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71577056
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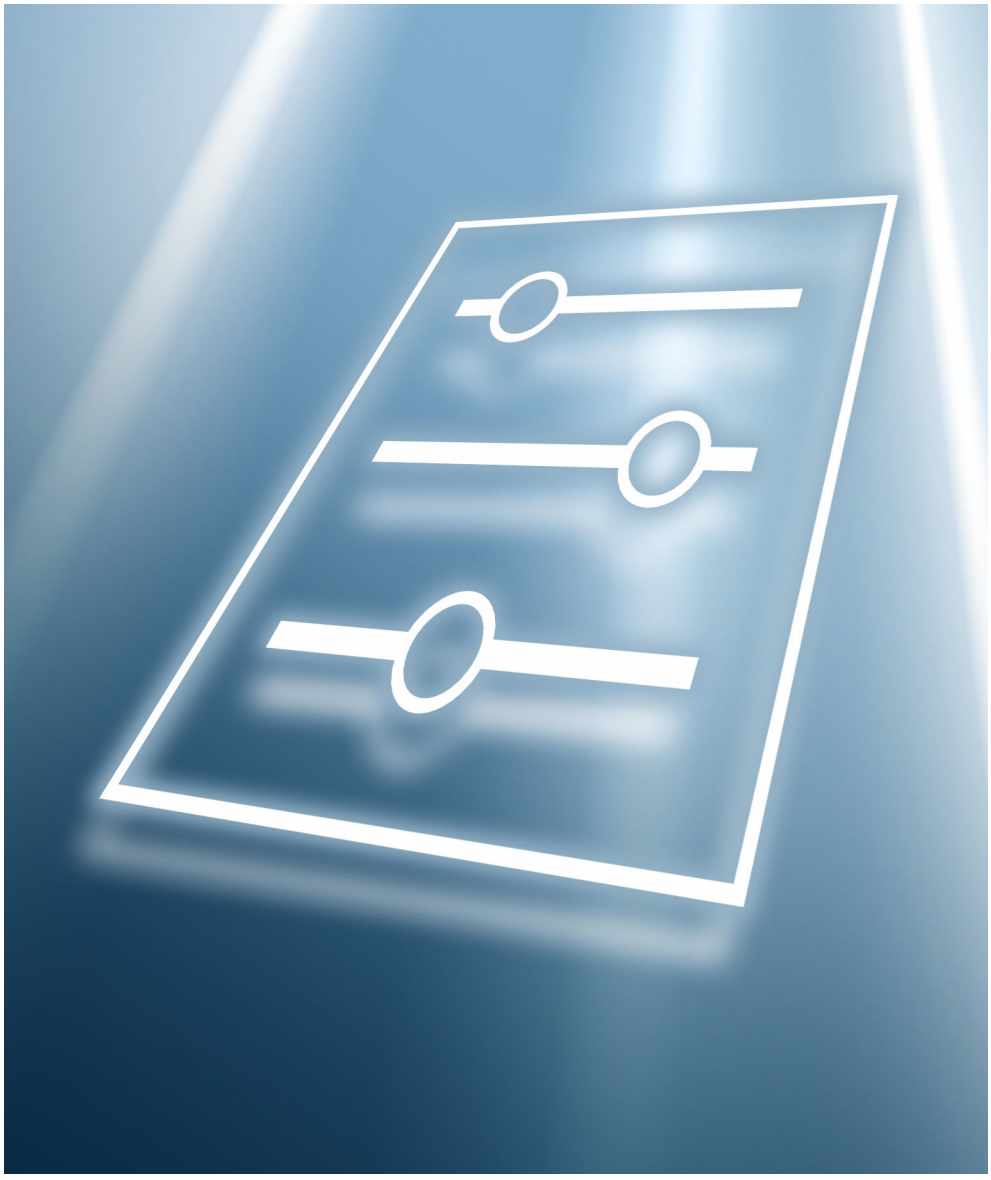
Valid as of version
01.06.zz (Device firmware)



# Description of Device Parameters
# **Proline Promag 500**

Electromagnetic flowmeter
HART



Endress+Hauser
People for Process Automation

# Table of contents

# 1 About this document

## 1.1 Document function

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

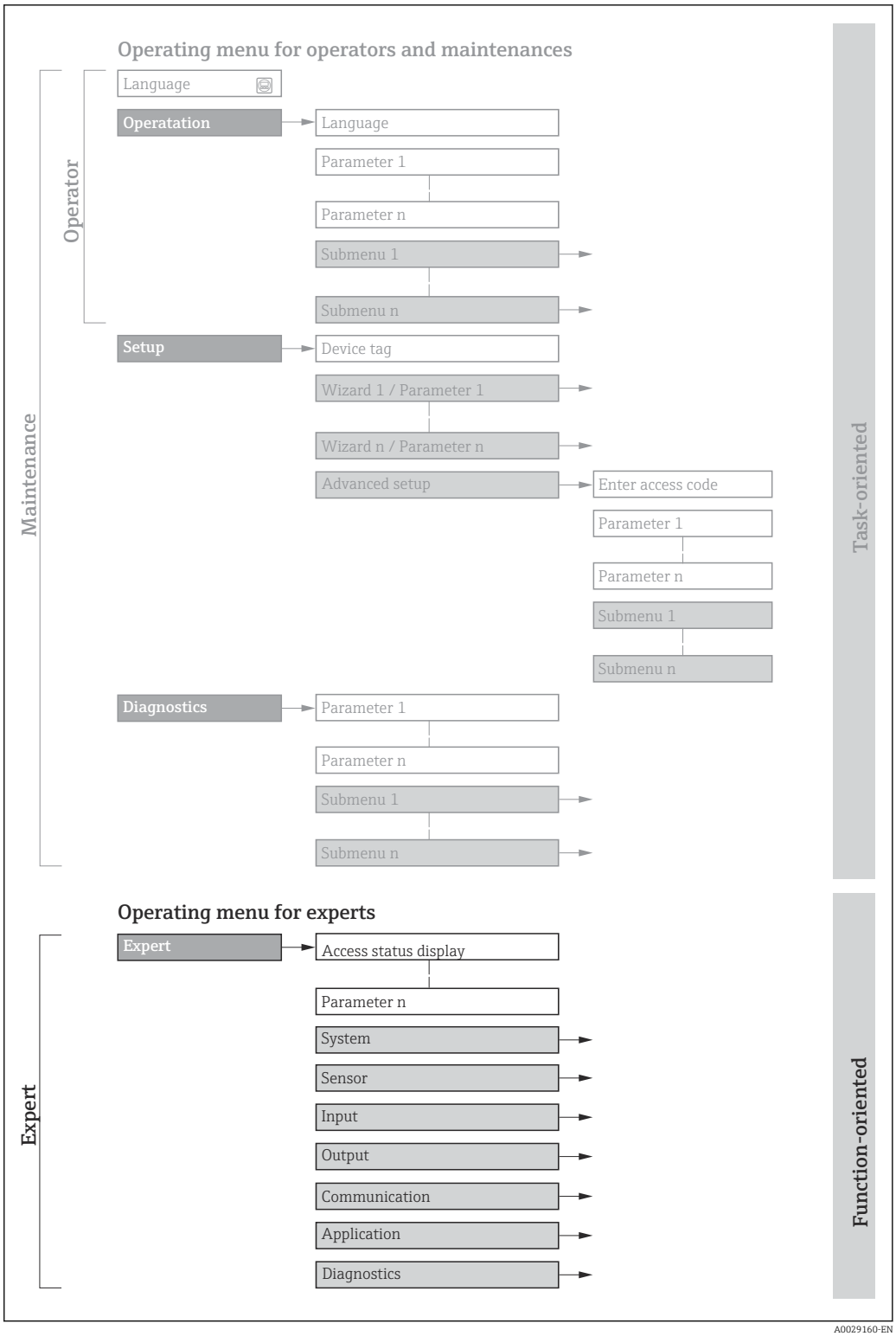
## 1.2 Target group

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

## 1.3 Using this document

### 1.3.1 Information on the document structure

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




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

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

### 1.3.2 Structure of a parameter description

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

| **Complete parameter name** | Write-protected parameter = |
|---|---|

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

**Prerequisite**
The parameter is only available under these specific conditions

**Description**
Description of the parameter function

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

**User entry**
Parameter entry range

**User interface**
Display value/data of the parameter

**Factory setting**
Default setting ex works

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

## 1.4 Symbols used

### 1.4.1 Symbols for certain types of information

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

### 1.4.2 Symbols in graphics

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

## 1.5 Documentation

### 1.5.1 Standard documentation

#### Operating Instructions

| Measuring device | Documentation code |
|---|---|
| Promag H 500 | BA01398D |
| Promag P 500 | BA01399D |
| Promag W 500 | BA01400D |

### 1.5.2 Supplementary device-dependent documentation

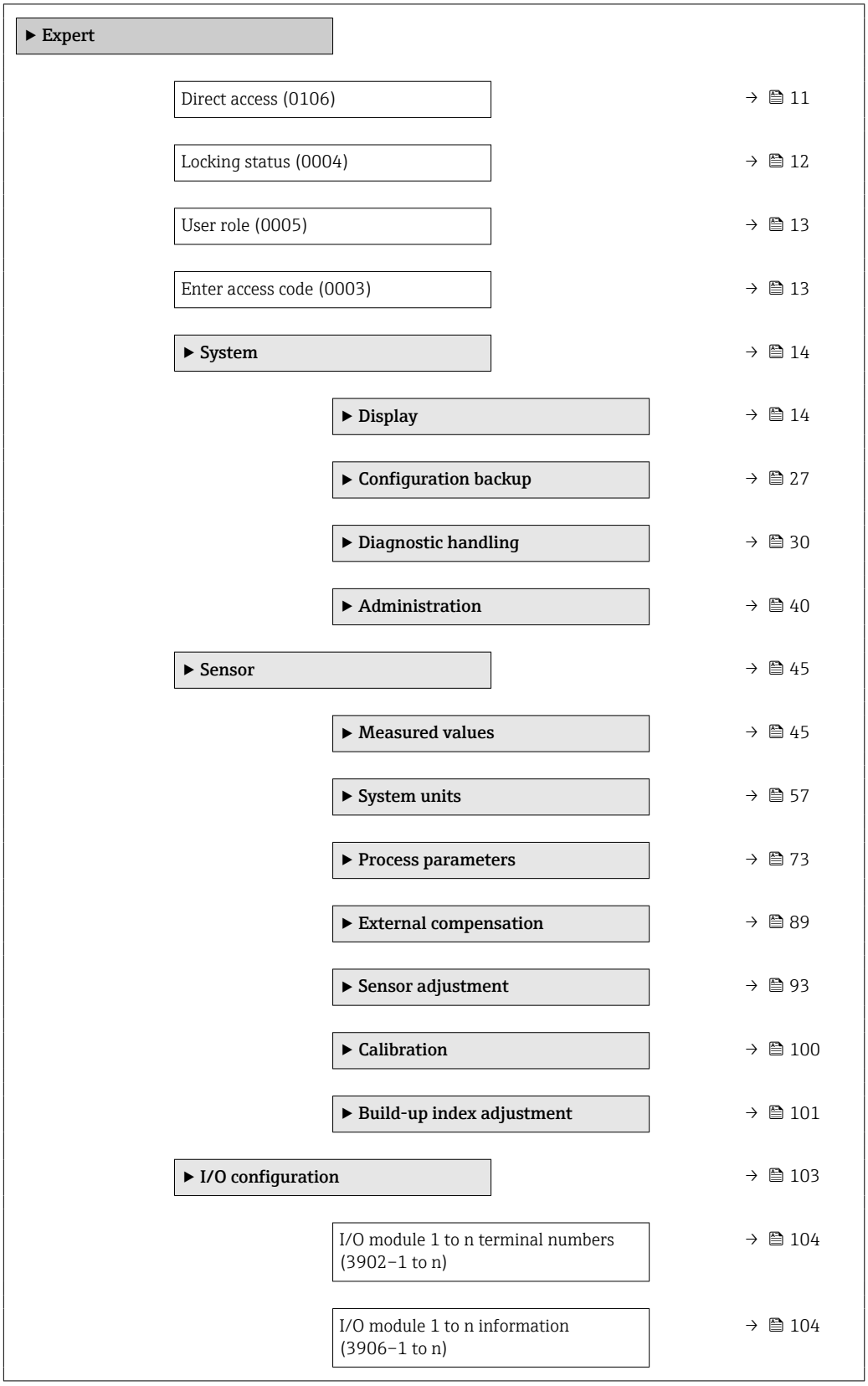
#### Special Documentation

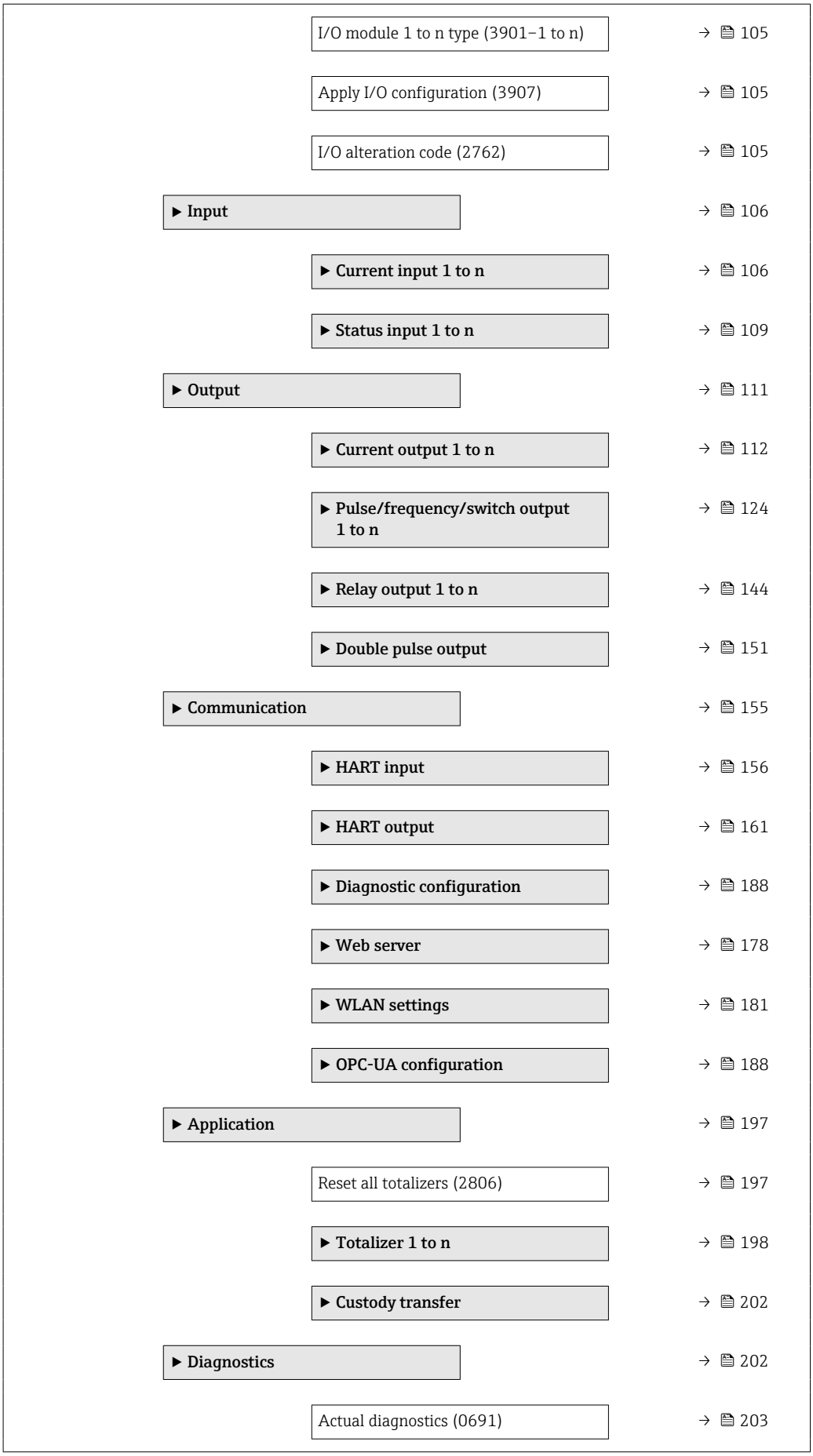
| Contents | Documentation code |
|---|---|
| Information on the Pressure Equipment Directive | SD01614D |
| Radio approvals for WLAN interface for A309/A310 display module | SD01793D |
| Web server | SD01658D |
| OPC-UA server | SD02044D |

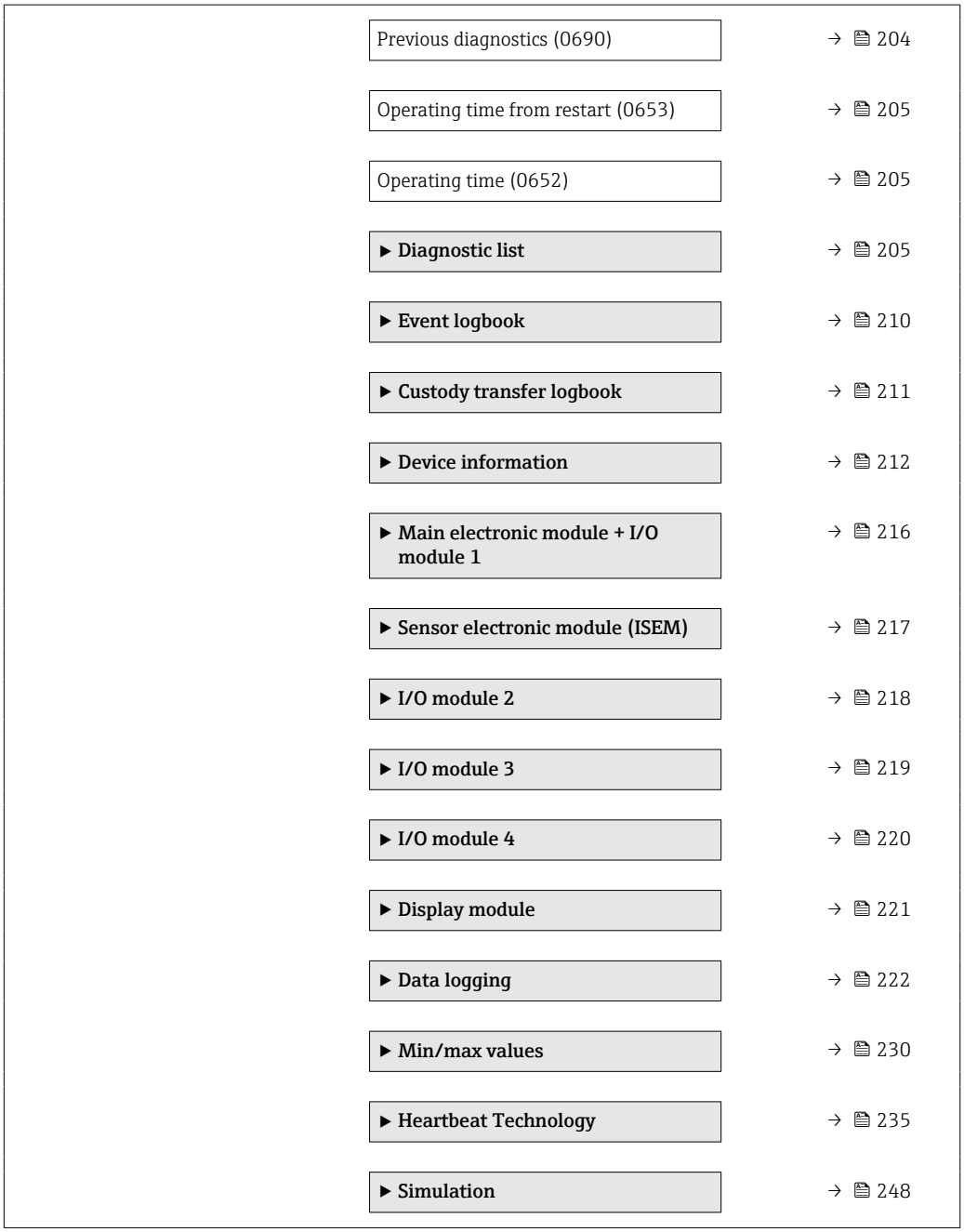
| Contents | Documentation code |
|---|---|
| Heartbeat Technology | SD01641D |
| Web server | SD01658D |

# 2 Overview of the Expert operating menu

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

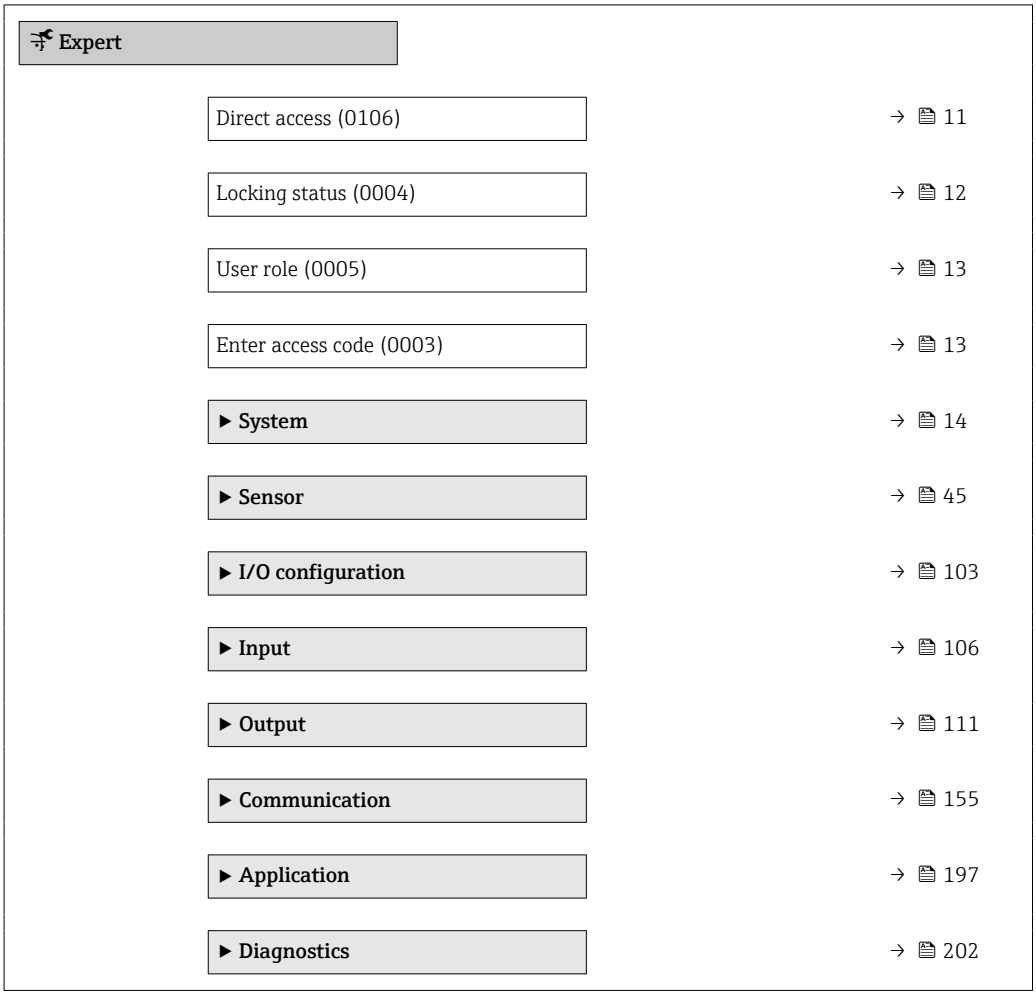



I/O module 1 to n type (3901–1 to n) → 105
Apply I/O configuration (3907) → 105
I/O alteration code (2762) → 105
▶ Input → 106
▶ Current input 1 to n → 106
▶ Status input 1 to n → 109
▶ Output → 111
▶ Current output 1 to n → 112
▶ Pulse/frequency/switch output 1 to n → 124
▶ Relay output 1 to n → 144
▶ Double pulse output → 151
▶ Communication → 155
▶ HART input → 156
▶ HART output → 161
▶ Diagnostic configuration → 188
▶ Web server → 178
▶ WLAN settings → 181
▶ OPC-UA configuration → 188
▶ Application → 197
Reset all totalizers (2806) → 197
▶ Totalizer 1 to n → 198
▶ Custody transfer → 202
▶ Diagnostics → 202
Actual diagnostics (0691) → 203


