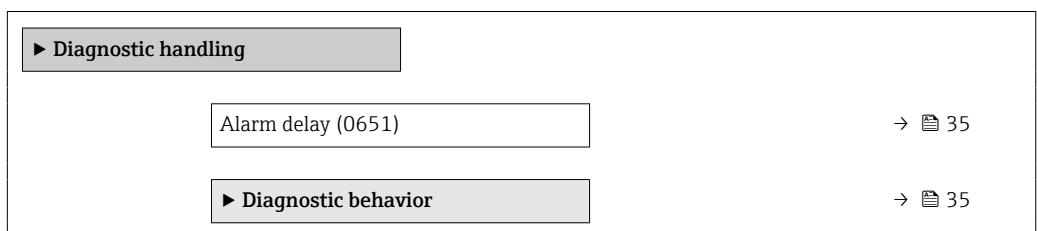
HistoROM

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 (→ 35).

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

Options	Description
Alarm	The device stops measurement. The signal outputs and totalizers assume the defined alarm condition. A diagnostic message is generated. The background lighting changes to red.
Warning	The device continues to measure. The signal outputs and totalizers are not affected. A diagnostic message is generated.

Options	Description
Logbook entry only	The device continues to measure. The diagnostic message is displayed only in the Event logbook submenu (→ 250) (Event list submenu (→ 251)) and is not displayed in alternation with the operational display.
Off	The diagnostic event is ignored, and no diagnostic message is generated or entered.

 For a list of all the diagnostic events, see the Operating Instructions for the device
→ [7](#)

Navigation

 Expert → System → Diagn. handling → Diagn. behavior

► Diagnostic behavior	
Assign behavior of diagnostic no. 140 (0708)	→ 38
Assign behavior of diagnostic no. 046 (0709)	→ 38
Assign behavior of diagnostic no. 142 (0648)	→ 38
Assign behavior of diagnostic no. 144 (0731)	→ 39
Assign behavior of diagnostic no. 374 (0710)	→ 39
Assign behavior of diagnostic no. 302 (0739)	→ 39
Assign behavior of diagnostic no. 304 (0644)	→ 40
Assign behavior of diagnostic no. 441 (0657)	→ 40
Assign behavior of diagnostic no. 442 (0658)	→ 40
Assign behavior of diagnostic no. 443 (0659)	→ 41
Assign behavior of diagnostic no. 444 (0740)	→ 41
Assign behavior of diagnostic no. 543 (0643)	→ 41
Assign behavior of diagnostic no. 599 (0646)	→ 42

Assign behavior of diagnostic no. 830 (0800)	→ 42
Assign behavior of diagnostic no. 831 (0641)	→ 42
Assign behavior of diagnostic no. 832 (0681)	→ 43
Assign behavior of diagnostic no. 833 (0682)	→ 43
Assign behavior of diagnostic no. 834 (0700)	→ 43
Assign behavior of diagnostic no. 835 (0702)	→ 44
Assign behavior of diagnostic no. 842 (0638)	→ 44
Assign behavior of diagnostic no. 862 (0679)	→ 45
Assign behavior of diagnostic no. 912 (0703)	→ 45
Assign behavior of diagnostic no. 913 (0712)	→ 45
Assign behavior of diagnostic no. 915 (0649)	→ 46
Assign behavior of diagnostic no. 941 (0632)	→ 46
Assign behavior of diagnostic no. 942 (0633)	→ 46
Assign behavior of diagnostic no. 943 (0634)	→ 47
Assign behavior of diagnostic no. 944 (0732)	→ 47
Assign behavior of diagnostic no. 948 (0744)	→ 48
Assign behavior of diagnostic no. 984 (0647)	→ 48

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: → 35

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: → 35

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

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 142 (0648)

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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Alarm
Additional information	For a detailed description of the options available: → 35

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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Warning
Additional information	For a detailed description of the options available: → 35

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	<ul style="list-style-type: none">▪ Off▪ Warning▪ Logbook entry only
Factory setting	Warning
Additional information	For a detailed description of the options available: → 35

Assign behavior of diagnostic no. 304

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 304 (0644)
Description	Change behavior of diagnostic event with diagnostic number 304 'Device verification failed'.
Selection	<ul style="list-style-type: none">▪ 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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Warning
Additional information	For a detailed description of the options available: → 35

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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Warning
Additional information	For a detailed description of the options available: → 35

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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Warning
Additional information	 For a detailed description of the options available: → 35

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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Warning
Additional information	 For a detailed description of the options available: → 35

Assign behavior of diagnostic no. 543 (Double pulse output)

Navigation	 Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 543 (0643)
Description	Use this function to change the diagnostic behavior of the 543 Double pulse output diagnostic message.
Selection	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only

Factory setting Warning

Additional information  For a detailed description of the options available: → [35](#)

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



Navigation  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 599 (0646)

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: → [35](#)

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: → [35](#)

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: → [35](#)

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: → [35](#)

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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Warning
Additional information	 For a detailed description of the options available: → 35

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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Warning
Additional information	 For a detailed description of the options available: → 35

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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Off
Additional information	 For a detailed description of the options available: → 35

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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Warning
Additional information	For a detailed description of the options available: → 35

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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Warning
Additional information	For a detailed description of the options available: → 35

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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Warning
Additional information	For a detailed description of the options available: → 35

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

Navigation	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 915 (0649)
Description	Change behavior of diagnostic event with diagnostic number 915 'Viscosity out of specification'.
Selection	<ul style="list-style-type: none">▪ 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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only
Factory setting	Warning
Additional information	For a detailed description of the options available: → 35

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	<ul style="list-style-type: none">▪ Off▪ Alarm▪ Warning▪ Logbook entry only

Factory setting Warning

Additional information  For a detailed description of the options available: → [35](#)

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: → [35](#)

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: → [35](#)

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: → [35](#)

Assign behavior of diagnostic no. 984 (Condensation risk)**Navigation**

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 984 (0647)

Description

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

Selection

- Off
- Alarm
- Warning
- Logbook entry only

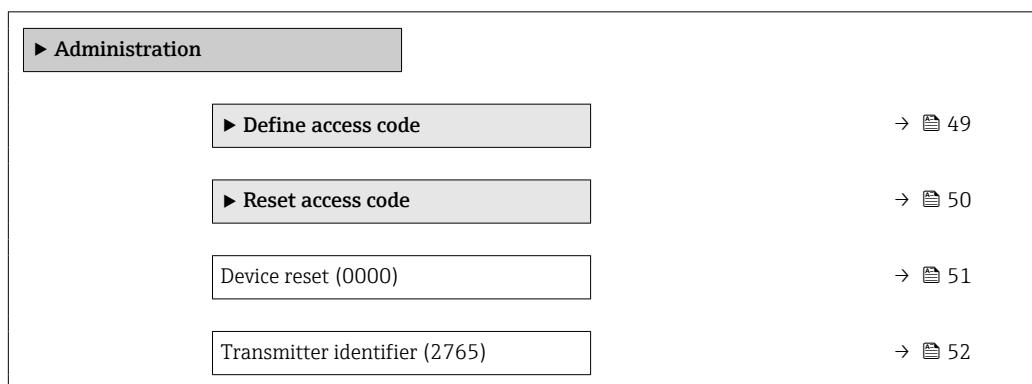
Factory setting

Warning

3.1.4 "Administration" submenu

Navigation

Expert → System → Administration



Activate SW option (0029)	→ 52
Software option overview (0015)	→ 53

"Define access code" wizard

 The **Define access code** wizard (→ [49](#)) 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	
Define access code	→ 49
Confirm access code	→ 50

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

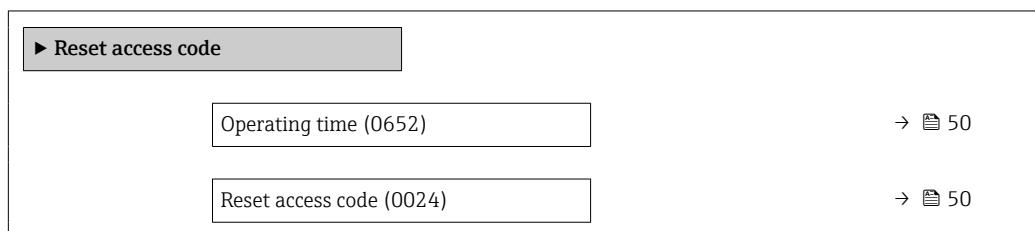
Enter the defined release code a second time to confirm the release code.

User entry

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

"Reset access code" submenu*Navigation*

Expert → System → Administration → Reset acc. code

**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.
Restore S-DAT backup	Restores the data that is saved on the S-DAT. Additional information: This function can be used to resolve the memory issue "083 Memory content inconsistent" or to restore the S-DAT data when a new S-DAT has been installed. This option is displayed only in an alarm condition.

* Visibility depends on order options or device settings

Transmitter identifier

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

Description Select transmitter identifier.

User interface

- Unknown
- 500
- 300

Factory setting 300

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.

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 (→ 53).
 - ↳ 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 (→ 53).

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 *
- SIL
- Viscosity/Hydrocarbon viscosity monitor.
- Custody transfer
- OPC-UA
- Application specific calculations
- 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"

"SIL" option

Order code for "Additional approval", option LA "SIL"

"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"

"OPC-UA" option

-  Only available for the HART communication protocol.

* Visibility depends on order options or device settings

Order code for "Application package", option EL "OPC-UA Server"

"*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, $\pm 0.1 \text{ kg/m}^3$ + Extended density function"

3.2 "Sensor" submenu

Navigation

Expert → Sensor

▶ Sensor	
▶ Measured values	→ 54
▶ System units	→ 69
▶ Process parameters	→ 79
▶ Calculated values	→ 93
▶ Measurement mode	→ 87
▶ External compensation	→ 90
▶ Sensor adjustment	→ 96
▶ Calibration	→ 114
▶ Testpoints	→ 116

3.2.1 "Measured values" submenu

Navigation

Expert → Sensor → Measured val.

▶ Measured values	
▶ Process variables	→ 55
▶ Totalizer	→ 61

▶ Input values	→ 63
▶ Output values	→ 64

"Process variables" submenu*Navigation*

Expert → Sensor → Measured val. → Process variab.

▶ Process variables	
Mass flow	→ 55
Volume flow	→ 56
Corrected volume flow	→ 56
Density	→ 56
Reference density	→ 57
Temperature	→ 57
Pressure	→ 57
Concentration	→ 57
Target mass flow	→ 58
Carrier mass flow	→ 58
Target corrected volume flow	→ 59
Carrier corrected volume flow	→ 59
Target volume flow	→ 60
Carrier volume flow	→ 60

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 (→ [69](#))

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 (→ [71](#))

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 (→ [73](#))

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 (→ [74](#))

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	<i>Dependency</i>  The unit is taken from the Reference density unit parameter (→ 76)

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	<i>Dependency</i>  The unit is taken from the Temperature unit parameter (→ 77)

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	<i>Dependency</i>  The unit is taken from the Pressure unit parameter (→ 78)

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 (→ 53).

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).

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 (→  53).

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 (→  69)

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 (→  53).

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 (→  69)

Target corrected volume flow

Navigation	  Expert → Sensor → Measured val. → Process variab. → Targ.corr.vol.fl (1893)
Prerequisite	With the following conditions: <ul style="list-style-type: none">▪ Order code for "Application package", option ED "Concentration"▪ The Ethanol in water option or %mass / %volume option is selected in the Liquid type parameter.  The software options currently enabled are displayed in the Software option overview parameter (→  53).
Description	Displays the corrected volume flow that is currently measured for the target fluid.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Volume flow unit parameter (→  71)

Carrier corrected volume flow

Navigation	  Expert → Sensor → Measured val. → Process variab. → Carr.corr.vol.fl (1894)
Prerequisite	With the following conditions: <ul style="list-style-type: none">▪ Order code for "Application package", option ED "Concentration"▪ In the Liquid type parameter, the Ethanol in water option or %mass / %volume option is selected.  The software options currently enabled are displayed in the Software option overview parameter (→  53).
Description	Displays the corrected volume flow currently measured for the carrier fluid.
User interface	Signed floating-point number
Additional information	<i>Dependency</i>  The unit is taken from the Volume flow unit parameter (→  71)

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.
 - The **%vol** option is selected in the **Concentration unit** parameter.
-  The software options currently enabled are displayed in the **Software option overview** parameter (→  53).

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 (→  71)

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.
- The **%vol** option is selected in the **Concentration unit** parameter.

 The software options currently enabled are displayed in the **Software option overview** parameter (→  53).

Description

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

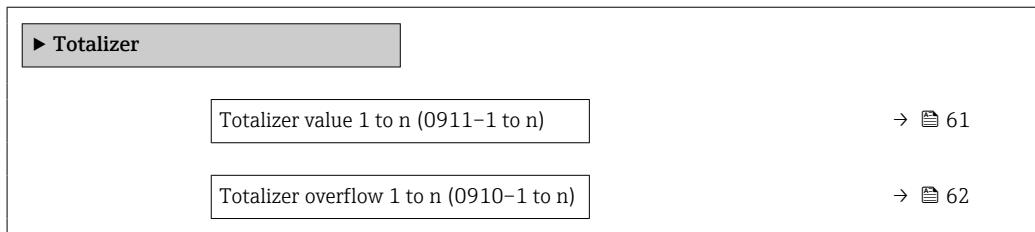
User interface

Signed floating-point number

Additional information

Dependency

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

"Totalizer" submenu*Navigation* Expert → Sensor → Measured val. → Totalizer**Totalizer value 1 to n****Navigation** Expert → Sensor → Measured val. → Totalizer → Totalizer val. 1 to n (0911-1 to n)**Prerequisite**

A process variable is selected in the **Assign process variable** parameter (→ 230) of the **Totalizer 1 to n** submenu.

Description

Displays the current totalizer counter reading.

User interface

Signed floating-point number

Additional information

Description

As the operating tool can only display a maximum of 7 digits, if the display range is exceeded the current counter reading is the sum of the totalizer value and the overflow value from the **Totalizer overflow 1 to n** parameter.

 In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (→ 233).

User interface

The value of the process variable totalized since measuring began can be positive or negative. This depends on the settings in the **Totalizer operation mode** parameter (→ 232).

 The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 230).

Example

Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:

- Value in the **Totalizer value 1** parameter: 1968457 m³
- Value in the **Totalizer overflow 1** parameter: 1 · 10⁷ (1 overflow) = 10 000 000 m³
- Current totalizer reading: 11 968 457 m³

Totalizer overflow 1 to n

Navigation	Expert → Sensor → Measured val. → Totalizer → Tot. overflow 1 to n (0910–1 to n)
Prerequisite	A process variable is selected in the Assign process variable parameter (→ 230) of the Totalizer 1 to n submenu.
Description	Displays the current totalizer overflow.
User interface	Integer with sign
Additional information	<p><i>Description</i></p> <p>If the current totalizer reading exceeds 7 digits, which is the maximum value range that can be displayed by the operating tool, the value above this range is output as an overflow. The current totalizer value is therefore the sum of the overflow value and the totalizer value from the Totalizer value 1 to n parameter.</p> <p><i>User interface</i></p> <p> The unit of the selected process variable is specified for the totalizer in the Unit totalizer parameter (→ 230).</p>

Example

Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:

- Value in the **Totalizer value 1** parameter: 1968 457 m³
- Value in the **Totalizer overflow 1** parameter: $2 \cdot 10^7$ (2 overflows) = 20 000 000 [m³]
- Current totalizer reading: 21 968 457 m³

Totalizer 1 to n value

Navigation	Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n value
Description	Shows the totalizer value reported to the controller for further processing.
User interface	Signed floating-point number
Factory setting	0 m ³

Totalizer 1 to n status

Navigation	Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n status
Description	Shows the status of the totalizer value reported to the controller for further processing ('Good', 'Uncertain', 'Bad').
User interface	<ul style="list-style-type: none">■ Good■ Uncertain■ Bad

Factory setting Good

Totalizer 1 to n status (Hex)

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

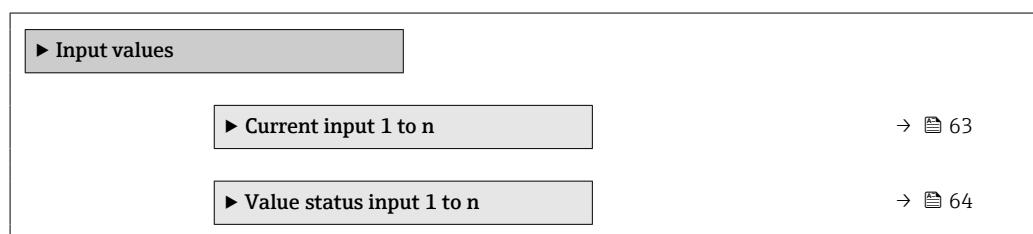
Description Shows the status of the totalizer value reported to the controller for further processing (Hex).

User interface 0 to 255

Factory setting 128

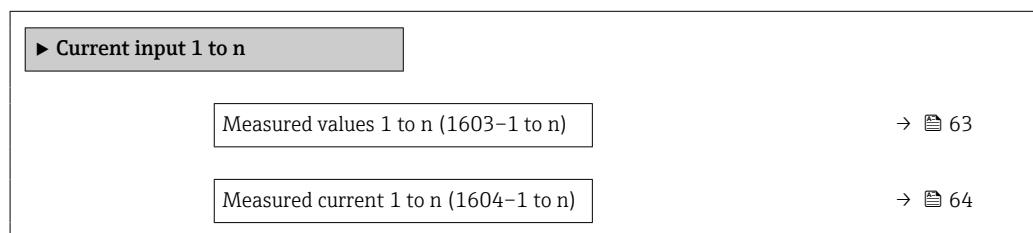
"Input values" submenu

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

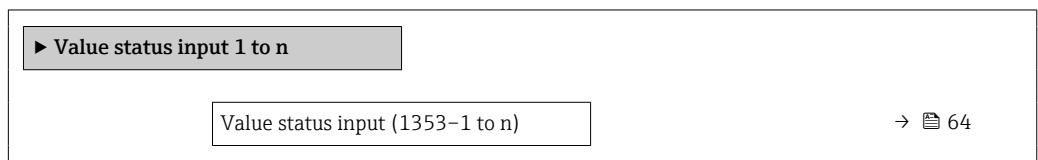
Displays the current value of the current input.

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

Navigation

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

Description

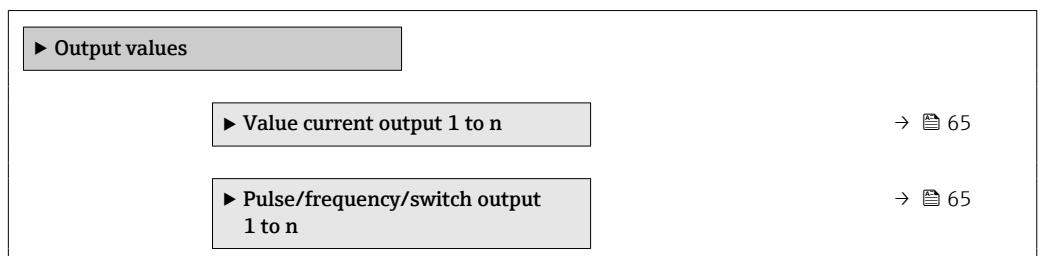
Displays the current input signal level.

User interface

- High
- Low

"Output values" submenu

Navigation Expert → Sensor → Measured val. → Output values



► Relay output 1 to n

→ 67

► Double pulse output

→ 68

"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)

→ 65

Measured current (0366-1 to n)

→ 65

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

► Pulse/frequency/switch output
1 to n

Output frequency (0471-1 to n)	→ 66
Pulse output 1 to n (0456-1 to n)	→ 66
Switch state (0461-1 to n)	→ 67

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 (→ 147), 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)

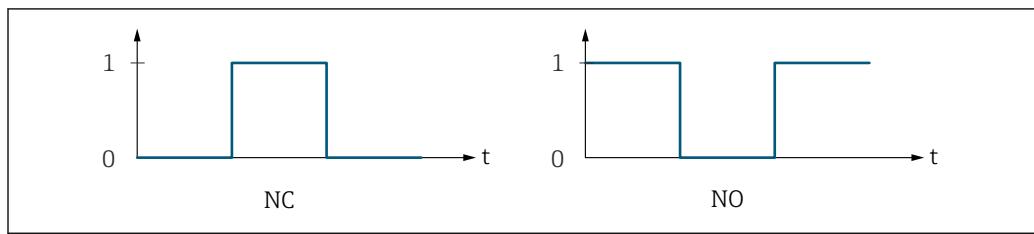
Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 147) parameter.

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 (→ 166) i.e. the transistor does not conduct for the duration of the pulse.

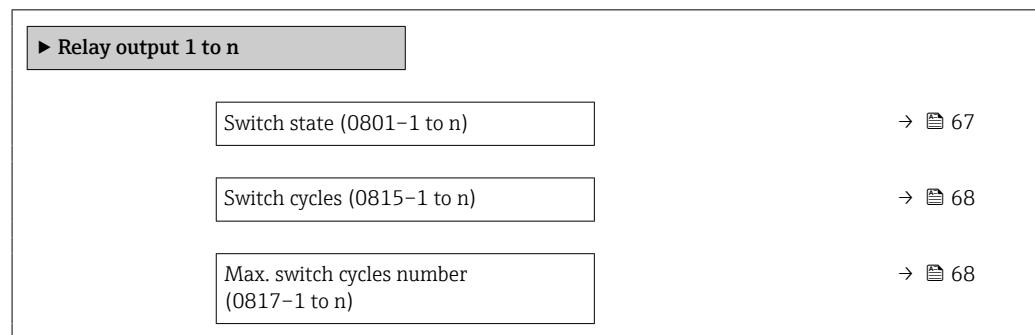
In addition, the behavior of the output in the event of a device alarm (**Failure mode** parameter (→ 152)) can be configured.

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 (→ 147).
Description	Displays the current switch status of the status output.
User interface	<ul style="list-style-type: none"> ▪ Open ▪ Closed
Additional information	<p><i>User interface</i></p> <ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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

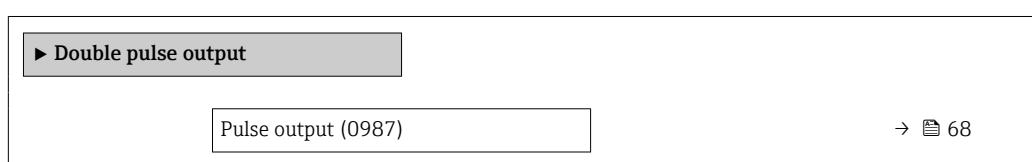
Displays the maximum number of guaranteed switch cycles.

User interface

Positive integer

*"Double pulse output" submenu**Navigation*

Expert → Sensor → Measured val. → Output values → Double pulse out



Pulse output

Navigation

Expert → Sensor → Measured val. → Output values → Double pulse out → Pulse output (0987)

Description

Displays the pulse frequency of the double pulse output which is currently output.

User interface

Positive floating-point number

Additional informationFor a detailed description and example: **Pulse output** parameter (→ [66](#))

3.2.2 "System units" submenu

Navigation

Expert → Sensor → System units

► System units	
Mass flow unit (0554)	→ 69
Mass unit (0574)	→ 70
Volume flow unit (0553)	→ 71
Volume unit (0563)	→ 72
Corrected volume flow unit (0558)	→ 73
Corrected volume unit (0575)	→ 74
Density unit (0555)	→ 74
Reference density unit (0556)	→ 76
Density 2 unit (0619)	→ 76
Temperature unit (0557)	→ 77
Pressure unit (0564)	→ 78
Date/time format (2812)	→ 78

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

- | <i>SI units</i> | <i>US units</i> |
|-----------------|-----------------|
| ▪ g/s | ▪ oz/s |
| ▪ g/min | ▪ oz/min |
| ▪ g/h | ▪ oz/h |
| ▪ g/d | ▪ oz/d |
| ▪ kg/s | ▪ lb/s |
| ▪ kg/min | ▪ lb/min |
| ▪ kg/h | ▪ lb/h |
| ▪ kg/d | ▪ lb/d |
| ▪ t/s | ▪ STon/s |
| ▪ t/min | ▪ STon/min |
| ▪ t/h | ▪ STon/h |
| ▪ t/d | ▪ STon/d |

Factory setting

Country-specific:

- kg/h
- lb/min

Additional information*Effect*

The selected unit applies for:

- **Target mass flow** parameter (→ [58](#))
- **Carrier mass flow** parameter (→ [58](#))
- **Mass flow** parameter (→ [55](#))

Selection

 For an explanation of the abbreviated units: → [305](#)

Customer-specific units

 The unit for the customer-specific mass is specified in the **User mass text** parameter.

