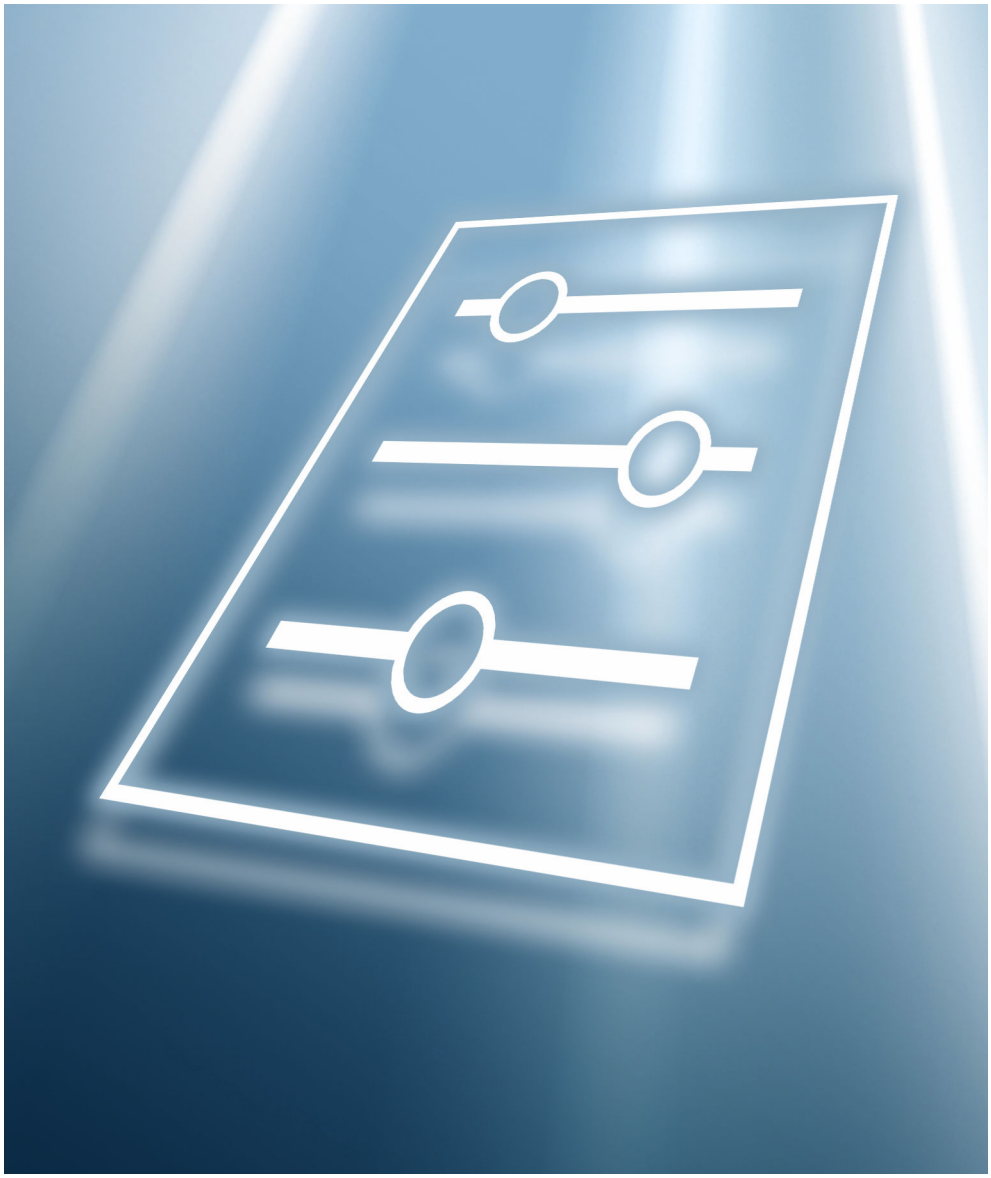
GP01060D/06/EN/05.22-00
71577122
2022-08-01

Valid as of version
01.06.zz (Device firmware)

Description of Device Parameters
Proline Promass 500

Coriolis flowmeter
HART



Endress+Hauser
People for Process Automation

Table of contents

1 About this document

1.1 Document function

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

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

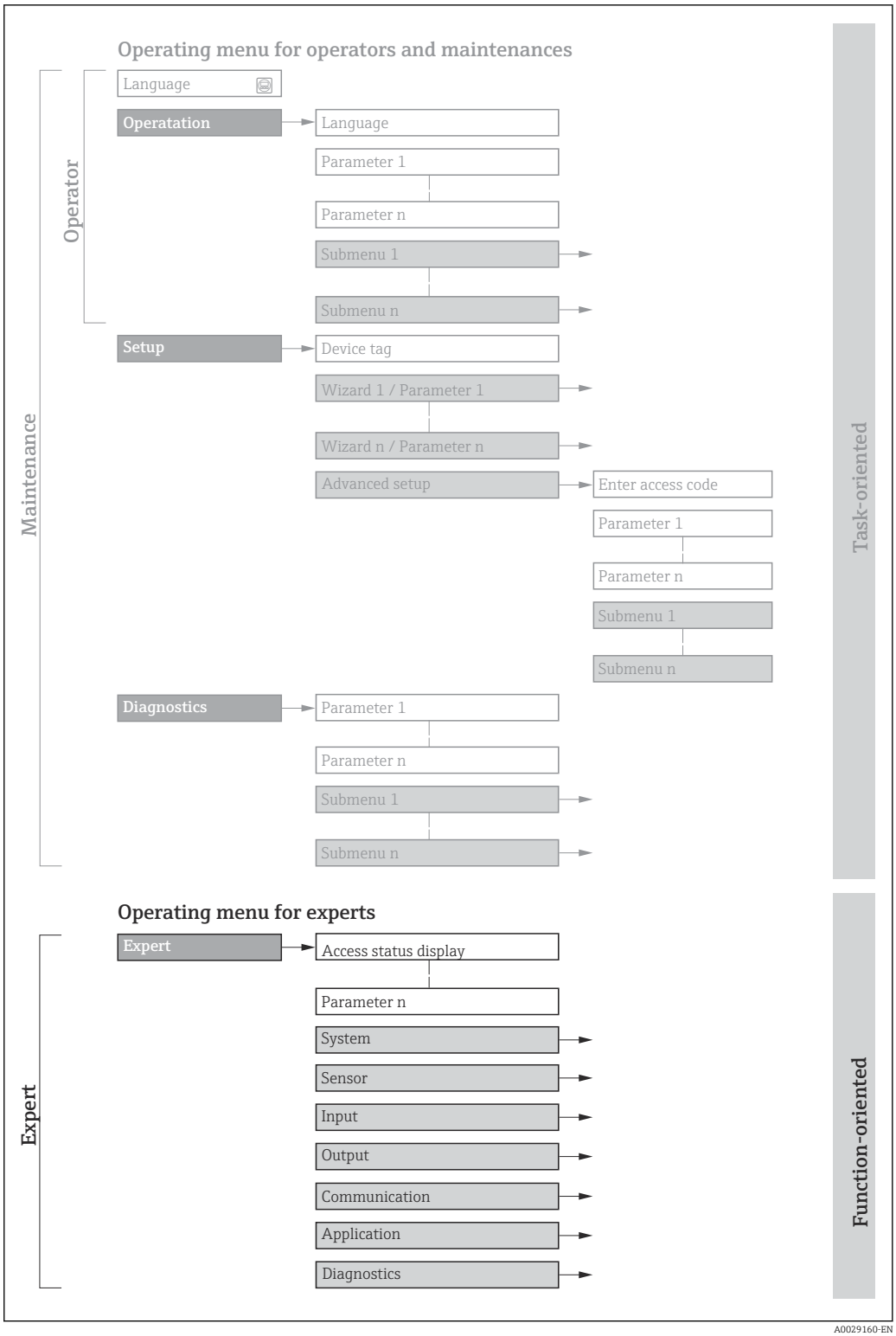
1.2 Target group

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

1.3 Using this document

1.3.1 Information on the document structure

The document lists the submenus and their parameters according to the structure from the **Expert** menu (→ 🖹 9), which is displayed when the **"Maintenance" user role** is enabled.



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

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

1.3.2 Structure of a parameter description

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

Complete parameter name	Write-protected parameter =

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

Prerequisite
The parameter is only available under these specific conditions

Description
Description of the parameter function

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

User entry
Parameter entry range

User interface
Display value/data of the parameter

Factory setting
Default setting ex works

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

1.4 Symbols used

1.4.1 Symbols for certain types of information

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

1.4.2 Symbols in graphics

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

1.5 Documentation

1.5.1 Standard documentation

Operating Instructions

Measuring device	Documentation code
Promass A 500 (8A5B**-...)	BA01526D
Promass A 500 (8A5C**-...)	BA01817D
Promass E 500	BA01528D
Promass F 500	BA01529D
Promass H 500	BA01530D
Promass I 500	BA01531D
Promass O 500	BA01532D
Promass P 500	BA01533D
Promass Q 500	BA01534D
Promass S 500	BA01535D
Promass X 500	BA01536D

1.5.2 Supplementary device-dependent documentation

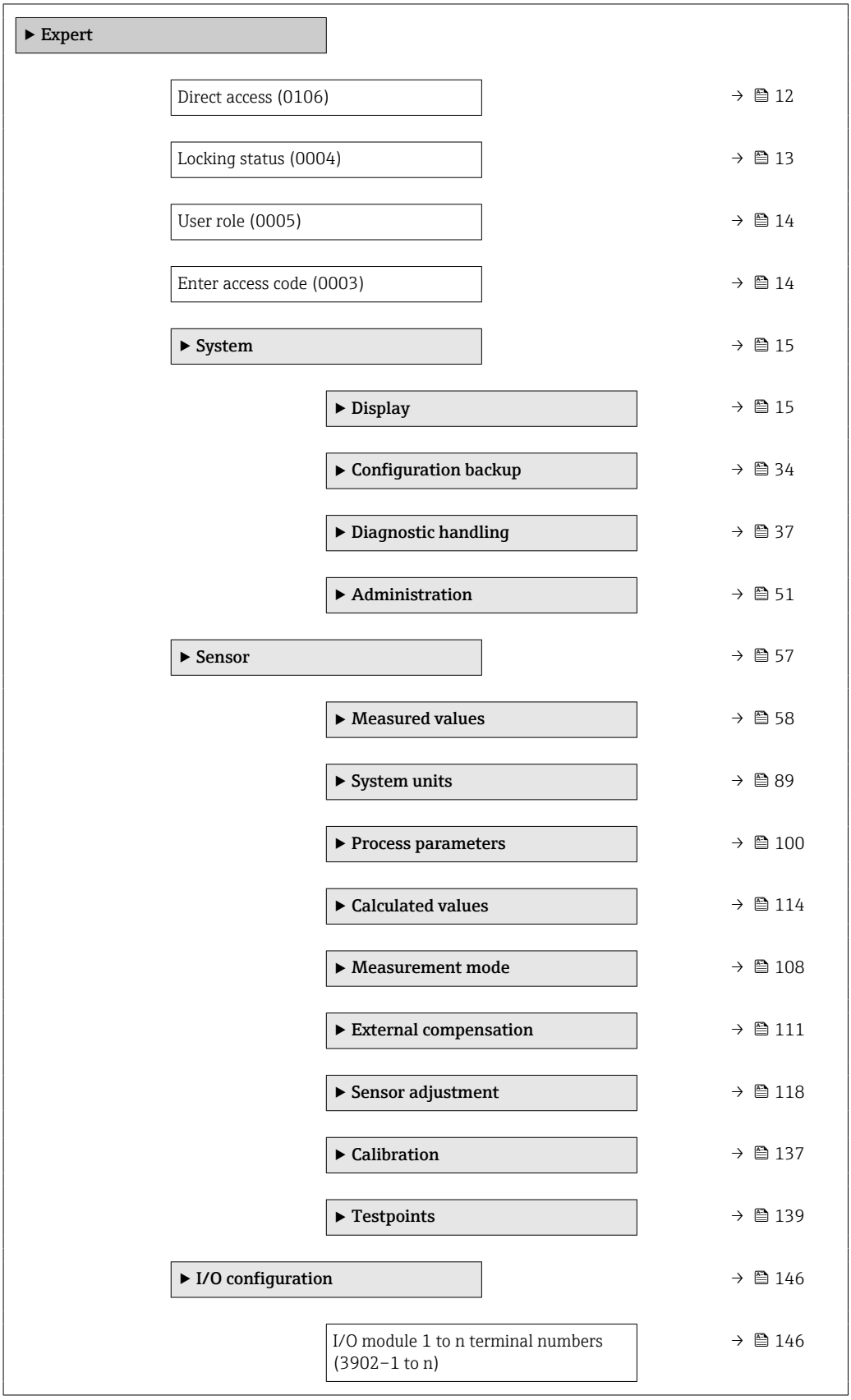
Special Documentation

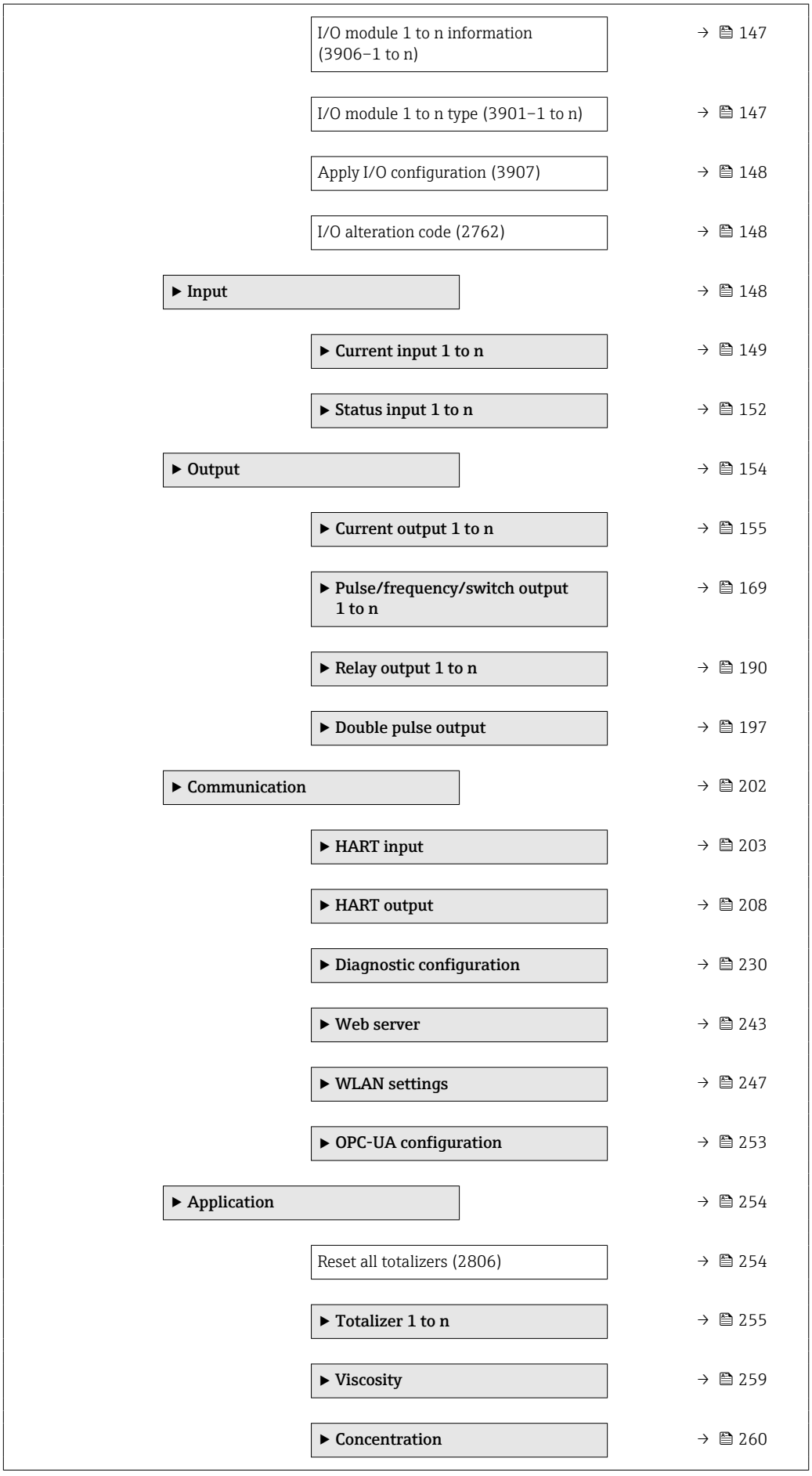
Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
Web server	SD01666D
OPC-UA Server	SD02040D
Heartbeat Technology	SD01643D
Concentration measurement	SD01645D
Petroleum	SD02013D
Petroleum & locking function	SD02499D
Viscosity measurement Promass I	SD01647D
Custody transfer (counter for liquids other than water)	SD01690D
Custody transfer (counter for gas)	SD02464D
Custody transfer (counter for gas, in accordance with the German Measurement and Calibration Ordinance (Mess- und Eichverordnung))	SD02582D

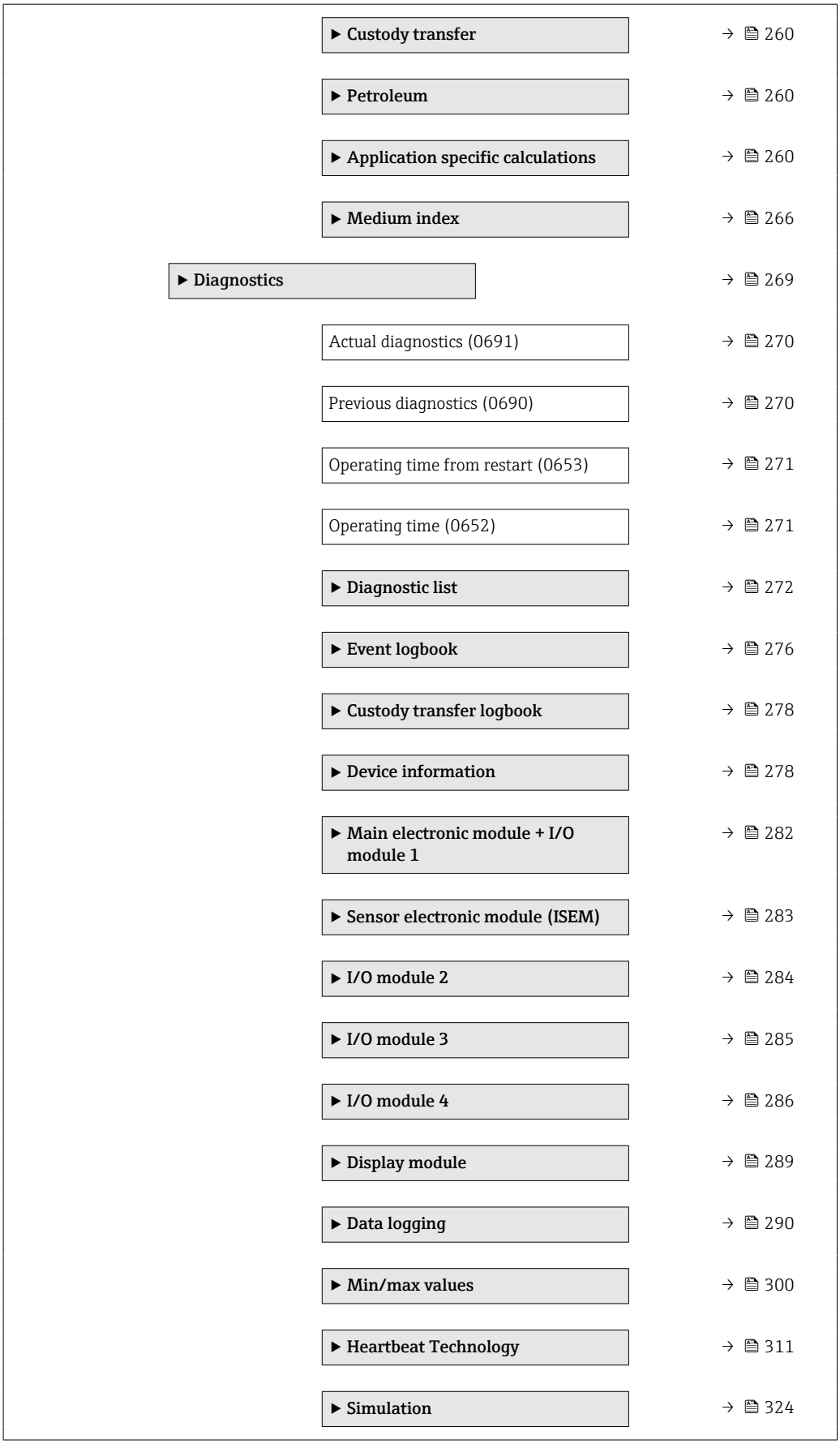
Contents	Documentation code
Advanced density function	SD02354D
Overrun measurement	SD02342D

2 Overview of the Expert operating menu

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

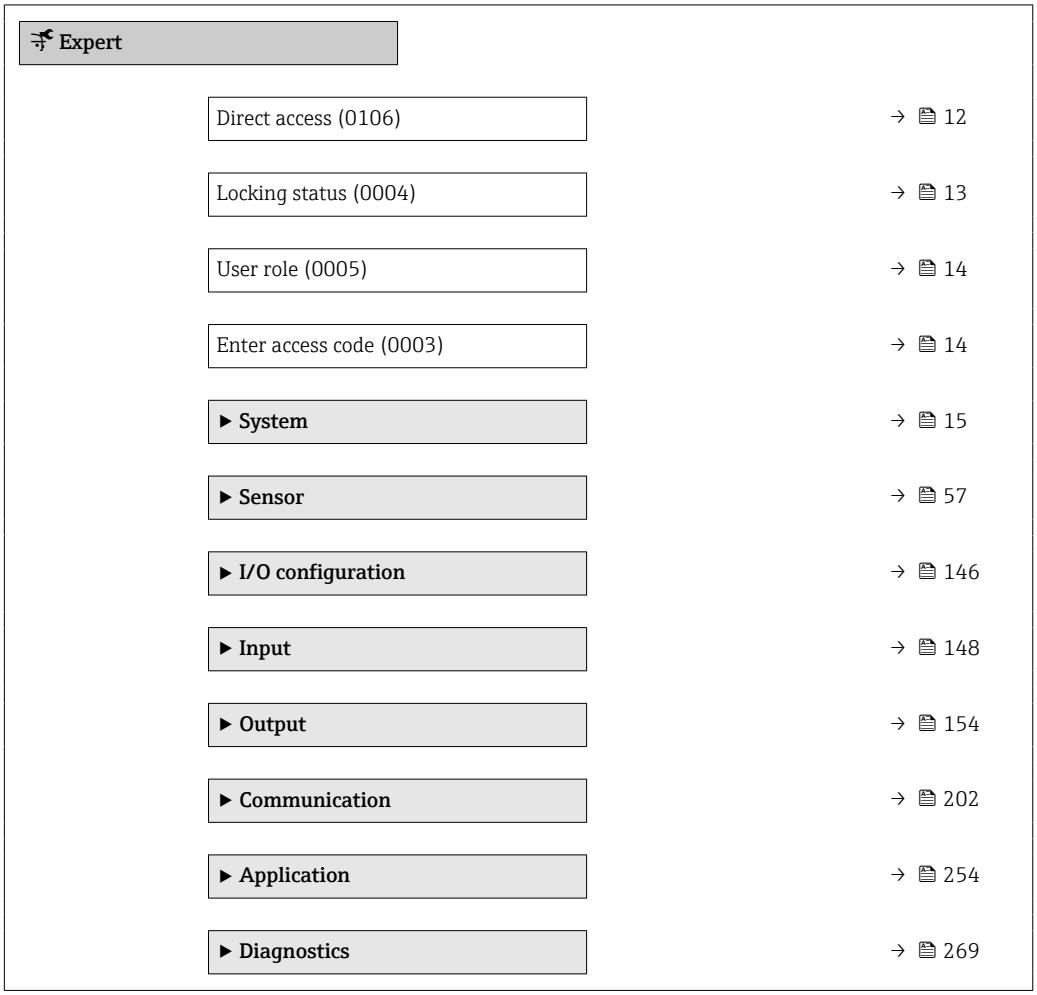



I/O module 1 to n information (3906–1 to n)
→ 147
I/O module 1 to n type (3901–1 to n)
→ 147
Apply I/O configuration (3907)
→ 148
I/O alteration code (2762)
→ 148
▶ Input
→ 148
▶ Current input 1 to n
→ 149
▶ Status input 1 to n
→ 152
▶ Output
→ 154
▶ Current output 1 to n
→ 155
▶ Pulse/frequency/switch output 1 to n
→ 169
▶ Relay output 1 to n
→ 190
▶ Double pulse output
→ 197
▶ Communication
→ 202
▶ HART input
→ 203
▶ HART output
→ 208
▶ Diagnostic configuration
→ 230
▶ Web server
→ 243
▶ WLAN settings
→ 247
▶ OPC-UA configuration
→ 253
▶ Application
→ 254
Reset all totalizers (2806)
→ 254
▶ Totalizer 1 to n
→ 255
▶ Viscosity
→ 259
▶ Concentration
→ 260


▶ Custody transfer → 260
▶ Petroleum → 260
▶ Application specific calculations → 260
▶ Medium index → 266
▶ Diagnostics → 269
Actual diagnostics (0691) → 270
Previous diagnostics (0690) → 270
Operating time from restart (0653) → 271
Operating time (0652) → 271
▶ Diagnostic list → 272
▶ Event logbook → 276
▶ Custody transfer logbook → 278
▶ Device information → 278
▶ Main electronic module + I/O module 1 → 282
▶ Sensor electronic module (ISEM) → 283
▶ I/O module 2 → 284
▶ I/O module 3 → 285
▶ I/O module 4 → 286
▶ Display module → 289
▶ Data logging → 290
▶ Min/max values → 300
▶ Heartbeat Technology → 311
▶ Simulation → 324

3 Description of device parameters

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



Direct access

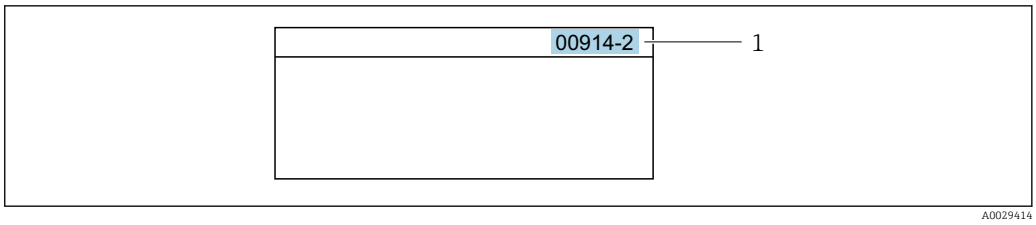
Navigation Expert → Direct access (0106)

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

User entry 0 to 65 535

Additional information *User entry*

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



1 Direct access code

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

Locking status

Navigation Expert → Locking status (0004)

Description Displays the active write protection.

User interface
- Hardware locked
- SIL locked
- CT active - defined parameters
- 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 (→ 14) 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).

Options	Description
CT active - all parameters (priority 3)	Only available for Promass F, O, Q and X. The DIP switch for custody transfer mode is activated on the PCB board. Locks the parameters that are relevant for custody transfer and also parameters that are predefined by Endress+Hauser and are not relevant for custody transfer (e.g. on local display or operating tool). For detailed information on custody transfer mode, see the Special Documentation for the device → 7
CT active - defined parameters (priority 4)	The DIP switch for the custody transfer mode is activated on the PCB board. Only locks the parameters that are relevant for custody transfer (e.g. on the local display or operating tool). For detailed information on custody transfer mode, see the Special Documentation for the device → 7
Temporarily locked (priority 5)	Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset, etc.). Once the internal processing has been completed, the parameters can be changed once again.

User role

Navigation Expert → User role (0005)

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

User interface
- Maintenance
- Service

Factory setting Maintenance

Additional information

Description

Access authorization can be modified via the **Enter access code** parameter (→ 14).

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

User interface

Detailed information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device → 7

Enter access code

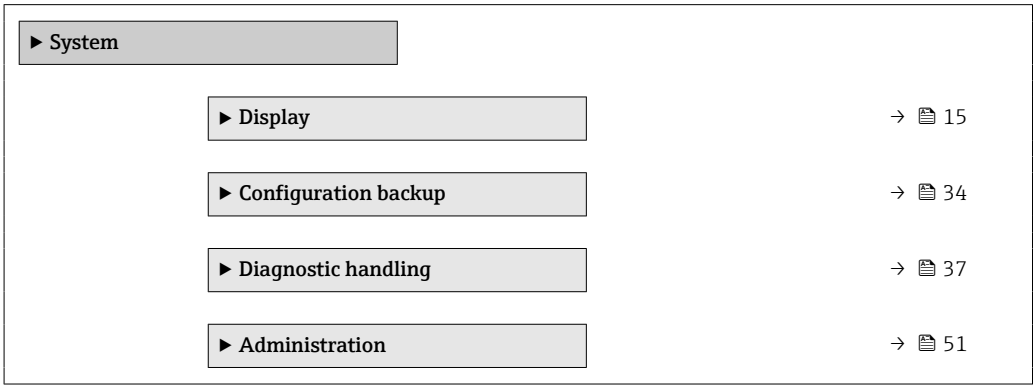
Navigation Expert → Ent. access code (0003)

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

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

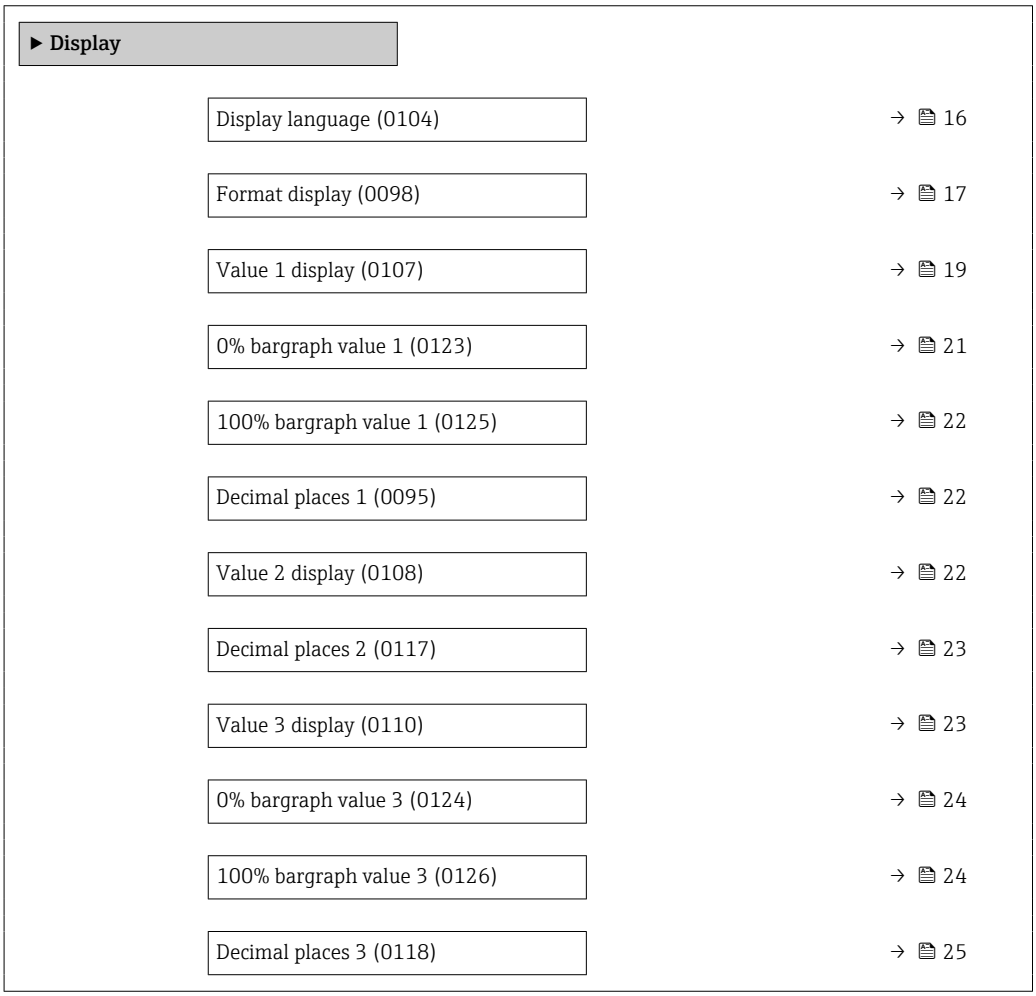
3.1 "System" submenu

Navigation Expert → System



3.1.1 "Display" submenu

Navigation Expert → System → Display



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 (→ 19)...**Value 8 display** parameter (→ 30) 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 (→ 31).

Custody transfer mode

Only available for Promass F, O, Q and X.

- Once the measuring device has been enabled for custody transfer mode, depending on the custody transfer approval selected the display can switch between showing the relevant information and the custody transfer counter.
- In addition, a padlock symbol appears in the header of the display ( ).

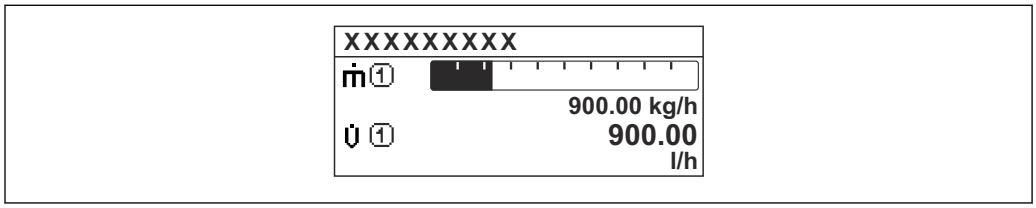
For detailed information on custody transfer mode, see the Special Documentation for the device → 7

Possible measured values shown on the local display:

"1 value, max. size" option

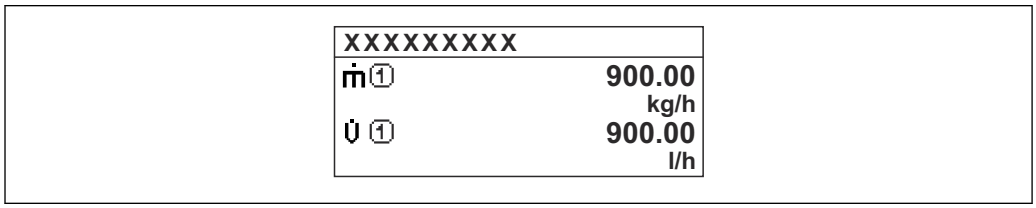
A0013099

"1 bargraph + 1 value" option



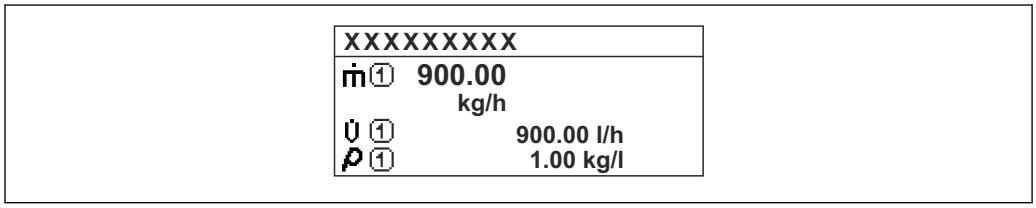
A0013098

"2 values" option



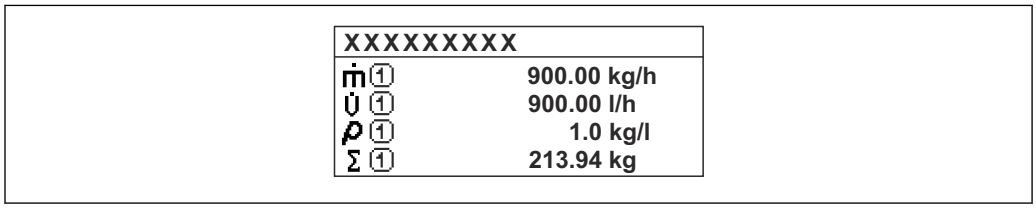
A0013100

"1 value large + 2 values" option



A0013102

"4 values" option



A0013103

Value 1 display

Navigation Expert → System → Display → Value 1 display (0107)

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
- Dynamic viscosity *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Reference density alternative *
- Weighted density average *
- Weighted temperature average *
- 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 *
- 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 *

* Visibility depends on order options or device settings

- 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 *
- 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

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 (→ 17) is used to specify how many measured values are displayed simultaneously and how.

Custody transfer mode

Only available for Promass F, O, Q and X.

* Visibility depends on order options or device settings

Once the measuring device has been enabled for custody transfer mode, depending on the custody transfer approval selected the display can switch to show the relevant information.

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 89).

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 (→ 17) 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 (→ 89).

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 → 335

Additional information

Description

The **Format display** parameter (→ 17) 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 (→ 89).

Decimal places 1

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

Prerequisite A measured value is specified in the **Value 1 display** parameter (→ 19).

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 (→ 19)

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 (→ 17) 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 (→ 89).

Decimal places 2

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

Prerequisite A measured value is specified in the **Value 2 display** parameter (→ 22).

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 (→ 19)

Factory setting None

Additional information *Description*

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

The **Format display** parameter (→ 17) 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 (→ 89).

0% bargraph value 3

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

Prerequisite A selection was made in the **Value 3 display** parameter (→ 23).

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

User entry Signed floating-point number

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

Additional information *Description*

The **Format display** parameter (→ 17) 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 (→ 89).

100% bargraph value 3

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

Prerequisite A selection was made in the **Value 3 display** parameter (→ 23).

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 (→ 17) 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 (→ 89).

Decimal places 3

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

Prerequisite A measured value is specified in the **Value 3 display** parameter (→ 23).

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 (→ 19)

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 (→ 17) 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 (→ 89).

Custody transfer mode

Only available for Promass F, O, Q and X.

Once the measuring device has been enabled for custody transfer mode, depending on the custody transfer approval selected the display can switch to showing the custody transfer counter.

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

Decimal places 4

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

Prerequisite A measured value is specified in the **Value 4 display** parameter (→ 25).

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 (→ 19)

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 (→ 17) 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 (→ 89).

Custody transfer mode

Only available for Promass F, O, Q and X.

Once the measuring device has been enabled for custody transfer mode, depending on the custody transfer approval selected the display can switch to showing the custody transfer counter.

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

Decimal places 5

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

Prerequisite A measured value is specified in the **Value 5 display** parameter (→ 26).

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 (→ 19)

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 (→ 17) 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 (→ 89).

Custody transfer mode

Only available for Promass F, O, Q and X.

Once the measuring device has been enabled for custody transfer mode, depending on the custody transfer approval selected the display can switch to showing the custody transfer counter.

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

Decimal places 6

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

Prerequisite A measured value is specified in the **Value 6 display** parameter (→ 28).

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 (→ 19)

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 (→ 17) 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 (→ 89).

Custody transfer mode

Only available for Promass F, O, Q and X.

Once the measuring device has been enabled for custody transfer mode, depending on the custody transfer approval selected the display can switch to showing the custody transfer counter.

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

Decimal places 7

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

Prerequisite A measured value is specified in the **Value 7 display** parameter (→ 29).

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 (→ 19)

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 (→ 17) 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 (→ 89).

Custody transfer mode

Only available for Promass F, O, Q and X.

Once the measuring device has been enabled for custody transfer mode, depending on the custody transfer approval selected the display can switch to showing the custody transfer counter.

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

Decimal places 8

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

Prerequisite A measured value is specified in the **Value 8 display** parameter (→ 30).

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 (→ 19)...**Value 8 display** parameter (→ 30) 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 (→ 17).

Custody transfer mode

Only available for Promass F, O, Q and X.

Once the measuring device has been enabled for custody transfer mode, depending on the custody transfer approval selected the display can switch between showing the relevant information and the custody transfer counter.

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

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 element [1]) for display damping:
- If a low time constant is entered, the display reacts particularly quickly to fluctuating measured variables.
- On the other hand, the display reacts more slowly if a high time constant is entered.

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

Header

Navigation Expert → System → Display → Header (0097)

Prerequisite A local display is provided.

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

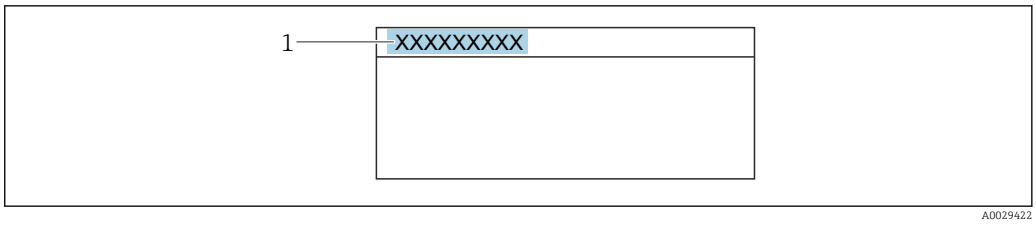
Selection
- Device tag
- Free text

Factory setting Device tag

Additional information *Description*

The header text only appears during normal operation.