Previous diagnostics (0690)
→ 204
Operating time from restart (0653)
→ 205
Operating time (0652)
→ 205
▶ Diagnostic list
→ 205
▶ Event logbook
→ 210
▶ Custody transfer logbook
→ 211
▶ Device information
→ 212
▶ Main electronic module + I/O module 1
→ 216
▶ Sensor electronic module (ISEM)
→ 217
▶ I/O module 2
→ 218
▶ I/O module 3
→ 219
▶ I/O module 4
→ 220
▶ Display module
→ 221
▶ Data logging
→ 222
▶ Min/max values
→ 230
▶ Heartbeat Technology
→ 235
▶ Simulation
→ 248

# 3 Description of device parameters

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




## Direct access

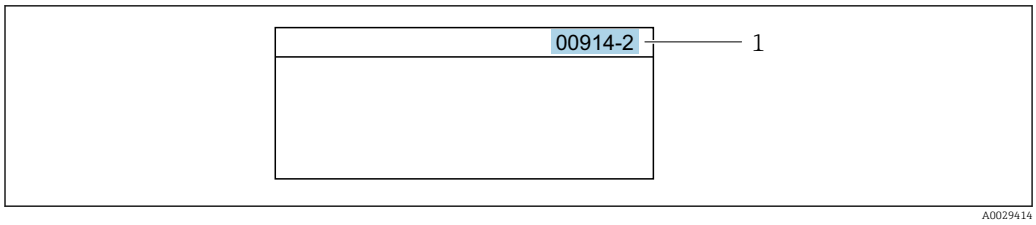
**Navigation** Expert → Direct access (0106)

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

**User entry** 0 to 65 535

**Additional information** *User entry*

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




*1 Direct access code*

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

## Locking status

**Navigation** Expert → Locking status (0004)

**Description** Displays the active write protection.

**User interface**
- Hardware locked
- SIL locked
- CT active - defined parameters
- CT active - all parameters
- Temporarily locked

**Additional information**

*User interface*

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

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

*Selection*

| Options | Description |
|---|---|
| None | The access authorization displayed in the **Access status** parameter (→ 13) applies . Only appears on local display. |
| Hardware locked (priority 1) | The DIP switch for hardware locking is activated on the PCB board. This locks write access to the parameters (e.g. via local display or operating tool) . |
| SIL locked (priority 2) | The SIL mode is enabled. This locks write access to the parameters (e.g. via local display or operating tool). |

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

## User role

**Navigation** Expert → User role (0005)

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

**User interface**
- Maintenance
- Service

**Factory setting** Maintenance

**Additional information**

*Description*

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

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

*User interface*

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

## Enter access code

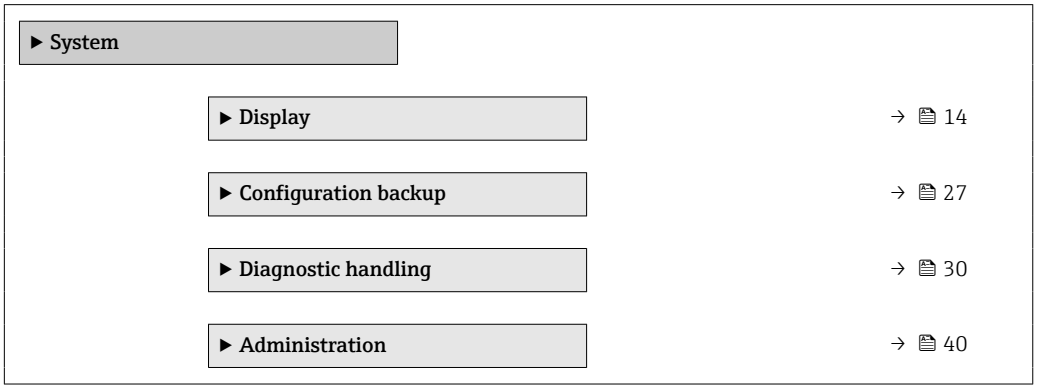
**Navigation** Expert → Ent. access code (0003)

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

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

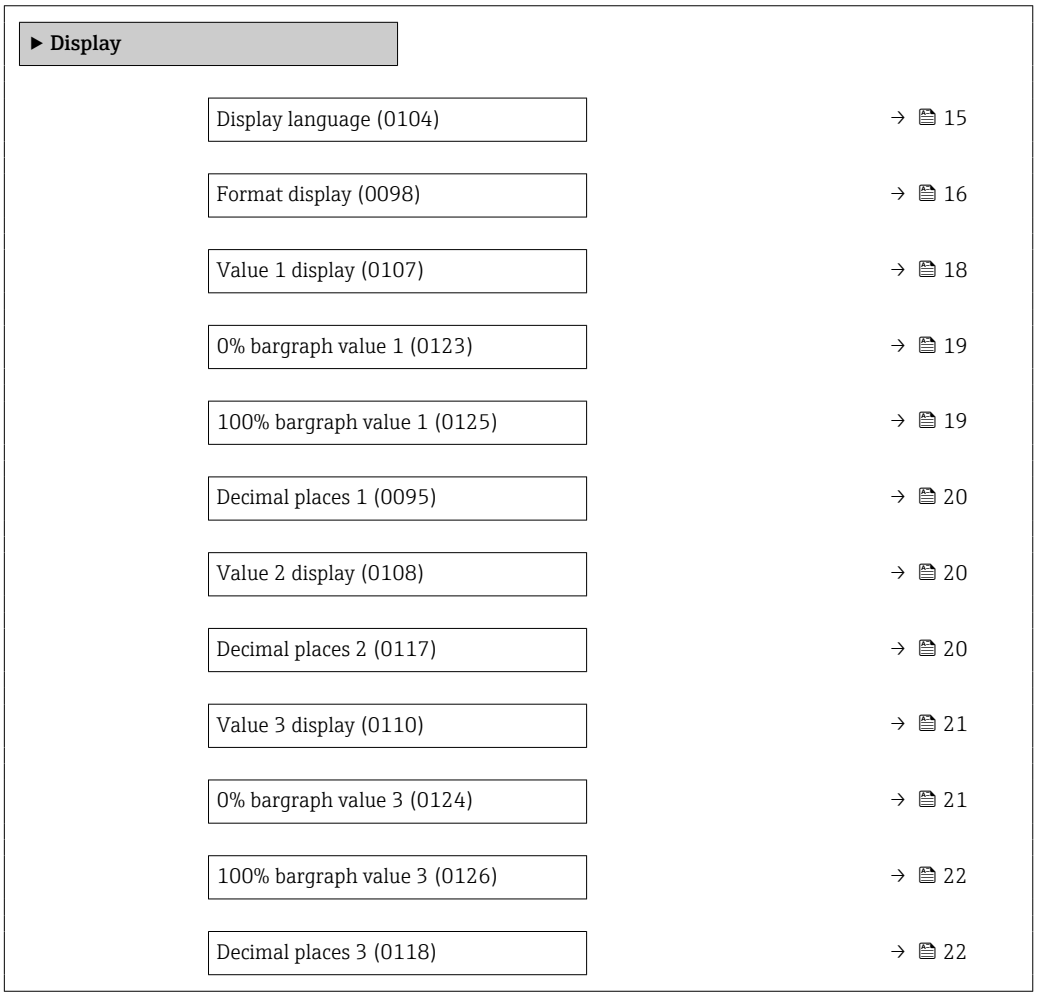
## 3.1 "System" submenu

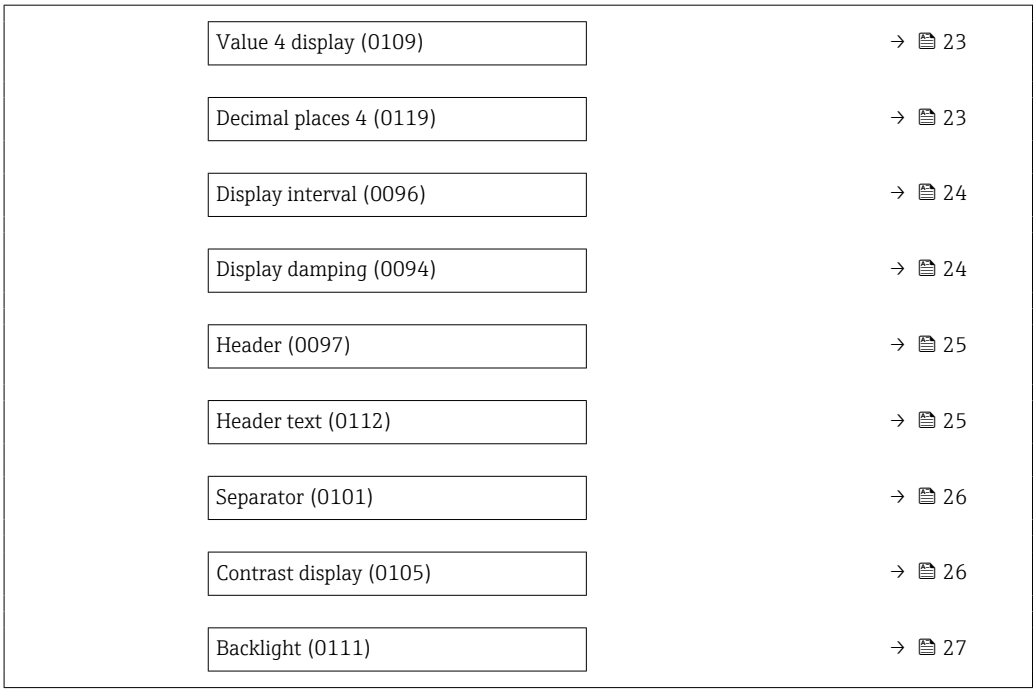
*Navigation* Expert → System




### 3.1.1 "Display" submenu

*Navigation* Expert → System → Display






## Display language

**Navigation** Expert → System → Display → Display language (0104)

**Prerequisite** A local display is provided.

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

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

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

## Format display

**Navigation** Expert → System → Display → Format display (0098)

**Prerequisite** A local display is provided.

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

**Selection**
- 1 value, max. size
- 1 bargraph + 1 value
- 2 values
- 1 value large + 2 values
- 4 values

**Factory setting** 1 value, max. size

**Additional information**

*Description*

The display format (size, bar graph etc.) and number of measured values displayed simultaneously (1 to 8) can be configured. This setting only applies to normal operation.

- The **Value 1 display** parameter (→ 18)...**Value 8 display** parameter are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device display. The display time until the next change is configured using the **Display interval** parameter (→ 24).

*Custody transfer mode*

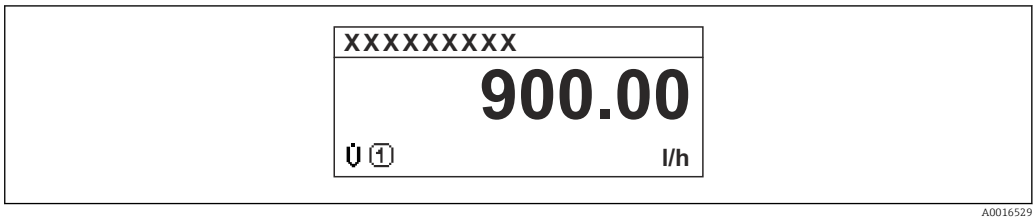
Only available for Promag H.

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

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

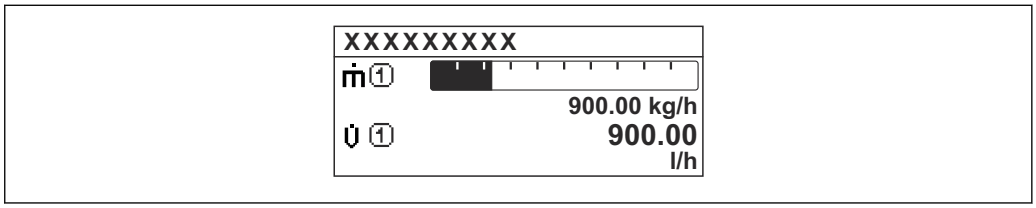
Possible measured values shown on the local display:

*"1 value, max. size" option*



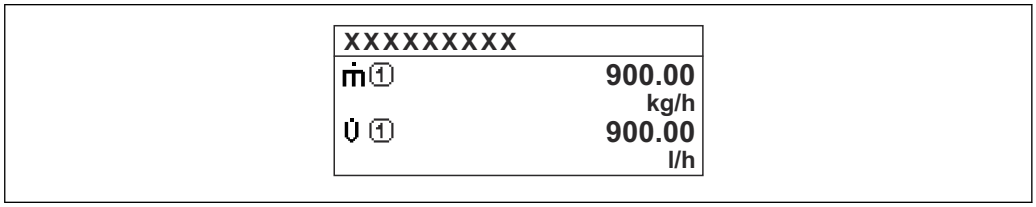

A0016529

*"1 bargraph + 1 value" option*



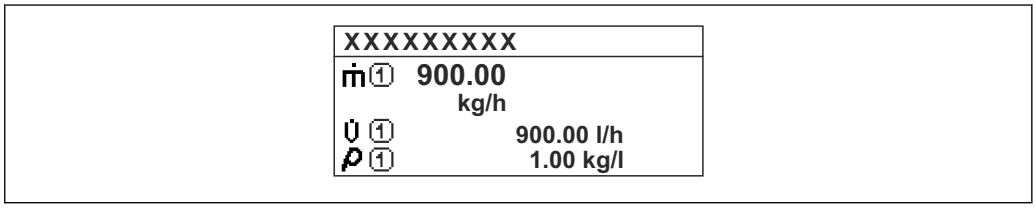

A0013098

*"2 values" option*



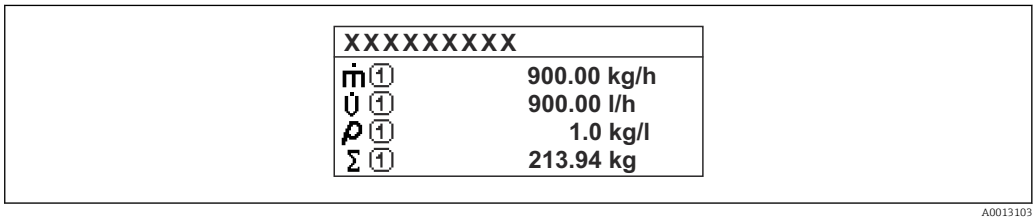

A0013100

*"1 value large + 2 values" option*




A0013102

*"4 values" option*




A0013103

## Value 1 display

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

**Prerequisite** A local display is provided.

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

**Selection**
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current output 1
- Current output 2 *
- Current output 3 *
- Current output 4 *
- Temperature *
- Electronics temperature
- HBSI *
- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- Build-up index *
- Test point 1
- Test point 2
- Test point 3

**Factory setting** Volume flow

**Additional information**

*Description*

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

The **Format display** parameter (→ 16) is used to specify how many measured values are displayed simultaneously and how.

*Custody transfer mode*

Only available for Promag H.

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

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

*Dependency*

The unit of the displayed measured value is taken from the **System units** submenu (→ 57).

* Visibility depends on order options or device settings

## 0% bargraph value 1

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

**Prerequisite** A local display is provided.

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

**User entry** Signed floating-point number

**Factory setting** Country-specific:
- 0 l/h
- 0 gal/min (us)

**Additional information**

*Description*

The **Format display** parameter (→ 16) 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 (→ 57).

## 100% bargraph value 1

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

**Prerequisite** A local display is provided.

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

**User entry** Signed floating-point number

**Factory setting** Depends on country and nominal diameter → 260

**Additional information**

*Description*

The **Format display** parameter (→ 16) 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 (→ 57).

## Decimal places 1

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

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

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

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

**Factory setting** x.xx

**Additional information** *Description*

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

## Value 2 display

**Navigation** Expert → System → Display → Value 2 display (0108)

**Prerequisite** A local display is provided.

**Description** Use this function to select a measured value that is shown on the local display.

**Selection** For the picklist, see the **Value 1 display** parameter (→ 18)

**Factory setting** None

**Additional information** *Description*

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

The **Format display** parameter (→ 16) 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 (→ 57).

## Decimal places 2

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

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

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

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

**Factory setting** x.xx

**Additional information** *Description*

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

## Value 3 display

**Navigation** Expert → System → Display → Value 3 display (0110)

**Prerequisite** A local display is provided.

**Description** Use this function to select a measured value that is shown on the local display.

**Selection** For the picklist, see the **Value 1 display** parameter (→ 18)

**Factory setting** None

**Additional information** *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 (→ 16) 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 (→ 57).

## 0% bargraph value 3

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

**Prerequisite** A selection was made in the **Value 3 display** parameter (→ 21).

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

**User entry** Signed floating-point number

**Factory setting**

Country-specific:
- 0 l/h
- 0 gal/min (us)

**Additional information**

*Description*

The **Format display** parameter (→ 16) 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 (→ 57).

## 100% bargraph value 3

**Navigation**

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

**Prerequisite**

A selection was made in the **Value 3 display** parameter (→ 21).

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

0

**Additional information**

*Description*

The **Format display** parameter (→ 16) 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 (→ 57).

## Decimal places 3

**Navigation**

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

**Prerequisite**

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

**Description**

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

**Selection**

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

**Factory setting**

x.xx

**Additional information** *Description*

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

## Value 4 display

**Navigation** Expert → System → Display → Value 4 display (0109)

**Prerequisite** A local display is provided.

**Description** Use this function to select a measured value that is shown on the local display.

**Selection** For the picklist, see the **Value 1 display** parameter (→ 18)

**Factory setting** None

**Additional information** *Description*

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

The **Format display** parameter (→ 16) 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 (→ 57).

*Custody transfer mode*

Only available for Promag H.

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

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

## Decimal places 4

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

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

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

**Selection**

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

**Factory setting** x.xx

**Additional information** *Description*

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

## Display interval

**Navigation** Expert → System → Display → Display interval (0096)

**Prerequisite** A local display is provided.

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

**User entry** 1 to 10 s

**Factory setting** 5 s

**Additional information** *Description*

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

- The **Value 1 display** parameter (→ 18)...**Value 8 display** parameter are used to specify which measured values are shown on the local display.
- The display format for the measured values displayed is defined in the **Format display** parameter (→ 16).

*Custody transfer mode*

Only available for Promag H.

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

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

## Display damping

**Navigation** Expert → System → Display → Display damping (0094)

**Prerequisite** A local display is provided.

**Description** Use this function to enter a time constant for the reaction time of the local display to fluctuations in the measured value caused by process conditions.

**User entry** 0.0 to 999.9 s

**Factory setting** 0.0 s

**Additional information** *User entry*

Use this function to enter a time constant (PT1 element [1]) for display damping:
- If a low time constant is entered, the display reacts particularly quickly to fluctuating measured variables.
- On the other hand, the display reacts more slowly if a high time constant is entered.

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

## Header

**Navigation** Expert → System → Display → Header (0097)

**Prerequisite** A local display is provided.

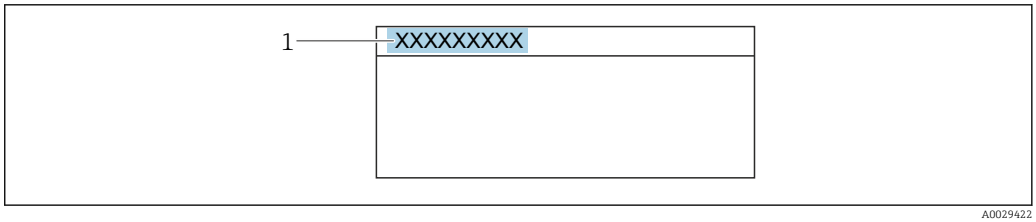
**Description** Use this function to select the contents of the header of the local display.

**Selection**
- Device tag
- Free text

**Factory setting** Device tag

**Additional information** *Description*

The header text only appears during normal operation.




*1 Position of the header text on the display*

*Selection*
- Device tag
  Is defined in the **Device tag** parameter (→ 212).
- Free text
  Is defined in the **Header text** parameter (→ 25).

## Header text

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

**Prerequisite** The **Free text** option is selected in the **Header** parameter (→ 25).

1) proportional transmission behavior with first order delay

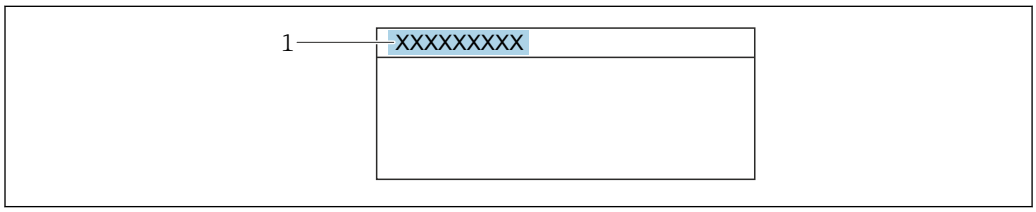
**Description** Use this function to enter a customer-specific text for the header of the local display.

