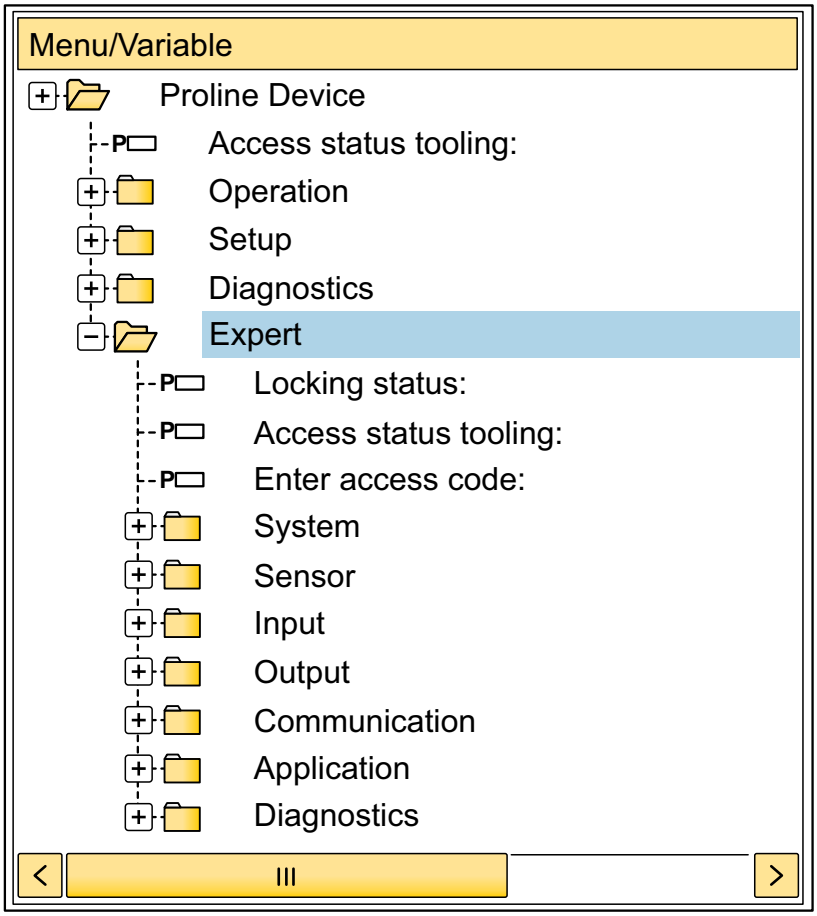
GP01033D/06/EN/02.17
71377883

Valid as of version
01.01.zz (Device firmware)

Description of Device Parameters
Proline Promass 100
HART

Coriolis flowmeter



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

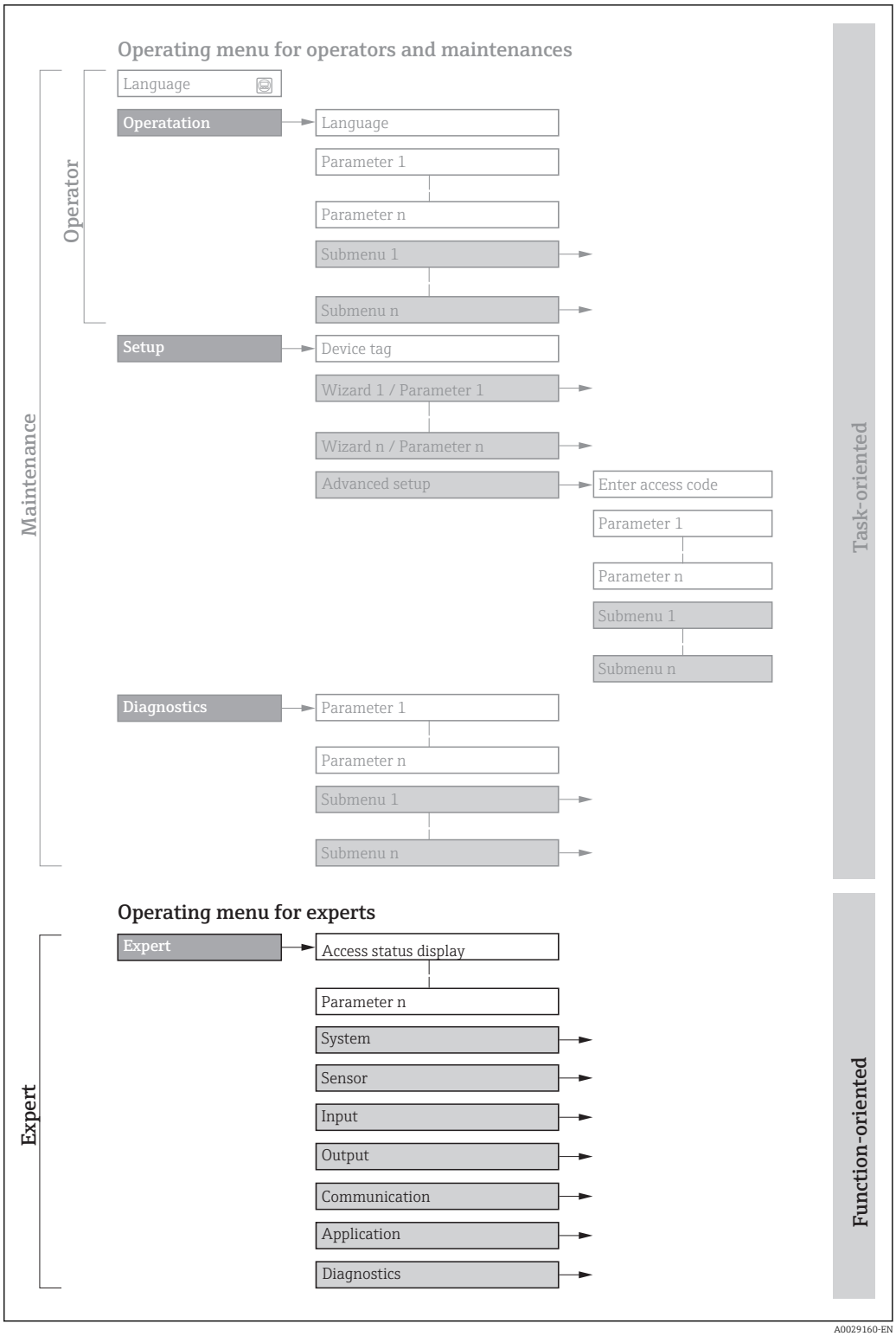
1.2 Target group

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 (→ 🖹 8), which is displayed when the **"Maintenance" user role** is enabled.



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

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

1.3.2 Structure of a parameter description

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

Complete parameter name	Write-protected parameter =

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

Prerequisite
The parameter is only available under these specific conditions

Description
Description of the parameter function

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

User entry
Input range for the parameter

User interface
Display value/data for the parameter

Factory setting
Default setting ex works

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

1.4 Symbols used

1.4.1 Symbols for certain types of information

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

1.4.2 Symbols in graphics

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

1.5 Documentation

1.5.1 Standard documentation

Operating Instructions

Measuring device	Documentation code
Promass A 100	BA01187D
Promass E 100 (8E1B**-...)	BA01167D
Promass E 100 (8E1C**-...)	BA01713D
Promass F 100	BA01168D
Promass G 100	BA01346D
Promass H 100	BA01189D
Promass I 100	BA01190D
Promass O 100	BA01191D
Promass P 100	BA01192D
Promass S 100	BA01193D
Promass X 100	BA01194D

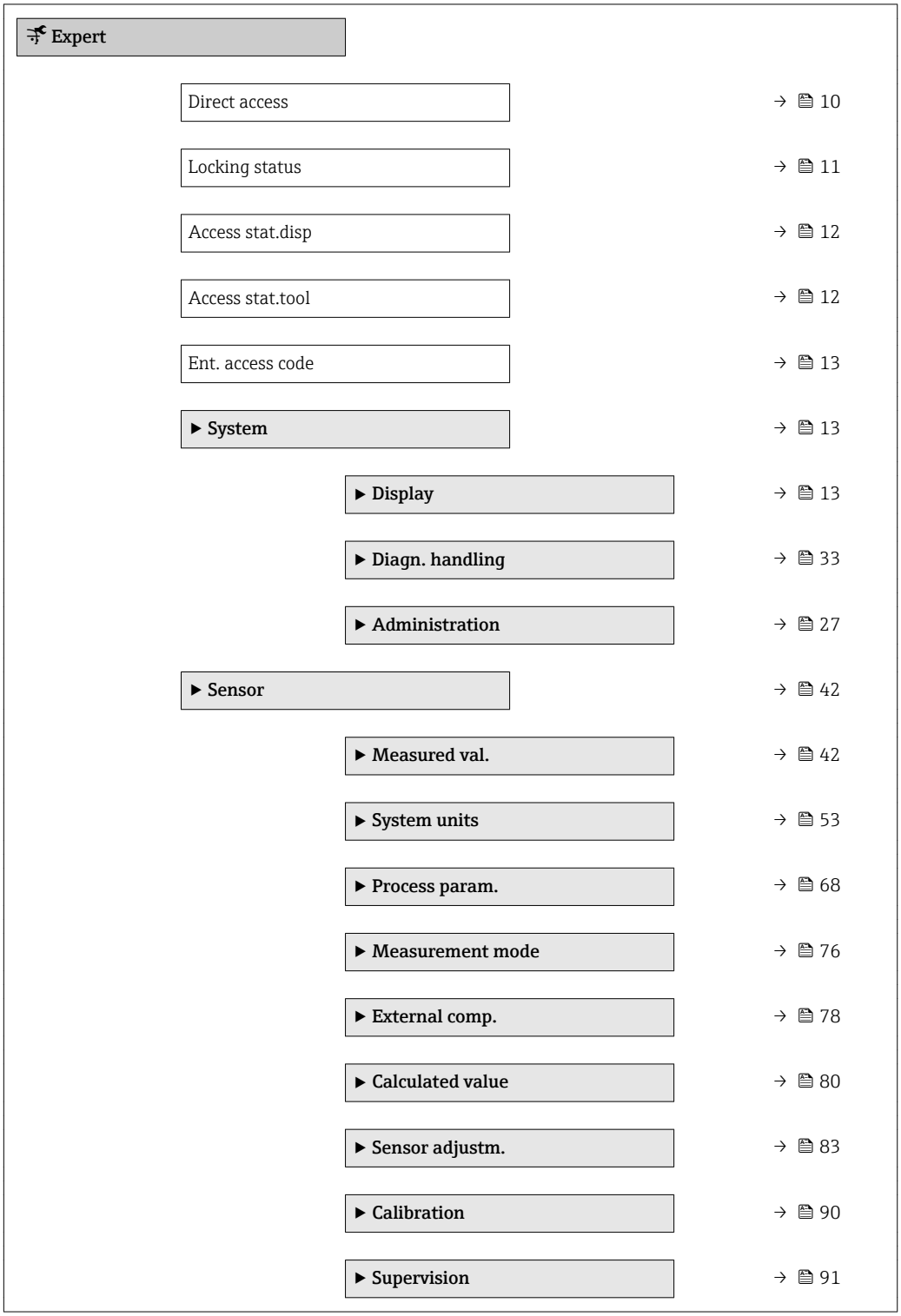
1.5.2 Supplementary device-dependent documentation

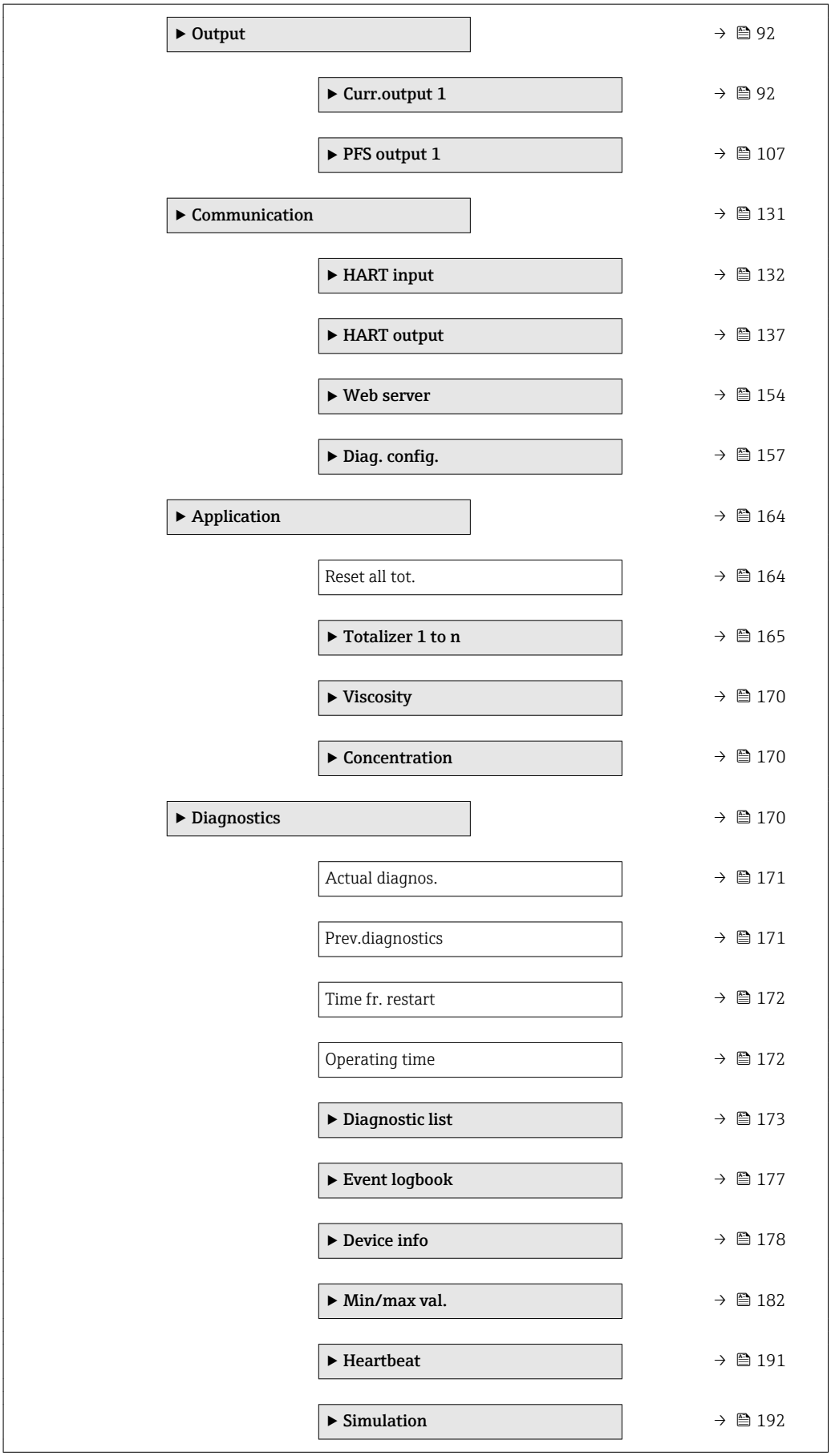
Special Documentation

Content	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Concentration Measurement	SD01152D
Heartbeat Technology	SD01153D
Web server	SD01820D

2 Overview of the Expert operating menu

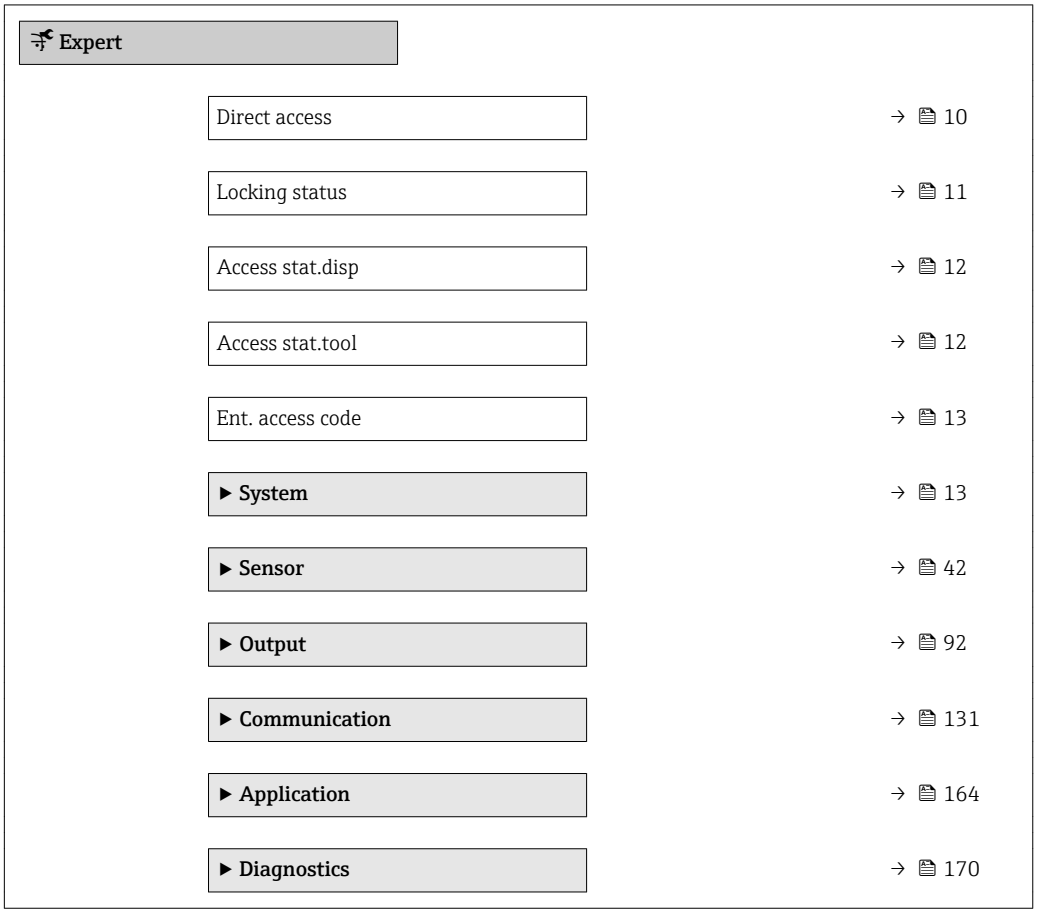
The following table provides an overview of the menu structure of the expert operating menu and its parameters. The page reference indicates where the associated description of the submenu or parameter can be found.




▶ Output → 92
▶ Curr.output 1 → 92
▶ PFS output 1 → 107
▶ Communication → 131
▶ HART input → 132
▶ HART output → 137
▶ Web server → 154
▶ Diag. config. → 157
▶ Application → 164
Reset all tot. → 164
▶ Totalizer 1 to n → 165
▶ Viscosity → 170
▶ Concentration → 170
▶ Diagnostics → 170
Actual diagnos. → 171
Prev.diagnostics → 171
Time fr. restart → 172
Operating time → 172
▶ Diagnostic list → 173
▶ Event logbook → 177
▶ Device info → 178
▶ Min/max val. → 182
▶ Heartbeat → 191
▶ Simulation → 192

3 Description of device parameters

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



Direct access

Navigation Expert → Direct access

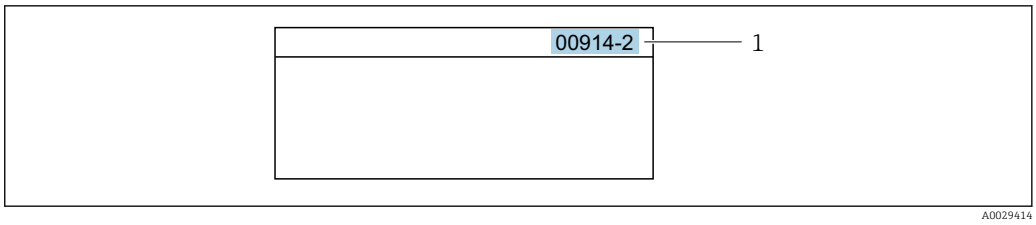
Prerequisite There is a local display with operating elements.

Description 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 accessed automatically.
  Example: Enter **00914** → **Assign variable** parameter
- If a different channel is accessed: Enter the direct access code with the corresponding channel number.
  Example: Enter **00914-2** → **Assign variable** parameter

Locking status

Navigation Expert → Locking status

Description Displays the active write protection.

User interface
- Hardware locked
- Temp. locked

Additional information

User interface

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

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

Selection

Options	Description
Hardware locked (priority 1)	The write protection switch (DIP switch) for locking the hardware is activated on the main electronic module. This locks write access to the parameters .
Temp. locked (priority 2)	Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset etc.). Once the internal processing has been completed, the parameters can be changed once again.

Access stat.disp

Navigation Expert → Access stat.disp

Prerequisite A local display is provided.

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

User interface
- Operator
- Maintenance

Factory setting Operator

Additional information

Description

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

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

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

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

Display

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

Access stat.tool

Navigation Expert → Access stat.tool

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

User interface
- Operator
- Maintenance

Factory setting Maintenance

Additional information

Description

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

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

Display

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

Ent. access code

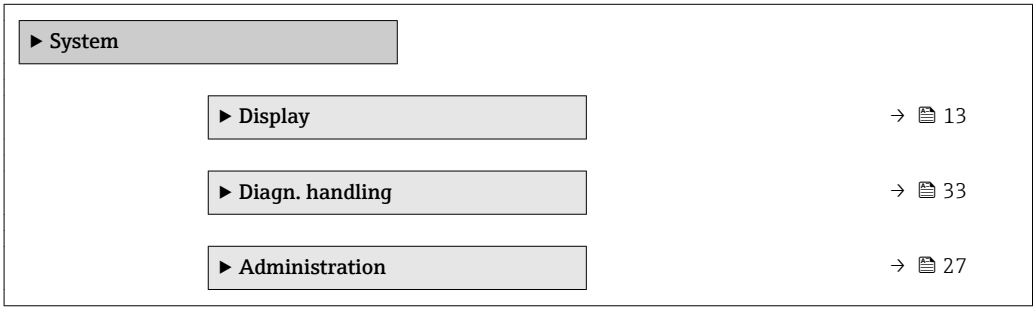
Navigation Expert → Ent. access code

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

User entry 0 to 9 999

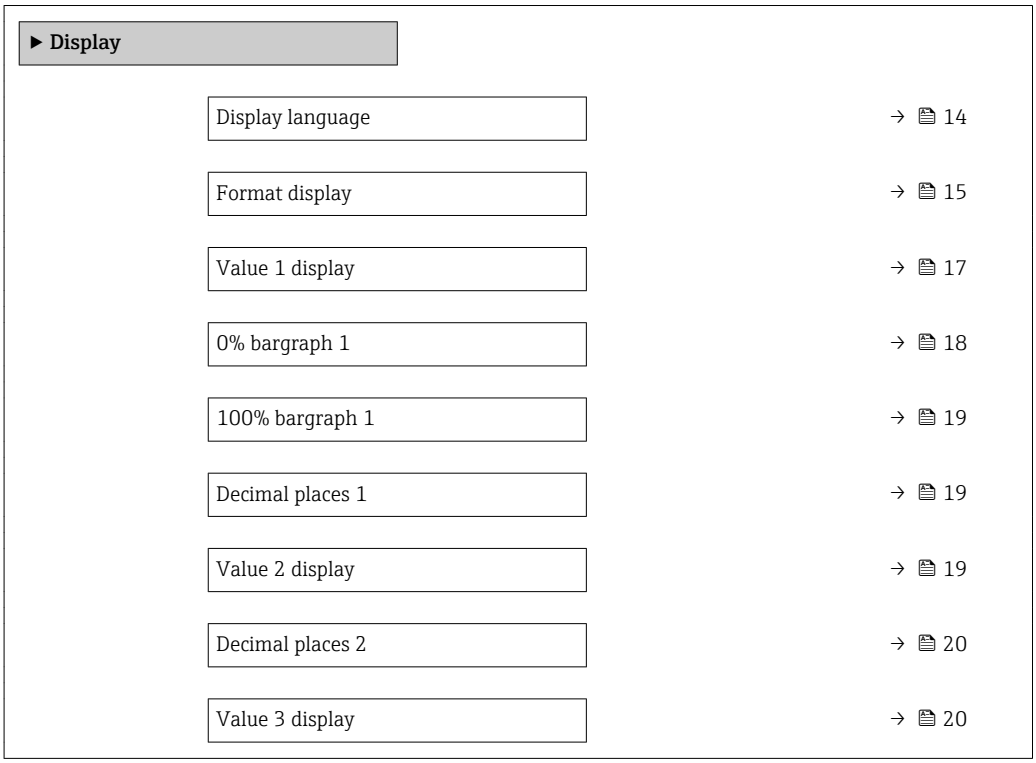
3.1 "System" submenu

Navigation Expert → System



3.1.1 "Display" submenu

Navigation Expert → System → Display



Display language

Navigation Expert → System → Display → Display language

Prerequisite A local display is provided.

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

Selection
- English
- Deutsch *
- Français *
- Español *
- Italiano *
- Nederlands *
- Portuguesa *
- Polski *
- русский язык(Ru) *
- Svenska *
- Türkçe *
- 中文 (Chinese) *
- 日本語 (Japanese) *

* Visibility depends on order options or device settings

- 한국어 (Korean) *
- Bahasa Indonesia *
- tiếng Việt (Vit) *
- čeština (Czech) *

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

Format display

Navigation Expert → System → Display → Format display

Prerequisite A local display is provided.

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

Selection
- 1 value, max.
- Bargr. + 1 value
- 2 values
- Val. large+2val.
- 4 values

Factory setting 1 value, max.

Additional information *Description*

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

- The **Value 1 display** parameter (→ 17) to **Value 4 display** parameter (→ 22) are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device display. The display time until the next change is configured via the **Display interval** parameter (→ 23).

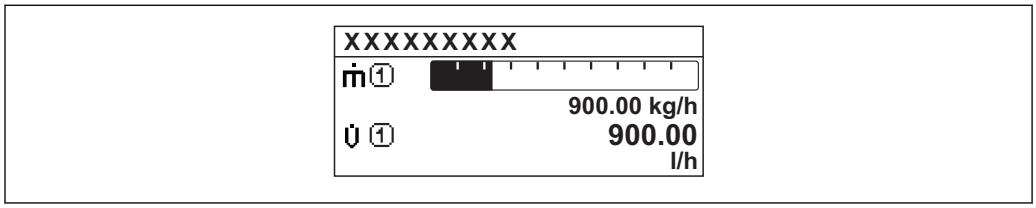
* Visibility depends on order options or device settings

Possible measured values shown on the local display:

"1 value, max." option

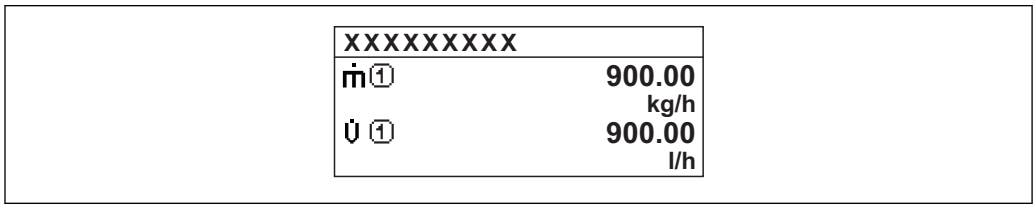
A0013099

"Bargr. + 1 value" option



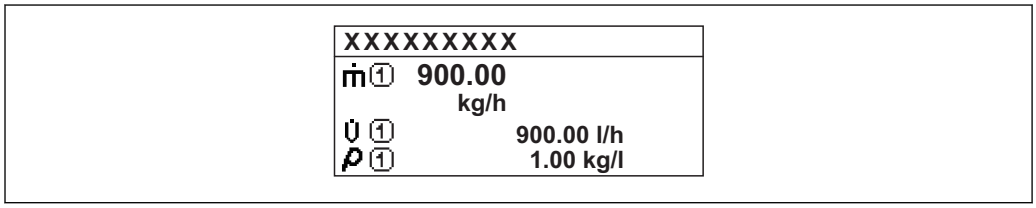
A0013098

"2 values" option



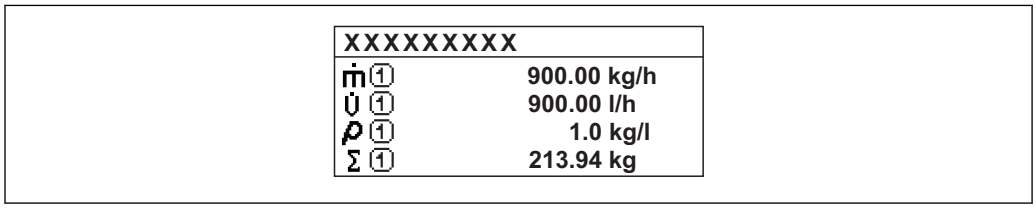
A0013100

"Val. large+2val." option



A0013102

"4 values" option



A0013103

Value 1 display

Navigation Expert → System → Display → Value 1 display

Prerequisite A local display is provided.