1) proportional transmission behavior with first order delay



1 Position of the header text on the display

Selection

- Device tag
  Is defined in the **Device tag** parameter (→ 279).
- Free text
  Is defined in the **Header text** parameter (→ 33).

Header text

Navigation Expert → System → Display → Header text (0112)

Prerequisite The **Free text** option is selected in the **Header** parameter (→ 32).

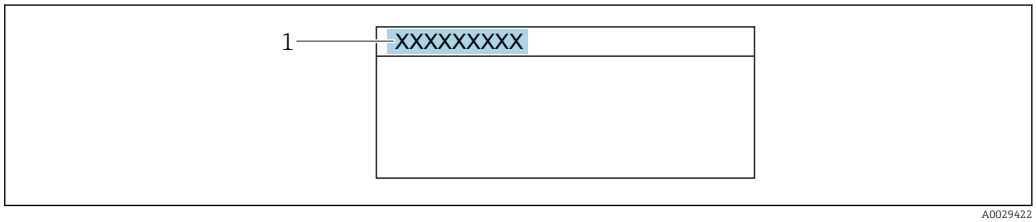
Description Use this function to enter a customer-specific text for the header of the local display.

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

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

Additional information *Description*

The header text only appears during normal operation.



1 Position of the header text on the display

User entry

The number of characters displayed depends on the characters used.

Separator

Navigation Expert → System → Display → Separator (0101)

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"

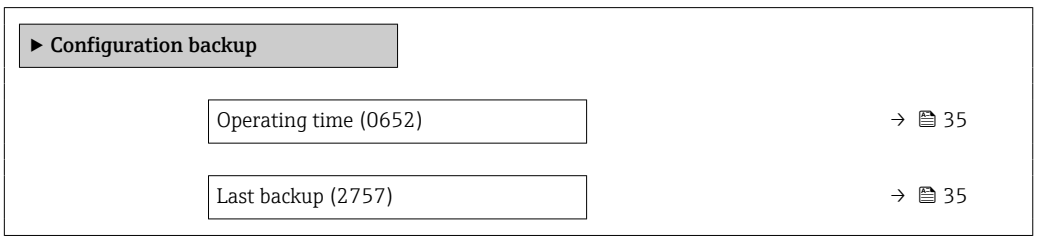
Description Use this function to switch the backlight of the local display on and off.

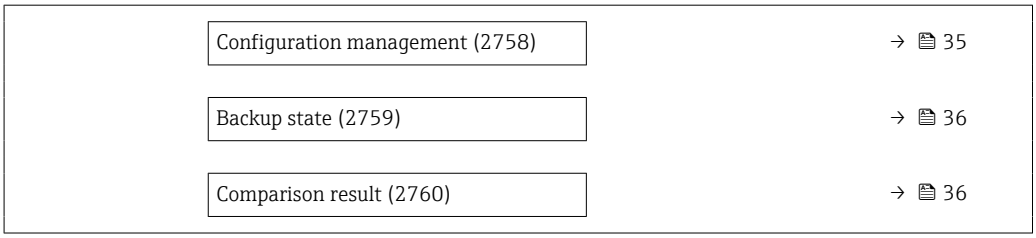
Selection
- Disable
- Enable

Factory setting Enable

3.1.2 "Configuration backup" submenu

Navigation Expert → System → Config. backup





Operating time

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

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

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

Additional information *User interface*
The maximum number of days is 9999, which is equivalent to 27 years.

Last backup

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

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

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

Configuration management

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

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

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

Factory setting Cancel

* 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*

The comparison is started via the **Compare** option in the **Configuration management** parameter (→ 35).

Selection

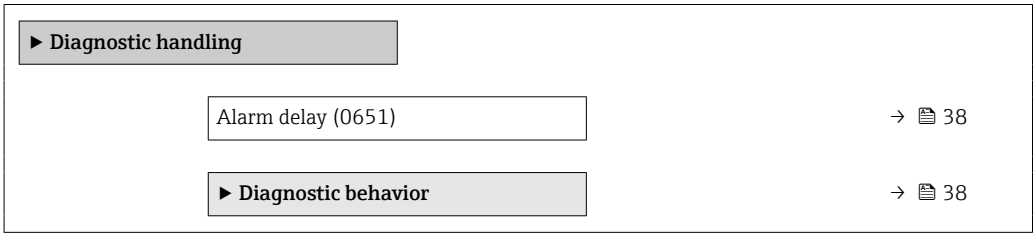
Options	Description
Settings identical	The current device configuration of the HistoROM is identical to the backup copy in the device memory. If the transmitter configuration of another device has been transmitted to the device via HistoROM in the **Configuration management** parameter, the current device 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
- 915 Viscosity ouf of specification
- 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 (→ 38).

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 (→ 276) (**Event list** submenu (→ 277)) 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)	→ 41
Assign behavior of diagnostic no. 046 (0709)	→ 41
Assign behavior of diagnostic no. 142 (0648)	→ 41
Assign behavior of diagnostic no. 144 (0731)	→ 42
Assign behavior of diagnostic no. 374 (0710)	→ 42
Assign behavior of diagnostic no. 302 (0739)	→ 42
Assign behavior of diagnostic no. 304 (0644)	→ 43
Assign behavior of diagnostic no. 441 (0657)	→ 43
Assign behavior of diagnostic no. 442 (0658)	→ 43
Assign behavior of diagnostic no. 443 (0659)	→ 44
Assign behavior of diagnostic no. 444 (0740)	→ 44
Assign behavior of diagnostic no. 543 (0643)	→ 44
Assign behavior of diagnostic no. 599 (0646)	→ 45

Assign behavior of diagnostic no. 830 (0800)	→ 45
Assign behavior of diagnostic no. 831 (0641)	→ 45
Assign behavior of diagnostic no. 832 (0681)	→ 46
Assign behavior of diagnostic no. 833 (0682)	→ 46
Assign behavior of diagnostic no. 834 (0700)	→ 46
Assign behavior of diagnostic no. 835 (0702)	→ 47
Assign behavior of diagnostic no. 842 (0638)	→ 47
Assign behavior of diagnostic no. 862 (0679)	→ 48
Assign behavior of diagnostic no. 912 (0703)	→ 48
Assign behavior of diagnostic no. 913 (0712)	→ 48
Assign behavior of diagnostic no. 915 (0649)	→ 49
Assign behavior of diagnostic no. 941 (0632)	→ 49
Assign behavior of diagnostic no. 942 (0633)	→ 49
Assign behavior of diagnostic no. 943 (0634)	→ 50
Assign behavior of diagnostic no. 944 (0732)	→ 50
Assign behavior of diagnostic no. 948 (0744)	→ 51
Assign behavior of diagnostic no. 984 (0647)	→ 51

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: → 38

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: → 38

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
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Alarm

Additional information For a detailed description of the options available: → 38

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

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

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

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

Selection
- Off
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

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
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

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

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

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

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

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

Description Use this function to change the diagnostic behavior of the **442 Frequency output 1 to n** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

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

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

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

Description Use this function to change the diagnostic behavior of the **443 Pulse output 1 to n** diagnostic message.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

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

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

Prerequisite The device has one current input.

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

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
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

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: → 38

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: → 38

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: → 38

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: → 38

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 834 (0700)

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 835 (0702)

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

Assign behavior of diagnostic no. 842 (Process limit)

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Off

Additional information For a detailed description of the options available: → 38

Assign behavior of diagnostic no. 862 (Empty pipe)

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

Assign behavior of diagnostic no. 912 (Medium inhomogeneous)

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

Assign behavior of diagnostic no. 913 (Medium unsuitable)

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

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

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

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 915 (0649)

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Logbook entry only

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

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

Prerequisite For the following order code:

"Application package", option EJ "Petroleum"

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

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

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

Prerequisite For the following order code:

"Application package", option EJ "Petroleum"

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

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

Additional information For a detailed description of the options available: → 38

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: → 38

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: → 38

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: → 38

Assign behavior of diagnostic no. 984 (Condensation risk)

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

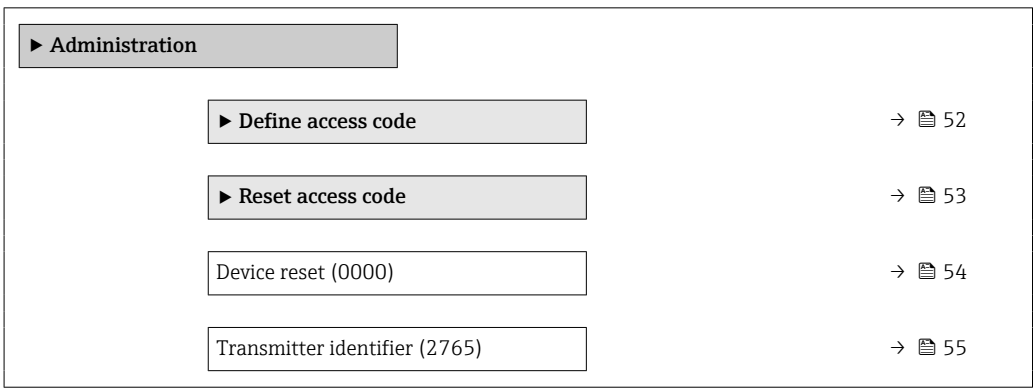
Description Change behavior of diagnostic event with diagnostic number 984 'Condensation risk'.

Selection
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting Warning

3.1.4 "Administration" submenu

Navigation Expert → System → Administration



Activate SW option (0029)	→ 55
Software option overview (0015)	→ 56

"Define access code" wizard

The **Define access code** wizard (→ 52) 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	→ 52
Confirm access code	→ 53

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 (→ 14).

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

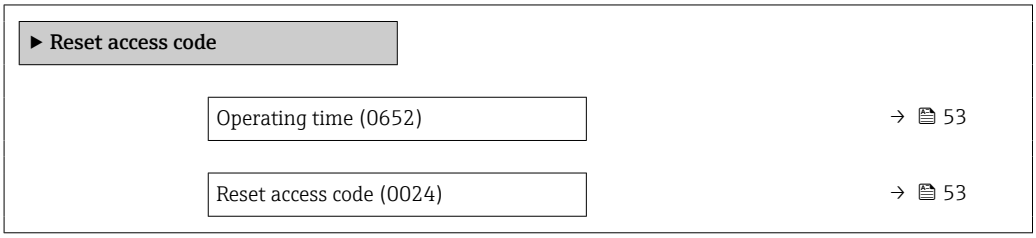
Navigation Expert → System → Administration → Def. access code → Confirm code

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 500

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 (→ 56).

↳ 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 (→ 56).

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 *
- Petroleum *
- Concentration *
- Viscosity/Hydrocarbon viscosity monitor. *
- Custody transfer *
- OPC-UA *
- Application specific calculations *
- Heartbeat Monitoring *
- Heartbeat Verification *
- 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" and option EE "Special density"

"Viscosity" option

Only available for Promass I.

* Visibility depends on order options or device settings

Order code for "Application package", option EG "Viscosity"

"Custody transfer" option

The measuring device has an approval for custody transfer measurement.

Detailed information on the national and international approvals for custody transfer that are currently available can be supplied by your Endress+Hauser sales organization.

"Petroleum" option

Only available for Promass E, F, O, Q and X.

Order code for "Application package", option EJ "Petroleum"

"OPC-UA" option

Only available for the HART communication protocol.

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"

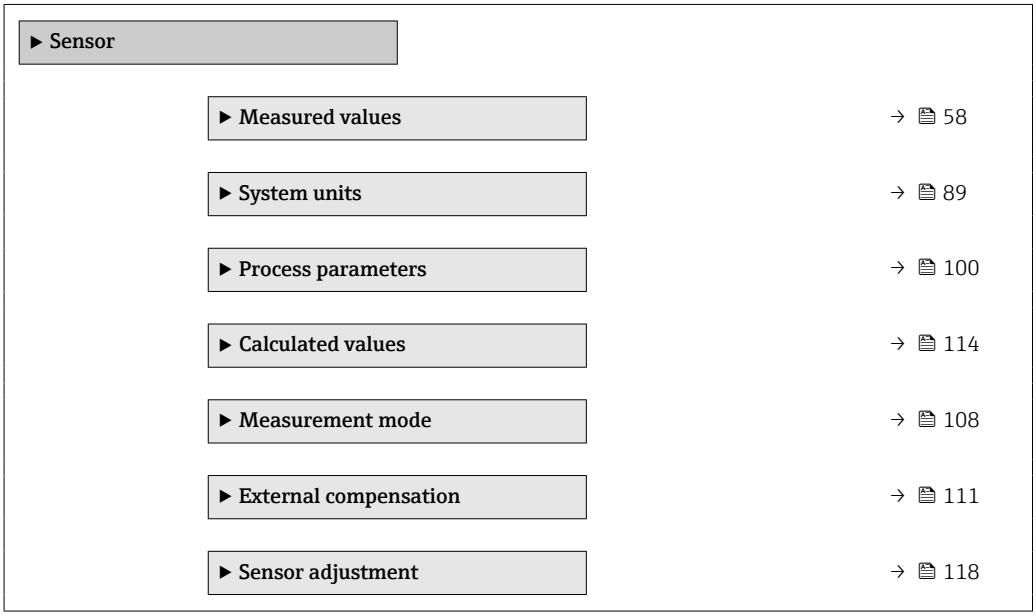
Option "Premium density + Extended density function"

Only available for Promass Q DN25.

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

3.2 "Sensor" submenu

Navigation Expert → Sensor



▶ **Calibration**	→ 137
▶ **Testpoints**	→ 139

3.2.1 "Measured values" submenu

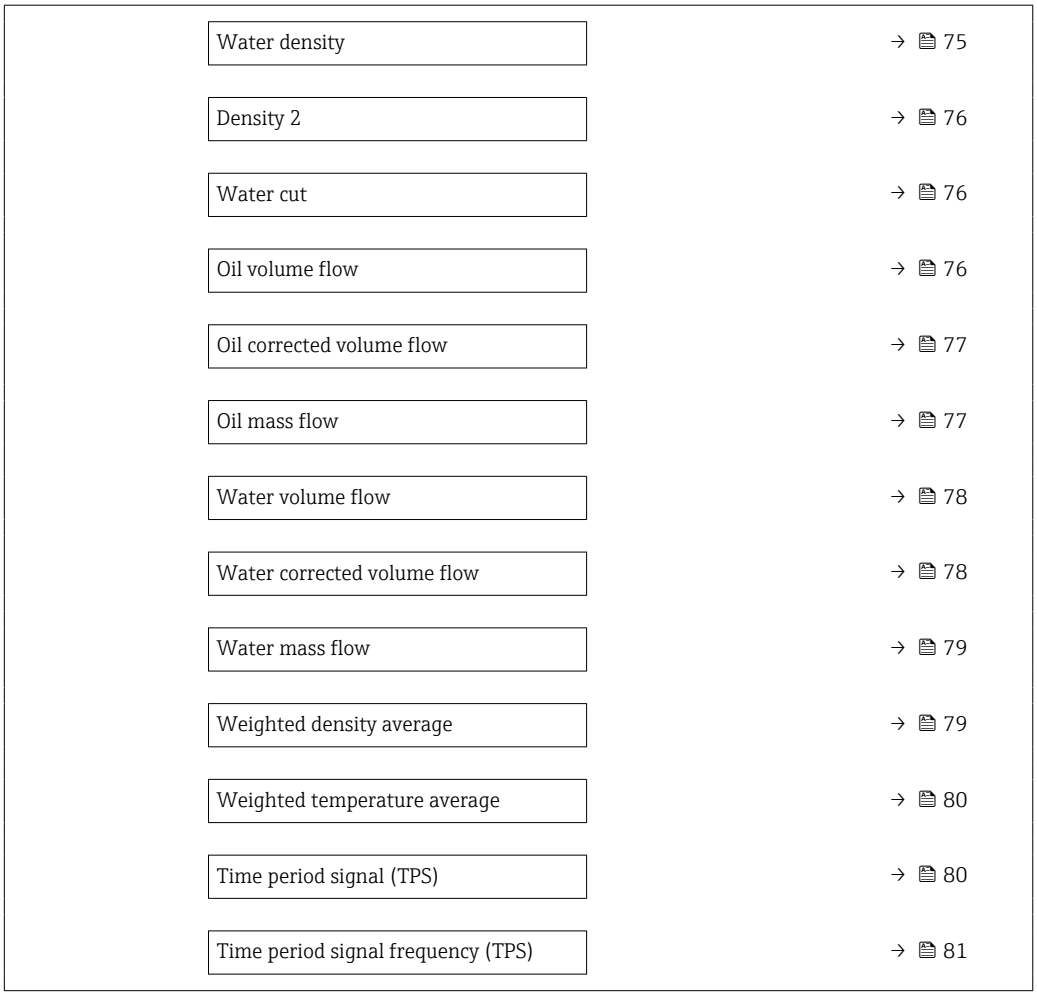
Navigation Expert → Sensor → Measured val.

▶ **Measured values**	
▶ **Process variables**	→ 58
▶ **Totalizer**	→ 81
▶ **Input values**	→ 83
▶ **Output values**	→ 85

"Process variables" submenu

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

▶ **Process variables**	
Mass flow	→ 60
Volume flow	→ 60
Corrected volume flow	→ 61
Density	→ 61
Reference density	→ 61
Temperature	→ 62
Pressure	→ 62
Dynamic viscosity	→ 62
Kinematic viscosity	→ 63
Temp. compensated dynamic viscosity	→ 63
Temp. compensated kinematic viscosity	→ 63
Concentration	→ 64



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 (→ 90)

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 (→ 91)

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 (→ 94)

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 (→ 95)

Reference density

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

Description Displays the reference density that is currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Reference density unit** parameter (→ 96)

Temperature

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

Description Displays the medium temperature that is currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 98)

Pressure

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

Description Displays the fixed or external pressure value.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Pressure unit** parameter (→ 98)

Dynamic viscosity

Navigation Expert → Sensor → Measured val. → Process variab. → Dynam. viscosity (1854)

Prerequisite For the following order code:
"Application package", option **EG** "Viscosity"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Displays the dynamic viscosity that is currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Dynamic viscosity unit** parameter.

Kinematic viscosity

Navigation Expert → Sensor → Measured val. → Process variab. → Kinematic visc. (1857)

Prerequisite For the following order code:
"Application package", option **EG** "Viscosity"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Displays the kinematic viscosity that is currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Kinematic viscosity unit** parameter (0578).

Temp. compensated dynamic viscosity

Navigation Expert → Sensor → Measured val. → Process variab. → TempCompDynVisc (1872)

Prerequisite For the following order code:
"Application package", option **EG** "Viscosity"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Displays the temperature compensation that is currently calculated for the viscosity.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Dynamic viscosity unit** parameter.

Temp. compensated kinematic viscosity

Navigation Expert → Sensor → Measured val. → Process variab. → TempCompKinVisc (1863)

Prerequisite For the following order code:
"Application package", option **EG** "Viscosity"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Displays the temperature compensation that is currently calculated for the kinetic viscosity.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Kinematic viscosity unit** parameter (0578).

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 (→ 56).

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 (→ 56).

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 (→ 90)

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 (→ 56).

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 (→ 90)

Target corrected volume flow

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

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

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

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 91)

Carrier corrected volume flow

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

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

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

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 91)

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 (→ 56).

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 (→ 91)

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 (→ 56).

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 (→ 91)

CTL

Navigation Expert → Sensor → Measured val. → Process variab. → CTL (4191)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

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

User interface Positive floating-point number

Factory setting –

CPL

Navigation Expert → Sensor → Measured val. → Process variab. → CPL (4192)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

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

User interface Positive floating-point number

Factory setting –

CTPL

Navigation Expert → Sensor → Measured val. → Process variab. → CTPL (4193)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

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

User interface Positive floating-point number

Factory setting –

S&W volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → S&W volume flow (4161)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Displays the S&W volume flow which is calculated from the measured total volume flow minus the net volume flow.

Dependency

The unit is taken from: **Volume flow unit** parameter (→ 91)

User interface Signed floating-point number

Factory setting –

Additional information The unit is taken from the **Volume flow unit** parameter (→ 91)

S&W correction value

Navigation Expert → Sensor → Measured val. → Process variab. → S&W correction (4194)

Prerequisite For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **S&W input mode** parameter, the **External value** option or the **Current input 1…n** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Shows the correction value for sediment and water.

User interface Positive floating-point number

Factory setting –

Reference density alternative

Navigation Expert → Sensor → Measured val. → Process variab. → Ref.dens.altern. (4168)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description
Displays the fluid density at the alternative reference temperature.

Dependency

The unit is taken from: **Reference density unit** parameter (→ 96)

User interface Signed floating-point number

Factory setting –

Additional information The unit is taken from the **Reference density unit** parameter (→ 96)

GSV flow

Navigation Expert → Sensor → Measured val. → Process variab. → GSV flow (4157)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description
Displays the measured total volume flow, corrected to the reference temperature and the reference pressure.

Dependency

The unit is taken from: **Corrected volume flow unit** parameter (→ 94)

User interface Signed floating-point number

Factory setting –

Additional information The unit is taken from the **Corrected volume flow unit** parameter (→ 94)

GSV flow alternative

Navigation Expert → Sensor → Measured val. → Process variab. → GSVa (4158)

Prerequisite

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description

Displays the measured total volume flow, corrected to the alternative reference temperature and the alternative reference pressure.

Dependency

The unit is taken from: **Corrected volume flow unit** parameter (→ 94)

User interface Signed floating-point number

Factory setting –

Additional information The unit is taken from the **Corrected volume flow unit** parameter (→ 94)

NSV flow

Navigation Expert → Sensor → Measured val. → Process variab. → NSV flow (4159)

Prerequisite

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description

Displays the net volume flow which is calculated from the measured total volume flow minus the value for sediment & water and minus the shrinkage.

Dependency

The unit is taken from: **Corrected volume flow unit** parameter (→ 94)

User interface Signed floating-point number

Factory setting –

Additional information The unit is taken from the **Corrected volume flow unit** parameter (→ 94)

NSV flow alternative

Navigation Expert → Sensor → Measured val. → Process variab. → NSVa (4160)

Prerequisite

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description

Displays the net volume flow which is calculated from the measured alternative total volume minus the value for sediment & water and minus the shrinkage.

Dependency

The unit is taken from: **Corrected volume flow unit** parameter (→ 94)

User interface Signed floating-point number

Factory setting –

Additional information The unit is taken from the **Corrected volume flow unit** parameter (→ 94)

Oil CTL

Navigation Expert → Sensor → Measured val. → Process variab. → Oil CTL (4175)

Prerequisite

For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description

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

User interface Positive floating-point number

Factory setting –

Oil CPL

Navigation Expert → Sensor → Measured val. → Process variab. → Oil CPL (4177)

Prerequisite
For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

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

User interface Positive floating-point number

Factory setting –

Oil CTPL

Navigation Expert → Sensor → Measured val. → Process variab. → Oil CTPL (4176)

Prerequisite
For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

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

User interface Positive floating-point number

Factory setting –

Water CTL

Navigation Expert → Sensor → Measured val. → Process variab. → Water CTL (4172)

Prerequisite
For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

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

User interface Positive floating-point number

Factory setting –

CTL alternative

Navigation Expert → Sensor → Measured val. → Process variab. → CTL alternative (4174)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

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

User interface Positive floating-point number

Factory setting –

CPL alternative

Navigation Expert → Sensor → Measured val. → Process variab. → CPL alternative (4197)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

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

User interface Positive floating-point number

Factory setting –

Oil reference density

Navigation Expert → Sensor → Measured val. → Process variab. → Oil ref. density (4195)

Prerequisite
For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Shows the oil density at the reference temperature.

User interface Signed floating-point number

Factory setting –

Additional information *Dependency*

The unit is taken from the **Reference density unit** parameter (→ 96)

Water reference density

Navigation Expert → Sensor → Measured val. → Process variab. → Water ref. dens. (4196)

Prerequisite
For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Shows the water density at the reference temperature.

User interface Signed floating-point number

Factory setting –

Additional information *Dependency*

The unit is taken from: **Water reference density unit** parameter

Oil density

Navigation Expert → Sensor → Measured val. → Process variab. → Oil density (4169)

Prerequisite
For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Displays the density of the oil currently measured.

User interface Signed floating-point number

Factory setting –

Additional information *Dependency*

The unit is taken from: **Oil density unit** parameter

Water density

Navigation Expert → Sensor → Measured val. → Process variab. → Water density (4170)

Prerequisite
For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Displays the density of the water currently measured.

User interface Signed floating-point number

Factory setting –

Additional information *Dependency*

The unit is taken from: **Water density unit** parameter

Density 2

Navigation Expert → Sensor → Measured val. → Process variab. → Density 2 (1905)

Prerequisite
For the following order code:
- "Application package", option **EH** "Extended density function"
- "Application package", option **EI** "Premium density"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Shows the density currently measured in the second density unit specified.

User interface Signed floating-point number

Water cut

Navigation Expert → Sensor → Measured val. → Process variab. → Water cut (4171)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Displays the percentage water volume flow in relation to the total volume flow of the fluid.

User interface 0 to 100 %

Factory setting –

Oil volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → Oil volume flow (4178)

Prerequisite
For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Displays the currently calculated volume flow of the oil.

Dependency:
- Based on the value displayed in the **Water cut** parameter (→ 76)
- The unit is taken from: **Volume flow unit** parameter (→ 91)

User interface Signed floating-point number

Factory setting –

Additional information *Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 91)

Oil corrected volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → Oil corr.vol.fl. (4179)

Prerequisite

For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description

Displays the currently calculated volume flow of the oil, calculated to values at reference temperature and reference pressure.

Dependency:
- Based on the value displayed in the **Water cut** parameter (→ 76)
- The unit is taken from: **Corrected volume flow unit** parameter (→ 94)

User interface Signed floating-point number

Factory setting –

Additional information

The unit is taken from the **Corrected volume flow unit** parameter (→ 94)

Oil mass flow

Navigation Expert → Sensor → Measured val. → Process variab. → Oil mass flow (4180)

Prerequisite

For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description

Displays the currently calculated mass flow of the oil.

Dependency:
- Based on the value displayed in the **Water cut** parameter (→ 76)
- The unit is taken from: **Mass flow unit** parameter (→ 90)

User interface Signed floating-point number

Factory setting –

Additional information *Dependency*

The unit is taken from the **Mass flow unit** parameter (→ 90)

Water volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → Water vol. flow (4181)

Prerequisite For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Displays the currently calculated volume flow of the water.

Dependency:
- Based on the value displayed in the **Water cut** parameter (→ 76)
- The unit is taken from: **Volume flow unit** parameter (→ 91)

User interface Signed floating-point number

Factory setting –

Additional information *Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 91)

Water corrected volume flow

Navigation Expert → Sensor → Measured val. → Process variab. → Water corr.v.fl. (4182)

Prerequisite For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Displays the currently calculated volume flow of the water, calculated to values at reference temperature and reference pressure.

Dependency:
- Based on the value displayed in the **Water cut** parameter (→ 76)
- The unit is taken from: **Corrected volume flow unit** parameter (→ 94)

User interface Signed floating-point number

Factory setting –

Additional information The unit is taken from the **Corrected volume flow unit** parameter (→ 94)

Water mass flow

Navigation Expert → Sensor → Measured val. → Process variab. → Water mass flow (4183)

Prerequisite
For the following order code:
- "Application package", option **EJ** "Petroleum"
- In the **Petroleum mode** parameter, the **Net oil & water cut** option is selected.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description
Displays the currently calculated mass flow of the water.

Dependency:
- Based on the value displayed in the **Water cut** parameter (→ 76)
- The unit is taken from: **Mass flow unit** parameter (→ 90)

User interface Signed floating-point number

Factory setting –

Additional information
Dependency

The unit is taken from the **Mass flow unit** parameter (→ 90)

Weighted density average

Navigation Expert → Sensor → Measured val. → Process variab. → Density average (4184)

Prerequisite
For the following order code:
- "Application package", option **EJ** "Petroleum"
- "Application package", option **EM** "Petroleum + Locking function"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description
Displays the weighted average for the density since the last time the density averages were reset.

Dependency:
- The unit is taken from: **Density unit** parameter (→ 95)
- The value is reset to NaN (Not a Number) via the **Reset weighted averages** parameter

User interface Signed floating-point number

Factory setting –

Additional information
Dependency

- The unit is taken from: **Density unit** parameter (→ 95)
- The value is reset to NaN (Not a Number) via the **Reset weighted averages** parameter

Weighted temperature average

Navigation Expert → Sensor → Measured val. → Process variab. → Temp. average (4185)

Prerequisite

For the following order code:
- "Application package", option **EJ** "Petroleum"
- "Application package", option **EM** "Petroleum + Locking function"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description

Displays the weighted average for the temperature since the last time the temperature averages were reset.

Dependency:
- The unit is taken from: **Temperature unit** parameter (→ 98)
- The value is reset to NaN (Not a Number) via the **Reset weighted averages** parameter

User interface Signed floating-point number

Factory setting –

Additional information *Dependency*

- The unit is taken from: **Temperature unit** parameter (→ 98)
- The value is reset to NaN (Not a Number) via the **Reset weighted averages** parameter

Time period signal (TPS)

Navigation Expert → Sensor → Measured val. → Process variab. → TPS (1903)

Prerequisite

For the following order code:
- "Application package", option **EH** "Extended density function"
- "Application package", option **EI** "Premium density"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description Shows the time period signal (TPS) currently calculated. Corresponds to the measured density.

User interface Positive floating-point number

Time period signal frequency (TPS)

Navigation Expert → Sensor → Measured val. → Process variab. → TPS frequency (1904)

Prerequisite

For the following order code:
- "Application package", option **EH** "Extended density function"
- "Application package", option **EI** "Premium density"

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

Description

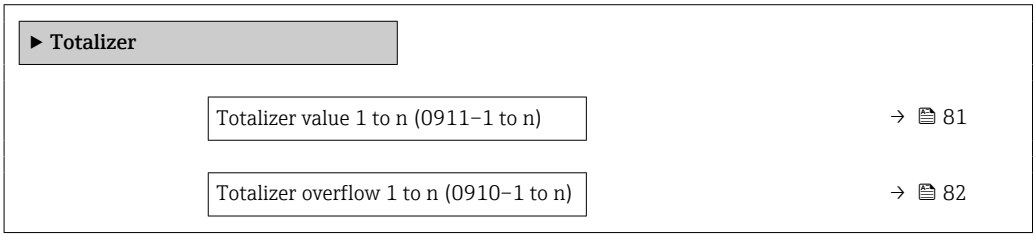
Shows the frequency of the time period signal (TPS) currently calculated. Corresponds to the measured density.

User interface

0 to 10 000 Hz

"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 (→ 255) 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 (→ 259).

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 (→ 257).

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 256).

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: 1 968 457 m^3
- Value in the **Totalizer overflow 1** parameter: $1 \cdot 10^7$ (1 overflow) = 10 000 000 m^3
- Current totalizer reading: 11 968 457 m^3

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 (→ 255) of the **Totalizer 1 to n** submenu.

Description Displays the current totalizer overflow.

User interface Integer with sign

Additional information

Description

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.

User interface

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 256).

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: 1 968 457 m^3
- Value in the **Totalizer overflow 1** parameter: $2 \cdot 10^7$ (2 overflows) = 20 000 000 [m^3]
- Current totalizer reading: 21 968 457 m^3

Totalizer 1 to n value

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

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

User interface Signed floating-point number

Factory setting 0 m^3

Totalizer 1 to n status

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

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

User interface
- Good
- Uncertain
- Bad

Factory setting Good

Totalizer 1 to n status (Hex)

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

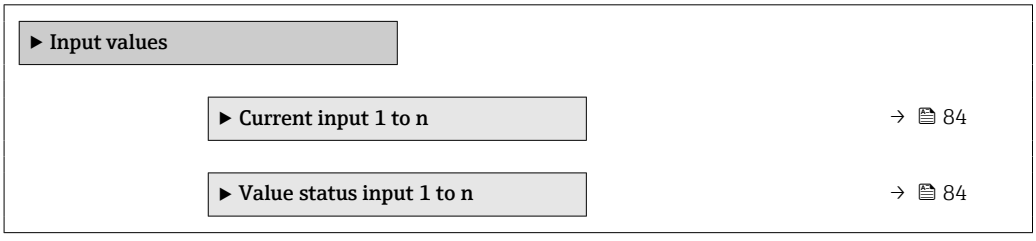
Description Shows the status of the totalizer value reported to the controller for further processing (Hex).

User interface 0 to 255

Factory setting 128

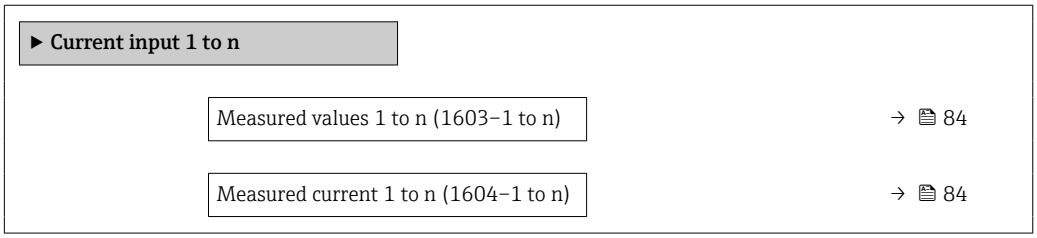
"Input values" submenu

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

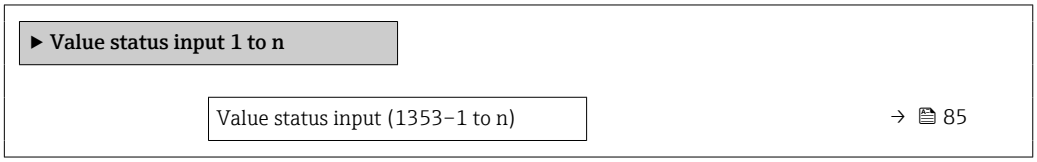
Navigation Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measur. curr. 1 to n (1604–1 to n)

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

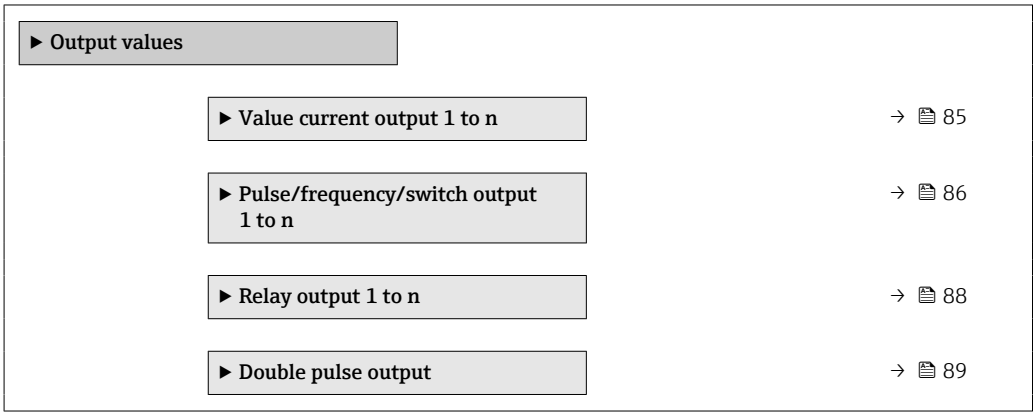
Navigation Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n → Val.stat.inp. (1353–1 to n)

Description Displays the current input signal level.

User interface
- High
- Low

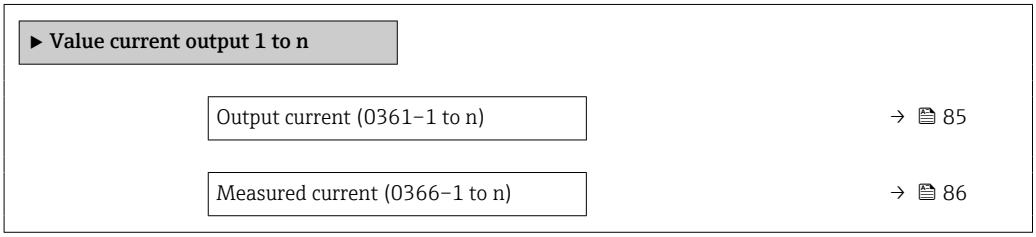
"Output values" submenu

Navigation Expert → Sensor → Measured val. → Output values



"Value current output 1 to n" submenu

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



Output current

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

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

User interface 0 to 22.5 mA

Measured current

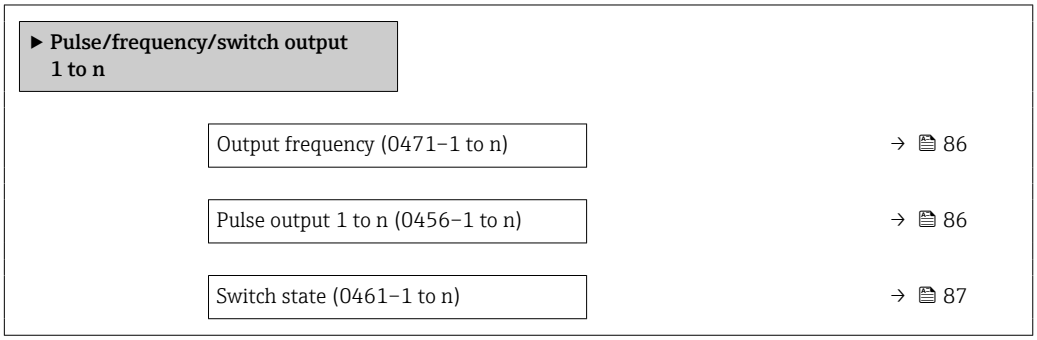
Navigation Expert → Sensor → Measured val. → Output values → Val. curr.outp 1 to n → Measur. curr. (0366–1 to n)

Description Displays the actual measured value of the output current.

User interface 0 to 30 mA

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

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



Output frequency

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

Prerequisite In the **Operating mode** parameter (→ 171), 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)

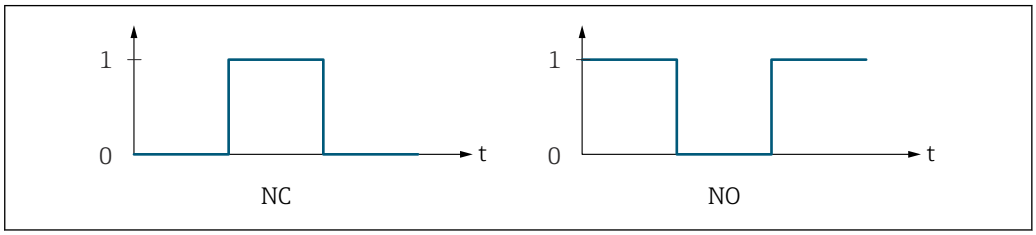
Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 171) parameter.

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 (→ 190) 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 (→ 175)) 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 (→ 171).

Description Displays the current switch status of the status output.

User interface

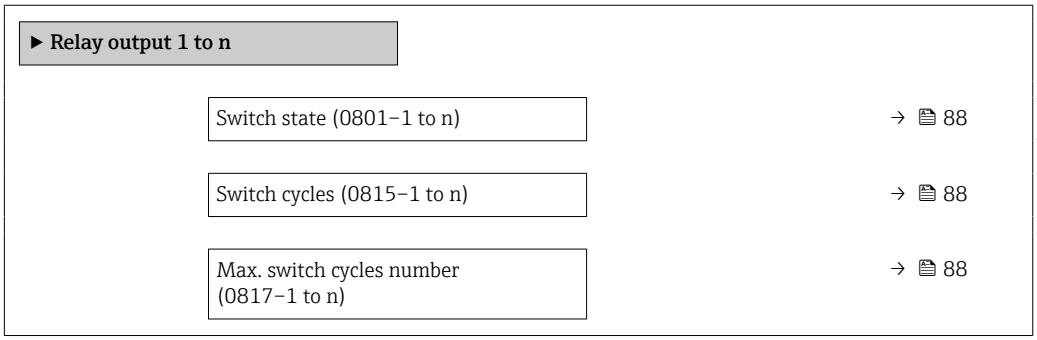
- Open
- Closed

Additional information *User interface*

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

"Relay output 1 to n" submenu

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



Switch state

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

Description Displays the current status of the relay output.

User interface
- Open
- Closed

Additional information *User interface*
- Open
  The relay output is not conductive.
- Closed
  The relay output is conductive.

Switch cycles

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

Description Displays all the switch cycles performed.

User interface Positive integer

Max. switch cycles number

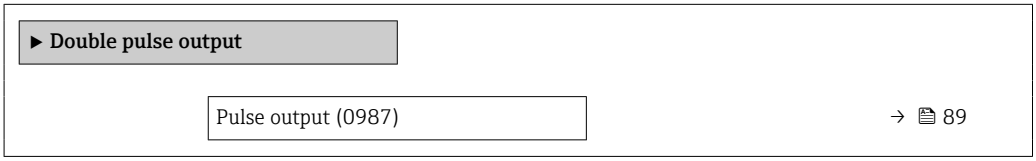
Navigation Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Max. cycles no. (0817–1 to n)

Description Displays the maximum number of guaranteed switch cycles.