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

**Factory setting** ----------

**Additional information** *Description*

The header text only appears during normal operation.




*1 Position of the header text on the display*

*User entry*

The number of characters displayed depends on the characters used.

## Separator

**Navigation** Expert → System → Display → Separator (0101)

**Prerequisite** A local display is provided.

**Description** Use this function to select the decimal separator.

**Selection**
- . (point)
- , (comma)

**Factory setting** . (point)

## Contrast display

**Navigation** Expert → System → Display → Contrast display (0105)

**Prerequisite** A local display is provided.

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

**User entry** 20 to 80 %

**Factory setting** Depends on the display

**Backlight**

**Navigation** Expert → System → Display → Backlight (0111)

**Prerequisite** One of the following conditions is met:
- Order code for "Display; operation", option **F** "4-line, illum.; touch control"
- Order code for "Display; operation", option **G** "4-line, illum.; touch control +WLAN"

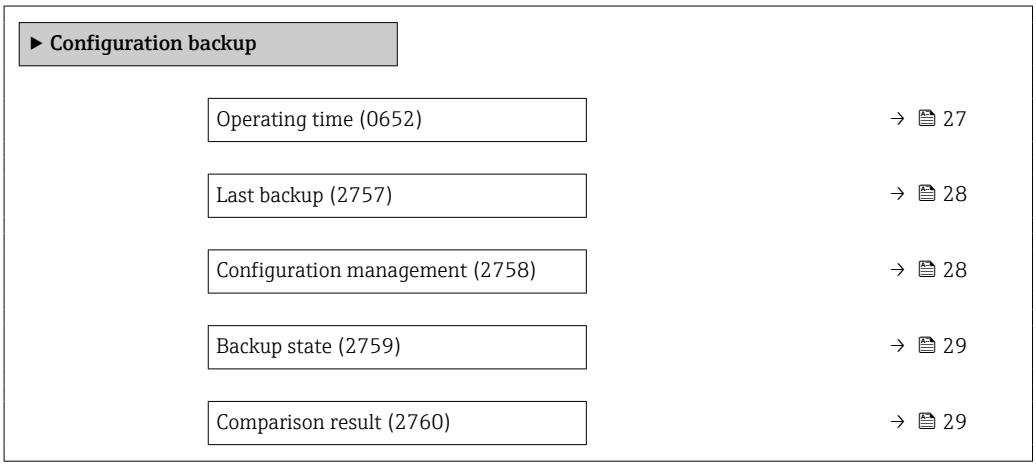
**Description** Use this function to switch the backlight of the local display on and off.

**Selection**
- Disable
- Enable

**Factory setting** Enable

## 3.1.2 "Configuration backup" submenu

*Navigation* Expert → System → Config. backup




**Operating time**

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

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

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

**Additional information** *User interface*

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

## Last backup

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

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

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

## Configuration management

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

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

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

**Factory setting** Cancel

**Additional information** *Selection*

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

*HistoROM*

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

* Visibility depends on order options or device settings

## Backup state

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

**Description** Displays the status of the data backup process.

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

**Factory setting** None

## Comparison result

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

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

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

**Factory setting** Check not done

**Additional information** *Description*

The comparison is started via the **Compare** option in the **Configuration management** parameter (→ 28).

*Selection*

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

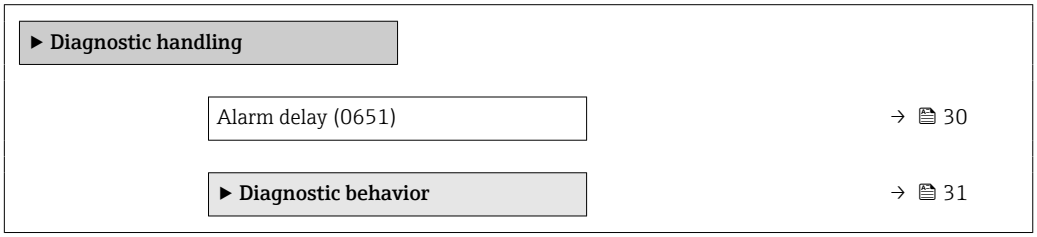
| Options | Description |
|---|---|
| Check not done | The device configuration of the HistoROM has not yet been compared to the backup copy in the device memory. |
| Dataset incompatible | The backup copy in the device memory is not compatible with the device. |

*HistoROM*

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

### 3.1.3 "Diagnostic handling" submenu

*Navigation* Expert → System → Diagn. handling




**Alarm delay**

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

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

The diagnostic message is reset without a time delay.

**User entry** 0 to 60 s

**Factory setting** 0 s

**Additional information** *Effect*

This setting affects the following diagnostic messages:
- 170 coil resistance
- 832 Electronics temperature too high
- 833 Electronics temperature too low
- 834 Process temperature too high
- 835 Process temperature too low
- 962 empty pipe

### "Diagnostic behavior" submenu

Each item of diagnostic information is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic information in the **Diagnostic behavior** submenu (→ 🖹 31).

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

| Options | Description |
|---|---|
| Alarm | The device stops measurement. The signal outputs and totalizers assume the defined alarm condition. A diagnostic message is generated.<br>The background lighting changes to red. |
| Warning | The device continues to measure. The signal outputs and totalizers are not affected. A diagnostic message is generated. |
| Logbook entry only | The device continues to measure. The diagnostic message is displayed only in the **Event logbook** submenu (→ 🖹 210) (**Event list** submenu (→ 🖹 210)) and is not displayed in alternation with the operational display. |
| Off | The diagnostic event is ignored, and no diagnostic message is generated or entered. |

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

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

► **Diagnostic behavior**

| | |
|---|---|
| Assign behavior of diagnostic no. 043 (0650) | → 🖹 32 |
| Assign behavior of diagnostic no. 143 (0644) | → 🖹 33 |
| Assign behavior of diagnostic no. 302 (0739) | → 🖹 33 |
| Assign behavior of diagnostic no. 376 (0645) | → 🖹 33 |
| Assign behavior of diagnostic no. 377 (0777) | → 🖹 34 |
| Assign behavior of diagnostic no. 441 (0657) | → 🖹 34 |
| Assign behavior of diagnostic no. 442 (0658) | → 🖹 34 |
| Assign behavior of diagnostic no. 443 (0659) | → 🖹 35 |
| Assign behavior of diagnostic no. 444 (0740) | → 🖹 35 |


## Assign behavior of diagnostic no. 043 (Sensor short circuit)

**Navigation** Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 043 (0650)

**Description** Use this function to change the diagnostic behavior of the **043 Sensor short circuit** diagnostic message.

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

## Assign behavior of diagnostic no. 143 (HBSI limit exceeded)

**Navigation** Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 143 (0644)

**Description** Change behavior of diagnostic event with diagnostic number 143 'HBSI limit exceeded'.

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

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

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

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

**Selection**
- Off
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

## Assign behavior of diagnostic no. 376 (Sensor electronics (ISEM) faulty)

**Navigation** Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 376 (0645)

**Description** Use this function to change the diagnostic behavior of the **376 Sensor electronics (ISEM) faulty** diagnostic message.

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

## Assign behavior of diagnostic no. 377 (Sensor electronics (ISEM) faulty)

**Navigation** Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 377 (0777)

**Description** Use this function to change the diagnostic behavior of the **377 Sensor electronics (ISEM) faulty** diagnostic message.

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

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

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

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

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

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

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

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

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

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

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

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

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

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

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

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

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

**Prerequisite** The device has one current input.

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

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

## Assign behavior of diagnostic no. 531 (Empty pipe detection)

**Navigation** Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 531 (0741)

**Description** Use this function to change the diagnostic behavior of the **531 Empty pipe detection** diagnostic message.

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

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

**Navigation** Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 543 (0643)

**Description** Use this function to change the diagnostic behavior of the **543 Double pulse output** diagnostic message.

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

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

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

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

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

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

**Navigation** Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832 (0681)

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

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Logbook entry only

**Additional information** For a detailed description of the options available: → 31

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

**Navigation** Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833 (0682)

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

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Logbook entry only

**Additional information** For a detailed description of the options available: → 31

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

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

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

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

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

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

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

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

## Assign behavior of diagnostic no. 842 (Process limit)

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

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

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Off

**Additional information** For a detailed description of the options available: → 31

## Assign behavior of diagnostic no. 937 (EMC interference)

**Navigation** Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 937 (0743)

**Description** Use this function to change the diagnostic behavior of the **937 EMC interference** diagnostic message.

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

## Assign behavior of diagnostic no. 938 (EMC interference)

**Navigation** Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 938 (0642)

**Description** Use this function to change the diagnostic behavior of the **938 EMC interference** diagnostic message.

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Alarm

**Additional information** For a detailed description of the options available: → 31

## Assign behavior of diagnostic no. 961 (Electrode potential out of specification)

**Navigation** Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 961 (0736)

**Description** Use this function to change the diagnostic behavior of the **861 Process fluid** diagnostic message.

**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Alarm

**Additional information** For a detailed description of the options available: → 31

## Assign behavior of diagnostic no. 962 (Pipe empty)

**Navigation** Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 962 (0745)

**Description** Use this function to change the diagnostic behavior of the **862 Pipe empty** diagnostic message.

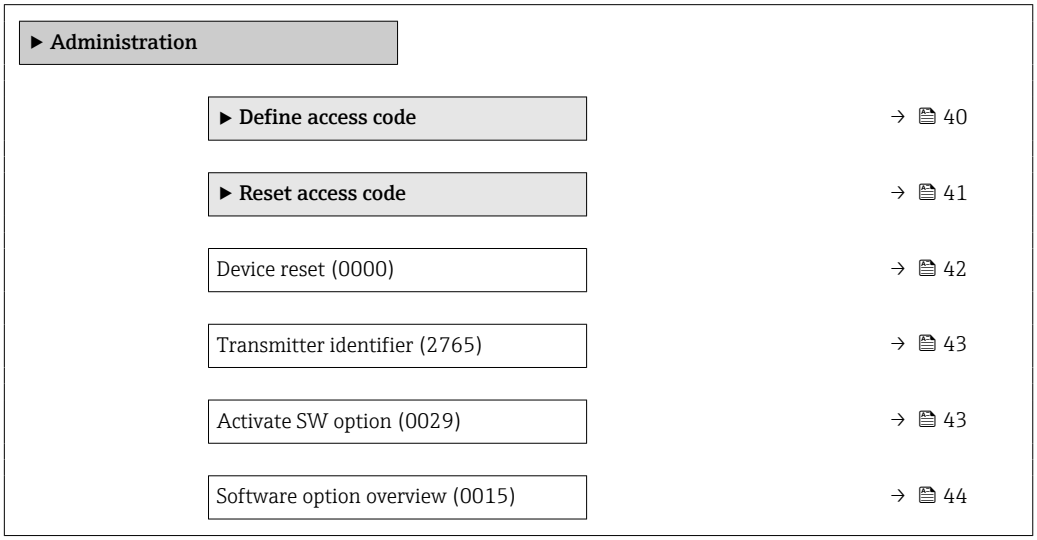
**Selection**
- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information** For a detailed description of the options available: → 31

### 3.1.4 "Administration" submenu

*Navigation* Expert → System → Administration

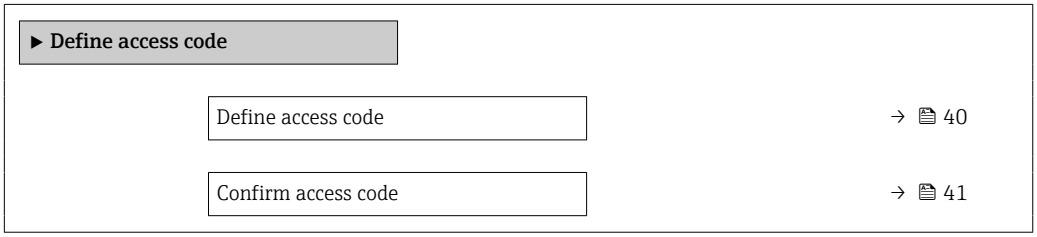



#### "Define access code" wizard

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

If operating via the operating tool, the **Define access code** parameter can be found directly in the **Administration** submenu. There is no **Confirm access code** parameter if the device is operated via the operating tool.

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




**Define access code**

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

**Description** Use this function to enter a user-specific release code to restrict write-access to the parameters. This protects the device configuration against any inadvertent modifications via the local display, Web browser, FieldCare or DeviceCare (via CDI-RJ45 service interface).

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

**Additional information**

*Description*

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

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

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

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

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

*User entry*

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

*Factory setting*

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

## Confirm access code

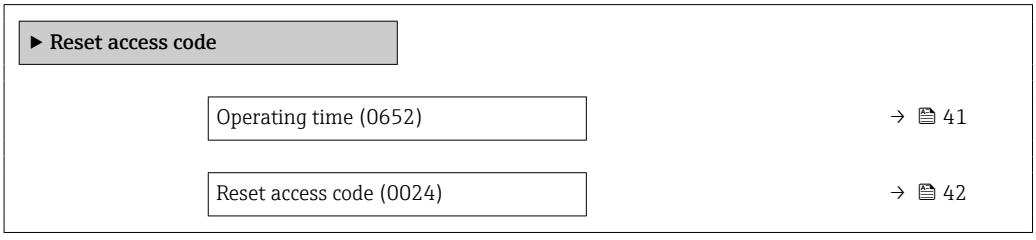
**Navigation** Expert → System → Administration → Def. access code → Confirm code

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

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

### "Reset access code" submenu

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




## Operating time

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

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

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

**Additional information** *User interface*

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

## Reset access code

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

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

**User entry** Character string comprising numbers, letters and special characters

**Factory setting** 0x00

**Additional information** *Description*

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

*User entry*

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

### Additional parameters in the "Administration" submenu

## Device reset

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

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

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

**Factory setting** Cancel

* Visibility depends on order options or device settings

**Additional information** *Options*

| Options | Description |
|---|---|
| Cancel | No action is executed and the user exits the parameter. |
| To delivery settings | Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting. |
| Restart device | The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged. |
| Restore S-DAT backup | Restores the data that is saved on the S-DAT. Additional information: This function can be used to resolve the memory issue "083 Memory content inconsistent" or to restore the S-DAT data when a new S-DAT has been installed.<br>This option is displayed only in an alarm condition. |

## Transmitter identifier

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

**Description** Select transmitter identifier.

**User interface**
- Unknown
- 500
- 300

**Factory setting** 500

## Activate SW option

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

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

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

**Factory setting** Depends on the software option ordered

**Additional information** *Description*

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

*User entry*

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

**NOTE!**

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

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

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

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

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

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

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

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

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

*Example for a software option*

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

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

*Web browser*

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

## Software option overview

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

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

**User interface**

- Extended HistoROM *
- SIL
- Electrode cleaning circuit *
- Custody transfer
- OPC-UA
- Build-up index
- Heartbeat Monitoring *
- Heartbeat Verification *

**Additional information**

*Description*

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

*"Extended HistoROM" option*

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

*"SIL" option*

Only available for Promag H and P.

* Visibility depends on order options or device settings

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

*"Electrode cleaning circuit" option*

Order code for "Application package", option **EC** "ECC electrode cleaning"

*"Heartbeat Verification" option and "Heartbeat Monitoring" option*

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

*"Custody transfer" option*

The measuring device has an approval for custody transfer measurement.

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

*"OPC-UA" option*

Only available for the HART communication protocol.

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

## 3.2 "Sensor" submenu

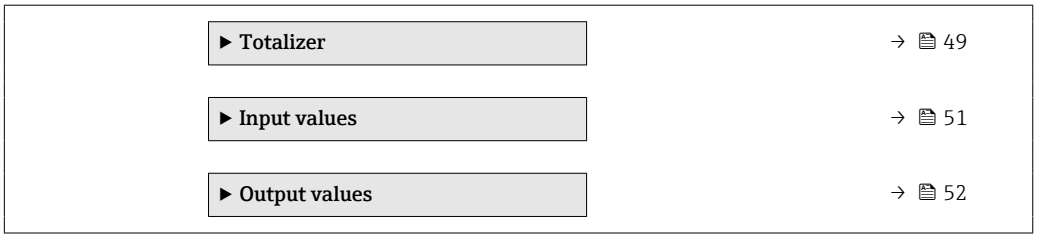
*Navigation* Expert → Sensor

| | |
|---|---|
| ▶ Sensor | |
| ▶ Measured values | → 45 |
| ▶ System units | → 57 |
| ▶ Process parameters | → 73 |
| ▶ External compensation | → 89 |
| ▶ Sensor adjustment | → 93 |
| ▶ Calibration | → 100 |
| ▶ Build-up index adjustment | → 101 |

### 3.2.1 "Measured values" submenu

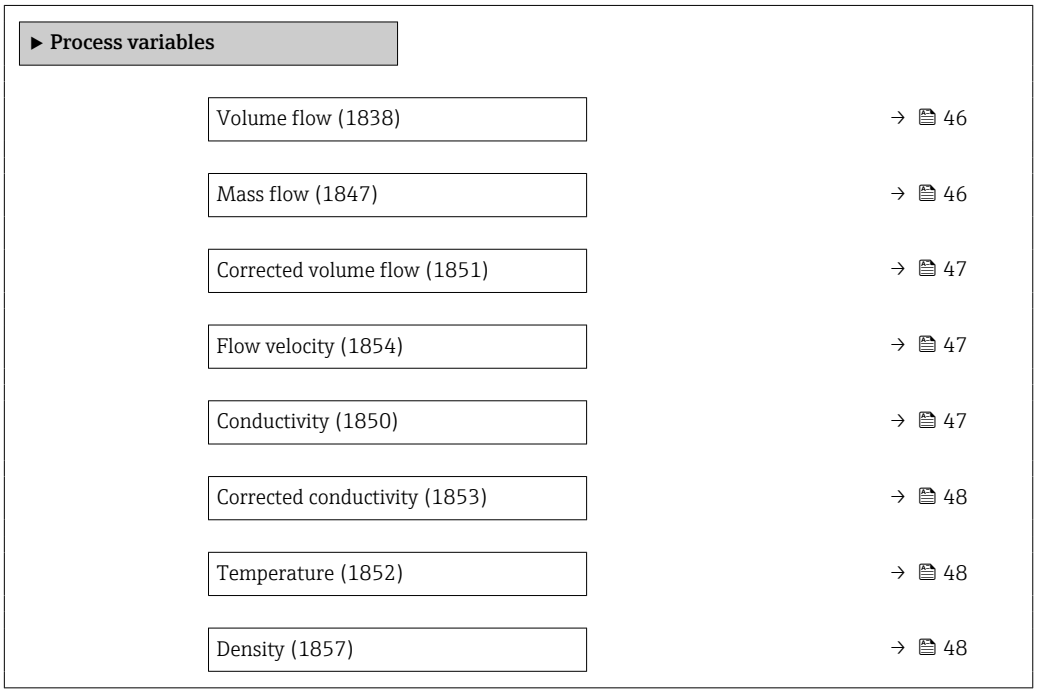
*Navigation* Expert → Sensor → Measured val.

| | |
|---|---|
| ▶ Measured values | |
| ▶ Process variables | → 46 |




### "Process variables" submenu

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




## Volume flow

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

**Description** Displays the volume flow that is currently measured.

**User interface** Signed floating-point number

**Additional information**

## Mass flow

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

**Description** Displays the mass flow that is currently calculated.

**User interface** Signed floating-point number

**Additional information** *Dependency*

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

## Corrected volume flow

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

**Description** Displays the corrected volume flow that is currently measured.

**User interface** Signed floating-point number

**Additional information** *Dependency*

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

## Flow velocity

**Navigation** Expert → Sensor → Measured val. → Process variab. → Flow velocity (1854)

**Description** Displays the flow velocity that is currently calculated.

**User interface** Signed floating-point number

## Conductivity

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

**Description** Displays the conductivity that is currently measured.

**User interface** Signed floating-point number

**Additional information** *Dependency*

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

## Corrected conductivity

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

**Prerequisite**
One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

**Description** Displays the conductivity that is currently corrected.

**User interface** Positive floating-point number

**Additional information** *Dependency*

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

## Temperature

**Navigation** Expert → Sensor → Measured val. → Process variab. → Temperature (1852)

**Prerequisite**
One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

**Description** Displays the temperature that is currently calculated.

**User interface** Positive floating-point number

**Additional information** *Dependency*

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

## Density

**Navigation** Expert → Sensor → Measured val. → Process variab. → Density (1857)

**Description** Displays the current fixed density or density read in from an external device.

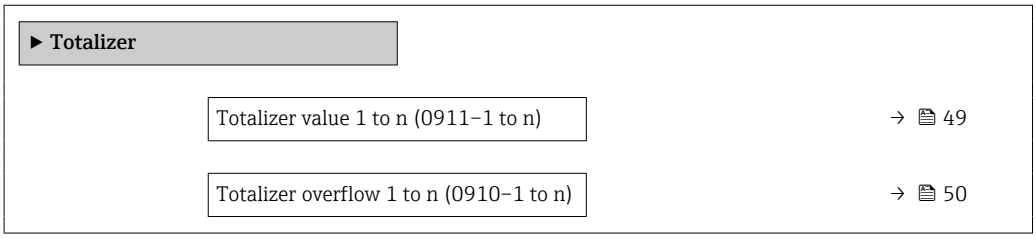
**User interface** Signed floating-point number

**Additional information** *Dependency*

The unit is taken from the **Density unit** parameter (→ 62)

### "Totalizer" submenu

*Navigation* Expert → Sensor → Measured val. → Totalizer




## Totalizer value 1 to n

**Navigation** Expert → Sensor → Measured val. → Totalizer → Totalizer val. 1 to n (0911–1 to n)

**Prerequisite** A process variable is selected in the **Assign process variable** parameter (→ 198) of the **Totalizer 1 to n** submenu.

**Description** Displays the current totalizer counter reading.

**User interface** Signed floating-point number

**Additional information**

*Description*

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

In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (→ 201).

*User interface*

The value of the process variable totalized since measuring began can be positive or negative. This depends on the settings in the **Totalizer operation mode** parameter (→ 200).

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 198).

*Example*

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

## Totalizer overflow 1 to n

**Navigation** Expert → Sensor → Measured val. → Totalizer → Tot. overflow 1 to n (0910–1 to n)

**Prerequisite** A process variable is selected in the **Assign process variable** parameter (→ 198) of the **Totalizer 1 to n** submenu.