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

Selection
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Freq. fluct. 0
- Osc. damping 0
- Osc. damping 1 *
- Damping fluct 0
- Damping fluct 1
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *
- Sensor integrity *
- None
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Curr.output 1

Factory setting Mass flow

* Visibility depends on order options or device settings

Additional information

Description

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

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

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

Selection

- **Oscil. frequency** option
  Displays the current oscillation frequency of the measuring tubes. This frequency depends on the density of the medium.
- **Oscil. amplitude** option
  Displays the relative oscillation amplitude of the measuring tubes in relation to the preset value. This value is 100 % under optimum conditions.
- **Oscil. 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 1

Navigation Expert → System → Display → 0% bargraph 1

Prerequisite A local display is provided.

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

User entry Signed floating-point number

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

Additional information

Description

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

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

100% bargraph 1

Navigation Expert → System → Display → 100% bargraph 1

Prerequisite A local display is provided.

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

User entry Signed floating-point number

Factory setting Depends on country and nominal diameter → 199

Additional information

Description

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

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

Decimal places 1

Navigation Expert → System → Display → Decimal places 1

Prerequisite A measured value is specified in the **Value 1 display** parameter (→ 17).

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

Selection

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

Factory setting x.xx

Additional information

Description

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

Value 2 display

Navigation Expert → System → Display → Value 2 display

Prerequisite A local display is provided.

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

Selection For the picklist, see the **Value 1 display** parameter (→ 17)

Factory setting None

Additional information *Description*

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

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

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

Decimal places 2

Navigation Expert → System → Display → Decimal places 2

Prerequisite A measured value is specified in the **Value 2 display** parameter (→ 19).

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

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

Factory setting x.xx

Additional information *Description*

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

Value 3 display

Navigation Expert → System → Display → Value 3 display

Prerequisite A local display is provided.

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

Selection For the picklist, see the **Value 1 display** parameter (→ 17)

Factory setting None

Additional information

Description

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

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

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

0% bargraph 3

Navigation Expert → System → Display → 0% bargraph 3

Prerequisite A selection was made in the **Value 3 display** parameter (→ 20).

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

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

100% bargraph 3

Navigation Expert → System → Display → 100% bargraph 3

Prerequisite A selection was made in the **Value 3 display** parameter (→ 20).

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

User entry Signed floating-point number

Factory setting 0

Additional information

Description

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

User entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

Decimal places 3

Navigation Expert → System → Display → Decimal places 3

Prerequisite A measured value is specified in the **Value 3 display** parameter (→ 20).

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

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

Factory setting x.xx

Additional information

Description

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

Value 4 display

Navigation Expert → System → Display → Value 4 display

Prerequisite A local display is provided.

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

Selection For the picklist, see the **Value 1 display** parameter (→ 17)

Factory setting None

Additional information *Description*

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

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

Selection

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

Decimal places 4

Navigation Expert → System → Display → Decimal places 4

Prerequisite A measured value is specified in the **Value 4 display** parameter (→ 22).

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

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

Factory setting x.xx

Additional information *Description*

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

Display interval

Navigation Expert → System → Display → Display interval

Prerequisite A local display is provided.

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

User entry 1 to 10 s

Factory setting 5 s

Additional information *Description*

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

- The **Value 1 display** parameter (→ 17) to **Value 4 display** parameter (→ 22) are used to specify which measured values are shown on the local display.
- The display format of the displayed measured values is specified using the **Format display** parameter (→ 15).

Display damping

Navigation Expert → System → Display → Display damping

Prerequisite A local display is provided.

Description Use this function to enter 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

Prerequisite A local display is provided.

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

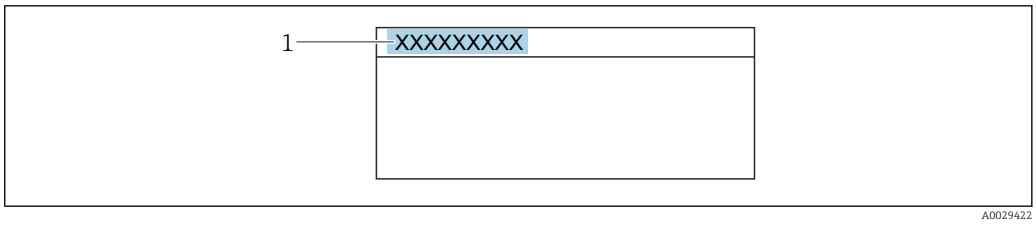
Selection
- Device tag
- Free text

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 (→ 179).
- Free text
  Is defined in the **Header text** parameter (→ 25).

Header text

Navigation Expert → System → Display → Header text

Prerequisite In the **Header** parameter (→ 24), the **Free text** option is selected.

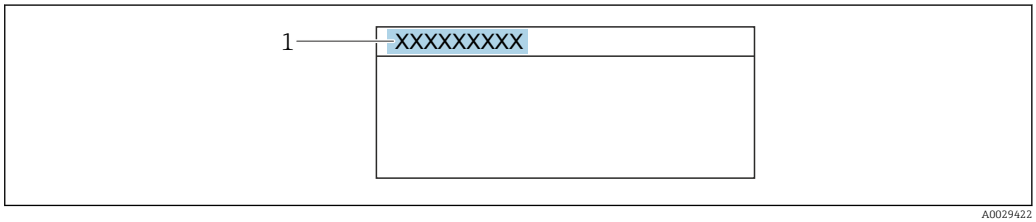
Description Use this function to enter a customer-specific text for the header of the local display.

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

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

Additional information *Description*

The header text only appears during normal operation.



1 Position of the header text on the display

User entry

The number of characters displayed depends on the characters used.

Separator

Navigation Expert → System → Display → Separator

Prerequisite A local display is provided.

Description Use this function to select the decimal separator.

Selection
- . (point)
- , (comma)

Factory setting . (point)

Contrast display

Navigation Expert → System → Display → Contrast display

Prerequisite A local display is provided.

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

User entry 20 to 80 %

Factory setting Depends on the display

Backlight

Navigation Expert → System → Display → Backlight

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

Selection
- Disable
- Enable

Factory setting Enable

Access stat.disp

Navigation Expert → System → Display → Access stat.disp

Prerequisite A local display is provided.

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

User interface
- Operator
- Maintenance

Factory setting Operator

Additional information

Description

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

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

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

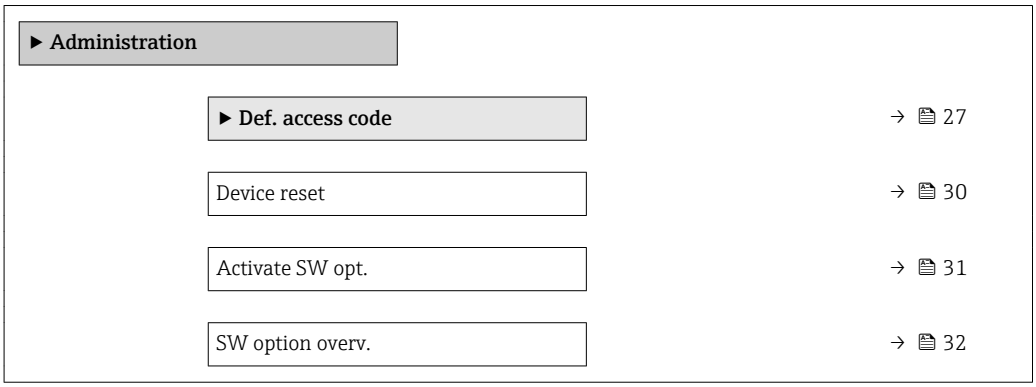
If additional write protection is active, this restricts the current access authorization even further.

Display

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

3.1.2 "Administration" submenu

Navigation Expert → System → Administration

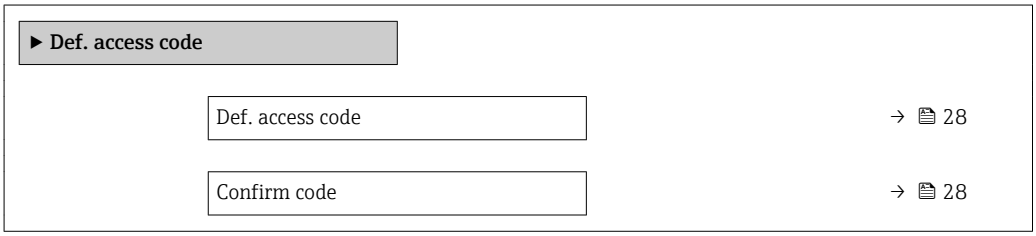


"Def. access code" wizard

The **Def. access code** wizard (→ 🖹 27) is only available when operating via the local display or Web browser.

If operating via the operating tool, the **Def. access code** parameter (→ 🖹 30) can be found directly in the **Administration** submenu. There is no **Confirm code** parameter if the device is operated via the operating tool.

Navigation Expert → System → Administration → Def. access code



Def. access code

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

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

User entry 0 to 9 999

Factory setting 0

Additional information

Description

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

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

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

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

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

User entry

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

Factory setting

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

Confirm code

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

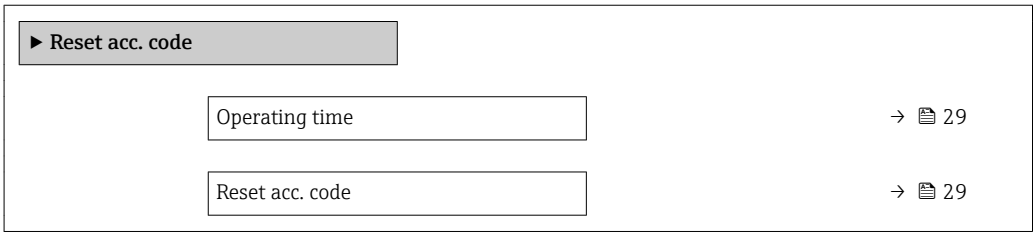
Description Enter the defined release code a second time to confirm the release code.

User entry 0 to 9 999

Factory setting 0

"Reset access code" submenu

Navigation Expert → System → Administration → Reset acc. code



Operating time

Navigation

Expert → Diagnostics → Operating time

Diagnostics → Operating time

Description

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

User interface

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

Additional information

User interface

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

Reset acc. code

Navigation

Expert → System → Administration → Reset acc. code → Reset acc. code

Description

Use this function to enter a reset code to reset the user-specific release code 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 interface CDI RJ45)
- Fieldbus

Additional parameters in the "Administration" submenu

Def. access code

Navigation Expert → System → Administration → Def. access code

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

User entry 0 to 9 999

Factory setting 0

Additional information

Description

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

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

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

User entry

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

Factory setting

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

Device reset

Navigation Expert → System → Administration → Device reset

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

Selection
- Cancel
- To delivery set.
- Restart device

Factory setting Cancel

Additional information *Selection*

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

Activate SW opt.

Navigation Expert → System → Administration → Activate SW opt.

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

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

Factory setting Depends on the software option ordered

Additional information *Description*

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

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 **SW option overv.** parameter (→ 32).

↳ 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 **EB** "Heartbeat Verification + Monitoring"

The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

Web browser

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

SW option overv.

Navigation Expert → System → Administration → SW option overv.

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

User interface
- HBT Verification
- HBT Monitoring
- Concentration
- Viscosity

Additional information

Description

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

"HBT Verification" option and "HBT 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"

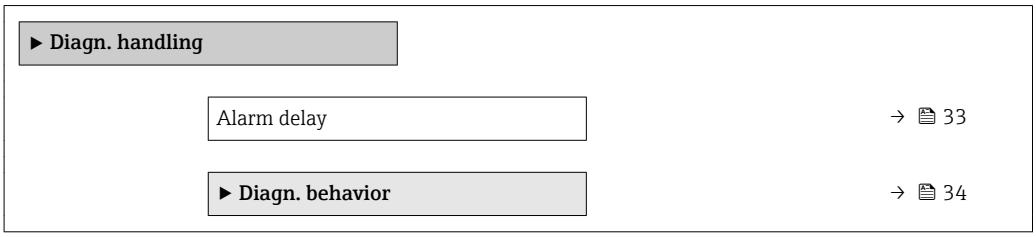
"Viscosity" option

Only available for Promass I.

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

3.1.3 "Diagn. handling" submenu

Navigation Expert → System → Diagn. handling



Alarm delay

Navigation Expert → System → Diagn. handling → Alarm delay

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

The diagnostic message is reset without a time delay.

User entry 0 to 60 s

Factory setting 0 s

Additional information *Result*

This setting affects the following diagnostic messages:
- 046 Sensor limit
- 140 Sensor sig.asym.
- 144 MeasErrorTooHigh
- 190 Special event 1
- 191 Special event 5
- 192 Special event 9
- 830 Sensor temp.
- 831 Sensor temp.
- 832 Electronic temp.
- 833 Electronic temp.
- 834 Process temp.
- 835 Process temp.
- 843 Process limit
- 862 Partly filled
- 910 Tube not oscill.
- 912 Medium inhomog.
- 913 Medium unsuitab.
- 944 MonitoringFailed
- 990 Special event 4
- 991 Special event 8
- 992 Special event 12

"Diagn. behavior" submenu

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

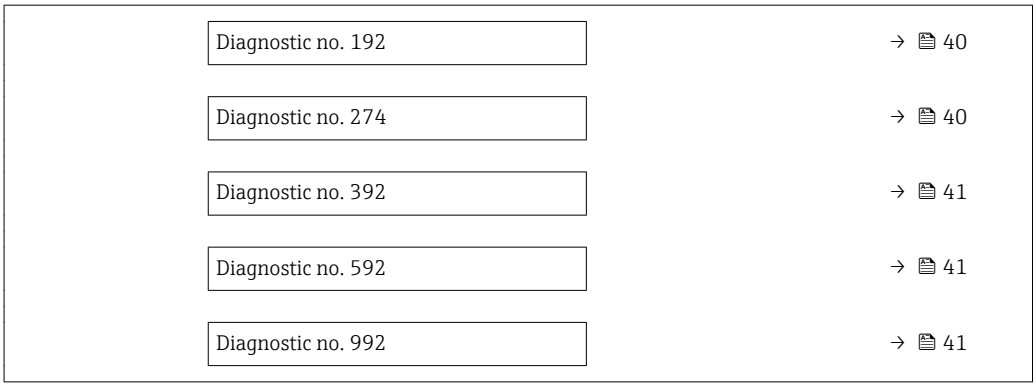
Modifying the diagnostic behavior of a diagnostic event. Each diagnostic event is assigned a certain diagnostic behavior at the factory. The user can change this assignment for certain diagnostics events.

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

- **Off** option
  The device continues to measure. The diagnostic event is ignored; it is neither entered into the Event logbook, nor is a diagnostic message generated.
- **Alarm** option
  The device continues to measure. The signal outputs assume the specified alarm condition. A diagnostic message is generated.
- **Warning** option
  The device continues to measure. A diagnostic message is generated.
- **Logbook only** option
  The device continues to measure. The diagnostic message is entered in the **Event logbook** submenu (→ 177) (**Event list** submenu (→ 177)) only and is not displayed in alternation with the measured value display.

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

▶ Diagn. behavior	
Diagnostic no. 441	→ 35
Diagnostic no. 442	→ 35
Diagnostic no. 443	→ 36
Diagnostic no. 140	→ 36
Diagnostic no. 046	→ 36
Diagnostic no. 144	→ 37
Diagnostic no. 832	→ 37
Diagnostic no. 833	→ 37
Diagnostic no. 834	→ 38
Diagnostic no. 835	→ 38
Diagnostic no. 912	→ 38
Diagnostic no. 913	→ 39
Diagnostic no. 944	→ 39
Diagnostic no. 948	→ 40



Diagnostic no. 441 (Curr.output 1)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 441

Description Option for changing the diagnostic behavior of the diagnostic message **441 Curr.output 1**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 442 (Freq. output)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 442

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

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

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available, see → 34

Diagnostic no. 443 (Pulse output)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 443

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

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

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information *Selection*

For a detailed description of the options available, see → 34

Diagnostic no. 140 (Sensor sig.asym.)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 140

Description Use this function to change the diagnostic behavior of the diagnostic message **140 Sensor sig.asym.**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 046 (Sensor limit)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 046

Description Option for changing the diagnostic behavior of the diagnostic message **046 Sensor limit**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 144 (MeasErrorTooHigh)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 144

Description Option for changing the diagnostic behavior of the diagnostic message **144 MeasErrorTooHigh**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Alarm

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 832 (Electronic temp.)

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

Description Use this function to change the diagnostic behavior of the diagnostic message **832 Electronic temp.**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 833 (Electronic temp.)

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

Description Use this function to change the diagnostic behavior of the diagnostic message **833 Electronic temp.**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 834 (Process temp.)

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

Description Use this function to change the diagnostic behavior of the diagnostic message **834 Process temp.**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 835 (Process temp.)

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

Description Use this function to change the diagnostic behavior of the diagnostic message **835 Process temp.**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 912 (Medium inhomog.)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 912

Description Option for changing the diagnostic behavior of the diagnostic message **912 Medium inhomog.**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 913 (Medium unsuitab.)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 913

Description Option for changing the diagnostic behavior of the diagnostic message **913 Medium unsuitab.**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 944 (MonitoringFailed)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 944

Description Option for changing the diagnostic behavior of the diagnostic message **944 MonitoringFailed**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 948 (Oscill. damping)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 948

Description Option for changing the diagnostic behavior of the diagnostic message **948 Oscill. damping**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 192 (Special event 9)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 192

Description Option for changing the diagnostic behavior of the diagnostic message **192 Special event 9**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 374 (Sensor electron.)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 274

Description Option for changing the diagnostic behavior of the diagnostic message **374 Sensor electron.**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 392 (Special event 10)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 392

Description Option for changing the diagnostic behavior of the diagnostic message **392 Special event 10**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 592 (Special event 11)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 592

Description Option for changing the diagnostic behavior of the diagnostic message **592 Special event 11**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

Diagnostic no. 992 (Special event 12)

Navigation Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 992

Description Option for changing the diagnostic behavior of the diagnostic message **992 Special event 12**.

Selection
- Off
- Alarm
- Warning
- Logbook only

Factory setting Warning

Additional information For a detailed description of the options available, see → 34

3.2 "Sensor" submenu

Navigation Expert → Sensor

▶ Sensor	
▶ Measured val.	→ 42
▶ System units	→ 53
▶ Process param.	→ 68
▶ Measurement mode	→ 76
▶ External comp.	→ 78
▶ Calculated value	→ 80
▶ Sensor adjustm.	→ 83
▶ Calibration	→ 90
▶ Supervision	→ 91

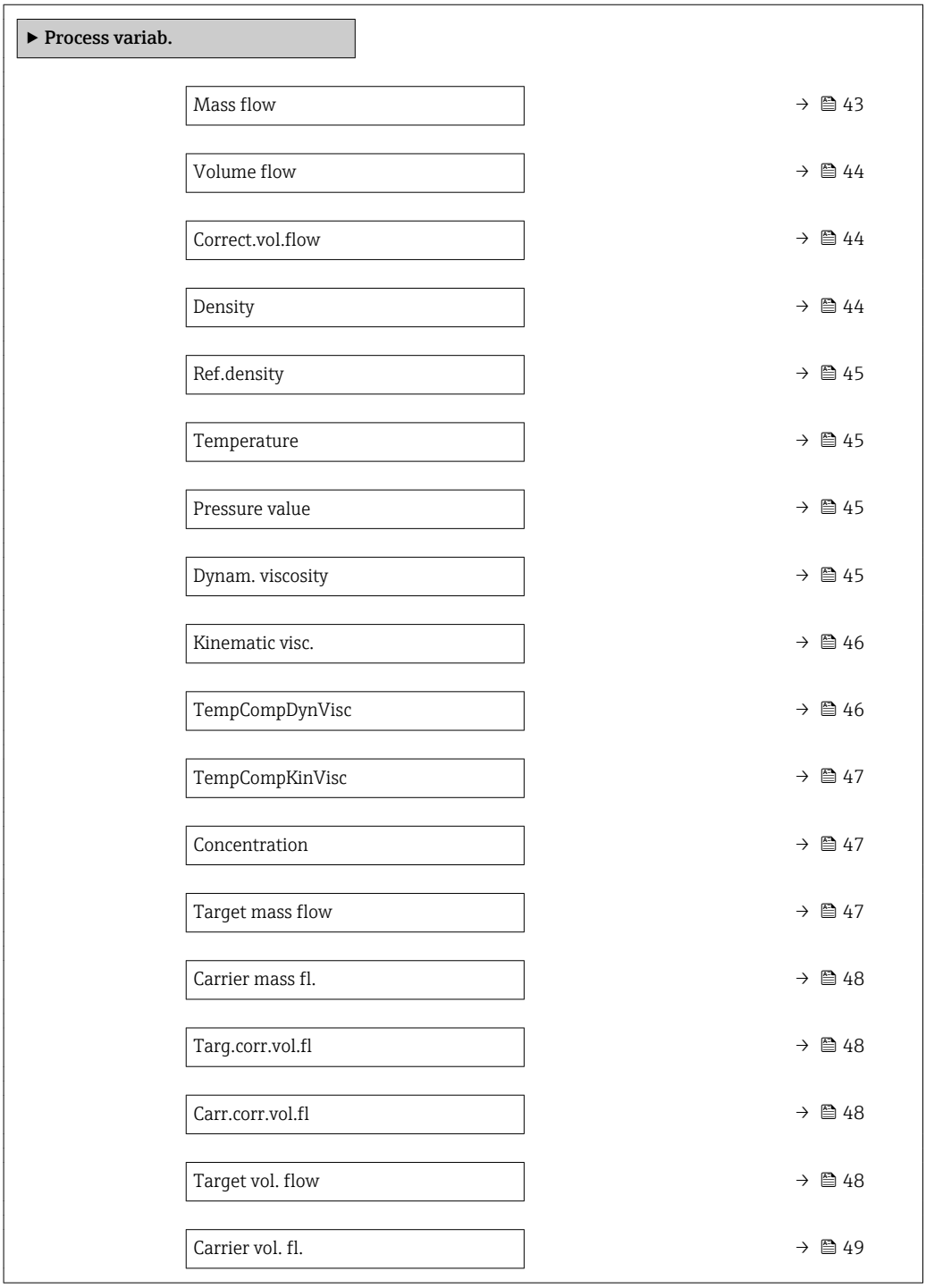
3.2.1 "Measured val." submenu

Navigation Expert → Sensor → Measured val.

▶ Measured val.	
▶ Process variab.	→ 43
▶ Totalizer	→ 49
▶ Output values	→ 51

"Process variab." submenu

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



Mass flow

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

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 (→ 54)

Volume flow

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

Description Displays the volume flow 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 (→ 55)

Correct.vol.flow

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

Description Displays the corrected volume flow currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Cor.volflow unit** parameter (→ 57)

Density

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

Description Displays the density currently measured.

User interface Signed floating-point number

Additional information *Dependency*

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

Ref.density

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

Description Displays the reference density currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Ref. dens. unit** parameter (→ 60)

Temperature

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

Description Displays the medium temperature currently measured.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 60)

Pressure value

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

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 (→ 61)

Dynam. viscosity

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

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

The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

Description Displays the dynamic viscosity currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Dyn. visc. unit** parameter.

Kinematic visc.

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

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

The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

Description Displays the kinematic viscosity currently calculated.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Kin. visc. unit** parameter.

TempCompDynVisc

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

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

The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

Description Displays the temperature compensation currently calculated for the viscosity.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Dyn. visc. unit** parameter.

TempCompKinVisc

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

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

The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

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

User interface Signed floating-point number

Additional information
Dependency

The unit is taken from the **Kin. visc. unit** parameter.

Concentration

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

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

The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

Description Displays the concentration currently calculated.

User interface Signed floating-point number

Additional information
Dependency

The unit is taken from the **Concentr. unit** parameter.

Target mass flow

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

Prerequisite
With the following conditions:
- Order code for "Application package", option **ED** "Concentration"
- The **WT-%** option or the **User conc.** option is selected in the **Concentr. unit** parameter.

The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

Description Displays the mass flow 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 (→ 54)

Carrier mass fl.

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

Prerequisite With the following conditions:
- Order code for "Application package", option **ED** "Concentration"
- The **WT-%** option or the **User conc.** option is selected in the **Concentr. unit** parameter.

The software options currently enabled are displayed in the **SW option overv.** parameter (→ 32).

Description Displays the mass flow currently measured for the carrier medium.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Mass flow unit** parameter (→ 54)

Targ.corr.vol.fl

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

User interface Signed floating-point number

Factory setting 0 Nl/h

Carr.corr.vol.fl

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

User interface Signed floating-point number

Factory setting 0 Nl/h

Target vol. flow

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

User interface Signed floating-point number

Factory setting 0 l/h

Carrier vol. fl.

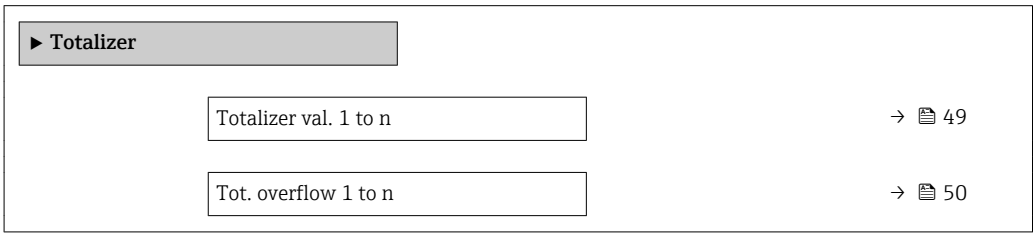
Navigation Expert → Sensor → Measured val. → Process variab. → Carrier vol. fl.

User interface Signed floating-point number

Factory setting 0 l/h

"Totalizer" submenu

Navigation Expert → Sensor → Measured val. → Totalizer



Totalizer val. 1 to n

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

Prerequisite One of the following options is selected in the **Assign variable** parameter (→ 165) of the **Totalizer 1 to n** submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

Description Displays the current totalizer reading.

User interface Signed floating-point number

* Visibility depends on order options or device settings

Additional information

Description

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

In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (→ 169).

User interface

The value of the process variable totalized since measuring began can be positive or negative. This depends on the settings in the **Operation mode** parameter (→ 167).

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 166).

Example

Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:
- Value in the **Totalizer val. 1** parameter: 1 968 457 m^3
- Value in the **Tot. overflow 1** parameter: $1 \cdot 10^7$ (1 overflow) = 10 000 000 [m^3]
- Current totalizer reading: 11 968 457 m^3

Tot. overflow 1 to n

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

Prerequisite One of the following options is selected in the **Assign variable** parameter (→ 165) of the **Totalizer 1 to n** submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

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.

* Visibility depends on order options or device settings

The current totalizer value is therefore the sum of the overflow value and the totalizer value from the **Totalizer val. 1 to n** parameter.