Mass unit**Navigation**

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

Description

Use this function to select the unit for the mass.

Selection

- | <i>SI units</i> | <i>US units</i> |
|-----------------|-----------------|
| ▪ g | ▪ oz |
| ▪ kg | ▪ lb |
| ▪ t | ▪ STon |

Factory setting

Country-specific:

- kg
- lb

Additional information*Selection*

 For an explanation of the abbreviated units: → [305](#)

Customer-specific units

 The unit for the customer-specific mass is specified in the **User mass text** parameter.

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*

- cm³/s
- cm³/min
- cm³/h
- cm³/d
- dm³/s
- dm³/min
- dm³/h
- dm³/d
- m³/s
- m³/min
- m³/h
- m³/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
- ft³/s
- ft³/min
- ft³/h
- ft³/d
- kft³/s
- kft³/min
- kft³/h
- kft³/d
- MMft³/s
- MMft³/min
- MMft³/h
- Mft³/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 (imp;oil)
- bbl/min (imp;oil)
- bbl/h (imp;oil)
- bbl/d (imp;oil)

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

<i>US units</i>	<i>Imperial units</i>
■ bbl/s (us;liq.) *	■ bbl/s (imp;beer) *
■ bbl/min (us;liq.) *	■ bbl/min (imp;beer) *
■ bbl/h (us;liq.) *	■ bbl/h (imp;beer) *
■ bbl/d (us;liq.) *	■ bbl/d (imp;beer) *
■ bbl/s (us;beer) *	
■ bbl/min (us;beer) *	
■ bbl/h (us;beer) *	
■ bbl/d (us;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 (→ 56)

Selection

 For an explanation of the abbreviated units: → 305

Customer-specific units

 The unit for the customer-specific volume is specified in the **User volume text** parameter.

Volume unit**Navigation**

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

Description

Use this function to select the unit for the volume.

Selection*SI units*

- cm³
- dm³
- m³
- ml
- l
- hl
- Ml Mega

US units

- af
- ft³
- Mft³
- Mft³
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)
- bbl (us;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: → 305

Customer-specific unitsThe unit for the customer-specific volume is specified in the **User volume text** parameter.**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
- Nm³/s
- Nm³/min
- Nm³/h
- Nm³/d
- Sl/s
- Sl/min
- Sl/h
- Sl/d
- Sm³/s
- Sm³/min
- Sm³/h
- Sm³/d

US units

- Sft³/s
- Sft³/min
- Sft³/h
- Sft³/d
- MSft³/s
- MSft³/min
- MSft³/h
- MSft³/D
- MMSft³/s
- MMSft³/min
- MMSft³/h
- MMSft³/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
- Sft³/min

Additional information*Result*

The selected unit applies for:
Corrected volume flow parameter (→ 56)

Selection

For an explanation of the abbreviated units: → 305

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*

- NI
- Nhl
- Nm³
- Sl
- Sm³

US units

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

Imperial units

Sgal (imp)

Factory setting

Country-specific:

- NI
- Sft³

Additional information*Selection*

For an explanation of the abbreviated units: → 305

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

Other units

°API

or

US units

SG60°F *

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)

* 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

Country-specific:

- kg/l
- lb/ft³

Additional information*Effect*

The selected unit applies for:

- **Density setpoint 1** parameter (→ 98)
- **Density setpoint 2** parameter (→ 98)
- **Density** parameter (→ 56)

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: → 305

Customer-specific units

 The unit for the customer-specific density is specified in the **User density text** parameter.

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*

- kg/Nm³
- kg/Nl
- g/Scm³
- kg/Sm³
- RD15°C
- RD20°C

US units

- lb/Sft³
- RD60°F

Other units

°APIbase

Factory setting

Country-dependent

- kg/Nl
- lb/Sft³

Additional information*Result*

The selected unit applies for:

- External reference density parameter (→ [94](#))
- Fixed reference density parameter (→ [95](#))
- Reference density parameter (→ [57](#))

Selection

For an explanation of the abbreviated units: → [305](#)

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
- SD4°C
- SD15°C
- SD20°C
- 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

<i>US units</i>	<i>Imperial units</i>
■ lb/bbl (us;liq.) [*]	lb/bbl (imp;beer) [*]
■ lb/bbl (us;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: → [305](#)

Customer-specific units

 The unit for the customer-specific density is specified in the **User density text** parameter.

Temperature unit



Navigation

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

Description

Use this function to select the unit for the temperature.

Selection

<i>SI units</i>	<i>US units</i>
■ °C	■ °F
■ K	■ °R

Factory setting

Country-specific:

- °C
- °F

Additional information

Effect

The selected unit applies for:

- **Maximum value** parameter (→ [273](#))
- **Minimum value** parameter (→ [273](#))
- **Maximum value** parameter (→ [274](#))
- **Minimum value** parameter (→ [274](#))
- **Maximum value** parameter (→ [275](#))

- **Minimum value** parameter (→ 275)
- **External temperature** parameter (→ 92)
- **Temperature** parameter (→ 57)
- **Reference temperature** parameter (→ 95)

Selection

 For an explanation of the abbreviated units: → 305

Pressure unit**Navigation**

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

Description

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

Selection

	<i>SI units</i>	<i>US units</i>
▪ MPa a		▪ psi a
▪ MPa g		▪ psi g
▪ kPa a		
▪ kPa g		
▪ Pa a		
▪ Pa g		
▪ bar		
▪ bar g		

Factory setting

Country-specific:

- bar a
- psi a

Additional information*Result*

The unit is taken from:

- **Pressure value** parameter (→ 91)
- **External pressure** parameter (→ 91)
- **Pressure value** parameter (→ 57)

Selection

 For an explanation of the abbreviated units: → 305

Customer-specific units

 The unit for the customer-specific energy is defined in the **User pressure text** parameter.

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	<ul style="list-style-type: none"> ■ 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	<i>Selection</i>
-------------------------------	------------------

 For an explanation of the abbreviated units: → [305](#)

3.2.3 "Process parameters" submenu

Navigation

 Expert → Sensor → Process param.

► Process parameters	
Flow damping (1802)	→ 79
Density damping (1803)	→ 80
Temperature damping (1822)	→ 80
Flow override (1839)	→ 81
Density limit (4199)	→ 81
► Low flow cut off	→ 82
► Partially filled pipe detection	→ 85

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 element²⁾.

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 → [131](#)
- Low flow cut off → [82](#)
- Totalizers → [229](#)

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

Additional information*Description*

The damping is performed by a PT1 element³⁾.

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

2) Proportional behavior with first-order lag

3) Proportional behavior with first-order lag

Factory setting 0 s

Additional information *Description*

 The damping is performed by a PT1 element⁴⁾.

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

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 (→  129).

Density limit



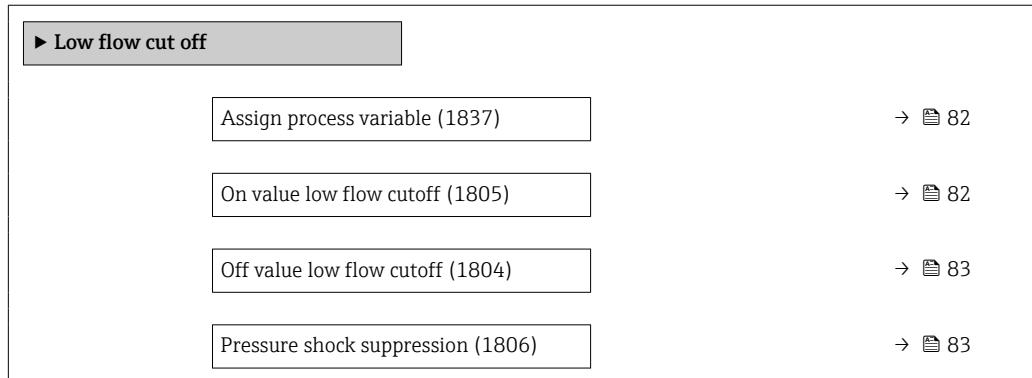
Navigation  Expert → Sensor → Process param. → Density limit (4199)

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

4) Proportional behavior with first-order lag

"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 (→ 82).

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 → 83.

User entry

Positive floating-point number

Factory setting

Depends on country and nominal diameter → 303

Additional information*Dependency*

 The unit depends on the process variable selected in the **Assign process variable** parameter (→ 82).

* Visibility depends on order options or device settings

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 (→ 82).

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 (→ 82).

User entry

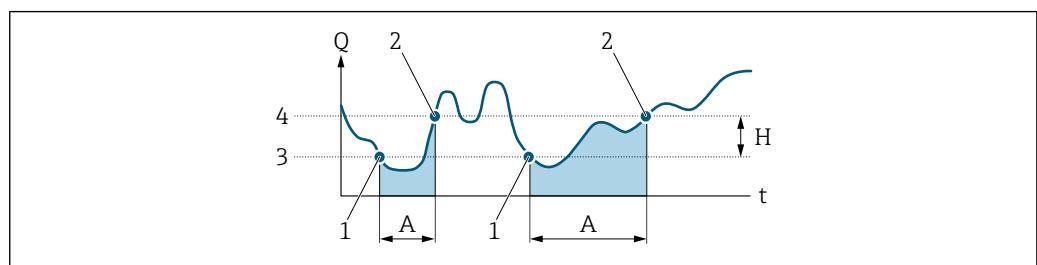
0 to 100.0 %

Factory setting

50 %

Additional information

Example



A0012887

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

Pressure shock suppression**Navigation**

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

Prerequisite

A process variable is selected in the **Assign process variable** parameter (→ 82).

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**

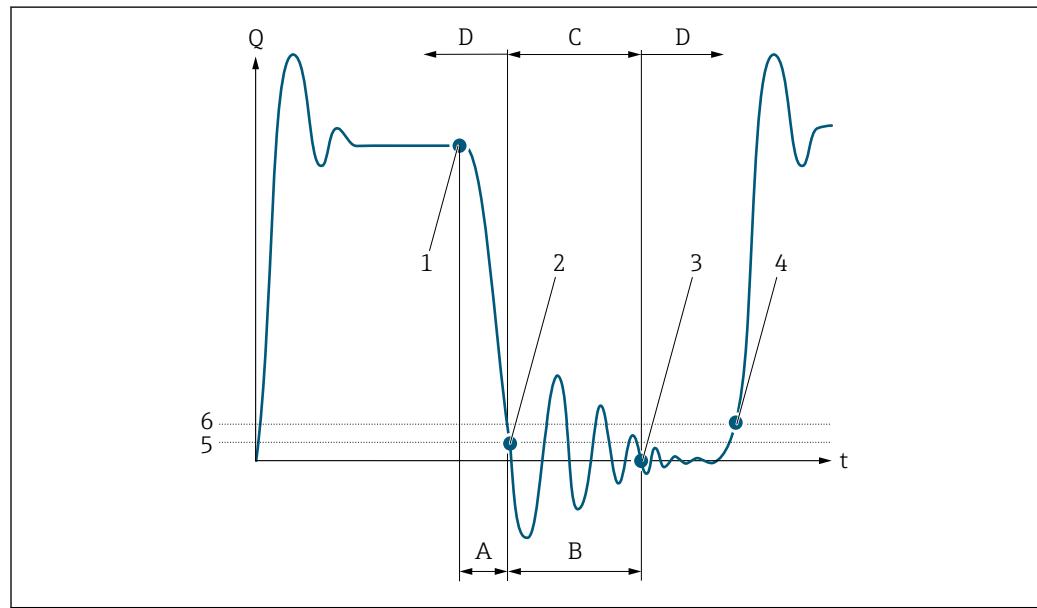
- Prerequisite:
 - Flow rate < on-value of low flow cut off
 - or
 - Change in the flow direction
- Output values
 - Current output: outputs the current corresponding to zero flow
 - Flow displayed: 0
 - Totalizer: the totalizers are pegged at the last correct value

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.



- | | |
|----------|--|
| <i>Q</i> | Flow |
| <i>t</i> | Time |
| <i>A</i> | After run |
| <i>B</i> | Pressure shock |
| <i>C</i> | Pressure shock suppression active according to the time entered |
| <i>D</i> | 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)	→ 85
Low value partial filled pipe detection (1861)	→ 85
High value partial filled pipe detection (1858)	→ 86
Response time part. filled pipe detect. (1859)	→ 86
Maximum damping partial filled pipe det. (6040)	→ 87

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 (→ 85).

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 (→ 86).

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

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 (→ 85).

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 (→ 85).

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

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 (→ 85).

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 "Measurement mode" submenu*Navigation*

Expert → Sensor → Measurement mode

Measurement mode	
Select medium type	→ 88
Select gas type	→ 88
Reference sound velocity	→ 89
Temperature coefficient sound velocity	→ 89
Gas Fraction Handler	→ 89

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 NO_x
- 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 (→ 88), 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

Temperature coefficient sound velocity

Navigation	Expert → Sensor → Measurement mode → Temp. coeff. SV (6181)
Prerequisite	In the Select gas type parameter (→ 88), 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

Gas Fraction Handler

Navigation	Expert → Sensor → Measurement mode → Gas Frac Handler (6377)
Description	Activates the Gas Fraction Handler function for two phase media.
Selection	<ul style="list-style-type: none"> ▪ Off ▪ Moderate ▪ Powerful
Factory setting	Moderate
Additional information	<ul style="list-style-type: none"> ▪ 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. <p>The influence of the disturbances can be configured in two steps via this switch:</p> <ul style="list-style-type: none"> ▪ 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 (→ 240)

3.2.5 "External compensation" submenu

Navigation

Expert → Sensor → External comp.

► External compensation	
Pressure compensation (6130)	→ 90
Pressure value (6059)	→ 91
External pressure (6209)	→ 91
Temperature correction source (6184)	→ 91
External temperature (6080)	→ 92
Application specific input source 0 (6401)	→ 92
Application specific input source 1 (6402)	→ 93

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

* Visibility depends on order options or device settings

Additional information*Selection*

- Fixed value
A fixed pressure value is used for compensation: **Pressure value** parameter (→ 91)
- External value
The pressure value read in via HART is used for compensation.
- **Current input 1** option, **Current input 2** option
The pressure value read in via the current input is used for compensation.

Pressure value**Navigation**

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

Prerequisite

In the **Pressure compensation** parameter (→ 90), 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 (→ 78)

External pressure**Navigation**

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

Prerequisite

In the **Pressure compensation** parameter (→ 90), 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 (→ 78)

Temperature correction source**Navigation**

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

Description

Use this function to select the temperature mode.

Selection	<ul style="list-style-type: none"> ■ Internal measured value ■ External value * ■ Current input 1 * ■ Current input 2 * ■ Current input 3 *
Factory setting	Internal measured value
Additional information	<p><i>Description</i></p> <p>Use this function to select the type of temperature compensation.</p> <p><i>Selection</i></p> <p>All the options available for selection are used for measured value compensation.</p> <ul style="list-style-type: none"> ■ Internal measured value The temperature value measured internally (temperature sensor of the measuring sensor) is used for compensation. ■ External value The temperature value read in via HART is used for compensation. ■ Current input 1 option, Current input 2 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 (→ 91), the External value option or the Current input 1...n option is selected.
Description	Displays the external temperature.
Additional information	<p><i>Dependency</i></p>  The unit is taken from the Temperature unit parameter (→ 77)

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.

* Visibility depends on order options or device settings

Selection	<ul style="list-style-type: none"> ■ Off ■ External value * ■ Current input 1 * ■ Current input 2 * ■ Current input 3 *
------------------	--

Factory setting	Off
------------------------	-----

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.
--------------------	--

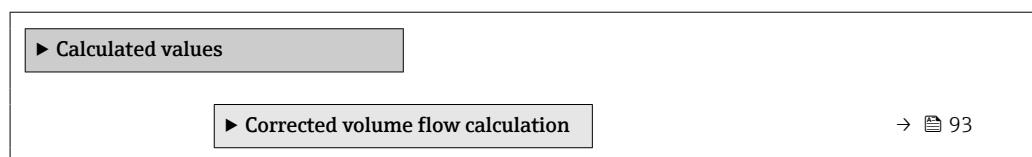
Selection	<ul style="list-style-type: none"> ■ Off ■ External value * ■ Current input 1 * ■ Current input 2 * ■ Current input 3 *
------------------	--

Factory setting	Off
------------------------	-----

3.2.6 "Calculated values" submenu

Navigation

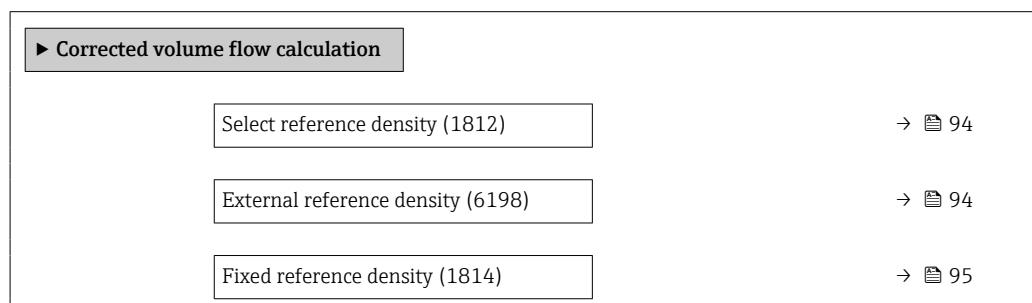
Expert → Sensor → Calculated value



"Corrected volume flow calculation" submenu

Navigation

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



* Visibility depends on order options or device settings

Reference temperature (1816)	→ 95
Linear expansion coefficient (1817)	→ 96
Square expansion coefficient (1818)	→ 96

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
 - 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 LPG⁵⁾, 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 → 90 → 90) 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)

Prerequisite One of the following options is selected in the **Corrected volume flow calculation** parameter (→ 94):

- Current input 1 *
- Current input 2 *

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

User interface Floating point number with sign

* Visibility depends on order options or device settings

5) liquefied petroleum gas

Additional information*Dependency*

The unit is taken from the **Reference density unit** parameter (→ 76)

**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 (→ 94) parameter.

Description

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

User entry

Positive floating-point number

Factory setting

1 kg/Nl

Additional information*Dependency*

The unit is taken from the **Reference density unit** parameter (→ 76)

**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 (→ 94) 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 (→ 77)

Reference density calculation

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

A0023403

- 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)

- $\Delta t: t - t_N$
- α : linear expansion coefficient of the fluid, unit = [1/K]; K = Kelvin
- β : square expansion coefficient of the fluid, unit = [1/K²]

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 (→ 94) 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 (→ 94) 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

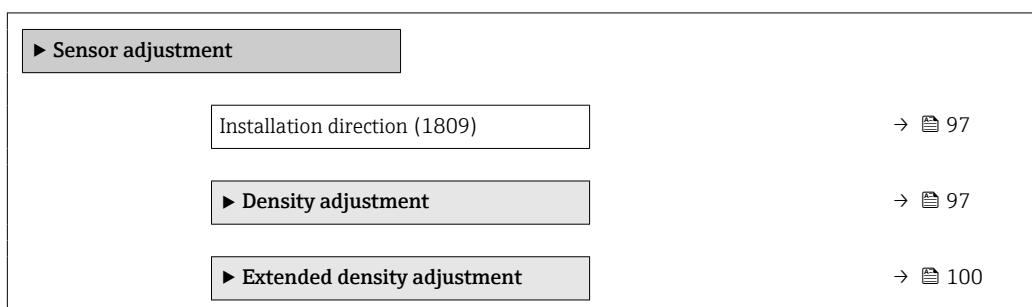
Factory setting

0.0 1/K²

3.2.7 "Sensor adjustment" submenu

Navigation

Expert → Sensor → Sensor adjustm.



▶ Process variable adjustment	→ 103
▶ Zero verification	→ 108
▶ Zero adjustment	→ 111

Installation direction

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

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.

"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.

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

▶ Density adjustment	
Density adjustment mode (6043)	→ 98
Density setpoint 1 (6045)	→ 98

Density setpoint 2 (6046)	→ 98
Execute density adjustment (6041)	→ 99
Progress (2808)	→ 99
Density adjustment factor (6042)	→ 99
Density adjustment offset (6044)	→ 99

Density adjustment mode

Navigation	  Expert → Sensor → Sensor adjustm. → Density adjustm. → Adjustment mode (6043)
Description	Displays the method for field density adjustment.
Selection	<ul style="list-style-type: none">▪ 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) (→ 74).
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) (→ 74).
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	<ul style="list-style-type: none"> ■ 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.
User interface	Signed floating-point number
Factory setting	1
Additional information	 Manual adjustment of the value: Density factor parameter (→  106)

Density adjustment offset

Navigation	 Expert → Sensor → Sensor adjustm. → Density adjustm. → Dens. adj offset (6044)
Description	Shows the calculated correction offset for the density.

* Visibility depends on order options or device settings

User interface Signed floating-point number

Factory setting 0

Additional information  Manual adjustment of the value: **Density offset** parameter (→ [105](#))

"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)	→ 100
Linear density factor (5967)	→ 101
Linear temperature factor (5966)	→ 101
Linear pressure factor (5965)	→ 101
Quadratic density factor (5964)	→ 101
Quadratic temperature factor (5963)	→ 102
Quadratic pressure factor (5962)	→ 102
Combined density-temperature factor (5961)	→ 102
Combined density-pressure factor (5971)	→ 102
Combined temperature-pressure factor (5970)	→ 103
Cubic temperature factor (5969)	→ 103

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 (→ 103) do not affect the calculated values, such as concentration, NSV.

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust

► Process variable adjustment

Mass flow offset (1831)

→ 104

Mass flow factor (1832)

→ 104

Volume flow offset (1841)

→ 105

Volume flow factor (1846)

→ 105

Density offset (1848)

→ 105

Density factor (1849)	→ 106
Corrected volume flow offset (1866)	→ 106
Corrected volume flow factor (1867)	→ 106
Reference density offset (1868)	→ 107
Reference density factor (1869)	→ 107
Temperature offset (1870)	→ 107
Temperature factor (1871)	→ 108

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 m³/s.

User entry Signed floating-point number

Factory setting 0 m³/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/m³.

User entry Signed floating-point number

Factory setting 0 kg/m³

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 Nm³/s.

User entry Signed floating-point number

Factory setting 0 Nm³/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/Nm ³ .
User entry	Signed floating-point number
Factory setting	0 kg/Nm ³
Additional information	<i>Description</i> 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	<i>Description</i> 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	<i>Description</i> 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

"Zero verification" wizard*Navigation*

Expert → Sensor → Sensor adjustm. → ZeroVerification

► Zero verification	
Process conditions	→ 108
Progress (2808)	→ 109
Status (6253)	→ 109
Additional information	→ 109
Recommendation: (6000)	→ 110
Root cause (6444)	→ 110
Abort cause	→ 110
Zero point measured (5999)	→ 110
Zero point standard deviation (5996)	→ 111

Process conditions**Navigation**

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

Description

Ensure process conditions as follows.