**Description** Displays the current totalizer overflow.

**User interface** Integer with sign

**Additional information**

*Description*

If the current totalizer reading exceeds 7 digits, which is the maximum value range that can be displayed by the operating tool, the value above this range is output as an overflow. The current totalizer value is therefore the sum of the overflow value and the totalizer value from the **Totalizer value 1 to n** parameter.

*User interface*

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 198).

*Example*

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

## Totalizer 1 to n value

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

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

**User interface** Signed floating-point number

**Factory setting** 0 $m^3$

## Totalizer 1 to n status

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

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

**User interface**
- Good
- Uncertain
- Bad

**Factory setting** Good

## Totalizer 1 to n status (Hex)

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

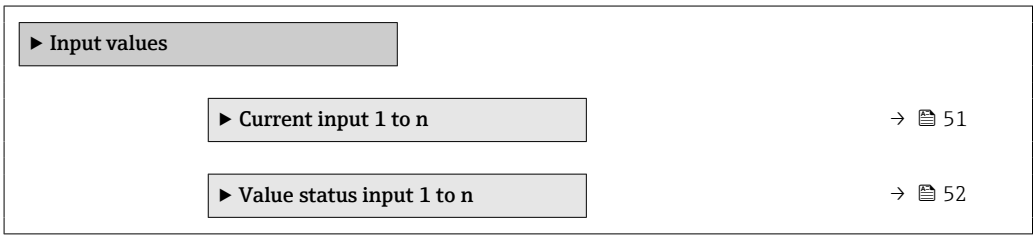
**Description** Shows the status of the totalizer value reported to the controller for further processing (Hex).

**User interface** 0 to 255

**Factory setting** 128

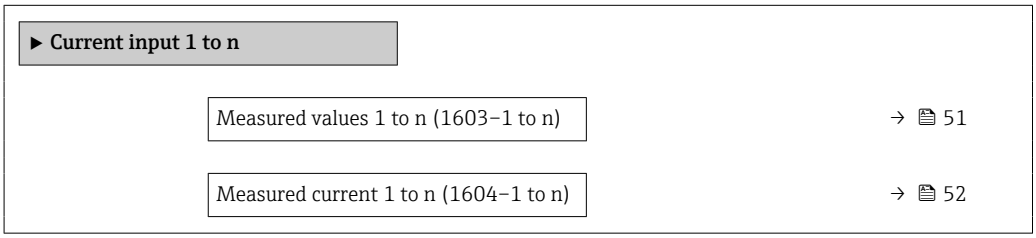
### "Input values" submenu

*Navigation* Expert → Sensor → Measured val. → Input values




*"Current input 1 to n" submenu*

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




## Measured values 1 to n

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

**Description** Displays the current input value.

**User interface** Signed floating-point number

## Measured current 1 to n

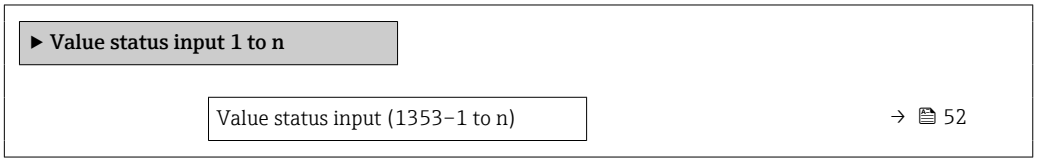
**Navigation** Expert → Sensor → Measured val. → Input values → Current input 1 to n → Measur. curr. 1 to n (1604–1 to n)

**Description** Displays the current value of the current input.

**User interface** 0 to 22.5 mA

*"Value status input 1 to n" submenu*

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




## Value status input

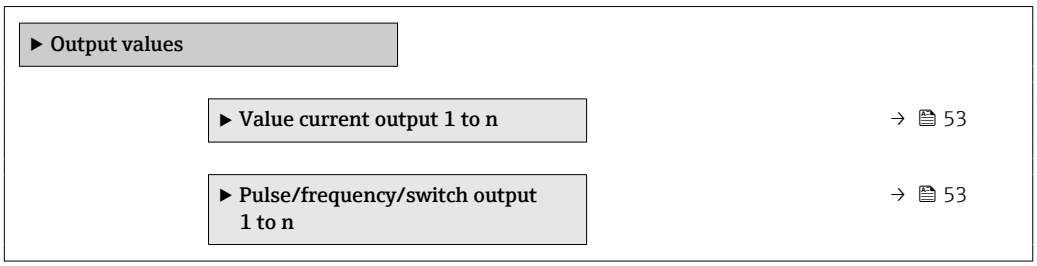
**Navigation** Expert → Sensor → Measured val. → Input values → Val.stat.inp. 1 to n → Val.stat.inp. (1353–1 to n)

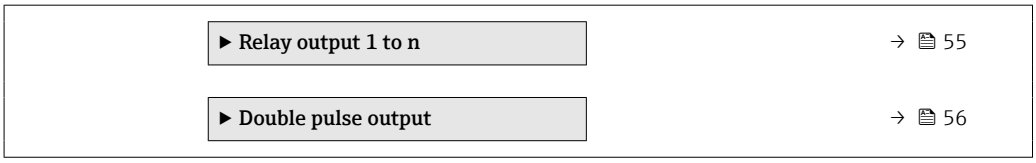
**Description** Displays the current input signal level.

**User interface**
- High
- Low

**"Output values" submenu**

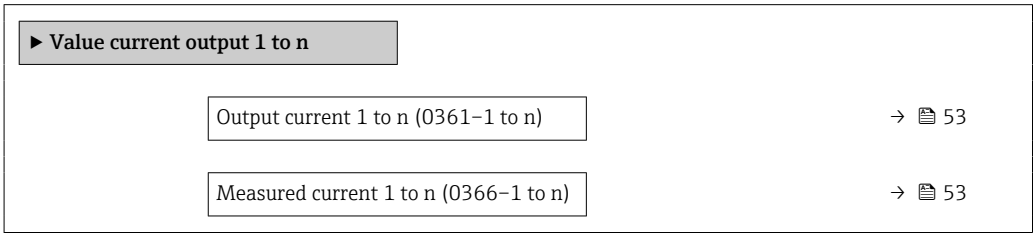
*Navigation* Expert → Sensor → Measured val. → Output values






*"Value current output 1 to n" submenu*

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




### Output current 1 to n

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

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

**User interface** 0 to 22.5 mA

### Measured current 1 to n

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

**Description** Displays the actual measured value of the output current.

**User interface** 0 to 30 mA

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

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

| | |
|---|---|
| Output frequency 1 to n (0471–1 to n) | → 54 |
| Pulse output 1 to n (0456–1 to n) | → 54 |
| Switch state 1 to n (0461–1 to n) | → 55 |

## Output frequency 1 to n

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

**Prerequisite** In the **Operating mode** parameter (→ 127), the **Frequency** option is selected.

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

**User interface** 0.0 to 12 500.0 Hz

## Pulse output 1 to n

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

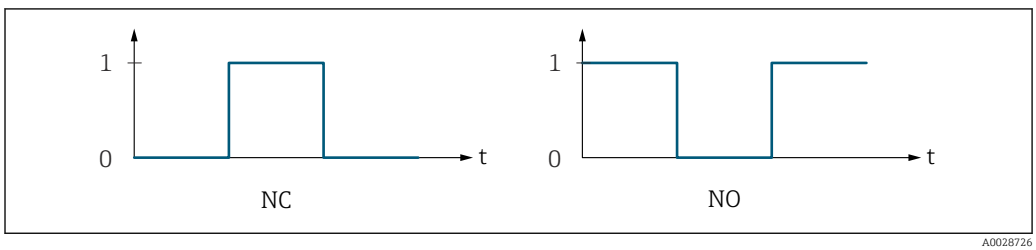
**Prerequisite** The **Pulse** option is selected in the **Operating mode** parameter (→ 127) parameter.

**Description** Displays the pulse frequency currently output.

**User interface** Positive floating-point number

**Additional information** *Description*

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




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 output signal** parameter (→ 144) 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 (→ 131)) can be configured.

### Switch state 1 to n

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

**Prerequisite** The **Switch** option is selected in the **Operating mode** parameter (→ 127).

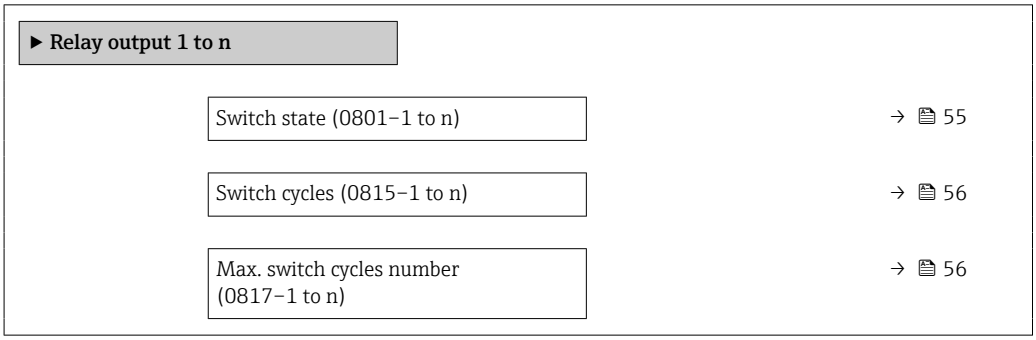
**Description** Displays the current switch status of the status output.

**User interface**
- Open
- Closed

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

*"Relay output 1 to n" submenu*

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




### Switch state

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

**Description** Displays the current status of the relay output.

**User interface**
- Open
- Closed

**Additional information** *User interface*

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

### Switch cycles

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

**Description** Displays all the switch cycles performed.

**User interface** Positive integer

### Max. switch cycles number

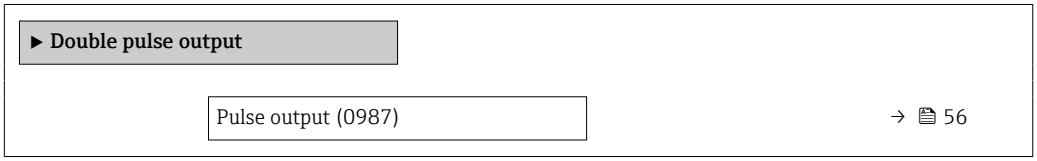
**Navigation** Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Max. cycles no. (0817–1 to n)

**Description** Displays the maximum number of guaranteed switch cycles.

**User interface** Positive integer

*"Double pulse output" submenu*

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




### Pulse output

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

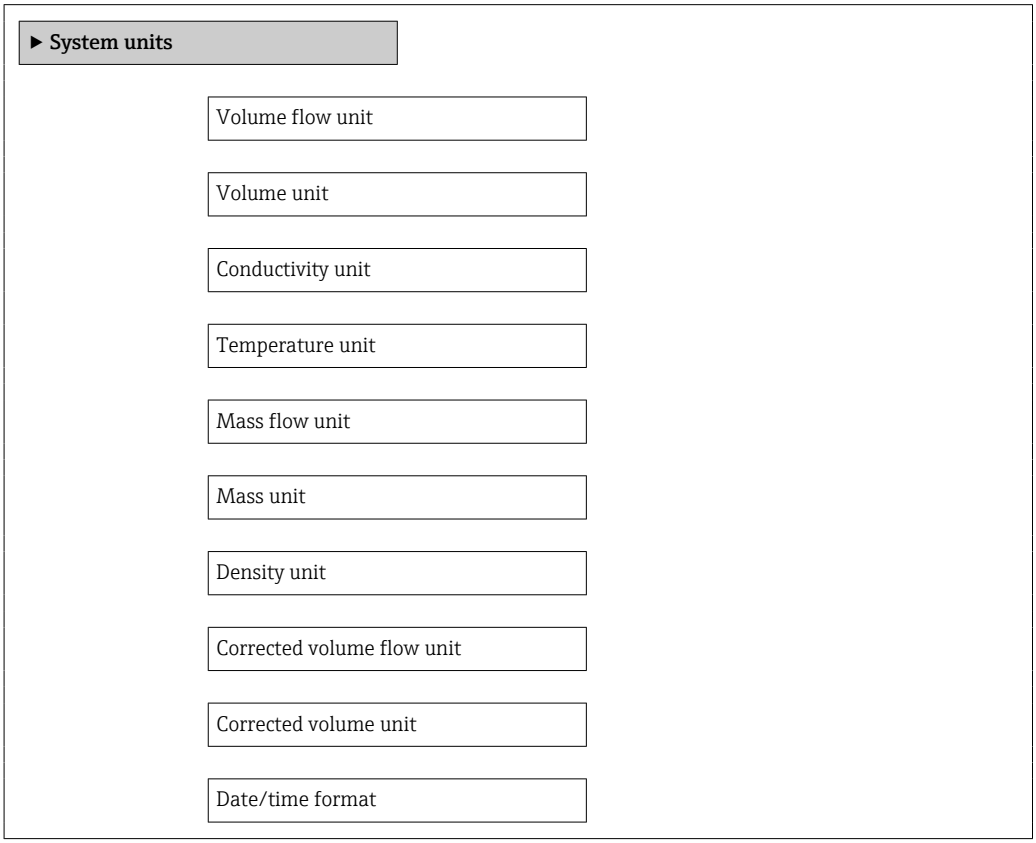
**Description** Displays the pulse frequency of the double pulse output which is currently output.

**User interface** Positive floating-point number

**Additional information** For a detailed description and example: **Pulse output** parameter (→ 54)

### 3.2.2 "System units" submenu

*Navigation* Expert → Sensor → System units




**Volume flow unit**

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

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

**Selection**

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

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

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

**Factory setting**

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

**Additional information**

*Effect*

The selected unit applies for:
**Volume flow** parameter (→ 46)

*Selection*

For an explanation of the abbreviated units: → 268

*Customer-specific units*

The unit for the customer-specific volume is specified in the **User volume text** parameter (→ 65).

## Volume unit

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

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

**Selection**

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

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

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

**Factory setting**

Country-specific:
- $m^3$
- gal (us)

**Additional information**

*Selection*

For an explanation of the abbreviated units: → 268

*Customer-specific units*

The unit for the customer-specific volume is specified in the **User volume text** parameter (→ 65).

## Conductivity unit

**Navigation** Expert → Sensor → System units → Conductiv. unit (0582)

**Prerequisite** The **On** option is selected in the **Conductivity measurement** parameter (→ 76) parameter.

**Description** Use this function to select the unit for the conductivity.

**Selection**

*SI units*
- nS/cm
- µS/cm
- µS/m
- µS/mm
- mS/m
- mS/cm
- S/cm
- S/m
- kS/m
- MS/m

**Factory setting** µS/cm

**Additional information**

*Effect*

The selected unit applies for:
- **Conductivity** parameter (→ 47)
- **Corrected conductivity** parameter (→ 48)

*Selection*

For an explanation of the abbreviated units: → 268

## Temperature unit

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

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

**Selection**

*SI units*
- °C
- K

*US units*
- °F
- °R

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

**Additional information**

*Effect*

The selected unit applies for:
- **Temperature** parameter (→ 48)
- **Maximum value** parameter (→ 232)
- **Minimum value** parameter (→ 231)
- **External temperature** parameter (→ 91)
- **Maximum value** parameter (→ 235)
- **Minimum value** parameter (→ 234)

*Selection*

For an explanation of the abbreviated units: → 268

## Mass flow unit

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

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

**Selection**

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

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

**Factory setting**

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

**Additional information**

*Effect*

The selected unit applies for:
**Mass flow** parameter (→ 46)

*Selection*

For an explanation of the abbreviated units: → 268

*Customer-specific units*

The unit for the customer-specific mass is specified in the **User mass text** parameter (→ 67).

## Mass unit

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

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

**Selection**

*SI units*
- g
- kg
- t

*US units*
- oz
- lb
- STon

**Factory setting**

Country-specific:
- kg
- lb

**Additional information**

*Selection*

For an explanation of the abbreviated units: → 268

*Customer-specific units*

The unit for the customer-specific mass is specified in the **User mass text** parameter (→ 67).

## Density unit

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

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

**Selection**

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

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

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

**Factory setting**

Country-specific:
- kg/l
- lb/ft³

**Additional information**

*Effect*

The selected unit applies for:
- **External density** parameter (→ 90)
- **Fixed density** parameter (→ 89)

*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: → 268

## Corrected volume flow unit

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

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

**Selection**

*SI units*
- Nl/s
- Nl/min
- Nl/h
- Nl/d
- Nhl/s
- Nhl/min
- Nhl/h
- Nhl/d
- $Nm^3/s$
- $Nm^3/min$
- $Nm^3/h$
- $Nm^3/d$
- Sl/s
- Sl/min
- Sl/h
- Sl/d
- $Sm^3/s$
- $Sm^3/min$
- $Sm^3/h$
- $Sm^3/d$

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

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

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

**Additional information**

*Result*

The selected unit applies for:
**Corrected volume flow** parameter (→ 47)

*Selection*

For an explanation of the abbreviated units: → 268

*Customer-specific units*

The unit for the customer-specific corrected volume is defined in the **User corrected volume text** parameter (→ 68).

## Corrected volume unit

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

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

**Selection**

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

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

*Imperial units*
Sgal (imp)

**Factory setting**

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

**Additional information**

*Selection*

For an explanation of the abbreviated units: → 268

*Customer-specific units*

The unit for the customer-specific corrected volume is defined in the **User corrected volume text** parameter (→ 68).

## Date/time format

**Navigation**

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

**Description**

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

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

**Factory setting**

dd.mm.yy hh:mm

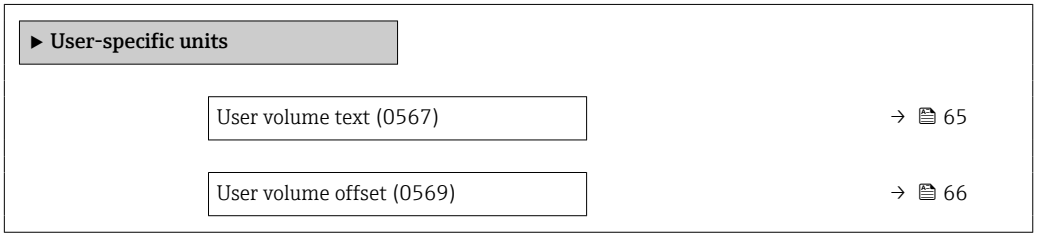
**Additional information**

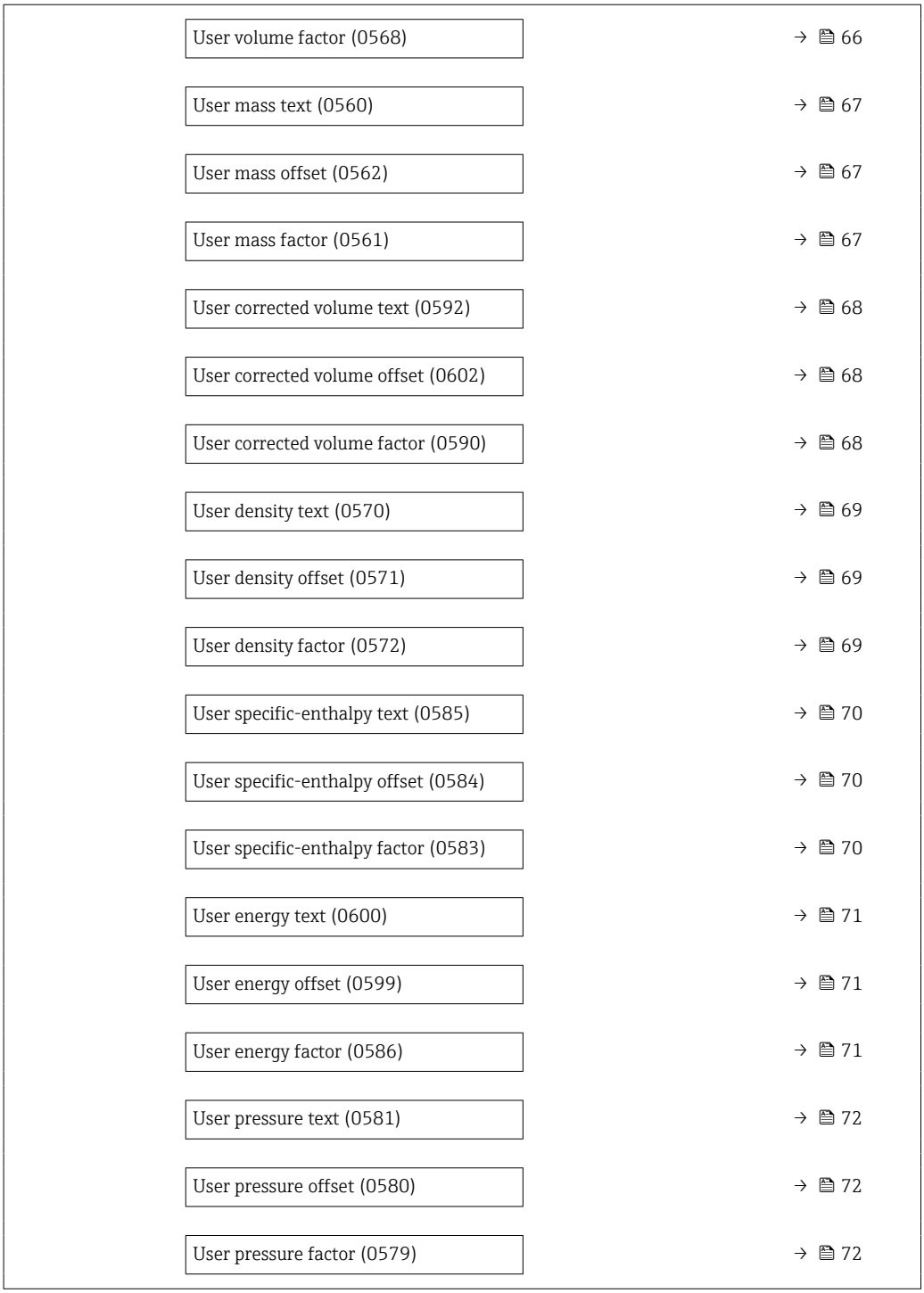
*Selection*

For an explanation of the abbreviated units: → 268

### "User-specific units" submenu

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






## User volume text

**Navigation** Expert → Sensor → System units → User-spec. units → Volume text (0567)

**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 (→ 57)
- **Volume unit** parameter (→ 59)

*Example*

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

## User volume offset

**Navigation** Expert → Sensor → System units → User-spec. units → Volume offset (0569)

**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

## User volume factor

**Navigation** Expert → Sensor → System units → User-spec. units → Volume factor (0568)

**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

## User mass text

**Navigation** Expert → Sensor → System units → User-spec. units → Mass text (0560)

**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 (→ 61)
- **Mass unit** parameter (→ 61)

*Example*

If the text GLAS is entered, the following options are displayed in the picklist for the **Mass flow unit** parameter (→ 61):
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

## User mass offset

**Navigation** Expert → Sensor → System units → User-spec. units → Mass offset (0562)

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

**User entry** Signed floating-point number

**Factory setting** 0

**Additional information** *Description*

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

## User mass factor

**Navigation** Expert → Sensor → System units → User-spec. units → Mass factor (0561)

**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

## User corrected volume text

**Navigation** Expert → Sensor → System units → User-spec. units → Corr. vol. text (0592)

**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:
- **Corrected volume flow unit** parameter (→ 63)
- **Corrected volume unit** parameter (→ 63)

*Example*

If the text GLAS is entered, the choose list of the **Corrected volume flow unit** parameter (→ 63) shows the following options:
- GLAS/s
- GLAS/min
- GLAS/h
- GLAS/d

## User corrected volume offset

**Navigation** Expert → Sensor → System units → User-spec. units → Corr vol. offset (0602)

**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

## User corrected volume factor

**Navigation** Expert → Sensor → System units → User-spec. units → Cor.vol. factor (0590)

**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

## User density text

**Navigation** Expert → Sensor → System units → User-spec. units → Density text (0570)

**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 (→ 62).

*Example*

Enter text “CE_L” for centners per liter

## User density offset

**Navigation** Expert → Sensor → System units → User-spec. units → Density offset (0571)

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

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

**User entry** Signed floating-point number

**Factory setting** 0

## User density factor

**Navigation** Expert → Sensor → System units → User-spec. units → Density factor (0572)

**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

## User specific-enthalpy text

**Navigation** Expert → Sensor → System units → User-spec. units → Spec. enth. text (0585)

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

**Factory setting** User enth.

**Additional information** *Result*

*Example*

If the text CAL is entered, the choose list of the **Calorific value unit** parameter shows the following options:
- CAL/Nm3
- CAL/m3
- CAL/ft3
- CAL/Sft3

## User specific-enthalpy offset

**Navigation** Expert → Sensor → System units → User-spec. units → Spec. enth. off. (0584)

**Description** Use this function to enter the offset for adapting the user-specific calorific value unit (without volume).