User interface

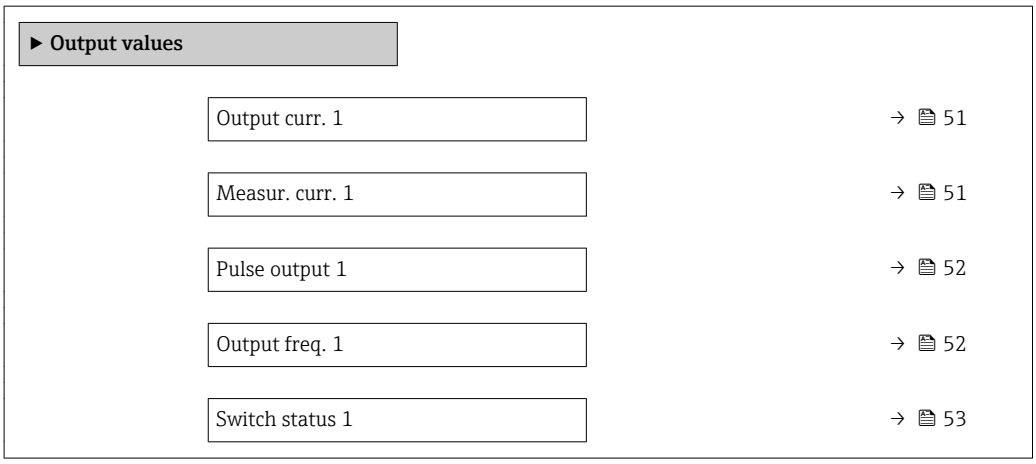
The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 166).

Example

Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:
- Value in the **Totalizer val. 1** parameter: 1 968 457 m^3
- Value in the **Tot. overflow 1** parameter: $2 \cdot 10^7$ (2 overflows) = 20 000 000 [m^3]
- Current totalizer reading: 21 968 457 m^3

"Output values" submenu

Navigation Expert → Sensor → Measured val. → Output values



Output curr. 1

Navigation Expert → Sensor → Measured val. → Output values → Output curr. 1

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

User interface 0 to 22.5 mA

Measur. curr. 1

Navigation Expert → Sensor → Measured val. → Output values → Measur. curr. 1

Description Use this function to display the actual measured value of the output current.

User interface 0 to 30 mA

Pulse output 1

Navigation Expert → Sensor → Measured val. → Output values → Pulse output 1

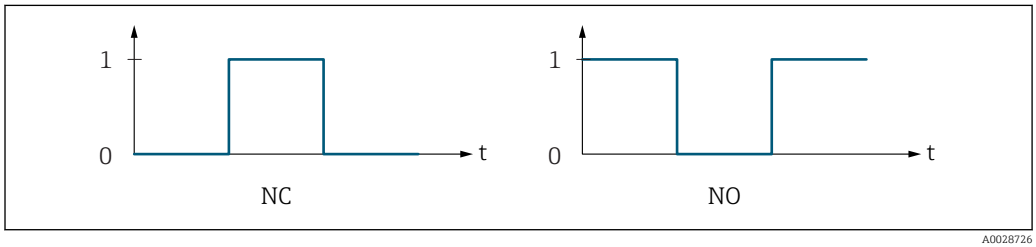
Prerequisite In the **Operating mode** parameter (→ 108), the **Pulse** option is selected.

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.
- The **Value per pulse** parameter (→ 110) and **Pulse width** parameter (→ 111) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.



A0028726

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

The output behavior can be reversed via the **Invert outp.sig.** parameter (→ 131) 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 (→ 112)) can be configured.

Output freq. 1

Navigation Expert → Sensor → Measured val. → Output values → Output freq. 1

Prerequisite In the **Operating mode** parameter (→ 108), 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 status 1

Navigation Expert → Sensor → Measured val. → Output values → Switch status 1

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 108).

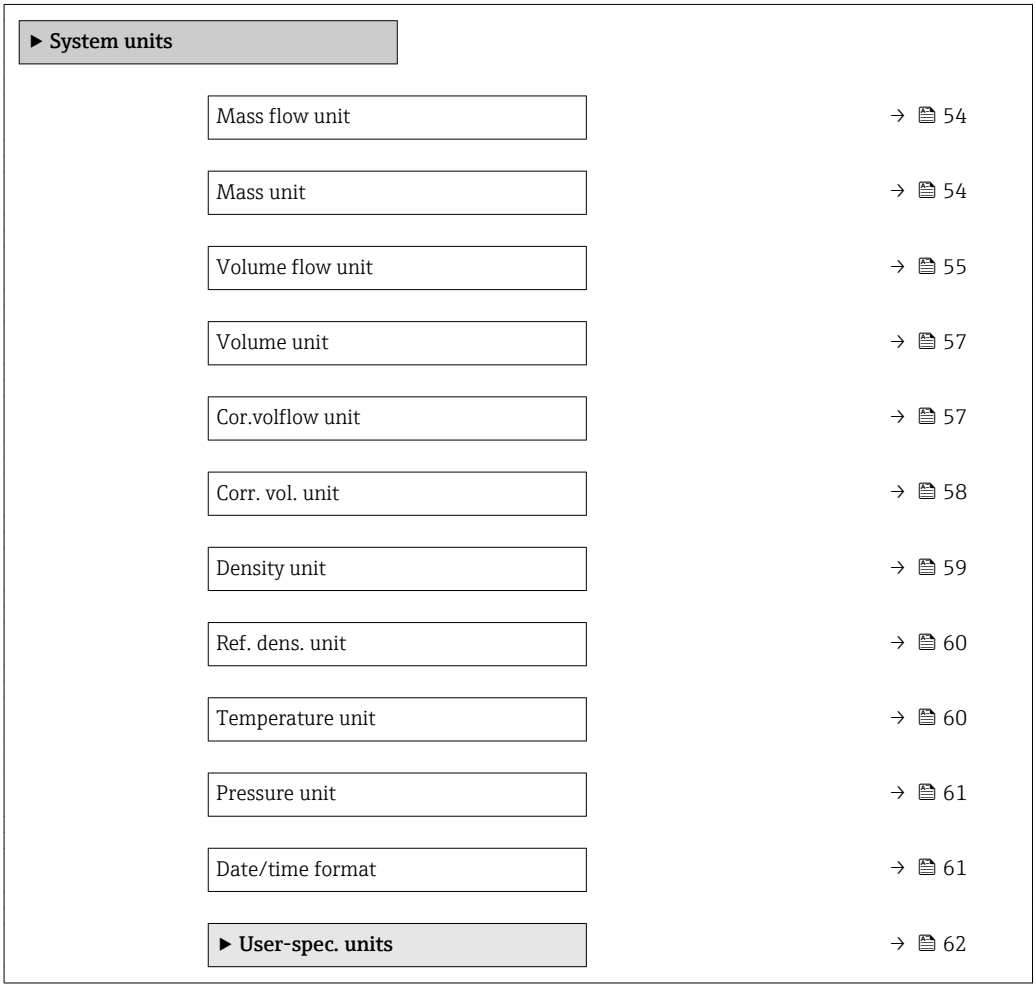
Description Displays the current switch status of the status output.

User interface
- Open
- Closed

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

3.2.2 "System units" submenu

Navigation Expert → Sensor → System units



Mass flow unit

Navigation Expert → Sensor → System units → Mass flow unit

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

Selection

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

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

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

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

Additional information

Result

The selected unit applies for:
- **Target mass flow** parameter (→ 47)
- **Carrier mass fl.** parameter (→ 48)
- **Mass flow** parameter (→ 43)

Selection

For an explanation of the abbreviated units: → 205

Customer-specific units

The unit for the customer-specific mass is specified in the **Mass text** parameter (→ 63).

Mass unit

Navigation Expert → Sensor → System units → Mass unit

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

Selection

SI units
- g
- kg
- t

US units
- oz
- lb
- STon

Custom-specific units
User mass

Factory setting

Country-specific:
- kg (DN > 150 (6"): t)
- lb

Additional information

Selection

For an explanation of the abbreviated units: → 205

Customer-specific units

The unit for the customer-specific mass is specified in the **Mass text** parameter (→ 63).

Volume flow unit

Navigation

Expert → Sensor → System units → Volume flow unit

Description

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

Selection

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

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

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

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

Factory setting

Country-specific:
- l/h (DN > 150 (6"): m^3/h)
- gal/min (us)

Additional information

Result

The selected unit applies for:
Volume flow parameter (→ 44)

Selection

For an explanation of the abbreviated units: → 205

Customer-specific units

The unit for the customer-specific volume is specified in the **Volume text** parameter (→ 64).

Volume unit

Navigation Expert → Sensor → System units → Volume unit

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

Selection

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

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

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

Custom-specific units
User vol.

Factory setting

Country-specific:
- l (DN > 150 (6"): m^3)
- gal (us)

Additional information

Selection

For an explanation of the abbreviated units: → 205

Customer-specific units

The unit for the customer-specific volume is specified in the **Volume text** parameter (→ 64).

Cor.volflow unit

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

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

Selection

SI units
- Nl/s
- Nl/min
- Nl/h
- Nl/d
- Nm^3/s
- Nm^3/min
- Nm^3/h
- Nm^3/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
- 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.)
- Sgal/s (imp)
- Sgal/min (imp)
- Sgal/h (imp)
- Sgal/d (imp)

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

Factory setting

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

Additional information

Result

The selected unit applies for:
Correct.vol.flow parameter (→ 🖹 44)

Selection

For an explanation of the abbreviated units: → 🖹 205

Corr. vol. unit

Navigation

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

Description

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

Selection

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

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

Imperial units
Sgal (imp)

Custom-specific units
UserCrVol.

Factory setting

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

Additional information *Selection*

For an explanation of the abbreviated units: → 205

Density unit

Navigation Expert → Sensor → System units → Density unit

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

Selection

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

US units
- lb/ft³
- lb/gal (us)
- lb/bbl (us;liq.)
- lb/bbl (us;beer)
- lb/bbl (us;oil)
- lb/bbl (us;tank)

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

Custom-specific units
User dens.

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

Additional information *Result*

The selected unit applies for:
Density parameter (→ 44)

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: → 205

Customer-specific units

The unit for the customer-specific density is specified in the **Density text** parameter (→ 66).

Ref. dens. unit

Navigation Expert → Sensor → System units → Ref. dens. unit

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

Selection

SI units
- kg/Nm³
- kg/Nl
- g/Scm³
- kg/Sm³

US units
- lb/Sft³

Factory setting Country-dependent
- kg/Nl
- lb/Sft³

Additional information

Result

The selected unit applies for:
- **Ext. ref.density** parameter (→ 81)
- **Fix ref.density** parameter (→ 82)
- **Ref.density** parameter (→ 45)

Selection

For an explanation of the abbreviated units: → 205

Temperature unit

Navigation Expert → Sensor → System units → Temperature unit

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

Selection

SI units
- °C
- K

US units
- °F
- °R

Factory setting Country-specific:
- °C
- °F

Additional information

Result

The selected unit applies for:
- **Maximum value** parameter (→ 184)
- **Minimum value** parameter (→ 183)
- **Maximum value** parameter (→ 184)
- **Minimum value** parameter (→ 184)
- **Maximum value** parameter (→ 186)
- **Minimum value** parameter (→ 185)
- **External temp.** parameter (→ 80)

- **Ref. temperature** parameter
- **Temperature** parameter (→ 45)
- **Ref. temperature** parameter (→ 82)

Selection

For an explanation of the abbreviated units: → 205

Pressure unit

Navigation Expert → Sensor → System units → Pressure unit

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

Selection

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

US units
- psi a
- psi g

Custom-specific units
User pres.

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

Additional information

Result

The unit is taken from:
- **Pressure value** parameter (→ 79)
- **External press.** parameter (→ 79)
- **Pressure value** parameter (→ 45)

Selection

For an explanation of the abbreviated units: → 205

Customer-specific units

The unit for the customer-specific energy is defined in the **Pressure text** parameter (→ 67).

Date/time format

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

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

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

Factory setting
dd.mm.yy hh:mm

Additional information
Selection

For an explanation of the abbreviated units: → 205

"User-spec. units" submenu

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

▶ User-spec. units	
Mass text	→ 63
Mass offset	→ 63
Mass factor	→ 63
Volume text	→ 64
Volume offset	→ 64
Volume factor	→ 65
Corr. vol. text	→ 65
Corr vol. offset	→ 65
Cor.vol. factor	→ 66
Density text	→ 66
Density offset	→ 66
Density factor	→ 66
Pressure text	→ 67
Pressure offset	→ 67
Pressure factor	→ 67

Mass text

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

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

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

Factory setting User mass

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Mass flow unit** parameter (→ 54)
- **Mass unit** parameter (→ 54)

Example

If the text CENT for "centner" is entered, the following options are displayed in the picklist for the **Mass flow unit** parameter (→ 54):
- CENT/s
- CENT/min
- CENT/h
- CENT/d

Mass offset

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

Description Use this function to enter the zero point shift for the user-specific mass and mass flow unit.

User entry Signed floating-point number

Factory setting 0

Additional information *Description*

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

Mass factor

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

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

User entry Signed floating-point number

Factory setting 1.0

Additional information *Example*

Mass of 1 Zentner = 50 kg → 0.02 Zentner = 1 kg → entry: 0.02

Volume text

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

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

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

Factory setting User vol.

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Volume flow unit** parameter (→ 55)
- **Volume unit** parameter (→ 57)

Example

If the text GLAS is entered, the choose list of the **Volume flow unit** parameter (→ 55) shows the following options:
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

Volume offset

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

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

User entry Signed floating-point number

Factory setting 0

Additional information *Description*

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

Volume factor

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

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

User entry Signed floating-point number

Factory setting 1.0

Corr. vol. text

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

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

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

Factory setting UserCrVol.

Additional information *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Cor.volflow unit** parameter (→ 57)
- **Corr. vol. unit** parameter (→ 58)

Example

If the text GLAS is entered, the choose list of the **Cor.volflow unit** parameter (→ 57) shows the following options:
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

Corr vol. offset

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

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

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

User entry Signed floating-point number

Factory setting 0

Cor.vol. factor

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

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

User entry Signed floating-point number

Factory setting 1.0

Density text

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

Description Use this function to enter a text or the user-specific unit of density.

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

Factory setting User dens.

Additional information *Result*

The defined unit is shown as an option in the choose list of the **Density unit** parameter (→ 59).

Example

Enter text “CE_L” for centners per liter

Density offset

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

Description Use this function to enter the zero point shift for the user-specific density unit.

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

User entry Signed floating-point number

Factory setting 0

Density factor

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

Description Use this function to enter a quantity factor for the user-specific density unit.

User entry Signed floating-point number

Factory setting 1.0

Pressure text

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

Description Use this function to enter a text for the user-specific pressure unit.

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

Factory setting User pres.

Additional information *Result*

The defined unit is shown as an option in the choose list of the **Pressure unit** parameter (→ 61).

Pressure offset

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

Description Use this function to enter the offset for adapting the user-specific pressure unit.

User entry Signed floating-point number

Factory setting 0

Pressure factor

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

Description Use this function to enter a quantity factor for the user-specific pressure unit.

User entry Signed floating-point number

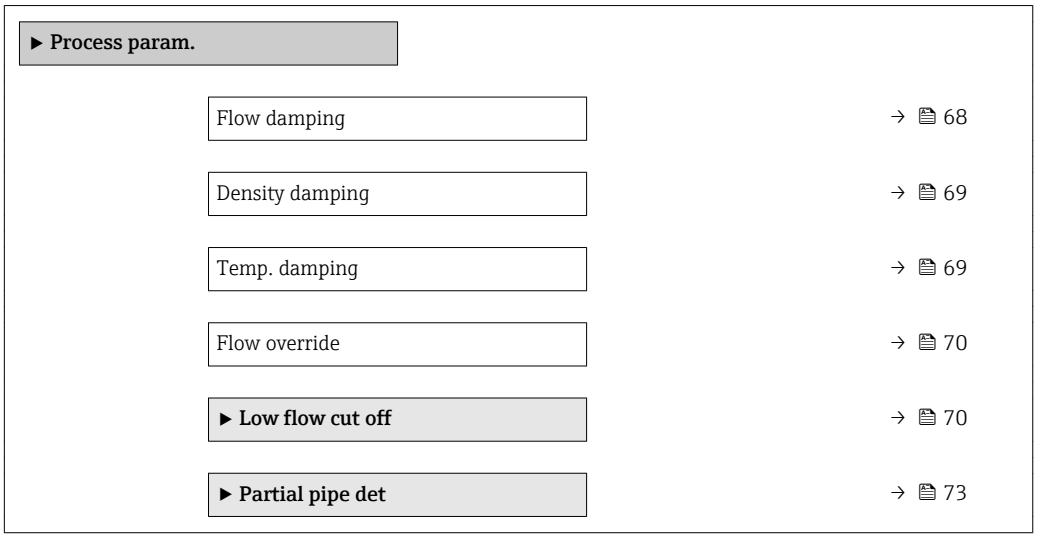
Factory setting 1.0

Additional information *Example*

1 Dyn/cm² = 0.1 Pa → 10 Dyn/cm² = 1 Pa → user entry: 10

3.2.3 "Process param." submenu

Navigation Expert → Sensor → Process param.



Flow damping

Navigation Expert → Sensor → Process param. → Flow damping

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).

Result

The damping affects the following variables of the device:
- Outputs → 92
- Low flow cut off → 70
- Totalizers → 165

2) Proportional behavior with first-order lag

Density damping

Navigation Expert → Sensor → Process param. → Density damping

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).

Temp. damping

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

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

User entry 0 to 999.9 s

Factory setting 0 s

Additional information

Description

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

User entry

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

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

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

Flow override

Navigation Expert → Sensor → Process param. → Flow override

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

Selection
- Off
- On

Factory setting Off

Additional information *Result*

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

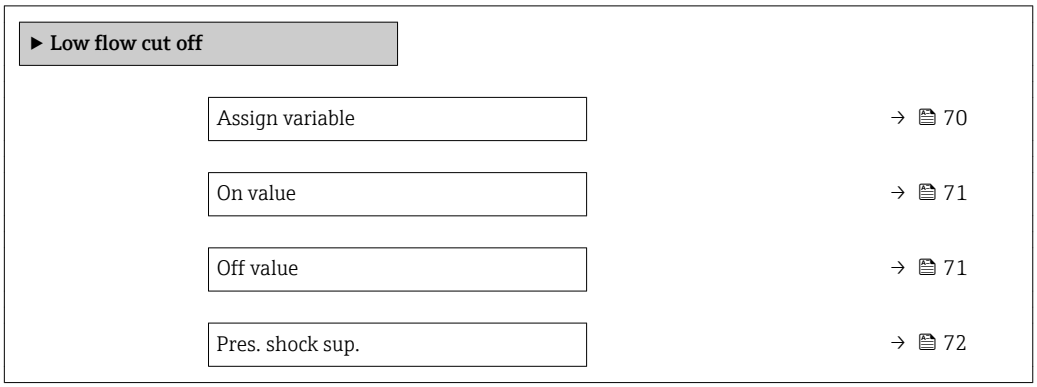
Description

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

Positive zero return can also be enabled via the Status input: **Assign stat.inp.** parameter.

"Low flow cut off" submenu

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



Assign variable

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

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

Selection
- Off
- Mass flow
- Volume flow
- Correct.vol.flow

Factory setting Mass flow

On value

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

Prerequisite One of the following options is selected in the **Assign variable** parameter (→ 70):
- Mass flow
- Volume flow
- Correct.vol.flow

Description Use this function to enter a switch-on value for low flow cut off. Low flow cut off is activated if the value entered is not equal to 0 → 71.

User entry Positive floating-point number

Factory setting Depends on country and nominal diameter→ 200

Additional information *Dependency*

The unit depends on the process variable selected in the **Assign variable** parameter (→ 70).

Off value

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

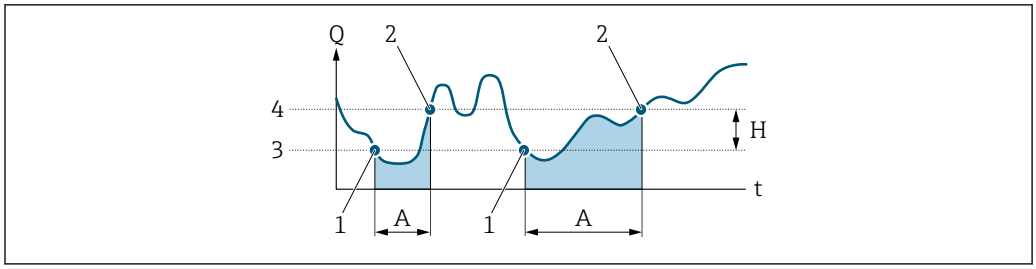
Prerequisite One of the following options is selected in the **Assign variable** parameter (→ 70):
- Mass flow
- Volume flow
- Correct.vol.flow

Description Use this function to enter a switch-off value for low flow cut off. The off value is entered as a positive hysteresis from the on value→ 71.

User entry 0 to 100.0 %

Factory setting 50 %

Additional information *Example*



A0012887

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

Pres. shock sup.

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

Prerequisite One of the following options is selected in the **Assign variable** parameter (→ 70):
- Mass flow
- Volume flow
- Correct.vol.flow

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

User entry 0 to 100 s

Factory setting 0 s

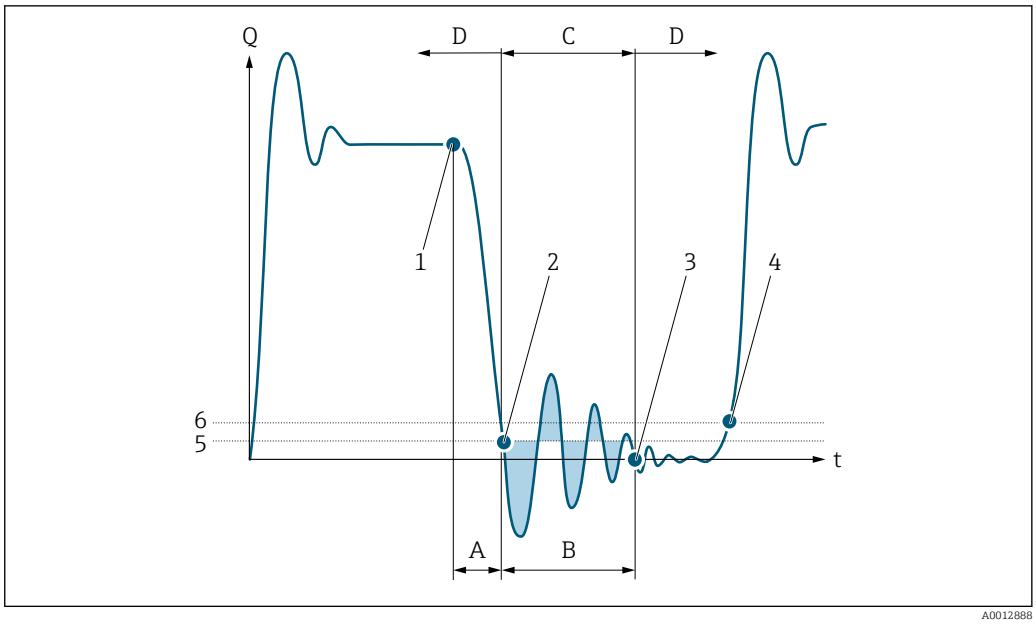
Additional information *Description*

Pressure shock suppression is enabled
- Prerequisite:
  - Flow rate < on-value of low flow cut off
    or
  - Changing 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 switch-off value for low flow cut off, the device starts processing the current flow value again and displays it.

Example

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



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

"Partial pipe det" submenu

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

▶ Partial pipe det	
Assign variable	→ 74
Low value	→ 74
High value	→ 74
Response time	→ 75
Max. damping	→ 75

Assign variable

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

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
- Ref.density

Factory setting Off

Low value

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

Prerequisite One of the following options is selected in the **Assign variable** parameter (→ 74):
- Density
- Ref.density

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 200

Additional information *User entry*

The lower limit value must be less than the upper limit value defined in the **High value** parameter (→ 74).

The unit depends on the process variable selected in the **Assign variable** parameter (→ 74).

Limit value

If the displayed value is outside the limit value, the measuring device displays the diagnostic message ⚠**S862 Partly filled**.

High value

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

Prerequisite One of the following options is selected in the **Assign variable** parameter (→ 74):
- Density
- Ref.density

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 6 000

Additional information *User entry*

The upper limit value must be greater than the lower limit value defined in the **Low value** parameter (→ 74).

The unit depends on the process variable selected in the **Assign variable** parameter (→ 74).

Limit value

If the displayed value is outside the limit value, the measuring device displays the diagnostic message ⚠**S862 Partly filled**.

Response time

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

Prerequisite One of the following options is selected in the **Assign variable** parameter (→ 74):
- Density
- Ref.density

Description Use this function to enter the minimum length of time (debouncing time) the signal must be present for the diagnostic message ⚠**S862 Partly filled** to be triggered if the measuring pipe is empty or partially full.

User entry 0 to 100 s

Factory setting 1 s

Max. damping

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

Prerequisite One of the following options is selected in the **Assign variable** parameter (→ 74):
- Density
- Ref.density

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

User entry

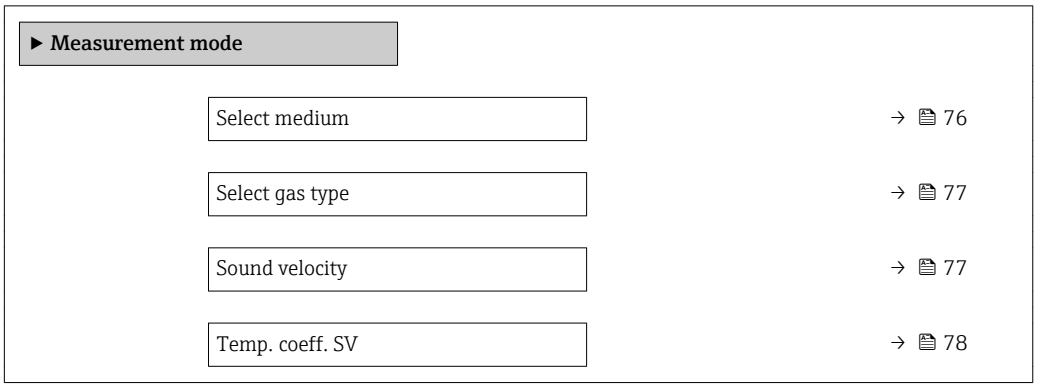
- Damping is disabled if **0** is entered (factory setting).
- Damping is enabled if the value entered is greater than **0**.
- The value entered depends on application-specific influence variables, such as the medium, nominal diameter, sensor etc.

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



Select medium

Navigation Expert → Sensor → Measurement mode → Select medium

Description Use this function to select the type of medium.

Selection Liquid

Factory setting Liquid

Select gas type

Navigation Expert → Sensor → Measurement mode → Select gas type

Prerequisite The **Gas** option is selected in the **Select medium** parameter (→ 76).

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

Selection
- Air
- Ammonia NH3
- Argon Ar
- Sulf. hex.fl.SF6
- Oxygen O2
- Ozone O3
- Nitrog. ox. NOx
- Nitrogen N2
- Nitrous ox. N2O
- Methane CH4
- Hydrogen H2
- Helium He
- Hydrog.chlor.HCl
- Hydrog.sulf. H2S
- Ethylene C2H4
- Carbon diox. CO2
- Carbon monox. CO
- Chlorine Cl2
- Butane C4H10
- Propane C3H8
- Propylene C3H6
- Ethane C2H6
- Others

Factory setting Methane CH4

Additional information *Description*

The gas type needs to be selected so that it is possible to comply with accuracy specifications in gas applications.