User interface Positive integer

"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)

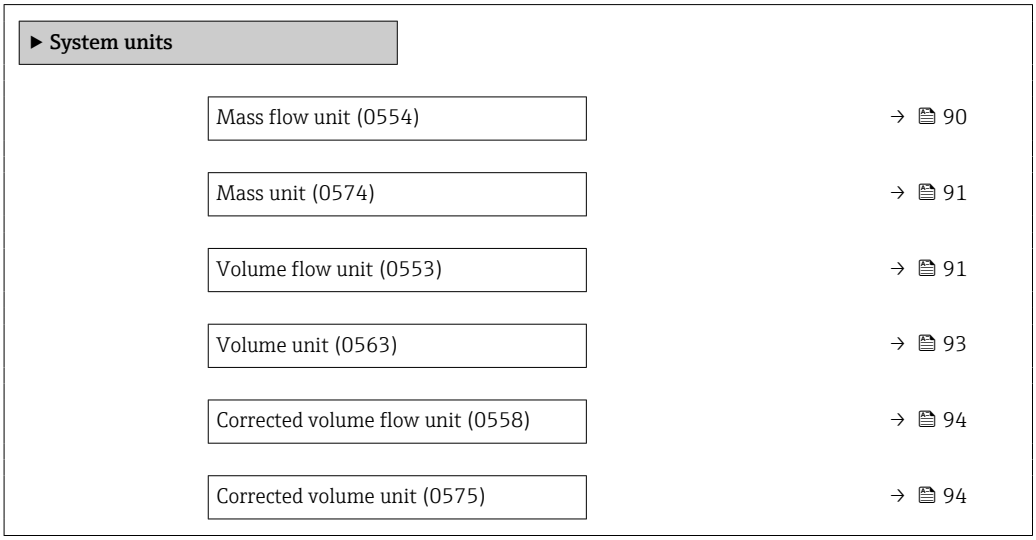
Description Displays the pulse frequency of the double pulse output which is currently output.

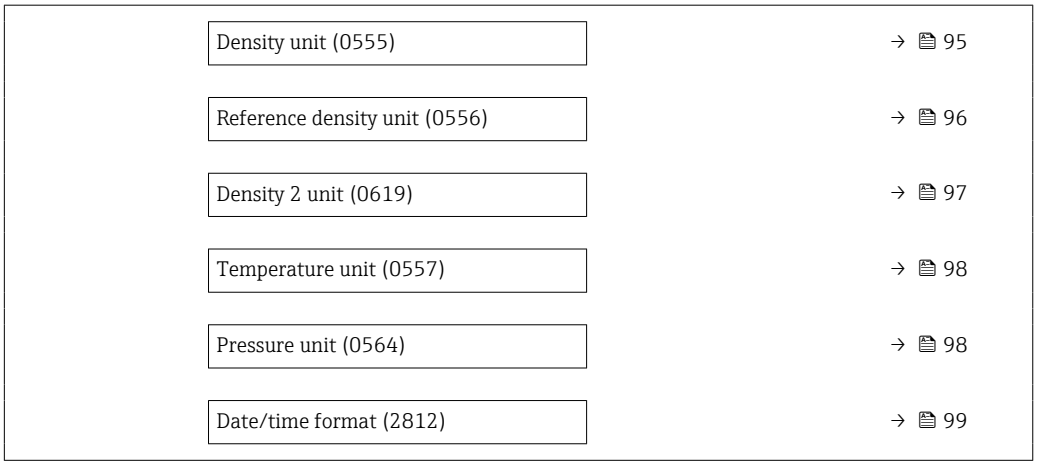
User interface Positive floating-point number

Additional information For a detailed description and example: **Pulse output** parameter (→ 86)

3.2.2 "System units" submenu

Navigation Expert → Sensor → System units





Mass flow unit

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

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

Selection

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

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

Factory setting

Country-specific:
- kg/h (DN > 150 (6"): **t/h** option)
- lb/min

Additional information

Effect

The selected unit applies for:
- **Target mass flow** parameter (→ 64)
- **Carrier mass flow** parameter (→ 65)
- **Mass flow** parameter (→ 60)

Selection

For an explanation of the abbreviated units: → 341

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

SI units
- g
- kg
- t

US units
- oz
- lb
- STon

Factory setting Country-specific:
- kg (DN > 150 (6"): **t** option)
- lb

Additional information

Selection

For an explanation of the abbreviated units: → 341

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

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

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

or

US units
- bbl/s (us;liq.) *
- bbl/min (us;liq.) *
- bbl/h (us;liq.) *
- bbl/d (us;liq.) *
- bbl/s (us;beer) *
- bbl/min (us;beer) *
- bbl/h (us;beer) *
- bbl/d (us;beer) *

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

* Visibility depends on order options or device settings

Factory setting

Depends on country:
- l/h (DN > 150 (6"): **m³/h** option)
- gal/min (us)

Additional information

Effect

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

Selection

For an explanation of the abbreviated units: → 341

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 (DN > 150 (6"): **m³** option)
- gal (us)

Additional information

Selection

For an explanation of the abbreviated units: → 341

Customer-specific units

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

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

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

Factory setting Country-specific:
- Nl/h (DN > 150 (6"): **Nm^3/h** option)
- Sft^3/min

Additional information

Result

The selected unit applies for:
Corrected volume flow parameter (→ 61)

Selection

For an explanation of the abbreviated units: → 341

Corrected volume unit

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

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

Selection

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

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

Imperial units
Sgal (imp)

Factory setting

Country-specific:
- Nl (DN > 150 (6"): **Nm^3** option)
- Sft^3

Additional information

Selection

For an explanation of the abbreviated units: → 341

Density unit

Navigation

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

Description

Use this function to select the unit for the density.

Selection

SI units
- g/cm^3
- g/m^3
- g/ml
- g/l
- kg/l
- kg/dm^3
- kg/m^3
- SD4°C
- SD15°C
- SD20°C
- SG4°C
- SG15°C
- SG20°C

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

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

Other units
°API

or

US units
SG60°F *

* Visibility depends on order options or device settings

or

US units
- 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 (→ 121)
- **Density setpoint 2** parameter (→ 121)
- **Density** parameter (→ 61)

Selection

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

For an explanation of the abbreviated units: → 341

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 (→ 116)
- **Fixed reference density** parameter (→ 116)
- **Reference density** parameter (→ 61)

Selection

For an explanation of the abbreviated units: → 341

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

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

Imperial units
lb/bbl (imp;beer) *

* Visibility depends on order options or device settings

Factory setting

Depends on country:
- kg/l
- lb/ft³

Additional information

Selection

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

For an explanation of the abbreviated units: → 341

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

SI units	*US units*
▪ °C	▪ °F
▪ K	▪ °R

Factory setting

Country-specific:
- °C
- °F

Additional information

Effect

The selected unit applies for:
- **Maximum value** parameter (→ 302)
- **Minimum value** parameter (→ 303)
- **Maximum value** parameter (→ 303)
- **Minimum value** parameter (→ 303)
- **Maximum value** parameter (→ 305)
- **Minimum value** parameter (→ 304)
- **External temperature** parameter (→ 113)
- **Reference temperature** parameter (6222)
- **Temperature** parameter (→ 62)
- **Reference temperature** parameter (→ 116)

Selection

For an explanation of the abbreviated units: → 341

Pressure unit

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

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

Selection

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

US units
- psi a
- psi g

Factory setting

Country-specific:
- bar a
- psi a

Additional information

Result

The unit is taken from:
- **Pressure value** parameter (→ 112)
- **External pressure** parameter (→ 112)
- **Pressure value** parameter (→ 62)

Selection

For an explanation of the abbreviated units: → 341

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

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

Factory setting

dd.mm.yy hh:mm

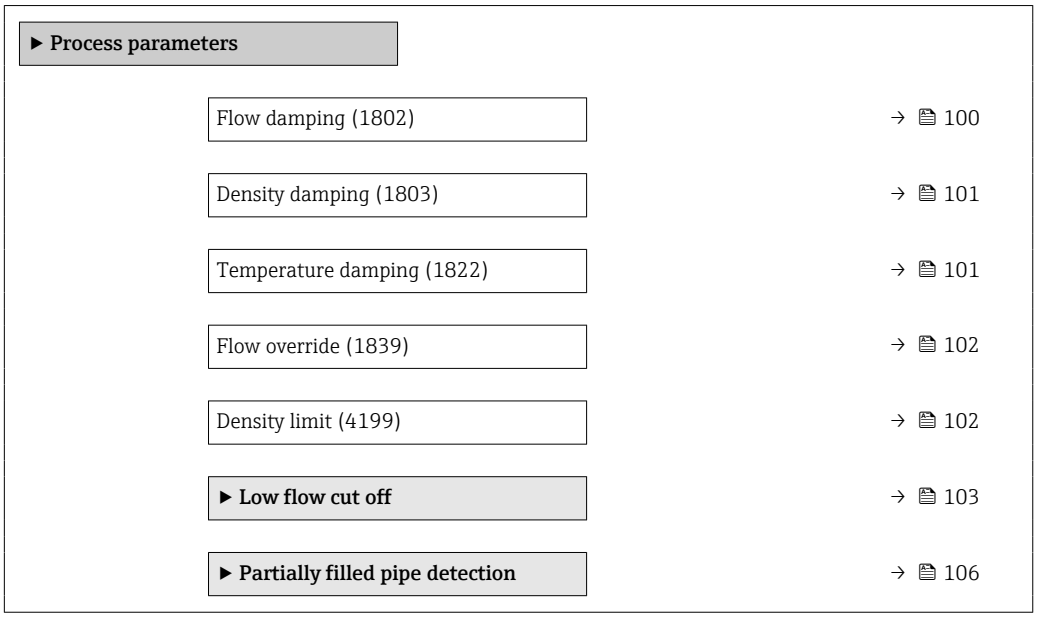
Additional information

Selection

For an explanation of the abbreviated units: → 341

3.2.3 "Process parameters" submenu

Navigation Expert → Sensor → Process param.



Flow damping

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

Description Use this function to enter a time constant for flow damping (PT1 element). Reduction of the variability of the flow measured value (in relation to interference). For this purpose, the depth of the flow filter is adjusted: when the filter setting increases, the reaction time of the device also increases.

User entry 0 to 100.0 s

Factory setting 0 s

Additional information

Description

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

User entry

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

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

Effect

The damping affects the following variables of the device:
- Outputs → 154
- Low flow cut off → 103
- Totalizers → 255

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 element [3].

User entry

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

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

Temperature damping

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

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

User entry 0 to 999.9 s

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 element [4].

User entry

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

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

Flow override

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

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

Selection
- Off
- On

Factory setting Off

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 (→ 153).

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.

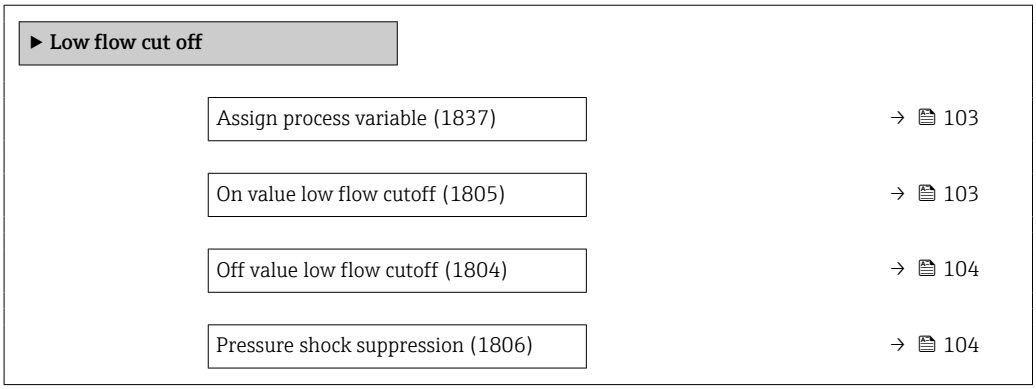
User entry Positive floating-point number

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 (→ 103).

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 → 104.

User entry Positive floating-point number

Factory setting Depends on country and nominal diameter → 336

Additional information *Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 103).

* 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)

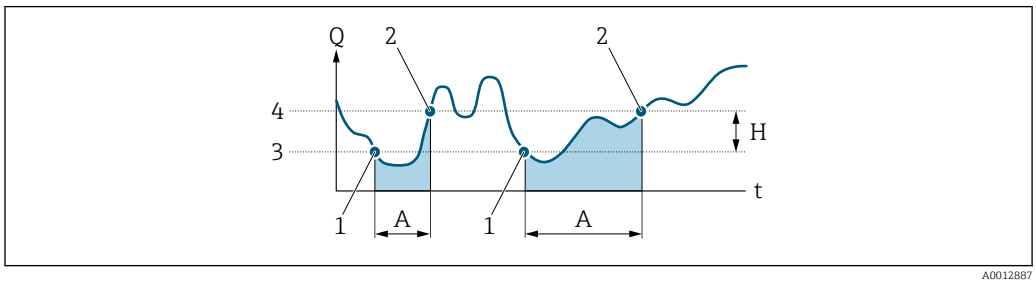
Prerequisite A process variable is selected in the **Assign process variable** parameter (→ 103).

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→ 103.

User entry 0 to 100.0 %

Factory setting 50 %

Additional information *Example*



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

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 (→ 103).

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

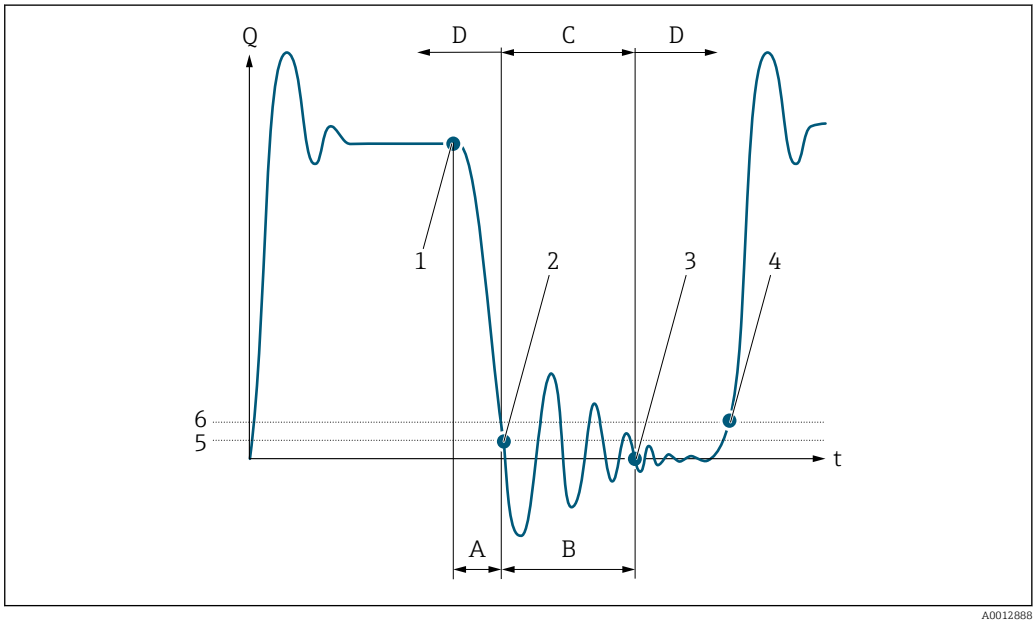
- Prerequisite:
  - Flow rate < on-value of low flow cut off
    or
  - Change in the flow direction
- Output values
  - Current output: outputs the current corresponding to zero flow
  - Flow displayed: 0
  - Totalizer: the totalizers are pegged at the last correct value

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

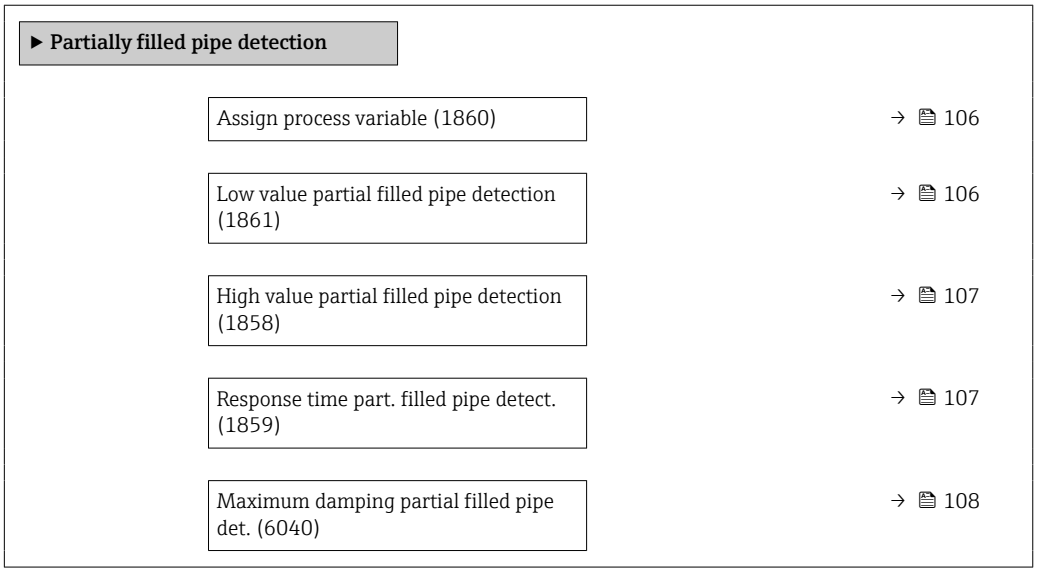
When closing a valve, momentarily strong fluid movements may occur in the pipeline, which are registered by the measuring system. These totalized flow values lead to a false totalizer status, particularly during batching processes.



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

"Partially filled pipe detection" submenu

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



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 (→ 106).

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 (→ 107).

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 106).

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 (→ 106).

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 (→ 106).

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 106).

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 (→ 106).

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

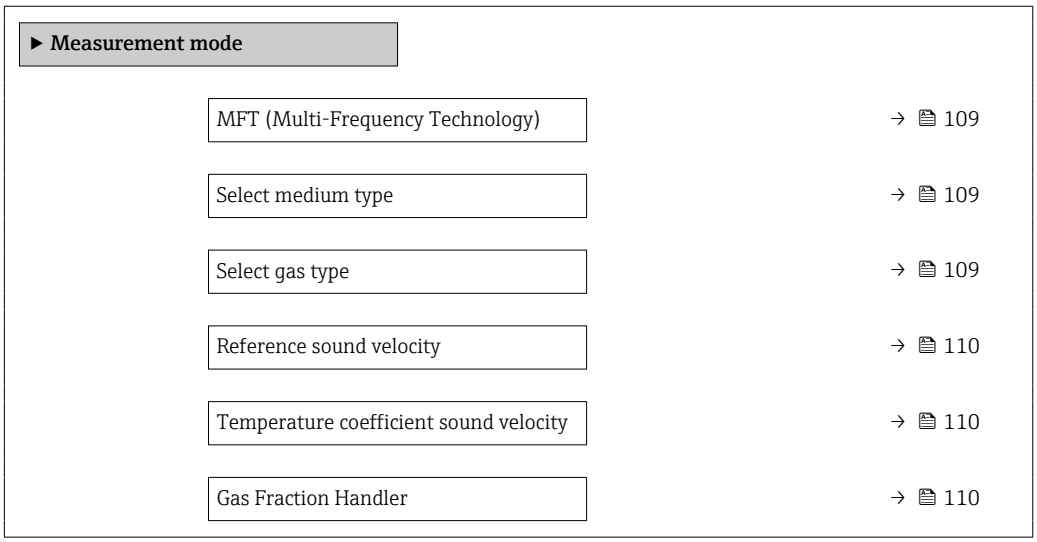
- Damping is disabled if **0** is entered (factory setting).
- Damping is enabled if the value entered is greater than **0**.
- The value entered depends on application-specific influence variables, such as the medium, nominal diameter, sensor etc.

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



MFT (Multi-Frequency Technology)

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

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

Selection
- No
- Yes

Factory setting Yes

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

Select medium type

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

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

Selection
- Liquid
- Gas
- Other

Factory setting Liquid

Select gas type

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

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

Description Select measured gas type.

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

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

Factory setting Methane CH4

Reference sound velocity

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

Prerequisite In the **Select gas type** parameter (→ 109), 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 (→ 109), 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
- Off
- Moderate
- Powerful

Factory setting
Moderate

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

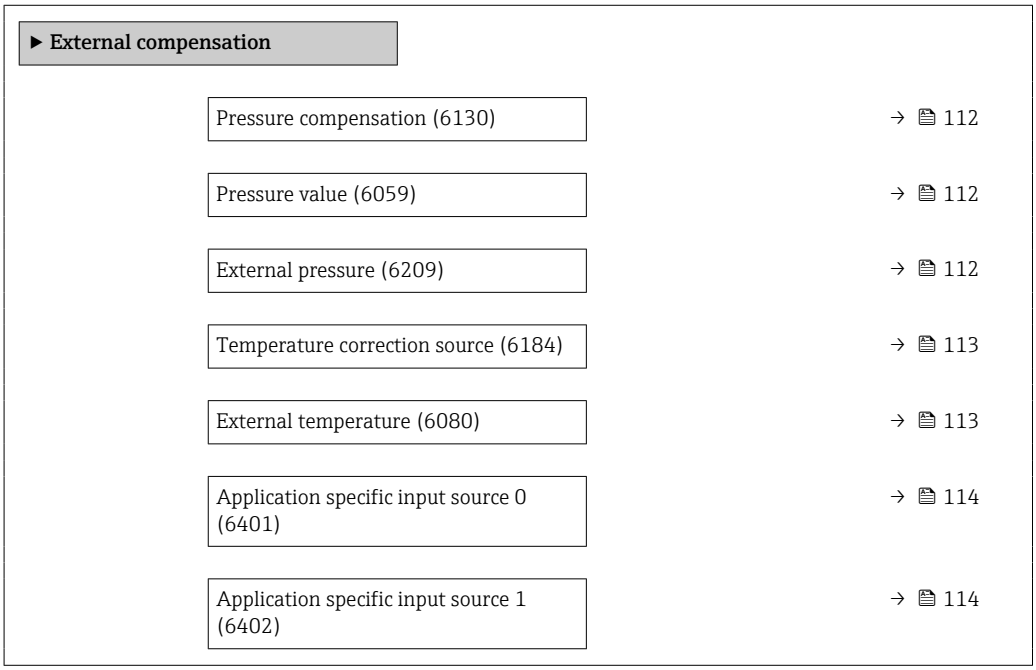
The influence of the disturbances can be configured in two steps via this switch:
- **Off** option: Deactivates the Gas Fraction Handler. When a second phase is present, large fluctuations of flow and density will occur.
- **Moderate** option: Use for applications with low level or intermittent levels of second phase.
- **Powerful** option: Use for applications with very significant levels of second phase.

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

Additional information in the **Medium index** submenu (→ 266)

3.2.5 "External compensation" submenu

Navigation Expert → Sensor → External comp.



Pressure compensation

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

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

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

Factory setting Off

Additional information *Selection*
- Fixed value
  A fixed pressure value is used for compensation: **Pressure value** parameter (→ 112)
- External value
  The pressure value read in via HART is used for compensation.
- **Current input 1** option, **Current input 2** option , **Current input 3** 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 (→ 112), 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 (→ 98)

External pressure

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

Prerequisite In the **Pressure compensation** parameter (→ 112), the **External value** option or the **Current input 1…n** option is selected.

* Visibility depends on order options or device settings

Description Displays the external pressure value.

Additional information *Dependency*

The unit is taken from the **Pressure unit** parameter (→ 98)

Temperature correction source

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

Description Use this function to select the temperature mode.

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

Factory setting Internal measured value

Additional information *Description*

Use this function to select the type of temperature compensation.

Selection

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

- Internal measured value
  The temperature value measured internally (temperature sensor of the measuring sensor) is used for compensation.
- External value
  The temperature value read in via HART is used for compensation.
- **Current input 1** option, **Current input 2** option, **Current input 3** 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 (→ 113), the **External value** option or the **Current input 1...n** option is selected.

Description Displays the external temperature.

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 98)

* Visibility depends on order options or device settings

Application specific input source 0

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

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

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

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

Factory setting Off

Application specific input source 1

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

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

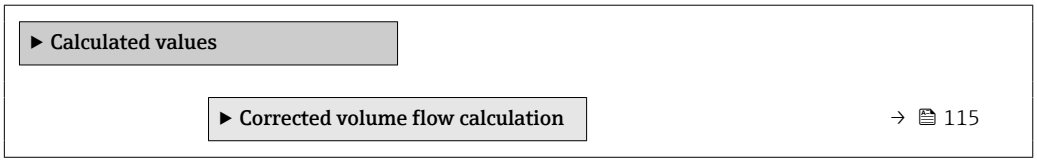
Description Select source for the input value 1 used for the application specific calculation.

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

Factory setting Off

3.2.6 "Calculated values" submenu

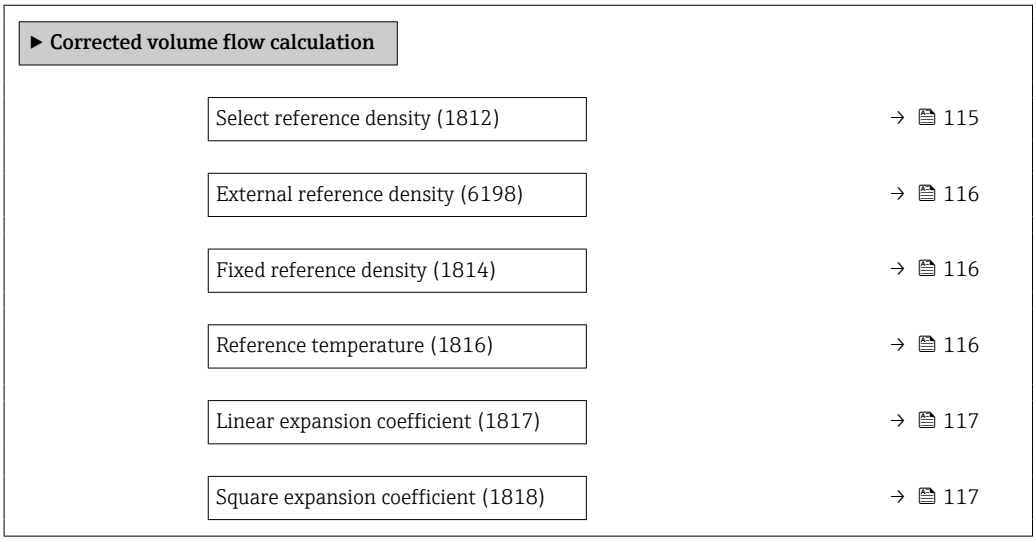
Navigation Expert → Sensor → Calculated value



* Visibility depends on order options or device settings

"Corrected volume flow calculation" submenu

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



Select reference density

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

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

Selection
- Fixed reference density
- Calculated reference density
- Current input 1 *
- Current input 2 *
- Current input 3 *

Factory setting Calculated reference density

Additional information *Selection*

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

Selecting this option means that the reference density is used, taking into account the values in table 53 E of API MPMS section 11.2. Temperature measurement (measured internally or read into the device from an external source→ 111→ 111) 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.

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

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 (→ 115):
- Current input 1 *
- Current input 2 *
- Current input 3 *

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

Additional information *Dependency*

The unit is taken from the **Reference density unit** parameter (→ 96)

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 (→ 115) 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 (→ 96)

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 (→ 115) parameter.

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

User entry −273.15 to 99 999 °C

* Visibility depends on order options or device settings

Factory setting

Country-specific:
- +20 °C
- +68 °F

Additional information

Dependency

The unit is taken from the **Temperature unit** parameter (→ 98)

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)
- Δt: t - t_N
- α: linear expansion coefficient of the fluid, unit = [1/K]; K = Kelvin
- β: square expansion coefficient of the fluid, unit = [1/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 (→ 115) 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 (→ 115) parameter.

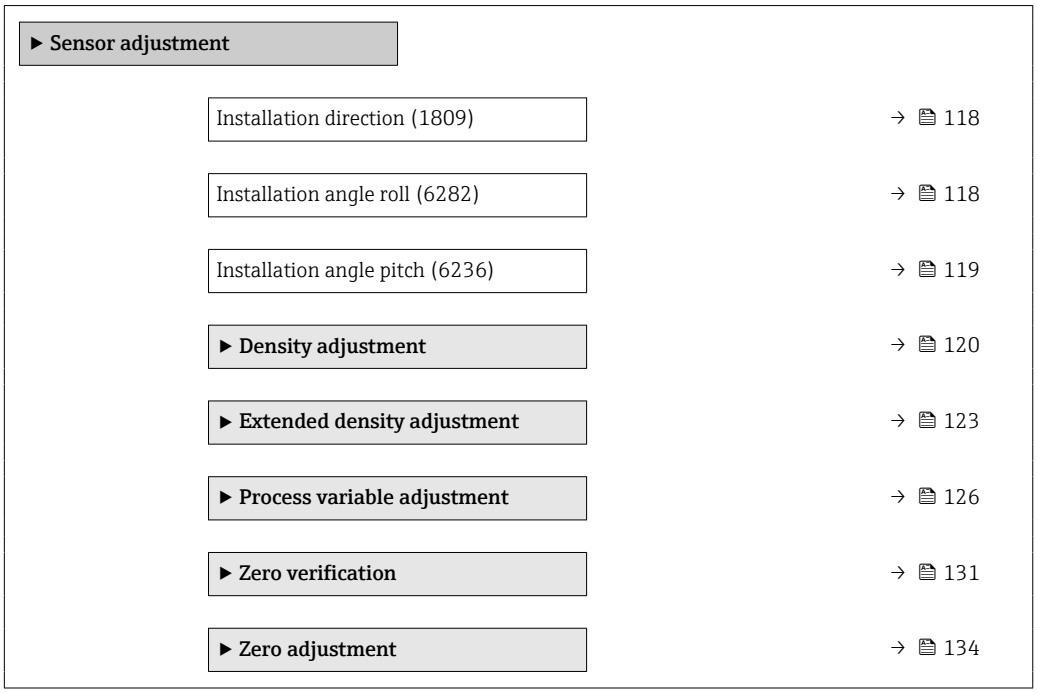
Description For fluid with a non-linear expansion pattern: use this function to enter a quadratic, fluid-specific expansion coefficient for calculating the reference density.

User entry Signed floating-point number

Factory setting 0.0 1/K²

3.2.7 "Sensor adjustment" submenu

Navigation Expert → Sensor → Sensor adjustm.



Installation direction

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

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

Selection
- Forward flow
- Reverse flow

Factory setting Forward flow

Additional information *Description*

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

Installation angle roll

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

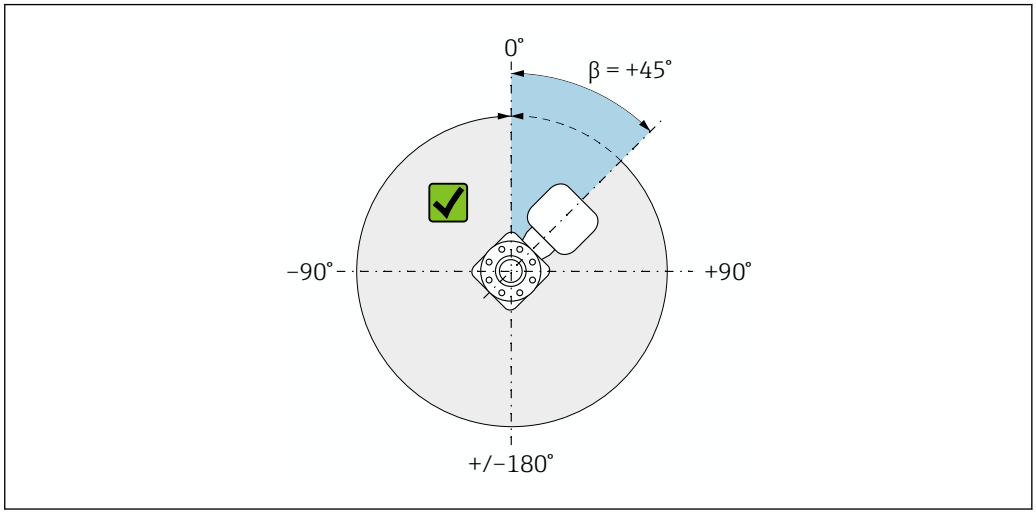
Prerequisite Available only with Promass Q.

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

User entry −180 to 180 °

Factory setting 0 °

Additional information The technically relevant roll angle is the angle shaded gray = −180 to +180 °.
Example (blue): Installation of the device with a roll angle β = +45 °



2 *Top view in flow direction*

Installation angle pitch

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

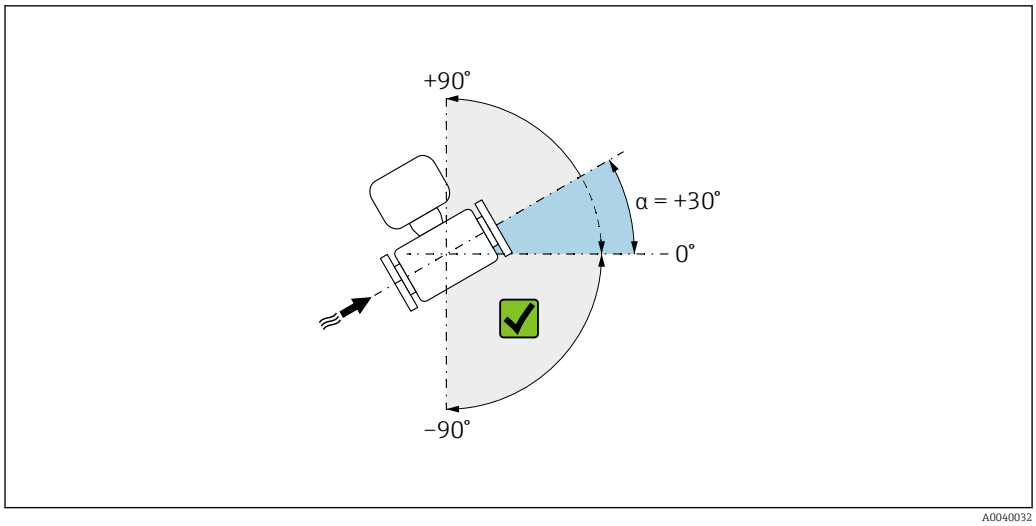
Prerequisite Available only with Promass Q.

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

User entry −90 to +90 °

Factory setting 0 °

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



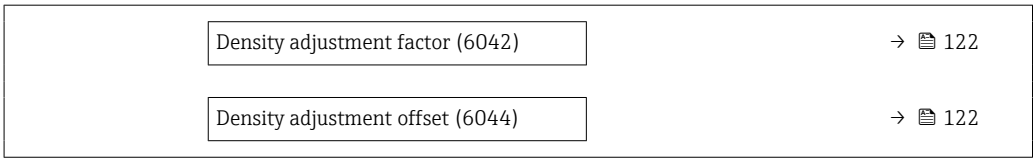
3 *Side view with flow direction from left to right.*

"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)	→ 121
Density setpoint 1 (6045)	→ 121
Density setpoint 2 (6046)	→ 121
Execute density adjustment (6041)	→ 122
Progress (2808)	→ 122



Density adjustment mode

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

Description Displays the method for field density adjustment.

Selection
- 1 point adjustment
- 2 point adjustment

Factory setting 1 point adjustment

Density setpoint 1

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

Description Displays the existing density value.

User entry The entry depends on the unit selected in the **Density unit** parameter (0555) (→ 95).

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) (→ 95).

Factory setting 1 kg/l

Execute density adjustment

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

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

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

Factory setting Ok

Progress

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

Description The progress of the process is indicated.

User interface 0 to 100 %

Density adjustment factor

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

Description Displays the current correction factor for the density.

User interface Signed floating-point number

Factory setting 1

Additional information Manual adjustment of the value: **Density factor** parameter (→ 129)

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

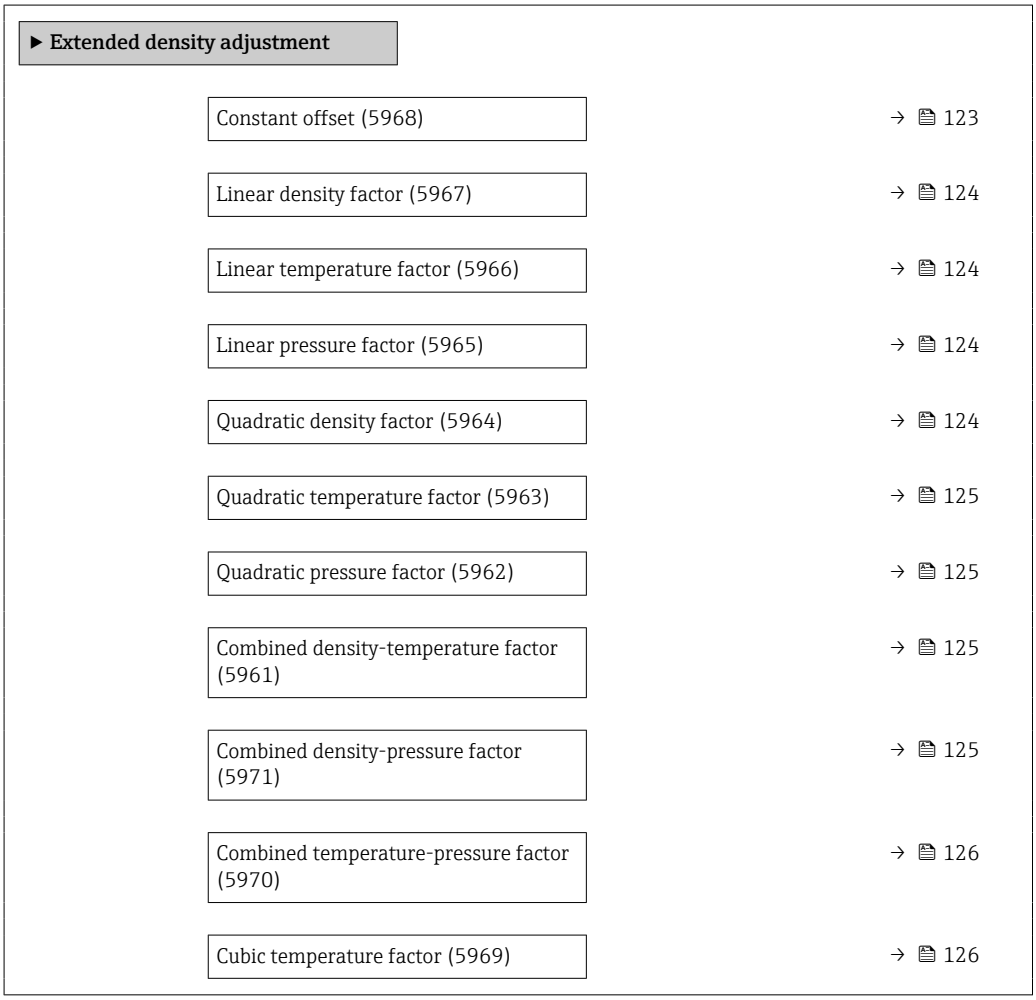
Factory setting 0

Additional information Manual adjustment of the value: **Density offset** parameter (→ 128)

"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



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.