**User entry** Signed floating-point number

**Factory setting** 0

## User specific-enthalpy factor

**Navigation** Expert → Sensor → System units → User-spec. units → Spec. enth. fac. (0583)

**Description** Use this function to enter a quantity factor (without volume) for the user-specific calorific value unit.

**User entry** Signed floating-point number

**Factory setting** 1.0

**Additional information** *Example*

1 W × min = 60 J → 0.166 W × min = 1 J → user entry: 0.0166

## User energy text

**Navigation** Expert → Sensor → System units → User-spec. units → Energy text (0600)

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

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

**Factory setting** User en.

**Additional information** *Result*

The defined unit is shown as an option in the choose list of the following parameters:
- **Energy unit** parameter
- **Energy flow unit** parameter

*Example*

If the text W is entered, the choose list of the **Energy flow unit** parameter shows the following options:
- W/s
- W/min
- W/h
- W/d

## User energy offset

**Navigation** Expert → Sensor → System units → User-spec. units → Energy offset (0599)

**Description** Use this function to enter the offset for adapting the user-specific energy unit (without time).

**User entry** Signed floating-point number

**Factory setting** 0

## User energy factor

**Navigation** Expert → Sensor → System units → User-spec. units → Energy factor (0586)

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

**User entry** Signed floating-point number

**Factory setting** 1.0

## User pressure text

**Navigation** Expert → Sensor → System units → User-spec. units → Pressure text (0581)

**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.

## User pressure offset

**Navigation** Expert → Sensor → System units → User-spec. units → Pressure offset (0580)

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

**User entry** Signed floating-point number

**Factory setting** 0

## User pressure factor

**Navigation** Expert → Sensor → System units → User-spec. units → Pressure factor (0579)

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

**User entry** Signed floating-point number

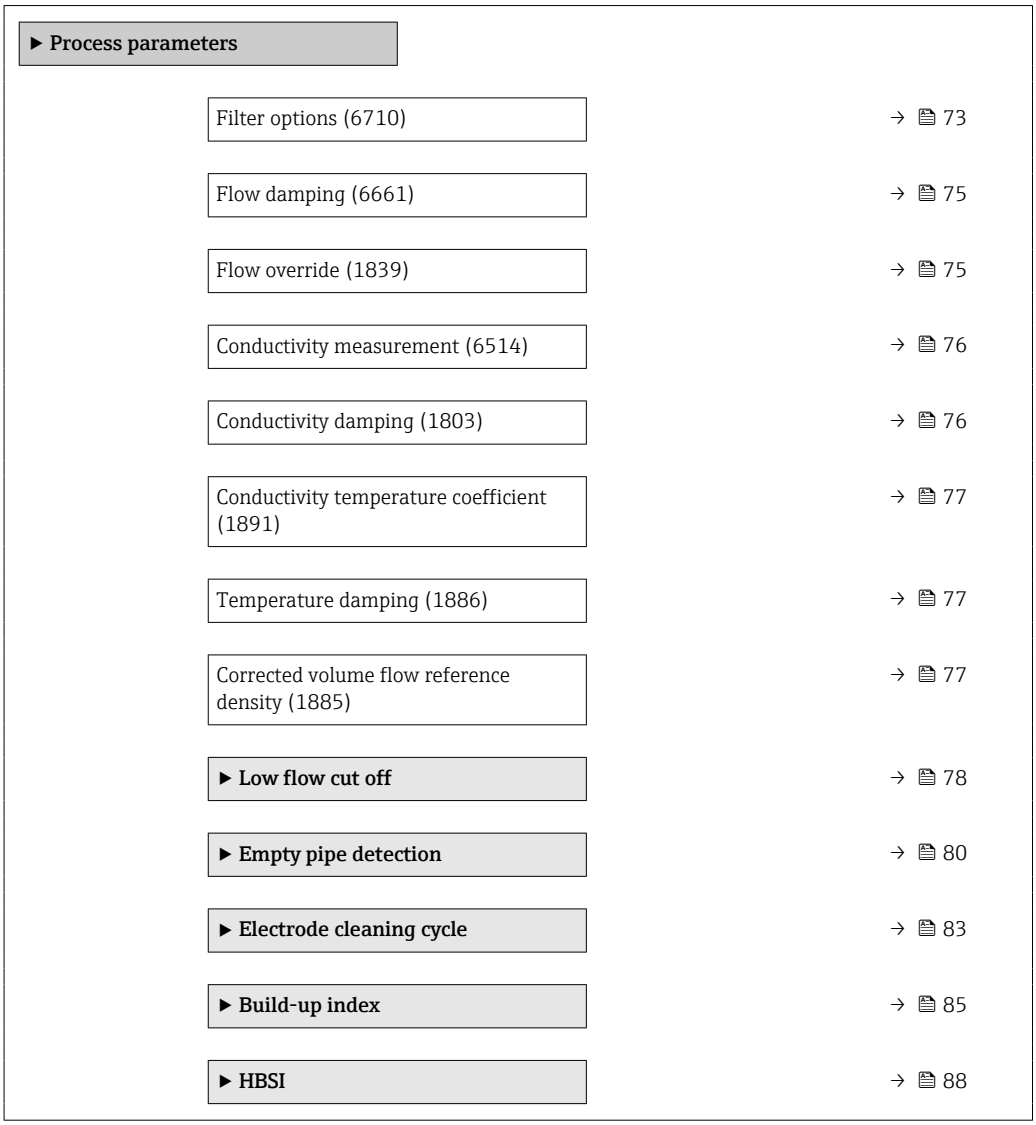
**Factory setting** 1.0

**Additional information** *Example*

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

### 3.2.3 "Process parameters" submenu

*Navigation* Expert → Sensor → Process param.




**Filter options**

**Navigation** Expert → Sensor → Process param. → Filter options (6710)

**Description** Use this function to select a filter option.

**Selection**
- Adaptive
- Adaptive CIP on
- Dynamic
- Dynamic CIP on
- Binomial
- Binomial CIP on

**Factory setting** Binomial

**Additional information**

*Description*

The user can choose from a range of filter combinations which can optimize the measurement result depending on the application. Each change in the filter setting affects the output signal of the measuring device. The response time of the output signal increases as the filter depth increases.

*Selection*

- **Adaptive**
  - Strong flow damping with a short output signal response time.
  - Some time is needed before a stable output signal can be generated.
  - Not suitable for pulsating flow as the average flow can be different here.
- **Dynamic**
  - Average flow damping with a delayed output signal response time.
  - The average flow is displayed correctly over a measuring interval determined over a long period.
- **Binomial**
  - Weak flow damping with a short output signal response time.
  - The average flow is displayed correctly over a measuring interval determined over a long period.
- **CIP**
  - This filter makes the **Adaptive**, **Dynamic** and **Binomial** filter options additionally available.
  - If the CIP filter has detected a change in the medium (abrupt increase in the noise level, e.g. quickly changing medium conductivity values during CIP cleaning), flow damping is greatly increased and the raw value (before flow damping) is limited by the mean value (delimiter). This eliminates extremely high measured errors (up to several 100 m/s).
  - If the CIP filter is enabled, the response time of the entire measuring system increases and the output signal is delayed accordingly.

*Examples*

*Possible applications for the filters*

| Application | Adaptive | Adaptive CIP | Dynamic | Dynamic CIP | Binomial | Binomial CIP |
|---|---|---|---|---|---|---|
| Pulsating flow (flow is negative intermittently) | −−− | −−− | ++ | −− | ++ | −− |
| Flow changes frequently (flow is dynamic) | − | −− | ++ | − | ++ | − |
| Clear signal, fast control loop (< 1 s) | −− | −− | + [1)] | | ++ | − |
| Poor signal, slow control loop (response time of a few seconds) | ++ | − | −− | −−− | −−− | −−− |
| Permanently bad signal | ++ | −− | − | −−− | − | −−− |
| Short and severe signal distortion after a while | | ++ | | ++ | | ++ |
| Replacement of a Promag 50/53: system damping Promag 100 = 0.5 * system damping Promag 50/53 | | | | | +++ | +++ |
| Replacement of a Promag 10: system damping Promag 100 = system damping Promag 10 + 2 | | | +++ | | | |
| For a stable flow signal (no other requirements) | +++ | | | | | |

1) Value of flow damping < 6

## Flow damping

**Navigation** Expert → Sensor → Process param. → Flow damping (6661)

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

**User entry** 0 to 15

**Factory setting** 4

**Additional information**

*Input range 0 to 15*

- Value = 0: no damping
- Value = 1: minor damping
- Value = 15: strong damping

- The damping depends on the measuring period and the filter type selected.
- An increase or decrease in the damping depends on the application.

*Effect*

The damping affects the following variables of the device:
- Outputs → 111
- Low flow cut off → 78
- Totalizers → 198

## Flow override

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

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

**Selection**
- Off
- On

**Factory setting** Off

**Additional information**

*Description*

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

The **Flow override** option can also be activated in the **Status input** submenu: **Assign status input** parameter (→ 110).

## Conductivity measurement

**Navigation** Expert → Sensor → Process param. → Conduct. measur. (6514)

**Prerequisite** The **On** option is selected in the **Conductivity measurement** parameter (→ 76) parameter.

**Description** Use this function to enable and disable conductivity measurement.

**Selection**
- Off
- On

**Factory setting** Off

**Additional information** *Description*

For conductivity measurement to work, the medium must have a minimum conductivity of 5 µS/cm.

## Conductivity damping

**Navigation** Expert → Sensor → Process param. → Conduct. damping (1803)

**Prerequisite** The **On** option is selected in the **Conductivity measurement** parameter (→ 76).

**Description** Use this function to enter a time constant for conductivity damping (PT1 element).

**User entry** 0 to 999.9 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).

2) Proportional behavior with first-order lag

## Conductivity temperature coefficient

**Navigation** Expert → Sensor → Process param. → Cond. temp.coeff (1891)

**Prerequisite**
One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

**Description** Use this function to enter the temperature coefficient for the conductivity.

**User entry** Signed floating-point number

**Factory setting** 2.1 %/K

## Temperature damping

**Navigation** Expert → Sensor → Process param. → Temp. damping (1886)

**Prerequisite**
One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

**Description** Use this function to enter the time constant for temperature damping.

**User entry** 0 to 999.9 s

**Factory setting** 0 s

## Corrected volume flow reference density

**Navigation** Expert → Sensor → Process param. → CVolFlowRefDens (1885)

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

**User entry** Positive floating-point number

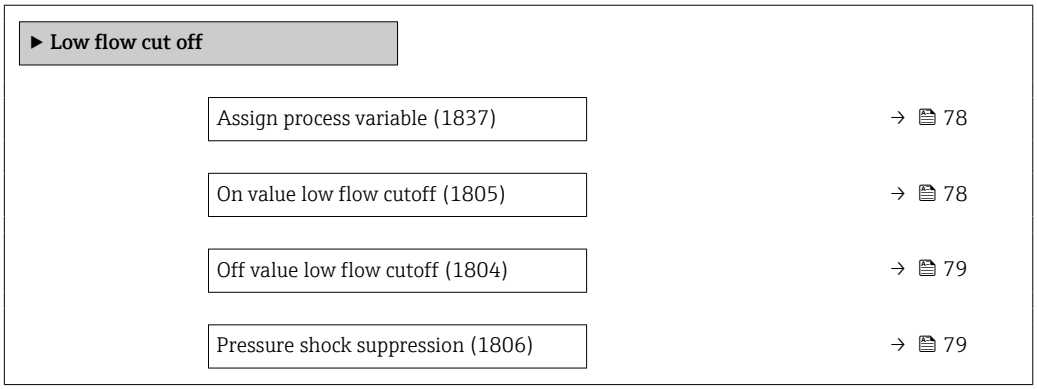
**Factory setting**
Country-specific:
- 1 kg/l
- 1 lb/ft³

**Additional information** *Dependency*

The unit is taken from the **Density unit** parameter (→ 62)

### "Low flow cut off" submenu

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




### Assign process variable

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

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

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

**Factory setting** Volume flow

### On value low flow cutoff

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

**Prerequisite** A process variable is selected in the **Assign process variable** parameter (→ 78).

**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 → 79.

**User entry** Positive floating-point number

**Factory setting** Depends on country and nominal diameter → 262

**Additional information** *Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ 78).

## Off value low flow cutoff

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

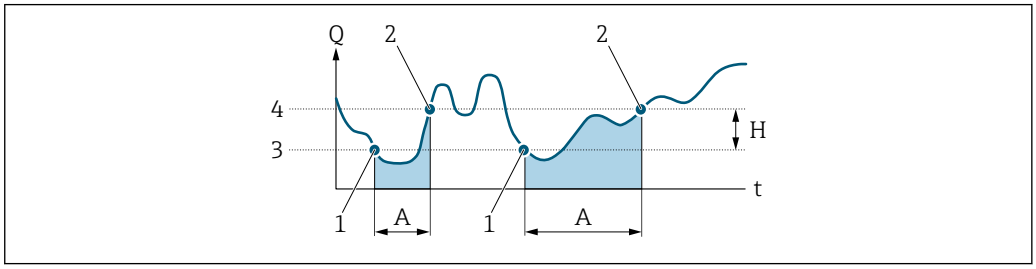
**Prerequisite** A process variable is selected in the **Assign process variable** parameter (→ 78).

**Description** Use this function to enter a switch-off value for low flow cut off. The switch-off value is entered as a positive hysteresis from the switch-on value→ 78.

**User entry** 0 to 100.0 %

**Factory setting** 50 %

**Additional information** *Example*




A0012887

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

## Pressure shock suppression

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

**Prerequisite** A process variable is selected in the **Assign process variable** parameter (→ 78).

**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*

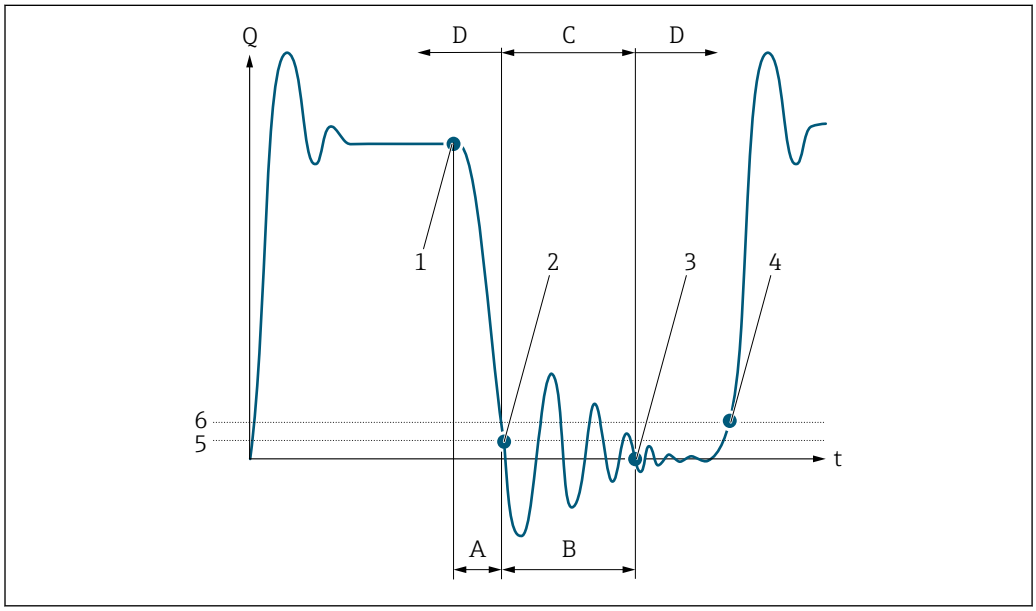
**Pressure shock suppression is enabled**
- Prerequisite:
  Flow rate < on-value of low flow cut off
- Output values
  - Current output: outputs the current corresponding to zero flow
  - Flow displayed: 0
  - Totalizer: the totalizers are pegged at the last correct value

**Pressure shock suppression is disabled**

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

*Example*

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

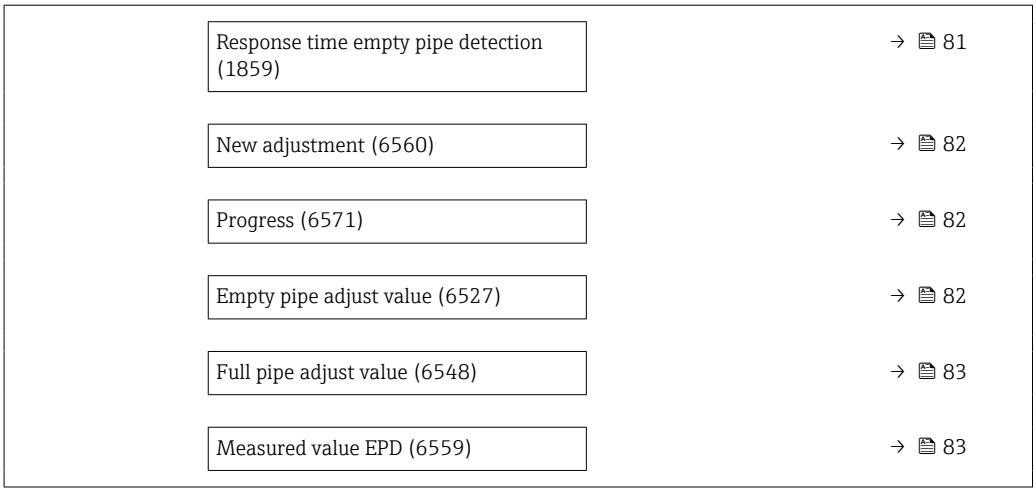



*Q Flow*
*t Time*
*A After run*
*B Pressure shock*
*C Pressure shock suppression active according to the time entered*
*D Pressure shock suppression inactive*
*1 Valve closes*
*2 Flow falls below the on-value of the low flow cut off: pressure shock suppression is activated*
*3 The time entered has elapsed: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

## "Empty pipe detection" submenu

*Navigation* Expert → Sensor → Process param. → Empty pipe det.

| ▶ **Empty pipe detection** | |
|---|---|
| Empty pipe detection (1860) | → 81 |
| Switch point empty pipe detection (6562) | → 81 |




### Empty pipe detection

**Navigation** Expert → Sensor → Process param. → Empty pipe det. → Empty pipe det. (1860)

**Description** Use this function to switch empty pipe detection on and off.

**Selection**
- Off
- On

**Factory setting** Off

### Switch point empty pipe detection

**Navigation** Expert → Sensor → Process param. → Empty pipe det. → Switch point EPD (6562)

**Prerequisite** The **On** option is selected in the **Empty pipe detection** parameter (→ 81).

**Description** Use this function to enter the percentage threshold value of the resistance in relation to the adjustment values.

**User entry** 0 to 100 %

**Factory setting** 50 %

### Response time empty pipe detection

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

**Prerequisite** A process variable is selected in the **Assign process variable** parameter (→ 81).

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

**User entry** 0 to 100 s

**Factory setting** 1 s

### New adjustment

**Navigation** Expert → Sensor → Process param. → Empty pipe det. → New adjustment (6560)

**Prerequisite** The **On** option is selected in the **Empty pipe detection** parameter (→ 81).

**Description** For selecting whether to perform an empty pipe or full pipe adjustment.

**Selection**
- Cancel
- Empty pipe adjust
- Full pipe adjust

**Factory setting** Cancel

### Progress

**Navigation** Expert → Sensor → Process param. → Empty pipe det. → Progress (6571)

**Prerequisite** The **On** option is selected in the **Empty pipe detection** parameter (→ 81).

**Description** Use this function to view the progress.

**User interface**
- Ok
- Busy
- Not ok

### Empty pipe adjust value

**Navigation** Expert → Sensor → Process param. → Empty pipe det. → Empty pipe value (6527)

**Prerequisite**
- In the **Empty pipe detection** parameter (→ 81), the **On** option is selected.
- Adjustment value > full pipe value.

**Description** Use this function to display the adjustment value when the measuring pipe is empty.

**User interface** Positive floating-point number

**Factory setting** 1 000 000 Ohm

### Full pipe adjust value

**Navigation** Expert → Sensor → Process param. → Empty pipe det. → Full pipe value (6548)

**Prerequisite**
- In the **Empty pipe detection** parameter (→ 81), the **On** option is selected.
- Adjustment value < empty pipe value.