Sound velocity

Navigation Expert → Sensor → Measurement mode → Sound velocity

Prerequisite In the **Select gas type** parameter (→ 77), the **Others** option is selected.

Description Use this function to enter the 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

Temp. coeff. SV

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

Prerequisite The **Others** option is selected in the **Select gas type** parameter (→ 77).

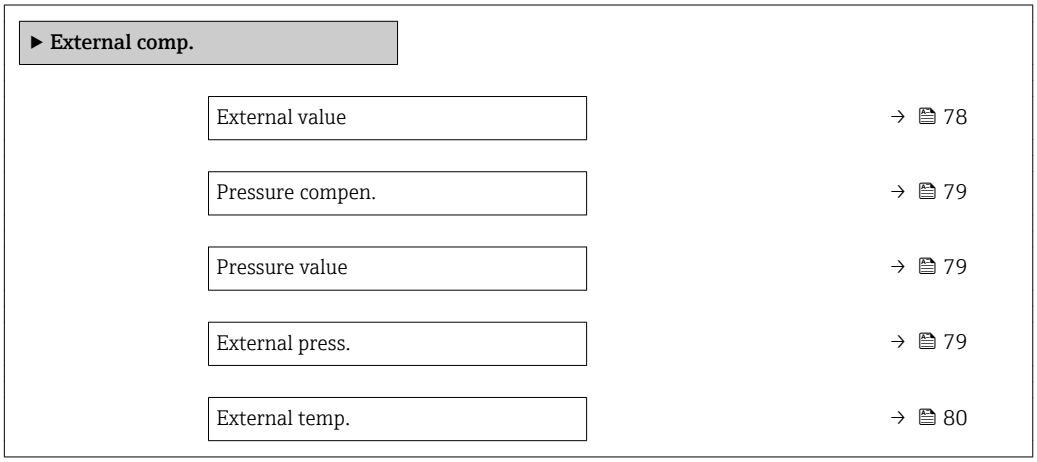
Description Use this function to enter a temperature coefficient for the sound velocity of the gas.

User entry Positive floating-point number

Factory setting 0 (m/s)/K

3.2.5 "External comp." submenu

Navigation Expert → Sensor → External comp.



External value

Navigation Expert → Sensor → External comp. → External value

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

Selection
- Off
- Pressure
- Temperature

Factory setting Off

Pressure compen.

Navigation Expert → Sensor → External comp. → Pressure compen.

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

Selection
- Off
- Fixed value
- External value

Factory setting Off

Additional information *Selection*
- Fixed value
  A fixed pressure value is used for compensation: **Pressure value** parameter (→ 79)
- External value
  The pressure value read in via HART is used for compensation.
- **Current input 1** option, **Current input 2** option
  The pressure value read in via the current input is used for compensation.

Pressure value

Navigation Expert → Sensor → External comp. → Pressure value

Prerequisite The **Fixed value** option is selected in the **Pressure compen.** parameter (→ 79).

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 0 bar

Additional information *User entry*

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

External press.

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

Prerequisite The **External value** option is selected in the **Pressure compen.** parameter (→ 79).

Description Use this function to enter an external pressure value.

User interface Positive floating-point number

Factory setting 0 bar

Additional information *User entry*

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

External temp.

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

Prerequisite In the **External value** parameter (→ 78), the **Temperature** option is selected.

Description Use this function to enter the external temperature.

User entry –273.15 to 99999 °C

Factory setting Country-specific:
- 0 °C
- +32 °F

Additional information *Description*

The unit is taken from the **Temperature unit** parameter (→ 60)

3.2.6 "Calculated value" submenu

Navigation Expert → Sensor → Calculated value

▶ **Calculated value**		
	▶ **Corr. vol.flow.**	→ 80

"Corr. vol.flow." submenu

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

▶ **Corr. vol.flow.**		
	Corr. vol.flow.	→ 81
	Ext. ref.density	→ 81
	Fix ref.density	→ 82
	Ref. temperature	→ 82

Linear exp coeff	→ 83
Square exp coeff	→ 83

Corr. vol.flow.

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

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

Selection
- Fix ref.density
- Calc ref density
- Ref. dens API 53

Factory setting Calc ref density

Additional information *Selection*

The **Ref. dens API 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) 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.

Ext. ref.density

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

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 **Ref. dens. unit** parameter (→ 60)

5) liquefied petroleum gas

Fix ref.density

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

Prerequisite The **Fix ref.density** option is selected in the **Corr. vol.flow.** parameter (→ 81) 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 **Ref. dens. unit** parameter (→ 60)

Ref. temperature

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

Prerequisite The **Calc ref density** option is selected in the **Corr. vol.flow.** parameter (→ 81).

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

User entry −273.15 to 99 999 °C

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

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 60)

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 exp coeff

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

Prerequisite The **Calc ref density** option is selected in the **Corr. vol.flow.** parameter (→ 81) 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

Square exp coeff

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

Prerequisite The **Calc ref density** option is selected in the **Corr. vol.flow.** parameter (→ 81) parameter.

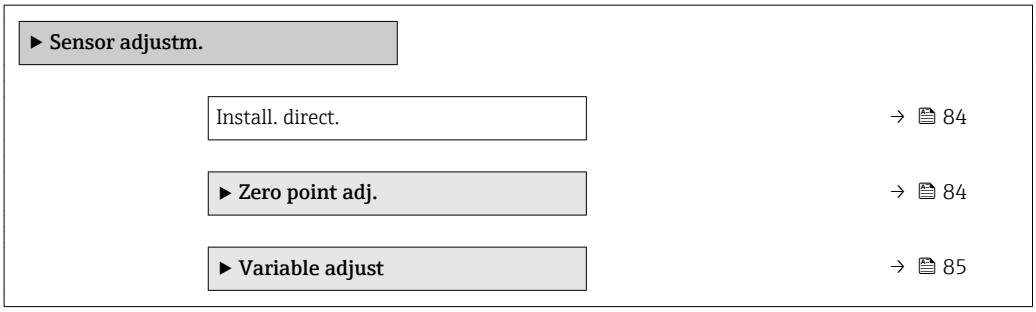
Description For fluid with a non-linear expansion pattern: use this function to enter a quadratic, fluid-specific expansion coefficient for calculating the reference density.

User entry Signed floating-point number

Factory setting 0.0

3.2.7 "Sensor adjustm." submenu

Navigation Expert → Sensor → Sensor adjustm.



Install. direct.

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

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

Selection
- In arrow direct.
- Against arrow

Factory setting In arrow direct.

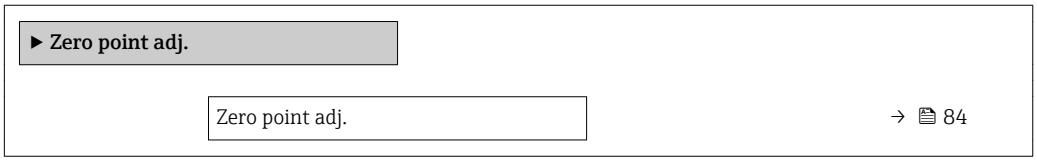
Additional information *Description*

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

"Zero point adj." submenu

- It is generally not necessary to perform zero point adjustment.
- However, this function may be needed in some applications with low flow and strict accuracy requirements.
- A zero point adjustment cannot increase repeatability.
- The following conditions should be met to perform a zero point adjustment successfully without the adjustment finishing in an error:
  - The real flow must be **0**.
  - The pressure must be at least 15 psi g.
- The adjustment takes a maximum of 60 s. The more stable the conditions, the faster the adjustment is completed.
- This function can also be used to check the health of the measuring device. A healthy measuring device has a maximum zero point deviation of ±100 compared to the factory setting of the measuring device (calibration report).

Navigation Expert → Sensor → Sensor adjustm. → Zero point adj.



Zero point adj.

Navigation Expert → Sensor → Sensor adjustm. → Zero point adj. → Zero point adj.

Description Use this function to select the start of the zero point adjustment.

Observe conditions → 84.

Selection
- Cancel
- Busy
- Zero adjust fail
- Start

Factory setting Cancel

Additional information *Description*
- Cancel
  If zero point adjustment has failed, select this option to cancel zero point adjustment.
- Busy
  Is displayed during zero point adjustment.
- Zero adjust fail
  Is displayed if zero point adjustment has failed.
- Start
  Select this option to start zero point adjustment.

Progress

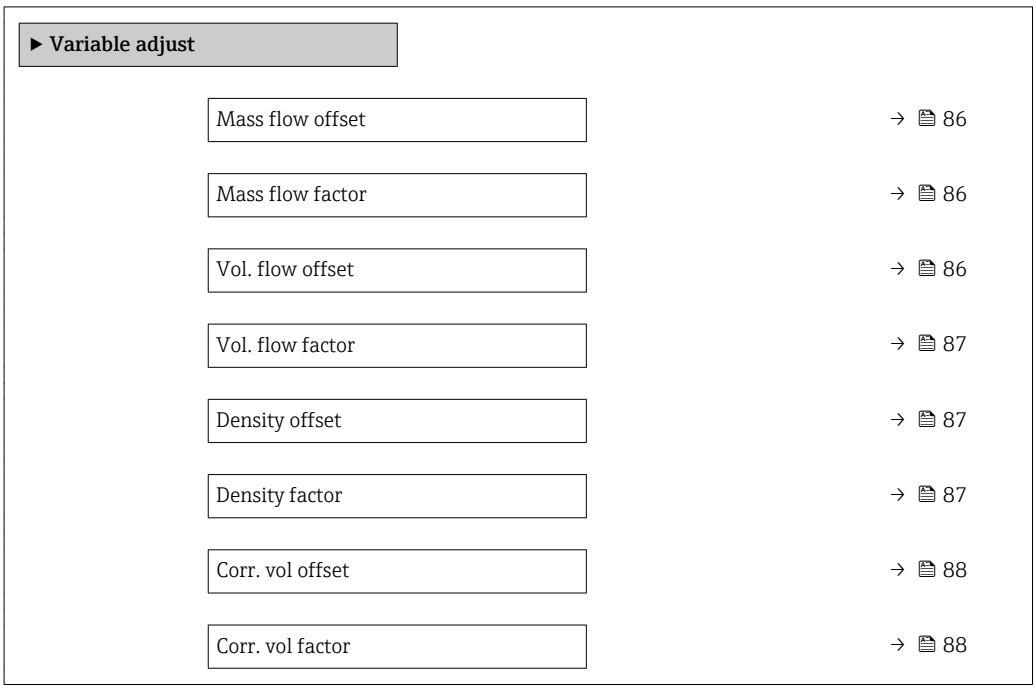
Navigation Expert → Sensor → Sensor adjustm. → Zero point adj. → Progress

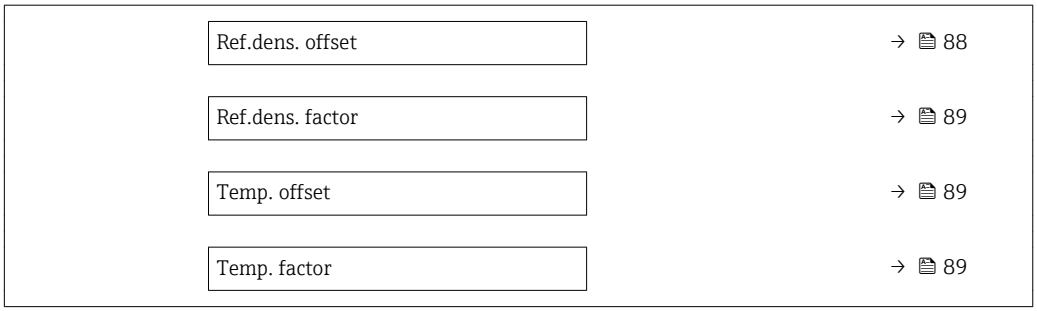
Description The progress of the process is indicated.

User interface 0 to 100 %

"Variable adjust" submenu

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust





Mass flow offset

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

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

User entry Signed floating-point number

Factory setting 0 kg/s

Additional information *Description*

Corrected value = (factor × value) + offset

Mass flow factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Vol. flow offset

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

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

User entry Signed floating-point number

Factory setting 0 m^3/s

Additional information *Description*

Corrected value = (factor × value) + offset

Vol. flow factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Density offset

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

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

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

Corr. vol offset

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

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

User entry Signed floating-point number

Factory setting 0 Nm^3/s

Additional information *Description*

Corrected value = (factor × value) + offset

Corr. vol factor

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

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

User entry Positive floating-point number

Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

Ref.dens. offset

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Ref.dens. offset

Description Use this parameter to enter the zero point shift for the reference density trim. The reference density unit on which the shift is based is 1 kg/Nm^3.

User entry Signed floating-point number

Factory setting 0 kg/Nm^3

Additional information *Description*

Corrected value = (factor × value) + offset

Ref.dens. factor

Navigation Expert → Sensor → Sensor adjustm. → Variable adjust → Ref.dens. factor

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

Temp. offset

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

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

Temp. factor

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

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

User entry Positive floating-point number

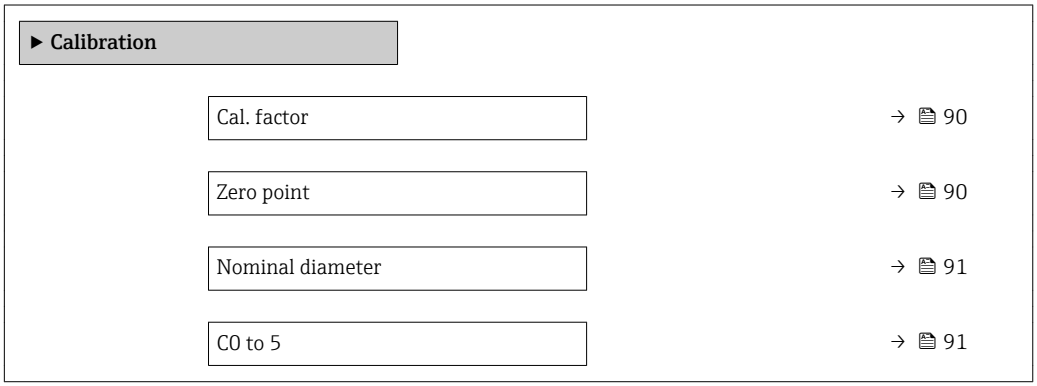
Factory setting 1

Additional information *Description*

Corrected value = (factor × value) + offset

3.2.8 "Calibration" submenu

Navigation Expert → Sensor → Calibration



Cal. factor

Navigation Expert → Sensor → Calibration → Cal. factor

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

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

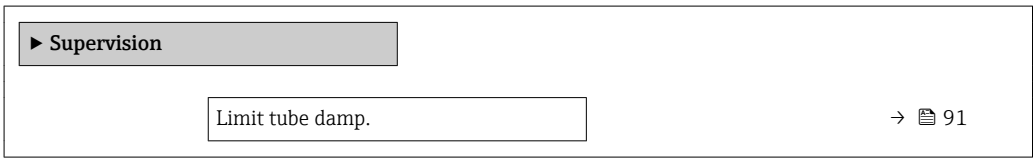
Navigation	Expert → Sensor → Calibration → Nominal diameter
Description	Displays the nominal diameter of the sensor.
User interface	DNxx / x"
Factory setting	Depends on the size of the sensor
Additional information	*Description* The value is also specified on the sensor nameplate.

C0 to 5

Navigation	Expert → Sensor → Calibration → C0 to 5
Description	Displays the current density coefficients C0 to 5 of the sensor.
User interface	Signed floating-point number
Factory setting	0

3.2.9 "Supervision" submenu

Navigation Expert → Sensor → Supervision



Limit tube damp.

Navigation	Expert → Sensor → Supervision → Limit tube damp.
Description	Use this function to enter a limit value for measuring tube damping.
User entry	Positive floating-point number
Factory setting	Positive floating-point number

Additional information *Limit value*

- If the displayed value is outside the limit value, the measuring device displays the diagnostic message ⚠**S948 Tube damp. high**.
- For detecting inhomogeneous media, for example

3.3 "Output" submenu

Navigation Expert → Output

▶ **Output**	
▶ **Curr.output 1**	→ 92
▶ **PFS output 1**	→ 107

3.3.1 "Current output 1" submenu

Navigation Expert → Output → Curr.output 1

▶ **Curr.output 1**	
Assign curr.	→ 93
Current span	→ 93
Fixed current	→ 95
0/4 mA value	→ 95
20 mA value	→ 97
Measuring mode	→ 97
Damping out.	→ 102
Response time	→ 103
Failure mode	→ 105
Failure current	→ 106
Output curr. 1	→ 106
Measur. curr. 1	→ 107

Assign curr.

Navigation Expert → Output → Curr.output 1 → Assign curr.

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

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

Selection

- Off
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Damping fluct 0
- Damping fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *
- Sensor integrity *

Factory setting Mass flow

Current span

Navigation Expert → Output → Curr.output 1 → Current span

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

* Visibility depends on order options or device settings

Selection

- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA
- 0...20 mA
- Fixed current

Factory setting

Country-specific:
- 4...20 mA NAMUR
- 4...20 mA US

Additional information

Description

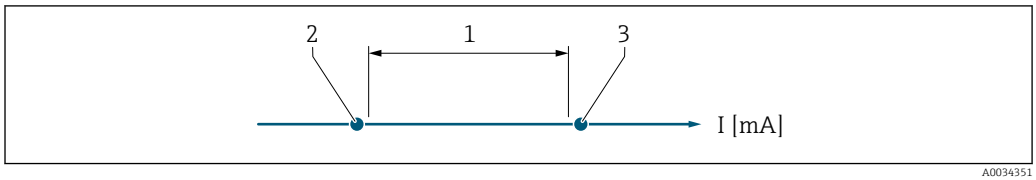
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→ 105).
- If the measured value is outside the measuring range, the diagnostic message ⚠**S441 Curr.output 1** is displayed.
- The measuring range is specified via the **0/4 mA value** parameter (→ 95) and **20 mA value** parameter (→ 97).

"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 (→ 95).

Example

Shows the relationship between the current span for the output of the process variable and the lower and upper alarm levels:



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

Selection

Options	1	2	3
4...20 mA NAMUR	3.8 to 20.5 mA	< 3.6 mA	> 21.95 mA
4...20 mA US	3.9 to 20.8 mA US	< 3.6 mA	> 21.95 mA
4...20 mA	4 to 20.5 mA	< 3.6 mA	> 21.95 mA
0...20 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 diagnostic message ⚠**S441 Curr.output 1** is displayed.

Fixed current

Navigation Expert → Output → Curr.output 1 → Fixed current

Prerequisite The **Fixed current** option is selected in the **Current span** parameter (→ 93).

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

0/4 mA value

Navigation Expert → Output → Curr.output 1 → 0/4 mA value

Prerequisite One of the following options is selected in the **Current span** parameter (→ 93):
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA
- 0...20 mA

Description Use this function to enter a value for the 0/4 mA current.

User entry Signed floating-point number

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

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign curr.** parameter (→ 93). In addition, the value can be greater than or smaller than the value assigned for the 20 mA current in the **20 mA value** parameter (→ 97).

Dependency

The unit depends on the process variable selected in the **Assign curr.** parameter (→ 93).

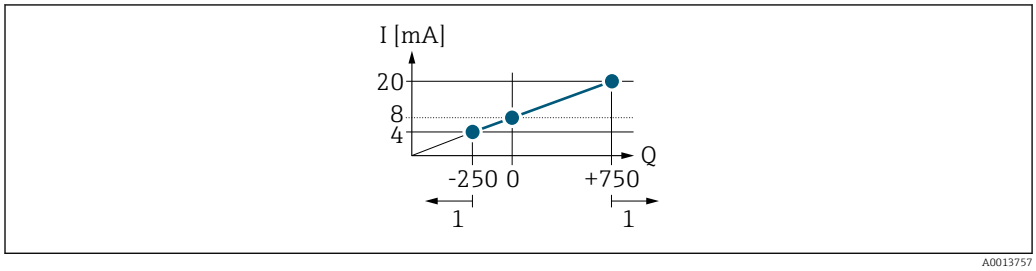
Current output behavior

The current output behaves differently depending on the settings configured in the following parameters:
- Current span (→ 93)
- Measuring mode (→ 97)
- Failure mode (→ 105)

Configuration examples

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

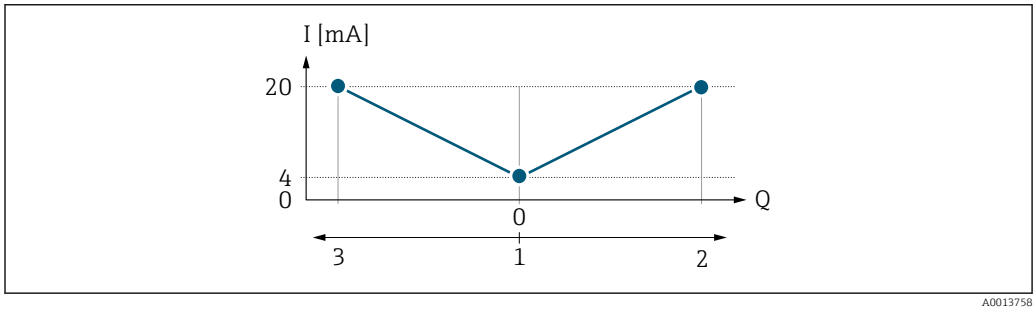
Configuration example A
Measuring mode with **Forward flow** option
- **0/4 mA value** parameter (→ 95) = not equal to zero flow (e.g. −250 m^3/h)
- **20 mA value** parameter (→ 97) = not equal to zero flow (e.g. +750 m^3/h)
- Calculated current value = 8 mA at zero flow



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 **0/4 mA value** parameter (→ 95) and **20 mA value** parameter (→ 97). If the effective flow exceeds or falls below this operational range, the diagnostic message ⚠**S441 Curr.output 1** is displayed.

Configuration example B
Measuring mode with **Forward/Reverse** option



I Current
Q Flow
1 Value assigned to the 0/4 mA current
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 **0/4 mA value** parameter (→ 95) and **20 mA value** parameter (→ 97) must have the same sign. The value for the **20 mA value** parameter (→ 97) (e.g. reverse flow) corresponds to the mirrored value for the **20 mA value** parameter (→ 97) (e.g. forward flow).

Configuration example C
Measuring mode with **Rev. flow comp.** 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 → 97.

20 mA value

Navigation Expert → Output → Curr.output 1 → 20 mA value

Prerequisite One of the following options is selected in the **Current span** parameter (→ 93):
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA
- 0...20 mA

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→ 199

Additional information

Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign curr.** parameter (→ 93). In addition, the value can be greater than or smaller than the value assigned for the 0/4 mA current in the **0/4 mA value** parameter (→ 95).

Dependency

The unit depends on the process variable selected in the **Assign curr.** parameter (→ 93).

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** option is selected in the **Measuring mode** parameter (→ 97), different signs cannot be entered for the values of the **0/4 mA value** parameter (→ 95) and **20 mA value** parameter (→ 97). The diagnostic message ⚠**S441 Curr.output 1** is displayed.

Configuration examples

Observe the configuration examples for the **0/4 mA value** parameter (→ 95).

Measuring mode

Navigation Expert → Output → Curr.output 1 → Measuring mode

Prerequisite One of the following options is selected in the **Assign curr.** parameter (→ 93):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

* Visibility depends on order options or device settings

- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *
- HBSI *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

One of the following options is selected in the **Current span** parameter (→ 93):
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA
- 0...20 mA

Description

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

Selection

- Forward flow
- Forward/Reverse
- Rev. flow comp.

Factory setting

Forward flow

Additional information

Description

The process variable that is assigned to the current output via the **Assign curr.** parameter (→ 93) is displayed below the parameter.

"Forward flow" option

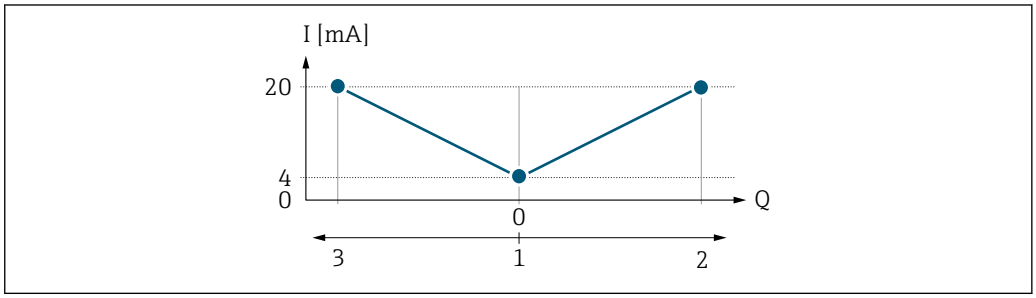
The current output signal is proportional to the process variable assigned. The measuring range is defined by the values that are assigned to the 0/4 mA and 20 mA current value.

* 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.:
  - 0/4 mA current value = −5 m^3/h
  - 20 mA current value = 10 m^3/h
- If the effective flow exceeds or falls below this measuring range, the diagnostic message ⚠**S441 Curr.output 1** is displayed.

"Forward/Reverse" option



I Current
Q Flow
1 Value assigned to the 0/4 mA current
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 **0/4 mA value** parameter (→ 🖹 95) and **20 mA value** parameter (→ 🖹 97) must have the same sign.
- The value for the **20 mA value** parameter (→ 🖹 97) (e.g. reverse flow) corresponds to the mirrored value for the **20 mA value** parameter (→ 🖹 97) (e.g. forward flow).

"Rev. flow comp." option

The **Rev. flow comp.** option is primarily used to compensate for abrupt reverse flow which can occur in connection with positive displacement pumps as a result of wear or high viscosity. The reverse flows are recorded in a buffer and balanced against forward flow the next time flow is in the forward direction.

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

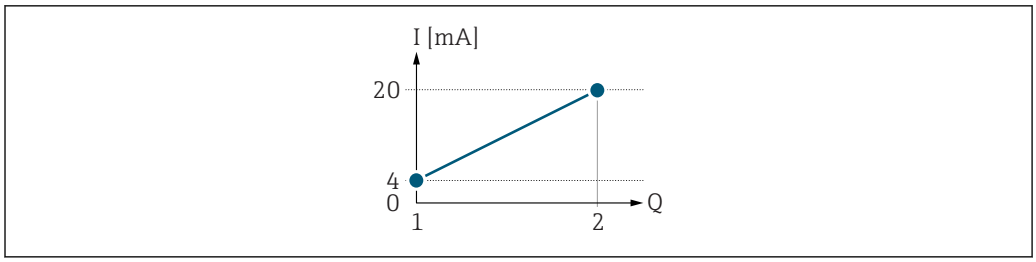
Flow values can aggregate in the buffer in the event of prolonged and unwanted fluid reverse flow. However, these flows are not taken into consideration by the current output configuration, i.e. the reverse flow is not compensated.