Selection	<ul style="list-style-type: none">■ 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	<ul style="list-style-type: none">■ Busy■ Failed■ Done
Factory setting	-

Additional information

Navigation	 Expert → Sensor → Sensor adjustm. → ZeroVerification → Additional info.
Description	Indicate whether to display additional information.
Selection	<ul style="list-style-type: none">■ 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	<ul style="list-style-type: none">▪ 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	<ul style="list-style-type: none">▪ 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	<ul style="list-style-type: none">▪ 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	→  112
Progress (2808)	→  112
Status (6253)	→  112
Root cause (6444)	→  112
Abort cause	→  113
Root cause (6444)	→  112
Reliability of measured zero point (5982)	→  113
Additional information	→  113
Reliability of measured zero point (5982)	→  113
Zero point measured (5999)	→  113
Zero point standard deviation (5996)	→  114
Select action (5995)	→  114

Process conditions

Navigation	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Process condit.
Description	Ensure process conditions as follows.
Selection	<ul style="list-style-type: none">▪ 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	<ul style="list-style-type: none">▪ 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	<ul style="list-style-type: none">▪ 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	<ul style="list-style-type: none">■ 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	<ul style="list-style-type: none">■ 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	<ul style="list-style-type: none">■ 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

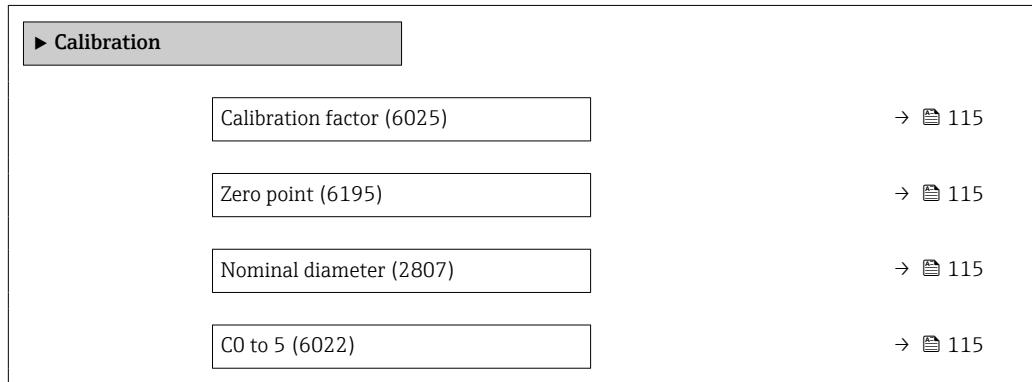
Navigation	 Expert → Sensor → Sensor adjustm. → Zero adjustment → ZeroStdDev (5996)
Description	Shows the standard deviation of the zero point measured.
User interface	Positive floating-point number
Factory setting	0

Select action

Navigation	 Expert → Sensor → Sensor adjustm. → Zero adjustment → Select action (5995)
Description	Select the zero point value to apply.
Selection	<ul style="list-style-type: none">■ Keep current zero point■ Apply zero point measured■ Apply factory zero point *
Factory setting	Keep current zero point

3.2.8 "Calibration" submenu

Navigation   Expert → Sensor → Calibration



* Visibility depends on order options or device settings

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	<i>Description</i>
	 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

i The **Testpoints** submenu (→ 116) is used to test the measuring device or the application.

Navigation

Diagnostic → Testpoints

Navigation

Expert → Sensor → Testpoints

► Testpoints	
Raw value mass flow	→ 117
Oscillation frequency 0 to 1	→ 117
Frequency fluctuation 0 to 1	→ 117
Oscillation amplitude 0 to 1	→ 118
Oscillation damping 0 to 1	→ 118
Oscillation damping fluctuation 0 to 1	→ 119
Signal asymmetry 0	→ 119
Torsion signal asymmetry	→ 120
Sensor electronics temperature (ISEM)	→ 120
Carrier pipe temperature	→ 120
Casing pipe temperature	→ 121
Exciter current 0 to 1	→ 121
Test point 0	→ 121
Test point 1	→ 122
Temperature difference measuring tube	→ 122
Temperat. difference meas. tube-carrier	→ 122
Sensor index coil asymmetry	→ 122
Sensor index coil asymmetry reliability	→ 123

Raw value mass flow

Navigation	  Diagnostics → Testpoints → Raw mass flow (6140)
	  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	<p><i>Description</i></p> <p>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.</p> <p><i>Dependency</i></p> <p> The unit is taken from the Mass flow unit parameter (→  69)</p>

Oscillation frequency 0 to 1

Navigation	  Diagnostics → Testpoints → Osc. freq. 0 to 1 (6067)
	  Expert → Sensor → Testpoints → Osc. freq. 0 to 1 (6067)
Prerequisite	<ul style="list-style-type: none"> ■ 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	  Diagnostics → Testpoints → Freq. fluct. 0 to 1 (6175)
	  Expert → Sensor → Testpoints → Freq. fluct. 0 to 1 (6175)
Prerequisite	<p>Order code for "Application package", option EB "Heartbeat Verification + Monitoring" available:</p> <ul style="list-style-type: none"> ■ 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	  Diagnostics → Testpoints → Osc. ampl. 0 to 1 (6006)
	  Expert → Sensor → Testpoints → Osc. ampl. 0 to 1 (6006)
Prerequisite	Order code for "Application package", option EB "Heartbeat Verification + Monitoring" available: <ul style="list-style-type: none">▪ 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	<p><i>Description</i></p> <p>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).</p> <p><i>Limit values</i></p> <p>5 %</p> <p> If the displayed value is outside the limit value, the measuring device displays the following diagnostic messages:<ul style="list-style-type: none">▪ △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<ul style="list-style-type: none">▪ Explanation: The fluctuation (standard deviation) of the amplitude is too high.▪ Possible cause: Air or suspended solids in the medium (multiphase)</p>

Oscillation damping 0 to 1

Navigation	  Diagnostics → Testpoints → Osc. damping 0 to 1 (6038)
	  Expert → Sensor → Testpoints → Osc. damping 0 to 1 (6038)
Prerequisite	<ul style="list-style-type: none">▪ 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. $\pm 30\%$). 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**

█ █ Diagnostics → Testpoints → Osc.damp.fluct0 to 1 (6172)

█ █ 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**

█ █ Diagnostics → Testpoints → Signal asymm. 0 (6013)

█ █ 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	Diagnostics → 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	Diagnostics → Testpoints → Sensor elec.temp (6053)
Prerequisite	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. <i>Dependency</i> The unit is taken from the Temperature unit parameter (→ 77)

Carrier pipe temperature

Navigation	Diagnostics → Testpoints → Carr. pipe temp. (6027)
Prerequisite	<ul style="list-style-type: none">■ 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

  Diagnostics → Testpoints → CasingPipeTemp. (6411)

  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

  Diagnostics → Testpoints → Exc. current 0 to 1 (6055)

  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

  Diagnostics → Testpoints → Test point 0 (6425)

  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	  Diagnostics → Testpoints → Test point 1 (6426)
	  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	  Diagnostics → Testpoints → TempDiffMeasTube (6344)
	  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	  Diagnostics → Testpoints → TempDiffTubeCarr
	  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	  Diagnostics → Testpoints → SensIndCoilAsym. (5951)
	  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 Diagnostics → Testpoints → SensIndCoilAReli (5952)
 Expert → Sensor → Testpoints → SensIndCoilAReli (5952)

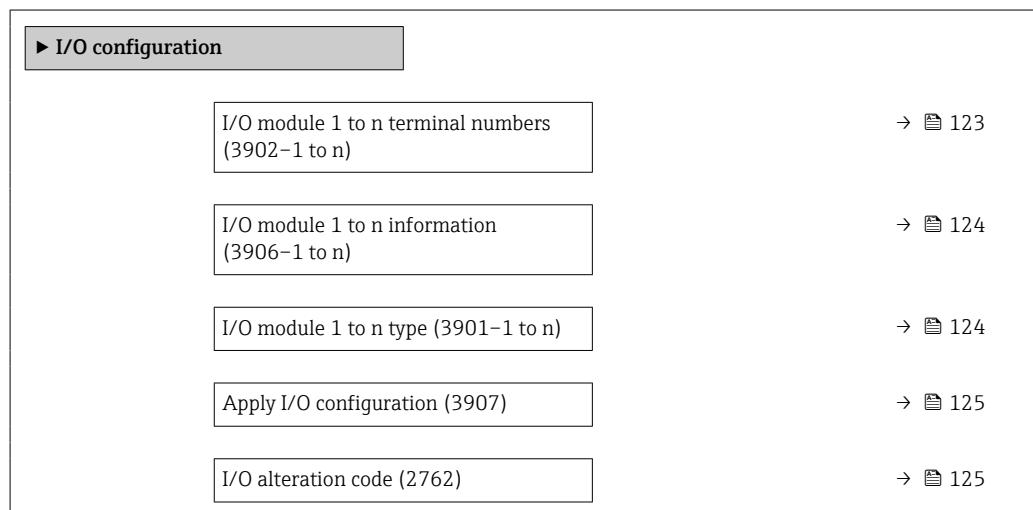
Description Indicates the reliability of the sensor index coil asymmetry value (SICA) currently measured.

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
 - HART

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.

"Fieldbus" option

The I/O module is configured for HART.

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"
- "Output; input 3", 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

* Visibility depends on order options or device settings

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	<ul style="list-style-type: none"> ■ No ■ Yes
Factory setting	No

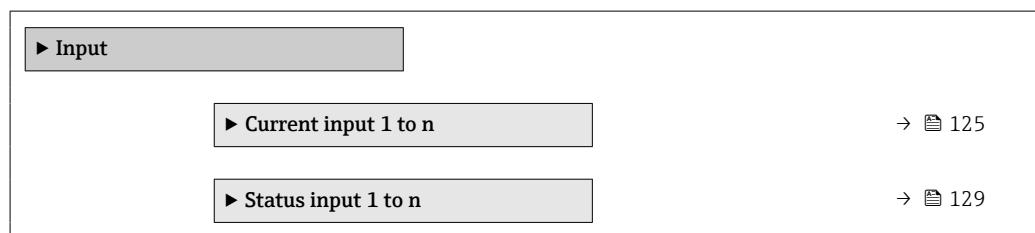
I/O alteration code

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	<p><i>Description</i></p> <p>The I/O configuration is changed in the I/O module type parameter (→ 124).</p>

3.4 "Input" submenu

Navigation

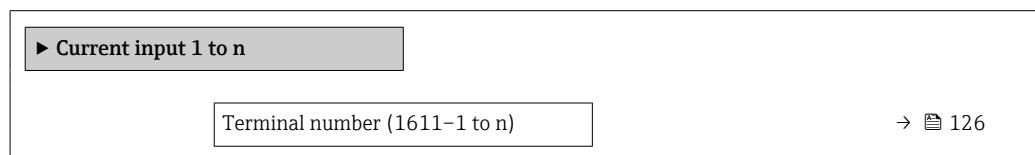
Expert → Input



3.4.1 "Current input 1 to n" submenu

Navigation

Expert → Input → Current input 1 to n



Signal mode (1610-1 to n)	→ 126
Current span (1605-1 to n)	→ 127
0/4 mA value (1606-1 to n)	→ 127
20 mA value (1607-1 to n)	→ 127
Failure mode (1601-1 to n)	→ 128
Failure value (1602-1 to n)	→ 128

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	<ul style="list-style-type: none"> ■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3)
Additional information	<p><i>"Not used" option</i></p> <p>The current input module does not use any terminal numbers.</p>

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	<ul style="list-style-type: none"> ■ Passive* ■ Active
Factory setting	Active

* Visibility depends on order options or device settings

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 (→ 134)

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

Additional information

Current input behavior

The current input behaves differently depending on the settings configured in the following parameters:

- Current span (→ 127)
- Failure mode (→ 128)

Configuration examples

Pay attention to the configuration examples for **4 mA value** parameter (→ 135).

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 (→ [135](#)).

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 (→ [127](#)).

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 (→ [128](#))).

Failure value



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

Prerequisite In the **Failure mode** parameter (→ [128](#)), 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.

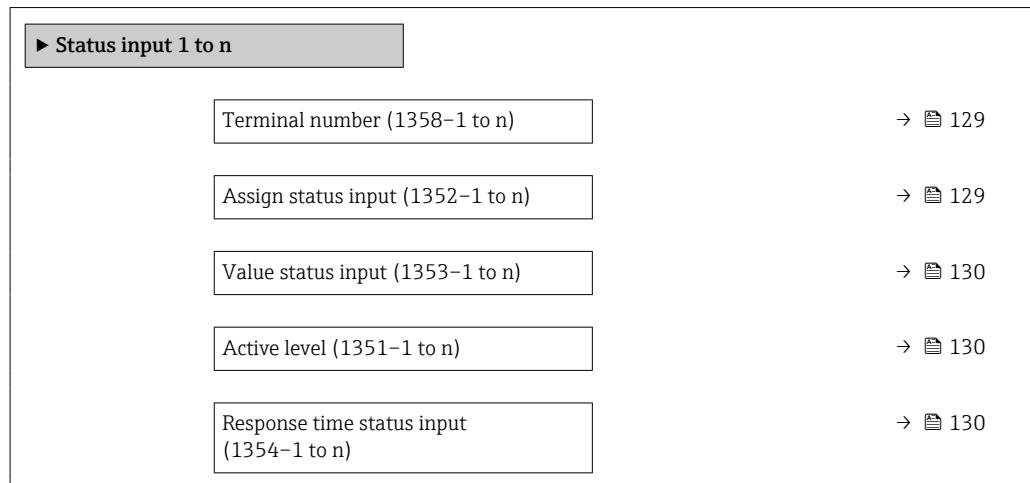
User entry Signed floating-point number

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 *

* Visibility depends on order options or device settings

Factory setting	Off
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ▪ 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 (→ 81) is activated. <p>i Note on the Flow override (→ 81):</p> <ul style="list-style-type: none"> ▪ The Flow override (→ 81) 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	<ul style="list-style-type: none"> ▪ High ▪ Low

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	<ul style="list-style-type: none"> ▪ High ▪ Low
Factory setting	High

Response time status input

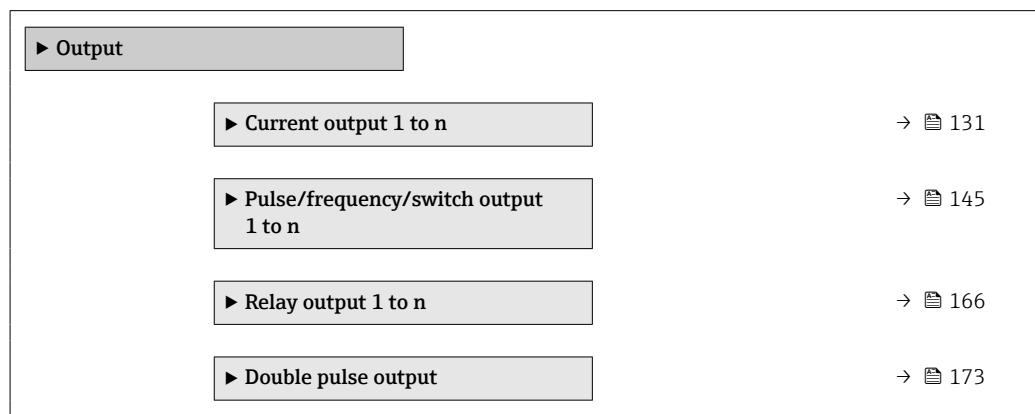


Navigation	  Expert → Input → Status input 1 to n → Response time (1354-1 to n)
Description	Use this function to enter the minimum time period for which the input signal level must be present before the selected function is activated.
User entry	5 to 200 ms

Factory setting

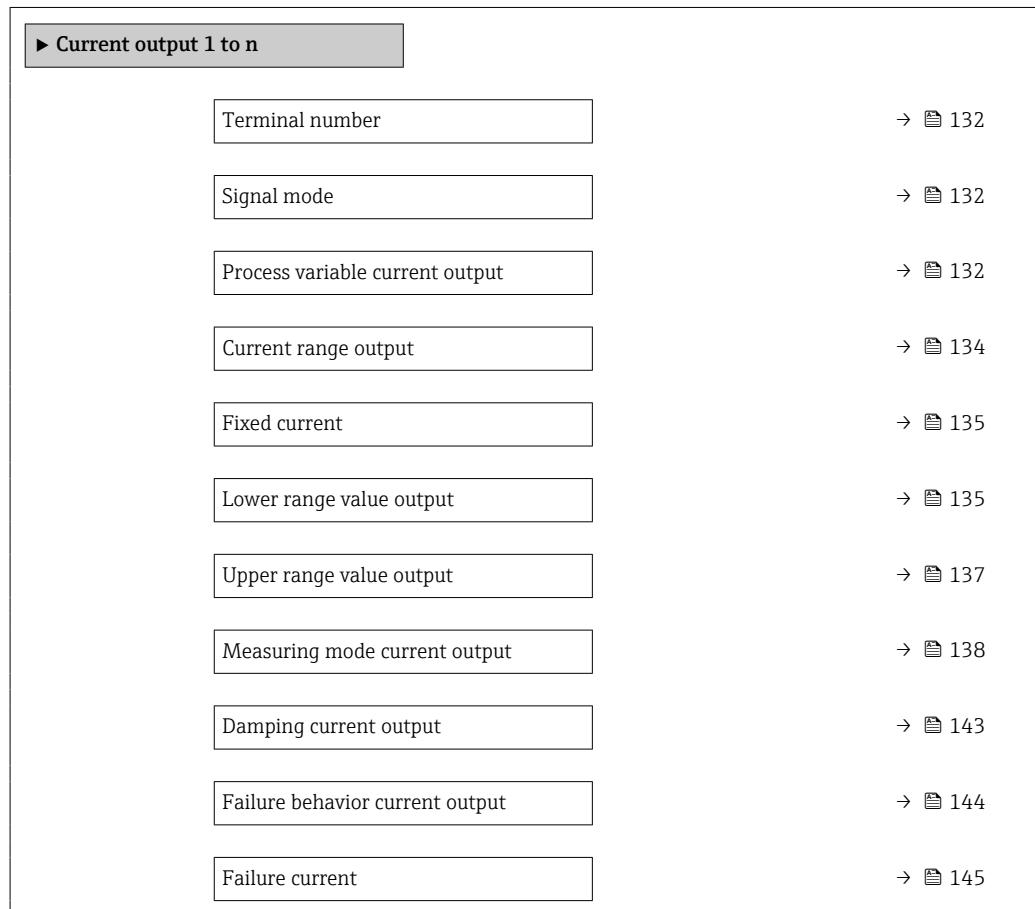
50 ms

3.5 "Output" submenu

Navigation Expert → Output

▶ Output	
▶ Current output 1 to n	→ 131
▶ Pulse/frequency/switch output 1 to n	→ 145
▶ Relay output 1 to n	→ 166
▶ Double pulse output	→ 173

3.5.1 "Current output 1 to n" submenu

Navigation Expert → Output → Curr.output 1 to n

▶ Current output 1 to n	
Terminal number	→ 132
Signal mode	→ 132
Process variable current output	→ 132
Current range output	→ 134
Fixed current	→ 135
Lower range value output	→ 135
Upper range value output	→ 137
Measuring mode current output	→ 138
Damping current output	→ 143
Failure behavior current output	→ 144
Failure current	→ 145

Output current	→ 145
Measured current	→ 145

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 (→ 18)

Selection

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

* Visibility depends on order options or device settings

- 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 *
- 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 *

* Visibility depends on order options or device settings

- 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)

Additional information *Description*

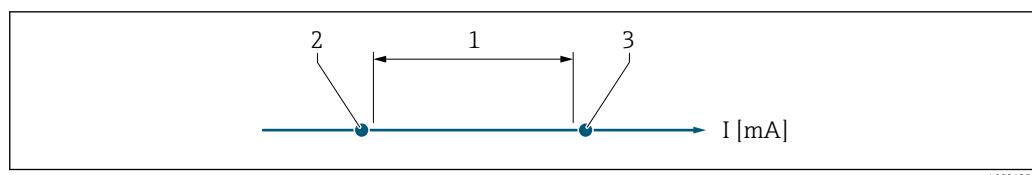
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→ [144](#)).
▪ If the measured value is outside the measuring range, the **△S441 Current output 1 to n** diagnostic message is displayed.
▪ The measuring range is specified via the **Lower range value output** parameter (→ [135](#)) and **Upper range value output** parameter (→ [137](#)).

"Fixed current" option

- This option is used for a HART Multidrop network.
- It can only be used for the 4...20 mA HART current output (current output 1).
- The current value is set via the **Fixed current** parameter (→ [135](#)).

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 (→ [134](#)).

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 (→ [134](#)):

- 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 (→ 132). 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 (→ 137).

Dependency

i The unit depends on the process variable selected in the **Assign current output** parameter (→ 132).

Current output behavior

The current output behaves differently depending on the settings configured in the following parameters:

- Current span (→ 134)
- Failure mode (→ 144)

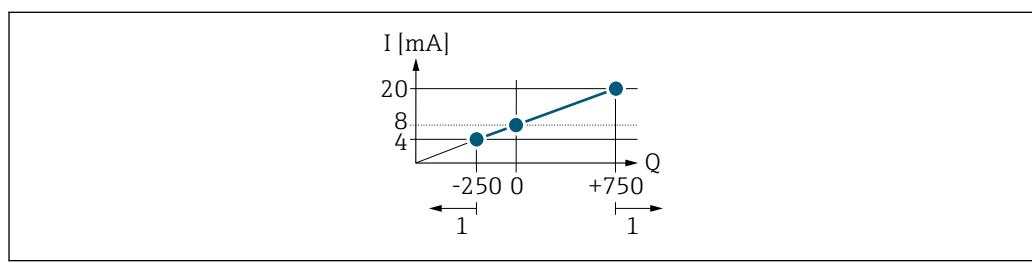
Configuration examples

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 (→ 135) = not equal to zero flow (e.g. -250 m³/h)
- **Upper range value output** parameter (→ 137) = not equal to zero flow (e.g. +750 m³/h)
- Calculated current value = 8 mA at zero flow



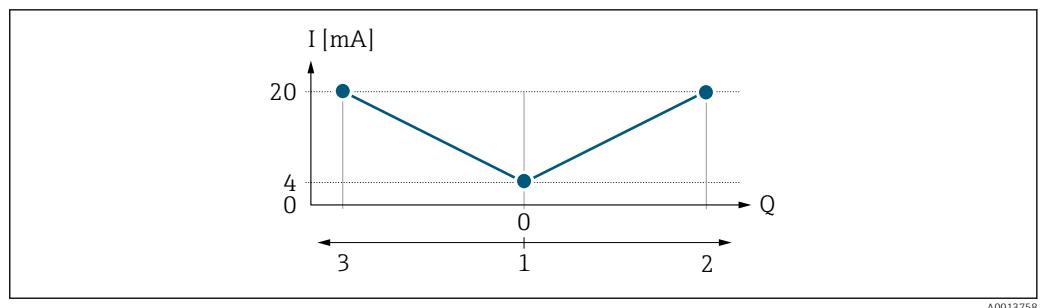
A0013757

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 (→ 135) and **Upper range value output** parameter (→ 137). 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 (→ 135) and **Upper range value output** parameter (→ 137) must have the same algebraic sign. The value for the **Upper range value output** parameter (→ 137) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 137) (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 → 138.

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 (→ 134):

- 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 → 302

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 132). 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 (→ 135).

Dependency

i The unit depends on the process variable selected in the **Assign current output** parameter (→ 132).

Example

- Value assigned to 0/4 mA = -250 m³/h
- Value assigned to 20 mA = +750 m³/h
- Calculated current value = 8 mA (at zero flow)

If the **Forward/Reverse flow** option is selected in the **Measuring mode** parameter (→ 138), different algebraic signs cannot be entered for the values for the **Lower range value output** parameter (→ 135) and **Upper range value output** parameter (→ 137). The **△S441 Current output 1 to n** diagnostic message is displayed.

Configuration examples

i Pay attention to the configuration examples for the **Lower range value output** parameter (→ 135).