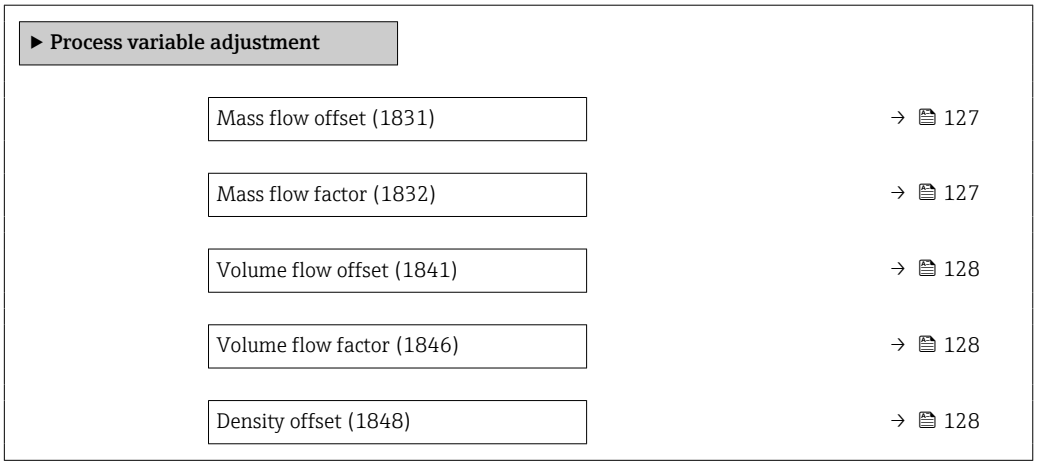
User entry Signed floating-point number

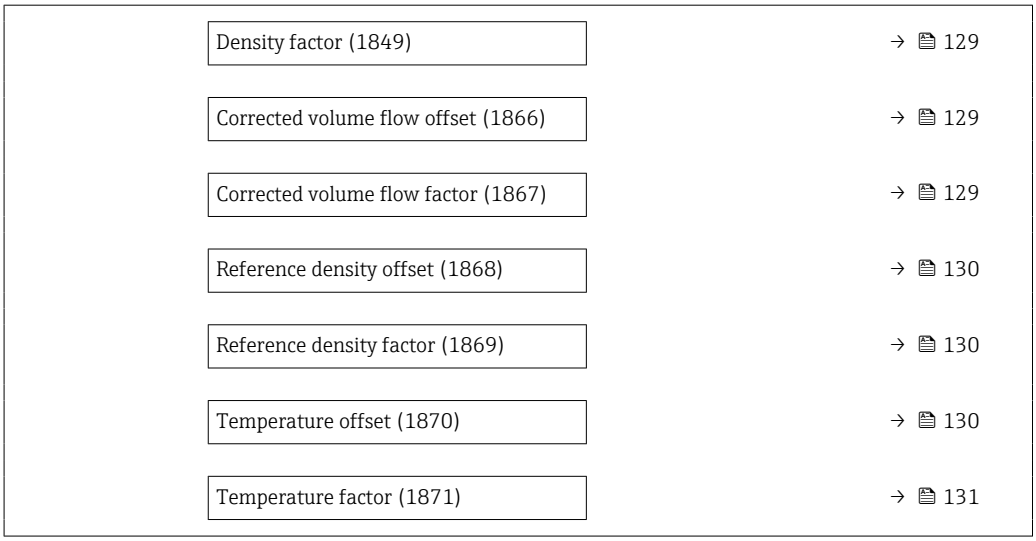
Factory setting 0 (kg/m³)/°C³

"Process variable adjustment" submenu

The adjustments to the offsets and factors in the **Process variable adjustment** submenu (→ 126) do not affect the calculated values, such as concentration, NSV.

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust





Mass flow offset

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

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

User entry Signed floating-point number

Factory setting 0 kg/s

Additional information *Description*

Corrected value = (factor × value) + offset

Mass flow factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Volume flow offset

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

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

User entry Signed floating-point number

Factory setting 0 m^3/s

Additional information *Description*

Corrected value = (factor × value) + offset

Volume flow factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Density offset

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

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

User entry Signed floating-point number

Factory setting 0 kg/m^3

Additional information *Description*

Corrected value = (factor × value) + offset

Density factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Corrected volume flow offset

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

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

User entry Signed floating-point number

Factory setting 0 Nm^3/s

Additional information *Description*

Corrected value = (factor × value) + offset

Corrected volume flow factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Reference density offset

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

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

User entry Signed floating-point number

Factory setting 0 kg/Nm³

Additional information *Description*

Corrected value = (factor × value) + offset

Reference density factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature offset

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

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

User entry Signed floating-point number

Factory setting 0 K

Additional information *Description*

Corrected value = (factor × value) + offset

Temperature factor

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

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

User entry Positive floating-point number

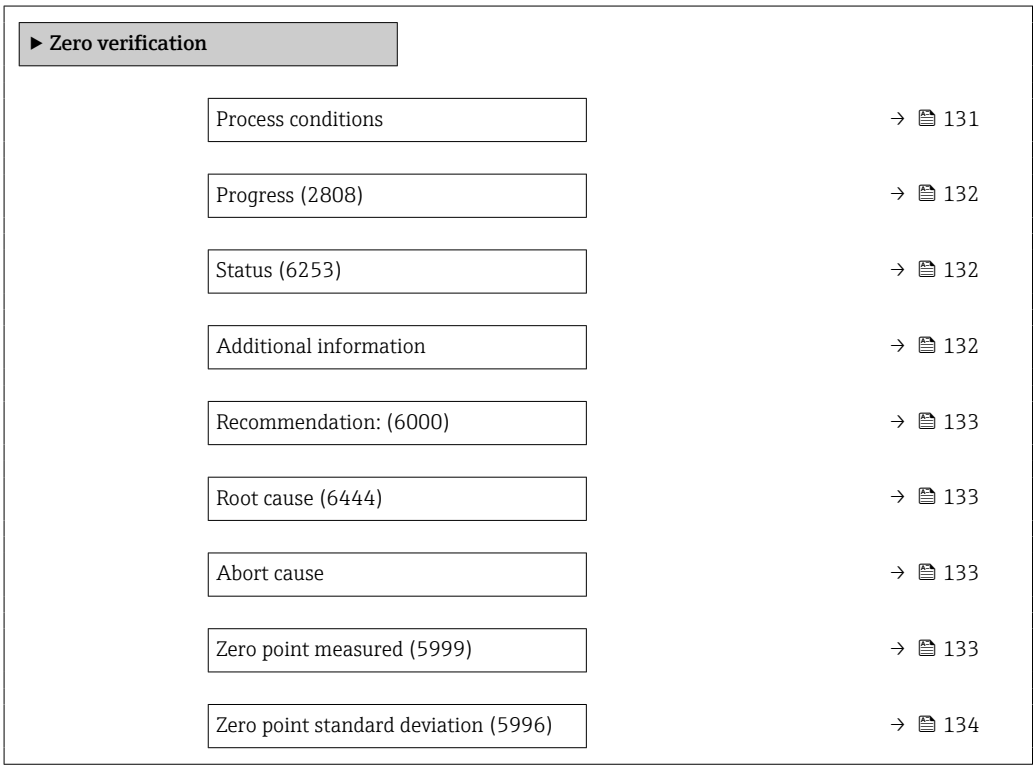
Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

"Zero verification" wizard

Navigation Expert → Sensor → Sensor adjustm. → ZeroVerification



Process conditions

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

Description Ensure process conditions as follows.

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

Factory setting –

Progress

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

Description The progress of the process is indicated.

User interface 0 to 100 %

Status

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

Description Shows the status of the process.

User interface
- Busy
- Failed
- Done

Factory setting –

Additional information

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

Description Indicate whether to display additional information.

Selection
- Hide
- Show

Factory setting Hide

Recommendation:

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

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

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

Factory setting –

Root cause

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

Description Shows the diagnostic and remedy.

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

Factory setting –

Abort cause

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

Description Indicates why the wizard was aborted.

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

Factory setting –

Zero point measured

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

Description Shows the zero point measured for the adjustment.

User interface Signed floating-point number

Factory setting –

Zero point standard deviation

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

Description Shows the standard deviation of the zero point measured.

User interface Positive floating-point number

Factory setting –

"Zero adjustment" wizard

Navigation Expert → Sensor → Sensor adjustm. → Zero adjustment

▶ Zero adjustment	
Process conditions	→ 135
Progress (2808)	→ 135
Status (6253)	→ 135
Root cause (6444)	→ 135
Abort cause	→ 136
Root cause (6444)	→ 135
Reliability of measured zero point (5982)	→ 136
Additional information	→ 136
Reliability of measured zero point (5982)	→ 136
Zero point measured (5999)	→ 136
Zero point standard deviation (5996)	→ 137
Select action (5995)	→ 137

Process conditions

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

Description Ensure process conditions as follows.

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

Factory setting –

Progress

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

Description The progress of the process is indicated.

User interface 0 to 100 %

Status

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

Description Shows the status of the process.

User interface
- Busy
- Failed
- Done

Factory setting –

Root cause

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

Description Shows the diagnostic and remedy.

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

Abort cause

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

Description Indicates why the wizard was aborted.

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

Factory setting –

Reliability of measured zero point

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

Description Indicates the reliability of the zero point measured.

User interface
- Not done
- Good
- Uncertain

Factory setting –

Additional information

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

Description Indicate whether to display additional information.

Selection
- Hide
- Show

Factory setting Hide

Zero point measured

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

Description Shows the zero point measured for the adjustment.

User interface Signed floating-point number

Factory setting –

Zero point standard deviation

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

Description Shows the standard deviation of the zero point measured.

User interface Positive floating-point number

Factory setting 0

Select action

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

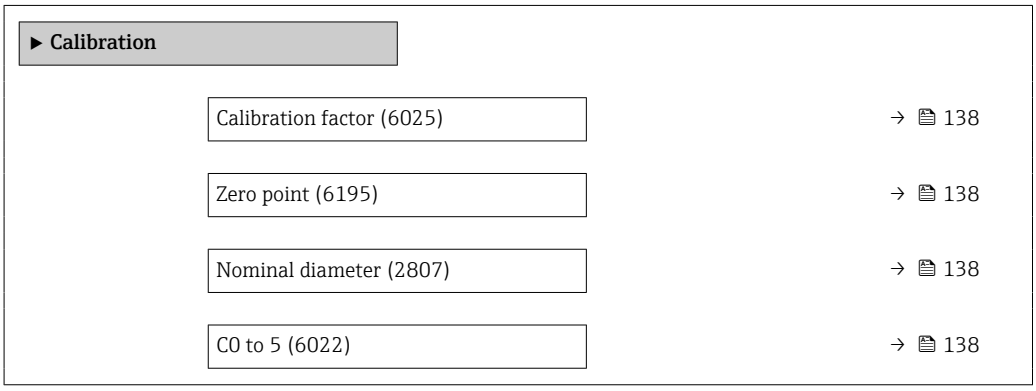
Description Select the zero point value to apply.

Selection
- 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 *Description*

The value is also specified on the sensor nameplate.

C0 to 5

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

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

User interface Signed floating-point number

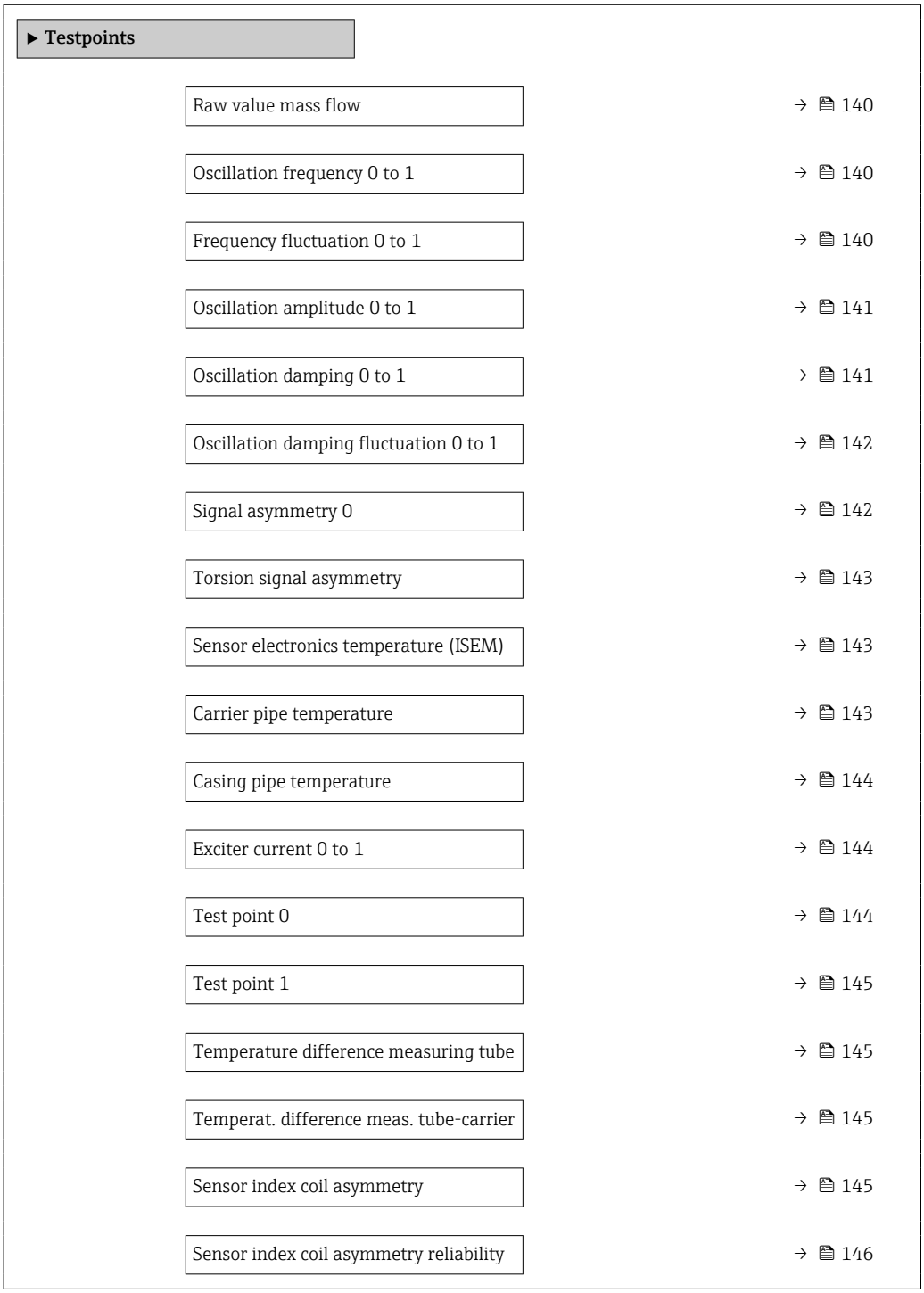
Factory setting Depends on nominal diameter and calibration.

3.2.9 "Testpoints" submenu

The **Testpoints** submenu (→ 139) is used to test the measuring device or the application.

Navigation Diagnostics → Testpoints

Navigation Expert → Sensor → Testpoints



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

Dependency
The unit is taken from the **Mass flow unit** parameter (→ 90)

Oscillation frequency 0 to 1

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

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

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

User interface
Positive floating point number

Frequency fluctuation 0 to 1

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

Prerequisite
Order code for "Application package", option EB "Heartbeat Verification + Monitoring" available:
- Frequency fluctuation 0 is available for all Promass sensors.
- Frequency fluctuation 1 is only available for the Promass I and Promass Q sensors.

Description
Shows the current fluctuation of the oscillation frequency.

User interface
Signed floating-point number

Oscillation amplitude 0 to 1

Navigation

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:

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

Description

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

User interface

Signed floating-point number

Additional information

Description

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

Limit values

5 %

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

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

Oscillation damping 0 to 1

Navigation

Diagnostics → Testpoints → Osc. damping 0 to 1 (6038)

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

Prerequisite

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

Description

Displays the current oscillation damping.

User interface

Positive floating-point number

Additional information

Description

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

Limit values

The damping depends on the transmitter type and model and changes with the type of medium (differences between models: approx. ±30 %). The minimum value is reached when the sensor is empty. The value can reach several 1 000 in the case of viscous media, and even several 10 000 in the case of multi-phase media. In such cases, the relative oscillation amplitude should also be used for diagnosis.

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

Oscillation damping fluctuation 0 to 1

Navigation

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

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

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

User interface
Signed floating-point number

Sensor electronics temperature (ISEM)

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

Description
Displays the current temperature inside the main electronics.

User interface
Signed floating-point number

Additional information
NOTE!
Stay within the specified ambient temperature range.

Dependency
The unit is taken from the **Temperature unit** parameter (→ 98)

Carrier pipe temperature

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

Prerequisite
- Order code for "Application package", option EB "Heartbeat Verification + Monitoring"
- If the carrier tube temperature is provided:
  - Promass A
  - Promass F
  - Promass H
  - Promass I
  - Promass O
  - Promass P
  - Promass Q
  - Promass S
  - Promass X

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)

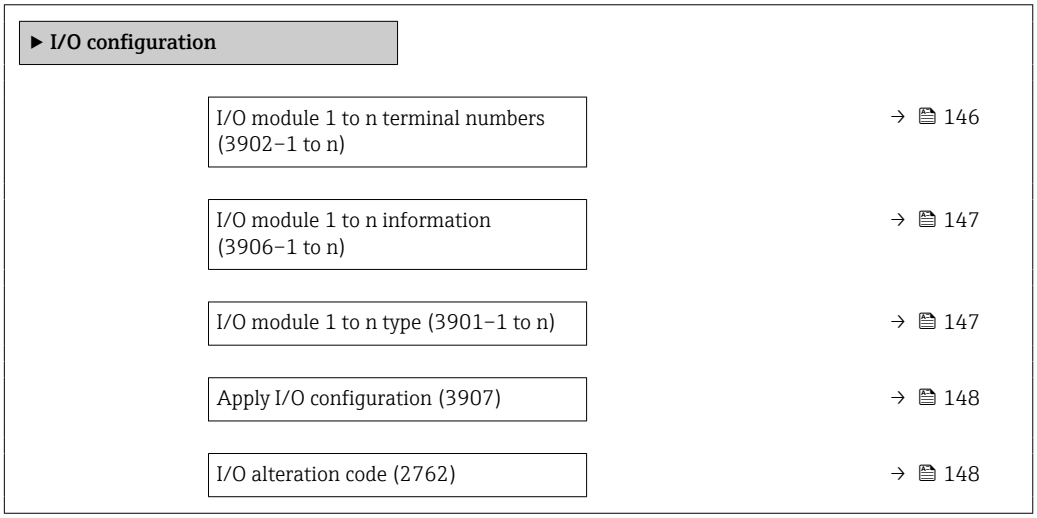
Description Indicates the reliability of the sensor index coil asymmetry value (SICA) currently measured.

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)
- 20-21 (I/O 4) *

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"
- "Output; input 4", 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.

* Visibility depends on order options or device settings

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

Factory setting Off

Apply I/O configuration

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

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

Selection
- No
- Yes

Factory setting No

I/O alteration code

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

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

User entry Positive integer

Factory setting 0

Additional information *Description*

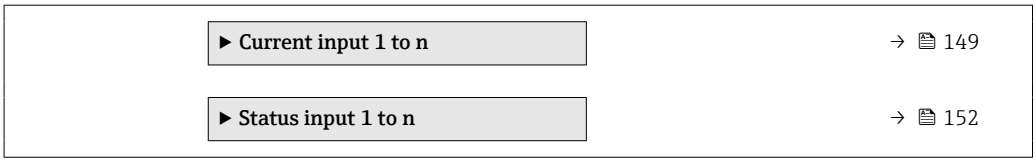
The I/O configuration is changed in the **I/O module type** parameter (→ 147).

3.4 "Input" submenu

Navigation Expert → Input

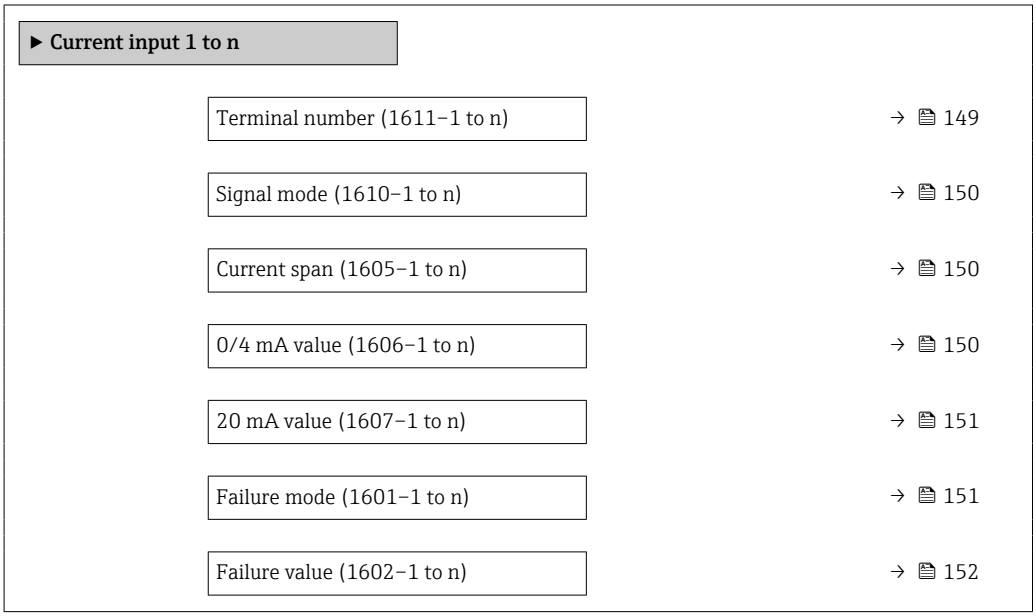
▶ **Input**

* Visibility depends on order options or device settings



3.4.1 "Current input 1 to n" submenu

Navigation Expert → Input → Current input 1 to n



Terminal number

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

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

User interface
- Not used
- 24-25 (I/O 2)
- 22-23 (I/O 3)
- 20-21 (I/O 4) *

Additional information *"Not used" option*

The current input module does not use any terminal numbers.

* Visibility depends on order options or device settings

Signal mode

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

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

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

Selection
- Passive
- Active *

Factory setting Active

Current span

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

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

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

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

Additional information *Examples*

Sample values for the current range: **Current span** parameter (→ 157)

0/4 mA value

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

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

User entry Signed floating-point number

Factory setting 0

* Visibility depends on order options or device settings

Additional information

Current input behavior

The current input behaves differently depending on the settings configured in the following parameters:
- Current span (→ 150)
- Failure mode (→ 151)

Configuration examples

Pay attention to the configuration examples for **4 mA value** parameter (→ 159).

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 (→ 159).

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 (→ 150).

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 (→ 152)).

Failure value

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

Prerequisite In the **Failure mode** parameter (→ 151), the **Defined value** option is selected.

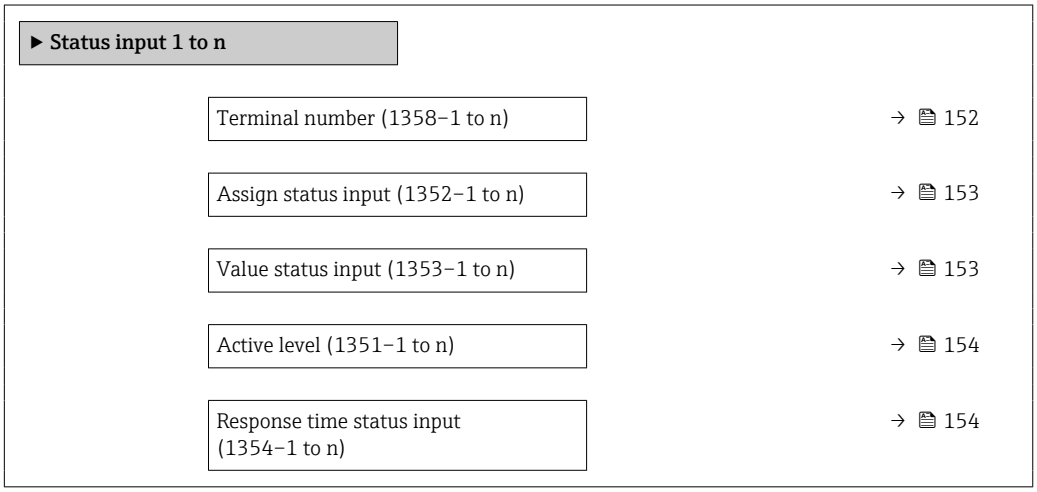
Description Use this function to enter the value that the device uses if it does not receive an input signal from the external device, or if the input signal is invalid.

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)
- 20-21 (I/O 4) *

Additional information *"Not used" option*

The status input module does not use any terminal numbers.

* Visibility depends on order options or device settings

Assign status input

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

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

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

Factory setting Off

Additional information *Custody transfer mode*

Only available for Promass F, O, Q and X.

NOTE!

Before enabling the measuring device for custody transfer mode, make sure that the **Off** option is selected in the Assign status input.

For detailed information on custody transfer mode, see the Special Documentation for the device → 7

Additional information *Selection*
- Off
  The status input is switched off.
- Reset totalizer 1…3
  The individual totalizers are reset.
- Reset all totalizers
  All totalizers are reset.
- Flow override
  The Flow override (→ 102) is activated.

Note on the Flow override (→ 102):
- The Flow override (→ 102) 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.

* Visibility depends on order options or device settings

User interface
- 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
- High
- Low

Factory setting High

Response time status input

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

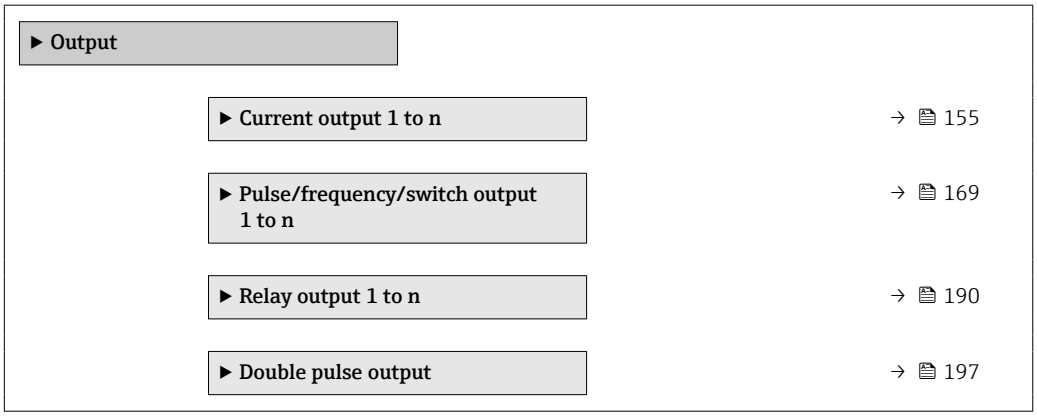
Description Use this function to enter the minimum time period for which the input signal level must be present before the selected function is activated.

User entry 5 to 200 ms

Factory setting 50 ms

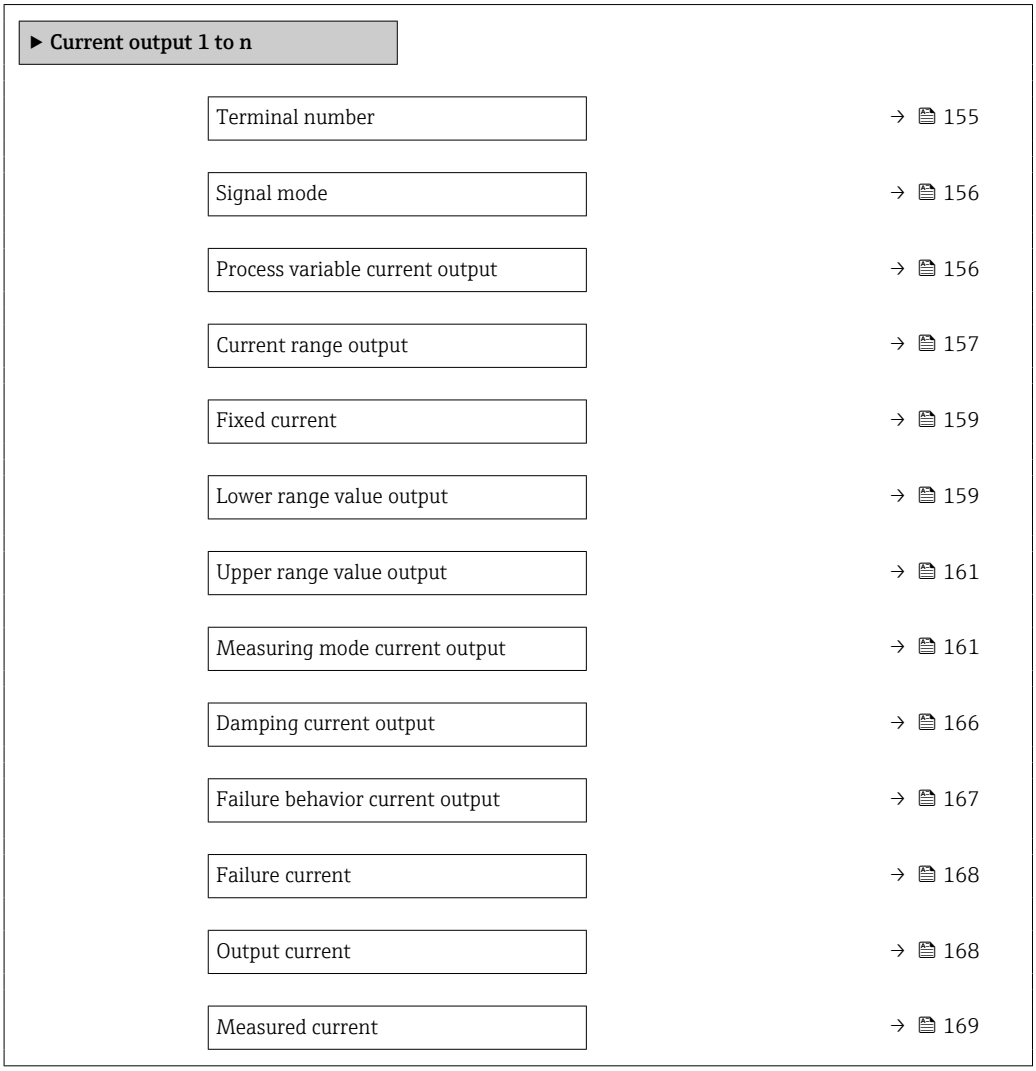
3.5 "Output" submenu

Navigation Expert → Output



3.5.1 "Current output 1 to n" submenu

Navigation Expert → Output → Curr.output 1 to n



Terminal number

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

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

User interface
- Not used
- 26-27 (I/O 1)
- 24-25 (I/O 2)
- 22-23 (I/O 3)
- 20-21 (I/O 4) *

Additional information *"Not used" option*

The current output module does not use any terminal numbers.

* Visibility depends on order options or device settings

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 (→ 19)

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 *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- 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 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 *
- Oscillation frequency 1 *
- Frequency fluctuation 0 *
- Oscillation amplitude 0 *
- Oscillation amplitude 1 *
- Frequency fluctuation 1 *
- Oscillation damping 1 *
- Oscillation damping fluctuation 0 *
- Oscillation damping fluctuation 1 *
- Exciter current 1 *
- HBSI *
- 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.

* Visibility depends on order options or device settings

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

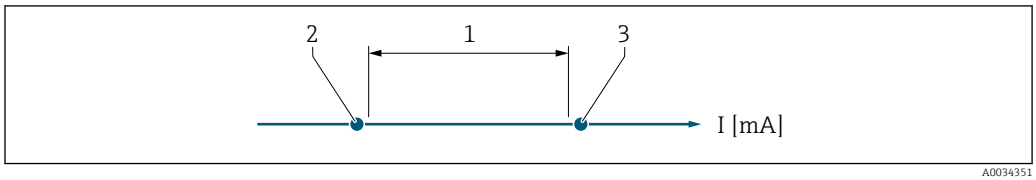
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→ 167).
- If the measured value is outside the measuring range, the ⚠**S441 Current output 1 to n** diagnostic message is displayed.
- The measuring range is specified via the **Lower range value output** parameter (→ 159) and **Upper range value output** parameter (→ 161).

"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 (→ 159).

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 (→ 157).

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 (→ 157):
- 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 (→ 156). 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 (→ 161).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 156).

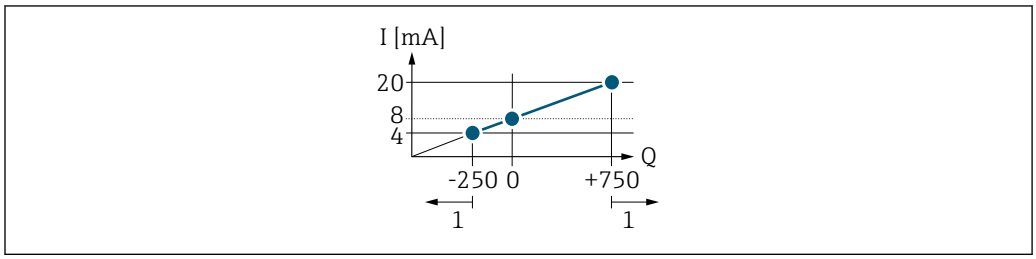
Current output behavior

The current output behaves differently depending on the settings configured in the following parameters:
- Current span (→ 157)
- Failure mode (→ 167)

Configuration examples

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

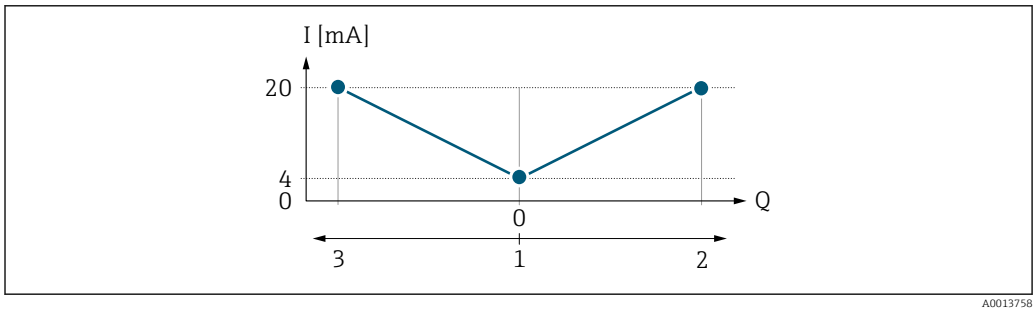
Configuration example A
Measurement mode with **Forward flow** option
- **Lower range value output** parameter (→ 159) = not equal to zero flow (e.g. −250 m^3/h)
- **Upper range value output** parameter (→ 161) = not equal to zero flow (e.g. +750 m^3/h)
- Calculated current value = 8 mA at zero flow



Q Flow
I Current
1 Measuring range is exceeded or undershot

The operational range of the measuring device is defined by the values entered for the **Lower range value output** parameter (→ 159) and **Upper range value output** parameter (→ 161). 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 (→ 159) and **Upper range value output** parameter (→ 161) must have the same algebraic sign. The value for the **Upper range value output** parameter (→ 161) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 161) (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 → 161.

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 (→ 157):
- 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 → 335

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 156). 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 (→ 159).

Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 156).

Example

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

If the **Forward/Reverse flow** option is selected in the **Measuring mode** parameter (→ 161), different algebraic signs cannot be entered for the values for the **Lower range value output** parameter (→ 159) and **Upper range value output** parameter (→ 161). The ⚠**S441 Current output 1 to n** diagnostic message is displayed.

Configuration examples

Pay attention to the configuration examples for the **Lower range value output** parameter (→ 159).

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 (→ 156):
- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *

* Visibility depends on order options or device settings

- Carrier mass flow *
- Density
- Reference density
- Concentration *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- Temperature
- Carrier pipe temperature *
- Electronics temperature
- Oscillation frequency 0
- Oscillation frequency 1 *
- Oscillation amplitude 0 *
- Oscillation amplitude 1 *
- Frequency fluctuation 0
- Frequency fluctuation 1 *
- Oscillation damping 0
- Oscillation damping 1 *
- Oscillation damping fluctuation 0
- Oscillation damping fluctuation 1 *
- Signal asymmetry
- Exciter current 0
- Exciter current 1 *
- HBSI *

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 19)

One of the following options is selected in the **Current span** parameter (→ 157):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description

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

Selection

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

Factory setting

Forward flow

Additional information

Description

The process variable that is assigned to the current output via the **Assign current output** parameter (→ 156) is displayed below the parameter.

"Forward flow" option

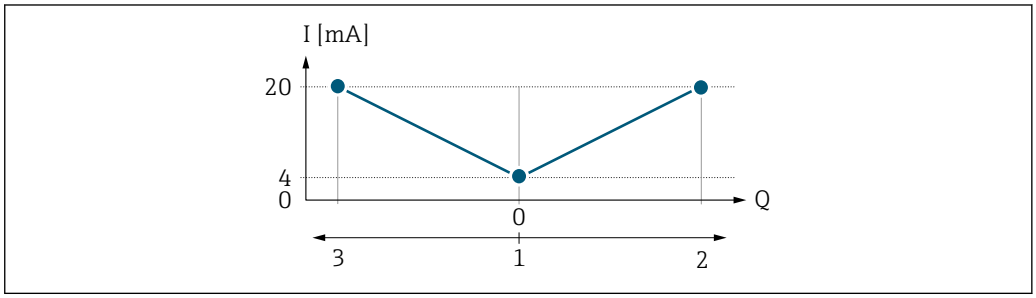
The current output signal is proportional to the process variable assigned. The measuring range is defined by the values that are assigned to the **Lower range value output** parameter (→ 159) and the **Upper range value output** parameter (→ 161).

* Visibility depends on order options or device settings

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

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

"Forward/Reverse flow" option



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

- The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **Lower range value output** parameter (→ 🖹 159) and **Upper range value output** parameter (→ 🖹 161) must have the same algebraic sign.
- The value for the **Upper range value output** parameter (→ 🖹 161) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 🖹 161) (e.g. forward flow).

"Reverse flow compensation" option

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

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

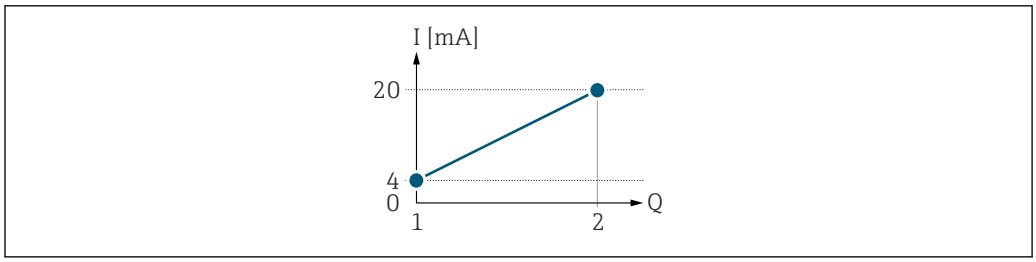
In the event of prolonged and undesired reverse flow, flow values can accumulate in the buffer memory. Due to the configuration of the current output, these values are not factored in, however, i.e. there is no compensation for the reverse flow.

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

Examples of how the current output behaves

Example 1

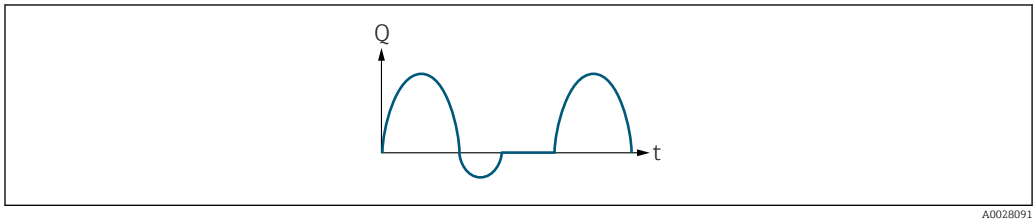
Defined measuring range: lower range value and upper range value with the **same** sign



4 Measuring range

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

With the following flow response:

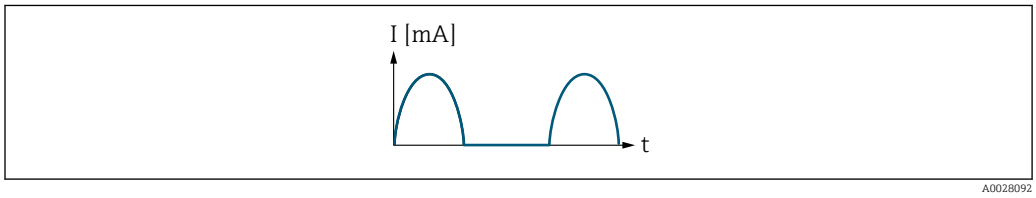


5 Flow response

Q Flow
t Time

With **Forward flow** option

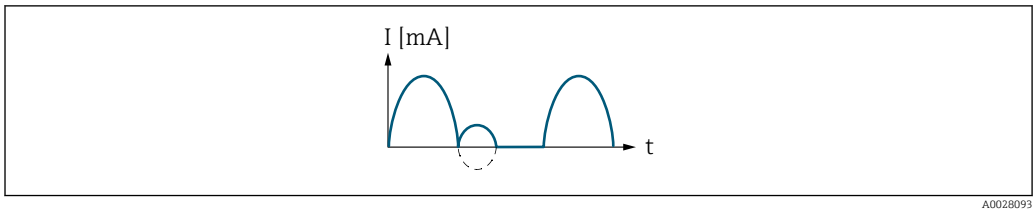
The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output:.



I Current
t Time

With **Forward/Reverse flow** option

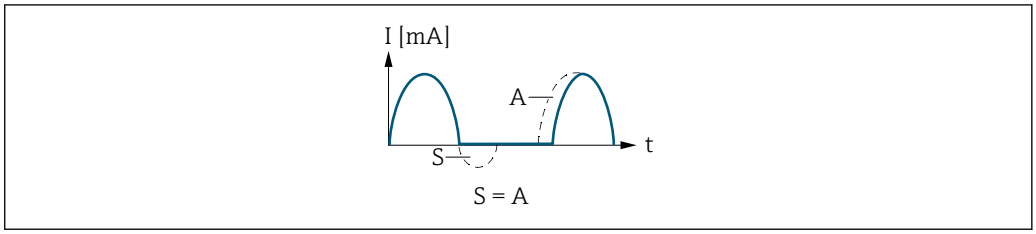
The current output signal is independent of the direction of flow.