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

Examples of how the current output behaves

Example 1

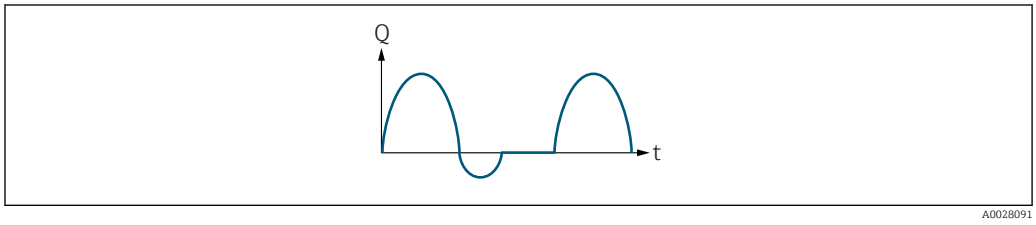
Defined measuring range: lower range value and upper range value with the **same** sign



2 Measuring range

I Current
Q Flow
1 Lower range value (value assigned to 0/4 mA current)
2 Upper range value (value assigned to 20 mA current)

With the following flow response:

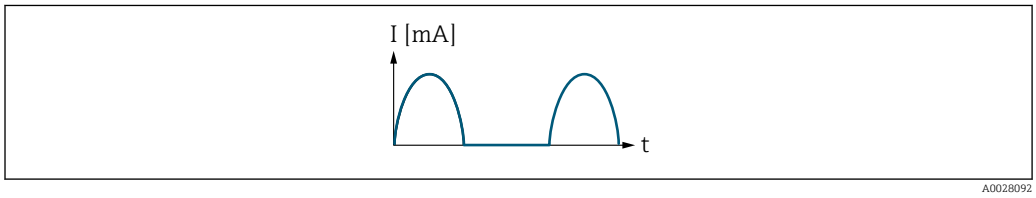


3 Flow response

Q Flow
t Time

With **Forward flow** option

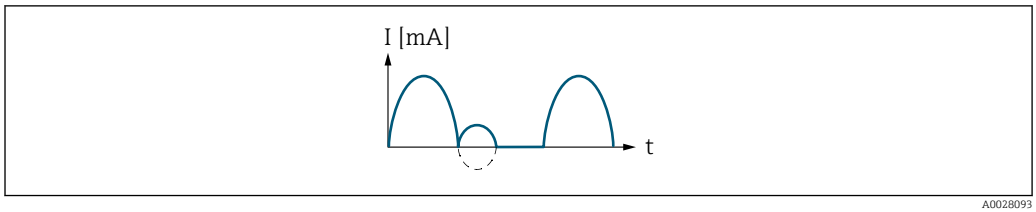
The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output:.



I Current
t Time

With **Forward/Reverse** option

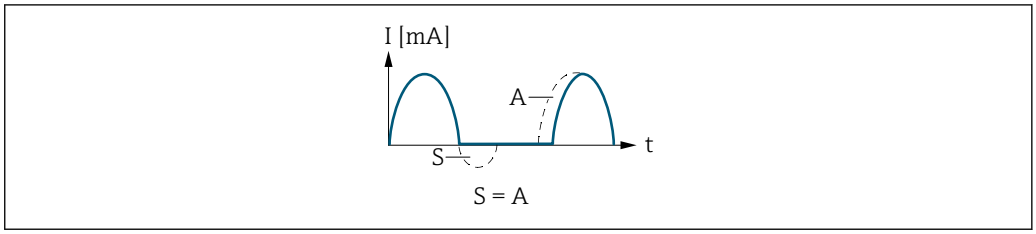
The current output signal is independent of the direction of flow.



I Current
t Time

With **Rev. flow comp.** option

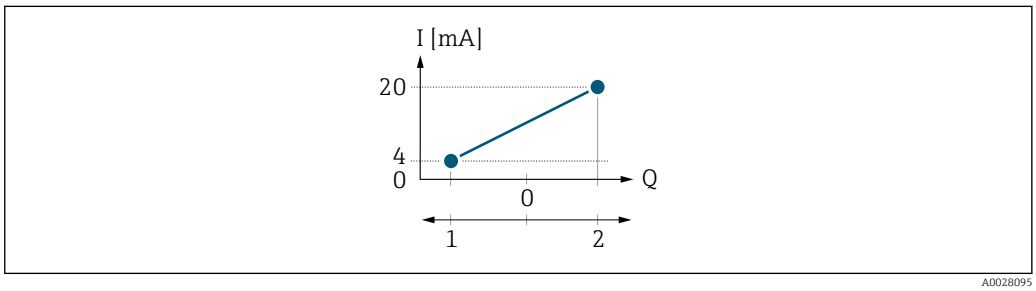
Flow components outside the span are buffered, balanced and output after a maximum delay of 60 s.



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

Example 2

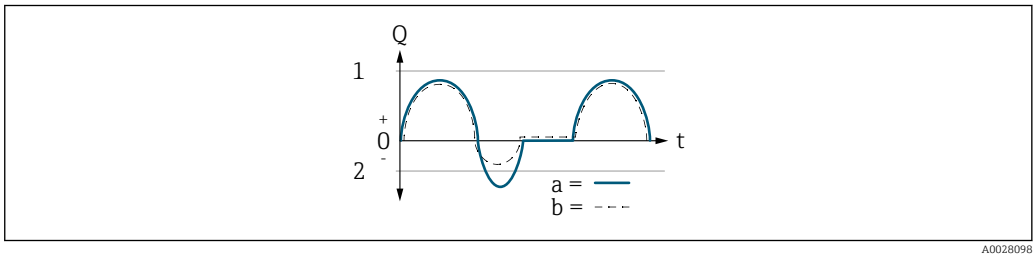
Defined measuring range: lower range value and upper range value with **different** signs



4 *Measuring range*

I *Current*
Q *Flow*
1 *Lower range value (value assigned to 0/4 mA current)*
2 *Upper range value (value assigned to 20 mA current)*

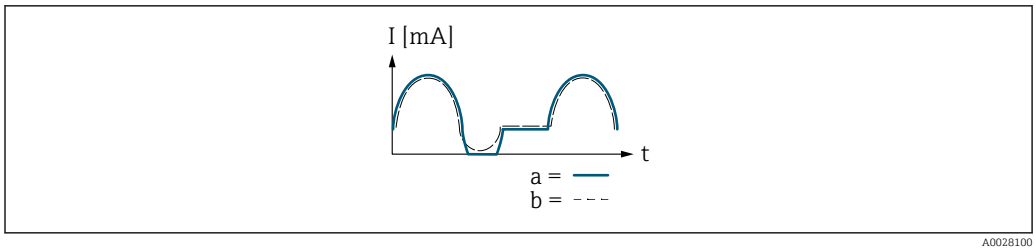
With flow a (—) outside, b (- -) inside the measuring range



Q *Flow*
t *Time*
1 *Lower range value (value assigned to 0/4 mA current)*
2 *Upper range value (value assigned to 20 mA current)*

With **Forward flow** option

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



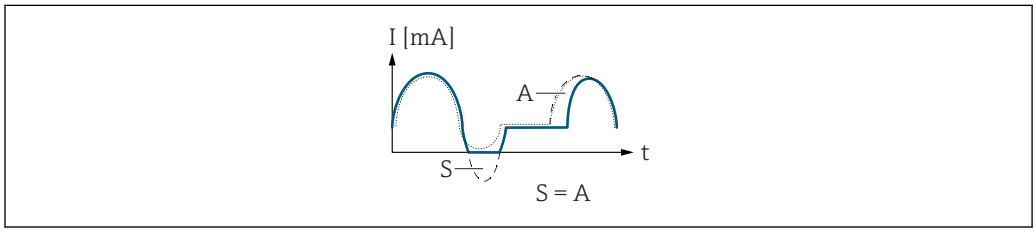
I *Current*
t *Time*

With **Forward/Reverse** option

This option is not possible in this case as the values for the **0/4 mA value** parameter (→ 95) and **20 mA value** parameter (→ 97) have different signs.

With **Rev. flow comp.** option

Flow components outside the 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 out.

Navigation Expert → Output → Curr.output 1 → Damping out.

Prerequisite One of the following options is selected in the **Assign curr.** parameter (→ 93):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0

* Visibility depends on order options or device settings

- Osc. freq. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *
- HBSI *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

One of the following options is selected in the **Current span** parameter (→ 93):
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA
- 0...20 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

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).

Response time

Navigation

Expert → Output → Curr.output 1 → Response time

Prerequisite

One of the following options is selected in the **Assign curr.** parameter (→ 93):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *

* Visibility depends on order options or device settings

6) proportional transmission behavior with first order delay

- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *
- HBSI *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

One of the following options is selected in the **Current span** parameter (→ 93):
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA
- 0...20 mA

Description

Displays the response time. This specifies how quickly the current output reaches the measured value change of 63 % of 100 % of the measured value change.

User interface

Positive floating-point number

Additional information

Description

The response time is made up of the time specified for the following dampings:
- Current output damping → 102
  and
- Depending on the measured variable assigned to the output.
  - Flow damping
    or
  - Density damping
    or
  - Temperature damping

* Visibility depends on order options or device settings

Failure mode

Navigation Expert → Output → Curr.output 1 → Failure mode

Prerequisite One of the following options is selected in the **Assign curr.** parameter (→ 93):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *
- HBSI *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

One of the following options is selected in the **Current span** parameter (→ 93):
- 4...20 mA NAMUR
- 4...20 mA US
- 4...20 mA
- 0...20 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
- Defined value

Factory setting Max.

* Visibility depends on order options or device settings

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 (→ 93).

"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 (→ 93).

"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 (→ 106).

Failure current

Navigation Expert → Output → Curr.output 1 → Failure current

Prerequisite The **Defined value** option is selected in the **Failure mode** parameter (→ 105).

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 curr. 1

Navigation Expert → Output → Curr.output 1 → Output curr. 1

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

User interface 0 to 22.5 mA

Measur. curr. 1

Navigation Expert → Output → Curr.output 1 → Measur. curr. 1

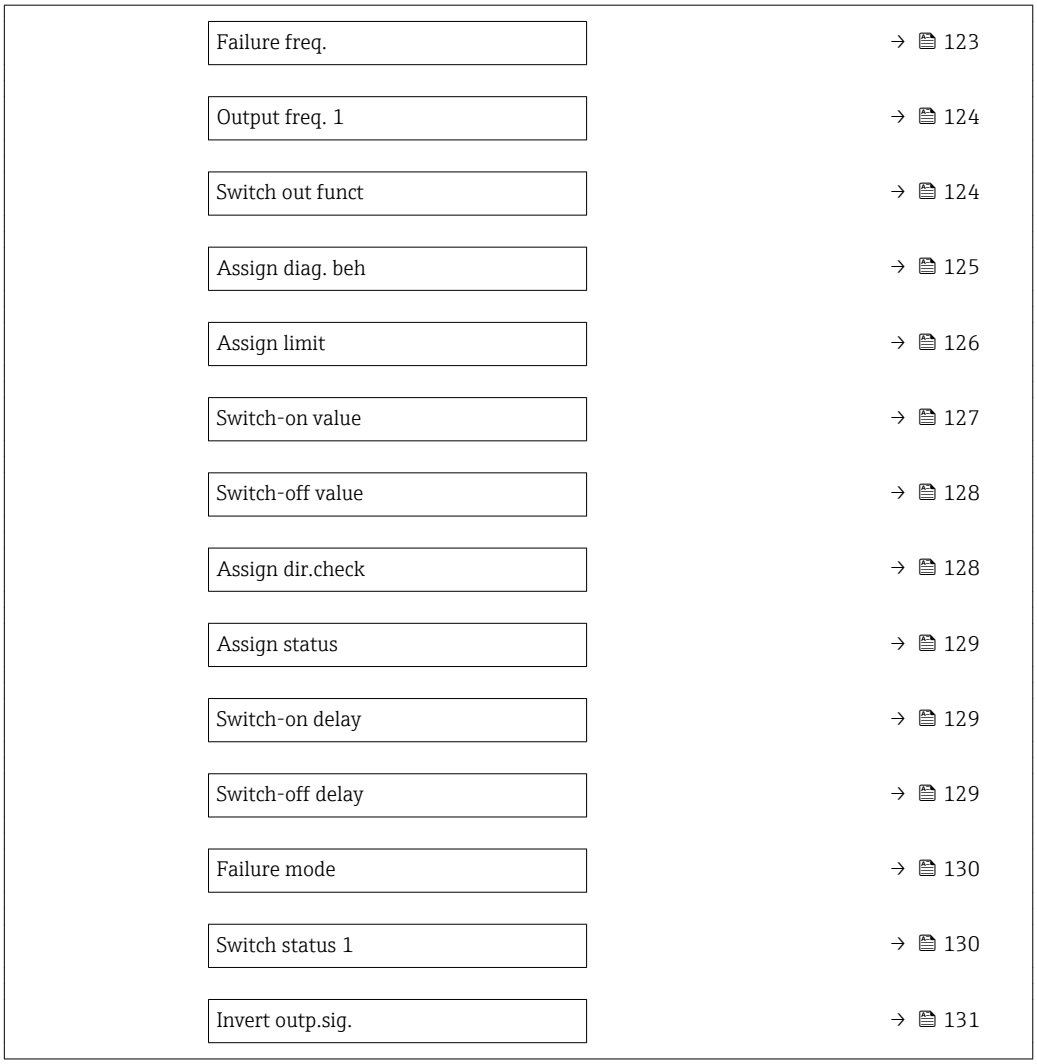
Description Use this function to display the actual measured value of the output current.

User interface 0 to 30 mA

3.3.2 "PFS output" submenu

Navigation Expert → Output → PFS output

▶ **PFS output 1**	
Operating mode	→ 108
Assign pulse	→ 110
Value per pulse	→ 110
Pulse width	→ 111
Measuring mode	→ 112
Failure mode	→ 112
Pulse output 1	→ 113
Assign freq.	→ 114
Min. freq. value	→ 115
Max. freq. value	→ 116
Val. at min.freq	→ 117
Val. at max.freq	→ 118
Measuring mode	→ 119
Damping out.	→ 120
Response time	→ 121
Failure mode	→ 122



Operating mode

Navigation Expert → Output → PFS output 1 → Operating mode

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

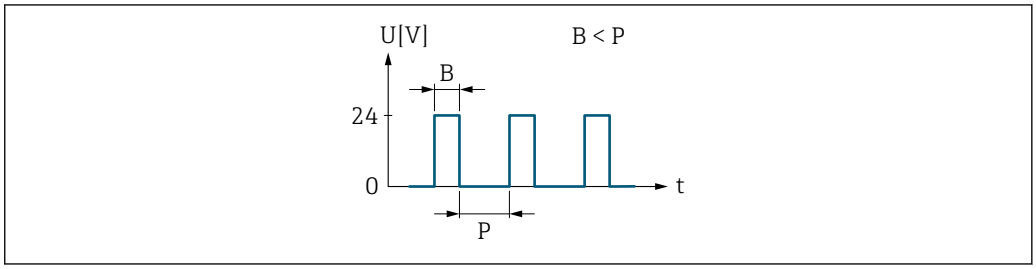
Selection
- Pulse
- Frequency
- Switch

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



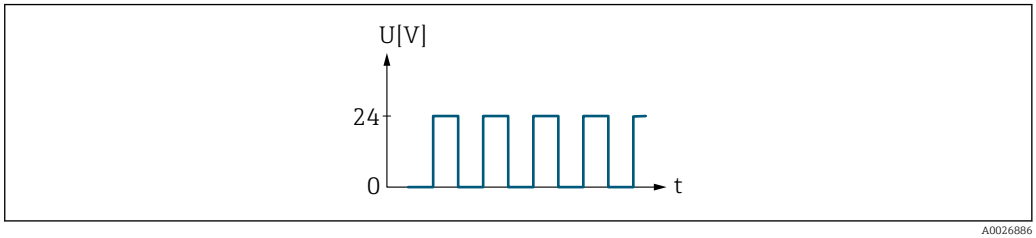
5 *Quantity-proportional pulse (pulse value) with pulse width to be configured*

B Pulse width entered
P Pauses between the individual pulses

"Frequency" option

Flow-proportional frequency output with 1:1 on/off ratio
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, electronic temperature, vibration frequency, frequency fluctuation, oscillation amplitude, oscillation damping, oscillation damping fluctuation, signal asymmetry or excitation current.

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

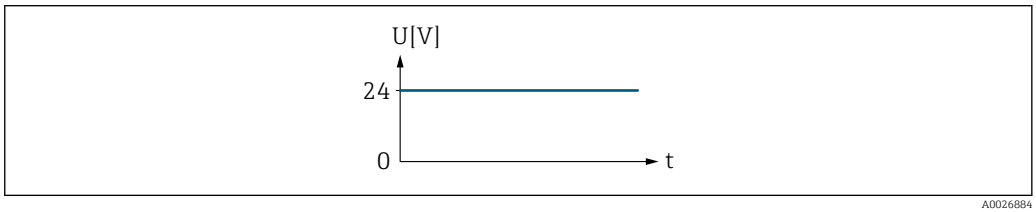


6 *Flow-proportional frequency output*

"Switch" option

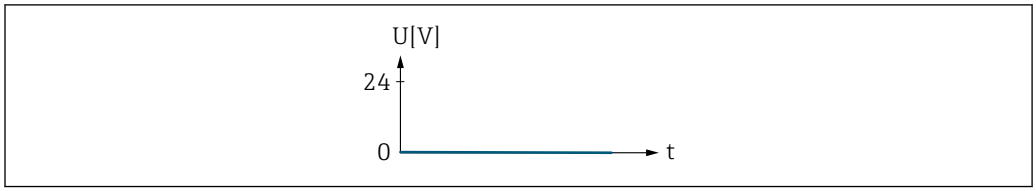
Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)

Example
Alarm response without alarm



7 *No alarm, high level*

Example
Alarm response in case of alarm



8 Alarm, low level

Assign pulse

Navigation Expert → Output → PFS output 1 → Assign pulse

Prerequisite The **Pulse** option is selected in the **Operating mode** parameter (→ 108).

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

Selection
- Off
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

Factory setting Off

Value per pulse

Navigation Expert → Output → PFS output 1 → Value per pulse

Prerequisite In the **Operating mode** parameter (→ 108), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse** parameter (→ 110):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

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→ 200

* Visibility depends on order options or device settings

Additional information *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 → Pulse width

Prerequisite In the **Operating mode** parameter (→ 108), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse** parameter (→ 110):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

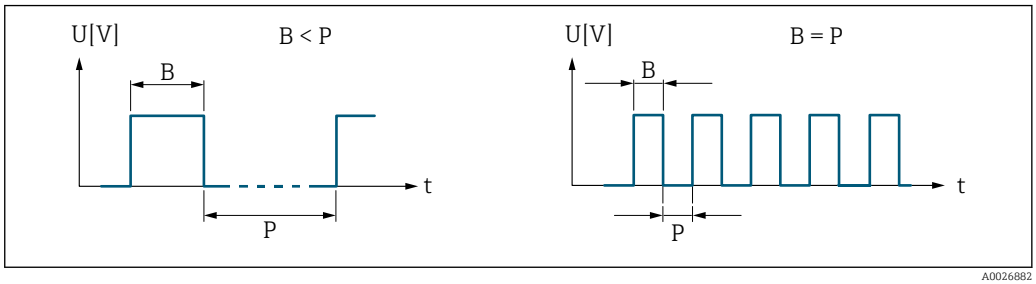
Description Use this function to enter the duration of the output pulse.

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 diagnostic message ⚠**S443 Pulse output 1**.



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

* Visibility depends on order options or device settings

Measuring mode

Navigation Expert → Output → PFS output 1 → Measuring mode

Prerequisite In the **Operating mode** parameter (→ 108) the **Pulse** option is selected and in the **Assign pulse** parameter (→ 110) one of the following options is selected:
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

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

Selection
- Forward flow
- Forward/Reverse
- Reverse flow
- Rev. flow comp.

Factory setting Forward flow

Additional information *Selection*
- Forward flow
  Positive flow is output, negative flow is not output.
- Forward/Reverse
  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.
- Rev. flow comp.
  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 (→ 97)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 97)

Failure mode

Navigation Expert → Output → PFS output 1 → Failure mode

Prerequisite In the **Operating mode** parameter (→ 108), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse** parameter (→ 110):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

* Visibility depends on order options or device settings

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

Selection
- Actual value
- No pulses

Factory setting No pulses

Additional information *Description*

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

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

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

Pulse output 1

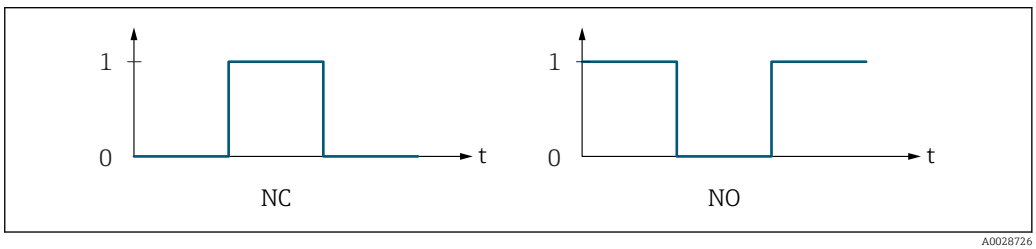
Navigation Expert → Output → PFS output 1 → Pulse output 1

Prerequisite In the **Operating mode** parameter (→ 108), the **Pulse** option is selected.

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.
- The **Value per pulse** parameter (→ 110) and **Pulse width** parameter (→ 111) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.



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

The output behavior can be reversed via the **Invert outp.sig.** parameter (→ 131) 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 (→ 112)) can be configured.

Assign freq.

Navigation Expert → Output → PFS output 1 → Assign freq.

Prerequisite The **Frequency** option is selected in the **Operating mode** parameter (→ 108).

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

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

Selection
- Off
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Damping fluct 0
- Damping fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Factory setting Off

* Visibility depends on order options or device settings

Min. freq. value

Navigation Expert → Output → PFS output 1 → Min. freq. value

Prerequisite In the **Operating mode** parameter (→ 108), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 114):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

Description Use this function to enter the start value frequency.

User entry 0.0 to 10 000.0 Hz

Factory setting 0.0 Hz

* Visibility depends on order options or device settings

Max. freq. value

Navigation Expert → Output → PFS output 1 → Max. freq. value

Prerequisite In the **Operating mode** parameter (→ 108), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 114):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

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

Val. at min.freq

Navigation Expert → Output → PFS output 1 → Val. at min.freq

Prerequisite In the **Operating mode** parameter (→ 108), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 114):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

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 freq.** parameter (→ 114).

* Visibility depends on order options or device settings

Val. at max.freq

Navigation Expert → Output → PFS output 1 → Val. at max.freq

Prerequisite In the **Operating mode** parameter (→ 108), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 114):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

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 freq.** parameter (→ 114).

* Visibility depends on order options or device settings

Measuring mode

Navigation Expert → Output → PFS output 1 → Measuring mode

Prerequisite In the **Operating mode** parameter (→ 108) the **Frequency** option is selected and in the **Assign freq.** parameter (→ 114) one of the following options is selected:
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

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

Selection
- Forward flow
- Forward/Reverse
- Rev. flow comp.

Factory setting Forward flow

Additional information

Selection

For a detailed description of the options available, see the **Measuring mode** parameter (→ 97)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 97)

* Visibility depends on order options or device settings

Damping out.

Navigation Expert → Output → PFS output 1 → Damping out.

Prerequisite In the **Operating mode** parameter (→ 108) the **Frequency** option is selected and in the **Assign freq.** parameter (→ 114) one of the following options is selected:
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

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.

Response time

Navigation Expert → Output → PFS output 1 → Response time

Prerequisite In the **Operating mode** parameter (→ 108) the **Frequency** option is selected and in the **Assign freq.** parameter (→ 114) one of the following options is selected:
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

Description Displays the response time. This specifies how quickly the pulse/frequency/switch output reaches the measured value change of 63 % of 100 % of the measured value change.

User interface Positive floating-point number

* Visibility depends on order options or device settings

Additional information *Description*

The response time is made up of the time specified for the following dampings:
- Damping of pulse/frequency/switch output → 102
  and
- Depending on the measured variable assigned to the output.
  – Flow damping
    or
  – Density damping
    or
  – Temperature damping

Failure mode

Navigation Expert → Output → PFS output 1 → Failure mode

Prerequisite In the **Operating mode** parameter (→ 108), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 114):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0
- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

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

* Visibility depends on order options or device settings

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 freq. (→ 123) 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 freq.

Navigation
Expert → Output → PFS output 1 → Failure freq.

Prerequisite
In the **Operating mode** parameter (→ 108), the **Frequency** option is selected, and one of the following options is selected in the **Assign freq.** parameter (→ 114):
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Osc.damp.fluct 0

* Visibility depends on order options or device settings

- Osc.damp.fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

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 freq. 1

Navigation Expert → Output → PFS output 1 → Output freq. 1

Prerequisite In the **Operating mode** parameter (→ 108), 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 out funct

Navigation Expert → Output → PFS output 1 → Switch out funct

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 108).

Description Use this function to select a function for the switch output.

Selection
- Off
- On
- Diag. behavior
- Limit
- Fl. direct.check
- Status

Factory setting Off

* Visibility depends on order options or device settings

Additional information *Selection*

- Off
  The switch output is permanently switched off (open, non-conductive).
- On
  The switch output is permanently switched on (closed, conductive).
- Diag. 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.
- Fl. direct.check
  Indicates the flow direction (forward or reverse flow).
- Status
  Indicates the device status depending on whether empty pipe detection or low flow cut off is selected.

Assign diag. beh

Navigation Expert → Output → PFS output 1 → Assign diag. beh

Prerequisite
- In the **Operating mode** parameter (→ 108), the **Switch** option is selected.
- In the **Switch out funct** parameter (→ 124), the **Diag. 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 → Assign limit

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 108).
- The **Limit** option is selected in the **Switch out funct** parameter (→ 124).

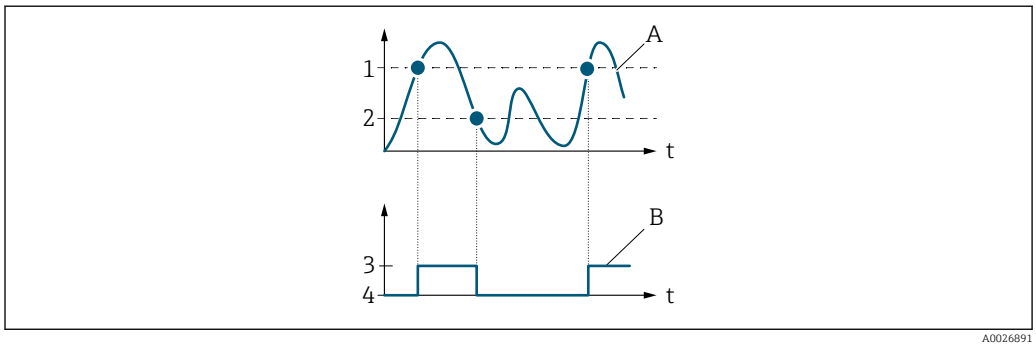
Description Use this function to select a process variable for the limit function.

Selection
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Dynam. viscosity *
- Concentration *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Meas. tube damp.

Factory setting Mass 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

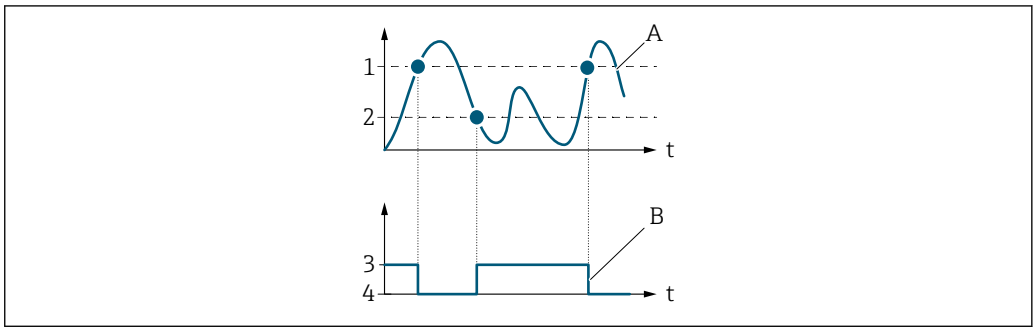


A0026891

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

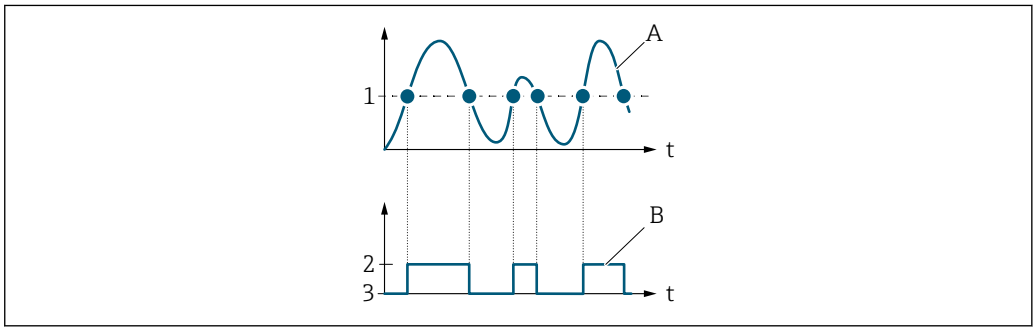
Behavior of status output when Switch-on value < Switch-off value:
- Process variable < Switch-on value: transistor is conductive
- Process variable > Switch-off value: transistor is non-conductive



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 → Switch-on value

Prerequisite
- In the **Operating mode** parameter (→ 108), the **Switch** option is selected.
- In the **Switch out funct** parameter (→ 124), the **Limit** option is selected.