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 (→ 132):

- 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
- Oscillation amplitude 0 *
- Frequency fluctuation 0
- Oscillation damping 0
- Oscillation damping fluctuation 0
- Signal asymmetry
- Exciter current 0

i Detailed description of the options **Oscillation frequency**, **Oscillation amplitude**, **Oscillation damping** and **Signal asymmetry: Value 1 display** parameter (→ 18)

* Visibility depends on order options or device settings

One of the following options is selected in the **Current span** parameter (→ 134):

- 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

i The process variable that is assigned to the current output via the **Assign current output** parameter (→ 132) is displayed below the parameter.

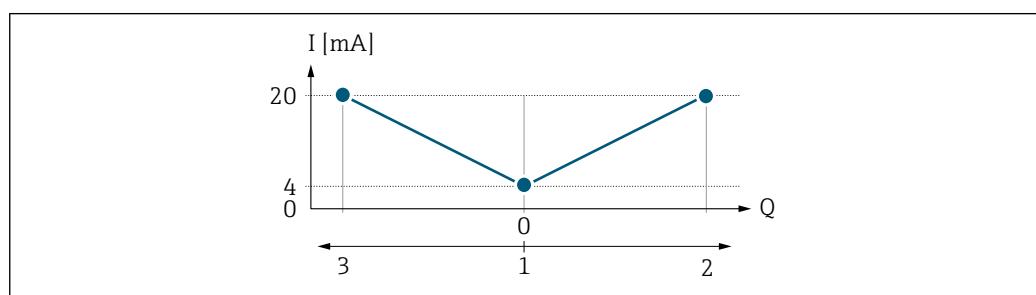
"Forward flow" option

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 (→ 135) and the **Upper range value output** parameter (→ 137).

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 m³/h
 - end of measuring range = 10 m³/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 |

* Visibility depends on order options or device settings

- 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 (→ 135) and **Upper range value output** parameter (→ 137) must have the same algebraic sign.
- The value for the **Upper range value output** parameter (→ 137) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 137) (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 **AS441 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

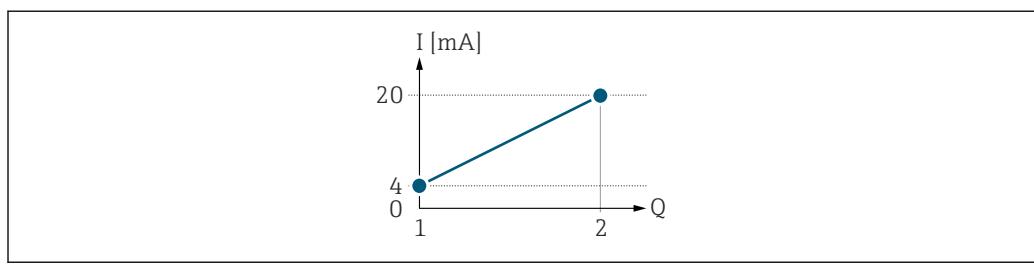


Fig. 2 Measuring range

- | | |
|---|---|
| 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:

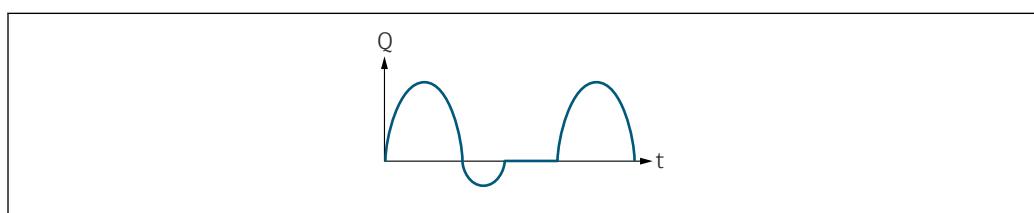
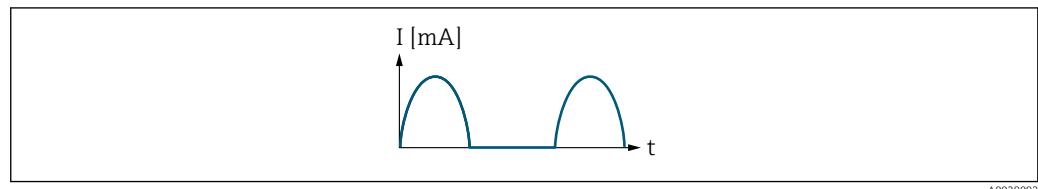


Fig. 3 Flow response

- | | |
|---|------|
| Q | Flow |
| t | Time |

With **Forward flow** option

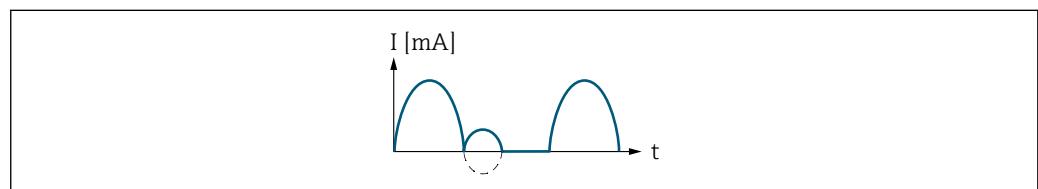
The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output.:



I Current
t Time

With Forward/Reverse flow option

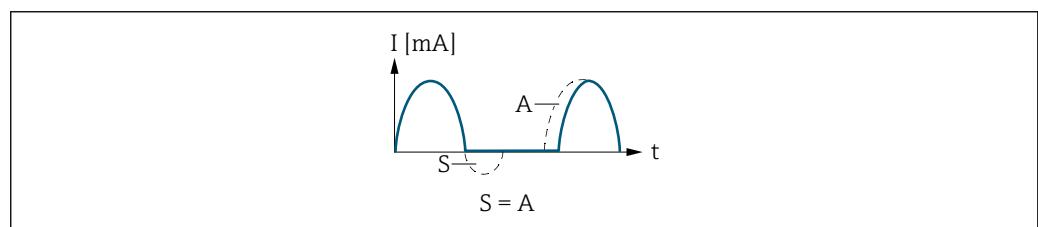
The current output signal is independent of the direction of flow.



I Current
t Time

With Reverse flow compensation option

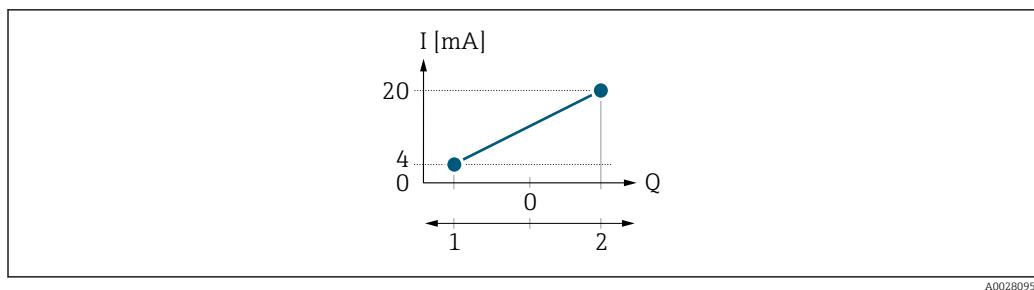
Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.



I Current
t Time
S Flow components saved
A Balancing of saved flow components

Example 2

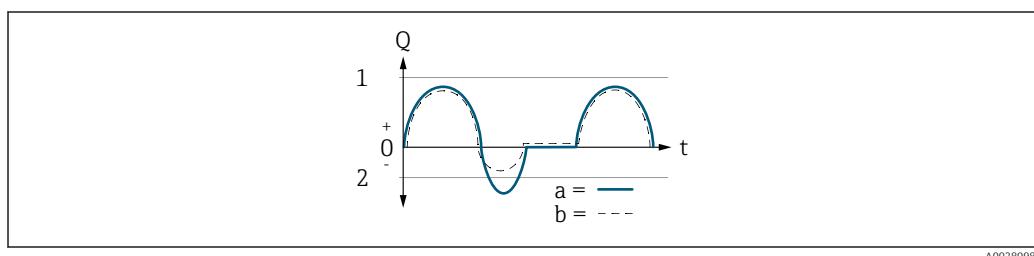
Defined measuring range: lower range value and upper range value with **different** signs

**Fig 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 flow a (—) outside, b (---) inside the measuring range

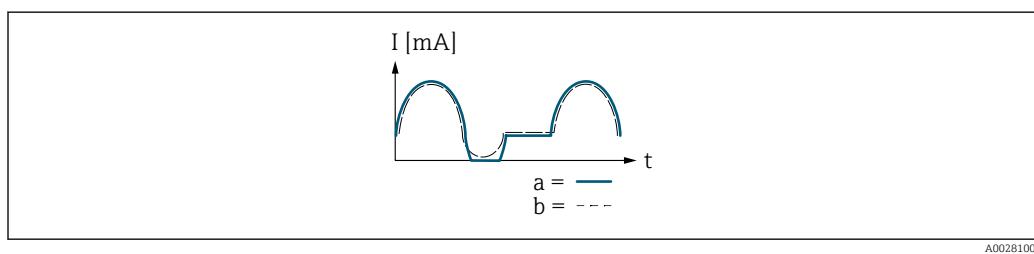
*Q* Flow*t* Time

1 Lower range value (Start of measuring range output)

2 Upper range value (end of measuring range output)

With **Forward flow** option

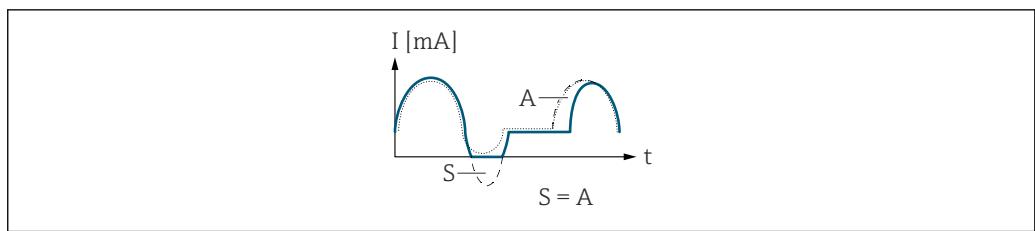
- a (—): The flow components outside the scaled measuring range cannot be taken into account for signal output.
The **△S441 Current output 1 to n** diagnostic message is output.
- b (---): The current output signal is proportional to the process variable assigned.

*I* Current*t* TimeWith **Forward/Reverse flow** option

This option cannot be selected here since the values for the **Lower range value output** parameter (→ **135**) and **Upper range value output** parameter (→ **137**) 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 (→ 132) and one of the following options is selected in the **Current span** parameter (→ 134):

- 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 element⁶⁾) 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).

6) proportional transmission behavior with first order delay

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 (→ 132) and one of the following options is selected in the **Current span** parameter (→ 134):

- 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.

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 (→ 134).

"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 (→ 134).

"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 (→ 145).

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 (→ [144](#)).

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

► Pulse/frequency/switch output
1 to n

Terminal number (0492–1 to n)

→ [147](#)

Signal mode (0490–1 to n)

→ [147](#)

Operating mode (0469–1 to n)

→ [147](#)

Assign pulse output (0460–1 to n)

→ [149](#)

Pulse scaling (0455-1 to n)	→ 150
Pulse width (0452-1 to n)	→ 150
Measuring mode (0457-1 to n)	→ 151
Failure mode (0480-1 to n)	→ 152
Pulse output 1 to n (0456-1 to n)	→ 153
Assign frequency output (0478-1 to n)	→ 153
Minimum frequency value (0453-1 to n)	→ 154
Maximum frequency value (0454-1 to n)	→ 155
Measuring value at minimum frequency (0476-1 to n)	→ 155
Measuring value at maximum frequency (0475-1 to n)	→ 155
Measuring mode (0479-1 to n)	→ 156
Damping output (0477-1 to n)	→ 157
Failure mode (0451-1 to n)	→ 158
Failure frequency (0474-1 to n)	→ 159
Output frequency (0471-1 to n)	→ 159
Switch output function (0481-1 to n)	→ 159
Assign diagnostic behavior (0482-1 to n)	→ 160
Assign limit (0483-1 to n)	→ 161
Switch-on value (0466-1 to n)	→ 163
Switch-off value (0464-1 to n)	→ 163
Assign flow direction check (0484-1 to n)	→ 164
Assign status (0485-1 to n)	→ 164
Switch-on delay (0467-1 to n)	→ 164

Switch-off delay (0465-1 to n)	→ 165
Failure mode (0486-1 to n)	→ 165
Switch state (0461-1 to n)	→ 165
Invert output signal (0470-1 to n)	→ 166

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.

* Visibility depends on order options or device settings

Selection

- Pulse
- Frequency
- Switch

Factory setting

Pulse

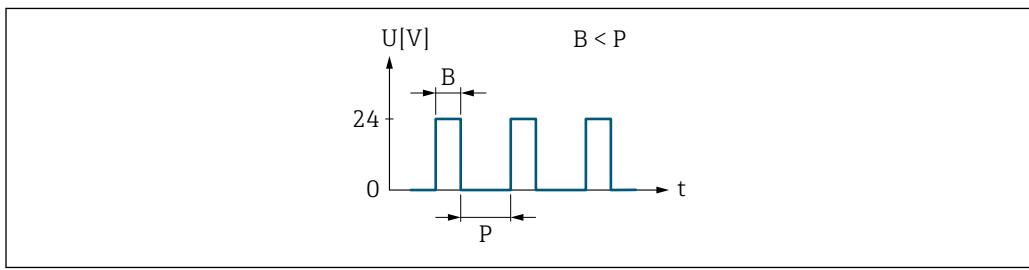
Additional information*"Pulse" option*

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



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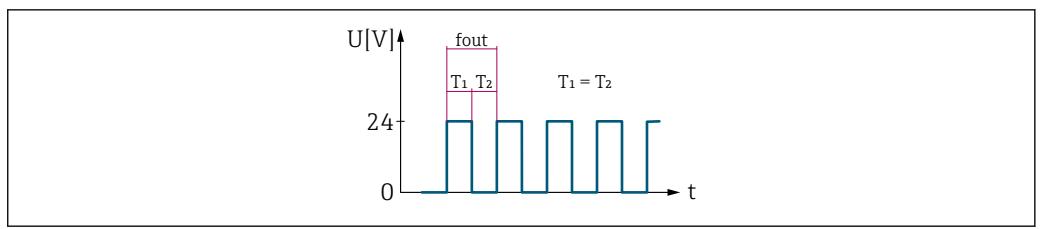
Fig. 5 Quantity-proportional pulse (pulse value) with pulse width to be configured*B* Pulse width entered*P* Pauses between the individual pulses*"Frequency" option*

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



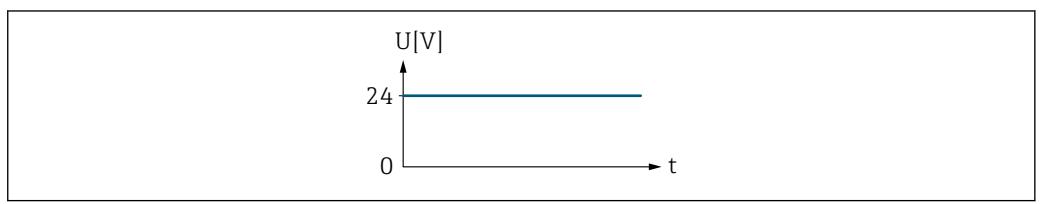
6 Flow-proportional frequency output

"Switch" option

Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)

Example

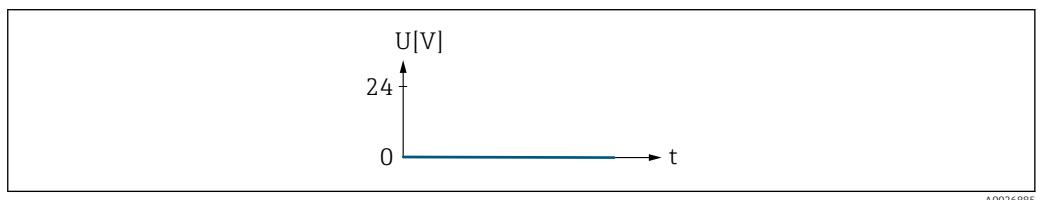
Alarm response without alarm



7 No alarm, high level

Example

Alarm response in case of alarm



8 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 (→ 147).

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 *

* Visibility depends on order options or device settings

- Carrier volume flow *
- Target corrected volume flow *
- Carrier 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 (→ [147](#)) and a process variable is selected in the **Assign pulse output** parameter (→ [149](#)).

Description Use this function to enter the value for the measured value that a pulse is equivalent to.

User entry Positive floating point number

Factory setting Depends on country and nominal diameter → [302](#)

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 (→ [147](#)) and a process variable is selected in the **Assign pulse output** parameter (→ [149](#)).

Description Use this function to enter the duration of the output pulse.

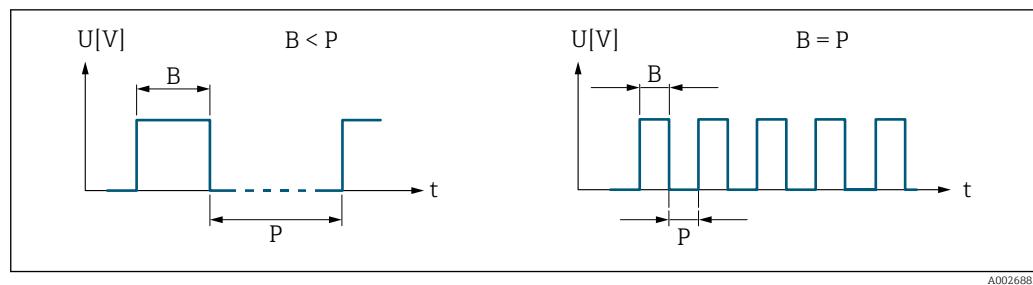
User entry 0.05 to 2 000 ms

Factory setting 100 ms

Additional information *Description*

- Define how long a pulse is (duration).
- The maximum pulse rate is defined by $f_{max} = 1 / (2 \times \text{pulse width})$.
- The interval between two pulses lasts at least as long as the set pulse width.
- The maximum flow is defined by $Q_{max} = f_{max} \times \text{pulse value}$.
- If the flow exceeds these limit values, the measuring device displays the **443 Pulse output 1 to n** diagnostic message.

* Visibility depends on order options or device settings



B Pulse width entered
P Pauses between the individual pulses

Example

- Pulse value: 0.1 g
- Pulse width: 0.1 ms
- f_{\max} : $1 / (2 \times 0.1 \text{ ms}) = 5 \text{ kHz}$
- Q_{\max} : $5 \text{ kHz} \times 0.1 \text{ g} = 0.5 \text{ kg/s}$

Measuring mode



Navigation

Expert → Output → PFS output 1 to n → Measuring mode (0457-1 to n)

Prerequisite

In the **Operating mode** parameter (→ 147), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse output** parameter (→ 149):

- 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

* Visibility depends on order options or device settings

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 (→ 138)

Examples

 For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 138)

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 (→ 147) and a process variable is selected in the **Assign pulse output** parameter (→ 149).

Description

Use this function to select the failure mode of the pulse output in the event of a device alarm.

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.

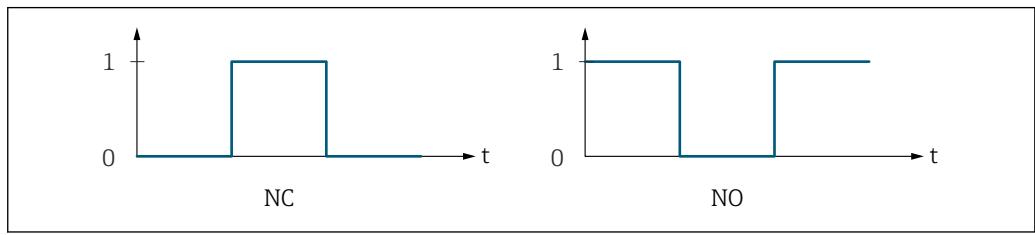
Selection

- 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 (→ 147) parameter.
Description	Displays the pulse frequency currently output.
User interface	Positive floating-point number
Additional information	<p><i>Description</i></p> <ul style="list-style-type: none"> ■ 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.



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- 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 (→ 166) 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 (→ 152)) 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 (→ 147), the Frequency option is selected.
Description	Use this function to select the process variable for the frequency output.
Selection	Detailed description of the options Oscillation frequency , Oscillation amplitude , Oscillation damping and Signal asymmetry : Value 1 display parameter (→ 18) <ul style="list-style-type: none"> ■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow * ■ Density ■ Reference density *

* Visibility depends on order options or device settings

- 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

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 (→ 147) and a process variable is selected in the **Assign frequency output** parameter (→ 153).

Description Use this function to enter the minimum frequency.

User entry 0.0 to 10 000.0 Hz

Factory setting 0.0 Hz

* Visibility depends on order options or device settings

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 (→ 147) and a process variable is selected in the **Assign frequency output** parameter (→ 153).

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 (→ 147) and a process variable is selected in the **Assign frequency output** parameter (→ 153).

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 (→ 153).

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 (→ 147) and a process variable is selected in the **Assign frequency output** parameter (→ 153).

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
	<p>Use this function to enter the maximum measured value at the maximum frequency. The selected process variable is output as a proportional frequency.</p>
	<p><i>Dependency</i></p> <p> The entry depends on the process variable selected in the Assign frequency output parameter (→ 153).</p>

Measuring mode



Navigation  Expert → Output → PFS output 1 to n → Measuring mode (0479-1 to n)

Prerequisite

In the **Operating mode** parameter (→ 147), the **Frequency** option is selected, and one of the following options is selected in the **Assign frequency output** parameter (→ 153):

- 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 (→ 18)

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

* Visibility depends on order options or device settings

Additional information*Selection*

For a detailed description of the options available, see the **Measuring mode** parameter (→ 138)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 138)

Damping output**Navigation**

Expert → Output → PFS output 1 to n → Damping out. (0477-1 to n)

Prerequisite

In the **Operating mode** parameter (→ 147), the **Frequency** option is selected, and one of the following options is selected in the **Assign frequency output** parameter (→ 153):

- 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 (→ 18)

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 element⁷⁾) 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.

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 (→ 147) and a process variable is selected in the **Assign frequency output** parameter (→ 153).

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 (→ 159) 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.

7) proportional transmission behavior with first order delay

Failure frequency

Navigation Expert → Output → PFS output 1 to n → Failure freq. (0474–1 to n)

Prerequisite In the **Operating mode** parameter (→ 147), the **Frequency** option is selected, in the **Assign frequency output** parameter (→ 153) a process variable is selected, and in the **Failure mode** parameter (→ 158), 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 (→ 147), 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 (→ 147).