I Current
t Time

With **Reverse flow compensation** option

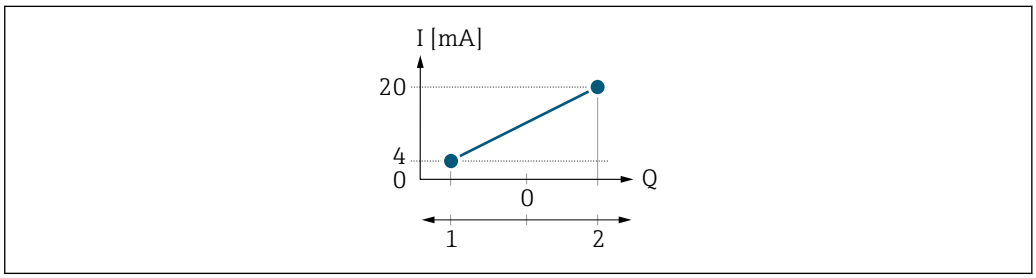
Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.



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

Example 2

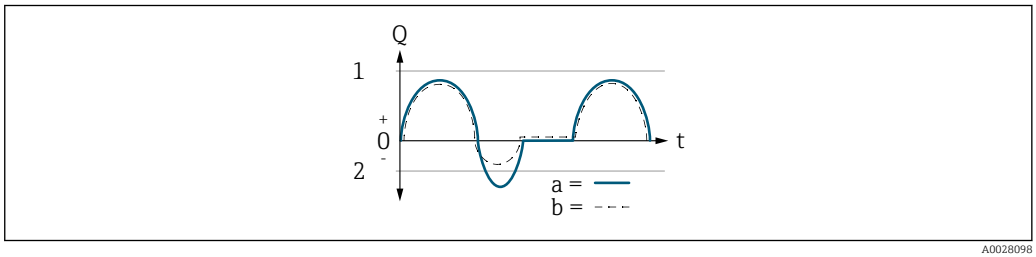
Defined measuring range: lower range value and upper range value with **different** signs



6 *Measuring range*

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

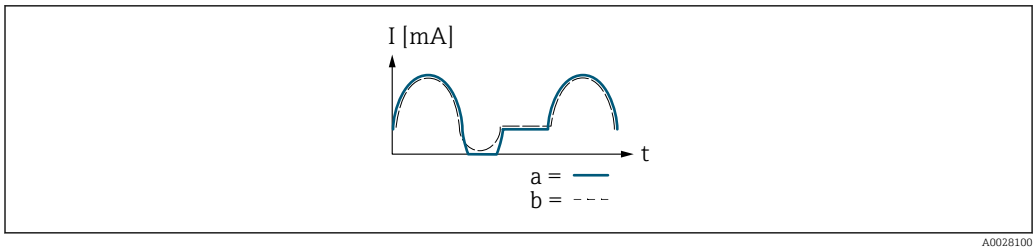
With flow a (–) outside, b (- -) inside the measuring range



Q *Flow*
t *Time*
1 *Lower range value (Start of measuring range output)*
2 *Upper range value (end of measuring range output)*

With **Forward flow** option

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



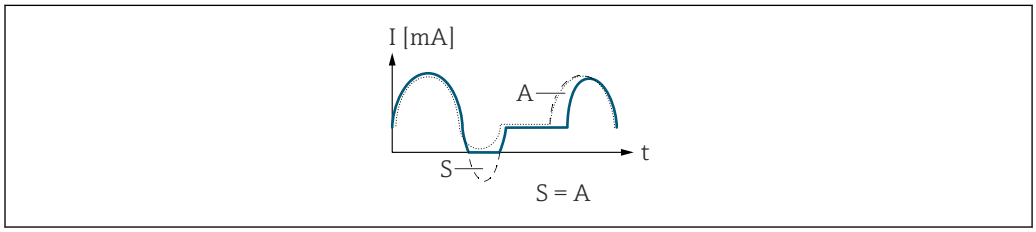
I Current
t Time

With **Forward/Reverse flow** option

This option cannot be selected here since the values for the **Lower range value output** parameter (→ 159) and **Upper range value output** parameter (→ 161) 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 (→ 156) and one of the following options is selected in the **Current span** parameter (→ 157):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description Use this function to enter a time constant for the reaction time of the current output signal to fluctuations in the measured value caused by process conditions.

User entry 0.0 to 999.9 s

Factory setting 1.0 s

Additional information *User entry*

Use this function to enter a time constant (PT1 element [6]) for current output damping:
- If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables.
- On the other hand, the current output reacts more slowly if a high time constant is entered.

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

Failure behavior current output

Navigation Expert → Output → Curr.output 1 to n → Fail.behav.out (0364–1 to n)

Prerequisite A process variable is selected in the **Assign current output** parameter (→ 156) and one of the following options is selected in the **Current span** parameter (→ 157):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description Use this function to select the value of the current output in the event of a device alarm.

Selection
- Min.
- Max.
- Last valid value
- Actual value
- Fixed value

Factory setting Max.

6) proportional transmission behavior with first order delay

Additional information

Description

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

"Min." option

The current output adopts the value of the lower level for signal on alarm.

The signal on alarm level is defined via the **Current span** parameter (→ 157).

"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 (→ 157).

"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 (→ 168).

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 (→ 167).

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)	→ 170
Signal mode (0490–1 to n)	→ 171
Operating mode (0469–1 to n)	→ 171
Assign pulse output (0460–1 to n)	→ 173
Pulse scaling (0455–1 to n)	→ 173
Pulse width (0452–1 to n)	→ 174
Measuring mode (0457–1 to n)	→ 175
Failure mode (0480–1 to n)	→ 175
Pulse output 1 to n (0456–1 to n)	→ 176
Assign frequency output (0478–1 to n)	→ 177
Minimum frequency value (0453–1 to n)	→ 178
Maximum frequency value (0454–1 to n)	→ 178
Measuring value at minimum frequency (0476–1 to n)	→ 179
Measuring value at maximum frequency (0475–1 to n)	→ 179

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)
- 20-21 (I/O 4) *

* Visibility depends on order options or device settings

Additional information *"Not used" option*

The pulse/frequency/switch output module does not use any terminal numbers.

Signal mode

Navigation Expert → Output → PFS output 1 to n → Signal mode (0490–1 to n)

Description Use this function to select the signal mode for the pulse/frequency/switch output.

Selection
- Passive
- Active *
- Passive NE

Factory setting Passive

Operating mode

Navigation Expert → Output → PFS output 1 to n → Operating mode (0469–1 to n)

Description Use this function to select the operating mode of the output as a pulse, frequency or switch output.

Selection
- Pulse
- Frequency
- Switch

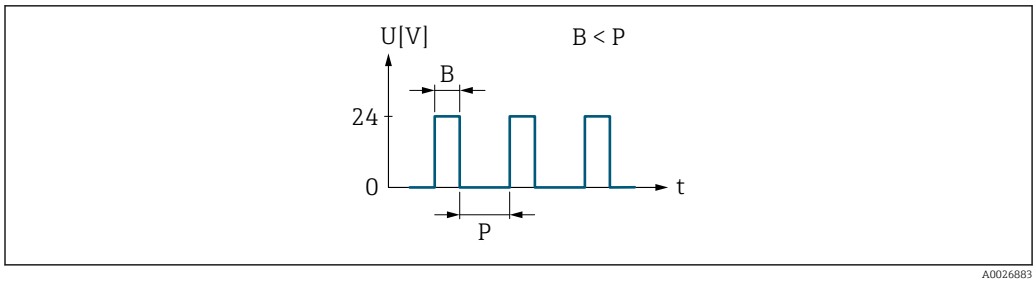
Factory setting Pulse

Additional information *"Pulse" option*

Quantity-dependent pulse with configurable pulse width
- Whenever a specific mass, volume, corrected volume, target mass or carrier mass is reached (pulse value), a pulse is output, the duration of which was set previously (pulse width).
- The pulses are never shorter than the set duration.

Example
- Flow rate approx. 100 g/s
- Pulse value 0.1 g
- Pulse width 0.05 ms
- Pulse rate 1 000 Impuls/s

* Visibility depends on order options or device settings



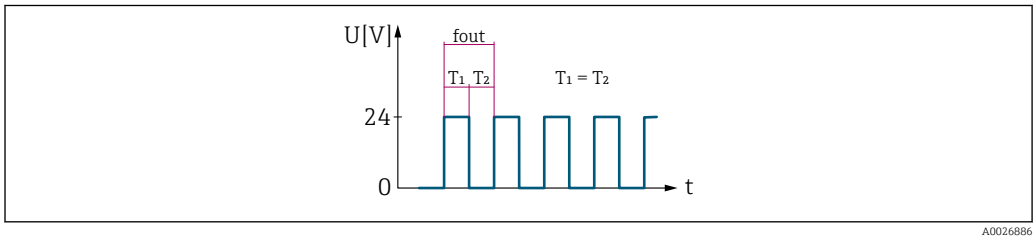
7 Quantity-proportional pulse (pulse value) with pulse width to be configured

B Pulse width entered
P Pauses between the individual pulses

"Frequency" option

Flow-proportional frequency output with on/off ratio of 1:1
An output frequency is output that is proportional to the value of a process variable, such as mass flow, volume flow, corrected volume flow, target mass flow, carrier mass flow, density, reference density, concentration, dynamic viscosity, kinematic viscosity, temperature-compensated dynamic viscosity, temperature-compensated kinematic viscosity, temperature, carrier tube temperature, electronics temperature, oscillation frequency, frequency fluctuation, oscillation amplitude, oscillation damping, oscillation damping fluctuation, signal asymmetry or excitation current.

Example
- Flow rate approx. 100 g/s
- Max. frequency 10 kHz
- Flow rate at max. frequency 1 000 g/s
- Output frequency approx. 1 000 Hz

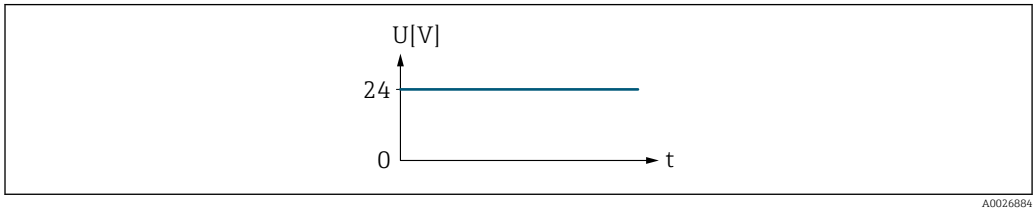


8 Flow-proportional frequency output

"Switch" option

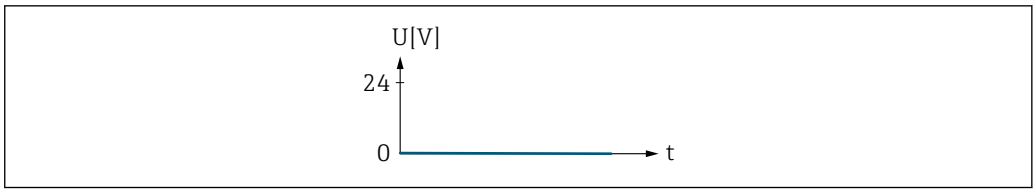
Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)

Example
Alarm response without alarm



9 No alarm, high level

Example
Alarm response in case of alarm



10 Alarm, low level

Assign pulse output

Navigation Expert → Output → PFS output 1 to n → Assign pulse (0460–1 to n)

Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 171).

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

Selection
- Off
- Mass flow
- Volume flow
- Corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *

Factory setting Off

Pulse scaling

Navigation Expert → Output → PFS output 1 to n → Pulse scaling (0455–1 to n)

Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 171) and a process variable is selected in the **Assign pulse output** parameter (→ 173).

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

* Visibility depends on order options or device settings

User entry Positive floating point number

Factory setting Depends on country and nominal diameter→ 336

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 (→ 171) and a process variable is selected in the **Assign pulse output** parameter (→ 173).

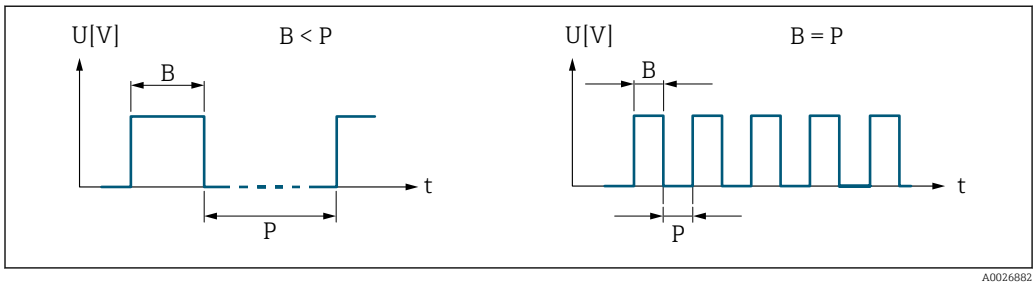
Description Use this function to enter the duration of the output pulse.

User entry 0.05 to 2 000 ms

Factory setting 100 ms

Additional information *Description*

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



B Pulse width entered
P Pauses between the individual pulses

Example

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

Measuring mode

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

Prerequisite In the **Operating mode** parameter (→ 171), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse output** parameter (→ 173):
- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *
- Carrier mass flow *

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

Selection
- Forward flow
- Forward/Reverse flow
- Reverse flow
- Reverse flow compensation

Factory setting Forward flow

Additional information *Selection*
- Forward flow
  Positive flow is output, negative flow is not output.
- Forward/Reverse flow
  Positive and negative flow are output (absolute value), but a distinction is not made between positive and negative flow.
- Reverse flow
  Negative flow is output, positive flow is not output.
- Reverse flow compensation
  The flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s.

For a detailed description of the options available, see the **Measuring mode** parameter (→ 161)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 161)

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 (→ 171) and a process variable is selected in the **Assign pulse output** parameter (→ 173).

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

* Visibility depends on order options or device settings

Selection
- Actual value
- No pulses

Factory setting
No pulses

Additional information
Description

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

Selection
- Actual value
  In the event of a device alarm, the pulse output continues on the basis of the current flow measurement. The fault is ignored.
- No pulses
  In the event of a device alarm, the pulse output is "switched off".

NOTICE! A device alarm is a measuring device error that must be taken seriously. It can affect the measurement quality such that the quality can no longer be guaranteed. The **Actual value** option is only recommended if it can be guaranteed that all possible alarm conditions will not affect the measurement quality.

Pulse output 1 to n

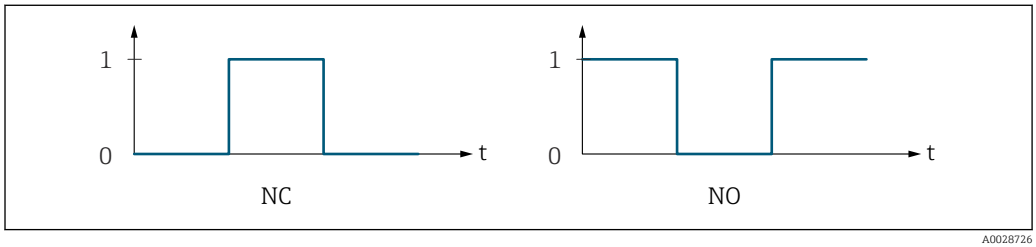
Navigation
Expert → Output → PFS output 1 to n → Pulse output 1 to n (0456–1 to n)

Prerequisite
The **Pulse** option is selected in the **Operating mode** parameter (→ 171) 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 (→ 190) 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 (→ 175)) 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 (→ 171), the **Frequency** option is selected.

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

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 19)

Selection

- Off
- Mass flow
- Volume flow
- Corrected volume flow *
- Density
- Reference density *
- Time period signal frequency (TPS) *
- Temperature
- Pressure
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- 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 *
- 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
- Exciter current 1 *
- Oscillation damping 0

* Visibility depends on order options or device settings

- 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 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 (→ 171) and a process variable is selected in the **Assign frequency output** parameter (→ 177).

Description Use this function to enter the minimum frequency.

User entry 0.0 to 10 000.0 Hz

Factory setting 0.0 Hz

Maximum frequency value

Navigation Expert → Output → PFS output 1 to n → Max. freq. value (0454–1 to n)

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 171) and a process variable is selected in the **Assign frequency output** parameter (→ 177).

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

* Visibility depends on order options or device settings

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 (→ 171) and a process variable is selected in the **Assign frequency output** parameter (→ 177).

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 (→ 177).

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 (→ 171) and a process variable is selected in the **Assign frequency output** parameter (→ 177).

Description Use this function to enter the measured value for the end value frequency.

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter

Additional information *Description*

Use this function to enter the maximum measured value at the maximum frequency. The selected process variable is output as a proportional frequency.

Dependency

The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 177).

Measuring mode

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

Prerequisite In the **Operating mode** parameter (→ 171), the **Frequency** option is selected, and one of the following options is selected in the **Assign frequency output** parameter (→ 177):
- Mass flow
- Volume flow
- Corrected volume flow

- Target mass flow *
- Carrier mass flow *
- Density
- Reference density
- Concentration *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- Temperature
- Carrier pipe temperature *
- Electronics temperature
- Oscillation frequency 0
- Oscillation frequency 1 *
- Frequency fluctuation 0
- Frequency fluctuation 1 *
- Oscillation amplitude 0 *
- Oscillation amplitude 1 *
- Oscillation damping 0
- Oscillation damping 1 *
- Oscillation damping fluctuation 0
- Oscillation damping fluctuation 1 *
- Signal asymmetry
- Exciter current 0
- Exciter current 1 *

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 19)

Description

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

Selection

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

Factory setting

Forward flow

Additional information

Selection

For a detailed description of the options available, see the **Measuring mode** parameter (→ 161)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 161)

* Visibility depends on order options or device settings

Damping output

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

Prerequisite In the **Operating mode** parameter (→ 171), the **Frequency** option is selected, and one of the following options is selected in the **Assign frequency output** parameter (→ 177):
- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *
- Carrier mass flow *
- Density
- Reference density
- Concentration *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- Temperature
- Carrier pipe temperature *
- Electronics temperature
- Oscillation frequency 0
- Oscillation frequency 1 *
- Frequency fluctuation 0
- Frequency fluctuation 1 *
- Oscillation amplitude 0 *
- Oscillation amplitude 1 *
- Oscillation damping 0
- Oscillation damping 1 *
- Oscillation damping fluctuation 0
- Oscillation damping fluctuation 1 *
- Signal asymmetry
- Exciter current 0
- Exciter current 1 *

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 19)

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

Additional information *User entry*

Use this function to enter a time constant (PT1 element [7]) for frequency output damping:
- If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables.
- On the other hand, the current output reacts more slowly if a high time constant is entered.

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

* Visibility depends on order options or device settings
7) proportional transmission behavior with first order delay

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 (→ 171) and a process variable is selected in the **Assign frequency output** parameter (→ 177).

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 (→ 182) replaces the current measured value, making it possible to bypass the device alarm. The actual measurement is switched off for the duration of the device alarm.
- 0 Hz
  In the event of a device alarm, the frequency output is "switched off".

NOTICE! A device alarm is a measuring device error that must be taken seriously. It can affect the measurement quality such that the quality can no longer be guaranteed. The **Actual value** option is only recommended if it can be guaranteed that all possible alarm conditions will not affect the measurement quality.

Failure frequency

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

Prerequisite In the **Operating mode** parameter (→ 171), the **Frequency** option is selected, in the **Assign frequency output** parameter (→ 177) a process variable is selected, and in the **Failure mode** parameter (→ 182), 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 (→ 171), 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 (→ 171).

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 (→ 171), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 183), 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 (→ 171), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 183), 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 *

* Visibility depends on order options or device settings

- 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 *
- Dynamic viscosity *
- Concentration *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Oscillation damping
- Pressure
- Application specific output 0 *
- Application specific output 1 *
- Inhomogeneous medium index
- Suspended bubbles index *

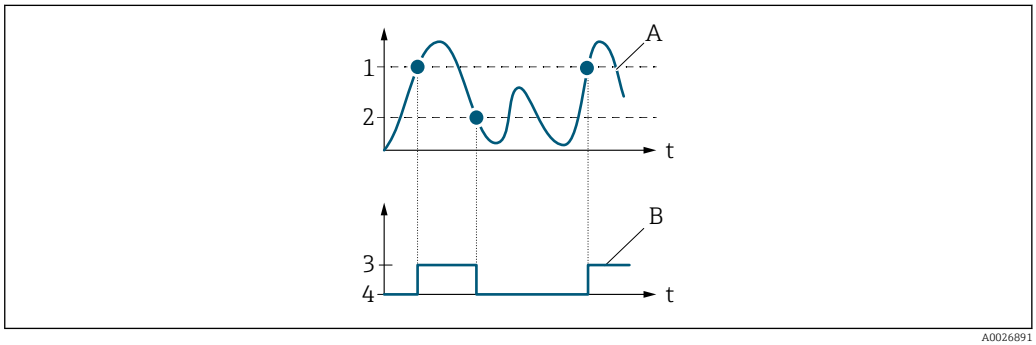
Factory setting

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



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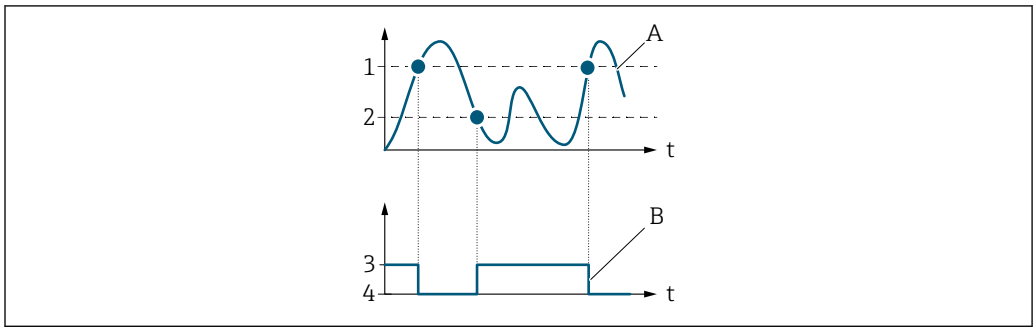
1 Switch-on value
2 Switch-off value
3 Conductive
4 Non-conductive
A Process variable
B Status output

* Visibility depends on order options or device settings

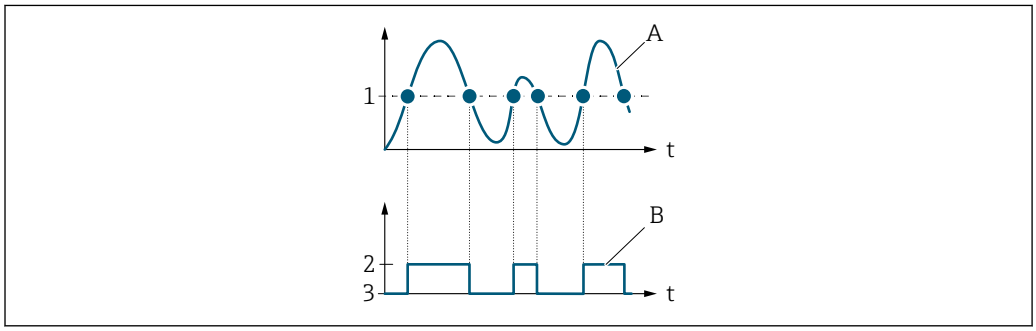
Behavior of status output when Switch-on value < Switch-off value:
- Process variable < Switch-on value: transistor is conductive
- Process variable > Switch-off value: transistor is non-conductive



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 (→ 171).
- The **Limit** option is selected in the **Switch output function** parameter (→ 183).

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 (→ 184).

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 (→ 171).
- The **Limit** option is selected in the **Switch output function** parameter (→ 183).

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 (→ 184).

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 (→ 171).
- The **Flow direction check** option is selected in the **Switch output function** parameter (→ 183).

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 (→ 171).
- The **Status** option is selected in the **Switch output function** parameter (→ 183).

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 (→ 171).
- The **Limit** option is selected in the **Switch output function** parameter (→ 183).

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

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 (→ 171).
- The **Limit** option is selected in the **Switch output function** parameter (→ 183).

* Visibility depends on order options or device settings

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 (→ 171).

Description Displays the current switch status of the status output.

User interface
- Open
- Closed

Additional information *User interface*
- Open
  The switch output is not conductive.
- Closed
  The switch output is conductive.

Invert output signal

Navigation Expert → Output → PFS output 1 to n → Invert outp.sig. (0470–1 to n)

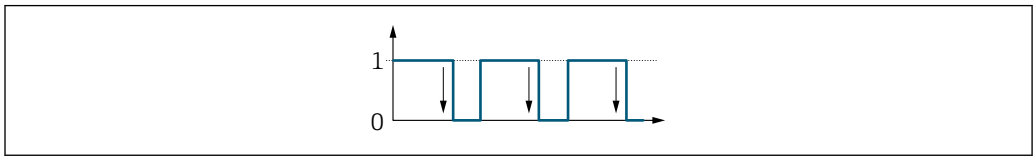
Description Use this function to select whether to invert the output signal.

Selection
- No
- Yes

Factory setting No

Additional information *Selection*

No option (passive - negative)



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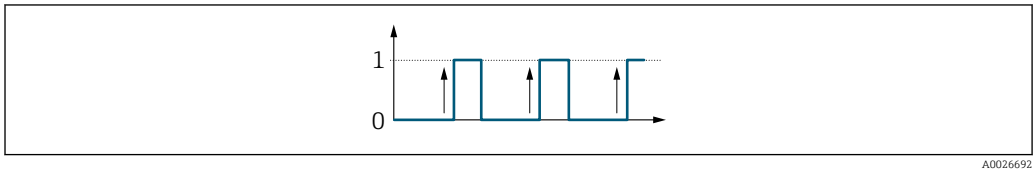
Yes option (passive - positive)



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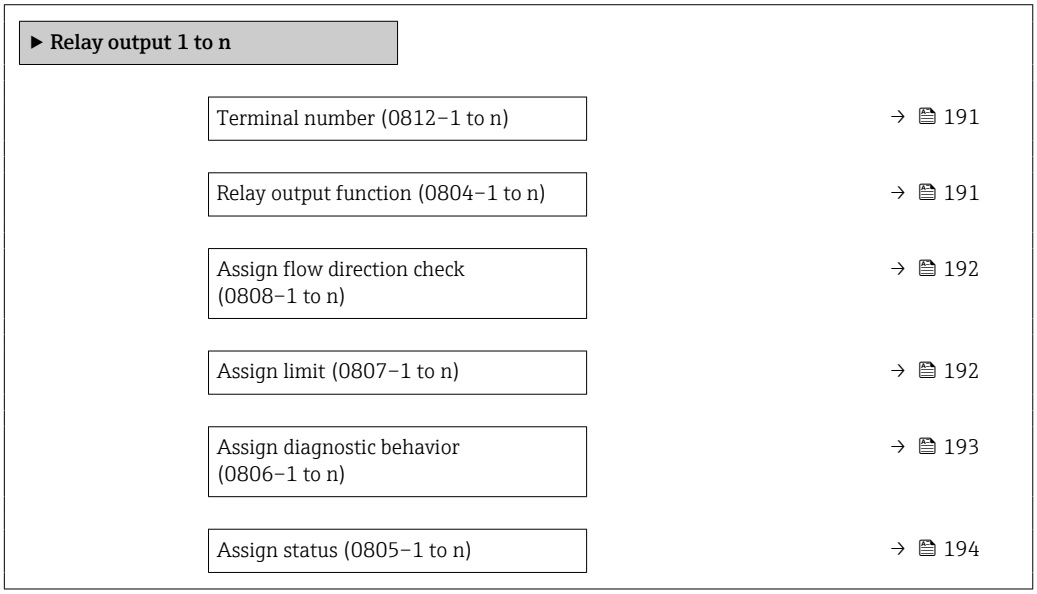
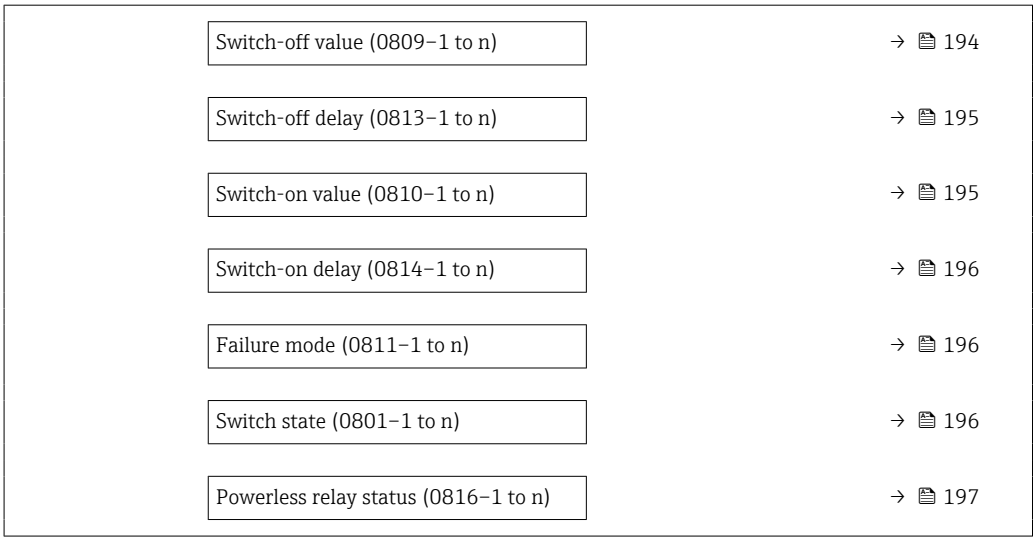
3.5.3 "Relay output 1 to n" submenu

Navigation Expert → Output → Relay output 1 to n





Terminal number

Navigation Expert → Output → Relay output 1 to n → Terminal no. (0812–1 to n)

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

User interface
- Not used
- 24-25 (I/O 2)
- 22-23 (I/O 3)
- 20-21 (I/O 4)

Additional information *"Not used" option*

The relay output module does not use any terminal numbers.

Relay output function

Navigation Expert → Output → Relay output 1 to n → Relay outp.func. (0804–1 to n)

Description Use this function to select an output function for the relay output.

Selection
- Closed
- Open
- Diagnostic behavior
- Limit
- Flow direction check
- Digital Output

Factory setting Closed

Additional information *Selection*

- Closed
  The relay output is permanently switched on (closed, conductive).
- Open
  The relay output is permanently switched off (open, non-conductive).
- Diagnostic behavior
  Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level.
- Limit
  Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level.
- Flow direction check
  Indicates the flow direction (forward or reverse flow).
- Digital Output
  Indicates the device status depending on whether empty pipe detection or low flow cut off is selected.

Assign flow direction check

Navigation Expert → Output → Relay output 1 to n → Assign dir.check (0808–1 to n)

Prerequisite The **Flow direction check** option is selected in the **Relay output function** parameter (→ 191).

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 (→ 191).

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

Selection

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

* Visibility depends on order options or device settings

- 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 *
- Dynamic viscosity *
- Concentration *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- 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 (→ 191), 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.

Selection
- Alarm
- Alarm or warning
- Warning

* Visibility depends on order options or device settings

Factory setting Alarm

Additional information *Description*

If no diagnostic event is pending, the relay output is closed and conductive.

Selection

- Alarm
  The relay output signals only diagnostic events in the alarm category.
- Alarm or warning
  The relay output signals diagnostic events in the alarm and warning category.
- Warning
  The relay output signals only diagnostic events in the warning category.

Assign status

Navigation Expert → Output → Relay output 1 to n → Assign status (0805–1 to n)

Prerequisite In the **Relay output function** parameter (→ 191), the **Digital Output** option is selected.

Description Use this function to select the device status for the relay output.

Selection
- Partially filled pipe detection
- Low flow cut off

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 (→ 191), 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:
- 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 (→ 192).

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 (→ 191), 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 (→ 191).

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 (→ 192).

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 (→ 191), 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

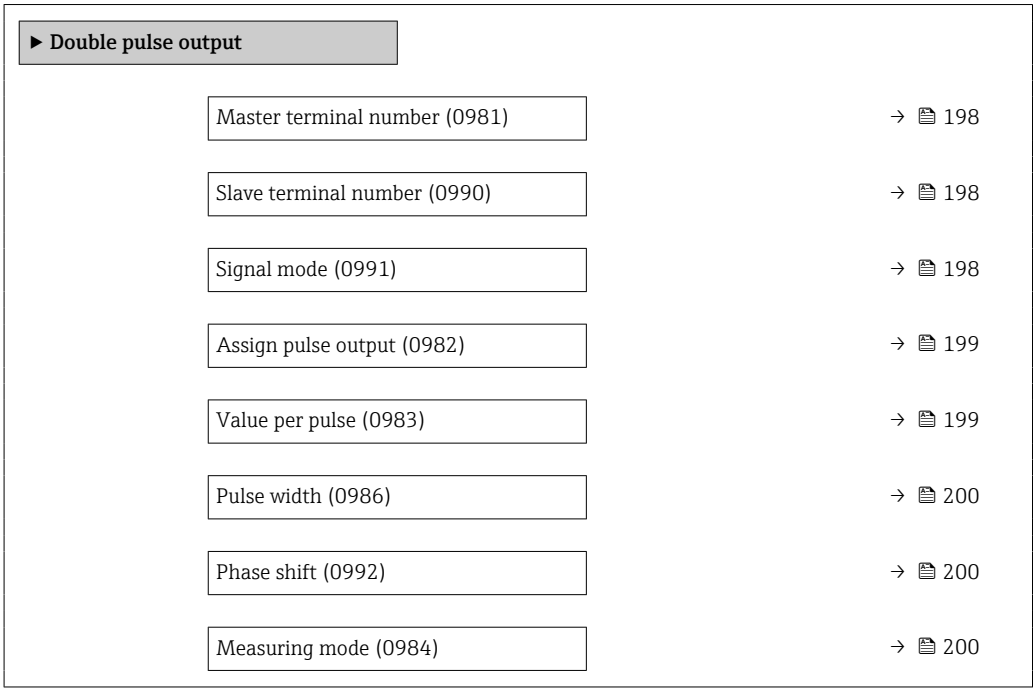
Factory setting Open

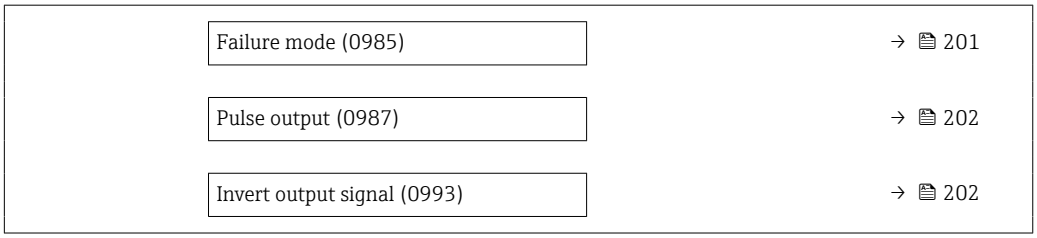
Additional information *Selection*

- 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





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
- Off
- Mass flow
- Volume flow
- Corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Target volume flow *
- Carrier volume flow *
- Target corrected volume flow *
- Carrier corrected volume flow *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *

Factory setting Off

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 → 336

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.

* Visibility depends on order options or device settings

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

Factory setting 0.5 ms

Additional information For a detailed description and example: **Pulse width** parameter (→ 174)

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 (→ 161)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 161)

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 (→ 86)

Invert output signal

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

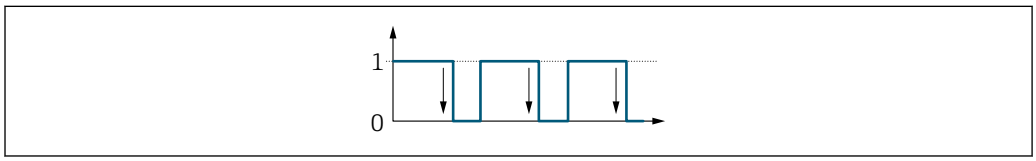
Description Use this function to select whether to invert the output signal.

Selection
- No
- Yes

Factory setting No

Additional information *Selection*

No option (passive - negative)



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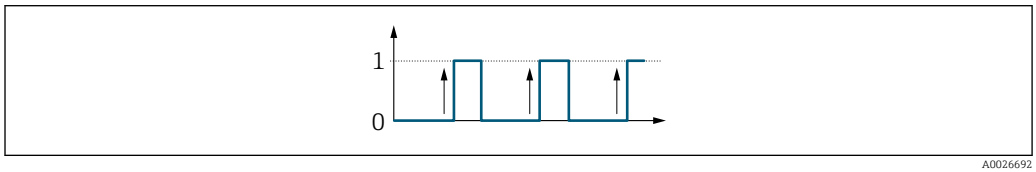
Yes option (passive - positive)



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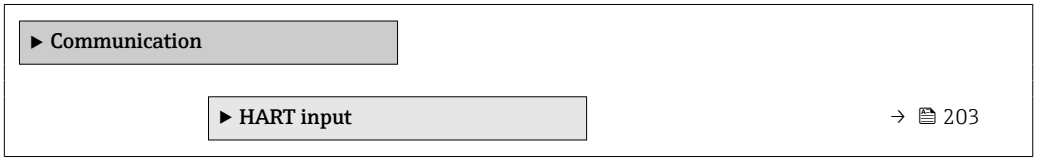
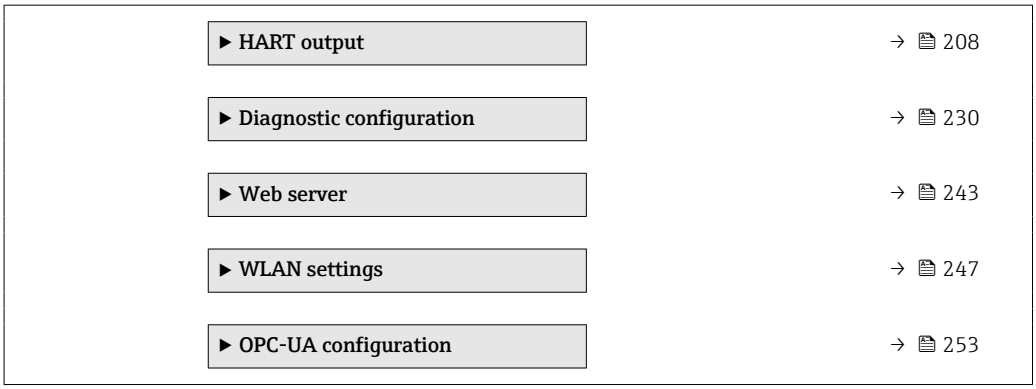
3.6 "Communication" submenu

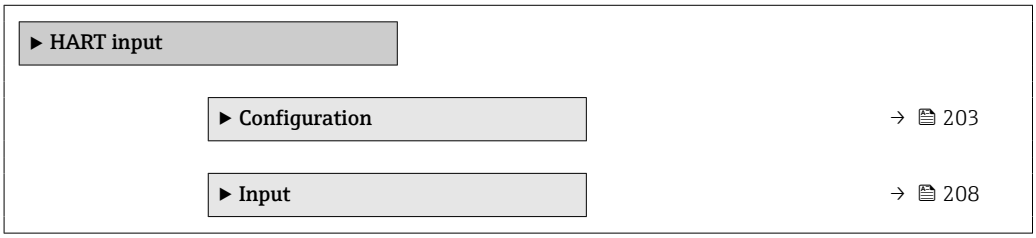
Navigation Expert → Communication





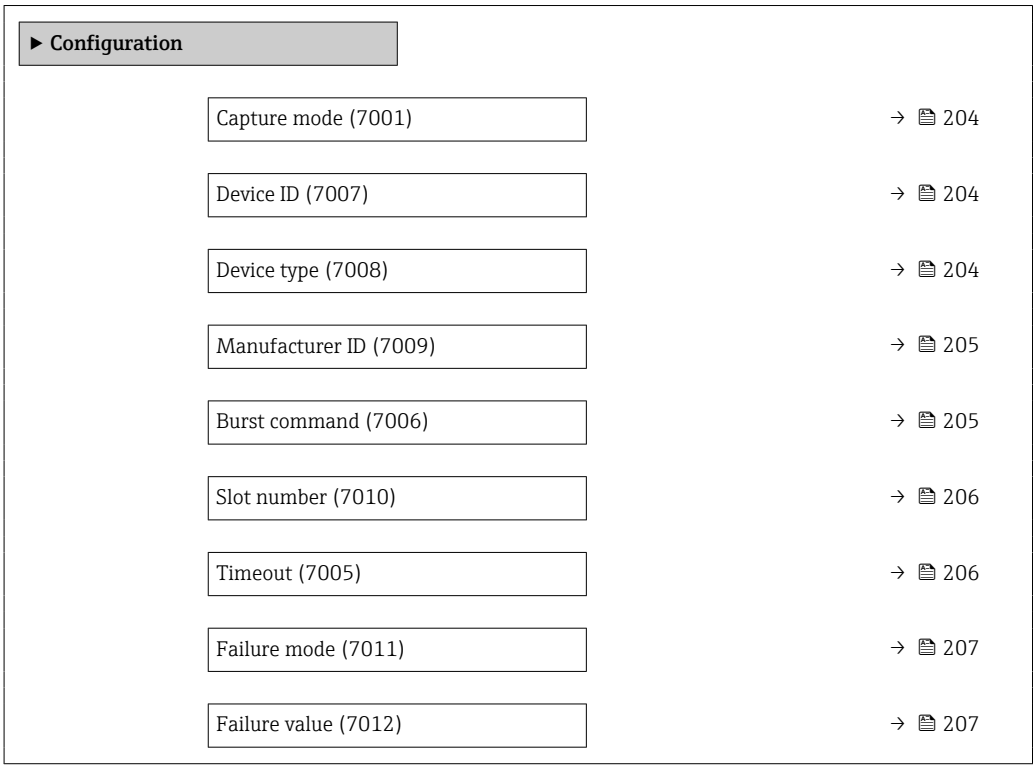
3.6.1 "HART input" submenu

Navigation Expert → Communication → HART input



"Configuration" submenu

Navigation Expert → Communication → HART input → Configuration



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 (→ 204).