**Description** Use this function to display the adjustment value when the measuring pipe is full.

**User interface** Positive floating-point number

**Factory setting** 1 000 Ohm

### Measured value EPD

**Navigation** Expert → Sensor → Process param. → Empty pipe det. → Meas. value EPD (6559)

**Prerequisite** In the **Empty pipe detection** parameter (→ 81), the **On** option is selected.

**Description** Displays the current measured value.

**User interface** Positive floating-point number

## "Electrode cleaning circuit" submenu

*Navigation* Expert → Sensor → Process param. → ECC

| | | |
|---|---|---|
| ▶ **Electrode cleaning cycle** | | |
| | Electrode cleaning cycle (6528) | → 84 |
| | ECC duration (6555) | → 84 |
| | ECC recovery time (6556) | → 84 |
| | ECC interval (6557) | → 85 |
| | ECC polarity (6631) | → 85 |

## Electrode cleaning cycle

**Navigation** Expert → Sensor → Process param. → Elec. clean cycl → Elec. clean cycl (6528)

**Prerequisite** For the following order code:
"Application package", option **EC** "ECC electrode cleaning"

**Description** Use this function to enable and disable cyclic electrode cleaning.

**Selection**
- Off
- On

**Factory setting** On

**Additional information** Conductive deposits on the electrodes and on the walls of the measuring tube (e.g. magnetite) can falsify measurement values. The Electrode Cleaning Circuitry (ECC) was developed to prevent such conductive deposits developing in the vicinity of the electrodes. ECC functions as described above for all available electrode materials except tantalum. If tantalum is used as the electrode material, the ECC protects the electrode surface only against oxidation.

## ECC duration

**Navigation** Expert → Sensor → Process param. → Elec. clean cycl → ECC duration (6555)

**Prerequisite** For the following order code:
"Application package", option **EC** "ECC electrode cleaning"

**Description** Use this function to enter the duration of electrode cleaning in seconds.

**User entry** 0.01 to 30 s

**Factory setting** 2 s

## ECC recovery time

**Navigation** Expert → Sensor → Process param. → Elec. clean cycl → ECC recov. time (6556)

**Prerequisite** For the following order code:
"Application package", option **EC** "ECC electrode cleaning"

**Description** Use this function to enter the recovery time after electrode cleaning to prevent signal output interference. The current output values are frozen in the meanwhile.

**User entry** 1 to 600 s

**Factory setting** 60 s

## ECC interval

**Navigation** Expert → Sensor → Process param. → Elec. clean cycl → ECC interval (6557)

**Prerequisite** For the following order code:
"Application package", option **EC** "ECC electrode cleaning"

**Description** Use this function to enter the pause duration until the next electrode cleaning.

**User entry** 0.5 to 168 h

**Factory setting** 0.5 h

## ECC polarity

**Navigation** Expert → Sensor → Process param. → Elec. clean cycl → ECC polarity (6631)

**Prerequisite** For the following order code:
"Application package", option **EC** "ECC electrode cleaning"

**Description** Displays the polarity of the electrode cleaning circuit.

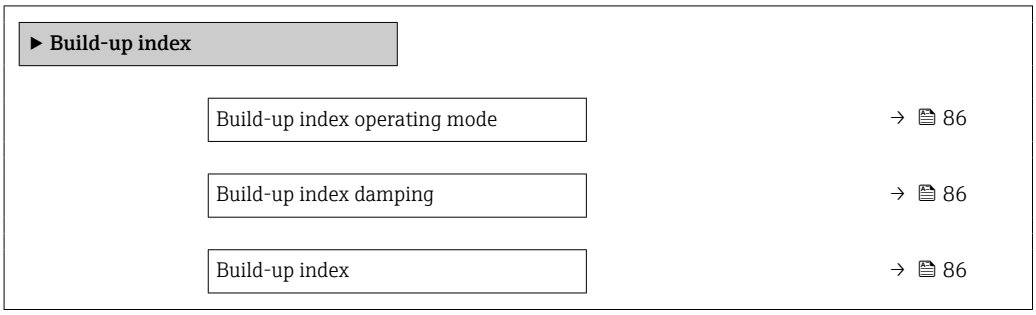
**User interface**
- Positive
- Negative

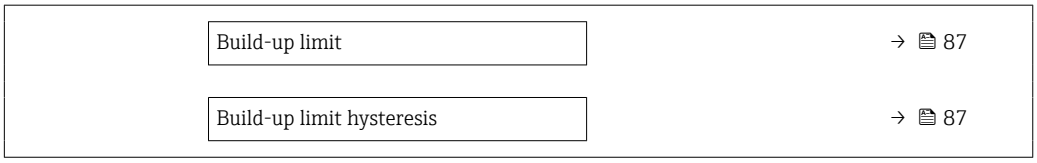
**Factory setting** Depends on the electrode material:
- Tantalum: **Negative** option
- Platinum, Alloy C22, stainless steel: **Positive** option

### "Coating detection" submenu

Build-up detection is only available:
- In conjunction with the Promag W sensor
- In the compact device version (transmitter and sensor form a mechanical unit)
- For detailed information on build-up detection: see the Special Documentation for the **Heartbeat Verification + Monitoring** application package

*Navigation* Expert → Sensor → Process param. → Build-up detect.






### Build-up index operating mode

**Navigation** Expert → Sensor → Process param. → Build-up index → BuildUpIndexMode (6734)

**Description** Select mode of operation for build-up index.

**Selection**
- Off
- Slow
- Standard
- Fast

**Factory setting** Off

### Build-up index damping

**Navigation** Expert → Sensor → Process param. → Build-up index → BuildUpIndexDamp (6840)

**Description** Enter damping value for build-up index.

Damping value:
- 0 = minimum damping
- 15 = maximum damping

The damping value should only be increased if the measured value is unstable.

**User entry** 0 to 15

**Factory setting** 0

### Build-up index

**Navigation** Expert → Sensor → Process param. → Build-up index → Build-up index (12111)

**Description** Shows current build-up index value.

**User interface** 0.0 to 100.0 %

**Factory setting** 0.0 %

**Additional information** The formation of build-up is output as a percentage in the Build-up index value (→ 86) parameter. The higher the percentage, the thicker the build-up.

Build-up index value (→ 🖹 86) = 0%
- No build-up present
- Measuring tube as-delivered state (initial value)
- Measuring tube was cleaned thoroughly after formation of build-up

Build-up index value (→ 🖹 86) = 100%
- Value for the maximum measurable build-up thickness
- The thickness of the build-up at 100% varies depending on the process
- A value of 100% should not be equated with a blocked measuring tube

The percentage indicated in the Build-up index value (→ 🖹 86) parameter does not provide direct information about the absolute thickness or the composition of the build-up. Therefore, to make optimum use of the build-up detection function, it is necessary to first compare the formation of build-up in the process, as known from experience, with the associated Build-up index value (→ 🖹 86). The aim is to determine the Build-up index value (→ 🖹 86) at the time the cleaning is usually performed.

On the basis of the Build-up index value (→ 🖹 86) during cleaning, it is possible to make a valid assessment of the condition inside the measuring tube and to plan the cleaning using the build-up limit and build-up detection hysteresis parameters.

In addition, conclusions about possible effects on neighboring processes can be drawn from the Build-up index value (→ 🖹 86).

### Build-up limit

**Navigation** Expert → Sensor → Process param. → Build-up index → Build-up limit (6466)

**Description** Enter limit value for the build-up index.

**User entry** 0 to 100 %

**Factory setting** 50 %

### Build-up limit hysteresis

**Navigation** Expert → Sensor → Process param. → Build-up index → BuildUpLimitHyst (6467)

**Description** Enter hysteresis for build-up limit value.

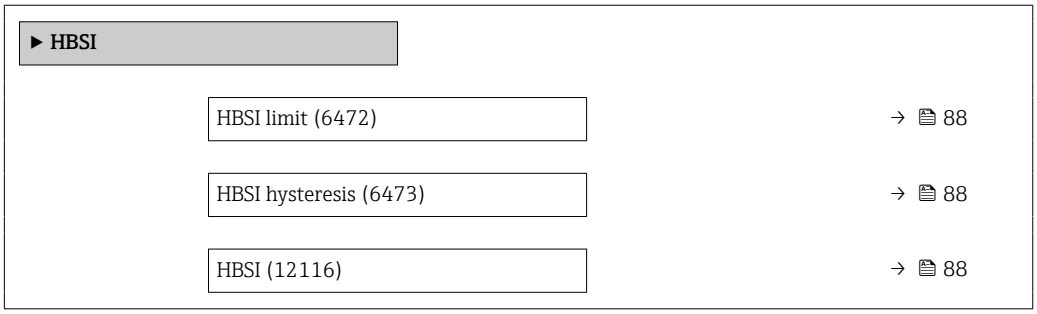
If the value for build-up detection hysteresis is higher than the Build-up limit (→ 🖹 87), the "Build-up detected" diagnostic information is not reset until the measuring tube has been cleaned and a restart has been performed.

**User entry** 0 to 100 %

**Factory setting** 20 %

**"HBSI" submenu**

*Navigation* Expert → Sensor → Process param. → HBSI




### HBSI limit

**Navigation** Expert → Sensor → Process param. → HBSI → HBSI limit (6472)

**Description** Enter HBSI limit value.

**User entry** 0 to 100 %

**Factory setting** 4 %

### HBSI hysteresis

**Navigation** Expert → Sensor → Process param. → HBSI → HBSI hysteresis (6473)

**Description** Enter hysteresis for HBSI limit value.

**User entry** 0 to 100 %

**Factory setting** 1 %

### HBSI

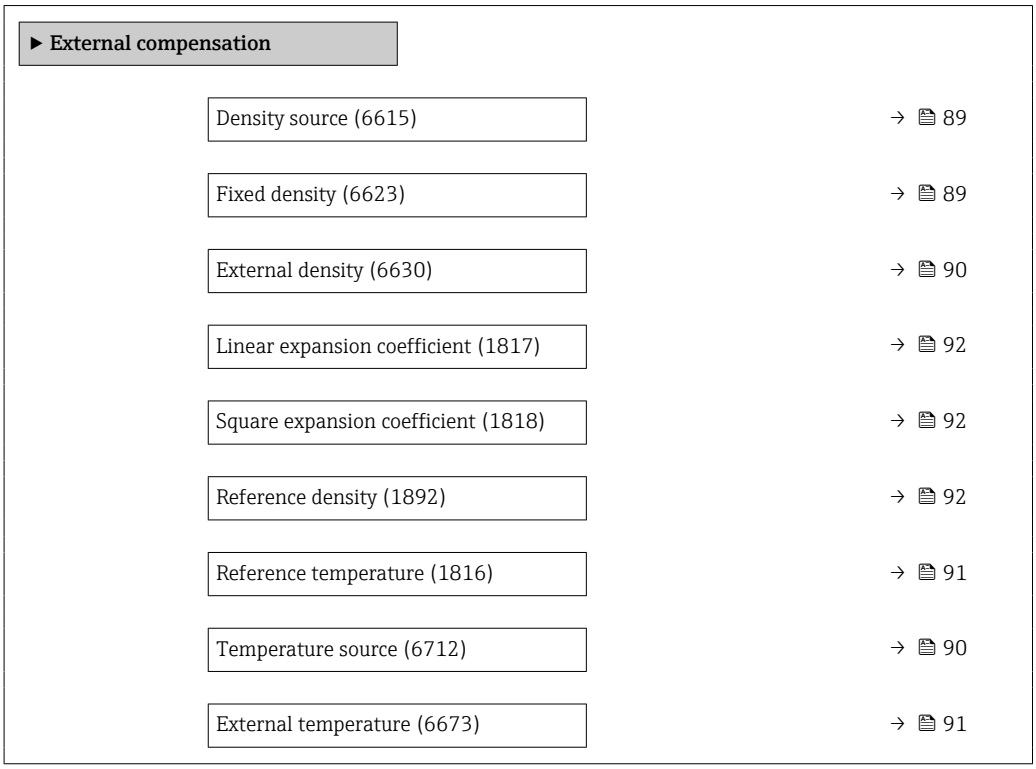
**Navigation** Expert → Sensor → Process param. → HBSI → HBSI (12116)

**Description** Displays the relative change of the entire sensor, with all its electrical, mechanical and electromechanical components incorporated in the sensor housing (including the measuring tube, electrodynamic pick-ups, excitation system, cables etc.), in % of the reference value.

**User interface** −100.0 to 100.0 %

### 3.2.4 "External compensation" submenu

*Navigation* Expert → Sensor → External comp.




**Density source**

**Navigation** Expert → Sensor → External comp. → Density source (6615)

**Description** Use this function to select the density source.

**Selection**
- Fixed density
- External density *
- Current input 1 *
- Current input 2 *
- Current input 3 *
- Calculated value

**Factory setting** Fixed density

**Fixed density**

**Navigation** Expert → Sensor → External comp. → Fixed density (6623)

**Prerequisite** The **Fixed density** option is selected in the **Density source** parameter (→ 89).

* Visibility depends on order options or device settings

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

**User entry** Positive floating-point number

**Factory setting** Depends on country:
- 1 000 kg/m³
- 62 lb/ft³

**Additional information** *Dependency*

The unit is taken from the **Density unit** parameter (→ 62)

## External density

**Navigation** Expert → Sensor → External comp. → External density (6630)

**Prerequisite** The **External density** option is selected in the **Density source** parameter (→ 89).

**Description** Displays the density read in from the external device.

**User entry** Positive floating-point number

**Additional information** *Dependency*

The unit is taken from the **Density unit** parameter (→ 62)

## Temperature source

**Navigation** Expert → Sensor → External comp. → Temp. source (6712)

**Description** Use this function to select the temperature source.

**Selection**
- Internal temperature sensor *
- Off
- External value *
- Current input 1 *
- Current input 2 *
- Current input 3 *

**Factory setting** Off

* Visibility depends on order options or device settings

## External temperature

**Navigation** Expert → Sensor → External comp. → External temp. (6673)

**Prerequisite** The **External value** option is selected in the **Temperature source** parameter (→ 90).

**Description** Displays the temperature read in from the external device.

**User entry** Floating point number with sign

**Additional information** *Dependency*

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

## Reference temperature

**Navigation** Expert → Sensor → External comp. → Ref. temperature (1816)

**Prerequisite** The **Fixed density** option or **External density** option are selected in the **Density source** parameter (→ 89).

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

**User interface** −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

- $\rho_N$: reference density
- $\rho$: fluid density currently measured
- t: fluid temperature currently measured
- $t_N$: reference temperature at which the reference density is calculated (e.g. 20 °C)
- $\Delta t$: $t - t_N$
- $\alpha$: linear expansion coefficient of the fluid, unit = [1/K]; K = Kelvin
- $\beta$: square expansion coefficient of the fluid, unit = [1/K²]

## Linear expansion coefficient

**Navigation** Expert → Sensor → External comp. → Linear exp coeff (1817)

**Prerequisite** The **Calculated value** option is selected in the **Density source** parameter (→ 89) parameter.

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

**User interface** Signed floating-point number

**Factory setting** $-2.0295 \cdot 10^{-04}$ 1/K

## Square expansion coefficient

**Navigation** Expert → Sensor → External comp. → Square exp coeff (1818)

**Prerequisite** The **Calculated value** option is selected in the **Density source** parameter (→ 89) 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 interface** Signed floating-point number

**Factory setting** $-3.8436 \cdot 10^{-06}$ 1/K²

## Reference density

**Navigation** Expert → Sensor → External comp. → Ref. density (1892)

**Prerequisite** The **Calculated value** option is selected in the **Density source** parameter (→ 89) parameter.

**Description** Displays the reference density.

**User interface** Positive floating-point number

**Additional information** *Description*

The reference density is required for density calculation.

*Deviation of the process temperature from the reference temperature:*

$\Delta T = T - T_{ref}$

*ΔT:* *Deviation*

*T:* *Process temperature*

$T_{ref}$: *Reference temperature (→ 91)*

*Temperature-compensated density:*

$\rho_{comp} = \rho_{ref}(1 + \alpha\Delta T + \beta\Delta T^2)$

$\rho_{comp}$: *Calculated density*

$\rho_{ref}$: *Reference density*

$\Delta T$: *Deviation of the process temperature from the reference temperature*

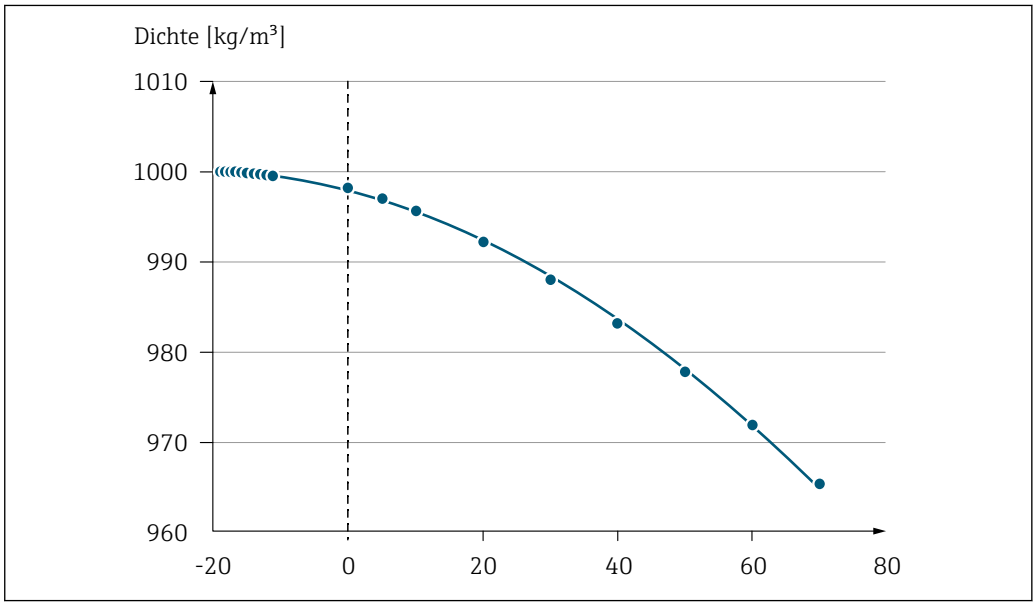
$\alpha$: *Linear expansion coefficient (→ 92)*

$\beta$: *Square expansion coefficient (→ 92)*

*Example for water (factory setting)*

For a reference temperature of $T_{ref}$ = 20 °C

A quadratic fit of a number of density values results in the following coefficients:
- $\alpha = -2.0295 \cdot 10^{-4}$ 1/K
- $\beta = -3.8436 \cdot 10^{-6}$ 1/K²
- $\rho_{ref}$ = 997.82 kg/m³




2 *Quadratic fit*

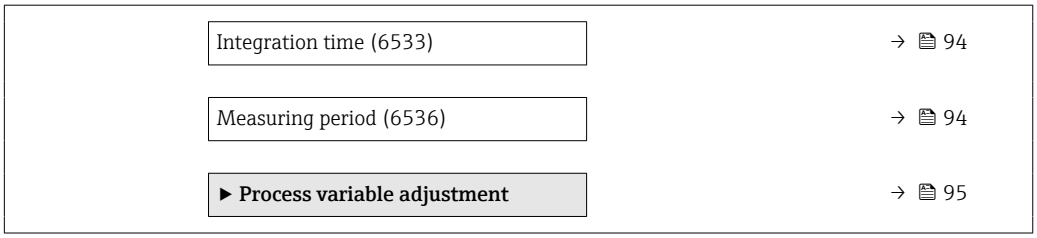
*Dependency*

The unit is taken from the **Density unit** parameter (→ 62)

## 3.2.5 "Sensor adjustment" submenu

*Navigation* Expert → Sensor → Sensor adjustm.

| ▶ **Sensor adjustment** | | |
|---|---|---|
| | Installation direction (1809) | → 94 |




## Installation direction

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

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

**Selection**
- Forward flow
- Reverse flow

**Factory setting** Forward flow

**Additional information** *Description*

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

## Integration time

**Navigation** Expert → Sensor → Sensor adjustm. → Integration time (6533)

**Description** Use this function to display the duration of the integration time.

**User interface** 1 to 65 ms

**Factory setting** Depends on country and nominal diameter

## Measuring period

**Navigation** Expert → Sensor → Sensor adjustm. → Measuring period (6536)

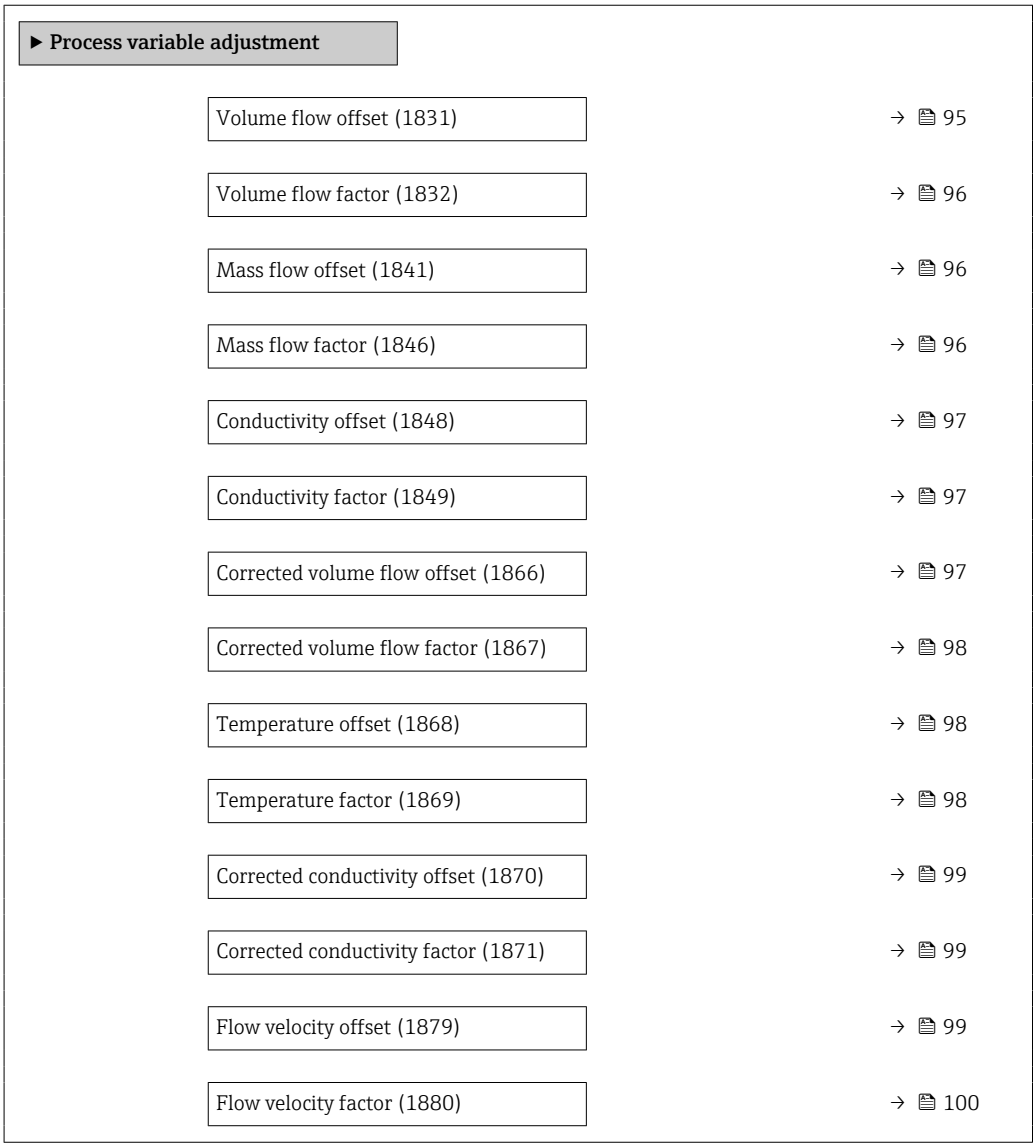
**Description** Use this function to display the time of a full measuring period.