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 (→ 147), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 159), 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 (→ 147), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 159), 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

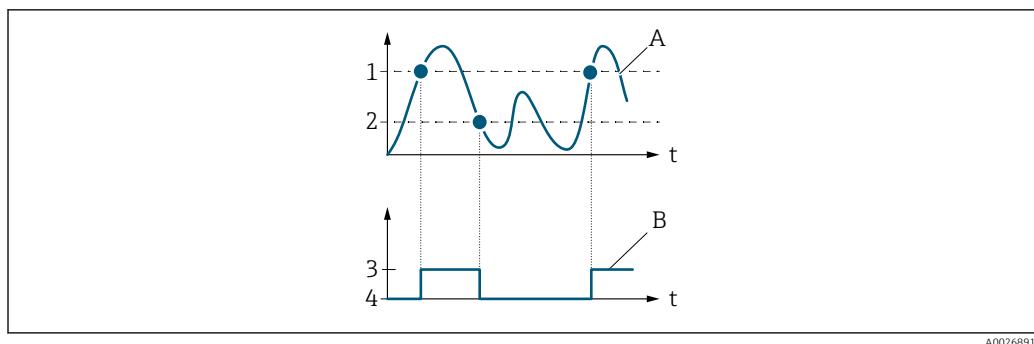
Volume flow

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

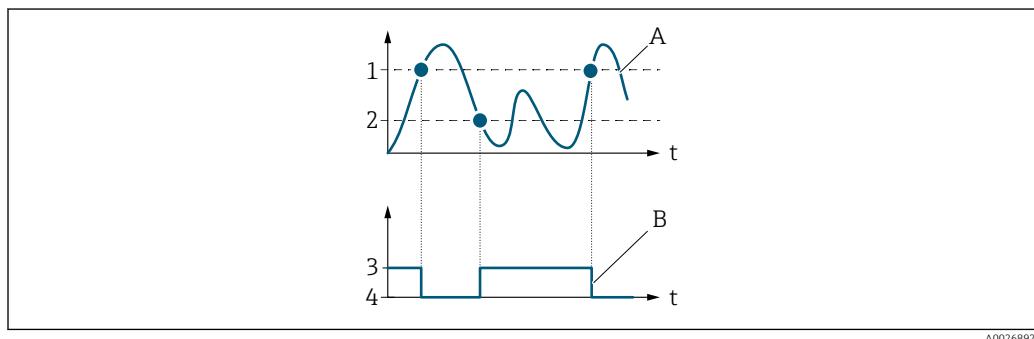


A0026891

- 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

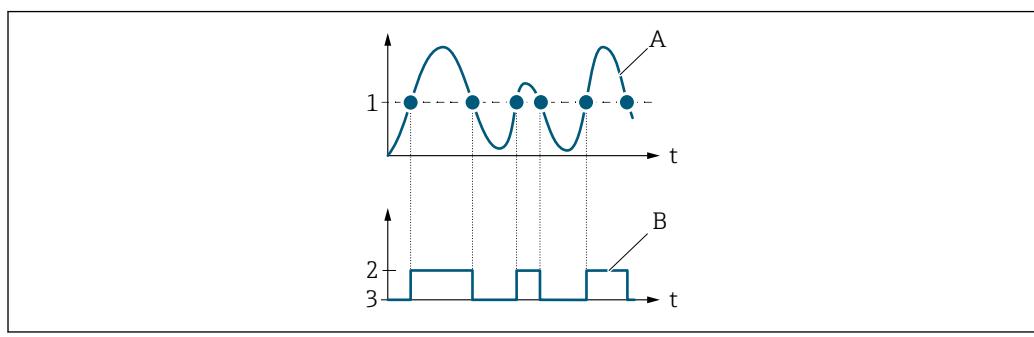


A0026892

- 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 (→ 147).
- The **Limit** option is selected in the **Switch output function** parameter (→ 159).

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 (→ 161).

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 (→ 147).
- The **Limit** option is selected in the **Switch output function** parameter (→ 159).

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 (→ 161).

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 (→ [147](#)).
- The **Flow direction check** option is selected in the **Switch output function** parameter (→ [159](#)).

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 (→ [147](#)).
- The **Status** option is selected in the **Switch output function** parameter (→ [159](#)).

Description

Use this function to select a device status for the switch output.

Selection

- Partially filled pipe detection
- Low flow cut off

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 (→ [147](#)).
- The **Limit** option is selected in the **Switch output function** parameter (→ [159](#)).

Description

Use this function to enter a delay time for switching on the switch output.

User entry

0.0 to 100.0 s

* Visibility depends on order options or device settings

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 (→ [147](#)).
■ The **Limit** option is selected in the **Switch output function** parameter (→ [159](#)).

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 (→ [147](#)).

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

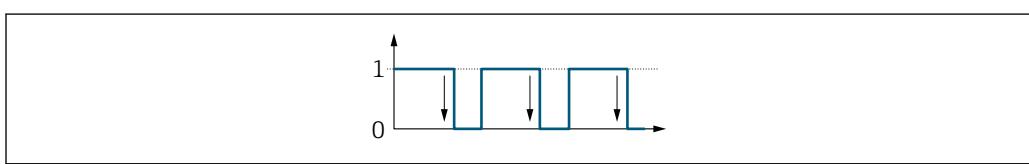
- No
- Yes

Factory setting

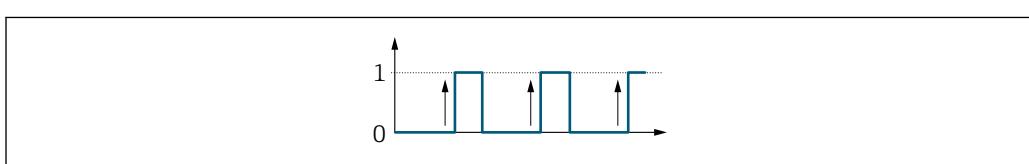
No

Additional information*Selection*

No option (passive - negative)



Yes option (passive - positive)

**3.5.3 "Relay output 1 to n" submenu****Navigation**

Expert → Output → Relay output 1 to n

► Relay output 1 to n		
Terminal number (0812-1 to n)		→ 167
Relay output function (0804-1 to n)		→ 167

Assign flow direction check (0808-1 to n)	→ 168
Assign limit (0807-1 to n)	→ 168
Assign diagnostic behavior (0806-1 to n)	→ 169
Assign status (0805-1 to n)	→ 170
Switch-off value (0809-1 to n)	→ 170
Switch-off delay (0813-1 to n)	→ 171
Switch-on value (0810-1 to n)	→ 171
Switch-on delay (0814-1 to n)	→ 172
Failure mode (0811-1 to n)	→ 172
Switch state (0801-1 to n)	→ 172
Powerless relay status (0816-1 to n)	→ 173

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

	<ul style="list-style-type: none"> ▪ Limit ▪ Flow direction check ▪ Digital Output
Factory setting	Closed
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ▪ 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 (→ 167).

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 (→ 167).

Description Use this function to select a process variable for the limit value function.

* Visibility depends on order options or device settings

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 (→ 167), 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	<ul style="list-style-type: none">■ Alarm■ Alarm or warning■ Warning
Factory setting	Alarm
Additional information	<p><i>Description</i></p> <p> If no diagnostic event is pending, the relay output is closed and conductive.</p>
	<p><i>Selection</i></p> <ul style="list-style-type: none">■ 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 (→ 167), the Digital Output option is selected.
Description	Use this function to select the device status for the relay output.
Selection	<ul style="list-style-type: none">■ Partially filled pipe detection■ Low flow cut off
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 (→ 167), 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
Factory setting	Country-specific: <ul style="list-style-type: none">■ 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 (→ 168).

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 (→ 167), 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 (→ 167).

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 (→ 168).

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 (→ 167), 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.

3.5.4 "Double pulse output" submenu*Navigation*

Expert → Output → Double pulse out

► Double pulse output	
Master terminal number (0981)	→ 174
Slave terminal number (0990)	→ 174
Signal mode (0991)	→ 174
Assign pulse output (0982)	→ 175
Value per pulse (0983)	→ 175
Pulse width (0986)	→ 175
Phase shift (0992)	→ 176
Measuring mode (0984)	→ 176

Failure mode (0985)	→ 177
Pulse output (0987)	→ 178
Invert output signal (0993)	→ 178

Master terminal number

Navigation Expert → Output → Double pulse out → Master term. no. (0981)

Description Displays the master terminal number for the double pulse output.

User interface

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

Additional information "Not used" option
The double pulse output does not use any terminal numbers.

Slave terminal number

Navigation Expert → Output → Double pulse out → Slave term. no. (0990)

Description Displays the slave terminal number for the double pulse output.

User interface

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

Additional information "Not used" option
The double pulse output does not use any terminal numbers.

Signal mode

Navigation Expert → Output → Double pulse out → Signal mode (0991)

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

Selection

- Passive
- Active *
- Passive NE

* Visibility depends on order options or device settings

Factory setting	Passive
------------------------	---------

Assign pulse output

Navigation Expert → Output → Double pulse out → Assign pulse (0982)

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

Selection	<ul style="list-style-type: none"> ■ 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 *
------------------	---

Factory setting	Off
------------------------	-----

Value per pulse

Navigation Expert → Output → Double pulse out → Value per pulse (0983)

Description Use this function to enter the value for the measured value that a pulse is equivalent to.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter → 302

Additional information	<p><i>User entry</i></p> <p>Weighting of the pulse output with a quantity. The lower the pulse value, the</p> <ul style="list-style-type: none"> ■ better the resolution. ■ the higher the frequency of the pulse response.
-------------------------------	---

Pulse width

Navigation Expert → Output → Double pulse out → Pulse width (0986)

Description Use this function to enter the duration of the output pulse.

User entry 0.5 to 2 000 ms

* Visibility depends on order options or device settings

Factory setting 0.5 ms

Additional information  For a detailed description and example: **Pulse width** parameter (→ 150)

Phase shift



Navigation   Expert → Output → Double pulse out → Phase shift (0992)

Description Use this function to select the degree of phase shift.

Selection

- 90°
- 180°

Factory setting 90°

Additional information *Selection*

- 90°
Phase shift by a quarter period.
- 180°
Phase shift by a half period, which is equivalent to a phase reversal.

Measuring mode



Navigation   Expert → Output → Double pulse out → Measuring mode (0984)

Description Use this function to select the measuring mode for the double 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 span 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 (→ 138)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 138)

Failure mode**Navigation**

Expert → Output → Double pulse out → Failure mode (0985)

Description

Use this function to select the failure mode of the double pulse output in the event of a device alarm.

Selection

- Actual value
- No pulses

Factory setting

No pulses

Additional information*Description*

The dictates of safety render it advisable to ensure that the double pulse output shows a predefined behavior in the event of a device alarm.

Selection

- Actual value
In the event of a device alarm, the double pulse output continues on the basis of the current flow measurement. The fault is ignored.
- No pulses
In the case of the double pulse output, if a device alarm occurs one pulse output is stopped and the other pulse output runs at the maximum pulse frequency.

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

Navigation  Expert → Output → Double pulse out → Pulse output (0987)

Description Displays the pulse frequency of the double pulse output which is currently output.

User interface Positive floating-point number

Additional information  For a detailed description and example: **Pulse output** parameter (→  66)

Invert output signal



Navigation  Expert → Output → Double pulse out → Invert outp.sig. (0993)

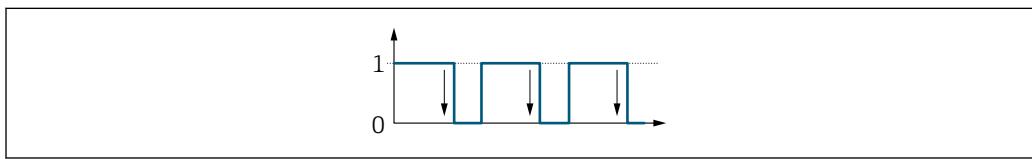
Description Use this function to select whether to invert the output signal.

Selection

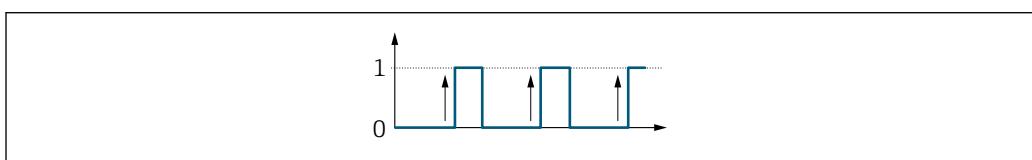
- No
- Yes

Factory setting No

Additional information *Selection*
No option (passive - negative)

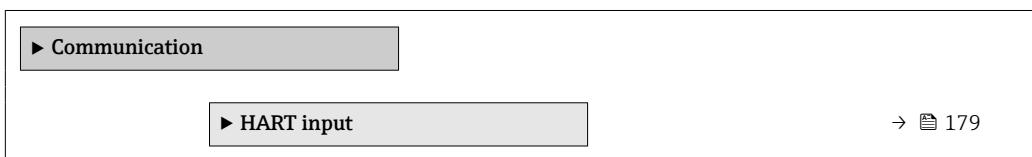


Yes option (passive - positive)



3.6 "Communication" submenu

Navigation  Expert → Communication



▶ HART output	→ 184
▶ Diagnostic configuration	→ 205
▶ Web server	→ 218
▶ WLAN settings	→ 222
▶ OPC-UA configuration	→ 228

3.6.1 "HART input" submenu

Navigation

Expert → Communication → HART input

▶ HART input	
▶ Configuration	→ 179
▶ Input	→ 184

"Configuration" submenu

Navigation

Expert → Communication → HART input → Configuration

▶ Configuration	
Capture mode (7001)	→ 180
Device ID (7007)	→ 180
Device type (7008)	→ 180
Manufacturer ID (7009)	→ 181
Burst command (7006)	→ 181
Slot number (7010)	→ 182
Timeout (7005)	→ 182
Failure mode (7011)	→ 183
Failure value (7012)	→ 183

Capture mode

Navigation Expert → Communication → HART input → Configuration → Capture mode (7001)

Description Use this function to select the capture mode via burst or master communication.

Selection

- Off
- Burst network
- Master network

Factory setting Off

Additional information "Burst network" option

The device records data transmitted via burst in the network.

An external pressure sensor must be in the burst mode.

"Master network" option

In this case, the device must be located in a HART network in which a HART master (control) queries the measured values of the up to 64 network participants. The device reacts only to the responses of a specific device in the network. Device ID, device type, manufacturer ID and the HART commands used by the master must be defined.

Device ID

Navigation Expert → Communication → HART input → Configuration → Device ID (7007)

Prerequisite The **Master network** option is selected in the **Capture mode** parameter (→ 180).

Description Use this function to enter the device ID of the HART slave device whose data are to be recorded.

User entry

6-digit value:

- Via local operation: enter as hexadecimal or decimal number
- Via operating tool: enter as decimal number

Factory setting 0

Additional information In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Device type

Navigation Expert → Communication → HART input → Configuration → Device type (7008)

Prerequisite In the **Capture mode** parameter (→ 180), the **Master network** option is selected.

Description	Use this function to enter the device type of the HART slave device whose data are to be recorded.
User entry	2-digit hexadecimal number
Factory setting	0x00
Additional information	 In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Manufacturer ID

Navigation	 Expert → Communication → HART input → Configuration → Manufacturer ID (7009)
Prerequisite	The Master network option is selected in the Capture mode parameter (→ 180).
Description	Use this function to enter the manufacturer ID of the HART slave device whose data are to be recorded.
User entry	2-digit value: <ul style="list-style-type: none"> ▪ Via local operation: enter as hexadecimal or decimal number ▪ Via operating tool: enter as decimal number
Factory setting	0
Additional information	 In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Burst command

Navigation	 Expert → Communication → HART input → Configuration → Burst command (7006)
Prerequisite	The Burst network option or the Master network option are selected in the Capture mode parameter (→ 180).
Description	Use this function to select the burst command to be recorded.
Selection	<ul style="list-style-type: none"> ▪ Command 1 ▪ Command 3 ▪ Command 9 ▪ Command 33
Factory setting	Command 1

Additional information*Selection*

- Command 1
Use this function to capture the primary variable.
- Command 3
Use this function to capture the dynamic HART variables and the current.
- Command 9
Use this function to capture the dynamic HART variables including the associated status.
- Command 33
Use this function to capture the dynamic HART variables including the associated unit.

Slot number**Navigation**

Expert → Communication → HART input → Configuration → Slot number (7010)

Prerequisite

The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 180).

Description

Use this function to enter the position of the process variable to be recorded in the burst command.

User entry

1 to 8

Factory setting

1

Additional information*User entry*

Slot	Command			
	1	3	9	33
1	PV	PV	HART variable (slot 1)	HART variable (slot 1)
2	-	SV	HART variable (slot 2)	HART variable (slot 2)
3	-	TV	HART variable (slot 3)	HART variable (slot 3)
4	-	QV	HART variable (slot 4)	HART variable (slot 4)
5	-	-	HART variable (slot 5)	-
6	-	-	HART variable (slot 6)	-
7	-	-	HART variable (slot 7)	-
8	-	-	HART variable (slot 8)	-

Timeout**Navigation**

Expert → Communication → HART input → Configuration → Timeout (7005)

Prerequisite

The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 180).

Description

Use this function to enter the maximum permitted interval between two HART frames.

User entry

1 to 120 s

Factory setting 5 s

Additional information *Description*

-  If the interval is exceeded, the measuring device displays the **F882 Input signal** diagnostic message.

Failure mode



Navigation  Expert → Communication → HART input → Configuration → Failure mode (7011)

Prerequisite In the **Capture mode** parameter (→ 180), the **Burst network** option or **Master network** option is selected.

Description Use this function to select the device behavior if no data are recorded within the maximum permitted interval.

- 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 (→ 183)).

Failure value



Navigation  Expert → Communication → HART input → Configuration → Failure value (7012)

Prerequisite The following conditions are met:

- In the **Capture mode** parameter (→ 180), the **Burst network** option or **Master network** option is selected.
- In the **Failure mode** parameter (→ 183), the **Defined value** option is selected.

Description Use this function to enter the measured value to be used if no data are recorded within the maximum permitted interval.

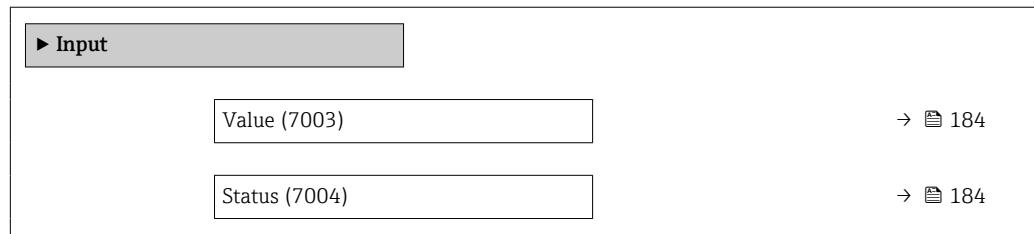
User entry Signed floating-point number

Factory setting 0

"Input" submenu

Navigation

Expert → Communication → HART input → Input



Value

Navigation

Expert → Communication → HART input → Input → Value (7003)

Description

Displays the value of the device variable recorded by the HART input.

User interface

Signed floating-point number

Additional information

Dependency

The unit is taken from the **Temperature unit** parameter (→ 77)

Status

Navigation

Expert → Communication → HART input → Input → Status (7004)

Description

Displays the value of the device variable recorded by the HART input in accordance with the HART specification.

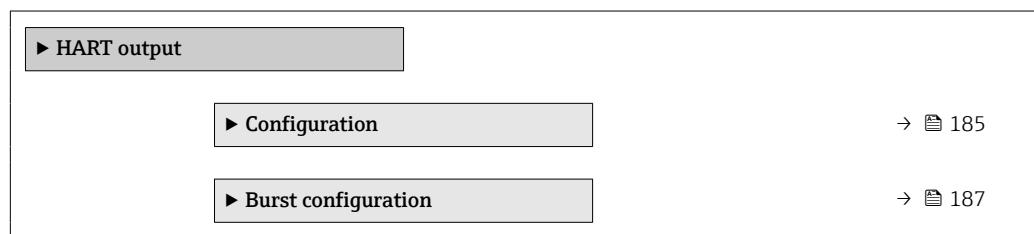
User interface

- Manual/Fixed
- Good
- Poor accuracy
- Bad

3.6.2 "HART output" submenu

Navigation

Expert → Communication → HART output



► Information	→ 194
► Output	→ 197

"Configuration" submenu**Navigation**

Expert → Communication → HART output → Configuration

► Configuration	
HART short tag (0220)	→ 185
Device tag (0215)	→ 185
HART address (0219)	→ 186
No. of preambles (0217)	→ 186
Fieldbus writing access (0273)	→ 186

HART short tag**Navigation**

Expert → Communication → HART output → Configuration → HART short tag (0220)

Description

Use this function to enter a brief description for the measuring point. This can be edited and displayed via HART protocol or using the local display.

User entry

Max. 8 characters: A to Z, 0 to 9 and certain special characters (e.g. punctuation marks, @, %).

Factory setting

PROMASS

Device tag**Navigation**

Expert → Communication → HART output → Configuration → Device tag (0215)

Description

Use this function to enter the name for the measuring point.

User entry

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

Factory setting

Promass

HART address

Navigation	Expert → Communication → HART output → Configuration → HART address (0219)
Description	Use this function to enter the address via which the data exchange takes place via HART protocol.
User entry	0 to 63
Factory setting	0
Additional information	<i>Description</i> For addressing in a HART Multidrop network, the Fixed current option must be set in the Current span parameter (→ 134) (current output 1).

No. of preambles

Navigation	Expert → Communication → HART output → Configuration → No. of preambles (0217)
Description	Use this function to enter the number of preambles in the HART protocol.
User entry	2 to 20
Factory setting	5
Additional information	<i>User entry</i> As every modem component can "swallow" a byte, 2-byte preambles at least must be defined.

Fieldbus writing access

Navigation	Expert → Communication → HART output → Configuration → Fieldb.writ.acc. (0273)
Description	Use this function to restrict access to the measuring device via fieldbus (HART interface).
Selection	<ul style="list-style-type: none">■ Read + write■ Read only
Factory setting	Read + write

Additional information*Description*

If read and/or write protection is enabled, the parameter can only be controlled and reset via local operation. Access is no longer possible via operating tools.

Selection

- Read + write
The parameters are readable and writable.
- Read only
The parameters are only readable.

"Burst configuration 1 to n" submenu*Navigation*

Expert → Communication → HART output → Burst config.
→ Burst config. 1 to n

► Burst configuration 1 to n	
Burst mode 1 to n (2032-1 to n)	→ 188
Burst command 1 to n (2031-1 to n)	→ 188
Burst variable 0 (2033)	→ 189
Burst variable 1 (2034)	→ 190
Burst variable 2 (2035)	→ 191
Burst variable 3 (2036)	→ 191
Burst variable 4 (2037)	→ 191
Burst variable 5 (2038)	→ 191
Burst variable 6 (2039)	→ 192
Burst variable 7 (2040)	→ 192
Burst trigger mode (2044-1 to n)	→ 192
Burst trigger level (2043-1 to n)	→ 193
Min. update period (2042-1 to n)	→ 193
Max. update period (2041-1 to n)	→ 194

Burst mode 1 to n

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n
→ Burst mode 1 to n (2032–1 to n)

Description Use this function to select whether to activate the HART burst mode for burst message X.

Selection

- Off
- On

Factory setting Off

Additional information *Options*

- Off
The measuring device transmits data only when requested by the HART master.
- On
The measuring device transmits data regularly without being requested.

Burst command 1 to n

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n
→ Burst command 1 to n (2031–1 to n)

Description Use this function to select the HART command that is sent to the HART master.

Selection

- Command 1
- Command 2
- Command 3
- Command 9
- Command 33
- Command 48

Factory setting Command 2

Additional information *Selection*

- Command 1
Read out the primary variable.
- Command 2
Read out the current and the main measured value as a percentage.
- Command 3
Read out the dynamic HART variables and the current.
- Command 9
Read out the dynamic HART variables including the related status.
- Command 33
Read out the dynamic HART variables including the related unit.
- Command 48
Read out the complete device diagnostics.

"Command 33" option

The HART device variables are defined via Command 107.

The following measured variables (HART device variables) can be read out:

- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow ^{*}
- Carrier mass flow ^{*}
- Density
- Reference density ^{*}
- Concentration ^{*}
- Temperature
- Totalizer 1...3
- Pressure
- HART input
- Percent of range
- Measured current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)

Commands

-  ■ Information about the defined details of the command: HART specifications
 ■ The measured variables (HART device variables) are assigned to the dynamic variables in the **Output** submenu (→ 131).

Burst variable 0



Navigation

  Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 0 (2033)

Description

For HART command 9 and 33: select the HART device variable or the process variable.

Selection

- Mass flow
- Volume flow
- Corrected volume flow ^{*}
- Density
- Reference density ^{*}
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- 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 ^{*}

* Visibility depends on order options or device settings

- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Concentration
- Totalizer 1
- Totalizer 2
- Totalizer 3
- 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 *
- Sensor index coil asymmetry
- Test point 0
- Test point 1
- HART input
- Percent of range
- Measured current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- Not used

Factory setting Volume flow

Additional information *Selection*
If a burst message is not configured, the **Not used** option is set.