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 (→ 204), 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 (→ 204).

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:
- 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 (→ 204).

Description Use this function to select the burst command to be recorded.

Selection
- 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 (→ 204).

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 (→ 204).

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 (→ 204), 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 (→ 207)).

Failure value

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

Prerequisite The following conditions are met:
- In the **Capture mode** parameter (→ 204), the **Burst network** option or **Master network** option is selected.
- In the **Failure mode** parameter (→ 207), the **Defined value** option is selected.

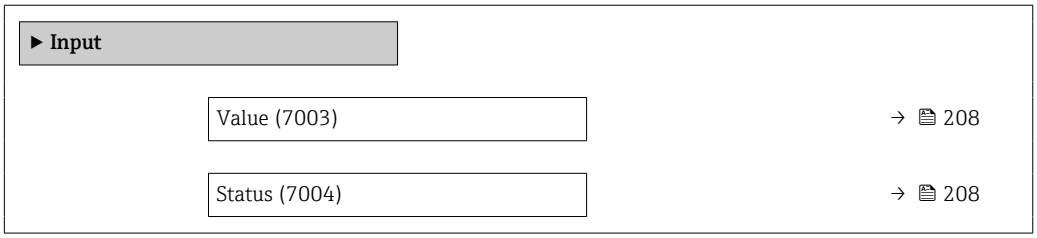
Description Use this function to enter the measured value to be used if no data are recorded within the maximum permitted interval.

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 (→ 98)

Status

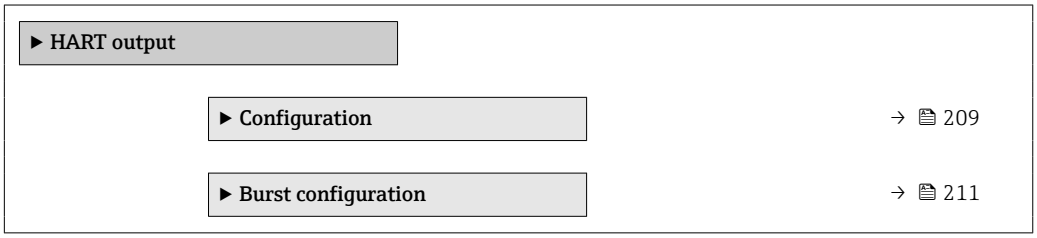
Navigation Expert → Communication → HART input → Input → Status (7004)

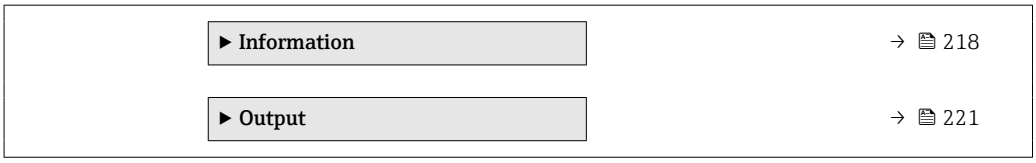
Description Displays the value of the device variable recorded by the HART input in accordance with the HART specification.

User interface
- Manual/Fixed
- Good
- Poor accuracy
- Bad

3.6.2 "HART output" submenu

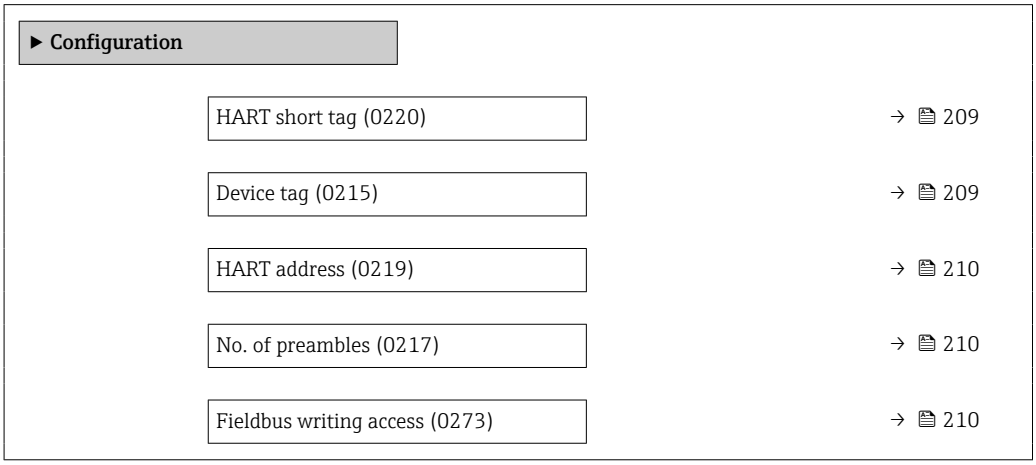
Navigation Expert → Communication → HART output





"Configuration" submenu

Navigation Expert → Communication → HART output → Configuration



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 *Description*

For addressing in a HART Multidrop network, the **Fixed current** option must be set in the **Current span** parameter (→ 157) (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 *User entry*

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
- Read + write
- Read only

Factory setting Read + write

Additional information

Description

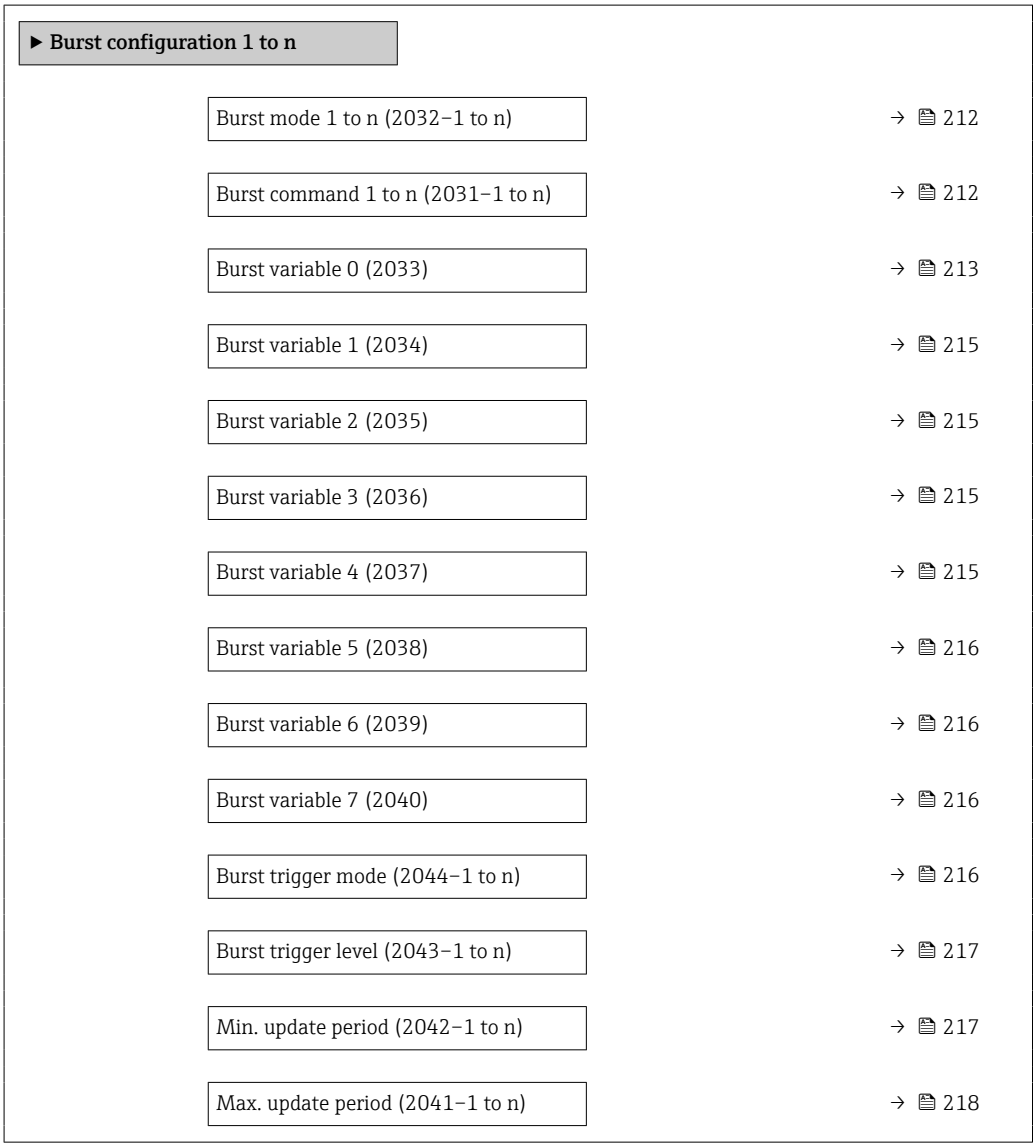
If read and/or write protection is enabled, the parameter can only be controlled and reset via local operation. Access is no longer possible via operating tools.

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 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 *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- Temperature
- Totalizer 1...3
- HBSI *
- 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 (→ 154).

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 *

* Visibility depends on order options or device settings

- 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 *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- 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 *
- HBSI *
- 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.

* Visibility depends on order options or device settings

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.

Selection See the **Burst variable 0** parameter (→ 213).

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 (→ 213).

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 (→ 213).

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 (→ 213).

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 (→ 213).

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 (→ 213).

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 (→ 213).

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

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 (→ 🖹 217).
- Window
  The message is sent if the specified measured value has changed by the value in the **Burst trigger level** parameter (→ 🖹 217).
- Rising
  The message is sent if the specified measured value exceeds the value in the **Burst trigger level** parameter (→ 🖹 217).
- Falling
  The message is sent if the specified measured value drops below the value in the **Burst trigger level** parameter (→ 🖹 217).
- 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 (→ 🖹 216) 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

* Visibility depends on order options or device settings

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)

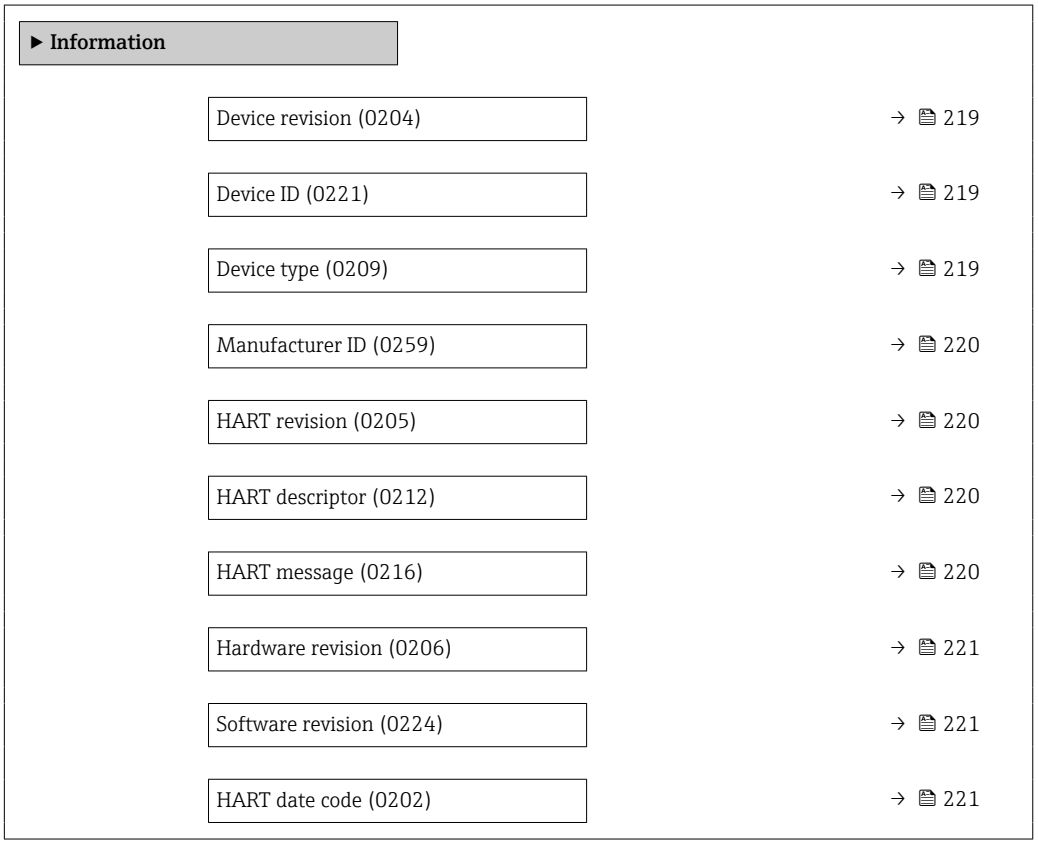
Description Use this function to enter the maximum time span between two burst commands of burst message X.

User entry Positive integer

Factory setting 2 000 ms

"Information" submenu

Navigation Expert → Communication → HART output → Information



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.

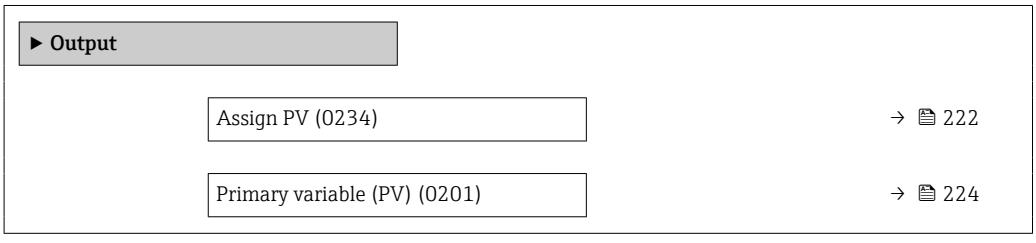
User entry Date entry format: yyyy-mm-dd

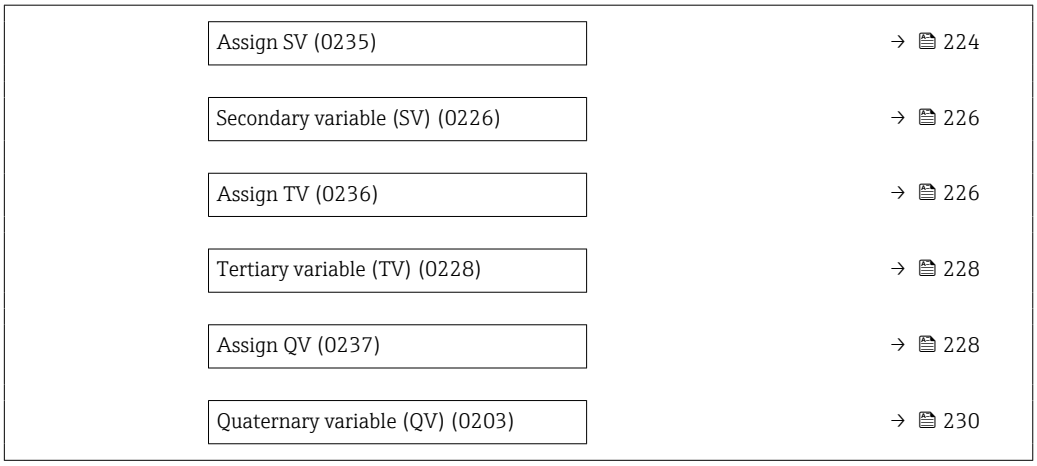
Factory setting 2009-07-20

Additional information *Example*
Device installation date

"Output" submenu

Navigation Expert → Communication → HART output → Output





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 *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *

* Visibility depends on order options or device settings

- 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 damping fluctuation 1 *
- Oscillation frequency 0
- Frequency fluctuation 0 *
- Signal asymmetry
- Torsion signal asymmetry *
- Carrier pipe temperature *
- Oscillation frequency 1 *
- Frequency fluctuation 0 *
- Oscillation amplitude 0 *
- Oscillation amplitude 1 *
- Frequency fluctuation 1 *
- Oscillation damping 1 *
- Exciter current 1 *
- HBSI *
- 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 (→ 19)

* Visibility depends on order options or device settings

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 (→ 222).

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 89).

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).

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 *

* Visibility depends on order options or device settings

- Target mass flow *
- Carrier mass flow *
- Concentration *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- 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 *
- 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 *
- HBSI *
- Electronics temperature

* Visibility depends on order options or device settings

- 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

User interface

The measured value displayed depends on the process variable selected in the **Assign SV** parameter (→ 224).

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 89).

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).

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 *

* Visibility depends on order options or device settings

- 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 *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- 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 *
- 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 *

* Visibility depends on order options or device settings

- Oscillation amplitude 1 *
- Signal asymmetry
- Torsion signal asymmetry *
- Carrier pipe temperature *
- HBSI *
- 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

User interface

The measured value displayed depends on the process variable selected in the **Assign TV** parameter (→ 226).

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 89).

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).

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 *

* Visibility depends on order options or device settings

- 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 *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- 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 *
- 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 *

* Visibility depends on order options or device settings

- 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 *
- HBSI *
- 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

User interface

The measured value displayed depends on the process variable selected in the **Assign QV** parameter (→ 228).

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 89).

3.6.3 "Diagnostic configuration" submenu

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

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).

* Visibility depends on order options or device settings

Category	Meaning
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)	→ 232
Event category 142 (0280)	→ 233
Event category 140 (0244)	→ 233
Event category 144 (0303)	→ 233
Event category 374 (0245)	→ 234
Event category 304 (0283)	→ 234
Event category 441 (0210)	→ 234
Event category 442 (0230)	→ 235
Event category 443 (0231)	→ 235
Event category 444 (0211)	→ 236
Event category 543 (0276)	→ 236
Event category 599 (0279)	→ 236
Event category 830 (0240)	→ 237
Event category 831 (0241)	→ 237
Event category 832 (0218)	→ 238
Event category 833 (0225)	→ 238
Event category 834 (0227)	→ 238

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
- 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: → 230

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: → 230

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: → 230

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: → 230

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: → 230

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: → 230

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: → 230

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: → 230

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: → 230

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
- 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: → 230

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
- 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: → 230

Event category 599 (Custody transfer logbook full)

Navigation Expert → Communication → Diag. config. → Event category 599 (0279)

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 *Selection*

For a detailed description of the event categories available for selection: → 230

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: → 230

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: → 230

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: → 230

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: → 230

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: → 230

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: → 230

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: → 230

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: → 230

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 information For a detailed description of the event categories available for selection: → 230

Event category 915 (Viscosity ouf 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 information For a detailed description of the event categories available for selection: → 230

Event category 941 (API/ASTM temperature out of specificat.)

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 information For a detailed description of the event categories available for selection: → 230

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: → 230

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: → 230

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: → 230

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: → 230

Event category 984 (Condensation risk)

Navigation Expert → Communication → Diag. config. → Event category 984 (0278)

Description Select category for diagnostic message.

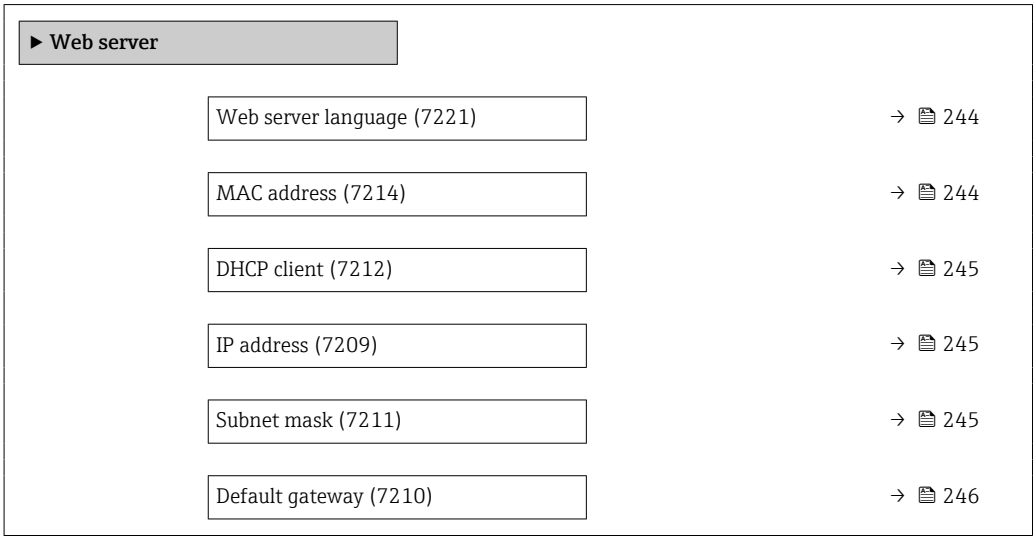
Selection
- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

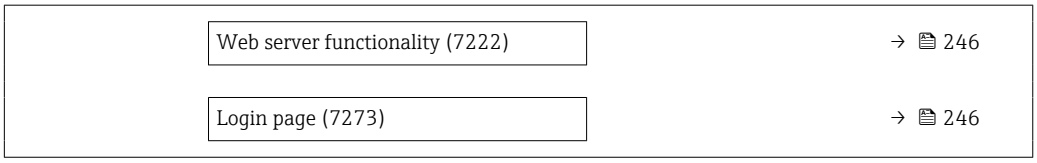
Factory setting Out of specification (S)

Additional information For a detailed description of the event categories available for selection: → 230

3.6.4 "Web server" submenu

Navigation Expert → Communication → Web server





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
- 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 *Example*

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

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 (→ 245), Subnet mask (→ 245) and Default gateway (→ 246) are set automatically.

- Identification is via the MAC address of the measuring device.
- The IP address (→ 245) in the **IP address** parameter (→ 245) is ignored as long as the **DHCP client** parameter (→ 245) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (→ 245) in the parameter of the same name is only used if the **DHCP client** parameter (→ 245) 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 (→ 246).

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

Login page

Navigation Expert → Communication → Web server → Login page (7273)

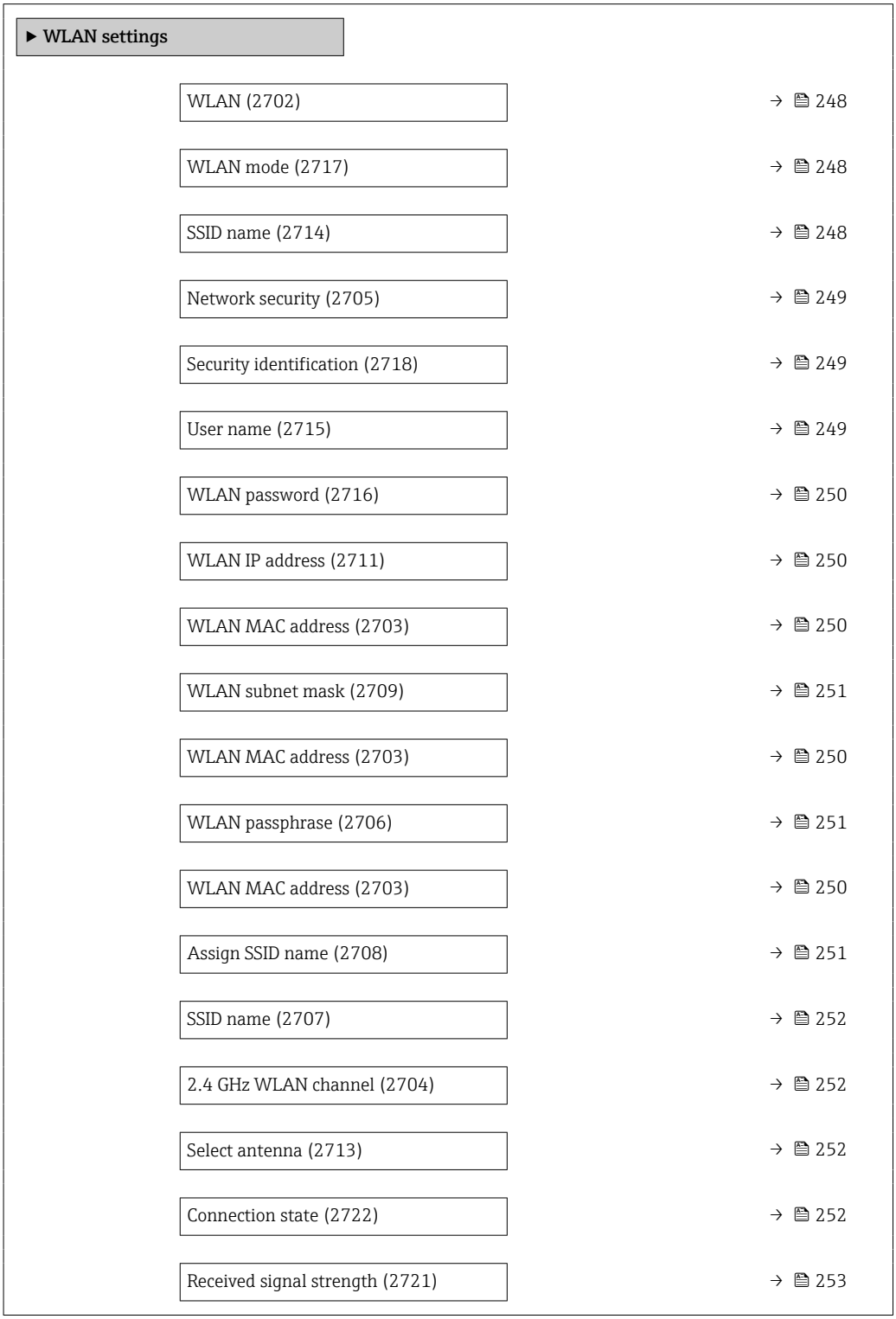
Description Use this function to select the format of the login page.

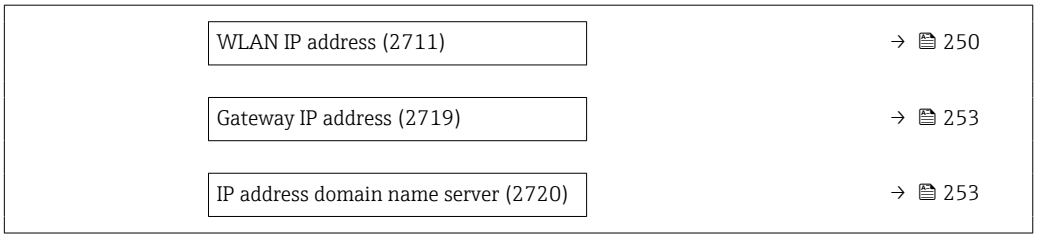
Selection
- Without header
- With header

Factory setting With header

3.6.5 "WLAN settings" wizard

Navigation Expert → Communication → WLAN settings





WLAN

Navigation Expert → Communication → WLAN settings → WLAN (2702)

Description Use this function to enable and disable the WLAN connection.

Selection
- Disable
- Enable

Factory setting Enable

WLAN mode

Navigation Expert → Communication → WLAN settings → WLAN mode (2717)

Description Use this function to select the WLAN mode.

Selection
- WLAN access point
- WLAN Client

Factory setting WLAN access point

SSID name

Navigation Expert → Communication → WLAN settings → SSID name (2714)

Prerequisite The client is activated.

Description Use this function to enter the user-defined SSID name (max. 32 characters) of the WLAN network.

User entry –

Factory setting –

Network security

Navigation Expert → Communication → WLAN settings → Network security (2705)

Description Use this function to select the type of security for the WLAN interface.

Selection
- Unsecured
- WPA2-PSK
- EAP-PEAP with MSCHAPv2 *
- EAP-PEAP MSCHAPv2 no server authentic. *
- EAP-TLS *

Factory setting WPA2-PSK

Additional information *Selection*
- Unsecured
  Access the WLAN connection without identification.
- WPA2-PSK
  Access the WLAN connection with a network key.
- EAP-PEAP with MSCHAPv2
  Access the WLAN connection with a password-based authentication protocol.
- EAP-PEAP MSCHAPv2 no server authentic.
  Access the WLAN connection with a password-based protocol without server authentication.
- EAP-TLS
  Access the WLAN connection with a certificate-based, two-way authentication of the client and network.

Security identification

Navigation Expert → Communication → WLAN settings → Sec. identific. (2718)

Description Use this function to select the security settings (download via the menu: Data Management > Security > Download WLAN).

User interface
- Trusted issuer certificate
- Device certificate
- Device private key

User name

Navigation Expert → Communication → WLAN settings → User name (2715)

Description Use this function to enter the username of the WLAN network.

User entry –

* 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 MAC [9] 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 (→ 249).

Description Use this function to enter the network key.

User entry 8 to 32-digit character string comprising numbers, letters and special characters (without spaces)

Factory setting Serial number of the measuring device (e.g. L100A802000)

Assign SSID name

Navigation Expert → Communication → WLAN settings → Assign SSID name (2708)

Description Use this function to select which name is used for the SSID [10].

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 (→ 251).
- The **WLAN access point** option is selected in the **WLAN mode** parameter (→ 248).

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_Promass_500_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

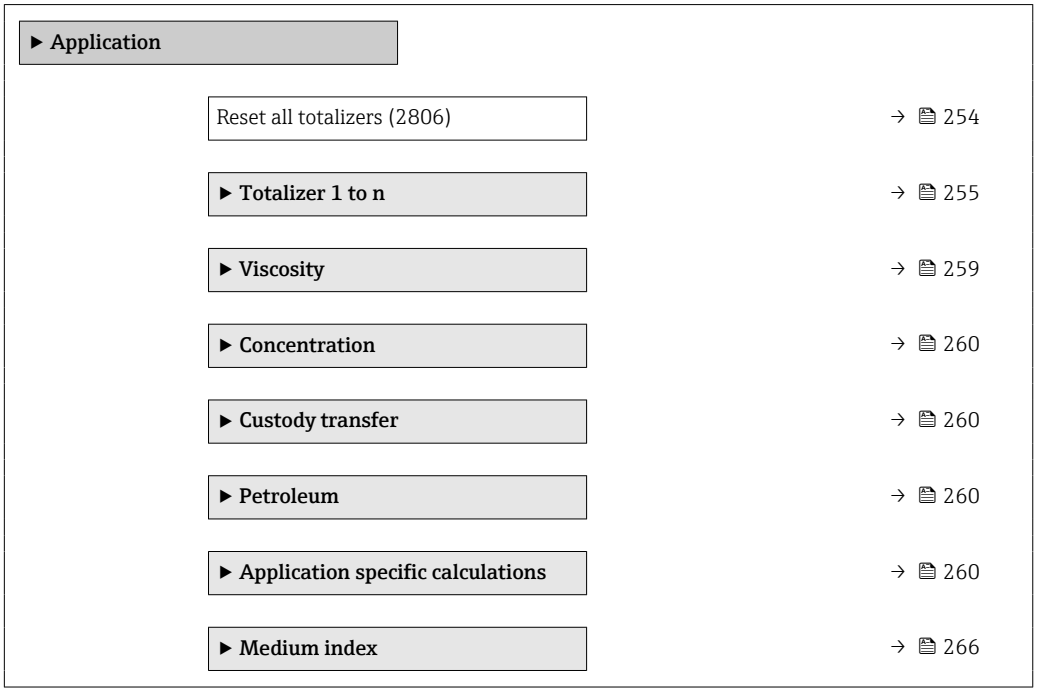
3.6.6 "OPC-UA configuration" submenu

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.

3.7 "Application" submenu

Navigation Expert → Application



Reset all totalizers

Navigation Expert → Application → Reset all tot. (2806)

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

Selection
- Cancel
- Reset + totalize

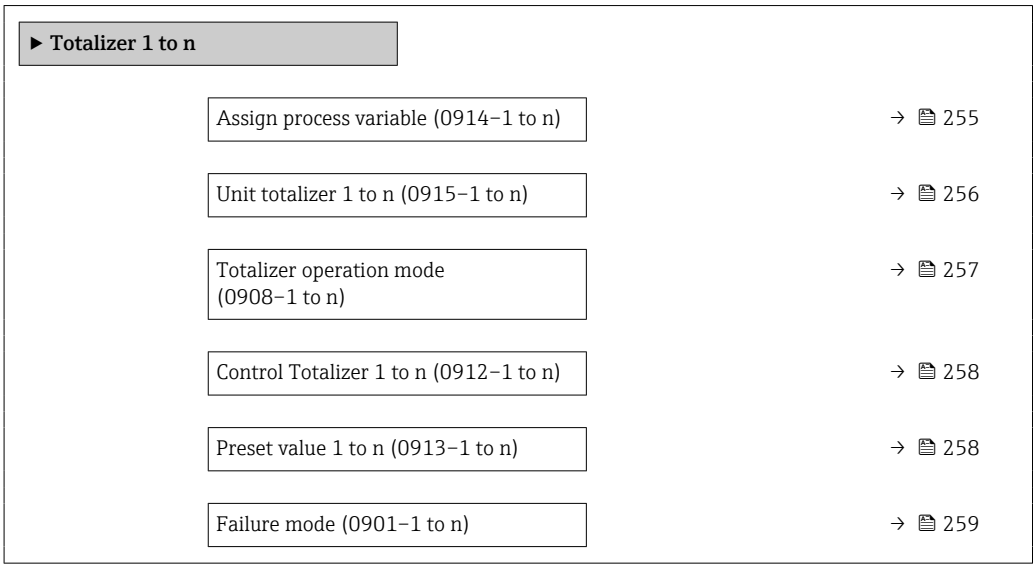
Factory setting Cancel

Additional information *Selection*

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

3.7.1 "Totalizer 1 to n" submenu

Navigation Expert → Application → Totalizer 1 to n



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 *
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Raw value mass flow

Factory setting Mass flow

* Visibility depends on order options or device settings

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 (→ 255) 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 (→ 255) of the **Totalizer 1 to n** submenu.

Description Use this function to select the process variable unit for the Totalizer 1 to n (→ 255).

Selection

SI units
- g *
- kg *
- t *

US units
- oz *
- lb *
- STon *

* Visibility depends on order options or device settings

or

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

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

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

* Visibility depends on order options or device settings

or

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

Imperial units
bbl (imp;beer) *

* Visibility depends on order options or device settings

or

SI units
- Nl *
- Nhl *
- 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

The unit is selected separately for each totalizer. It is independent of the selection made in the **System units** submenu (→ 89).

Selection

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ 255).

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 (→ 255) of the **Totalizer 1 to n** submenu.

Description

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

Selection
- Net
- Forward
- Reverse

Factory setting

Net

Additional information

Selection
- 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 (→ 255) of the **Totalizer 1 to n** submenu.

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

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

Factory setting Totalize

Additional information *Selection*

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 (→ 255) 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

* Visibility depends on order options or device settings

Additional information *User entry*

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 256).

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 (→ 255) 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
- Hold
- Continue
- Last valid value + continue

Factory setting Hold

Additional information *Description*

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

Selection
- Stop
  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 "Viscosity" submenu

Only available for Promass I.

For detailed information on the parameter descriptions for the **Viscosity** application package,refer to the Special Documentation for the device → 7

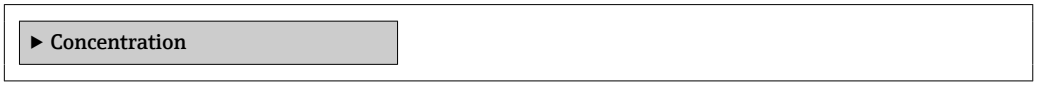
Navigation Expert → Application → Viscosity

▶ **Viscosity**

3.7.3 "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



3.7.4 "Custody transfer" submenu

Only available for Promass F, O, Q and X.

For detailed information on the parameter descriptions for custody transfer measurement, see the Special Documentation for the device → 7

Navigation Expert → Application → Custody transfer

3.7.5 "Petroleum" submenu

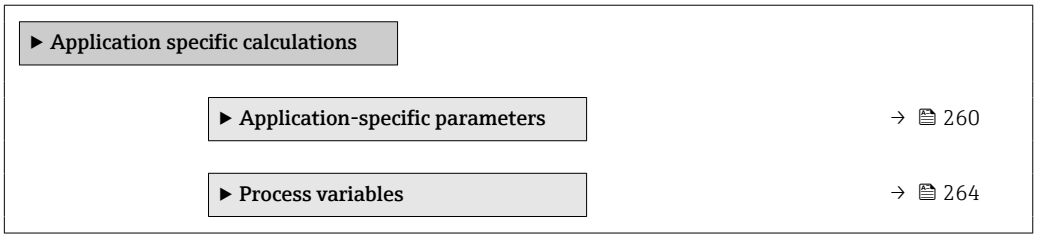
For detailed information on the parameter descriptions for the **Petroleum** application package,refer to the Special Documentation for the device → 7

Navigation Expert → Application → Petroleum

3.7.6 "Application specific calculations" submenu

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

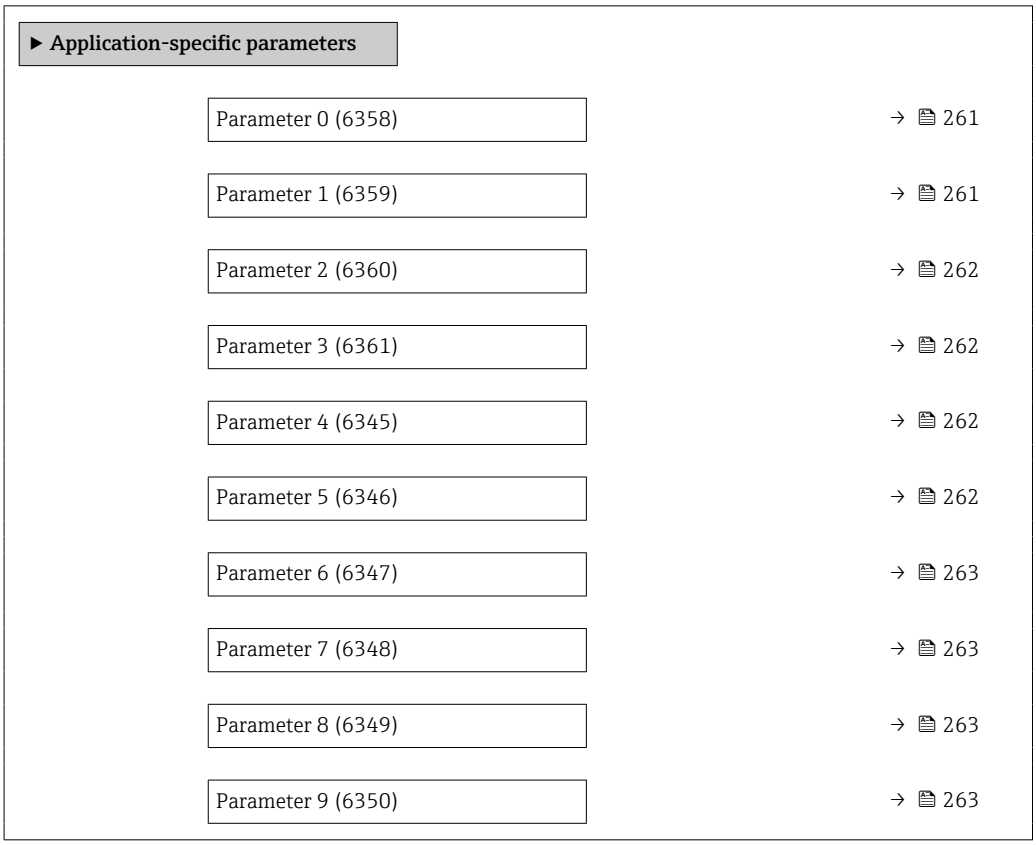
Navigation Expert → Application → Appl.spec. calc.



"Application-specific parameters" submenu

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

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



Parameter 0

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 0 (6358)

Description Enter application specific value 0 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 1

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 1 (6359)

Description Enter application specific value 1 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 2

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 2 (6360)

Description nter application specific value 2 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 3

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 3 (6361)

Description Enter application specific value 3 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 4

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 4 (6345)

Description Enter application specific value 4 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 5

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 5 (6346)

Description Enter application specific value 5 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 6

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 6 (6347)

Description Enter application specific value 6 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 7

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 7 (6348)

Description Enter application specific value 7 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 8

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 8 (6349)

Description Enter application specific value 8 for application specific calculation.

User entry Signed floating-point number

Factory setting 0

Parameter 9

Navigation Expert → Application → Appl.spec. calc. → Appl.spec.param. → Parameter 9 (6350)

Description Enter application specific value 9 for application specific calculation.