**User interface** 0 to 1 000 ms

**Factory setting** Depends on country and nominal diameter

### "Process variable adjustment" submenu

*Navigation* Expert → Sensor → Sensor adjustm. → Variable adjust




## Volume flow offset

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

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

**User entry** Signed floating-point number

**Factory setting** 0 $m^3/s$

**Additional information** *Description*

Corrected value = (factor × value) + offset

### Volume flow factor

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

**Description** Enter quantity factor for the volume flow value.

**User entry** Positive floating-point number

**Factory setting** 1

**Additional information** *Description*

Corrected value = (factor × value) + offset

### Mass flow offset

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

**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 (1846)

**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

## Conductivity offset

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

**Prerequisite** The **On** option is selected in the **Conductivity measurement** parameter (→ 76).

**Description** Use this function to enter the zero point shift for the conductivity trim. The conductivity unit on which the shift is based is S/m.

**User entry** Signed floating-point number

**Factory setting** 0 S/m

**Additional information** *Description*

Corrected value = (factor × value) + offset

## Conductivity factor

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

**Prerequisite** The **On** option is selected in the **Conductivity measurement** parameter (→ 76).

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

**User entry** Positive floating-point number

**Factory setting** 1

**Additional information** *Description*

Corrected value = (factor × value) + offset

## Corrected volume flow offset

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

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

**User entry** Signed floating-point number

**Factory setting** 0 $Nm^3/s$

**Additional information** *Description*

Corrected value = (factor × value) + offset

## Corrected volume flow factor

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

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

**User entry** Positive floating-point number

**Factory setting** 1

**Additional information** *Description*

Corrected value = (factor × value) + offset

## Temperature offset

**Navigation** Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. offset (1868)

**Prerequisite** One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

**Description** Use this function to enter the zero point shift for the temperature trim. The temperature unit on which the shift is based is 1 K.

**User entry** Signed floating-point number

**Factory setting** 0 K

**Additional information** *Description*

Corrected value = (factor × value) + offset

## Temperature factor

**Navigation** Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor (1869)

**Prerequisite** One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

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

**User entry** Positive floating-point number

**Factory setting** 1

**Additional information** *Description*

Corrected value = (factor × value) + offset

## Corrected conductivity offset

**Navigation** Expert → Sensor → Sensor adjustm. → Variable adjust → Corr.cond.offset (1870)

**Prerequisite** The **On** option is selected in the **Conductivity measurement** parameter (→ 76).

**Description** Use this function to enter the zero point shift to trim the corrected conductivity. The conductivity unit on which the shift is based is µS/cm.

**User entry** Signed floating-point number

**Factory setting** 0 S/m

**Additional information** *Description*

Corrected value = (factor × value) + offset

## Corrected conductivity factor

**Navigation** Expert → Sensor → Sensor adjustm. → Variable adjust → Corr.cond.factor (1871)

**Prerequisite** The **On** option is selected in the **Conductivity measurement** parameter (→ 76).

**Description** Use this function to enter a quantity factor for the corrected conductivity. In each case, this factor refers to the conductivity in µS/cm.

**User entry** Positive floating-point number

**Factory setting** 1

**Additional information** *Description*

Corrected value = (factor × value) + offset

## Flow velocity offset

**Navigation** Expert → Sensor → Sensor adjustm. → Variable adjust → Flow vel. offset (1879)

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

**User entry** Signed floating-point number

**Factory setting** 0 m/s

**Additional information** *Description*

Corrected value = (factor × value) + offset

**Flow velocity factor**

**Navigation** Expert → Sensor → Sensor adjustm. → Variable adjust → Flow vel. factor (1880)

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

**User entry** Positive floating-point number

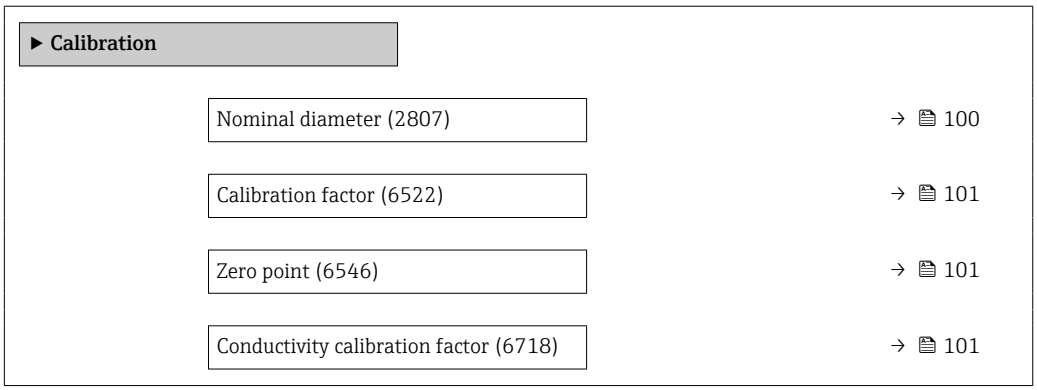
**Factory setting** 1

**Additional information** *Description*

Corrected value = (factor × value) + offset

## 3.2.6 "Calibration" submenu

*Navigation* Expert → Sensor → Calibration




**Nominal diameter**

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

**Description** Displays the nominal diameter of the sensor.

**User interface** DNxx / x"

**Factory setting** Depends on the size of the sensor

**Additional information** *Description*

The value is also specified on the sensor nameplate.

### Calibration factor

**Navigation** Expert → Sensor → Calibration → Cal. factor (6522)

**Description** Displays the current calibration factor for the sensor.

**User interface** Positive floating-point number

**Factory setting** Depends on nominal diameter and calibration.

### Zero point

**Navigation** Expert → Sensor → Calibration → Zero point (6546)

**Description** This function shows the zero point correction value for the sensor.

**User interface** Signed floating-point number

**Factory setting** Depends on nominal diameter and calibration

### Conductivity calibration factor

**Navigation** Expert → Sensor → Calibration → Cond. cal. fact. (6718)

**Prerequisite** In the **Conductivity measurement** parameter (→ 76), the **On** option is selected.

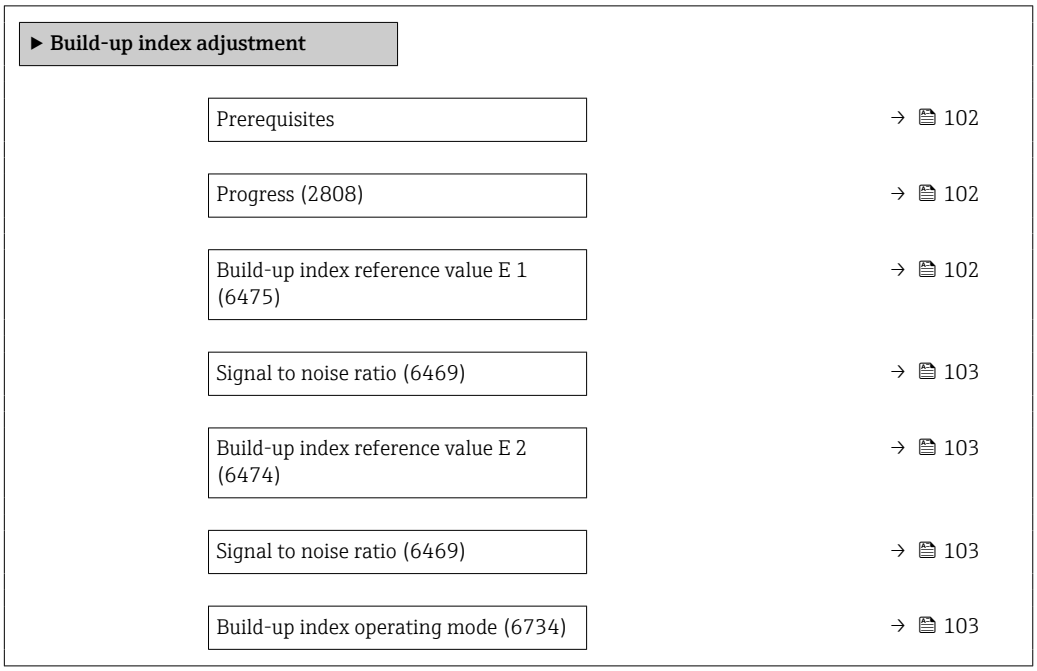
**Description** Displays the calibration factor for the conductivity measurement.

**User interface** 0.01 to 10 000

## 3.2.7 "Build-up index adjustment" wizard

Complete this wizard to adjust the reference values of the build-up index for each electrode (E1 and E2) and activate the build-up index for build-up measurement.

*Navigation* Expert → Sensor → BuildUpIndAdjust




## Prerequisites

**Navigation** Expert → Sensor → BuildUpIndAdjust → Prerequisites

**Description** The following conditions must be met before performing a build-up index adjustment.

**User interface**
- The sensor is free of build-up
- The measuring tube is completely filled

## Progress

**Navigation** Expert → Sensor → BuildUpIndAdjust → Progress (2808)

**Description** The progress of the process is indicated.

**User interface** 0 to 100 %

## Build-up index reference value E 1

**Navigation** Expert → Sensor → BuildUpIndAdjust → BuildUpIndRefE 1 (6475)

**Description** Shows the reference value 'Build-up free sensor' measured for electrode E1.

**User interface** 0 to 1

**Signal to noise ratio**

**Navigation** Expert → Sensor → BuildUpIndAdjust → SNR (6469)

**Description** Shows the signal to noise ratio during the measurement. A value between 1.0 - 2.0 is sufficient to excellent.

**User interface** Signed floating-point number

**Build-up index reference value E 2**

**Navigation** Expert → Sensor → BuildUpIndAdjust → BuildUpIndRefE 2 (6474)

**Description** Shows the reference value 'Build-up free sensor' measured for electrode E2.

**User interface** 0 to 1

**Build-up index operating mode**

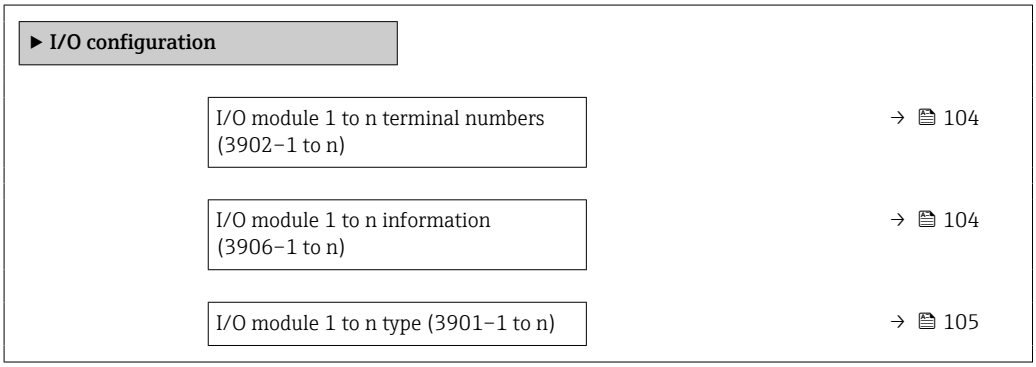
**Navigation** Expert → Sensor → BuildUpIndAdjust → BuildUpIndexMode (6734)

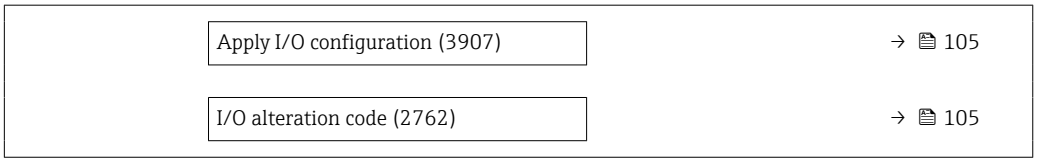
**Description** Select mode of operation for build-up index.

**Selection**
- Off
- Slow
- Standard
- Fast

## 3.3 "I/O configuration" submenu

*Navigation* Expert → I/O config.






## I/O module 1 to n terminal numbers

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

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

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

## I/O module 1 to n information

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

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

**User interface**
- Not plugged
- Invalid
- Not configurable
- Configurable
- HART

**Additional information**

*"Not plugged" option*

The I/O module is not plugged in.

*"Invalid" option*

The I/O module is not plugged correctly.

*"Not configurable" option*

The I/O module is not configurable.

*"Configurable" option*

The I/O module is configurable.

*"Fieldbus" option*

The I/O module is configured for HART.

* Visibility depends on order options or device settings

## I/O module 1 to n type

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

**Prerequisite** For the following order code:
- "Output; input 2", option **D** "Configurable I/O initial setting off"
- "Output; input 3", option **D** "Configurable I/O initial setting off"
- "Output; input 4", option **D** "Configurable I/O initial setting off"

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

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

**Factory setting** Off

## Apply I/O configuration

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

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

**Selection**
- No
- Yes

**Factory setting** No

## I/O alteration code

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

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

**User entry** Positive integer

**Factory setting** 0

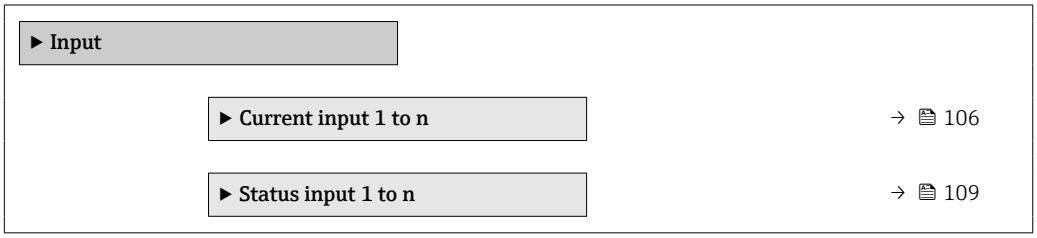
* Visibility depends on order options or device settings

**Additional information** *Description*

The I/O configuration is changed in the **I/O module type** parameter (→ 105).

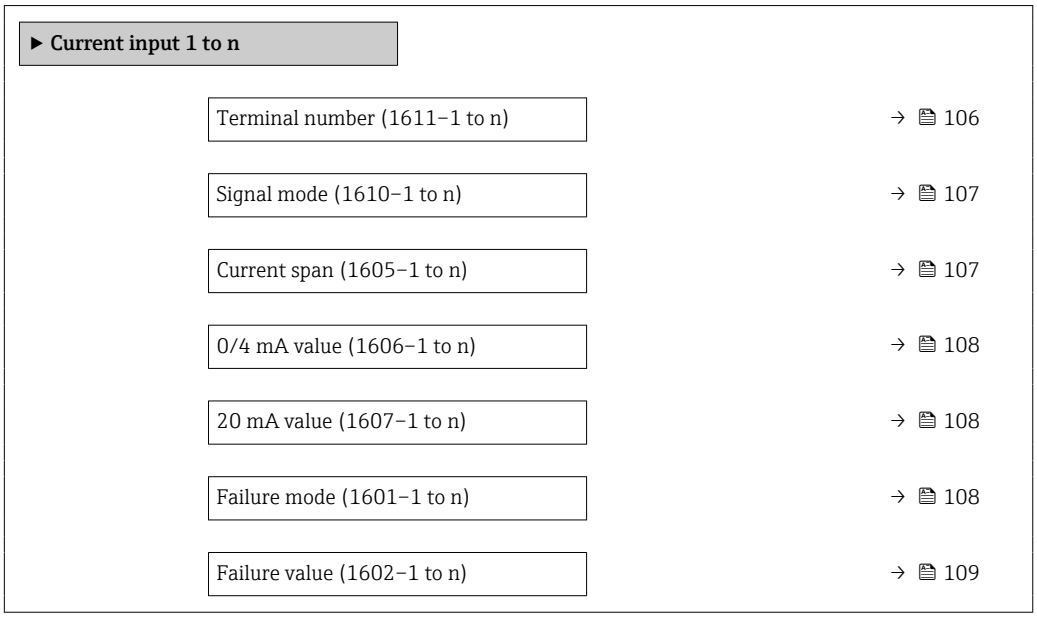
## 3.4 "Input" submenu

*Navigation* Expert → Input




### 3.4.1 "Current input 1 to n" submenu

*Navigation* Expert → Input → Current input 1 to n




**Terminal number**

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

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

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

**Additional information**
*"Not used" option*

The current input module does not use any terminal numbers.

## Signal mode

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

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

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

**Selection**
- Passive
- Active *

**Factory setting** Active

## Current span

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

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

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

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

**Additional information**
*Examples*

Sample values for the current range: **Current span** parameter (→ 114)

* Visibility depends on order options or device settings

## 0/4 mA value

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

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

**User entry** Signed floating-point number

**Factory setting** 0

**Additional information**

*Current input behavior*

The current input behaves differently depending on the settings configured in the following parameters:
- Current span (→ 107)
- Failure mode (→ 108)

*Configuration examples*

Pay attention to the configuration examples for **4 mA value** parameter (→ 115).

## 20 mA value

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

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

**User entry** Signed floating-point number

**Factory setting** Depends on country and nominal diameter

**Additional information**

*Configuration examples*

Pay attention to the configuration examples for **4 mA value** parameter (→ 115).

## Failure mode

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

**Description** Use this function to select the input behavior when measuring a current outside the configured **Current span** parameter (→ 107).

**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 (→ 109)).

**Failure value**

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

**Prerequisite** In the **Failure mode** parameter (→ 108), the **Defined value** option is selected.

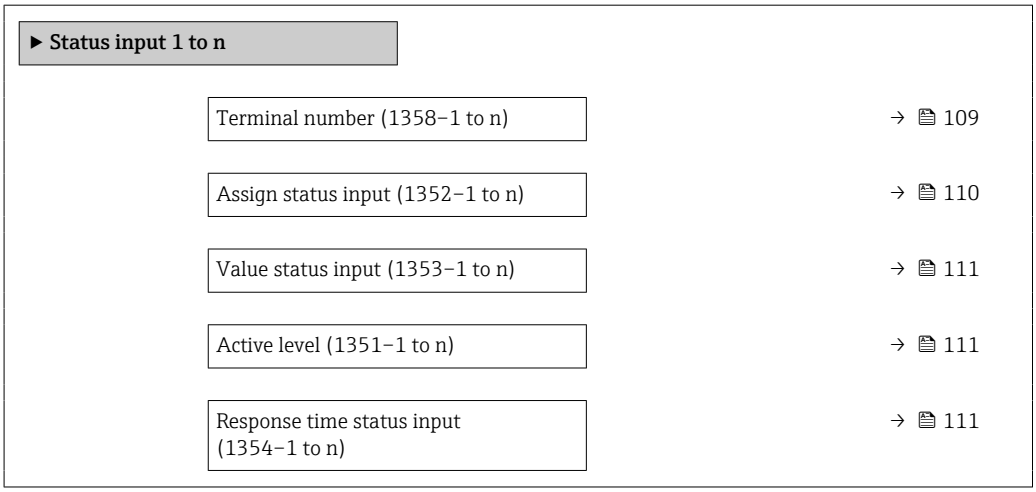
**Description** Use this function to enter the value that the device uses if it does not receive an input signal from the external device, or if the input signal is invalid.

**User entry** Signed floating-point number

**Factory setting** 0

## 3.4.2 "Status input 1 to n" submenu

*Navigation* Expert → Input → Status input 1 to n




**Terminal number**

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

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

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

**Additional information** *"Not used" option*

The status input module does not use any terminal numbers.

## Assign status input

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

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

**Selection**
- Off
- Reset totalizer 1
- Reset totalizer 2
- Reset totalizer 3
- Reset all totalizers
- Flow override

**Factory setting** Off

**Additional information** *Custody transfer mode*

Only available for Promag H.

**NOTE!**

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

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

**Additional information** *Selection*
- Off
  The status input is switched off.
- Reset totalizer 1…3
  The individual totalizers are reset.
- Reset all totalizers
  All totalizers are reset.
- Flow override
  The Flow override (→ 75) is activated.

Note on the Flow override (→ 75):
- The Flow override (→ 75) is enabled as long as the level is at the status input (continuous signal).
- All other assignments react to a change in level (pulse) at the status input.

* Visibility depends on order options or device settings

### Value status input

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

**Description** Displays the current input signal level.

**User interface**
- High
- Low

### Active level

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

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

**Selection**
- High
- Low

**Factory setting** High

### Response time status input

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

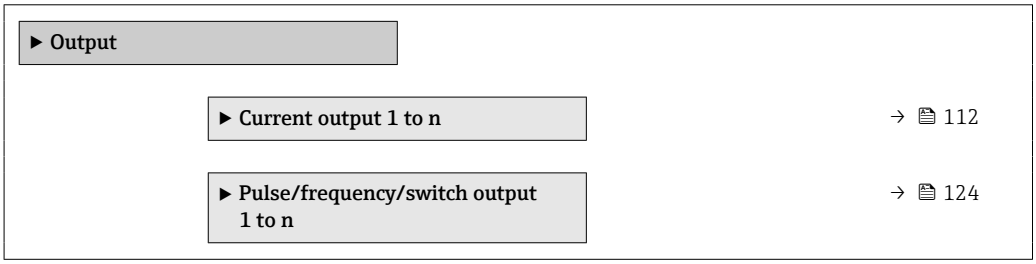
**Description** Use this function to enter the minimum time period for which the input signal level must be present before the selected function is activated.