Burst variable 1



Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n
→ Burst variable 1 (2034)

Description For HART command 9 and 33: select the HART device variable or the process variable.

* Visibility depends on order options or device settings

Selection See the **Burst variable 0** parameter (→ 189).

Factory setting Not used

Burst variable 2



Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 2 (2035)

Description For HART command 9 and 33: select the HART device variable or the process variable.

Selection See the **Burst variable 0** parameter (→ 189).

Factory setting Not used

Burst variable 3



Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 3 (2036)

Description For HART command 9 and 33: select the HART device variable or the process variable.

Selection See the **Burst variable 0** parameter (→ 189).

Factory setting Not used

Burst variable 4



Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 4 (2037)

Description For HART command 9: select the HART device variable or the process variable.

Selection See the **Burst variable 0** parameter (→ 189).

Factory setting Not used

Burst variable 5



Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 5 (2038)

Description For HART command 9: select the HART device variable or the process variable.

Selection See the **Burst variable 0** parameter (→ 189).

Factory setting Not used

Burst variable 6



Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n
→ Burst variable 6 (2039)

Description For HART command 9: select the HART device variable or the process variable.

Selection See the **Burst variable 0** parameter (→ 189).

Factory setting Not used

Burst variable 7



Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n
→ Burst variable 7 (2040)

Description For HART command 9: select the HART device variable or the process variable.

Selection See the **Burst variable 0** parameter (→ 189).

Factory setting Not used

Burst trigger mode



Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n
→ Trigger mode (2044–1 to n)

Description Use this function to select the event that triggers burst message X.

Selection

- Continuous
- Window *
- Rising *
- Falling *
- On change

Factory setting Continuous

* Visibility depends on order options or device settings

Additional information*Selection*

- Continuous
The message is sent continuously, at least at intervals corresponding to the time frame specified in the **Burst min period** parameter (→ 193).
- Window
The message is sent if the specified measured value has changed by the value in the **Burst trigger level** parameter (→ 193).
- Rising
The message is sent if the specified measured value exceeds the value in the **Burst trigger level** parameter (→ 193).
- Falling
The message is sent if the specified measured value drops below the value in the **Burst trigger level** parameter (→ 193).
- On change
The message is sent if a measured value changes in the burst message.

Burst trigger level**Navigation**

Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger level (2043–1 to n)

Description

For entering the burst trigger value.

User entry

Signed floating-point number

Additional information*Description*

Together with the option selected in the **Burst trigger mode** parameter (→ 192) the burst trigger value determines the time of burst message X.

Min. update period**Navigation**

Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Min. upd. per. (2042–1 to n)

Description

Use this function to enter the minimum time span between two burst commands of burst message X.

User entry

Positive integer

Factory setting

1 000 ms

Max. update period

Navigation	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Max. upd. per. (2041–1 to n)
Description	Use this function to enter the maximum time span between two burst commands of burst message X.
User entry	Positive integer
Factory setting	2 000 ms

"Information" submenu

Navigation Expert → Communication → HART output → Information

Information	
Device revision (0204)	→ 194
Device ID (0221)	→ 195
Device type (0209)	→ 195
Manufacturer ID (0259)	→ 195
HART revision (0205)	→ 196
HART descriptor (0212)	→ 196
HART message (0216)	→ 196
Hardware revision (0206)	→ 196
Software revision (0224)	→ 197
HART date code (0202)	→ 197

Device revision

Navigation	Expert → Communication → HART output → Information → Device revision (0204)
Description	Displays the device revision with which the device is registered with the HART Communication Foundation.

User interface 2-digit hexadecimal number

Factory setting 7

Additional information *Description*

 The device revision is needed to assign the appropriate device description file (DD) to the device.

Device ID

Navigation   Expert → Communication → HART output → Information → Device ID (0221)

Description Use this function to view the device ID for identifying the measuring device in a HART network.

User interface 6-digit hexadecimal number

Additional information *Description*

 In addition to the device type and manufacturer ID, the device ID is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Device type

Navigation   Expert → Communication → HART output → Information → Device type (0209)

Description Displays the device type with which the measuring device is registered with the HART Communication Foundation.

User interface 2-digit hexadecimal number

Factory setting 0x3B (for Promass 300/500)

Additional information *Description*

 The device type is specified by the manufacturer. It is needed to assign the appropriate device description file (DD) to the device.

Manufacturer ID

Navigation   Expert → Communication → HART output → Information → Manufacturer ID (0259)

Description Use this function to view the manufacturer ID with which the measuring device is registered with the HART Communication Foundation.

User interface 2-digit hexadecimal number

Factory setting 0x11 (for Endress+Hauser)

HART revision

Navigation  Expert → Communication → HART output → Information → HART revision (0205)

Description Use this function to display the HART protocol revision of the measuring device.

User interface 5 to 7

Factory setting 7

HART descriptor



Navigation  Expert → Communication → HART output → Information → HART descriptor (0212)

Description Use this function to enter a description for the measuring point. This can be edited and displayed via HART protocol or using the local display.

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

Factory setting Promass300/500

HART message



Navigation  Expert → Communication → HART output → Information → HART message (0216)

Description Use this function to enter a HART message which is sent via the HART protocol when requested by the master.

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

Factory setting Promass300/500

Hardware revision

Navigation  Expert → Communication → HART output → Information → Hardware rev. (0206)

Description Displays the hardware revision of the measuring device.

User interface 0 to 255

Factory setting 2

Software revision

Navigation	Expert → Communication → HART output → Information → Software rev. (0224)
Description	Displays the software revision of the measuring device.
User interface	0 to 255
Factory setting	7

HART date code

Navigation	Expert → Communication → HART output → Information → HART date code (0202)
Description	Use this function to enter the date information for individual use.
User entry	Date entry format: yyyy-mm-dd
Factory setting	2009-07-20
Additional information	<p><i>Example</i></p> <p>Device installation date</p>

"Output" submenu

Navigation Expert → Communication → HART output → Output

Output	
Assign PV (0234)	→ 198
Primary variable (PV) (0201)	→ 199
Assign SV (0235)	→ 199
Secondary variable (SV) (0226)	→ 201
Assign TV (0236)	→ 201
Tertiary variable (TV) (0228)	→ 203
Assign QV (0237)	→ 203
Quaternary variable (QV) (0203)	→ 205

Assign PV**Navigation**

Expert → Communication → HART output → Output → Assign PV (0234)

Description

Use this function to select a measured variable (HART device variable) for the primary dynamic variable (PV).

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 *
- 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

* Visibility depends on order options or device settings

- Suspended bubbles index *
- Raw value mass flow
- Exciter current 0
- Oscillation damping 0
- Oscillation damping fluctuation 0 *
- Oscillation damping fluctuation 1 *
- Oscillation frequency 0
- Frequency fluctuation 0 *
- Signal asymmetry
- Torsion signal asymmetry *
- Carrier pipe temperature *
- Frequency fluctuation 0 *
- Oscillation amplitude 0 *
- Electronics temperature
- Sensor index coil asymmetry
- Test point 0
- Test point 1

Factory setting Mass flow

Additional information *Selection*

 Detailed description of the options **Oscillation frequency**, **Oscillation amplitude**, **Oscillation damping** and **Signal asymmetry**: Value 1 display parameter (→ 18)

Primary variable (PV)

Navigation  Expert → Communication → HART output → Output → Primary var (PV) (0201)

Description Displays the current measured value of the primary dynamic variable (PV).

User interface Signed floating-point number

Additional information *User interface*

The measured value displayed depends on the process variable selected in the **Assign PV** parameter (→ 198).

Dependency

 The unit of the displayed measured value is taken from the **System units** submenu (→ 69).

Assign SV



Navigation  Expert → Communication → HART output → Output → Assign SV (0235)

Description Use this function to select a measured variable (HART device variable) for the secondary dynamic variable (SV).

* Visibility depends on order options or device settings

Selection

- Mass flow
- Volume flow
- Corrected volume flow *
- Density
- Reference density *
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- 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 *
- Current input 1 *
- Current input 2 *
- Current input 3 *
- Target mass flow *
- Carrier mass flow *
- Concentration *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- 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 *
- Current input 1 *
- Current input 2 *
- Current input 3 *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Application specific output 0 *

* Visibility depends on order options or device settings

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

Factory setting

Totalizer 1

Secondary variable (SV)

Navigation	  Expert → Communication → HART output → Output → Second.var(SV) (0226)
Description	Displays the current measured value of the secondary dynamic variable (SV).
User interface	Signed floating-point number
Additional information	<p><i>User interface</i></p> <p>The measured value displayed depends on the process variable selected in the Assign SV parameter (→  199).</p> <p><i>Dependency</i></p> <p> The unit of the displayed measured value is taken from the System units submenu (→  69).</p>

Assign TV

Navigation	  Expert → Communication → HART output → Output → Assign TV (0236)
Description	Use this function to select a measured variable (HART device variable) for the tertiary (third) dynamic variable (TV).

* Visibility depends on order options or device settings

Selection

- Mass flow
- Volume flow
- Corrected volume flow *
- Density
- Reference density *
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- 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 *
- Current input 1 *
- Current input 2 *
- Current input 3 *
- Target mass flow *
- Carrier mass flow *
- Concentration *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- 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 *
- Current input 1 *
- Current input 2 *
- Current input 3 *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Application specific output 0 *

* Visibility depends on order options or device settings

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

Factory setting

Totalizer 2

Tertiary variable (TV)

Navigation	 Expert → Communication → HART output → Output → Tertiary var(TV) (0228)
Description	Displays the current measured value of the tertiary dynamic variable (TV).
User interface	Signed floating-point number
Additional information	<p><i>User interface</i></p> <p>The measured value displayed depends on the process variable selected in the Assign TV parameter (→  201).</p> <p><i>Dependency</i></p> <p> The unit of the displayed measured value is taken from the System units submenu (→  69).</p>

Assign QV

Navigation	 Expert → Communication → HART output → Output → Assign QV (0237)
Description	Use this function to select a measured variable (HART device variable) for the quaternary (fourth) dynamic variable (QV).

* Visibility depends on order options or device settings

Selection

- Mass flow
- Volume flow
- Corrected volume flow *
- Density
- Reference density *
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- 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 *
- Current input 1 *
- Current input 2 *
- Current input 3 *
- Target mass flow *
- Carrier mass flow *
- Concentration *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- 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 *
- Current input 1 *
- Current input 2 *
- Current input 3 *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- Application specific output 0 *

* Visibility depends on order options or device settings

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

Factory setting

Totalizer 3

Quaternary variable (QV)

Navigation	 Expert → Communication → HART output → Output → Quaterna.var(QV) (0203)
Description	Displays the current measured value of the quaternary dynamic variable (QV).
User interface	Signed floating-point number
Additional information	<p><i>User interface</i></p> <p>The measured value displayed depends on the process variable selected in the Assign QV parameter (→  203).</p> <p><i>Dependency</i></p> <p> The unit of the displayed measured value is taken from the System units submenu (→  69).</p>

3.6.3 "Diagnostic configuration" submenu

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

* Visibility depends on order options or device settings

Assign a category to the particular diagnostic event:

Category	Meaning
Failure (F)	A device error is present. The measured value is no longer valid.
Function check (C)	The device is in service mode (e.g. during a simulation).
Out of specification (S)	The device is being operated: ▪ Outside its technical specification limits (e.g. outside the process temperature range) ▪ Outside of the configuration carried out by the user (e.g. maximum flow in parameter 20 mA value)
Maintenance required (M)	Maintenance is required. The measured value is still valid.
No effect (N)	Has no effect on the condensed status ¹⁾ .

1) Condensed status according to NAMUR recommendation NE107

Navigation



Expert → Communication → Diag. config.

► Diagnostic configuration	
Event category 046 (0246)	→ 207
Event category 142 (0280)	→ 208
Event category 140 (0244)	→ 208
Event category 144 (0303)	→ 208
Event category 374 (0245)	→ 209
Event category 304 (0283)	→ 209
Event category 441 (0210)	→ 209
Event category 442 (0230)	→ 210
Event category 443 (0231)	→ 210
Event category 444 (0211)	→ 211
Event category 543 (0276)	→ 211
Event category 599 (0279)	→ 211
Event category 830 (0240)	→ 212
Event category 831 (0241)	→ 212
Event category 832 (0218)	→ 213
Event category 833 (0225)	→ 213

Event category 834 (0227)	→ 213
Event category 835 (0229)	→ 214
Event category 842 (0295)	→ 214
Event category 862 (0214)	→ 215
Event category 912 (0243)	→ 215
Event category 913 (0242)	→ 215
Event category 915 (0282)	→ 216
Event category 941 (0294)	→ 216
Event category 942 (0302)	→ 216
Event category 943 (0301)	→ 217
Event category 944 (0304)	→ 217
Event category 948 (0275)	→ 217
Event category 984 (0278)	→ 218

Event category 046 (Sensor limit exceeded)



Navigation	Expert → Communication → Diag. config. → Event category 046 (0246)
Description	Use this function to select a category for the 046 Sensor limit exceeded diagnostic message.
Selection	<ul style="list-style-type: none"> ■ Failure (F) ■ Function check (C) ■ Out of specification (S) ■ Maintenance required (M) ■ No effect (N)
Factory setting	Out of specification (S)
Additional information	For a detailed description of the event categories available for selection: → 206

Event category 142 (Sensor index coil asymmetry too high)

Navigation Expert → Communication → Diag. config. → Event category 142 (0280)

Description Select category for diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting No effect (N)

Additional information For a detailed description of the event categories available for selection: → [206](#)

Event category 140 (Sensor signal asymmetrical)

Navigation Expert → Communication → Diag. config. → Event category 140 (0244)

Description Use this function to select a category for the **140 Sensor signal asymmetrical** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → [206](#)

Event category 144 (Measurement error too high)

Navigation Expert → Communication → Diag. config. → Event category 144 (0303)

Description Select category for diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting Out of specification (S)

Additional information

For a detailed description of the event categories available for selection: → [206](#)

Event category 374 (Main electronic failure)**Navigation**

Expert → Communication → Diag. config. → Event category 374 (0245)

Description

Use this function to assign a category to the diagnostic message "374 Sensor electronics (ISEM) faulty".

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting

Out of specification (S)

Additional information

For a detailed description of the event categories available for selection: → [206](#)

**Event category 304 (Device verification failed)****Navigation**

Expert → Communication → Diag. config. → Event category 304 (0283)

Description

Select category for diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting

Failure (F)

Additional information

For a detailed description of the event categories available for selection: → [206](#)

**Event category 441 (Current output 1 to n)****Navigation**

Expert → Communication → Diag. config. → Event category 441 (0210)

Description

Use this function to select a category for the **441 Current output 1 to n** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting

Out of specification (S)

Additional information

 For a detailed description of the event categories available for selection: → [206](#)

Event category 442 (Frequency output 1 to n)**Navigation**

 Expert → Communication → Diag. config. → Event category 442 (0230)

Prerequisite

The pulse/frequency/switch output is available.

Description

Use this function to select a category for the **442 Frequency output 1 to n** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting

Out of specification (S)

Additional information

 For a detailed description of the event categories available for selection: → [206](#)

Event category 443 (Pulse output 1 to n)**Navigation**

 Expert → Communication → Diag. config. → Event category 443 (0231)

Prerequisite

The pulse/frequency/switch output is available.

Description

Use this function to select a category for the **443 Pulse output 1 to n** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting

Out of specification (S)

Additional information

 For a detailed description of the event categories available for selection: → [206](#)

Event category 444 (Current input 1 to n)



Navigation	Expert → Communication → Diag. config. → Event category 444 (0211)
Prerequisite	The current input is available.
Description	Use this function to select a category for the 444 Current input 1 to n diagnostic message.
Selection	<ul style="list-style-type: none">■ Failure (F)■ Function check (C)■ Out of specification (S)■ Maintenance required (M)■ No effect (N)
Factory setting	Out of specification (S)
Additional information	<i>Selection</i> For a detailed description of the event categories available for selection: → 206

Event category 543 (Double pulse output)



Navigation	Expert → Communication → Diag. config. → Event category 543 (0276)
Description	Use this option to select a category for the 543 Double pulse output diagnostic message.
Selection	<ul style="list-style-type: none">■ Failure (F)■ Function check (C)■ Out of specification (S)■ Maintenance required (M)■ No effect (N)
Factory setting	Out of specification (S)
Additional information	For a detailed description of the event categories available for selection: → 206

Event category 599 (Custody transfer logbook full)



Navigation	Expert → Communication → Diag. config. → Event category 599 (0279)
Description	Select category for diagnostic message.
Selection	<ul style="list-style-type: none">■ Failure (F)■ Function check (C)■ Out of specification (S)■ Maintenance required (M)■ No effect (N)

Factory setting Out of specification (S)

Additional information *Selection*

 For a detailed description of the event categories available for selection: → [206](#)

Event category 830 (Sensor temperature too high)



Navigation  Expert → Communication → Diag. config. → Event category 830 (0240)

Description Use this function to select a category for the **830 Sensor temperature too high** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting Out of specification (S)

Additional information  For a detailed description of the event categories available for selection: → [206](#)

Event category 831 (Sensor temperature too low)



Navigation  Expert → Communication → Diag. config. → Event category 831 (0241)

Description Use this function to select a category for the **831 Sensor temperature too low** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting Out of specification (S)

Additional information  For a detailed description of the event categories available for selection: → [206](#)

Event category 832 (Electronics temperature too high)



Navigation Expert → Communication → Diag. config. → Event category 832 (0218)

Description Use this function to select a category for the **832 Electronics temperature too high** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting Out of specification (S)

Additional information *Selection*

For a detailed description of the event categories available for selection: → 206

Event category 833 (Electronics temperature too low)



Navigation Expert → Communication → Diag. config. → Event category 833 (0225)

Description Use this option to select a category for the **833 Electronics temperature too low** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting Out of specification (S)

Additional information *Selection*

For a detailed description of the event categories available for selection: → 206

Event category 834 (Process temperature too high)



Navigation Expert → Communication → Diag. config. → Event category 834 (0227)

Description Use this option to select a category for the **834 Process temperature too high** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting

Out of specification (S)

Additional information

Selection

 For a detailed description of the event categories available for selection: → [206](#)

Event category 835 (Process temperature too low)**Navigation**

 Expert → Communication → Diag. config. → Event category 835 (0229)

Description

Use this option to select a category for the **835 Process temperature too low** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting

Out of specification (S)

Additional information

Selection

 For a detailed description of the event categories available for selection: → [206](#)

Event category 842 (Process value above limit)**Navigation**

 Expert → Communication → Diag. config. → Event category 842 (0295)

Description

Change status signal of diagnostic event with diagnostic number 842 'Process limit'.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting

Out of specification (S)

Event category 862 (Empty pipe)



Navigation Expert → Communication → Diag. config. → Event category 862 (0214)

Description Use this option to select a category for the **862 Empty pipe** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → [206](#)

Event category 912 (Medium inhomogeneous)



Navigation Expert → Communication → Diag. config. → Event category 912 (0243)

Description Use this function to select a category for the **912 Medium inhomogeneous** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → [206](#)

Event category 913 (Medium unsuitable)



Navigation Expert → Communication → Diag. config. → Event category 913 (0242)

Description Use this function to select a category for the **913 Medium unsuitable** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting Out of specification (S)

Additional informationFor a detailed description of the event categories available for selection: → [206](#)**Event category 915 (Viscosity out of specification)****Navigation**

Expert → Communication → Diag. config. → Event category 915 (0282)

Description

Select category for diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting

No effect (N)

Additional informationFor a detailed description of the event categories available for selection: → [206](#)**Event category 941 (API/ASTM temperature out of specification)****Navigation**

Expert → Communication → Diag. config. → Event category 941 (0294)

Description

Select category for diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting

Out of specification (S)

Additional informationFor a detailed description of the event categories available for selection: → [206](#)**Event category 942 (API/ASTM density out of specification)****Navigation**

Expert → Communication → Diag. config. → Event category 942 (0302)

Description

Select category for diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting Out of specification (S)

Additional information  For a detailed description of the event categories available for selection: → [206](#)

Event category 943 (API pressure out of specification)

Navigation  Expert → Communication → Diag. config. → Event category 943 (0301)

Description Select category for diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting Out of specification (S)

Additional information  For a detailed description of the event categories available for selection: → [206](#)

Event category 944 (Monitoring failed)

Navigation  Expert → Communication → Diag. config. → Event category 944 (0304)

Description Select category for diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting Out of specification (S)

Additional information  For a detailed description of the event categories available for selection: → [206](#)

Event category 948 (Tube damping too high)

Navigation  Expert → Communication → Diag. config. → Event category 948 (0275)

Description Use this function to assign a category to the **948 Tube damping too high** diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting

Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → [206](#)**Event category 984 (Condensation risk)****Navigation** Expert → Communication → Diag. config. → Event category 984 (0278)**Description**

Select category for diagnostic message.

Selection

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

Factory setting

Out of specification (S)

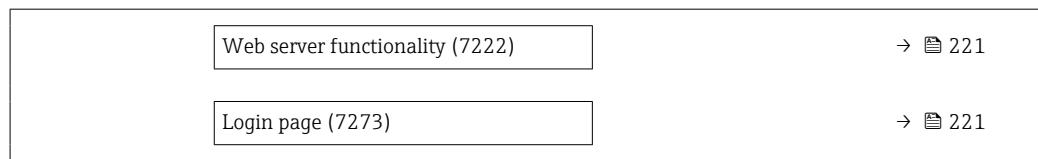
Additional information For a detailed description of the event categories available for selection: → [206](#)

3.6.4 "Web server" submenu

Navigation Expert → Communication → Web server

► **Web server**

Web server language (7221)	→ 219
MAC address (7214)	→ 219
DHCP client (7212)	→ 220
IP address (7209)	→ 220
Subnet mask (7211)	→ 220
Default gateway (7210)	→ 221



Web server language

Navigation	Expert → Communication → Web server → Webserv.language (7221)
Description	Use this function to select the language configured for the Web server.
Selection	<ul style="list-style-type: none"> ■ 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

MAC address

Navigation	Expert → Communication → Web server → MAC Address (7214)
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	<p><i>Example</i></p> <p>For the display format 00:07:05:10:01:5F</p>

8) Media Access Control

DHCP client**Navigation**

Expert → Communication → Web server → DHCP client (7212)

Description

Use this function to activate and deactivate the DHCP client functionality.

Selection

- Off
- On

Factory setting

On

Additional information**Effect**

If the DHCP client functionality of the web server is selected, the IP address (→ 220), Subnet mask (→ 220) and Default gateway (→ 221) are set automatically.



- Identification is via the MAC address of the measuring device.
- The IP address (→ 220) in the **IP address** parameter (→ 220) is ignored as long as the **DHCP client** parameter (→ 220) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (→ 220) in the parameter of the same name is only used if the **DHCP client** parameter (→ 220) is inactive.

IP address**Navigation**

Expert → Communication → Web server → 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**

Expert → Communication → Web server → 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 Expert → Communication → Web server → Default gateway (7210)

Description Display or enter the Default gateway (→ [221](#)).