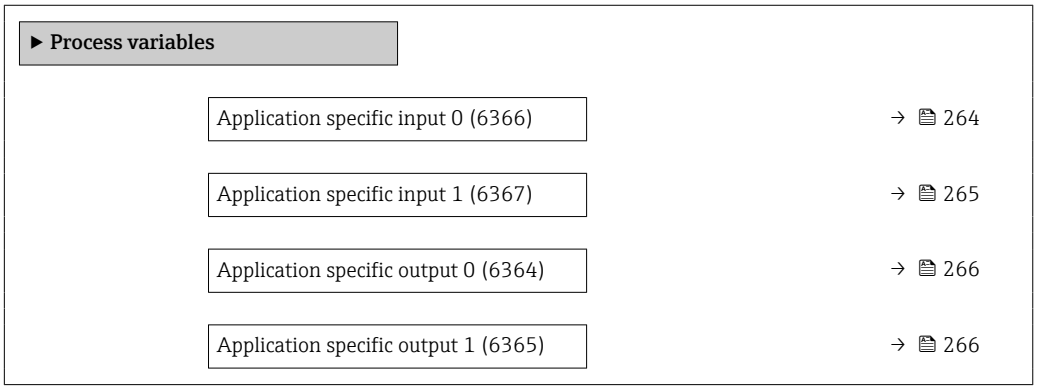
User entry Signed floating-point number

Factory setting 0

"Process variables" submenu

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

Navigation Expert → Application → Appl.spec. calc. → Process variab.



Application specific input 0

Navigation Expert → Application → Appl.spec. calc. → Process variab. → Spec. input 0 (6366)

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

User interface Signed floating-point number

Factory setting 0

Fail-safe type application specific 0

Navigation Expert → Application → Appl.spec. calc. → Process variab. → FSTypeAppSpec 0 (2098)

Description Use this function to select the failsafe mode for the application-specific input value 0.

Selection
- Fail-safe value
- Fallback value
- Off

Factory setting Off

Fail-safe value application specific 0

Navigation Expert → Application → Appl.spec. calc. → Process variab. → FSValueAppSpec 0 (2099)

Description Use this function to enter the failsafe value for the application-specific input value 0.

User entry Signed floating-point number

Factory setting 0

Application specific input 1

Navigation Expert → Application → Appl.spec. calc. → Process variab. → Spec. input 1 (6367)

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

User interface Signed floating-point number

Factory setting 0

Fail-safe type application specific 1

Navigation Expert → Application → Appl.spec. calc. → Process variab. → FSTypeAppSpec 1 (2100)

Description Use this function to select the failsafe mode for the application-specific input value 1.

Selection
- Fail-safe value
- Fallback value
- Off

Factory setting Off

Fail-safe value application specific 1

Navigation Expert → Application → Appl.spec. calc. → Process variab. → FSValueAppSpec 1 (65535)

Description Use this function to enter the failsafe value for the application-specific input value 1.

User entry Signed floating-point number

Factory setting 0

Application specific output 0

Navigation Expert → Application → Appl.spec. calc. → Process variab. → Spec. output 0 (6364)

Description Shows the calculated application specific output value 0.

User interface Signed floating-point number

Factory setting 0

Application specific output 1

Navigation Expert → Application → Appl.spec. calc. → Process variab. → Spec. output 1 (6365)

Description Shows the calculated specific output value 1.

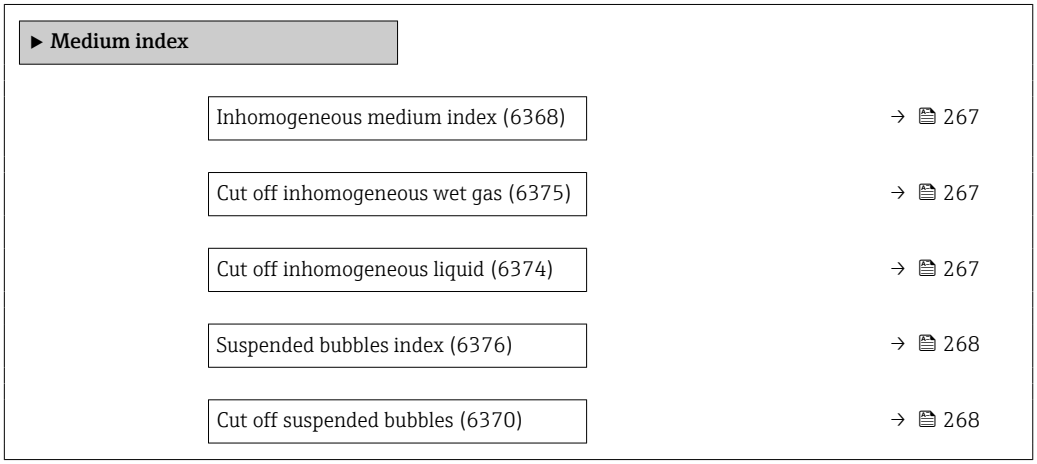
User interface Signed floating-point number

Factory setting 0

3.7.7 "Medium index" submenu

The following additional parameters and settings are part of the Gas Fraction Handler function. Due to its use of two operating frequencies (MFT - Multi-Frequency-Technology), Promass Q can provide additional diagnostic information about entrained gas that is suspended in the process liquid and the measured density is > 400 kg/m^3. The gas typically occurs in viscous liquids in the form of microbubbles or small bubbles.

Navigation Expert → Application → Medium index



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
- 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.

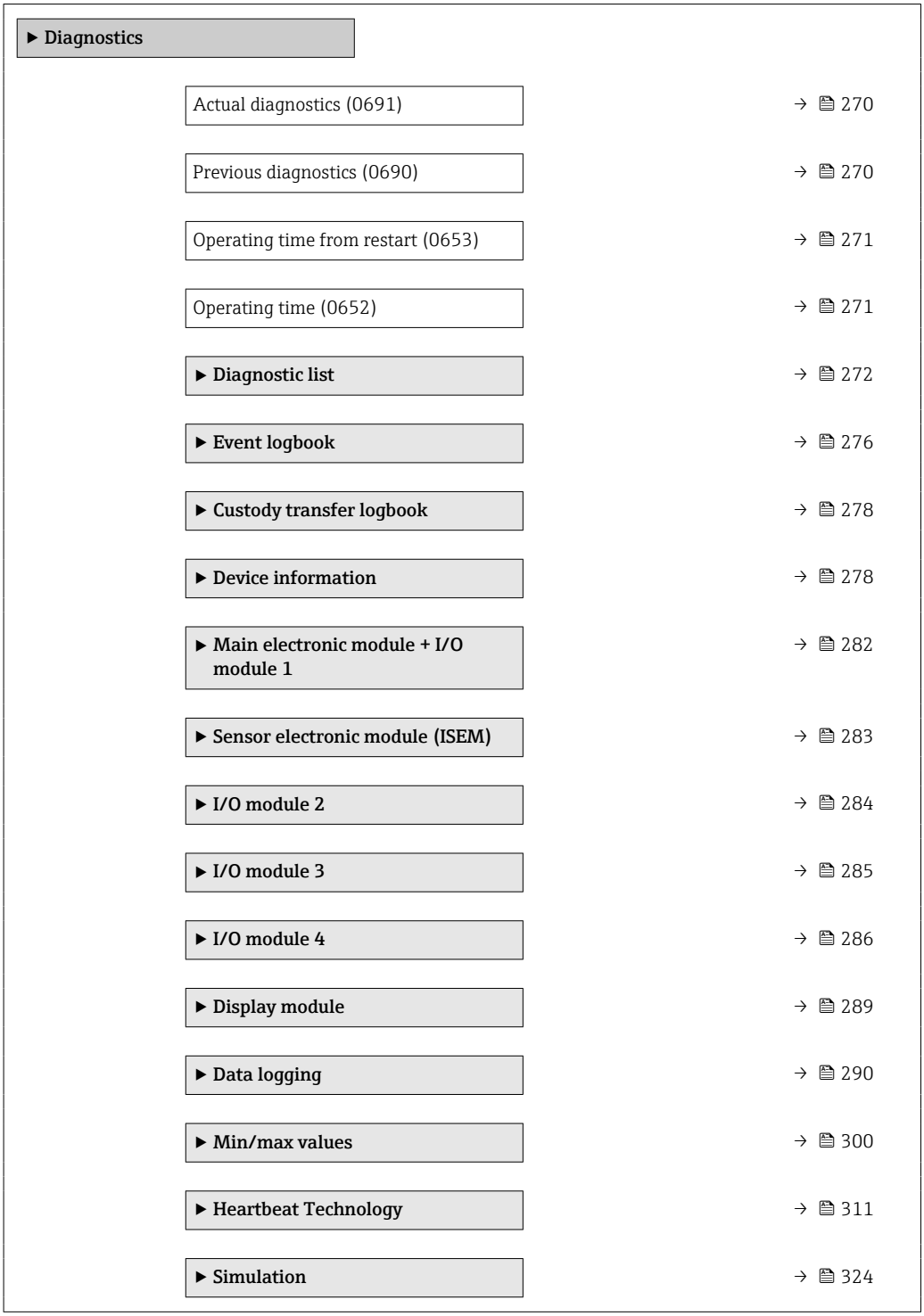
Description Shows the relative amount of suspended bubbles in the medium.

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



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 (→ 272).

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

Example

For the display format:
⊗F271 Main electronic failure

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 (→ 270).

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

Display

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

Example

For the display format:
⊗F271 Main electronic failure

Timestamp

Navigation Expert → Diagnostics → Timestamp

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

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

Additional information

Display

The diagnostic message can be viewed via the **Previous diagnostics** parameter (→ 270).

Example

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.

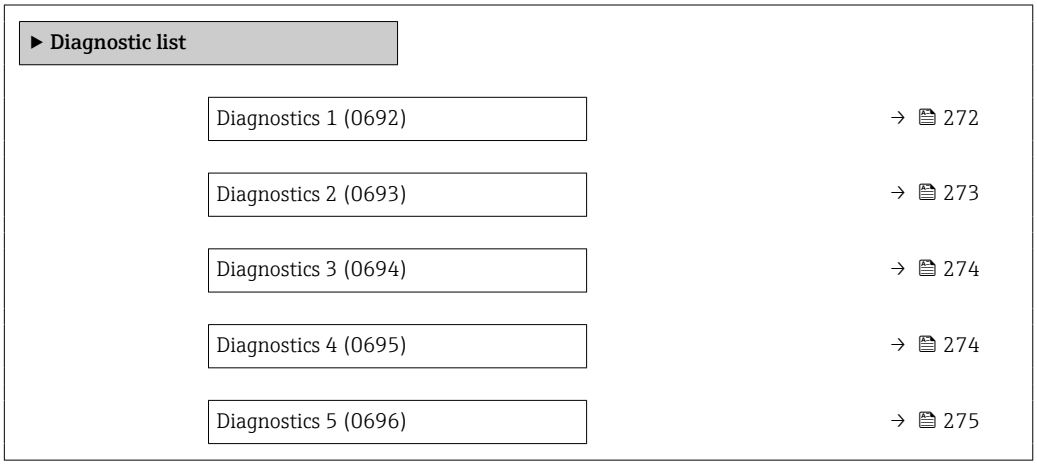
User interface Days (d), hours (h), minutes (m) and seconds (s)

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



Diagnostics 1

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 1 (0692)

Description Displays the current diagnostics message with the highest priority.

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

Additional information *Display*

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

Examples

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

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 *Display*

The diagnostic message can be viewed via the **Diagnostics 1** parameter (→ 272).

Example

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 *Display*

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

Examples

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

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 (→ 273).

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 E 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 (→ 274).

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 *Display*

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

Examples

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

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 *Display*

The diagnostic message can be viewed via the **Diagnostics 4** parameter (→ 274).

Example

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*

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

Examples

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

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*

The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ 275).

Example

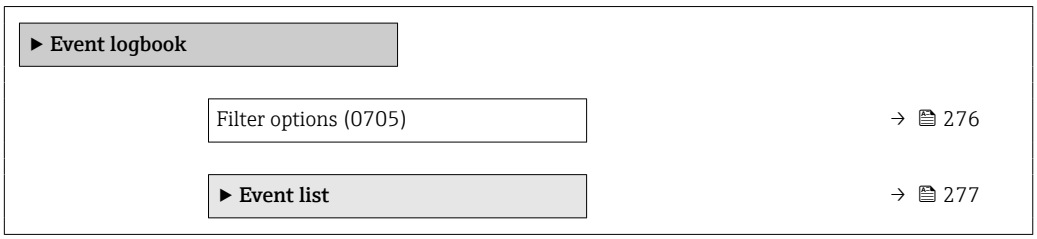
For the display format:
24d12h13m00s

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 (→ 276).

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 "Custody transfer logbook" submenu

Only available for Promass F, O, Q and X.

For detailed information on the parameter descriptions for custody transfer measurement, see the Special Documentation for the device → 7

Navigation Expert → Diagnostics → Cust.transf.log.

▶ **Custody transfer logbook**

3.8.4 "Device information" submenu

Navigation Expert → Diagnostics → Device info

▶ **Device information**	
Device tag (0011)	→ 279
Serial number (0009)	→ 279
Firmware version (0010)	→ 280
Device name (0020)	→ 280
Order code (0008)	→ 280
Extended order code 1 (0023)	→ 281
Extended order code 2 (0021)	→ 281
Extended order code 3 (0022)	→ 281

Configuration counter (0233)	→ 281
ENP version (0012)	→ 282

Device tag

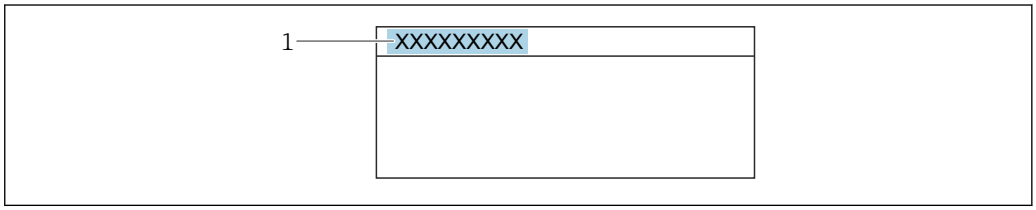
Navigation Expert → Diagnostics → Device info → Device tag (0011)

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*



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 Promass 300/500

Order code

Navigation Expert → Diagnostics → Device info → Order code (0008)

Description Displays the device order code.

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

Additional information *Description*

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

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

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

Extended order code 1

Navigation Expert → Diagnostics → Device info → Ext. order cd. 1 (0023)

Description Displays the first part of the extended order code.

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

User interface Character string

Additional information *Description*

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

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

Extended order code 2

Navigation Expert → Diagnostics → Device info → Ext. order cd. 2 (0021)

Description Displays the second part of the extended order code.

User interface Character string

Additional information For additional information, see **Extended order code 1** parameter (→ 281)

Extended order code 3

Navigation Expert → Diagnostics → Device info → Ext. order cd. 3 (0022)

Description Displays the third part of the extended order code.

User interface Character string

Additional information For additional information, see **Extended order code 1** parameter (→ 281)

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

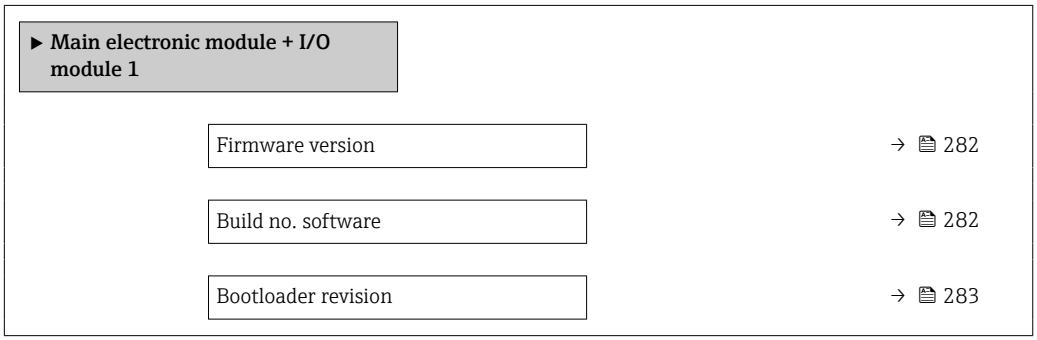
Factory setting 2.02.00

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.

3.8.5 "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

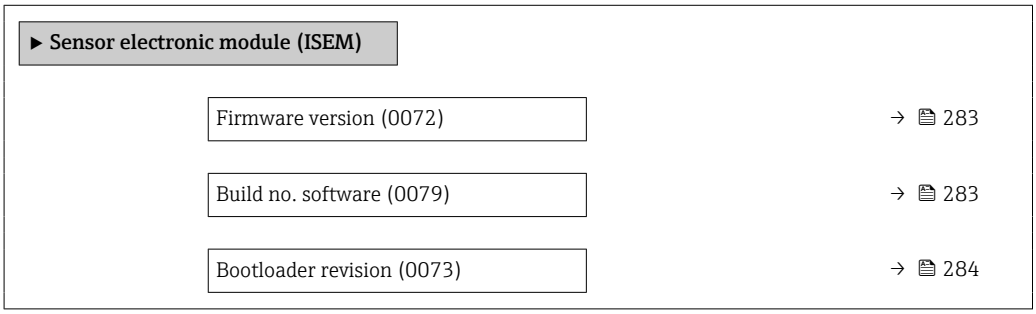
Navigation Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)

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

User interface Positive integer

3.8.6 "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

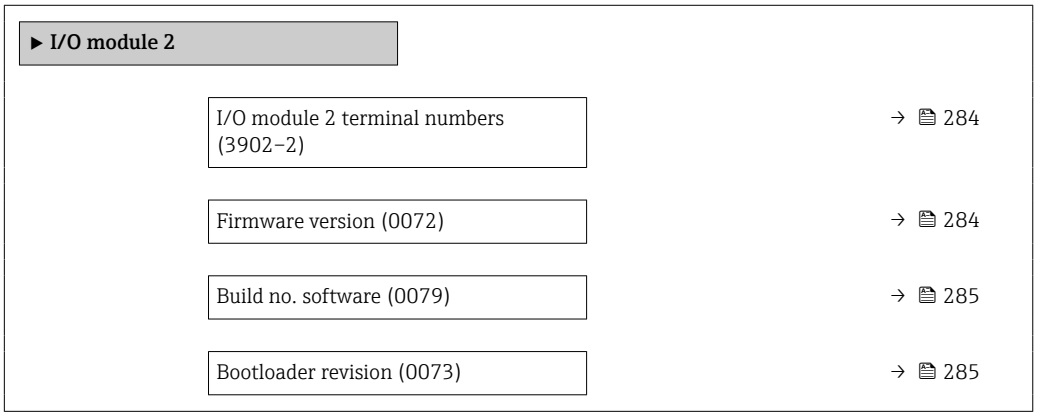
Navigation Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)

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

User interface Positive integer

3.8.7 "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)
- 20-21 (I/O 4) *

Firmware version

Navigation Expert → Diagnostics → I/O module 2 → Firmware version (0072)

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

* Visibility depends on order options or device settings

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

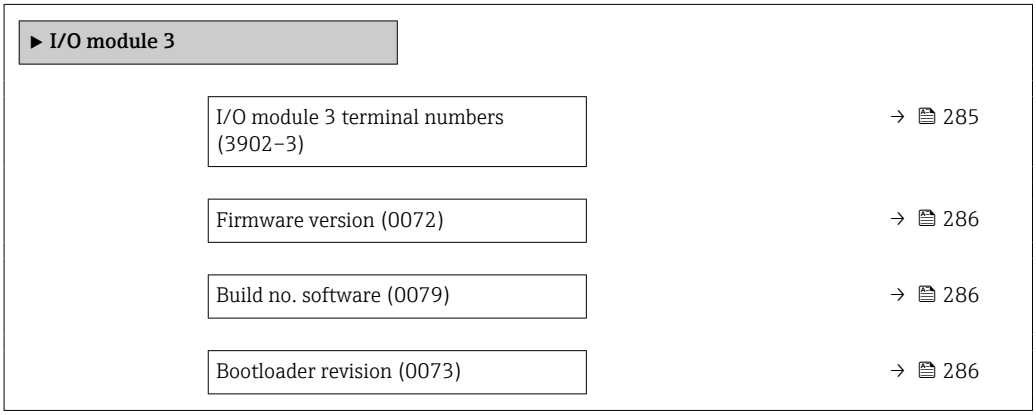
Navigation Expert → Diagnostics → I/O module 2 → Bootloader rev. (0073)

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

User interface Positive integer

3.8.8 "I/O module 3" submenu

Navigation Expert → Diagnostics → I/O module 3



I/O module 3 terminal numbers

Navigation Expert → Diagnostics → I/O module 3 → I/O 3 terminals (3902–3)

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

User interface
- Not used
- 26-27 (I/O 1)
- 24-25 (I/O 2)
- 22-23 (I/O 3)
- 20-21 (I/O 4) *

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

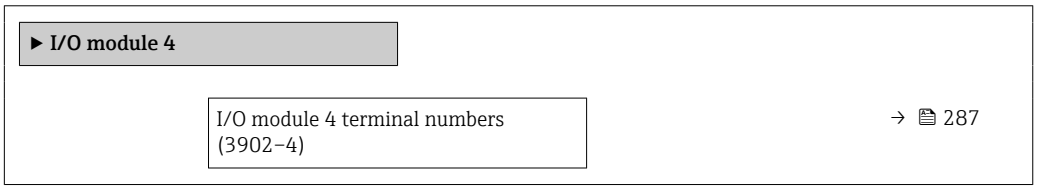
Navigation Expert → Diagnostics → I/O module 3 → Bootloader rev. (0073)

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

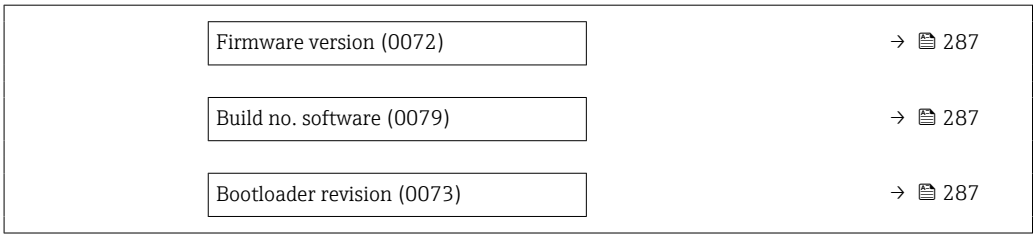
User interface Positive integer

3.8.9 "I/O module 4" submenu

Navigation Expert → Diagnostics → I/O module 4



* Visibility depends on order options or device settings



I/O module 4 terminal numbers

Navigation Expert → Diagnostics → I/O module 4 → I/O 4 terminals (3902–4)

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

User interface
- Not used
- 26-27 (I/O 1)
- 24-25 (I/O 2)
- 22-23 (I/O 3)
- 20-21 (I/O 4) *

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)

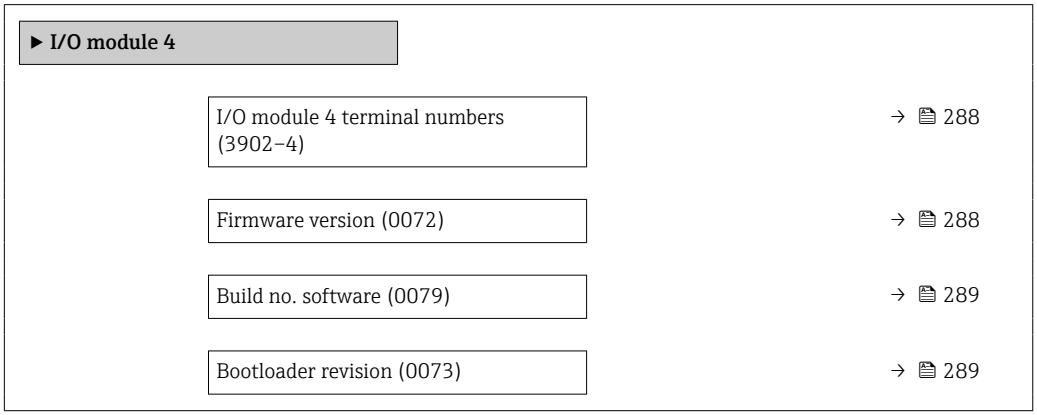
Description Use this function to display the bootloader revision of the software.

* Visibility depends on order options or device settings

User interface Positive integer

3.8.10 "I/O module 4" submenu

Navigation Expert → Diagnostics → I/O module 4



I/O module 4 terminal numbers

Navigation Expert → Diagnostics → I/O module 4 → I/O 4 terminals (3902–4)

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

User interface
- Not used
- 26-27 (I/O 1)
- 24-25 (I/O 2)
- 22-23 (I/O 3)
- 20-21 (I/O 4) *

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

* Visibility depends on order options or device settings

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

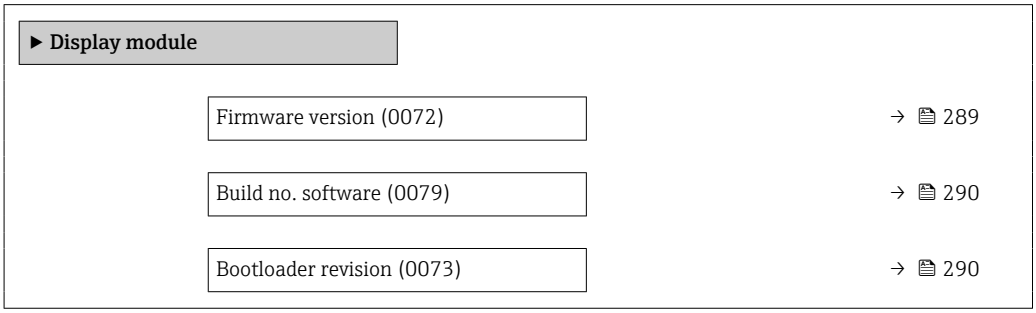
Navigation Expert → Diagnostics → I/O module 4 → Bootloader rev. (0073)

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

User interface Positive integer

3.8.11 "Display module" submenu

Navigation Expert → Diagnostics → Display module



Firmware version

Navigation Expert → Diagnostics → Display module → Firmware version (0072)

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

User interface Positive integer

Build no. software

Navigation Expert → Diagnostics → Display module → Build no. softw. (0079)

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

User interface Positive integer

Bootloader revision

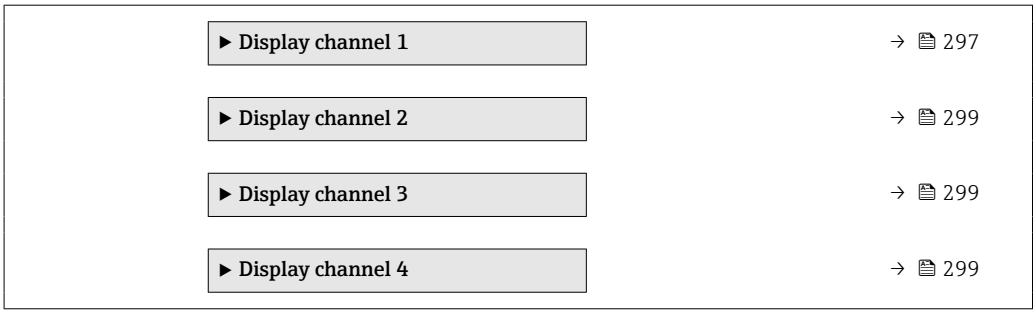
Navigation Expert → Diagnostics → Display module → Bootloader rev. (0073)

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

User interface Positive integer

3.8.12 "Data logging" submenu

Navigation Expert → Diagnostics → Data logging



Assign channel 1

Navigation Expert → Diagnostics → Data logging → Assign chan. 1 (0851)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

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

Selection
- Off
- Mass flow
- Volume flow
- Corrected volume flow *
- Density
- Reference density *
- Temperature
- Pressure
- GSV flow *
- GSV flow alternative *
- NSV flow *
- NSV flow alternative *
- S&W volume flow *
- Reference density alternative *
- Water cut *
- Oil density *
- Water density *
- Oil mass flow *
- Water mass flow *
- Oil volume flow *
- Water volume flow *
- Oil corrected volume flow *
- Water corrected volume flow *
- Target mass flow *
- Carrier mass flow *
- Concentration *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- 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 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 *
- Oscillation frequency 1 *
- Frequency fluctuation 0 *
- Frequency fluctuation 1 *
- Oscillation amplitude *
- Oscillation amplitude 1 *
- Oscillation damping 1 *
- Oscillation damping fluctuation 0 *
- Oscillation damping fluctuation 1 *
- Exciter current 1 *
- Electronics temperature
- Sensor index coil asymmetry
- Test point 0
- Test point 1
- Current output 1
- Current output 2 *
- Current output 3 *
- Current output 4 *

Factory setting Off

* Visibility depends on order options or device settings

Additional information

Description

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

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

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

Selection

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Assign current output** parameter (→ 156)

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 (→ 56).

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

Selection For the picklist, see the **Assign channel 1** parameter (→ 291)

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 (→ 56).

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

Selection For the picklist, see the **Assign channel 1** parameter (→ 291)

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 (→ 56).

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

Selection For the picklist, see the **Assign channel 1** parameter (→ 291)

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 (→ 56).

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

User entry 0.1 to 3 600.0 s

Factory setting 1.0 s

Additional information *Description*

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

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

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

Example

If 1 logging channel is used:
- $T_{log} = 1000 \times 1$ s = 1 000 s ≈15 min
- $T_{log} = 1000 \times 10$ s = 10 000 s ≈ 3 h
- $T_{log} = 1000 \times 80$ s = 80 000 s ≈ 1 d
- $T_{log} = 1000 \times 3\,600$ s = 3 600 000 s ≈ 41 d

Clear logging data

Navigation Expert → Diagnostics → Data logging → Clear logging (0855)

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

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 (→ 295), the **Not overwriting** option is selected.

Description Use this function to enter the time delay for measured value logging.

User entry 0 to 999 h

Factory setting 0 h

Additional information *Description*

Once data logging has been started with the **Data logging control** parameter (→ 296), 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 (→ 295), the **Not overwriting** option is selected.

Description Use this function to start and stop measured value logging.

Selection
- None
- Delete + start
- Stop

Factory setting None

Additional information *Selection*

- None
  Initial measured value logging status.
- Delete + start
  All the measured values recorded for all the channels are deleted and measured value logging starts again.
- Stop
  Measured value logging is stopped.

Data logging status

Navigation Expert → Diagnostics → Data logging → Data log. status (0858)

Prerequisite In the **Data logging** parameter (→ 295), the **Not overwriting** option is selected.

Description Displays the measured value logging status.

User interface
- Done
- Delay active
- Active
- Stopped

Factory setting Done

Additional information *Selection*

- Done
  Measured value logging has been performed and completed successfully.
- Delay active
  Measured value logging has been started but the logging interval has not yet elapsed.
- Active
  The logging interval has elapsed and measured value logging is active.
- Stopped
  Measured value logging is stopped.

Entire logging duration

Navigation Expert → Diagnostics → Data logging → Logging duration (0861)

Prerequisite In the **Data logging** parameter (→ 295), the **Not overwriting** option is selected.

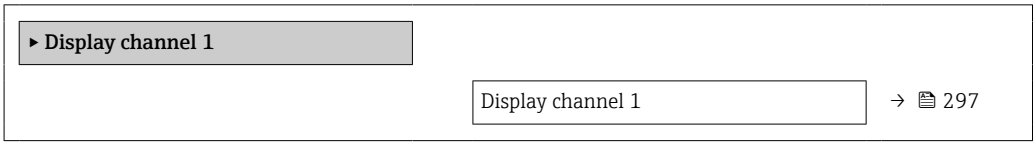
Description Displays the total logging duration.

User interface Positive floating-point number

Factory setting 0 s

"Display channel 1" submenu

Navigation Expert → Diagnostics → Data logging → Displ.channel 1



Display channel 1

Navigation Expert → Diagnostics → Data logging → Displ.channel 1

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

The software options currently enabled are displayed in the **Software option overview** parameter (→ 56).

One of the following options is selected in the **Assign channel 1** parameter (→ 291):
- Mass flow
- Volume flow
- Corrected volume flow
- Target mass flow *

* Visibility depends on order options or device settings

- Carrier mass flow *
- Density
- Reference density
- Concentration *
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- Carrier pipe temperature *
- Electronics temperature
- Current output 1
- Oscillation frequency 0
- Oscillation frequency 1 *
- Frequency fluctuation 0
- Frequency fluctuation 1 *
- Oscillation amplitude *
- Oscillation amplitude 1 *
- Oscillation damping 0
- Oscillation damping 1 *
- Oscillation damping fluctuation 0
- Oscillation damping fluctuation 1 *
- Signal asymmetry
- Exciter current 0
- Exciter current 1 *

Description

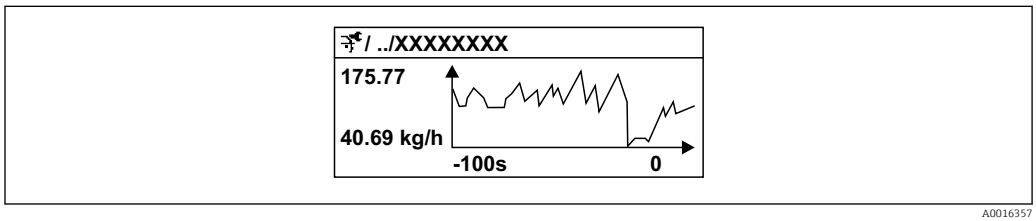
Displays the measured value trend for the logging channel in the form of a chart.

Additional information

Prerequisite

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Assign current output** parameter (→ 156)

Description



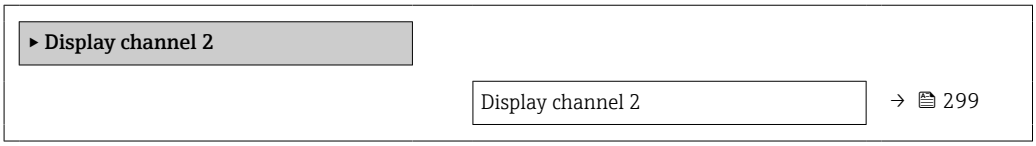
11 *Chart of a measured value trend*

- x-axis: depending on the number of channels selected displays 250 to 1000 measured values of a process variable.
- y-axis: displays the approximate measured value span and constantly adapts this to the ongoing measurement.

* Visibility depends on order options or device settings

"Display channel 2" submenu

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



Display channel 2

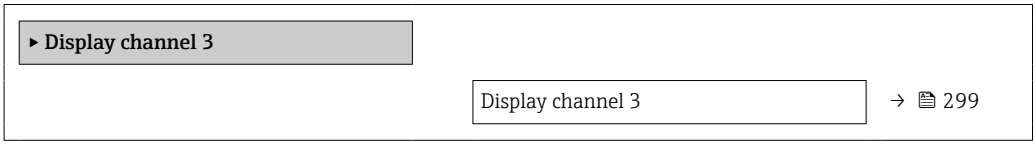
Navigation Expert → Diagnostics → Data logging → Displ.channel 2

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

Description See the **Display channel 1** parameter → 297

"Display channel 3" submenu

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



Display channel 3

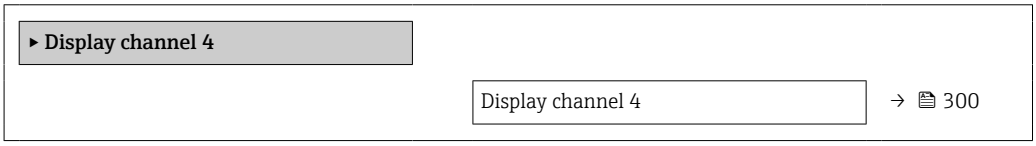
Navigation Expert → Diagnostics → Data logging → Displ.channel 3

Prerequisite A process variable is specified in the **Assign channel 3** parameter.

Description See the **Display channel 1** parameter → 297

"Display channel 4" submenu

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



Display channel 4

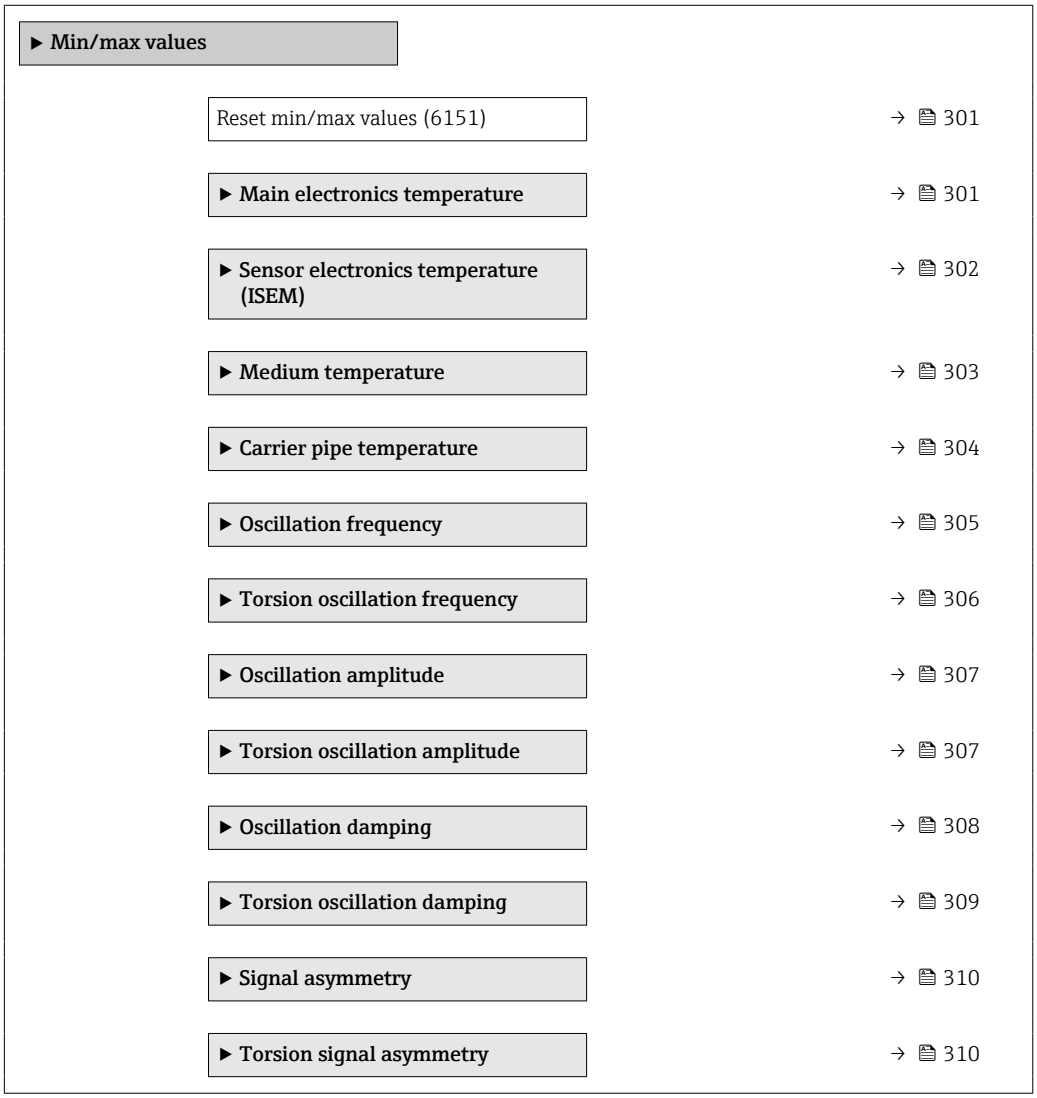
Navigation Expert → Diagnostics → Data logging → Displ.channel 4

Prerequisite A process variable is specified in the **Assign channel 4** parameter.

Description See the **Display channel 1** parameter → 297

3.8.13 "Min/max values" submenu

Navigation Expert → Diagnostics → Min/max val.