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 (→ 126).

Switch-off value

Navigation

Expert → Output → PFS output 1 → Switch-off value

Prerequisite

- In the **Operating mode** parameter (→ 108), the **Switch** option is selected.
- In the **Switch out funct** parameter (→ 124), 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 depends on the process variable selected in the **Assign limit** parameter (→ 126).

Assign dir.check

Navigation

Expert → Output → PFS output 1 → Assign dir.check

Prerequisite

- The **Switch** option is selected in the **Operating mode** parameter (→ 108).
- The **Fl. direct.check** option is selected in the **Switch out funct** parameter (→ 124).

Description

Use this function to select a process variable for monitoring the flow direction.

Selection
- Off
- Volume flow
- Mass flow
- Correct.vol.flow

Factory setting Mass flow

Assign status

Navigation Expert → Output → PFS output 1 → Assign status

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 108).
- The **Status** option is selected in the **Switch out funct** parameter (→ 124).

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

Selection
- Partial pipe det
- Low flow cut off

Factory setting Partial pipe det

Additional information *Options*

If empty pipe detection or low flow cut off are enabled, the output is conductive. Otherwise, the switch output is non-conductive.

Switch-on delay

Navigation Expert → Output → PFS output 1 → Switch-on delay

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 108).
- The **Limit** option is selected in the **Switch out funct** parameter (→ 124).

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 → Switch-off delay

Prerequisite
- The **Switch** option is selected in the **Operating mode** parameter (→ 108).
- The **Limit** option is selected in the **Switch out funct** parameter (→ 124).

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 → Failure mode

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 status 1

Navigation Expert → Output → PFS output 1 → Switch status 1

Prerequisite The **Switch** option is selected in the **Operating mode** parameter (→ 108).

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 outp.sig.

Navigation Expert → Output → PFS output 1 → Invert outp.sig.

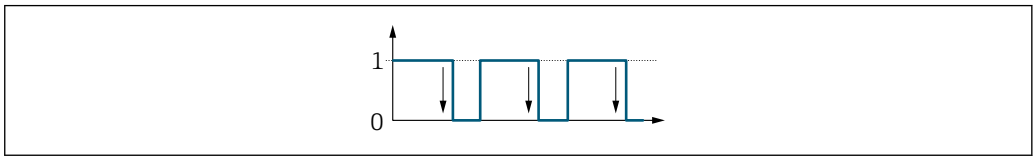
Description Use this function to select whether to invert the output signal.

Selection
- No
- Yes

Factory setting No

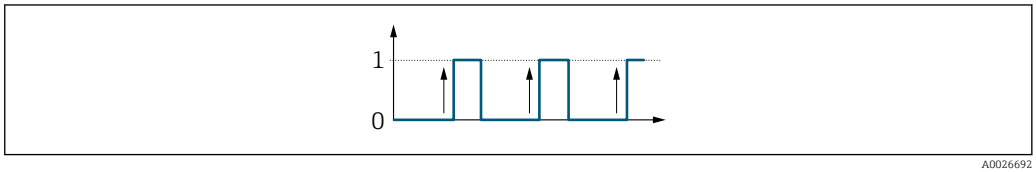
Additional information *Selection*

No option (passive - negative)



A0026693

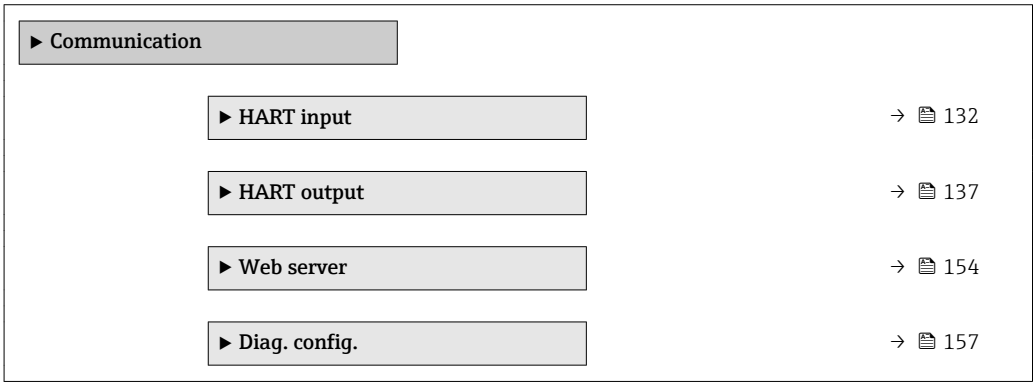
Yes option (passive - positive)



A0026692

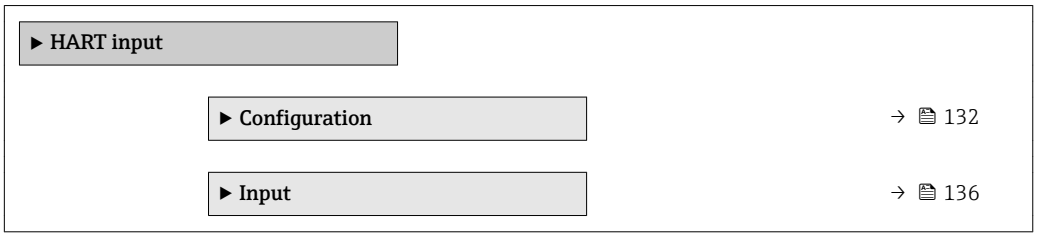
3.4 "Communication" submenu

Navigation Expert → Communication



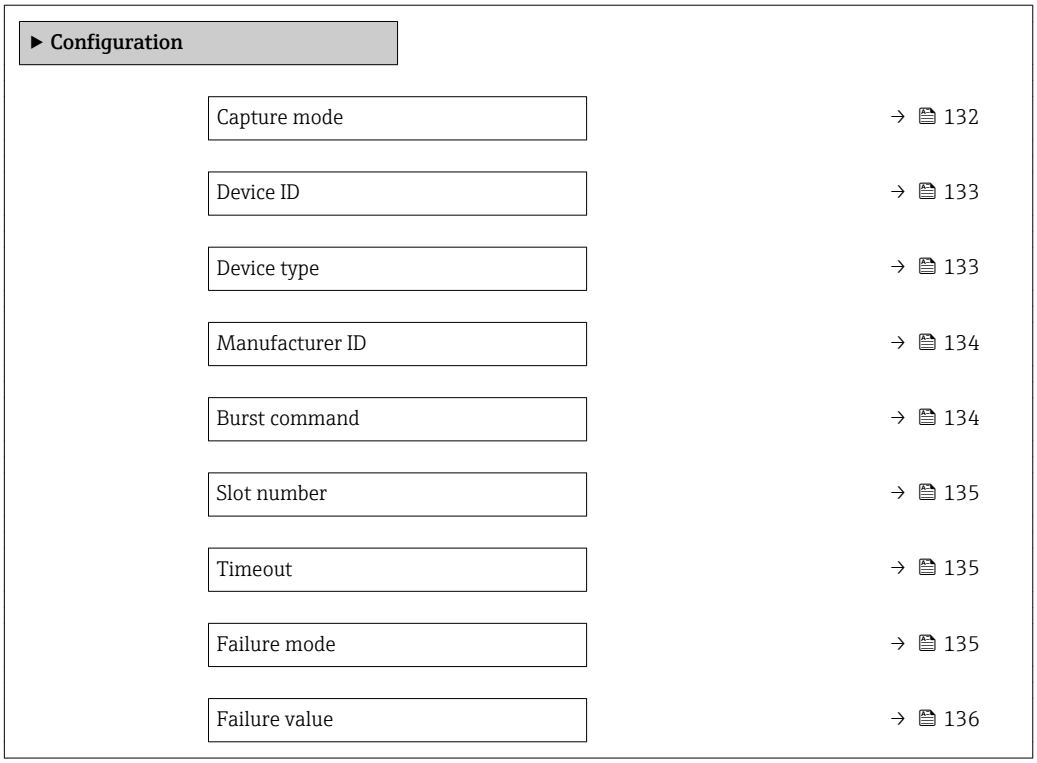
3.4.1 "HART input" submenu

Navigation Expert → Communication → HART input



"Configuration" submenu

Navigation Expert → Communication → HART input → Configuration



Capture mode

Navigation Expert → Communication → HART input → Configuration → Capture mode

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

Prerequisite The **Master network** option is selected in the **Capture mode** parameter (→ 132).

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

Prerequisite In the **Capture mode** parameter (→ 132), 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

Prerequisite The **Master network** option is selected in the **Capture mode** parameter (→ 132).

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

Prerequisite The **Burst network** option or the **Master network** option are selected in the **Capture mode** parameter (→ 132).

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

Prerequisite The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 132).

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

User entry 1 to 4

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)

Timeout

Navigation Expert → Communication → HART input → Configuration → Timeout

Prerequisite The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 132).

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 diagnostic message **F882 Input signal**.

Failure mode

Navigation Expert → Communication → HART input → Configuration → Failure mode

Prerequisite In the **Capture mode** parameter (→ 132), 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 (→ 136)).

Failure value

Navigation Expert → Communication → HART input → Configuration → Failure value

Prerequisite The following conditions are met:
- In the **Capture mode** parameter (→ 132), the **Burst network** option or **Master network** option is selected.
- In the **Failure mode** parameter (→ 135), the **Defined value** option is selected.

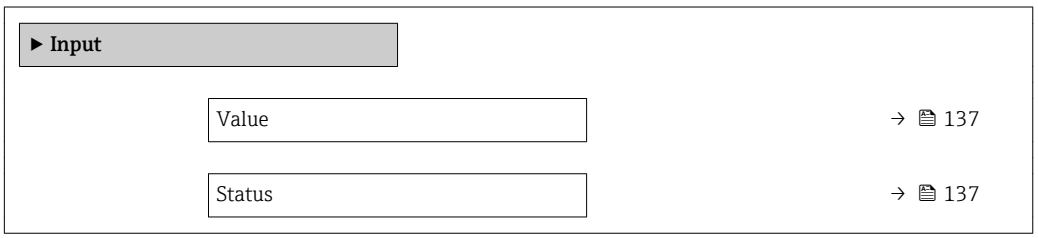
Description Use this function to enter the measured value to be used if no data are recorded within the maximum permitted interval.

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

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

User interface 0 to 99 999.9999 °C

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 60)

Status

Navigation Expert → Communication → HART input → Input → Status

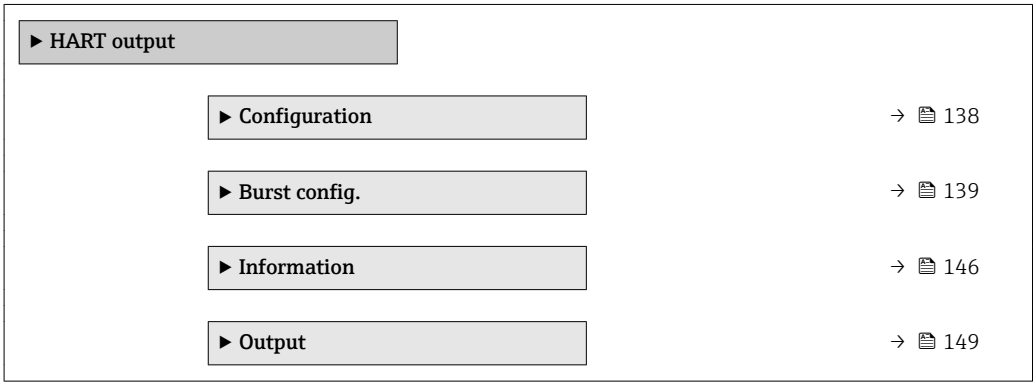
Description Displays the value of the device variable recorded by the HART input in accordance with the HART specification.

User interface

- Manual/Fixed
- Good
- Poor accuracy
- Bad

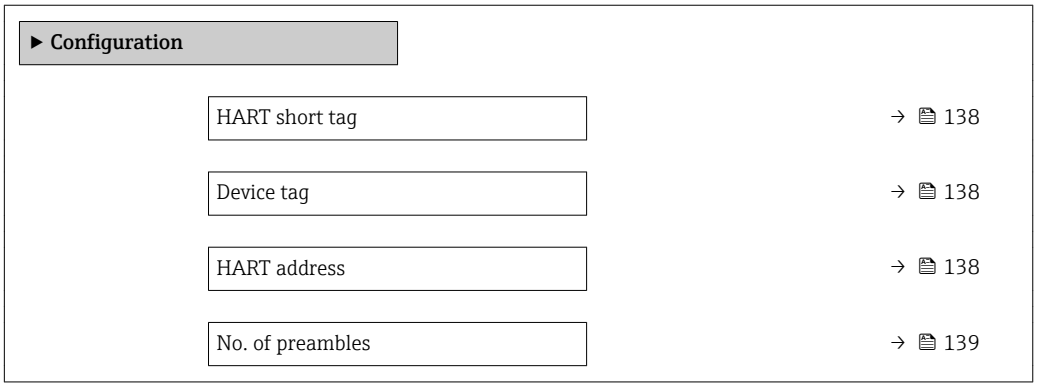
3.4.2 "HART output" submenu

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

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

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

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 (→ 🖹 93) (current output 1).

No. of preambles

Navigation Expert → Communication → HART output → Configuration → No. of preambles

Description Use this function to enter the number of preambles in the HART protocol.

User entry 2 to 20

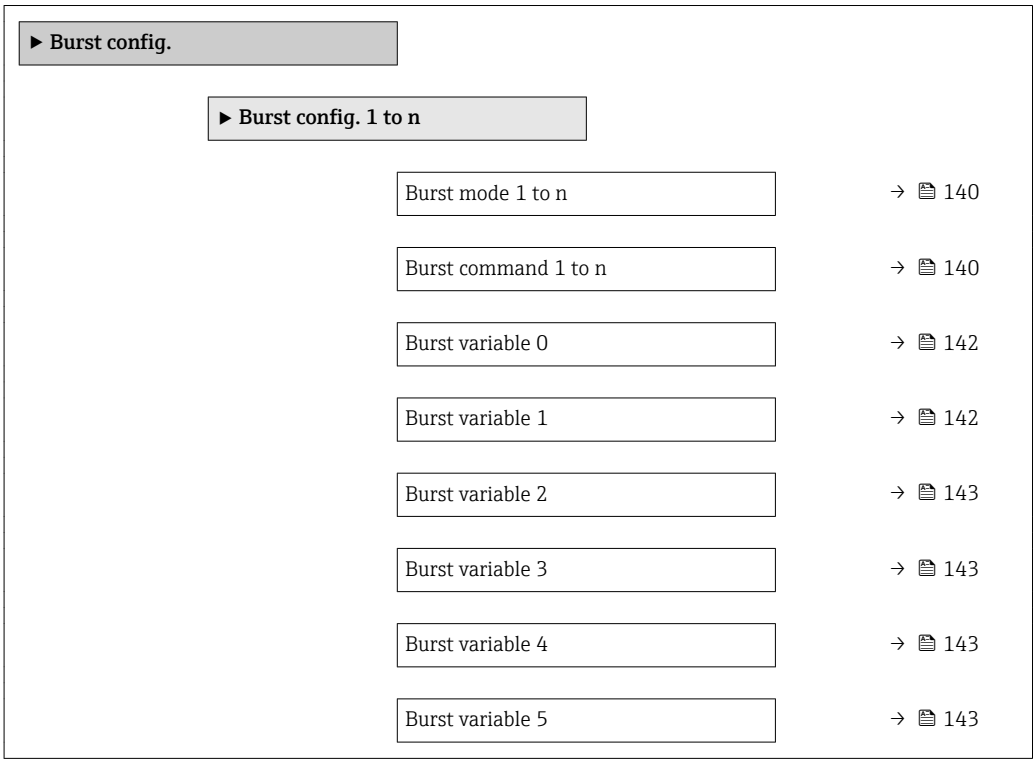
Factory setting 5

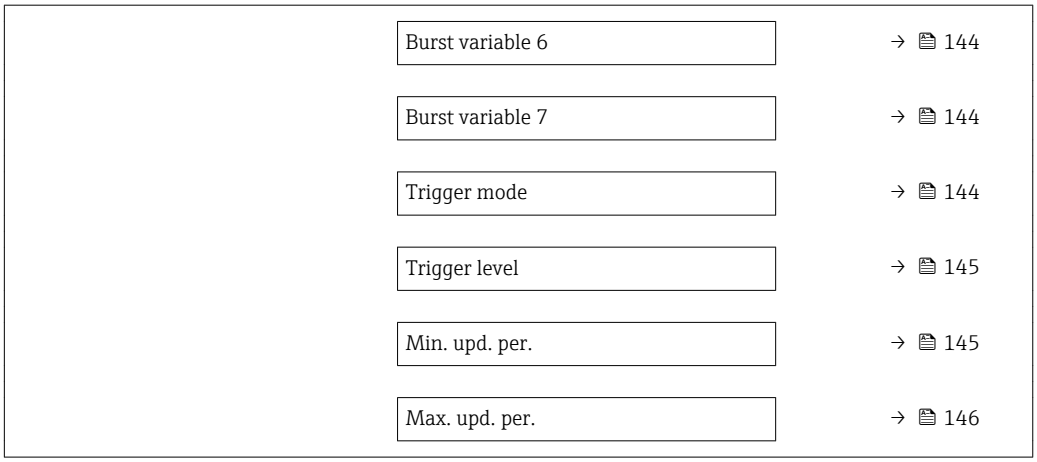
Additional information *User entry*

As every modem component can "swallow" a byte, 2-byte preambles at least must be defined.

"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

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

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
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Totalizer 1…3
- HBSI *
- Pressure
- HART input
- Percent of range
- Measur. curr.
- Primary var (PV)
- Second.var(SV)
- Tertiary var(TV)
- Quaterna.var(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 (→ 92).

* Visibility depends on order options or device settings

Burst variable 0

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 0

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

Selection
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Sensor integrity
- Pressure
- HART input
- Percent of range
- Measur. curr.
- Primary var (PV)
- Second.var(SV)
- Tertiary var(TV)
- Quaterna.var(QV)
- Not used

Factory setting Volume flow

Additional information *Selection*

The **Not used** option is set if a burst message is not configured.

Burst variable 1

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

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

Selection See the **Burst variable 0** parameter (→ 142).

Factory setting Not used

* Visibility depends on order options or device settings

Burst variable 2

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

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

Selection See the **Burst variable 0** parameter (→ 142).

Factory setting Not used

Burst variable 3

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

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

Selection See the **Burst variable 0** parameter (→ 142).

Factory setting Not used

Burst variable 4

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

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

Selection See the **Burst variable 0** parameter (→ 142).

Factory setting Not used

Burst variable 5

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

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

Selection See the **Burst variable 0** parameter (→ 142).

Factory setting Not used

Burst variable 6

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

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

Selection See the **Burst variable 0** parameter (→ 142).

Factory setting Not used

Burst variable 7

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

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

Selection See the **Burst variable 0** parameter (→ 142).

Factory setting Not used

Trigger mode

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger mode

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 *Options*

- Continuous
  The message is sent continuously, at least at intervals corresponding to the time frame specified in the **Burst min per** parameter (→ 🖹 145).
- Window
  The message is sent if the specified measured value has changed by the value in the **Trigger level** parameter (→ 🖹 145).
- Rising
  The message is sent if the specified measured value exceeds the value in the **Trigger level** parameter (→ 🖹 145).
- Falling
  The message is sent if the specified measured value drops below the value in the **Trigger level** parameter (→ 🖹 145).
- On change
  The message is sent if a measured value changes in the burst message.

Trigger level

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger level

Description For entering the burst trigger value.

User entry Positive floating-point number

Additional information *Description*

Together with the option selected in the **Trigger mode** parameter (→ 🖹 144) the burst trigger value determines the time of burst message X.

Min. upd. per.

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Min. upd. per.

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

User entry Positive integer

Factory setting 1 000 ms

Max. upd. per.

Navigation Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Max. upd. per.

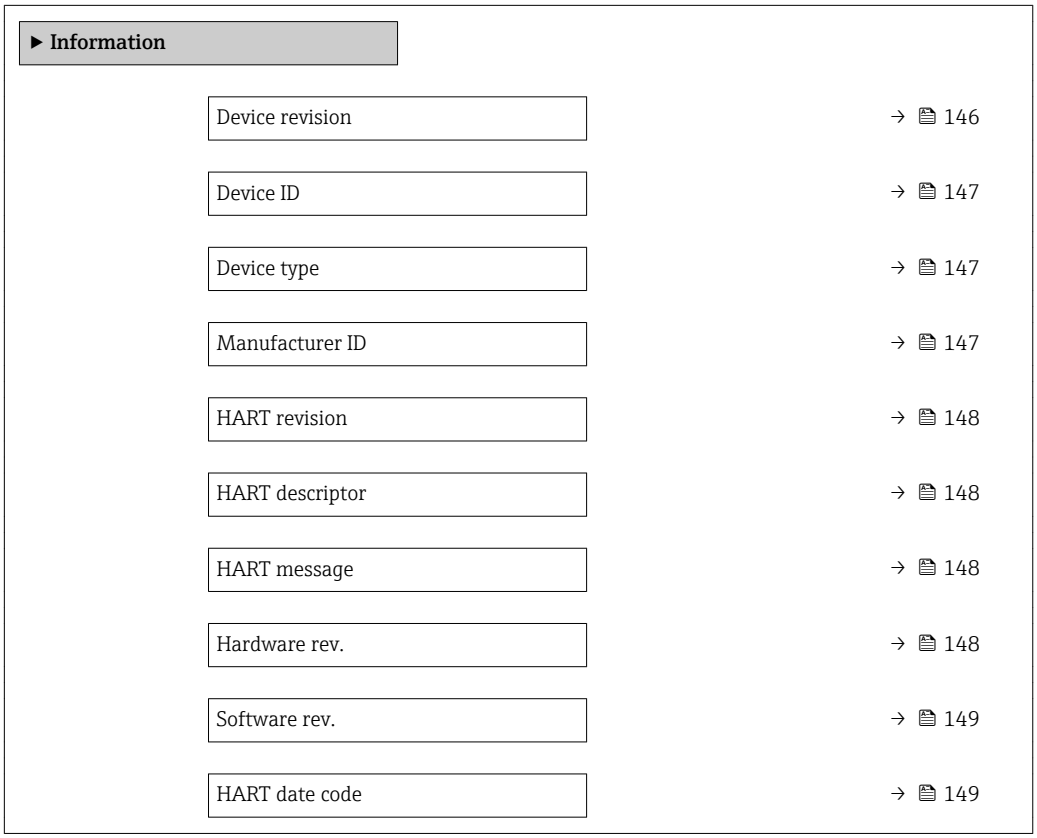
Description Use this function to enter the maximum time span between two burst commands of burst message X.

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

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

User interface 2-digit hexadecimal number

Factory setting 2

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

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

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 0x4A (for Promass 100)

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

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

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

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 Promass 100

HART message

Navigation Expert → Communication → HART output → Information → HART message

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 Promass 100

Hardware rev.

Navigation Expert → Communication → HART output → Information → Hardware rev.

Description Displays the hardware revision of the measuring device.

User interface 0 to 255

Factory setting 1

Software rev.

Navigation Expert → Communication → HART output → Information → Software rev.

Description Displays the software revision of the measuring device.

User interface 0 to 255

Factory setting 2

HART date code

Navigation Expert → Communication → HART output → Information → HART date code

Description Use this function to enter the date information for individual use.

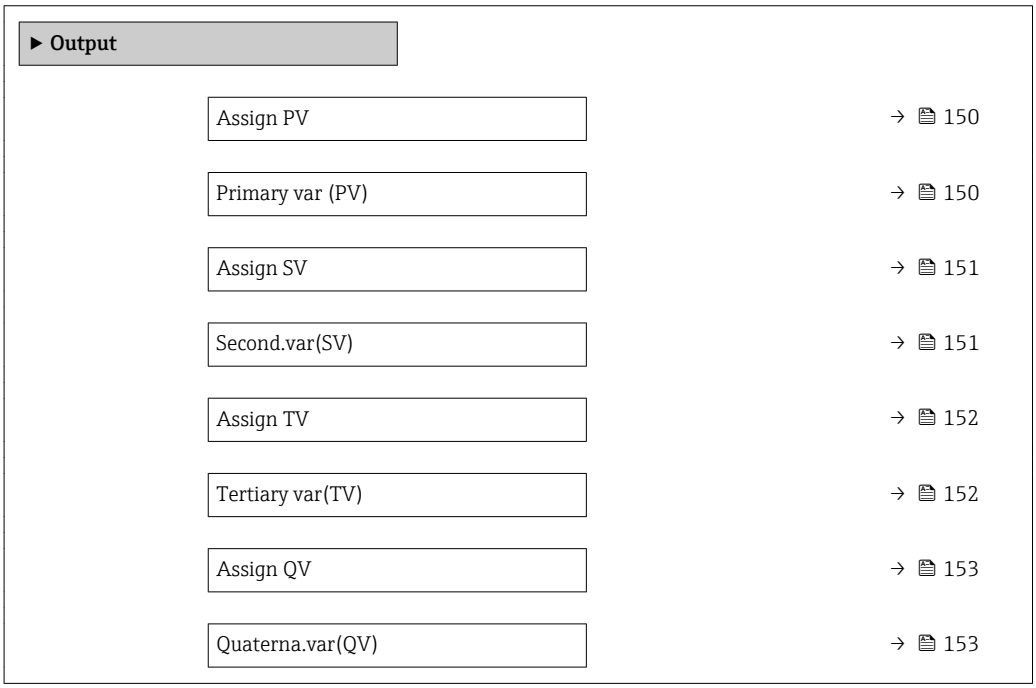
User entry Date entry format: yyyy-mm-dd

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

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

Selection
- Off
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Carr. pipe temp. *
- Electronic temp.
- Osc. freq. 0
- Osc. freq. 1 *
- Osc. ampl. 0 *
- Osc. ampl. 1 *
- Freq. fluct. 0
- Freq. fluct. 1 *
- Osc. damping 0
- Osc. damping 1 *
- Damping fluct 0
- Damping fluct 1 *
- Signal asymmetry
- Exc. current 0
- Exc. current 1 *
- Sensor integrity

Factory setting Mass flow

Additional information *Selection*

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

Primary var (PV)

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

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

* Visibility depends on order options or device settings

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 (→ 150).

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

Assign SV

Navigation Expert → Communication → HART output → Output → Assign SV

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

Selection
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Sensor integrity

Factory setting Totalizer 1

Second.var(SV)

Navigation Expert → Communication → HART output → Output → Second.var(SV)

Description Displays the current measured value of the secondary dynamic variable (SV).

User interface Signed floating-point number

* Visibility depends on order options or device settings

Additional information

User interface

The measured value displayed depends on the process variable selected in the **Assign SV** parameter (→ 151).

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

Assign TV

Navigation Expert → Communication → HART output → Output → Assign TV

Description Use this function to select a measured variable (HART device variable) for the tertiary (third) dynamic variable (TV).