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

Factory setting 0.0.0.0

Web server functionality

Navigation Expert → Communication → Web server → Webserver funct. (7222)

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

Selection

- Off
- HTML Off
- On

Factory setting On

Additional information *Description*

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

Selection

Option	Description
Off	<ul style="list-style-type: none"> ▪ The Web server is completely disabled. ▪ Port 80 is locked.
HTML Off	The HTML version of the Web server is not available.
On	<ul style="list-style-type: none"> ▪ 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

3.6.5 "WLAN settings" wizard

Navigation

Expert → Communication → WLAN settings

► WLAN settings	
WLAN (2702)	→ 223
WLAN mode (2717)	→ 223
SSID name (2714)	→ 223
Network security (2705)	→ 224
Security identification (2718)	→ 224
User name (2715)	→ 224
WLAN password (2716)	→ 225
WLAN IP address (2711)	→ 225
WLAN MAC address (2703)	→ 225
WLAN subnet mask (2709)	→ 226
WLAN MAC address (2703)	→ 225
WLAN passphrase (2706)	→ 226
WLAN MAC address (2703)	→ 225
Assign SSID name (2708)	→ 226
SSID name (2707)	→ 227
2.4 GHz WLAN channel (2704)	→ 227
Select antenna (2713)	→ 227
Connection state (2722)	→ 227
Received signal strength (2721)	→ 228

WLAN IP address (2711)	→ 225
Gateway IP address (2719)	→ 228
IP address domain name server (2720)	→ 228

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

—

* Visibility depends on order options or device settings

Factory setting

–

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 MAC⁹⁾ 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

9) Media Access Control

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)

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 (→ 224).

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 SSID¹⁰⁾.

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.

10) Service Set Identifier

SSID name**Navigation**

Expert → Communication → WLAN settings → SSID name (2707)

Prerequisite

- The **User-defined** option is selected in the **Assign SSID name** parameter (→ 226).
- The **WLAN access point** option is selected in the **WLAN mode** parameter (→ 223).

Description

Use this function to enter a user-defined SSID name.

User entry

Max. 32-digit character string comprising numbers, letters and special characters

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

3.6.6 "OPC-UA configuration" submenu

 For detailed information on the parameter descriptions for the **OPC-UA server** application package, refer to the Special Documentation for the device →  7

Navigation

Expert → Communication → OPC-UA config.

► OPC-UA configuration

3.7 "Application" submenu

Navigation

Expert → Application

► Application

Reset all totalizers (2806)

→ 229

► Totalizer

→ 229

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.

3.7.1 "Totalizer 1 to n" submenu

Navigation

Expert → Application → Totalizer 1 to n

► Totalizer 1 to n

Assign process variable (0914-1 to n)

→ 230

Unit totalizer 1 to n (0915-1 to n)

→ 230

Totalizer operation mode (0908-1 to n)	→ 232
Control Totalizer 1 to n (0912-1 to n)	→ 232
Preset value 1 to n (0913-1 to n)	→ 233
Failure mode (0901-1 to n)	→ 233

Assign process variable



Navigation

Expert → Application → Totalizer 1 to n → Assign variable (0914-1 to n)

Description

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

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 *
- Raw value mass flow

Factory setting

Mass flow

Additional information

Description

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

Selection

If the **Off** option is selected, only the **Assign process variable** parameter (→ 230) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

Unit totalizer 1 to n



Navigation

Expert → Application → Totalizer 1 to n → Unit totalizer 1 to n (0915-1 to n)

Prerequisite

A process variable is selected in the **Assign process variable** parameter (→ 230) of the **Totalizer 1 to n** submenu.

Description

Use this function to select the process variable unit for the Totalizer 1 to n (→ 229).

* Visibility depends on order options or device settings

Selection*SI units*

- g *
- kg *
- t *

US units

- oz *
- lb *
- STon *

* Visibility depends on order options or device settings

or

SI units

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

US units

- af *
- ft³ *
- Mft³ *
- Mft³ *
- fl oz (us) *
- gal (us) *
- kgal (us) *
- Mgal (us) *
- bbl (us;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 *
- Nm³ *
- Sl *
- Sm³ *

US units

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

Imperial units

- Sgal (imp) *

* Visibility depends on order options or device settings

or

Other units

None *

* Visibility depends on order options or device settings

Factory setting

Depends on country:

- kg
- lb

Additional information	Description
 i	The unit is selected separately for each totalizer. It is independent of the selection made in the System units submenu (→ 69).
<i>Selection</i>	The selection is dependent on the process variable selected in the Assign process variable parameter (→ 230).

Totalizer operation mode



Navigation	 Expert → Application → Totalizer 1 to n → Operation mode (0908-1 to n)
Prerequisite	A process variable is selected in the Assign process variable parameter (→ 230) of the Totalizer 1 to n submenu.
Description	Use this function to select how the totalizer summates the flow.
Selection	<ul style="list-style-type: none"> ■ Net ■ Forward ■ Reverse
Factory setting	Net
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ Net flow total Flow values in the forward and reverse flow direction are totalized and balanced against one another. Net flow is registered in the flow direction. ■ Forward flow total Only the flow in the forward flow direction is totalized. ■ Reverse flow total Only the flow in the reverse flow direction is totalized (= reverse flow quantity).

Control Totalizer 1 to n

Navigation	 Expert → Application → Totalizer 1 to n → Control Tot. 1 to n (0912-1 to n)
Prerequisite	A process variable is selected in the Assign process variable parameter (→ 230) of the Totalizer 1 to n submenu.
Description	Use this function to select the control of totalizer value 1-3.
Selection	<ul style="list-style-type: none"> ■ Totalize ■ Reset + hold * ■ Preset + hold * ■ Reset + totalize ■ Preset + totalize * ■ Hold *

* Visibility depends on order options or device settings

Factory setting Totalize

Additional information Selection

Options	Description
Totalize	The totalizer is started or continues running.
Reset + hold	The totaling process is stopped and the totalizer is reset to 0.
Preset + hold ¹⁾	The totaling process is stopped and the totalizer is set to its defined start value from the Preset value parameter.
Reset + totalize	The totalizer is reset to 0 and the totaling process is restarted.
Preset + totalize ¹⁾	The totalizer is set to the defined start value in the Preset value parameter and the totaling process is restarted.
Hold	Totalizing is stopped.

1) Visible depending on the order options or device settings

Preset value 1 to n

Navigation  Expert → Application → Totalizer 1 to n → Preset value 1 to n (0913-1 to n)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 230) of the **Totalizer 1 to n** submenu.

Description Use this function to enter a start value for the Totalizer 1 to n.

User entry Signed floating-point number

Factory setting Country-specific:

- 0 kg
- 0 lb

Additional information User entry

 The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 230).

Example

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

Failure mode



Navigation  Expert → Application → Totalizer 1 to n → Failure mode (0901-1 to n)

Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 230) of the **Totalizer 1 to n** submenu.

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

Selection	<ul style="list-style-type: none">▪ Hold▪ Continue▪ Last valid value + continue
Factory setting	Hold
Additional information	<p>Description</p> <p> This setting does not affect the failsafe mode of other totalizers and the outputs. This is specified in separate parameters.</p> <p><i>Selection</i></p> <ul style="list-style-type: none">▪ Stop The totalizer is stopped in the event of a device alarm.▪ Actual value The totalizer continues to count based on the actual (current) measured value; the device alarm is ignored.▪ Last valid value The totalizer continues to count based on the last valid measured value before the device alarm occurred.

3.7.2 "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



3.7.3 "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



3.7.4 "Application specific calculations" submenu

 Only available if "Application-specific calculations" has been ordered.

Navigation

  Expert → Application → Appl.spec. calc.



► Application-specific parameters → 235

► Process variables → 238

"Application-specific parameters" submenu

 Only available if "Application-specific calculations" has been ordered.

Navigation

Expert → Application → Appl.spec. calc. → Appl.spec.param.

► Application-specific parameters

Parameter 0 (6358) → 235

Parameter 1 (6359) → 236

Parameter 2 (6360) → 236

Parameter 3 (6361) → 236

Parameter 4 (6345) → 236

Parameter 5 (6346) → 237

Parameter 6 (6347) → 237

Parameter 7 (6348) → 237

Parameter 8 (6349) → 237

Parameter 9 (6350) → 238

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	Enter 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

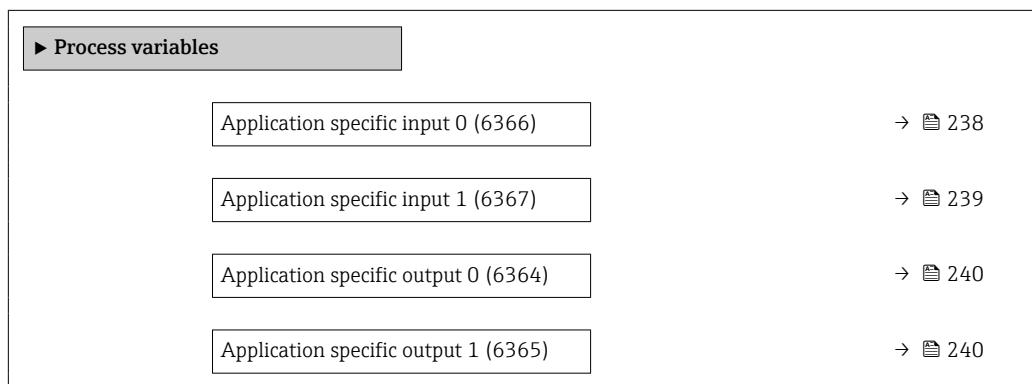
Parameter 9

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	<ul style="list-style-type: none">■ 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	<ul style="list-style-type: none">■ 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

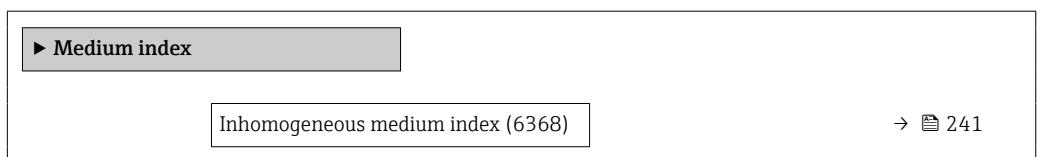
Application specific output 1

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

3.7.5 "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/m³. The gas typically occurs in viscous liquids in the form of microbubbles or small bubbles.

Navigation Expert → Application → Medium index



Cut off inhomogeneous wet gas (6375)	→ 241
Cut off inhomogeneous liquid (6374)	→ 241
Suspended bubbles index (6376)	→ 242
Cut off suspended bubbles (6370)	→ 242

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.

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	<ul style="list-style-type: none">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 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.

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.

3.8 "Diagnostics" submenu

Navigation Expert → Diagnostics

► Diagnostics	
Actual diagnostics (0691)	→  244
Previous diagnostics (0690)	→  245
Operating time from restart (0653)	→  245
Operating time (0652)	→  246
► Diagnostic list	→  246
► Event logbook	→  250
► Device information	→  252
► Main electronic module + I/O module 1	→  256
► Sensor electronic module (ISEM)	→  257
► I/O module 2	→  258
► I/O module 3	→  259
► Display module	→  261
► Data logging	→  262
► Min/max values	→  272

► Heartbeat Technology	→ 278
► Simulation	→ 291

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 (→ 246).

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

Example

For the display format:

F271 Main electronic failure

Timestamp

Navigation Expert → Diagnostics → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Actual diagnostics** parameter (→ 244).

Example

For the display format:

24d12h13m00s

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	<i>Display</i>  Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.
	<i>Example</i> For the display format:  F271 Main electronic failure

Timestamp

Navigation	 Expert → Diagnostics → Timestamp
Description	Displays the operating time when the last diagnostic message before the current message occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	<i>Display</i>  The diagnostic message can be viewed via the Previous diagnostics parameter (→  245).
	<i>Example</i> For the display format: 24d12h13m00s

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.

3.8.1 "Diagnostic list" submenu

Navigation  Expert → Diagnostics → Diagnostic list

 Diagnostic list	
Diagnostics 1 (0692)	→  246
Diagnostics 2 (0693)	→  247
Diagnostics 3 (0694)	→  248
Diagnostics 4 (0695)	→  249
Diagnostics 5 (0696)	→  249

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  key.

Examples

For the display format:

-  F271 Main electronic failure
-  F276 I/O module failure

Timestamp 1

Navigation	 Expert → Diagnostics → Diagnostic list → Timestamp
Description	Displays the operating time when the diagnostic message with the highest priority occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	<i>Display</i>  The diagnostic message can be viewed via the Diagnostics 1 parameter (→  246).
	<i>Example</i> For the display format: 24d12h13m00s

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	<i>Display</i>  Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.
	<i>Examples</i> For the display format: <ul style="list-style-type: none">■  F271 Main electronic failure■  F276 I/O module failure

Timestamp 2

Navigation	 Expert → Diagnostics → Diagnostic list → Timestamp
Description	Displays the operating time when the diagnostic message with the second-highest priority occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)

Additional information*Display*

The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 247).

Example

For the display format:
24d12h13m00s

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 key.

Examples

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

Timestamp 3

Navigation

Expert → Diagnostics → Diagnostic list → Timestamp

Description

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

User interface

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

Additional information*Display*

The diagnostic message can be viewed via the **Diagnostics 3** parameter (→ 248).

Example

For the display format:
24d12h13m00s

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	<i>Display</i>  Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.
	<i>Examples</i> For the display format: ■  F271 Main electronic failure ■  F276 I/O module failure

Timestamp 4

Navigation	 Expert → Diagnostics → Diagnostic list → Timestamp
Description	Displays the operating time when the diagnostic message with the fourth-highest priority occurred.
User interface	Days (d), hours (h), minutes (m) and seconds (s)
Additional information	<i>Display</i>  The diagnostic message can be viewed via the Diagnostics 4 parameter (→  249).
	<i>Example</i> For the display format: 24d12h13m00s

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*

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

Examples

For the display format:

- F271 Main electronic failure
- F276 I/O module failure

Timestamp 5

Navigation

Expert → Diagnostics → Diagnostic list → Timestamp

Description

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

User interface

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

Additional information*Display*

i The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ 249).

Example

For the display format:

24d12h13m00s

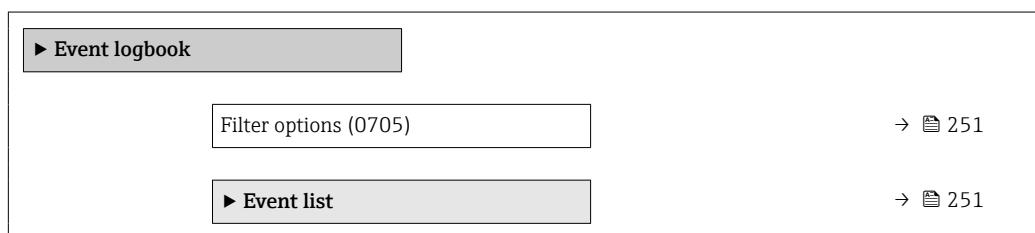
3.8.2 "Event logbook" submenu

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

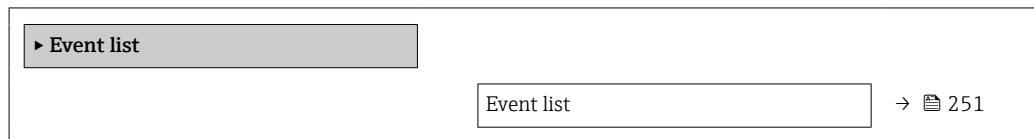
"Event list" submenu

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 (→ 251).

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.

3.8.3 "Device information" submenu

Navigation

Expert → Diagnostics → Device info

► Device information	
Device tag (0011)	→ 253
Serial number (0009)	→ 253
Firmware version (0010)	→ 254
Device name (0020)	→ 254
Order code (0008)	→ 254
Extended order code 1 (0023)	→ 255
Extended order code 2 (0021)	→ 255
Extended order code 3 (0022)	→ 255

Configuration counter (0233)	→ 255
ENP version (0012)	→ 256

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

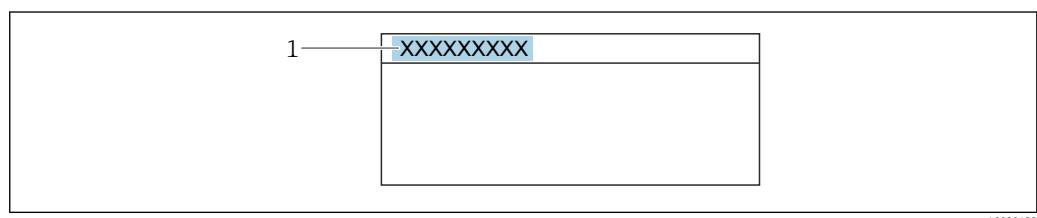
Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).

Factory setting

Promass

Additional information

User interface



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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 informationFor additional information, see **Extended order code 1** parameter (→ 255)

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 informationFor additional information, see **Extended order code 1** parameter (→ 255)

Configuration counter**Navigation**

Expert → Diagnostics → Device info → Config. counter (0233)

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

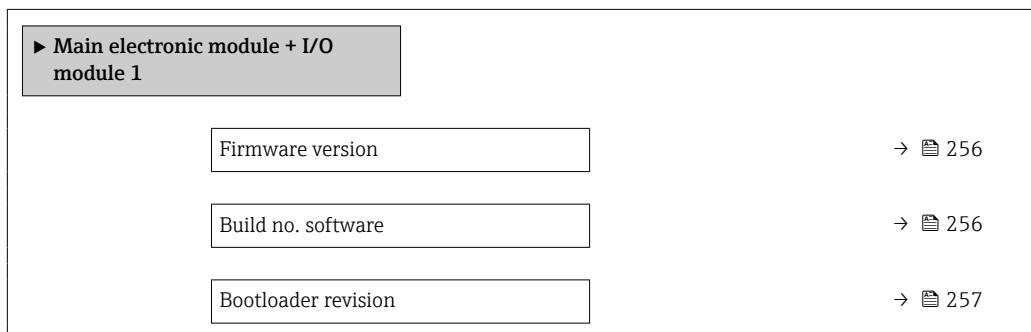
Factory setting 2.02.00

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.

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

Navigation   Expert → Diagnostics → 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)

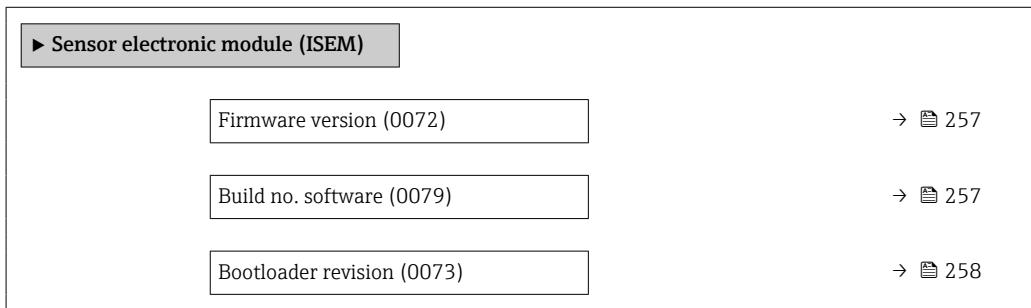
Description Use this function to display the bootloader revision of the software.

User interface Positive integer

3.8.5 "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

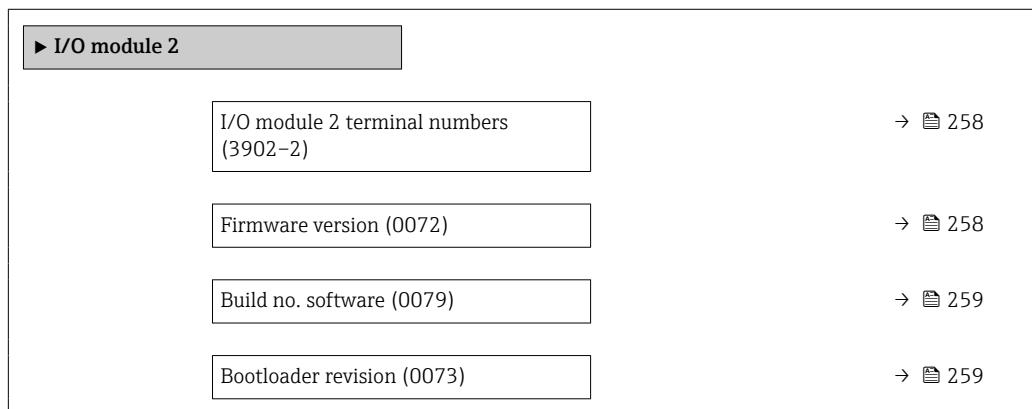
Navigation  Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)

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

User interface Positive integer

3.8.6 "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

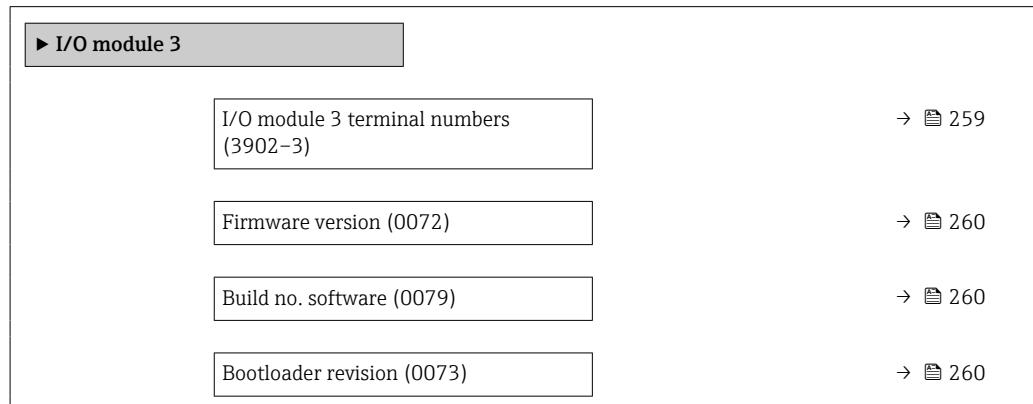
Navigation	Expert → Diagnostics → I/O module 2 → Build no. softw. (0079)
Description	Use this function to display the software build number of the module.
User interface	Positive integer

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

3.8.7 "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	<ul style="list-style-type: none"> ■ 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

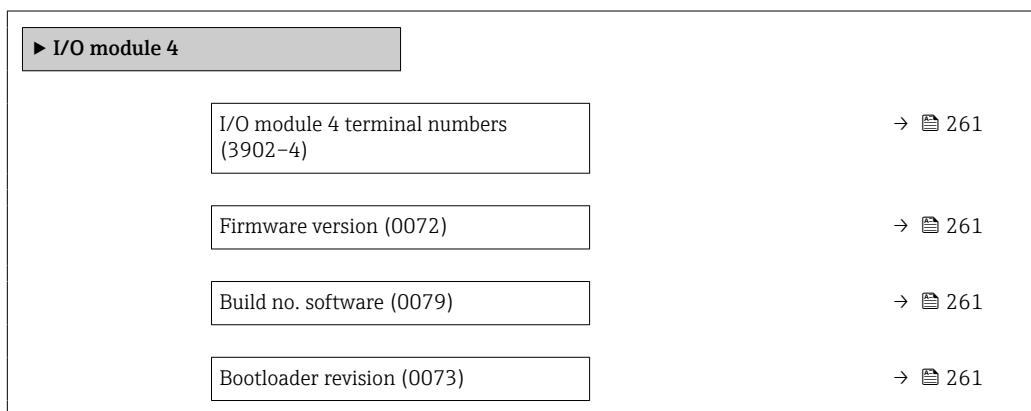
Navigation   Expert → Diagnostics → I/O module 3 → Bootloader rev. (0073)

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

User interface Positive integer

3.8.8 "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	<ul style="list-style-type: none">■ 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

3.8.9 "Display module" submenu

Navigation   Expert → Diagnostics → Display module

 ► Display module

Firmware version (0072)	→ 262
Build no. software (0079)	→ 262
Bootloader revision (0073)	→ 262

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

3.8.10 "Data logging" submenu

Navigation Expert → Diagnostics → Data logging

► Data logging	
Assign channel 1 (0851)	→ 263
Assign channel 2 (0852)	→ 265

Assign channel 3 (0853)	→ 265
Assign channel 4 (0854)	→ 266
Logging interval (0856)	→ 266
Clear logging data (0855)	→ 267
Data logging (0860)	→ 267
Logging delay (0859)	→ 268
Data logging control (0857)	→ 268
Data logging status (0858)	→ 268
Entire logging duration (0861)	→ 269
▶ Display channel 1	→ 269
▶ Display channel 2	→ 270
▶ Display channel 3	→ 271
▶ Display channel 4	→ 271

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 (→ 53).