Reset min/max values

Navigation Expert → Diagnostics → Min/max val. → Reset min/max (6151)

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

Selection
- Cancel
- Oscillation amplitude *
- Oscillation amplitude 1 *
- Oscillation damping
- Torsion oscillation damping *
- Oscillation frequency
- Torsion oscillation frequency *
- Signal asymmetry
- Torsion signal asymmetry *

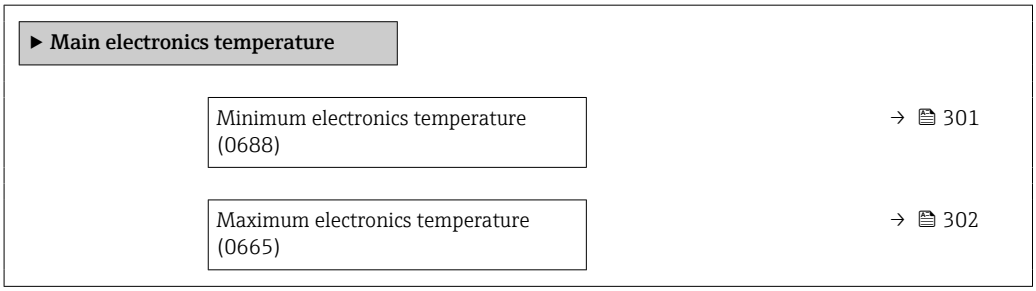
Factory setting Cancel

Additional information *Selection*

Detailed description of the options **Oscillation frequency, Oscillation amplitude, Oscillation damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 19)

"Main electronics temperature" submenu

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



Minimum electronics temperature

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp. → Min.electr.temp. (0688)

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

User interface Signed floating-point number

* Visibility depends on order options or device settings

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 98)

Maximum electronics temperature

Navigation Expert → Diagnostics → Min/max val. → Main elect.temp. → Max.electr.temp. (0665)

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

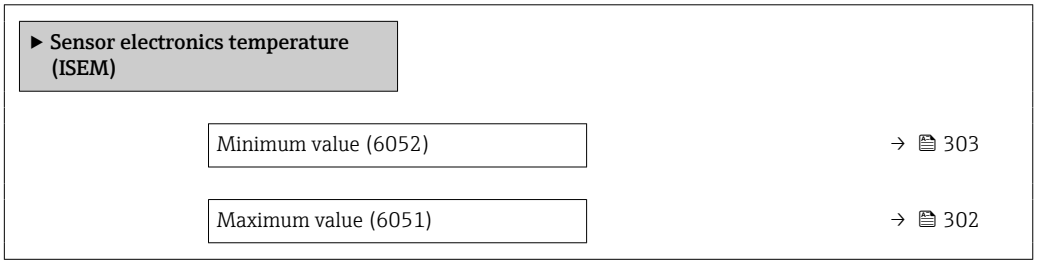
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 98)

"Sensor electronics temperature (ISEM)" submenu

Navigation Expert → Diagnostics → Min/max val. → Sensor elec.temp



Maximum value

Navigation Expert → Diagnostics → Min/max val. → Sensor elec.temp → Maximum value (6051)

Description Displays the highest previously measured temperature value of the electronics module in the sensor connection housing.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 98)

Minimum value

Navigation Expert → Diagnostics → Min/max val. → Sensor elec.temp → Minimum value (6052)

Description Displays the lowest previously measured temperature value of the electronics module in the sensor connection housing.

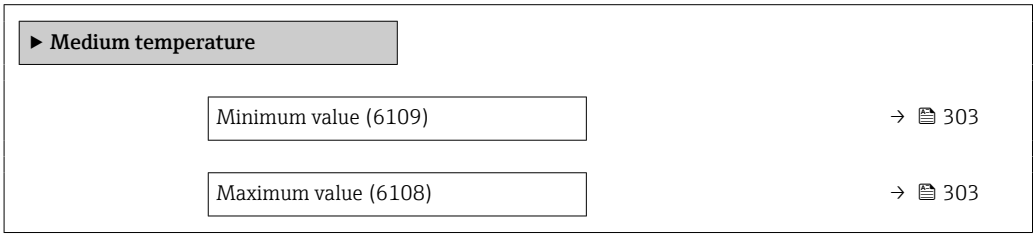
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 98)

"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 (→ 98)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Medium temp. → Maximum value (6108)

Description Displays the highest previously measured medium temperature value.

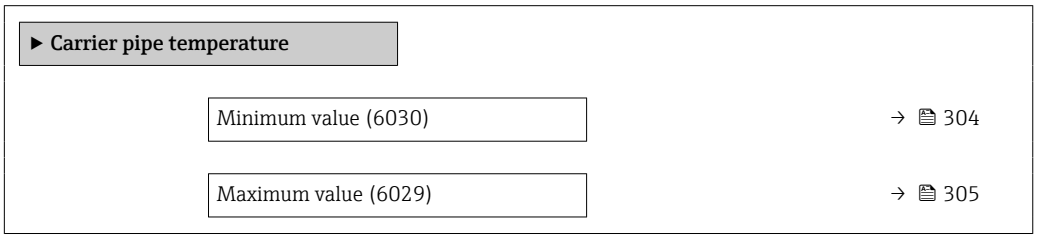
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 98)

"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

Only available for:
- Promass A
- Promass F
- Promass H
- Promass I
- Promass O
- Promass P
- PromassQ
- Promass S
- Promass X

For the following order code
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the lowest previously measured temperature value of the carrier pipe.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 98)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Carr. pipe temp. → Maximum value (6029)

Prerequisite

Only available for:
- Promass A
- Promass F
- Promass H
- Promass I
- Promass O
- Promass P
- PromassQ
- Promass S
- Promass X

For the following order code
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the highest previously measured temperature value of the carrier pipe.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 98)

"Oscillation frequency" submenu

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

▶ Oscillation frequency	
Minimum value (6071)	→ 305
Maximum value (6070)	→ 306

Minimum value

Navigation Expert → Diagnostics → Min/max val. → Oscil. frequency → Minimum value (6071)

Description Displays the lowest previously measured oscillation frequency.

User interface Signed floating-point number

Maximum value

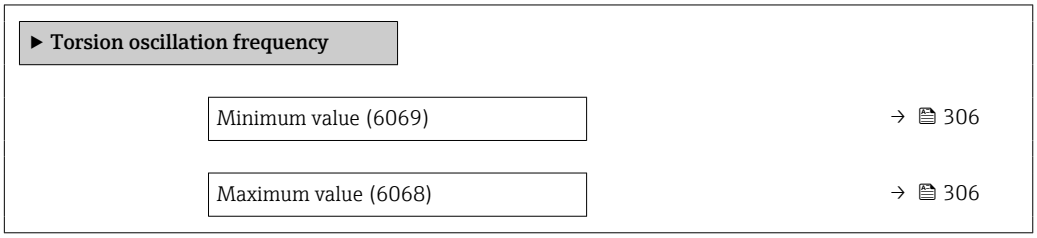
Navigation Expert → Diagnostics → Min/max val. → Oscil. frequency → Maximum value (6070)

Description Displays the highest previously measured oscillation frequency.

User interface Signed floating-point number

"Torsion oscillation frequency" submenu

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.freq.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.freq. → Minimum value (6069)

Prerequisite Only available for Promass I and Q.

For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the lowest previously measured torsion oscillation frequency.

User interface Signed floating-point number

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.freq. → Maximum value (6068)

Prerequisite Only available for Promass I and Q.

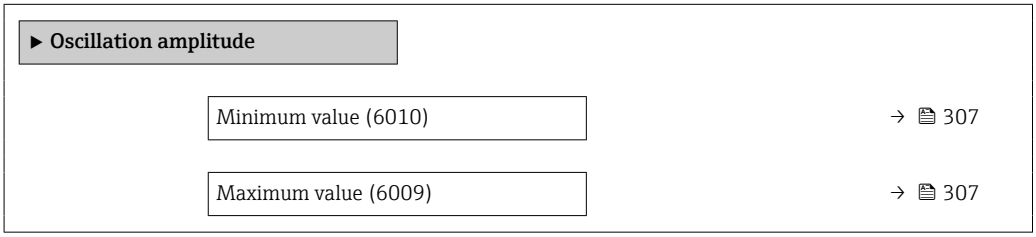
For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the highest previously measured torsion oscillation frequency.

User interface Signed floating-point number

"Oscillation amplitude" submenu

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



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Oscil. amplitude → Minimum value (6010)

Description Displays the lowest previously measured oscillation amplitude.

User interface Signed floating-point number

Maximum value

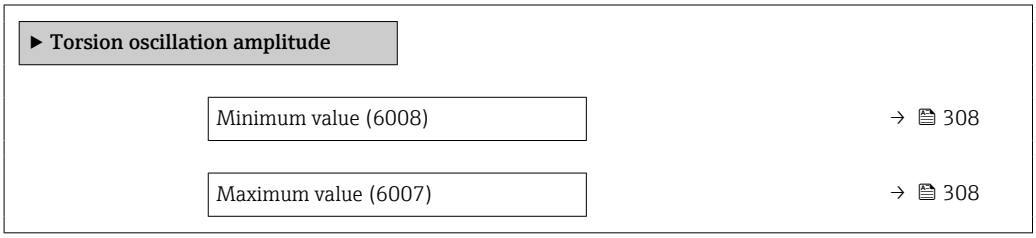
Navigation Expert → Diagnostics → Min/max val. → Oscil. amplitude → Maximum value (6009)

Description Displays the highest previously measured oscillation amplitude.

User interface Signed floating-point number

"Torsion oscillation amplitude" submenu

Navigation Expert → Diagnostics → Min/max val. → Tor. osc. amp.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Tor. osc. amp. → Minimum value (6008)

Prerequisite Only available for Promass I and Q.

For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the lowest previously measured torsion oscillation amplitude.

User interface Signed floating-point number

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Tor. osc. amp. → Maximum value (6007)

Prerequisite Only available for Promass I and Q.

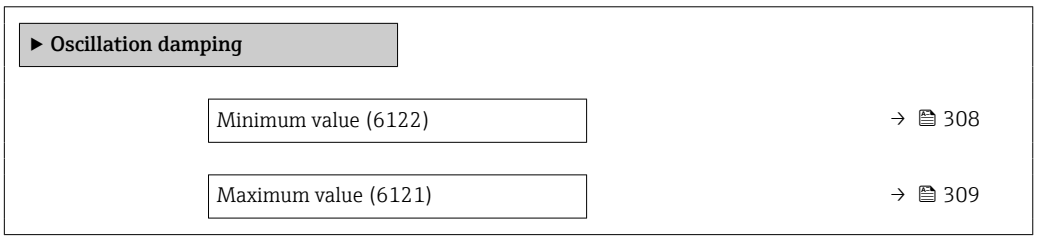
For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the highest previously measured torsion oscillation amplitude.

User interface Signed floating-point number

"Oscillation damping" submenu

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



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Oscil. damping → Minimum value (6122)

Description Displays the lowest previously measured oscillation damping.

User interface Signed floating-point number

Maximum value

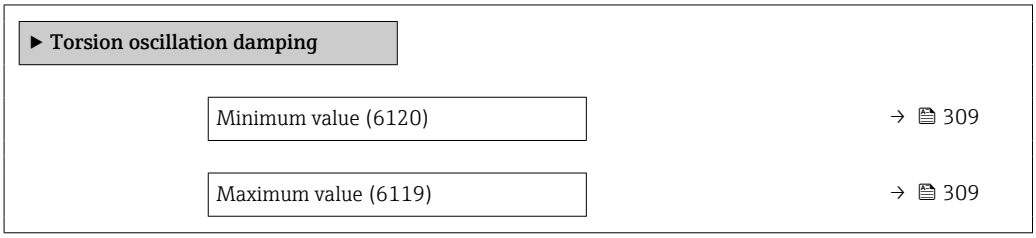
Navigation Expert → Diagnostics → Min/max val. → Oscil. damping → Maximum value (6121)

Description Displays the highest previously measured oscillation damping.

User interface Signed floating-point number

"Torsion oscillation damping" submenu

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.damp.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.damp. → Minimum value (6120)

Prerequisite Only available for Promass I and Q.

For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the lowest previously measured torsion oscillation damping.

User interface Signed floating-point number

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.damp. → Maximum value (6119)

Prerequisite Only available for Promass I and Q.

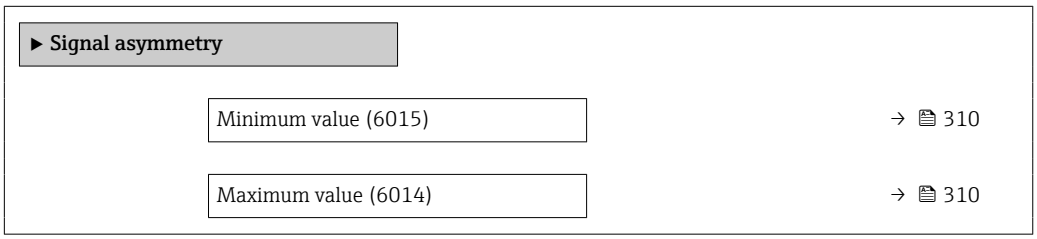
For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the highest previously measured torsion oscillation damping.

User interface Signed floating-point number

"Signal asymmetry" submenu

Navigation Expert → Diagnostics → Min/max val. → Signal asymmetry



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Signal asymmetry → Minimum value (6015)

Description Displays the lowest previously measured signal asymmetry.

User interface Signed floating-point number

Maximum value

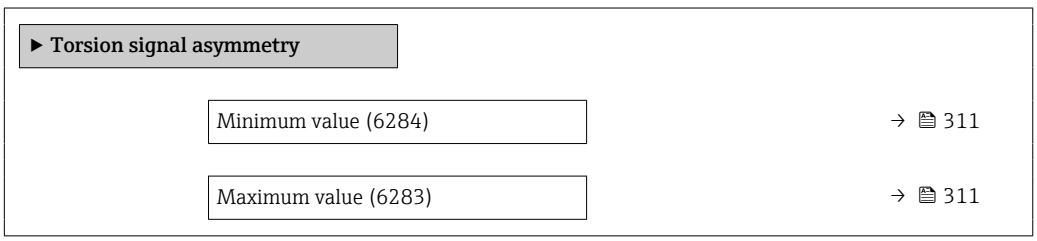
Navigation Expert → Diagnostics → Min/max val. → Signal asymmetry → Maximum value (6014)

Description Displays the highest previously measured signal asymmetry.

User interface Signed floating-point number

"Torsion signal asymmetry" submenu

Navigation Expert → Diagnostics → Min/max val. → Tors.sig.asymm.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Tors.sig.asymm. → Minimum value (6284)

Prerequisite Only available for Promass I and Q.

For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the lowest previously measured torsion signal asymmetry.

User interface Signed floating-point number

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Tors.sig.asymm. → Maximum value (6283)

Prerequisite Only available for Promass I and Q.

For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

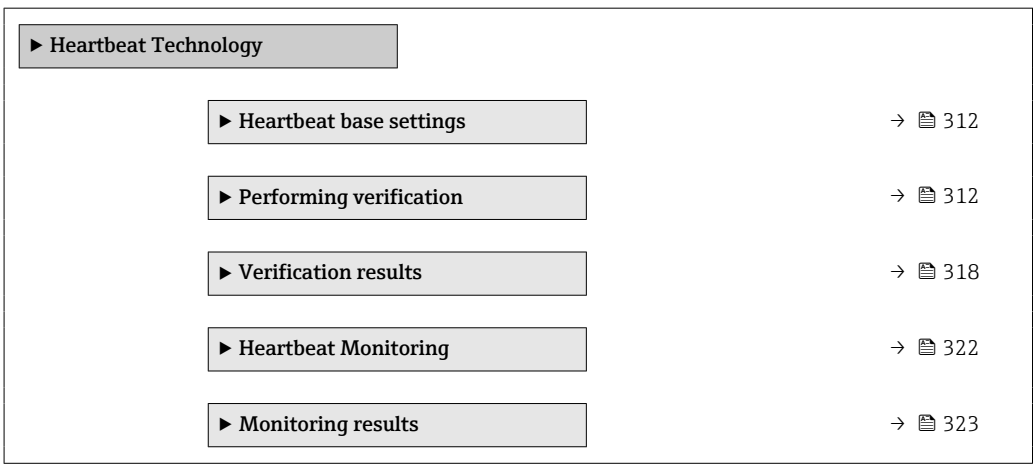
Description Displays the highest previously measured torsion signal asymmetry.

User interface Signed floating-point number

3.8.14 "Heartbeat Technology" submenu

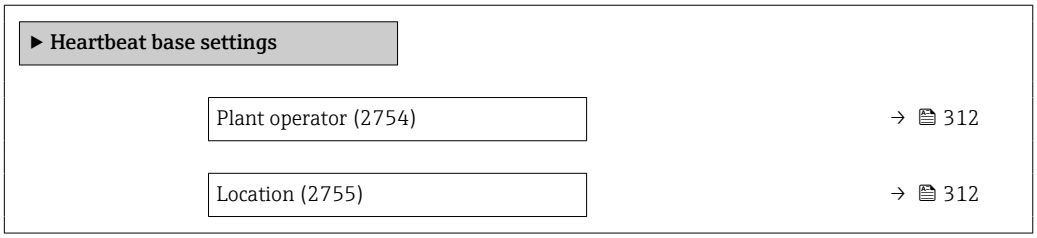
For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring**: Special Documentation for the device → 7

Navigation Expert → Diagnostics → Heartbeat Techn.



"Heartbeat base settings" submenu

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings



Plant operator

Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings → Plant operator (2754)

Description Use this function to enter the plant operator.

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

Location

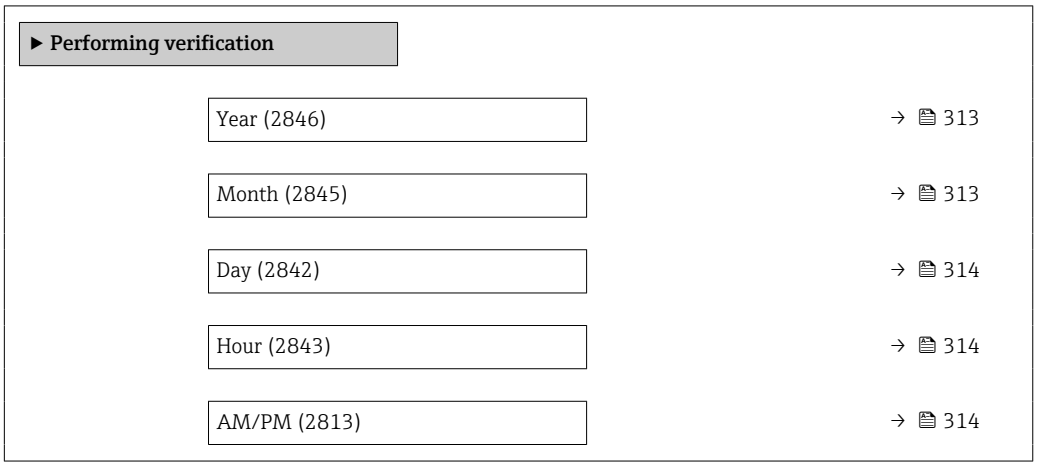
Navigation Expert → Diagnostics → Heartbeat Techn. → Base settings → Location (2755)

Description Use this function to enter the location.

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

"Performing verification" wizard

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific.



Minute (2844)	→ 315
Verification mode (12105)	→ 315
External device information (12101)	→ 315
Start verification (12127)	→ 316
Progress (2808)	→ 316
Measured values (12102)	→ 317
Output values (12103)	→ 317
Status (12153)	→ 317
Verification result (12149)	→ 318

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) (→ 99).

Description Use this function to select the time entry in the morning (**AM** option) or afternoon (**PM** option) in the case of 12-hour notation.

Selection
- AM
- PM

Factory setting AM

Minute

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Minute (2844)

Prerequisite Can be edited if Heartbeat Verification is not active.

Description Use this function to enter the minutes of recalibration.

User entry 0 to 59 min

Factory setting 0 min

Verification mode

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verificat. mode (12105)

Prerequisite Can be edited if verification status is not active.

Description Select verification mode.

Standard verification: Verification is performed automatically by the device and without manual checking of external measured variables.

Extended verification: Similar to internal verification but with the entry of external measured variables (see also "Measured values" parameter).

Selection
- Standard verification
- Extended verification

Factory setting Standard verification

External device information

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Ext. device info (12101)

Prerequisite With the following conditions:
- The **Extended verification** option is selected in the **Verification mode** parameter (→ 315).
- Can be edited if the verification status is not active.

Description Record measuring equipment for extended verification.

User entry Free text entry

Factory setting –

Start verification

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Start verificat. (12127)

Description Start the verification.

To carry out a complete verification, select the selection parameters individually. Once the external measured values have been recorded, verification is started using the **Start** option.

Selection
- Cancel
- Output 1 low value *
- Output 1 high value *
- Output 2 low value *
- Output 2 high value *
- Output 3 low value *
- Output 3 high value *
- Output 4 low value *
- Output 4 high value *
- Frequency output 1 *
- Pulse output 1 *
- Frequency output 2 *
- Pulse output 2 *
- Frequency output 3 *
- Double pulse output *
- Start

Factory setting Cancel

Progress

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Progress (2808)

Description The progress of the process is indicated.

User interface 0 to 100 %

* Visibility depends on order options or device settings

Measured values

Navigation Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Measured val. (12102)

Prerequisite One of the following options is selected in the **Start verification** parameter (→ 316):
- Output 1 low value
- Output 1 high value
- Output 2 low value
- Output 2 high value
- Output 3 low value
- Output 3 high value
- Output 4 low value
- Output 4 high value
- Frequency output 1
- Pulse output 1
- Frequency output 2
- Pulse output 2
- Frequency output 3
- 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
- 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)	→ 319
Verification ID (12141)	→ 319
Operating time (12126)	→ 319
Verification result (12149)	→ 319
Sensor (12152)	→ 320
HBSI (12167)	→ 320
Sensor electronic module (ISEM) (12151)	→ 320
I/O module (12145)	→ 321
System status (12109)	→ 321

Date/time (manually entered)

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Date/time (12142)

Prerequisite The verification has been performed.

Description Date and time.

User interface dd.mmmm.yyyy; hh:mm

Factory setting 1 January 2010; 12:00

Verification ID

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verification ID (12141)

Prerequisite The verification has been performed.

Description Displays consecutive numbering of the verification results in the measuring device.

User interface 0 to 65 535

Factory setting 0

Operating time

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Operating time (12126)

Prerequisite The verification has been performed.

Description Indicates how long the device has been in operation up to the verification.

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

Factory setting –

Verification result

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verific. result (12149)

Description Displays the overall result of the verification.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

Sensor

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

Prerequisite The **Failed** option result is shown in the **Overall result** parameter (→ 318).

Description Displays the result for the sensor.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

HBSI

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → HBSI (12167)

Prerequisite In the **Overall result** parameter (→ 318), the **Failed** option was displayed.

Description Displays the relative change in the sensor with all the sensor components.

Detailed description of results classification:

User interface
- Not supported
- Passed
- Not done
- Failed

Factory setting Not done

Sensor electronic module (ISEM)

Navigation Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sens. electronic (12151)

Prerequisite The **Failed** option result is shown in the **Overall result** parameter (→ 318).

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 (→ 318), 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 (→ 318).

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

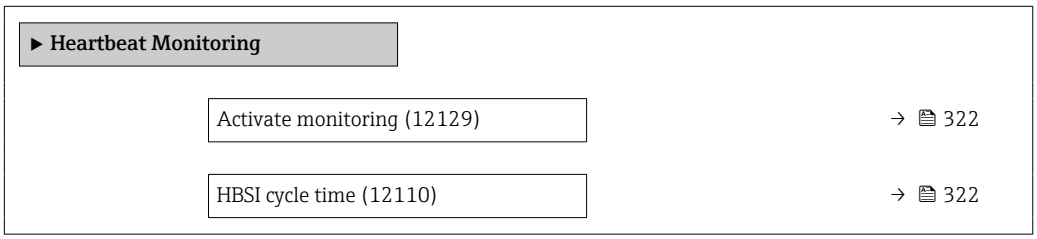
Detailed description of results classification:

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 (→ 322), the **Time-controlled HBSI** option is selected.

Not available for Promass I.

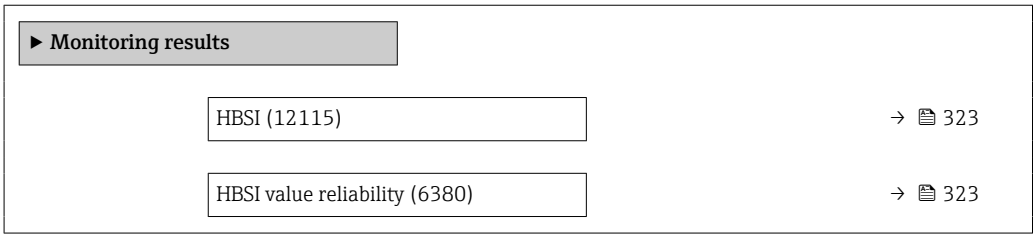
Description Use this function to enter the cycle time for determining the HBSI measured value. The HBSI measured value may only be determined in the configured cycle time in the firmware if the **Activate monitoring** parameter (→ 322) is set to **Scheduled HBSI** option.

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)

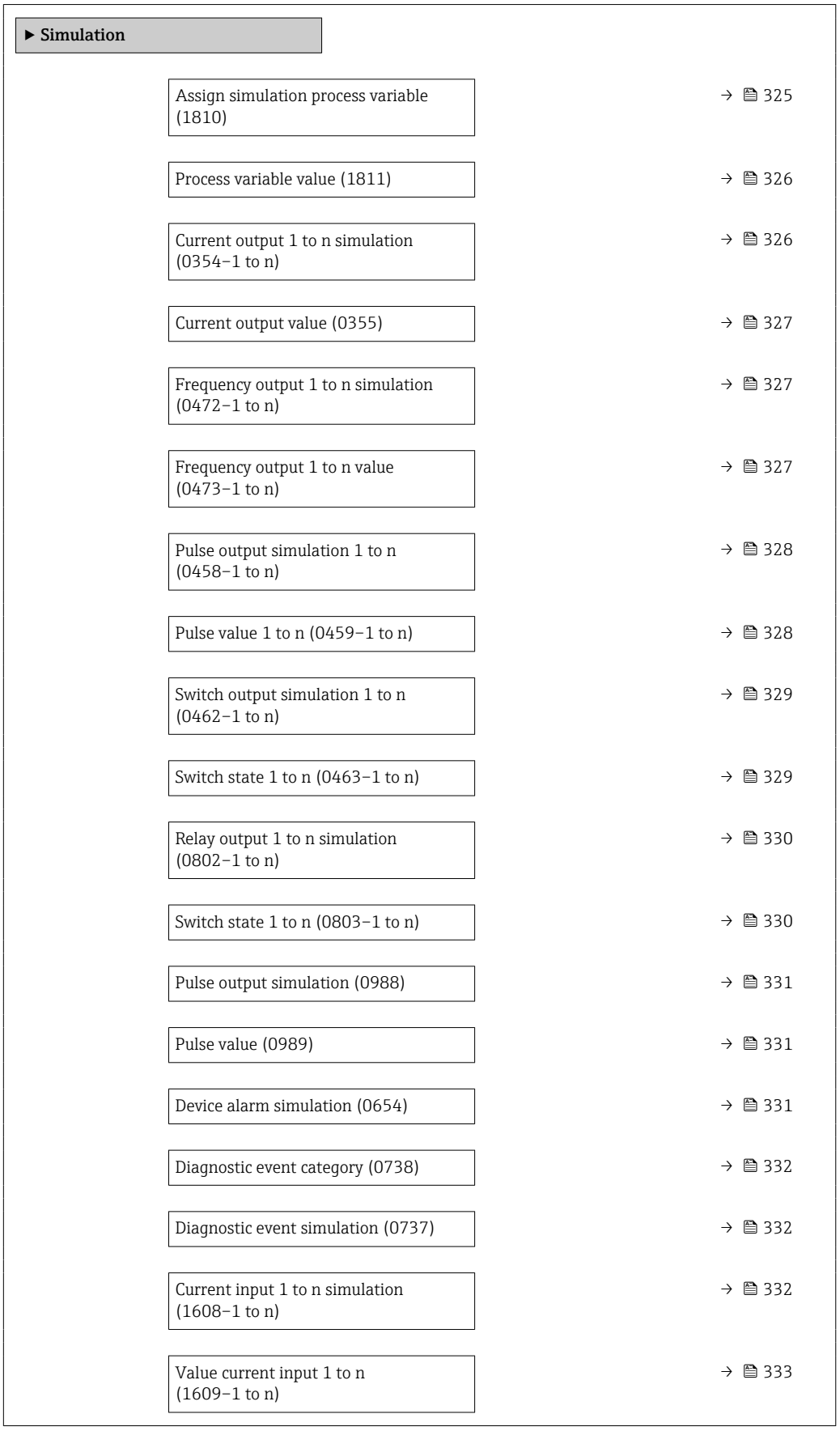
Description Shows the status of the HBSI value. Uncertain or Bad: Due to difficult process conditions over a long time no HBSI value could be determined.

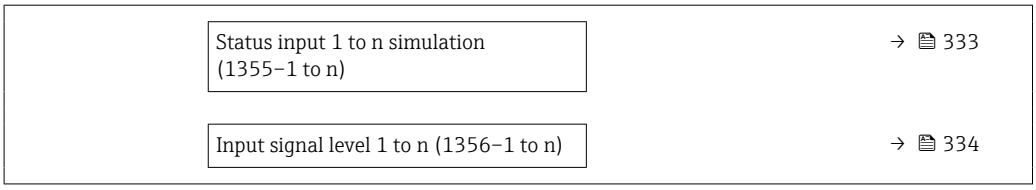
User interface
- Good
- Uncertain
- Bad

Factory setting Uncertain

3.8.15 "Simulation" submenu

Navigation Expert → Diagnostics → Simulation





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
- Dynamic viscosity *
- Kinematic viscosity *
- Temp. compensated dynamic viscosity *
- Temp. compensated kinematic viscosity *
- Concentration *
- Target mass flow *
- Carrier mass flow *
- Time period signal frequency (TPS) *

Factory setting Off

* Visibility depends on order options or device settings

Additional information *Description*

The simulation value of the process variable selected is defined in the **Process variable value** parameter (→ 326).

Process variable value

Navigation Expert → Diagnostics → Simulation → Proc. var. value (1811)

Prerequisite A process variable is selected in the **Assign simulation process variable** parameter (→ 325).

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 (→ 89).

Current output 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Curr.outp 1 to n sim. (0354–1 to n)

Description Use this function to switch simulation of the current output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- On

Factory setting Off

Additional information *Description*

The desired simulation value is defined in the **Value current output 1 to n** parameter.

Selection
- Off
  Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Current simulation is active.

Current output value

Navigation Expert → Diagnostics → Simulation → Curr.outp val. (0355)

Prerequisite In the **Current output 1 to n simulation** parameter, the **On** option is selected.

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

User entry 3.59 to 22.5 mA

Additional information *Dependency*

The input range is dependent on the option selected in the **Current span** parameter (→ 157).

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 (→ 171), the **Frequency** option is selected.

Description Use this function to switch simulation of the frequency output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- On

Factory setting Off

Additional information *Description*

The desired simulation value is defined in the **Frequency value 1 to n** parameter.

Selection
- Off
  Frequency simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Frequency simulation is active.

Frequency output 1 to n value

Navigation Expert → Diagnostics → Simulation → Freq.outp 1 to n val. (0473–1 to n)

Prerequisite In the **Frequency simulation 1 to n** parameter, the **On** option is selected.

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

User entry 0.0 to 12 500.0 Hz

Pulse output simulation 1 to n

Navigation Expert → Diagnostics → Simulation → Puls.outp.sim. 1 to n (0458–1 to n)

Prerequisite In the **Operating mode** parameter (→ 171), 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 (→ 174).
- Down-counting value
  The pulses specified in the **Pulse value** parameter (→ 328) 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 (→ 171), the **Switch** option is selected.

Description Use this function to switch simulation of the switch output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- On

Factory setting Off

Additional information *Description*

The desired simulation value is defined in the **Switch state 1 to n** parameter.

Selection
- Off
  Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Switch simulation is active.

Switch state 1 to n

Navigation Expert → Diagnostics → Simulation → Switch state 1 to n (0463–1 to n)

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

Selection
- Open
- Closed

Additional information *Selection*
- Open
  Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed
  Switch simulation is active.

Relay output 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Relay out. 1 to n sim (0802–1 to n)

Description Use this function to switch simulation of the relay output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- On

Factory setting Off

Additional information

Description

The desired simulation value is defined in the **Switch state 1 to n** parameter.

Selection
- Off
  Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Relay simulation is active.

Switch state 1 to n

Navigation Expert → Diagnostics → Simulation → Switch state 1 to n (0803–1 to n)

Prerequisite The **On** option is selected in the **Switch output simulation 1 to n** parameter parameter.

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

Selection
- Open
- Closed

Additional information

Selection
- Open
  Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed
  Relay simulation is active.

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 (→ 331).

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 (→ 200).
- Down-counting value
  The pulses specified in the **Pulse value** parameter (→ 331) are output.

Pulse value

Navigation Expert → Diagnostics → Simulation → Pulse value (0989)

Prerequisite In the **Pulse output simulation** parameter (→ 331), 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 (→ 332).

Selection
- Sensor
- Electronics
- Configuration
- Process

Factory setting Process

Diagnostic event simulation

Navigation Expert → Diagnostics → Simulation → Diag. event sim. (0737)

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

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

Factory setting Off

Additional information *Description*

For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event category** parameter (→ 332).

Current input 1 to n simulation

Navigation Expert → Diagnostics → Simulation → Curr.inp 1 to n sim. (1608–1 to n)

Description Option for switching simulation of the current input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

The desired simulation value is defined in the **Value current input 1 to n** parameter.

Selection
- Off
- On

Factory setting
Off

Additional information
Selection
- Off
  Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Current simulation is active.

Value current input 1 to n

Navigation
Expert → Diagnostics → Simulation → Value curr.inp 1 to n (1609–1 to n)

Prerequisite
In the **Current input 1 to n simulation** parameter, the **On** option is selected.

Description
Use this function to enter the current value for the simulation. In this way, users can verify the correct configuration of the current input and the correct function of upstream feed-in units.

User entry
0 to 22.5 mA

Status input 1 to n simulation

Navigation
Expert → Diagnostics → Simulation → Status inp 1 to n sim (1355–1 to n)

Description
Use this function to switch simulation of the status input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection
- Off
- On

Factory setting
Off

Additional information
Description
The desired simulation value is defined in the **Input signal level** parameter (→ 334).

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 (→ 333), 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 applie 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
8	400
15	1 300
15 FB	3 600
25	3 600
25 FB	9 000
40	9 000
40 FB	14 000
50	14 000
50 FB	36 000
80	36 000
100	60 000
150	130 t/h
200	230 t/h

Nominal diameter [mm]	[kg/h]
250	360 t/h
350	650 t/h

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
8	0.1
15	0.1
15 FB	1
25	1
25 FB	1
40	1
40 FB	10
50	10
50 FB	10
80	10
100	10
150	100
200	100
250	100
350	100

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
8	8
15	26

Nominal diameter [mm]	On-value for liquid [kg/h]
15 FB	72
25	72
25 FB	180
40	180
40 FB	300
50	300
50 FB	720
80	720
100	1200
150	2.6 t/h
200	1.15 t/h
250	4.6 t/h
350	13 t/h

Nominal diameter [mm]	On-value for gas [kg/h]
1	0.02
2	0.1
4	0.45
8	2
15	6.5
15 FB	18
25	18
25 FB	45
40	45
40 FB	75
50	75
50 FB	180
80	180
100	300
150	650
200	1.0 t/h
250	1.8 t/h
350	3.25 t/h

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 applie 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
3/8	15
½	50
½ FB	130
1	130
1 FB	330
1½	330
1½ FB	550
2	550
2 FB	1300
3	1300
4	2200
6	4800
8	8500
10	13000
14	23500

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
3/8	0.2
½	0.2
½ FB	2
1	2
1 FB	2
1½	2
1½ FB	20
2	20
2 FB	20
3	20
4	20
6	200
8	200
10	200
14	200

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
3/8	0.3
½	1
½ FB	2.6
1	2.6
1 FB	6.6
1½	6.6
1½ FB	11
2	11
2 FB	26
3	26
4	44
6	95

Nominal diameter [in]	On-value for liquid [lb/min]
8	165
10	260
14	470

Nominal diameter [in]	On-value for gas [lb/min]
1/24	0.001
1/12	0.004
1/8	0.016
3/8	0.075
½	0.25
½ FB	0.65
1	0.65
1 FB	1.65
1½	1.65
1½ FB	2.75
2	2.75
2 FB	6.5
3	6.5
4	11
6	23.75
8	36.74
10	65
14	117.5

5 Explanation of abbreviated units

5.1 SI units

Process variable	Units	Explanation
Density	g/cm³, g/m³	Gram/volume unit
	kg/dm³, kg/l, kg/m³	Kilogram/volume unit
	SD4°C, SD15°C, SD20°C	Specific density: The specific density is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
	SG4°C, SG15°C, SG20°C	Specific gravity: The specific gravity is the ratio of the density of the fluid to the density of water at a water temperature of 4 °C (39 °F), 15 °C (59 °F), 20 °C (68 °F).
Pressure	Pa a, kPa a, MPa a	Pascal, kilopascal, megapascal (absolute)
	bar	Bar
	Pa g, kPa g, MPa g	Pascal, kilopascal, megapascal (relative/gauge)
	bar g	Bar (relative/gauge)
Mass	g, kg, t	Gram, kilogram, metric ton
Mass flow	g/s, g/min, g/h, g/d	Gram/time unit
	kg/s, kg/min, kg/h, kg/d	Kilogram/time unit
	t/s, t/min, t/h, t/d	Metric ton/time unit
Reference density	kg/Nm³, kg/Nl, g/Scm³, kg/Sm³	Kilogram, gram/standard volume unit
Corrected volume	Nl, Nm³, Sm³	Normal liter, normal cubic meter, standard cubic meter
Corrected volume flow	Nl/s, Nl/min, Nl/h, Nl/d	Normal liter/time unit
	Nm³/s, Nm³/min, Nm³/h, Nm³/d	Normal cubic meter/time unit
	Sm³/s, Sm³/min, Sm³/h, Sm³/d	Standard cubic meter/time unit
Temperature	°C , K	Celsius, Kelvin
Volume	cm³, dm³, m³	Cubic centimeter, cubic decimeter, cubic meter
	ml, l, hl, Ml Mega	Milliliter, liter, hectoliter, megaliter
Volume flow	cm³/s, cm³/min, cm³/h, cm³/d	Cubic centimeter/time unit
	dm³/s, dm³/min, dm³/h, dm³/d	Cubic decimeter/time unit
	m³/s, m³/min, m³/h, m³/d	Cubic meter/time unit
	ml/s, ml/min, ml/h, ml/d	Milliliter/time unit
	l/s, l/min, l/h, l/d	Liter/time unit
	hl/s, hl/min, hl/h, hl/d	Hectoliter/time unit
	Ml/s, Ml/min, Ml/h, Ml/d	Megaliter/time unit
Time	s, m, h, d, y	Second, minute, hour, day, year

5.2 US units

Process variable	Units	Explanation
Density	lb/ft³, lb/gal (us)	Pound/cubic foot, pound/gallon
	lb/bbl (us;liq.), lb/bbl (us;beer), lb/bbl (us;oil), lb/bbl (us;tank)	Pound/volume unit

Process variable	Units	Explanation
Pressure	psi a	Pounds per square inch (absolute)
	psi g	Pounds per square inch (gauge)
Mass	oz, lb, STon	Ounce, pound, standard ton
Mass flow	oz/s, oz/min, oz/h, oz/d	Ounce/time unit
	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	STon/s, STon/min, STon/h, STon/d	Standard ton/time unit
Reference density	lb/Sft³	Weight unit/standard volume unit
Corrected volume	Sft³, Sgal (us), Sbbl (us;liq.)	Standard cubic foot, standard gallon, standard barrel
Corrected volume flow	Sft³/s, Sft³/min, Sft³/h, Sft³/d	Standard cubic foot/time unit
	Sgal/s (us), Sgal/min (us), Sgal/h (us), Sgal/d (us)	Standard gallon/time unit
	Sbbl/s (us;liq.), Sbbl/min (us;liq.), Sbbl/h (us;liq.), Sbbl/d (us;liq.)	Barrel/time unit (normal liquids)
Temperature	°F, °R	Fahrenheit, Rankine
Volume	af	Acre foot
	ft³	Cubic foot
	fl oz (us), gal (us), kgal (us), Mgal (us)	Fluid ounce, gallon, kilogallon, million gallon
	bbl (us;liq.), bbl (us;beer), bbl (us;oil), bbl (us;tank)	Barrel (normal liquids), barrel (beer), barrel (petrochemicals), barrel (filling tanks)
Volume flow	af/s, af/min, af/h, af/d	Acre foot/time unit
	ft³/s, ft³/min, ft³/h, ft³/d	Cubic foot/time unit
	fl oz/s (us), fl oz/min (us), fl oz/h (us), fl oz/d (us)	Fluid ounce/time unit
	gal/s (us), gal/min (us), gal/h (us), gal/d (us)	Gallon/time unit
	kgal/s (us), kgal/min (us), kgal/h (us), kgal/d (us)	Kilogallon/time unit
	Mgal/s (us), Mgal/min (us), Mgal/h (us), Mgal/d (us)	Million gallon/time unit
	bbl/s (us;liq.), bbl/min (us;liq.), bbl/h (us;liq.), bbl/d (us;liq.)	Barrel/time unit (normal liquids) Normal liquids: 31.5 gal/bbl
	bbl/s (us;beer), bbl/min (us;beer), bbl/h (us;beer), bbl/d (us;beer)	Barrel /time unit (beer) Beer: 31.0 gal/bbl
	bbl/s (us;oil), bbl/min (us;oil), bbl/h (us;oil), bbl/d (us;oil)	Barrel/time unit (petrochemicals) Petrochemicals: 42.0 gal/bbl
	bbl/s (us;tank), bbl/min (us;tank), bbl/h (us;tank), bbl/d (us;tank)	Barrel/time unit (filling tank) Filling tanks: 55.0 gal/bbl
Time	s, m, h, d, y	Second, minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

5.3 Imperial units

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

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