Selection
- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Sensor integrity

Factory setting Density

Tertiary var(TV)

Navigation Expert → Communication → HART output → Output → Tertiary var(TV)

Description Displays the current measured value of the tertiary dynamic variable (TV).

User interface Positive floating-point number

* Visibility depends on order options or device settings

Additional information

User interface

The measured value displayed depends on the process variable selected in the **Assign TV** parameter (→ 152).

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

Assign QV

Navigation Expert → Communication → HART output → Output → Assign QV

Description Use this function to select a measured variable (HART device variable) for the quaternary (fourth) dynamic variable (QV).

Selection

- Mass flow
- Volume flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *
- Density
- Ref.density
- Concentration *
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Sensor integrity

Factory setting Temperature

Quaterna.var(QV)

Navigation Expert → Communication → HART output → Output → Quaterna.var(QV)

Description Displays the current measured value of the quaternary dynamic variable (QV).

User interface 0 to 99 999.9999 °C

* Visibility depends on order options or device settings

Additional information

User interface

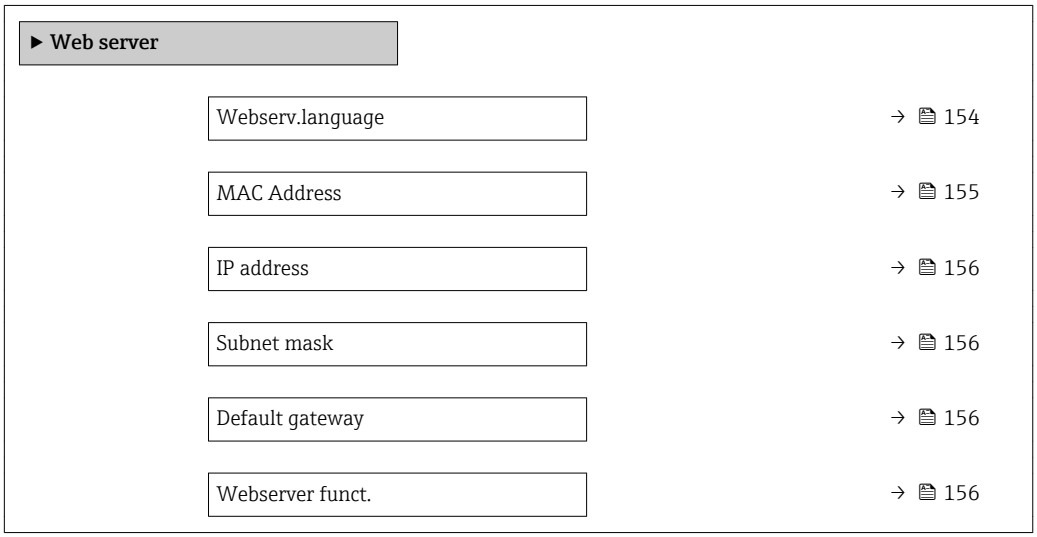
The measured value displayed depends on the process variable selected in the **Assign QV** parameter (→ 153).

Dependency

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

3.4.3 "Web server" submenu

Navigation Expert → Communication → Web server



Webserv.language

Navigation Expert → Communication → Web server → Webserv.language

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

Selection

- English
- Deutsch *
- Français *
- Español *
- Italiano *
- Nederlands *
- Portuguesa *
- Polski *
- русский язык(Ru) *
- Svenska *
- Türkçe *
- 中文 (Chinese) *

* Visibility depends on order options or device settings

- 日本語 (Japanese) *
- 한국어 (Korean) *
- العَرَبيّة (Ara) *
- Bahasa Indonesia *
- ภาษาไทย (Thai) *
- tiếng Việt (Vit) *
- čeština (Czech) *

Factory setting English

MAC Address

Navigation Expert → Communication → Web server → MAC Address

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

DHCP client

Navigation Expert → Communication → Configuration → DHCP client

Setup → Communication → DHCP client

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

Selection
- Off
- On

Factory setting Off

Additional information *Result*

If the DHCP client functionality of the Web server is activated, the IP address (→ 156), Subnet mask (→ 156) and Default gateway (→ 156) are set automatically.

Identification is via the MAC address of the measuring device.

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

IP address

Navigation Expert → Communication → Web server → IP address

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

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

Factory setting 192.168.1.212

Subnet mask

Navigation Expert → Communication → Web server → Subnet mask

Description Displays the subnet mask.

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

Factory setting 255.255.255.0

Default gateway

Navigation Expert → Communication → Web server → Default gateway

Description Displays the default gateway.

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

Factory setting 0.0.0.0

Webserver funct.

Navigation Expert → Communication → Web server → Webserver funct.

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

Selection
- Off
- On

Factory setting On

Additional information

Description

Once disabled, the Webserver funct. can only be re-enabled via the local display or the operating tool FieldCare.

Selection

Option	Description
Off	▪ The web server is completely disabled. ▪ Port 80 is locked.
On	▪ The complete functionality of the web server is available. ▪ JavaScript is used. ▪ The password is transferred in an encrypted state. ▪ Any change to the password is also transferred in an encrypted state.

3.4.4 "Diag. config." submenu

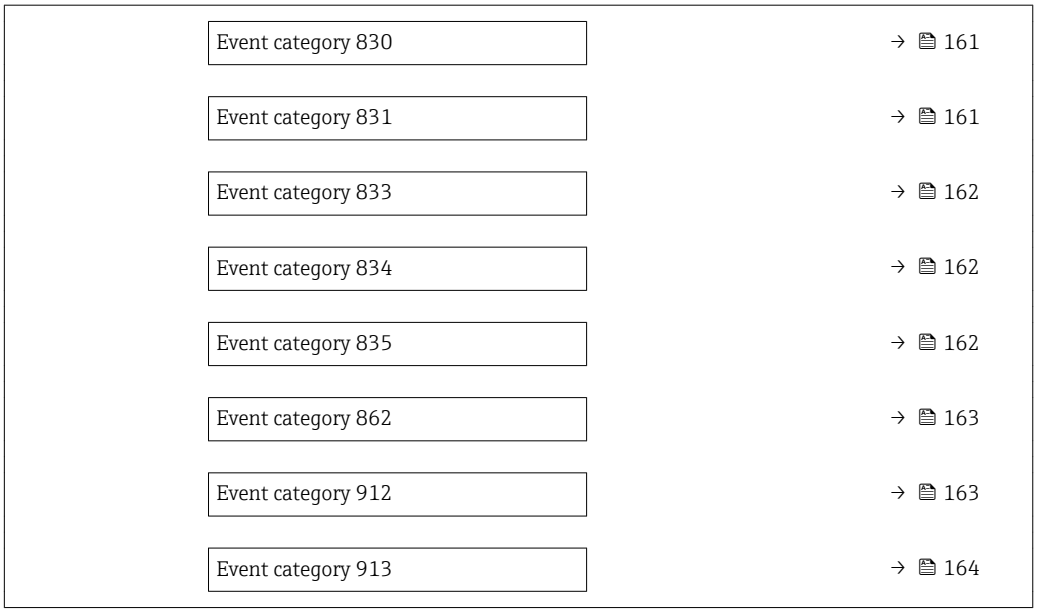
For a list of all the diagnostic events, see the Operating Instructions for the device

Assign a category to the particular diagnostic event:
- **Failure (F)** option
  A device error has occurred. The measured value is no longer valid.
- **Funct. check (C)** option
  The device is in service mode (e.g. during a simulation).
- **Out of spec. (S)** option
  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)
- **Mainten. req.(M)** option
  Maintenance is required. The measured value is still valid.
- **No effect (N)** option
  Has no effect on the condensed status.

Navigation Expert → Communication → Diag. config.

▶ **Diag. config.**

Event category 046	→ 158
Event category 140	→ 158
Event category 274	→ 159
Event category 441	→ 159
Event category 442	→ 159
Event category 443	→ 160
Event category 832	→ 160



Event category 046 (Sensor limit)

Navigation Expert → Communication → Diag. config. → Event category 046

Description Use this function to assign a category to the diagnostic message **046 Sensor limit**.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information For a detailed description of the event categories available for selection:

Event category 140 (Sensor sig.asym.)

Navigation Expert → Communication → Diag. config. → Event category 140

Description Use this function to assign a category to the diagnostic message **140 Sensor sig.asym.**.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information For a detailed description of the event categories available for selection:

Event category 274 (Main electronic)

Navigation Expert → Communication → Diag. config. → Event category 274

Description Use this function to assign a category to the diagnostic message **274 Main electronic**.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information For a detailed description of the event categories available for selection:

Event category 441 (Curr.output 1)

Navigation Expert → Communication → Diag. config. → Event category 441

Description Use this option to select a category for the diagnostic message **441 Curr.output 1**.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information For a detailed description of the event categories available for selection:

Event category 442 (Freq. output)

Navigation Expert → Communication → Diag. config. → Event category 442

Prerequisite The pulse/frequency/switch output is available.

Description Use this function to select the category assigned to diagnostic message **442 Freq. output**.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information *Selection*

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

Event category 443 (Pulse output)

Navigation Expert → Communication → Diag. config. → Event category 443

Prerequisite The pulse/frequency/switch output is available.

Description Use this function to select the category assigned to diagnostic message **443 Pulse output**.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information *Selection*

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

Event category 832 (Electronic temp.)

Navigation Expert → Communication → Diag. config. → Event category 832

Description Use this function to select a category for the diagnostic message **832 Electronic temp.**.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information *Selection*

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

Event category 830 (Sensor temp.)

Navigation Expert → Communication → Diag. config. → Event category 830

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

Description Use this function to assign a category to the diagnostic message **830 Sensor temp.**.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information For a detailed description of the event categories available for selection:

Event category 831 (Sensor temp.)

Navigation Expert → Communication → Diag. config. → Event category 831

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

Description Use this function to assign a category to the diagnostic message **831 Sensor temp.**.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information For a detailed description of the event categories available for selection:

Event category 833 (Electronic temp.)

Navigation Expert → Communication → Diag. config. → Event category 833

Description Use this option to select a category for the diagnostic message **833 Electronic temp.**.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information *Selection*

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

Event category 834 (Process temp.)

Navigation Expert → Communication → Diag. config. → Event category 834

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

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information *Selection*

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

Event category 835 (Process temp.)

Navigation Expert → Communication → Diag. config. → Event category 835

Description Use this option to select a category for the diagnostic message **835 Process temp.**.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information *Selection*

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

Event category 862 (Empty pipe)

Navigation Expert → Communication → Diag. config. → Event category 862

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

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information For a detailed description of the event categories available for selection:

Event category 912 (Medium inhomog.)

Navigation Expert → Communication → Diag. config. → Event category 912

Description Use this function to assign a category to the diagnostic message **912 Medium inhomog.**.

Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information For a detailed description of the event categories available for selection:

Event category 913 (Medium unsuitab.)

Navigation Expert → Communication → Diag. config. → Event category 913

Description Use this function to assign a category to the diagnostic message **913 Medium unsuitab.**.

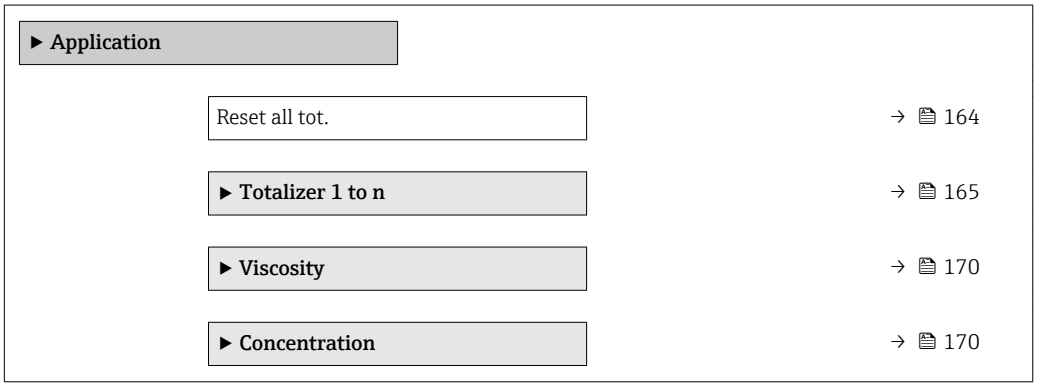
Selection
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(M)
- No effect (N)

Factory setting Out of spec. (S)

Additional information For a detailed description of the event categories available for selection:

3.5 "Application" submenu

Navigation Expert → Application



Reset all tot.

Navigation Expert → Application → Reset all tot.

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

Selection
- Cancel
- Reset + totalize

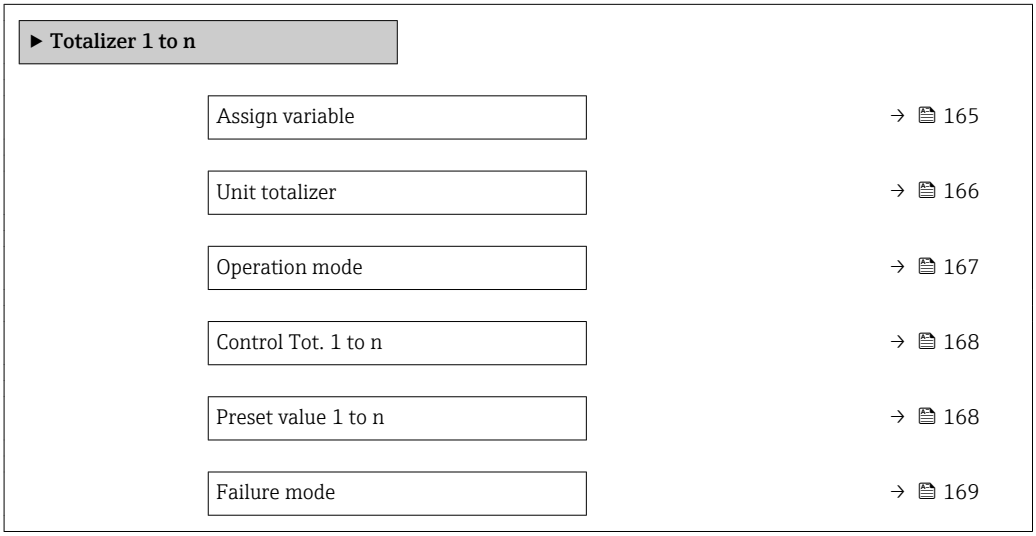
Factory setting Cancel

Additional information *Selection*

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

3.5.1 "Totalizer 1 to n" submenu

Navigation Expert → Application → Totalizer 1 to n



Assign variable

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

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

Selection
- Off
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

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 **Assign variable** parameter (→ 165) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

Unit totalizer

Navigation

Expert → Application → Totalizer 1 to n → Unit totalizer

Prerequisite

One of the following options is selected in the **Assign variable** parameter (→ 165) of the **Totalizer 1 to n** submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

Description

Use this function to select the process variable unit for the Totalizer 1 to n (→ 165).

Selection

SI units
- g
- kg
- t

US units
- oz
- lb
- STon

Custom-specific units
User mass

or

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

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

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

Custom-specific units
User vol.

or

* Visibility depends on order options or device settings

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

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

Imperial units
Sgal (imp)

Custom-specific units
UserCrVol.

Factory setting

Country-specific:
- 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 (→ 53).

Selection

The selection is dependent on the process variable selected in the **Assign variable** parameter (→ 165).

Operation mode

Navigation

Expert → Application → Totalizer 1 to n → Operation mode

Prerequisite

One of the following options is selected in the **Assign variable** parameter (→ 165) of the **Totalizer 1 to n** submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

Description

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

Selection

- Net flow total
- Forward total
- Reverse total

Factory setting

Net flow total

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 total
  Only the flow in the forward flow direction is totalized.
- Reverse total
  Only the flow in the reverse flow direction is totalized (= reverse flow quantity).

* Visibility depends on order options or device settings

Control Tot. 1 to n

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

Prerequisite One of the following options is selected in the **Assign variable** parameter (→ 165) of the **Totalizer 1 to n** submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

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

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

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	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	The totalizer is set to the defined start value from the **Preset value** parameter and the totaling process is restarted.

Preset value 1 to n

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

Prerequisite One of the following options is selected in the **Assign variable** parameter (→ 165) of the **Totalizer 1 to n** submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

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

User entry Signed floating-point number

* Visibility depends on order options or device settings

Factory setting

Country-specific:
- 0 kg
- 0 lb

Additional information

Entry

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 166).

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

Prerequisite

One of the following options is selected in the **Assign variable** parameter (→ 165) of the **Totalizer 1 to n** submenu:
- Volume flow
- Mass flow
- Correct.vol.flow
- Target mass flow *
- Carrier mass fl. *

Description

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

Selection

- Stop
- Actual value
- Last valid value

Factory setting

Stop

Additional information

Description

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

Selection

- Stop
  The totalizer is stopped in the event of a device alarm.
- Actual value
  The totalizer continues to count based on the actual 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.

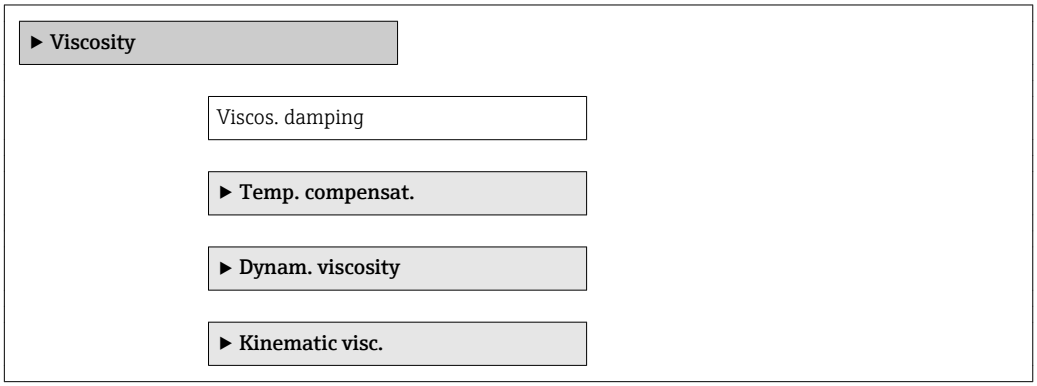
* Visibility depends on order options or device settings

3.5.2 "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

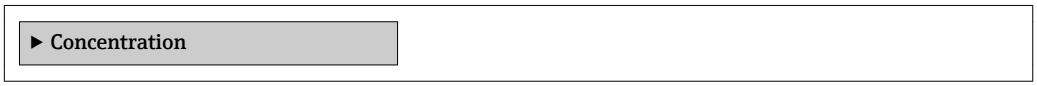
Navigation Expert → Application → Viscosity



3.5.3 "Concentration" submenu

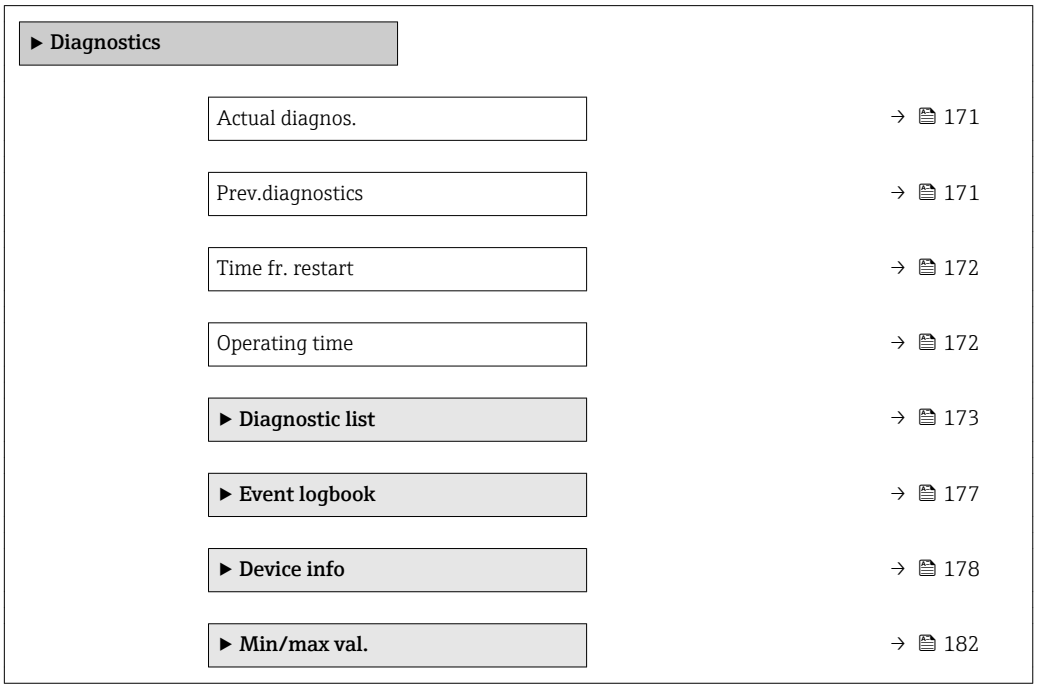
For detailed information on the parameter descriptions for the **Concentration** application package,refer to the Special Documentation for the device

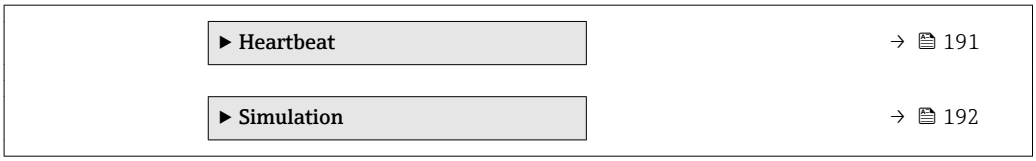
Navigation Expert → Application → Concentration



3.6 "Diagnostics" submenu

Navigation Expert → Diagnostics





Actual diagnos.

Navigation Expert → Diagnostics → Actual diagnos.

Prerequisite A diagnostic event has occurred.

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

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

Additional information *Display*

Additional pending diagnostic messages can be viewed in the **Diagnostic list** submenu (→ 173).

Example

For the display format:
⊗F271 Main electronic

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 diagnos.** parameter (→ 171).

Example

For the display format:
24d12h13m00s

Prev.diagnostics

Navigation Expert → Diagnostics → Prev.diagnostics

Prerequisite Two diagnostic events have already occurred.

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

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

Additional information *Example*

For the display format:
⊗F271 Main electronic

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 **Prev.diagnostics** parameter (→ 171).

Example

For the display format:
24d12h13m00s

Time fr. restart

Navigation Expert → Diagnostics → Time fr. restart

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

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

Operating time

Navigation Expert → Diagnostics → Operating time

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

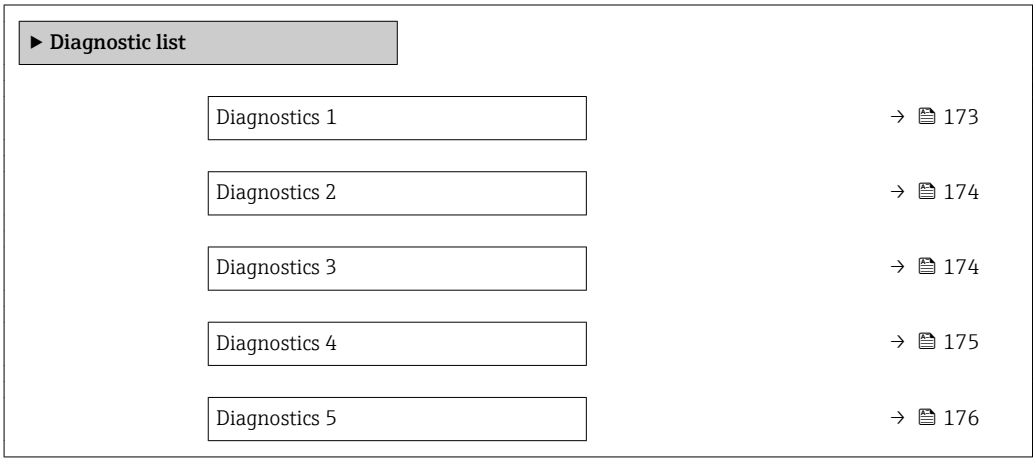
User interface Days (d), hours (h), minutes (m) and seconds (s)

Additional information *User interface*

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

3.6.1 "Diagnostic list" submenu

Navigation Expert → Diagnostics → Diagnostic list



Diagnostics 1

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 1

Description Displays the current diagnostics message with the highest priority.

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

Additional information *Examples*

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

Timestamp

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information

Display

The diagnostic message can be viewed via the **Diagnostics 1** parameter (→ 173).

Example

For the display format:
24d12h13m00s

Diagnostics 2

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 2

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

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

Additional information

Examples

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

Timestamp

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information

Display

The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 174).

Example

For the display format:
24d12h13m00s

Diagnostics 3

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 3

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

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

Additional information *Examples*

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

Timestamp

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 3** parameter (→ 174).

Example

For the display format:
24d12h13m00s

Diagnostics 4

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 4

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

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

Additional information *Examples*

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

Timestamp

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

The diagnostic message can be viewed via the **Diagnostics 4** parameter (→ 175).

Example

For the display format:
24d12h13m00s

Diagnostics 5

Navigation Expert → Diagnostics → Diagnostic list → Diagnostics 5

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

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

Additional information *Examples*

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

Timestamp

Navigation Expert → Diagnostics → Diagnostic list → Timestamp

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

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

Additional information *Display*

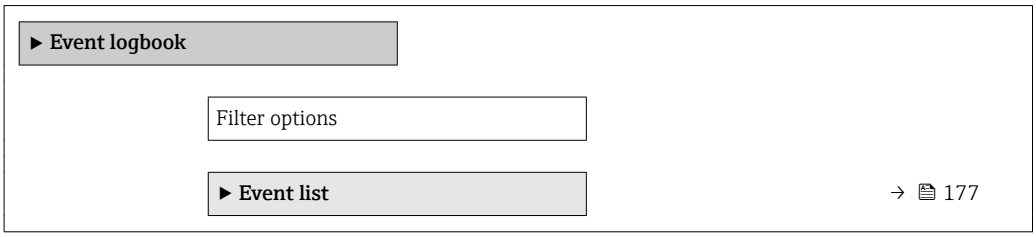
The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ 176).

Example

For the display format:
24d12h13m00s

3.6.2 "Event logbook" submenu

Navigation Expert → Diagnostics → Event logbook



Filter options

Navigation Expert → Diagnostics → Event logbook → Filter options

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

Selection
- All
- Failure (F)
- Funct. check (C)
- Out of spec. (S)
- Mainten. req.(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

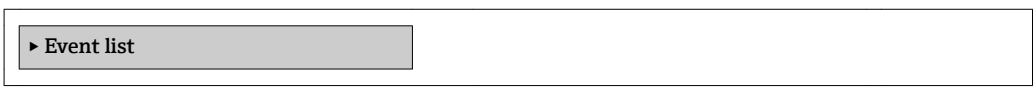
"Event list" submenu

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	→ 178

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.

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.