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 *

* Visibility depends on order options or device settings

- 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 *
- 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

* Visibility depends on order options or device settings

- Current output 1 *
- Current output 2 *
- Current output 3 *
- Current output 4 *

Factory setting Off

Additional information *Description*

A total of 1000 measured values can be logged. This means:

- 1000 data points if 1 logging channel is used
- 500 data points if 2 logging channels are used
- 333 data points if 3 logging channels are used
- 250 data points if 4 logging channels are used

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.

Selection

 Detailed description of the options **Oscillation frequency**, **Oscillation amplitude**, **Oscillation damping** and **Signal asymmetry**: **Assign current output parameter** (→  132)

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 (→  53).

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

Selection For the picklist, see the **Assign channel 1** parameter (→  263)

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 (→  53).

* Visibility depends on order options or device settings

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

Selection For the picklist, see the **Assign channel 1** parameter (→ 263)

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 (→ 53).

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

Selection For the picklist, see the **Assign channel 1** parameter (→ 263)

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 (→ 53).

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:

- $T_{\log} = 1000 \times 1 \text{ s} = 1 \text{ 000 s} \approx 15 \text{ min}$
- $T_{\log} = 1000 \times 10 \text{ s} = 10 \text{ 000 s} \approx 3 \text{ h}$
- $T_{\log} = 1000 \times 80 \text{ s} = 80 \text{ 000 s} \approx 1 \text{ d}$
- $T_{\log} = 1000 \times 3 \text{ 600 s} = 3 \text{ 600 000 s} \approx 41 \text{ d}$

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 (→  53).

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 (→ 267), 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	<i>Description</i> Once data logging has been started with the Data logging control parameter (→ 268), 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 (→ 267), the Not overwriting option is selected.
Description	Use this function to start and stop measured value logging.
Selection	<ul style="list-style-type: none">■ None■ Delete + start■ Stop
Factory setting	None
Additional information	<i>Selection</i> <ul style="list-style-type: none">■ 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 (→ 267), the Not overwriting option is selected.
Description	Displays the measured value logging status.

User interface	<ul style="list-style-type: none"> ■ Done ■ Delay active ■ Active ■ Stopped
Factory setting	Done
Additional information	<p><i>Selection</i></p> <ul style="list-style-type: none"> ■ 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 (→ 267), 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	<p>The Extended HistoROM application package is available.</p> <p> The software options currently enabled are displayed in the Software option overview parameter (→ 53).</p>

One of the following options is selected in the **Assign channel 1** parameter (→ 263):

- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *
- 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

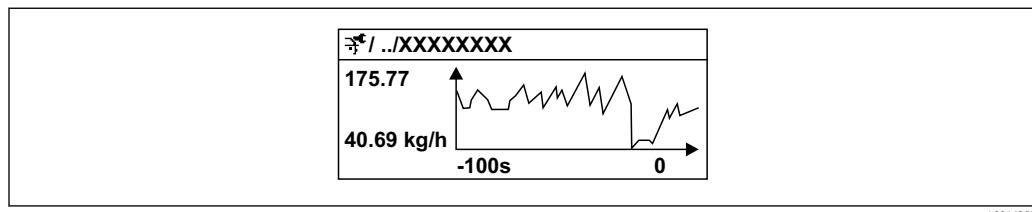
Displays the measured value trend for the logging channel in the form of a chart.

Additional information

Prerequisite

i Detailed description of the options **Oscillation frequency**, **Oscillation amplitude**, **Oscillation damping** and **Signal asymmetry**: **Assign current output** parameter (→ 132)

Description



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9 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



* Visibility depends on order options or device settings

Display channel 2

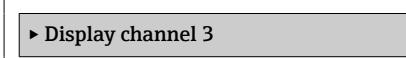
Navigation  Expert → Diagnostics → Data logging → Displ.channel 2

Prerequisite A process variable is specified in the **Assign channel 2** parameter.

Description See the **Display channel 1** parameter →  269

"Display channel 3" submenu

Navigation  Expert → Diagnostics → Data logging → Displ.channel 3

 ► Display channel 3

 Display channel 3

→  271

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 →  269

"Display channel 4" submenu

Navigation  Expert → Diagnostics → Data logging → Displ.channel 4

 ► Display channel 4

 Display channel 4

→  271

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 → [269](#)

3.8.11 "Min/max values" submenu

Navigation

  Expert → Diagnostics → Min/max val.

► Min/max values	
Reset min/max values (6151)	→ 272
► Electronics temperature	→ 273
► Medium temperature	→ 274
► Carrier pipe temperature	→ 274
► Oscillation frequency	→ 275
► Oscillation amplitude	→ 276
► Oscillation damping	→ 277
► Signal asymmetry	→ 277

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 damping
- Oscillation frequency
- Signal asymmetry

Factory setting

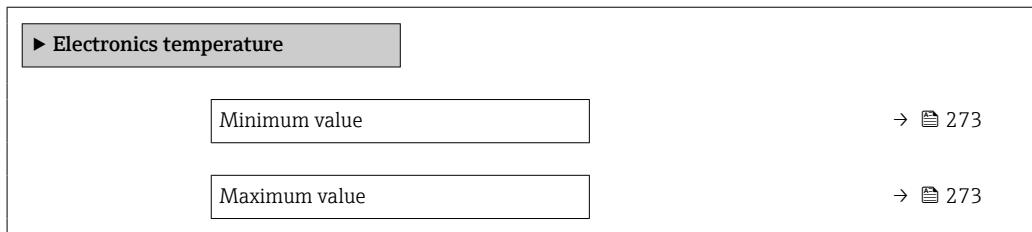
Cancel

Additional information

Selection

 Detailed description of the options **Oscillation frequency**, **Oscillation amplitude**, **Oscillation damping** and **Signal asymmetry**: Value 1 display parameter (→ [18](#))

* 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 (→ 77)

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.

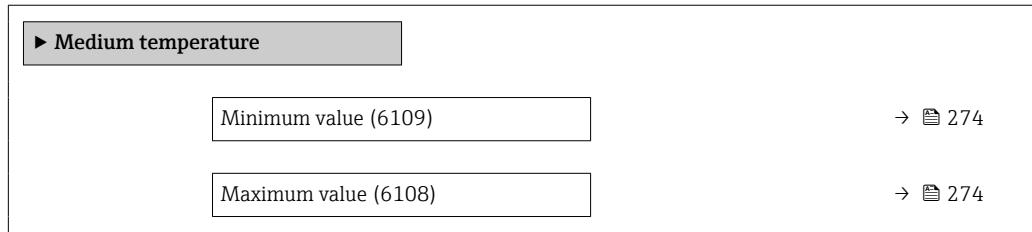
User interface

Signed floating-point number

Additional information

Dependency

 The unit is taken from the **Temperature unit** parameter (→ 77)

"Medium temperature" submenu**Navigation** Expert → Diagnostics → Min/max val. → Medium temp.

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

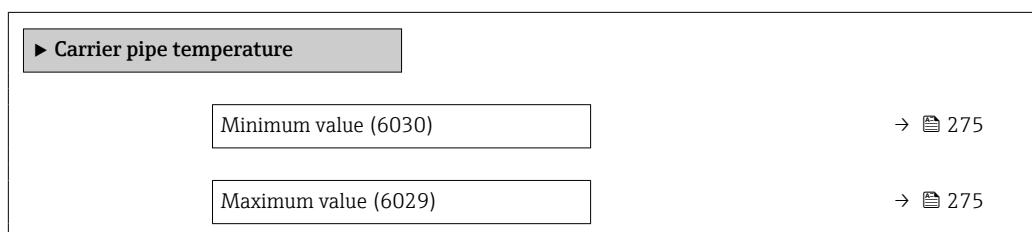
Additional information*Dependency* The unit is taken from the **Temperature unit** parameter (→ 77)

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 (→ 77)**"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	<i>Dependency</i>  The unit is taken from the Temperature unit parameter (→ 77)

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	<i>Dependency</i>  The unit is taken from the Temperature unit parameter (→ 77)

"Oscillation frequency" submenu

Navigation   Expert → Diagnostics → Min/max val. → Oscil. frequency

 Oscillation frequency	
Minimum value (6071)	→ 276
Maximum value (6070)	→ 276

Minimum value

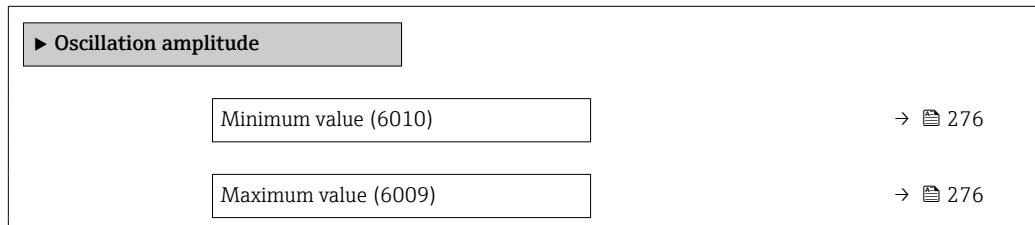
Navigation	  Expert → Diagnostics → Min/max val. → Oscil. frequency → Minimum value (6071)
Description	Displays the lowest previously measured oscillation frequency.
User interface	Signed floating-point number

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

"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

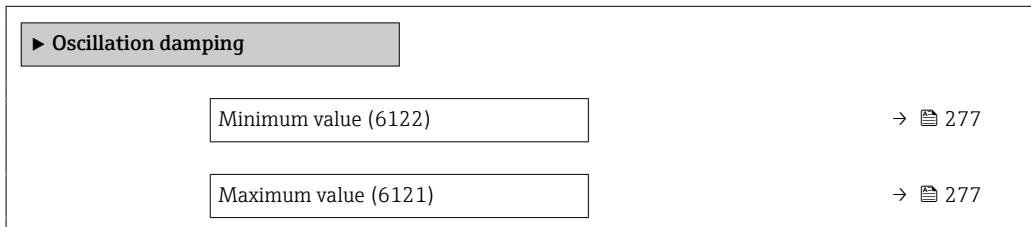
Maximum value

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

"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

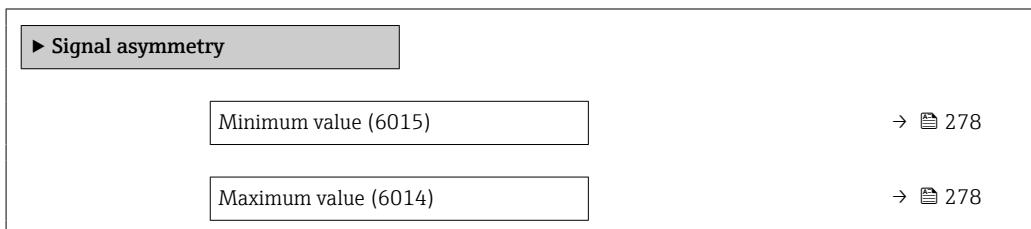
Navigation  Expert → Diagnostics → Min/max val. → Oscil. damping → Maximum value (6121)

Description Displays the highest previously measured oscillation damping.

User interface Signed floating-point number

"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

3.8.12 "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 Technology	
 Heartbeat base settings	→  278
 Performing verification	→  279
 Verification results	→  285
 Heartbeat Monitoring	→  289
 Monitoring results	→  290

"Heartbeat base settings" submenu

Navigation   Expert → Diagnostics → Heartbeat Techn. → Base settings

 Heartbeat base settings	
--	--

Plant operator (2754)	→ 279
Location (2755)	→ 279

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.

► Performing verification	
Year (2846)	→ 280
Month (2845)	→ 280
Day (2842)	→ 281
Hour (2843)	→ 281
AM/PM (2813)	→ 281
Minute (2844)	→ 282
Verification mode (12105)	→ 282
External device information (12101)	→ 282

Start verification (12127)	→ 283
Progress (2808)	→ 283
Measured values (12102)	→ 283
Output values (12103)	→ 284
Status (12153)	→ 284
Verification result (12149)	→ 285

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) (→ 78).
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	<ul style="list-style-type: none"> ■ 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 (→ 282).
- 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 verific. (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	<ul style="list-style-type: none"> ■ 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 %

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 (→ 283): <ul style="list-style-type: none"> ■ 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

* Visibility depends on order options or device settings

- Pulse output 1
- Frequency output 2
- Pulse output 2
- Double pulse output

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	<ul style="list-style-type: none"> ■ 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)	→  286
Verification ID (12141)	→  286
Operating time (12126)	→  286
Verification result (12149)	→  286
Sensor (12152)	→  287
HBSI (12167)	→  287
Sensor electronic module (ISEM) (12151)	→  287
I/O module (12145)	→  288
System status (12109)	→  288

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	<ul style="list-style-type: none">■ Not supported■ Passed■ Not done■ Failed
----------------	--

Factory setting	Not done
-----------------	----------

Sensor

Navigation	  Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sensor (12152)
------------	---

Prerequisite The **Failed** option result is shown in the **Overall result** parameter (→  285).

Description Displays the result for the sensor.

 Detailed description of results classification:

User interface	<ul style="list-style-type: none">■ 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 (→  285), 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	<ul style="list-style-type: none">■ 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 result is shown in the **Overall result** parameter (→  285).

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 In the **Overall result** parameter (→ [285](#)), the **Failed** option was displayed.

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

 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 result is shown in the **Overall result** parameter (→ [285](#)).

Description Displays the system condition. Tests the measuring device for active errors.

 Detailed description of results classification:

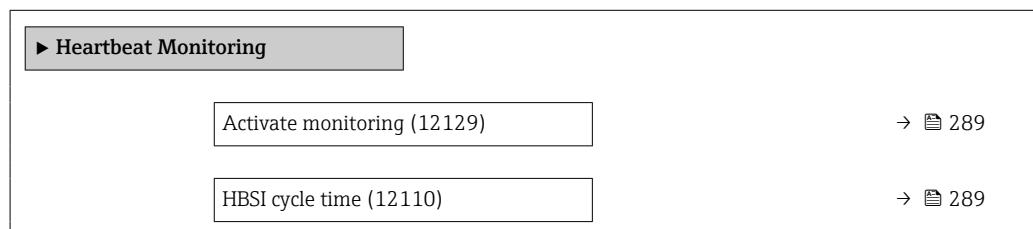
User interface

- 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

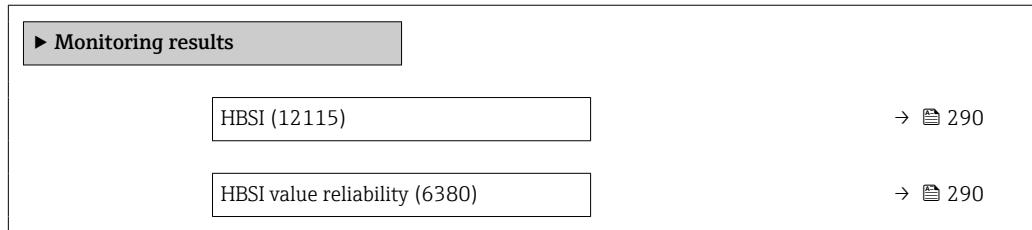
Navigation Expert → Diagnostics → Heartbeat Techn. → Heartbeat Mon. → HBSI cycle time (12110)

Prerequisite In the **Activate monitoring** parameter (→ 289), 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 (→ 289) 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

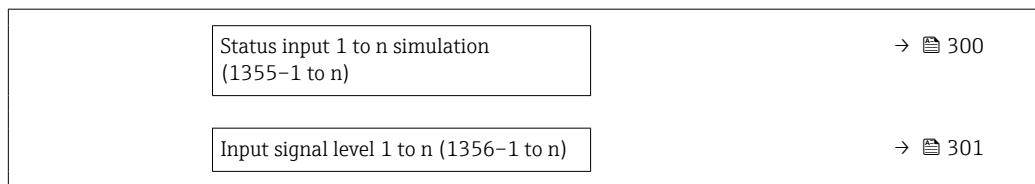
Uncertain

3.8.13 "Simulation" submenu

Navigation

Expert → Diagnostics → Simulation

▶ Simulation	
Assign simulation process variable (1810)	→ 292
Process variable value (1811)	→ 293
Current output 1 to n simulation (0354-1 to n)	→ 293
Current output value (0355)	→ 293
Frequency output 1 to n simulation (0472-1 to n)	→ 294
Frequency output 1 to n value (0473-1 to n)	→ 294
Pulse output simulation 1 to n (0458-1 to n)	→ 295
Pulse value 1 to n (0459-1 to n)	→ 295
Switch output simulation 1 to n (0462-1 to n)	→ 295
Switch state 1 to n (0463-1 to n)	→ 296
Relay output 1 to n simulation (0802-1 to n)	→ 296
Switch state 1 to n (0803-1 to n)	→ 297
Pulse output simulation (0988)	→ 297
Pulse value (0989)	→ 298
Device alarm simulation (0654)	→ 298
Diagnostic event category (0738)	→ 299
Diagnostic event simulation (0737)	→ 299
Current input 1 to n simulation (1608-1 to n)	→ 299
Value current input 1 to n (1609-1 to n)	→ 300

**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 (→ 293).

* 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 (→ 292).

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 (→ 69).

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	<i>Dependency</i> The input range is dependent on the option selected in the Current span parameter (→  134).

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 (→  147), 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	<ul style="list-style-type: none">▪ Off▪ On
Factory setting	Off
Additional information	<i>Description</i>  The desired simulation value is defined in the Frequency value 1 to n parameter. <i>Selection</i> <ul style="list-style-type: none">▪ 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 (→ 147), 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 (→ 150).
- Down-counting value
The pulses specified in the **Pulse value** parameter (→ 295) 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 (→ 147), 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	<ul style="list-style-type: none">▪ Off▪ On
Factory setting	Off
Additional information	<p><i>Description</i></p> <p> The desired simulation value is defined in the Switch state 1 to n parameter.</p>
	<p><i>Selection</i></p> <ul style="list-style-type: none">▪ 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.

Pulse output simulation**Navigation**

Expert → Diagnostics → Simulation → Puls.outp.sim. (0988)

Description

Use this function to switch simulation of the double 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** parameter (→ 298).

Selection

- Off

Simulation of the double pulse output 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 (→ 175).

- Down-counting value

The pulses specified in the **Pulse value** parameter (→ 298) are output.

Pulse value**Navigation**

Expert → Diagnostics → Simulation → Pulse value (0989)

Prerequisite

In the **Pulse output simulation** parameter (→ 297), the **Down-counting value** option is selected.

Description

Use this function to enter a pulse value for simulation of the double pulse output. In this way, users can verify the correct adjustment of the double pulse output and the correct function of downstream switching units.

User entry

0 to 65 535

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 (→ 299).
Selection	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Off ▪ Diagnostic event picklist (depends on the category selected)
Factory setting	Off
Additional information	<p><i>Description</i></p> <p> For the simulation, you can choose from the diagnostic events of the category selected in the Diagnostic event category parameter (→ 299).</p>

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	<ul style="list-style-type: none"> ▪ 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 (→ 301).

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 (→ 300), 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

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 apply to the following parameters:

- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

 For detailed information about the full scale value for measuring devices for custody transfer, see the Special Documentation for the device →  7

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

 For detailed information about the pulse value for measuring devices for custody transfer, see the Special Documentation for the device →  7

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	Sft ³
Corrected volume flow	Sft ³ /min
Density	lb/ft ³
Reference density	lb/Sft ³
Temperature	°F
Pressure	psi a

4.2.2 Full scale values



The factory settings apply to the following parameters:

- 20 mA value (full scale value of the current output)
- 100% bar graph value 1



For detailed information about the full scale value for measuring devices for custody transfer, see the Special Documentation for the device → 7

Nominal diameter [in]	[lb/min]
1/24	0.15
1/12	0.75
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



For detailed information about the pulse value for measuring devices for custody transfer, see the Special Documentation for the device → 7

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/cm ³ , g/m ³	Gram/volume unit
	kg/dm ³ , kg/l, kg/m ³	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/Nm ³ , kg/Nl, g/Scm ³ , kg/Sm ³	Kilogram, gram/standard volume unit
Corrected volume	Nl, Nm ³ , Sm ³	Normal liter, normal cubic meter, standard cubic meter
Corrected volume flow	Nl/s, Nl/min, Nl/h, Nl/d	Normal liter/time unit
	Nm ³ /s, Nm ³ /min, Nm ³ /h, Nm ³ /d	Normal cubic meter/time unit
	Sm ³ /s, Sm ³ /min, Sm ³ /h, Sm ³ /d	Standard cubic meter/time unit
Temperature	°C, K	Celsius, Kelvin
Volume	cm ³ , dm ³ , m ³	Cubic centimeter, cubic decimeter, cubic meter
	ml, l, hl, Ml Mega	Milliliter, liter, hectoliter, megaliter
Volume flow	cm ³ /s, cm ³ /min, cm ³ /h, cm ³ /d	Cubic centimeter/time unit
	dm ³ /s, dm ³ /min, dm ³ /h, dm ³ /d	Cubic decimeter/time unit
	m ³ /s, m ³ /min, m ³ /h, m ³ /d	Cubic meter/time unit
	ml/s, ml/min, ml/h, ml/d	Milliliter/time unit
	l/s, l/min, l/h, l/d	Liter/time unit
	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/ft ³ , lb/gal (us)	Pound/cubic foot, pound/gallon
	lb/bbl (us;liq.), lb/bbl (us;beer), lb/bbl (us;oil), lb/bbl (us;tank)	Pound/volume unit

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/Sft ³	Weight unit/standard volume unit
Corrected volume	Sft ³ , Sgal (us), Sbbl (us;liq.)	Standard cubic foot, standard gallon, standard barrel
Corrected volume flow	Sft ³ /s, Sft ³ /min, Sft ³ /h, Sft ³ /d	Standard cubic foot/time unit
	Sgal/s (us), Sgal/min (us), Sgal/h (us), Sgal/d (us)	Standard gallon/time unit
	Sbbl/s (us;liq.), Sbbl/min (us;liq.), Sbbl/h (us;liq.), Sbbl/d (us;liq.)	Barrel/time unit (normal liquids)
Temperature	°F, °R	Fahrenheit, Rankine
Volume	af	Acre foot
	ft ³	Cubic foot
	fl oz (us), gal (us), kgal (us), Mgal (us)	Fluid ounce, gallon, kilogallon, million gallon
	bbl (us;liq.), bbl (us;beer), bbl (us;oil), bbl (us;tank)	Barrel (normal liquids), barrel (beer), barrel (petrochemicals), barrel (filling tanks)
Volume flow	af/s, af/min, af/h, af/d	Acre foot/time unit
	ft ³ /s, ft ³ /min, ft ³ /h, ft ³ /d	Cubic foot/time unit
	fl oz/s (us), fl oz/min (us), fl oz/h (us), fl oz/d (us)	Fluid ounce/time unit
	gal/s (us), gal/min (us), gal/h (us), gal/d (us)	Gallon/time unit
	kgal/s (us), kgal/min (us), kgal/h (us), kgal/d (us)	Kilogallon/time unit
	Mgal/s (us), Mgal/min (us), Mgal/h (us), Mgal/d (us)	Million gallon/time unit
	bbl/s (us;liq.), bbl/min (us;liq.), bbl/h (us;liq.), bbl/d (us;liq.)	Barrel/time unit (normal liquids) Normal liquids: 31.5 gal/bbl
	bbl/s (us;beer), bbl/min (us;beer), bbl/h (us;beer), bbl/d (us;beer)	Barrel /time unit (beer) Beer: 31.0 gal/bbl
	bbl/s (us;oil), bbl/min (us;oil), bbl/h (us;oil), bbl/d (us;oil)	Barrel/time unit (petrochemicals) Petrochemicals: 42.0 gal/bbl
	bbl/s (us;tank), bbl/min (us;tank), bbl/h (us;tank), bbl/d (us;tank)	Barrel/time unit (filling tank) Filling tanks: 55.0 gal/bbl
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

5.3 Imperial units

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

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