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
  ⊕ 01d04h12min30s

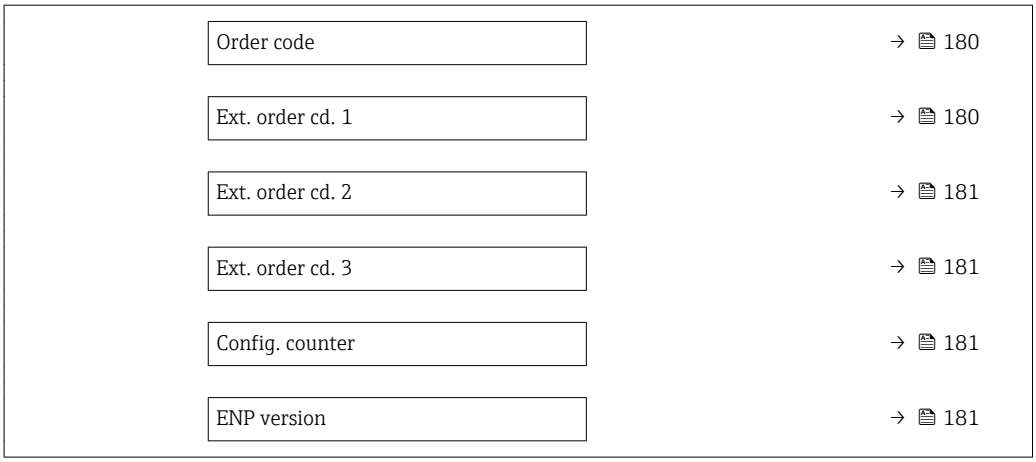
HistoROM

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

3.6.3 "Device info" submenu

Navigation Expert → Diagnostics → Device info

▶ **Device info**		
	Device tag	→ 179
	Serial number	→ 179
	Firmware version	→ 179
	Device name	→ 180



Device tag

Navigation Expert → Diagnostics → Device info → Device tag

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

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

Factory setting Promass 100

Serial number

Navigation Expert → Diagnostics → Device info → Serial number

Description Displays the serial number of the measuring device.

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

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

Additional information *Description*

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

Firmware version

Navigation Expert → Diagnostics → Device info → Firmware version

Description Displays the device firmware version installed.

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

Additional information *Display*

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

Device name

Navigation Expert → Diagnostics → Device info → Device name

Description Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.

User interface Max. 32 characters such as letters or numbers.

Factory setting Promass 100

Order code

Navigation Expert → Diagnostics → Device info → Order code

Description Displays the device order code.

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

Additional information *Description*

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

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

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

Ext. order cd. 1

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

Description Displays the first part of the extended order code.

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

User interface Character string

Additional information *Description*

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

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

Ext. order cd. 2

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

Description Displays the second part of the extended order code.

User interface Character string

Additional information For additional information, see **Ext. order cd. 1** parameter (→ 180)

Ext. order cd. 3

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

Description Displays the third part of the extended order code.

User interface Character string

Additional information For additional information, see **Ext. order cd. 1** parameter (→ 180)

Config. counter

Navigation Expert → Diagnostics → Device info → Config. counter

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

User interface 0 to 65 535

ENP version

Navigation Expert → Diagnostics → Device info → ENP version

Description Displays the version of the electronic nameplate.

User interface Character string

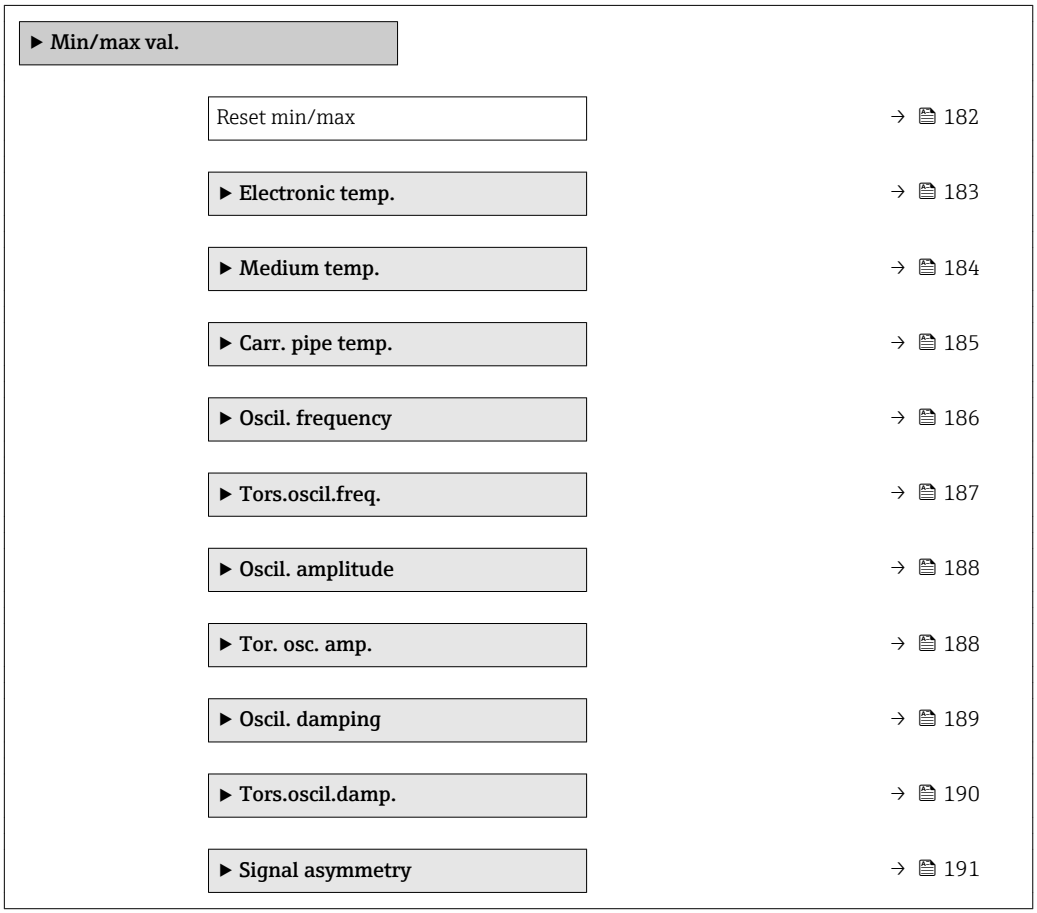
Factory setting 2.02.00

Additional information *Description*

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

3.6.4 "Min/max val." submenu

Navigation Expert → Diagnostics → Min/max val.



Reset min/max

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

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

Selection
- Cancel
- Oscil. amplitude
- Osc. ampl. 1 *
- Oscil. damping
- Tors.oscil.damp. *
- Oscil. frequency
- Tors.oscil.freq. *
- Signal asymmetry

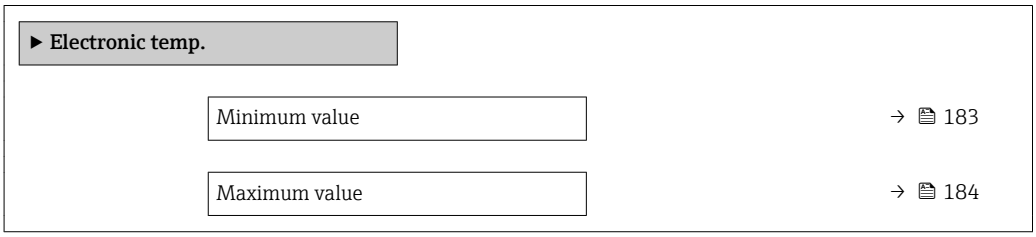
Factory setting
Cancel

Additional information
Selection

Detailed description of the options **Oscil. frequency, Oscil. amplitude, Oscil. damping** and **Signal asymmetry**: **Value 1 display** parameter (→ 17)

"Electronic temp." submenu

Navigation Expert → Diagnostics → Min/max val. → Electronic temp.



Minimum value

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

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

User interface
Signed floating-point number

Additional information
Dependency

The unit is taken from the **Temperature unit** parameter (→ 60)

* Visibility depends on order options or device settings

Maximum value

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

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

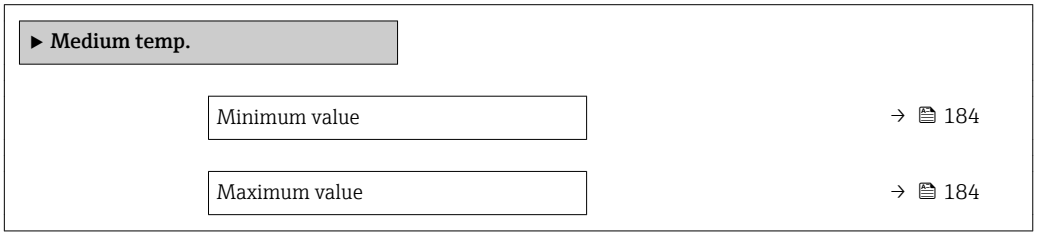
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 60)

"Medium temp." submenu

Navigation Expert → Diagnostics → Min/max val. → Medium temp.



Minimum value

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

Description Displays the lowest previously measured medium temperature value.

User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 60)

Maximum value

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

Description Displays the highest previously measured medium temperature value.

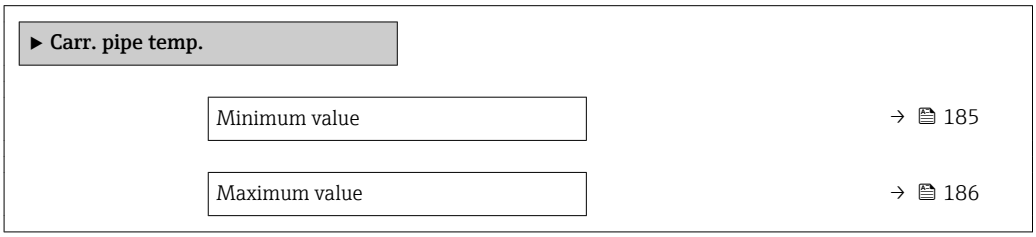
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 60)

"Carr. pipe temp." submenu

Navigation Expert → Diagnostics → Min/max val. → Carr. pipe temp.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Carr. pipe temp. → Minimum value

Prerequisite

Only available for:
- Promass A
- Promass F
- PromassG
- 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 (→ 60)

Maximum value

Navigation Expert → Diagnostics → Min/max val. → Carr. pipe temp. → Maximum value

Prerequisite

Only available for:
- Promass A
- Promass F
- PromassG
- 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.

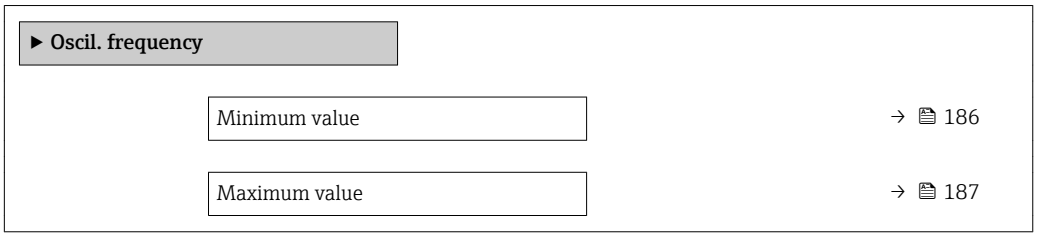
User interface Signed floating-point number

Additional information *Dependency*

The unit is taken from the **Temperature unit** parameter (→ 60)

"Oscil. frequency" submenu

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



Minimum value

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

Description Displays the lowest previously measured oscillation frequency.

User interface Signed floating-point number

Maximum value

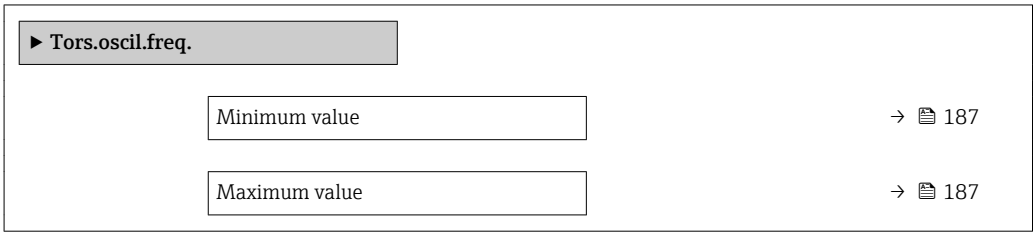
Navigation Expert → Diagnostics → Min/max val. → Oscil. frequency → Maximum value

Description Displays the highest previously measured oscillation frequency.

User interface Signed floating-point number

"Tors.oscil.freq." submenu

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.freq.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.freq. → Minimum value

Prerequisite Only available for Promass I.

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

Prerequisite Only available for Promass I.

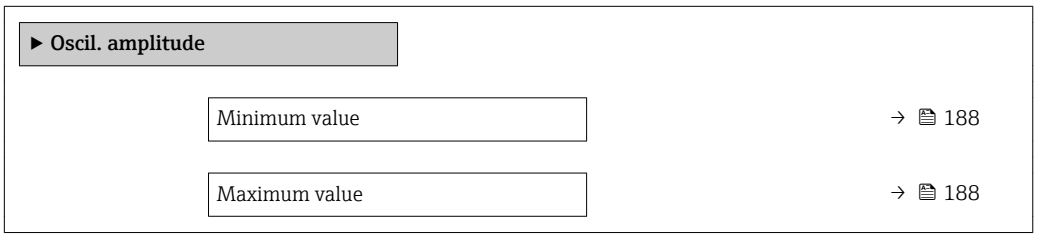
For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the highest previously measured torsion oscillation frequency.

User interface Signed floating-point number

"Oscil. amplitude" submenu

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



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Oscil. amplitude → Minimum value

Description Displays the lowest previously measured oscillation amplitude.

User interface Signed floating-point number

Maximum value

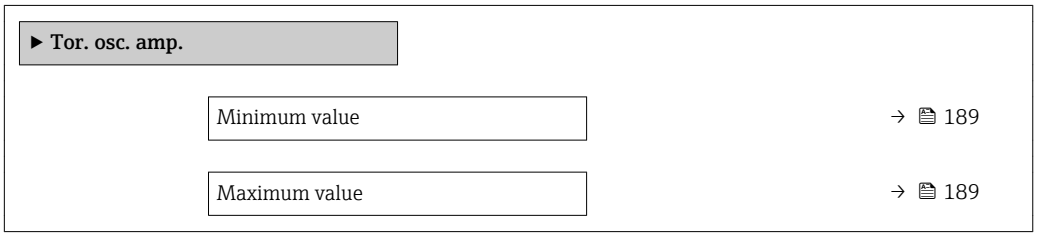
Navigation Expert → Diagnostics → Min/max val. → Oscil. amplitude → Maximum value

Description Displays the highest previously measured oscillation amplitude.

User interface Signed floating-point number

"Tor. osc. amp." submenu

Navigation Expert → Diagnostics → Min/max val. → Tor. osc. amp.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Tor. osc. amp. → Minimum value

Prerequisite Only available for Promass I.

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

Prerequisite Only available for Promass I.

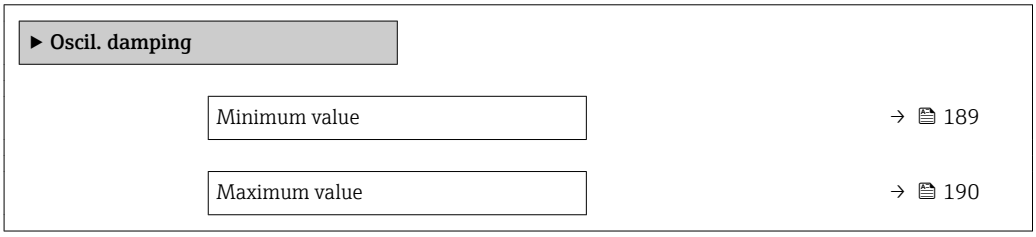
For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

Description Displays the highest previously measured torsion oscillation amplitude.

User interface Signed floating-point number

"Oscil. damping" submenu

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



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Oscil. damping → Minimum value

Description Displays the lowest previously measured oscillation damping.

User interface Signed floating-point number

Maximum value

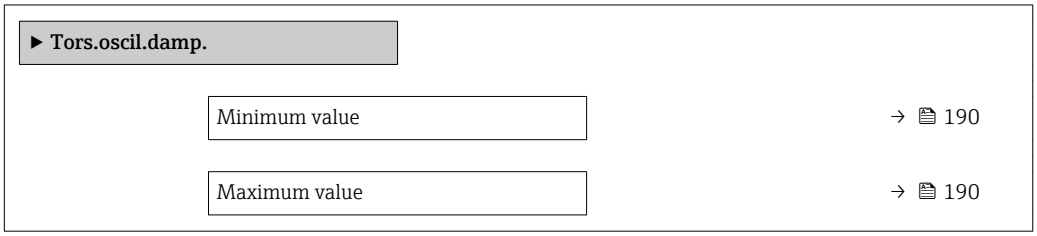
Navigation Expert → Diagnostics → Min/max val. → Oscil. damping → Maximum value

Description Displays the highest previously measured oscillation damping.

User interface Signed floating-point number

"Tors.oscil.damp." submenu

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.damp.



Minimum value

Navigation Expert → Diagnostics → Min/max val. → Tors.oscil.damp. → Minimum value

Prerequisite Only available for Promass I.

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

Prerequisite Only available for Promass I.

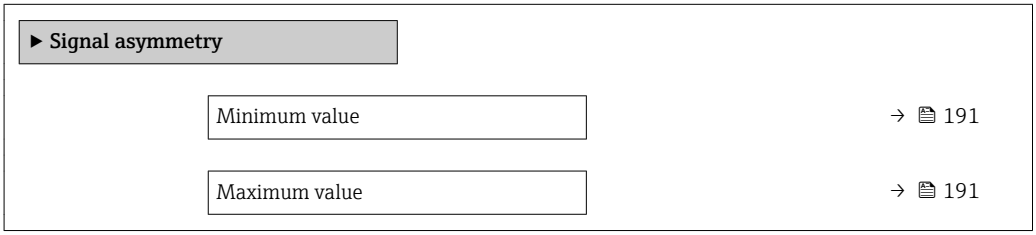
For the following order code:
"Application package", option **EB** "Heartbeat Verification + Monitoring"

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

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

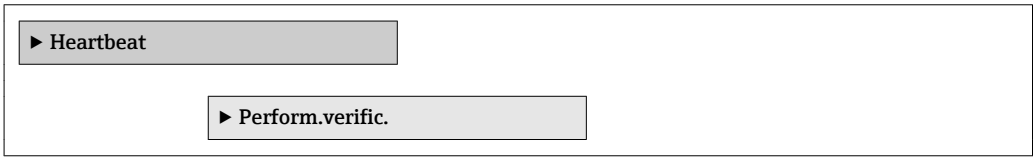
Description Displays the highest previously measured signal asymmetry.

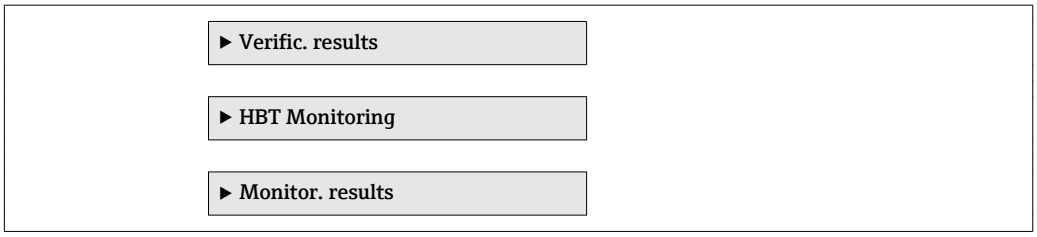
User interface Signed floating-point number

3.6.5 "Heartbeat" submenu

For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring**application package, refer to the Special Documentation for the device

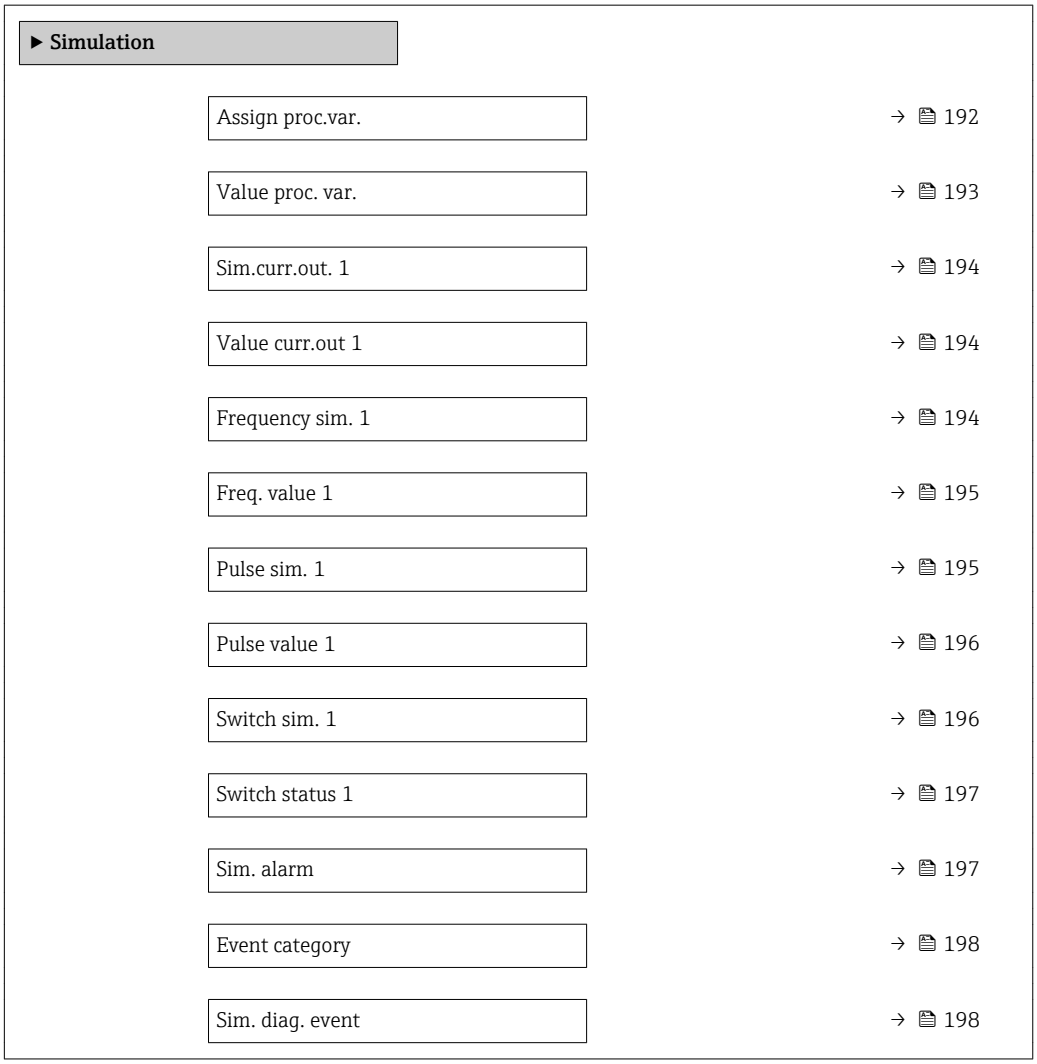
Navigation Expert → Diagnostics → Heartbeat





3.6.6 "Simulation" submenu

Navigation Expert → Diagnostics → Simulation



Assign proc.var.

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

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

Selection
- Off
- Mass flow
- Volume flow
- Correct.vol.flow
- Density
- Ref.density
- Temperature
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Concentration *
- Target mass flow *
- Carrier mass fl. *

Factory setting
Off

Additional information
Description

The simulation value of the process variable selected is defined in the **Value proc. var.** parameter (→ 193).

Value proc. var.

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

Prerequisite
One of the following options is selected in the **Assign proc.var.** parameter (→ 192):
- Mass flow
- Volume flow
- Correct.vol.flow
- Density
- Ref.density
- Temperature
- Dynam. viscosity *
- Kinematic visc. *
- TempCompDynVisc *
- TempCompKinVisc *
- Concentration *
- Target mass flow *
- Carrier mass fl. *

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
Entry

The unit of the displayed measured value is taken from the **System units** submenu (→ 53).

* Visibility depends on order options or device settings

Sim.curr.out. 1

Navigation Expert → Diagnostics → Simulation → Sim.curr.out. 1

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 specified in the **Value curr.out 1** parameter (→ 194).

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 curr.out 1

Navigation Expert → Diagnostics → Simulation → Value curr.out 1

Prerequisite In the **Sim.curr.out. 1** 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 0 to 22.5 mA

Frequency sim. 1

Navigation Expert → Diagnostics → Simulation → Frequency sim. 1

Prerequisite In the **Operating mode** parameter (→ 108), 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 **Freq. value** parameter (→ 195).

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.

Freq. value 1

Navigation Expert → Diagnostics → Simulation → Freq. value 1

Prerequisite In the **Frequency sim.** parameter (→ 194), 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 sim. 1

Navigation Expert → Diagnostics → Simulation → Pulse sim. 1

Prerequisite In the **Operating mode** parameter (→ 108), 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-count. val.

Factory setting Off

Additional information

Description

The desired simulation value is defined in the **Pulse value** parameter (→ 196).

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 (→ 111).
- Down-count. val.
  The pulses specified in the **Pulse value** parameter (→ 196) are output.

Pulse value 1

Navigation Expert → Diagnostics → Simulation → Pulse value 1

Prerequisite In the **Pulse sim.** parameter (→ 195), the **Down-count. val.** 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 sim. 1

Navigation Expert → Diagnostics → Simulation → Switch sim. 1

Prerequisite In the **Operating mode** parameter (→ 108), 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 status** parameter (→ 197).

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 status 1

Navigation Expert → Diagnostics → Simulation → Switch status 1

Prerequisite In the **Switch sim.** parameter (→ 196) **Switch sim. 1 to n** parameter **Switch sim. 1 to n** parameter, the **On** option is selected.

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.

Sim. alarm

Navigation Expert → Diagnostics → Simulation → Sim. alarm

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

Selection

- Off
- On

Factory setting Off

Additional information *Description*

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

Event category

Navigation Expert → Diagnostics → Simulation → Event category

Description Use this function to select the category of the diagnostic events that are displayed for the simulation in the **Sim. diag. event** parameter (→ 198).

Selection
- Sensor
- Electronics
- Configuration
- Process

Factory setting Process

Sim. diag. event

Navigation Expert → Diagnostics → Simulation → Sim. diag. event

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 **Event category** parameter (→ 198).

4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

Mass	kg
Mass flow	kg/h
Volume	l
Volume flow	l/h
Corrected volume	Nl
Corrected volume flow	Nl/h
Density	kg/l
Reference density	kg/Nl
Temperature	°C
Pressure	bar a

4.1.2 Full scale values

The factory settings applie to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

Nominal diameter [mm]	[kg/h]
1	4
2	20
4	90
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
250	360 t/h
350	650 t/h

4.1.3 Output current span

Current output 1	4 to 20 mA NAMUR

4.1.4 Pulse value

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
250	100
350	100

4.1.5 On value 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
15 FB	72
25	72
25 FB	180
40	180
40 FB	300
50	300
50 FB	720
80	720
100	1200

Nominal diameter [mm]	On-value for liquid [kg/h]
150	2.6 t/h
250	7.2 t/h
350	13 t/h

Nominal diameter [mm]	Switch-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
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

Mass	lb
Mass flow	lb/min
Volume	gal (us)
Volume flow	gal/min (us)
Corrected volume	Sft³
Corrected volume flow	Sft³/min
Density	lb/ft³
Reference density	lb/Sft³
Temperature	°F
Pressure	psi a

4.2.2 Full scale values

The factory settings applie to the following parameters:
- 20 mA value (full scale value of the current output)
- 100% bar graph value 1

Nominal diameter [in]	[lb/min]
1/24	0.15
1/12	0.75
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
10	13000
14	23500

4.2.3 Output current span

Current output 1	4 to 20 mA US

4.2.4 Pulse value

Nominal diameter [in]	[lb/p]
1/24	0.002
1/12	0.02
1/8	0.02
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

Nominal diameter [in]	[lb/p]
4	20
6	200
10	200
14	200

4.2.5 On value 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
10	260
14	470

Nominal diameter [in]	Switch-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

Nominal diameter [in]	Switch-on value for gas [lb/min]
3	6.5
4	11
6	23.75
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
Ref.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
Correct.vol.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
Ref.density	lb/Sft³	Weight unit/standard volume unit
Corrected volume	Sft³, Sgal (us), Sbbl (us;liq.)	Standard cubic foot, standard gallon, standard barrel
Correct.vol.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
Correct.vol.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)

Index

E

F

H

I

K

L

M

www.addresses.endress.com

Endress+Hauser

People for Process Automation