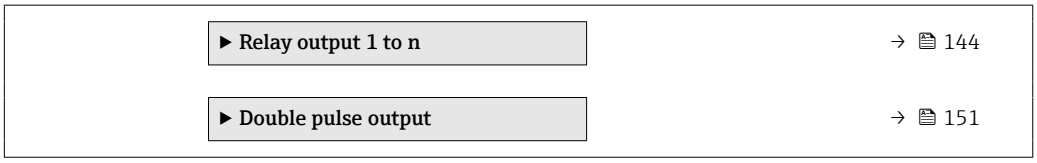
**User entry** 5 to 200 ms

**Factory setting** 50 ms

## 3.5 "Output" submenu

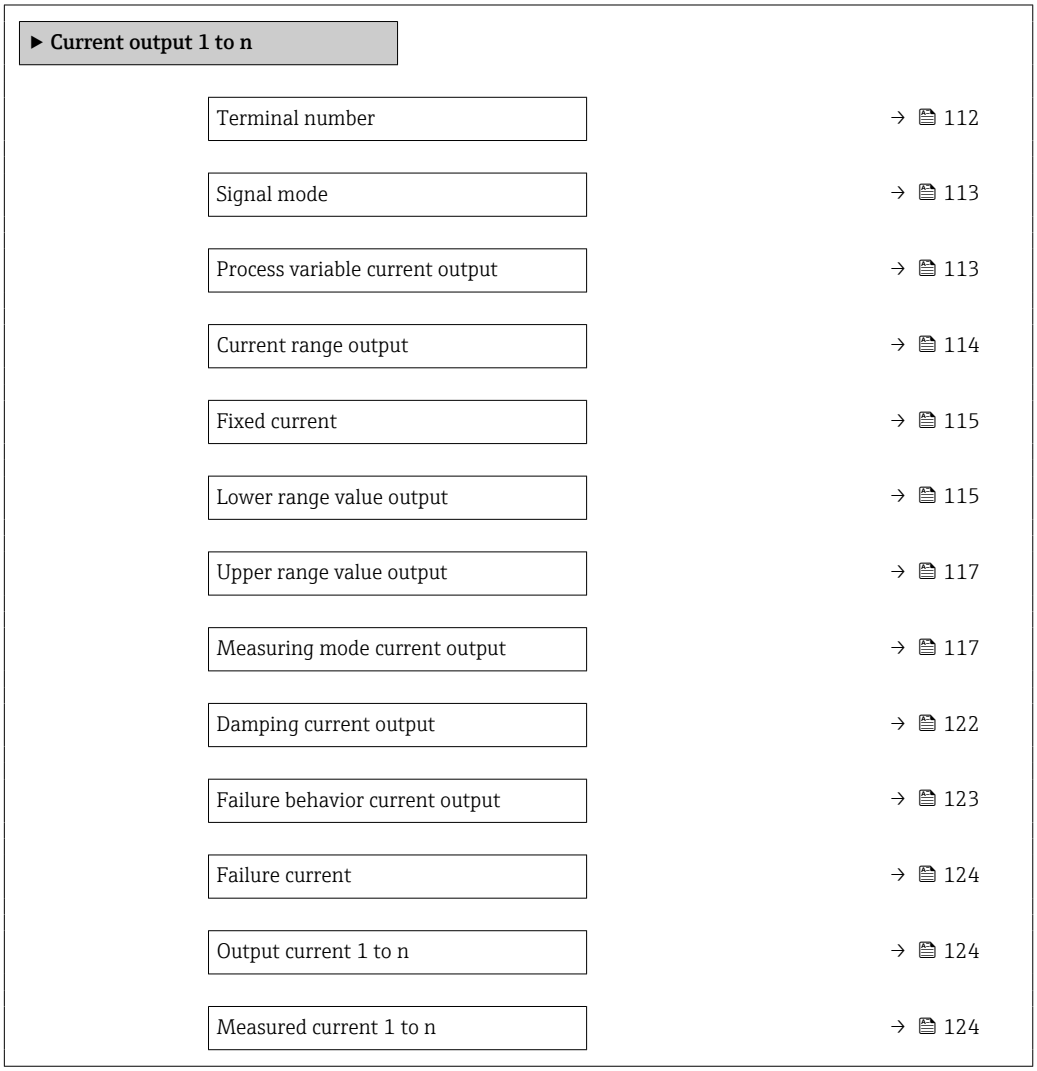
*Navigation* Expert → Output






### 3.5.1 "Current output 1 to n" submenu

*Navigation* Expert → Output → Curr.output 1 to n




**Terminal number**

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

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

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

**Additional information** *"Not used" option*

The current output module does not use any terminal numbers.

## Signal mode

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

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

**Selection**
- Active *
- Passive *

**Factory setting** Active

## Process variable current output

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

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

**Selection**
- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity
- Corrected conductivity *
- Temperature *
- Electronics temperature
- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- HBSI *
- Build-up index *
- Test point 1
- Test point 2
- Test point 3

**Factory setting** Volume flow

* Visibility depends on order options or device settings

## Current range output

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

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

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

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

**Additional information**

*Description*

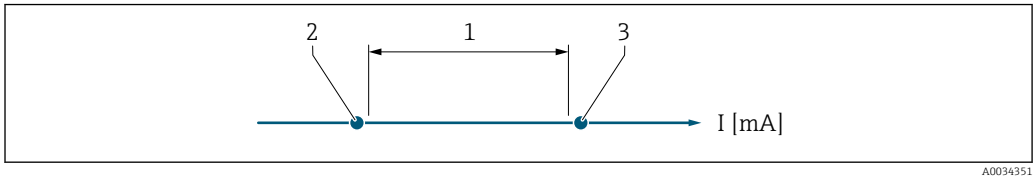
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→ 123).
- If the measured value is outside the measuring range, the ⚠**S441 Current output 1 to n** diagnostic message is displayed.
- The measuring range is specified via the **Lower range value output** parameter (→ 115) and **Upper range value output** parameter (→ 117).

*"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 (→ 115).

*Example*

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




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

*Selection*

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

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

## Fixed current

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

**Prerequisite** The **Fixed current** option is selected in the **Current span** parameter (→ 114).

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

**User entry** 0 to 22.5 mA

**Factory setting** 22.5 mA

## Lower range value output

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

**Prerequisite** One of the following options is selected in the **Current span** parameter (→ 114):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

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

**User entry** Signed floating-point number

**Factory setting** Depends on country:
- 0 l/h
- 0 gal/min (us)

**Additional information**

*Description*

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 113). In addition, the value can be greater than or smaller than the value assigned for the 20 mA current in the **Upper range value output** parameter (→ 117).

*Dependency*

The unit depends on the process variable selected in the **Assign current output** parameter (→ 113).

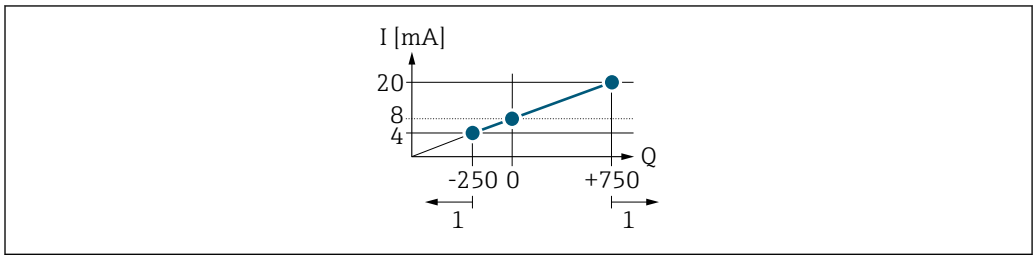
*Current output behavior*

The current output behaves differently depending on the settings configured in the following parameters:
- Current span (→ 114)
- Failure mode (→ 123)

*Configuration examples*

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

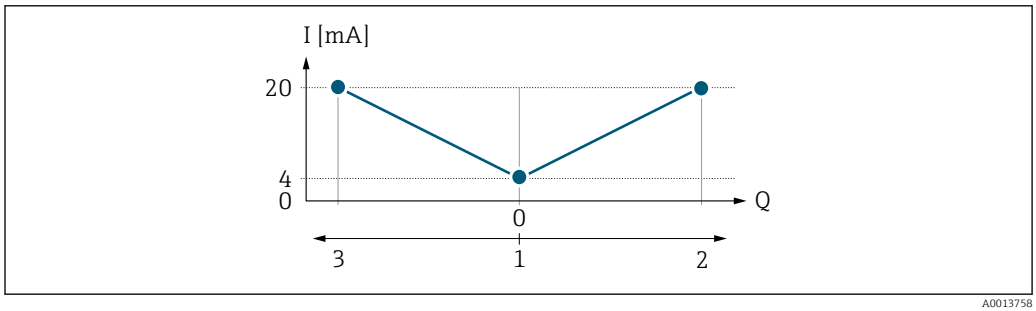
**Configuration example A**
Measurement mode with **Forward flow** option
- **Lower range value output** parameter (→ 115) = not equal to zero flow (e.g. −250 $m^3$/h)
- **Upper range value output** parameter (→ 117) = not equal to zero flow (e.g. +750 $m^3$/h)
- Calculated current value = 8 mA at zero flow




*Q Flow*
*I Current*
*1 Measuring range is exceeded or undershot*

The operational range of the measuring device is defined by the values entered for the **Lower range value output** parameter (→ 115) and **Upper range value output** parameter (→ 117). If the effective flow exceeds or falls below this operational range, the ⚠**S441 Current output 1 to n** diagnostic message is output.

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




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

The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **Lower range value output** parameter (→ 115) and **Upper range value output** parameter (→ 117) must have the same algebraic sign. The value for the **Upper range value output** parameter (→ 117) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 117) (e.g. forward flow).

**Configuration example C**
Measurement mode with **Reverse flow compensation** option
If flow is characterized by severe fluctuations (e.g. when using reciprocating pumps), flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s → 117.

## Upper range value output

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

**Prerequisite** One of the following options is selected in the **Current span** parameter (→ 114):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

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

**User entry** Signed floating-point number

**Factory setting** Depends on country and nominal diameter → 260

**Additional information**

*Description*

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 113). In addition, the value can be greater than or smaller than the value assigned for the 0/4 mA current in the **Lower range value output** parameter (→ 115).

*Dependency*

The unit depends on the process variable selected in the **Assign current output** parameter (→ 113).

*Example*

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

If the **Forward/Reverse flow** option is selected in the **Measuring mode** parameter (→ 117), different algebraic signs cannot be entered for the values for the **Lower range value output** parameter (→ 115) and **Upper range value output** parameter (→ 117). The ⚠**S441 Current output 1 to n** diagnostic message is displayed.

*Configuration examples*

Pay attention to the configuration examples for the **Lower range value output** parameter (→ 115).

## Measuring mode current output

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

**Prerequisite** One of the following options is selected in the **Assign current output** parameter (→ 113):
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity

- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature

One of the following options is selected in the **Current span** parameter (→ 114):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

**Description**

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

**Selection**

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

**Factory setting**

Forward flow

**Additional information**

*Description*

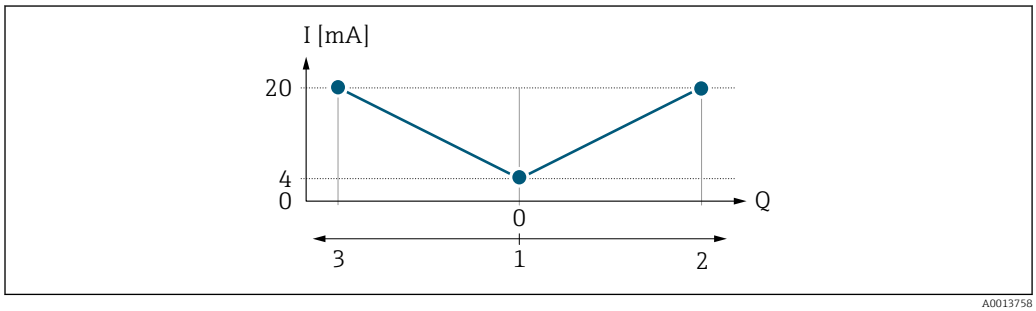
The process variable that is assigned to the current output via the **Assign current output** parameter (→ 113) is displayed below the parameter.

*"Forward flow" option*

The current output signal is proportional to the process variable assigned. The measuring range is defined by the values that are assigned to the **Lower range value output** parameter (→ 115) and the **Upper range value output** parameter (→ 117).

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

*"Forward/Reverse flow" option*




A0013758

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

* Visibility depends on order options or device settings

- The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **Lower range value output** parameter (→ 115) and **Upper range value output** parameter (→ 117) must have the same algebraic sign.
- The value for the **Upper range value output** parameter (→ 117) (e.g. reverse flow) corresponds to the mirrored value for the **Upper range value output** parameter (→ 117) (e.g. forward flow).

*"Reverse flow compensation" option*

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

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

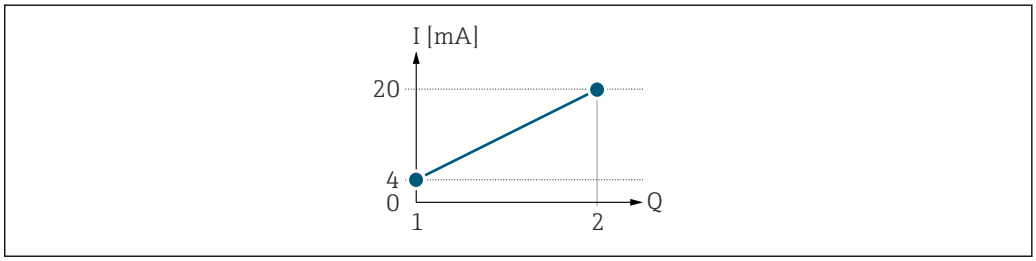
In the event of prolonged and undesired reverse flow, flow values can accumulate in the buffer memory. Due to the configuration of the current output, these values are not factored in, however, i.e. there is no compensation for the reverse flow.

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

*Examples of how the current output behaves*

**Example 1**

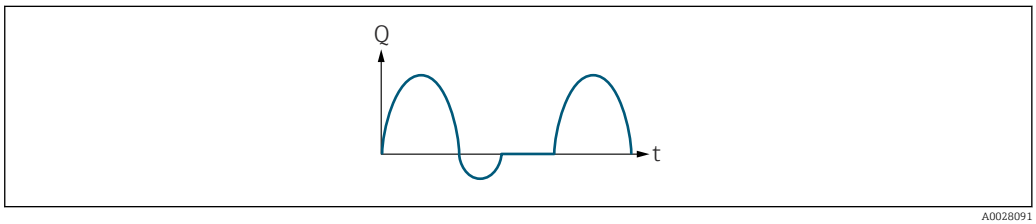
Defined measuring range: lower range value and upper range value with the **same** sign




*3 Measuring range*

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

With the following flow response:

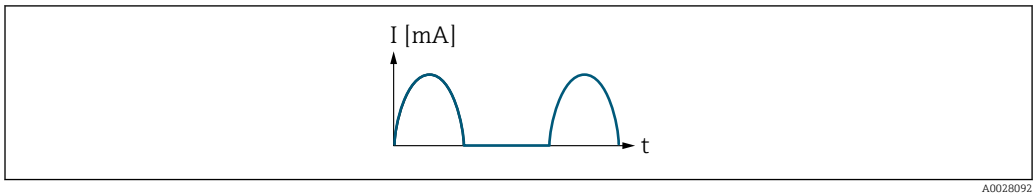



*4 Flow response*

*Q Flow*
*t Time*

With **Forward flow** option

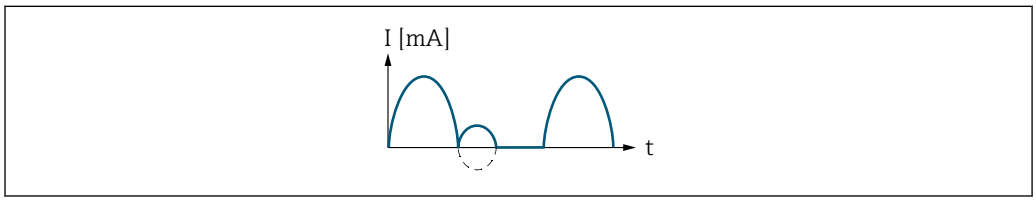
The current output signal is proportional to the process variable assigned. The flow components outside the scaled measuring range are not taken into account for signal output:.




*I* *Current*
*t* *Time*

With **Forward/Reverse flow** option

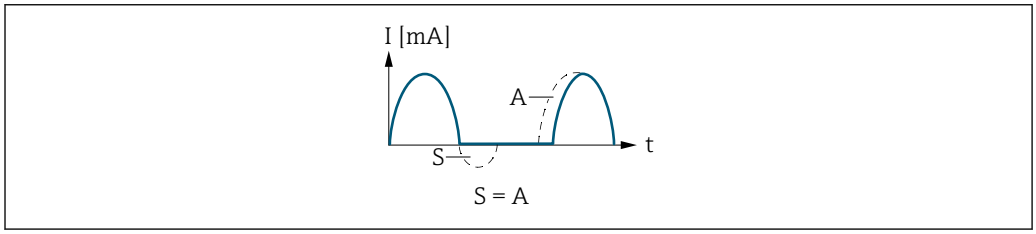
The current output signal is independent of the direction of flow.




*I* *Current*
*t* *Time*

With **Reverse flow compensation** option

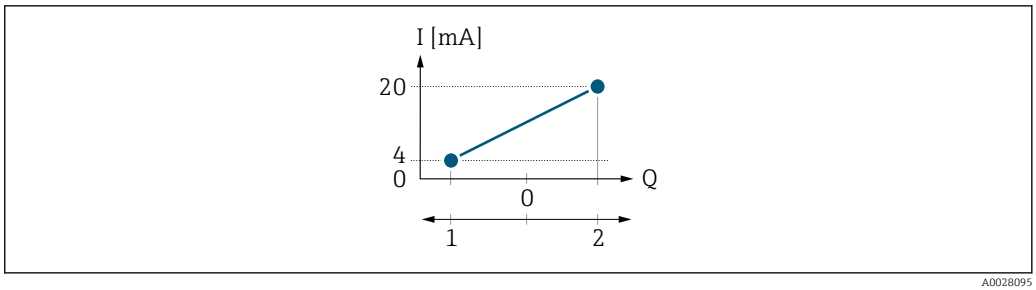
Flow components outside the measuring span are buffered, balanced and output after a maximum delay of 60 s.




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

### Example 2

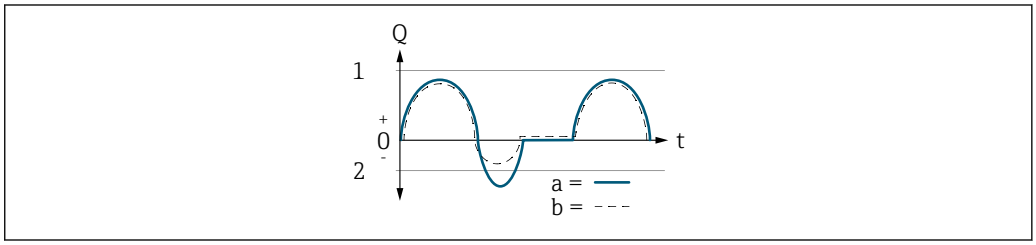
Defined measuring range: lower range value and upper range value with **different** signs




5 *Measuring range*

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

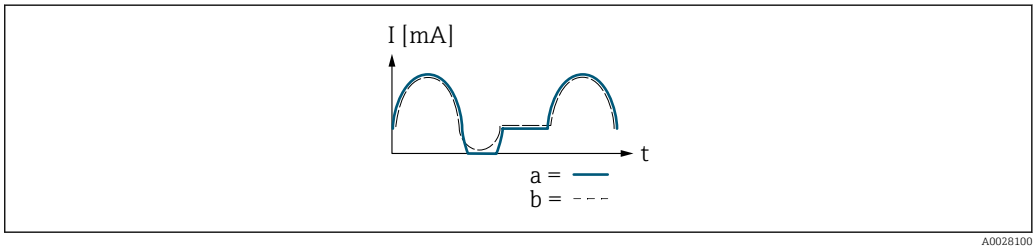
With flow a (—) outside, b (- -) inside the measuring range




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

With **Forward flow** option

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



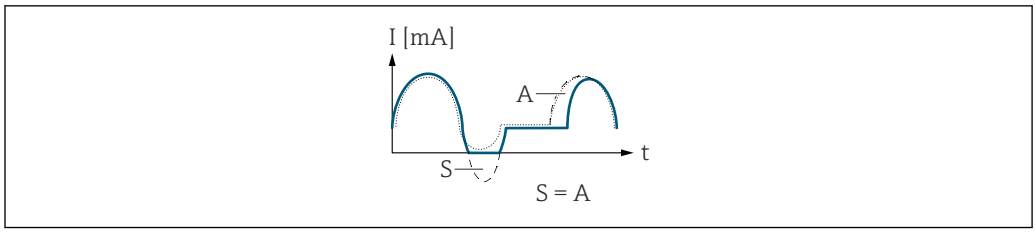

*I Current*
*t Time*

With **Forward/Reverse flow** option

This option cannot be selected here since the values for the **Lower range value output** parameter (→ 115) and **Upper range value output** parameter (→ 117) have different algebraic signs.

With **Reverse flow compensation** option

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




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

## Damping current output

**Navigation** Expert → Output → Curr.output 1 to n → Damp.curr.outp (0363–1 to n)

**Prerequisite** A process variable is selected in the **Assign current output** parameter (→ 113) and one of the following options is selected in the **Current span** parameter (→ 114):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

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

**User entry** 0.0 to 999.9 s

**Factory setting** 1.0 s

**Additional information** *User entry*

Use this function to enter a time constant (PT1 element [3]) 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).

3) proportional transmission behavior with first order delay

## Failure behavior current output

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

**Prerequisite** A process variable is selected in the **Assign current output** parameter (→ 113) and one of the following options is selected in the **Current span** parameter (→ 114):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

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

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

**Factory setting** Max.

**Additional information**

*Description*

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

*"Min." option*

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

The signal on alarm level is defined via the **Current span** parameter (→ 114).

*"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 (→ 114).

*"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 (→ 124).

**Failure current**

**Navigation** Expert → Output → Curr.output 1 to n → Fail. current (0352–1 to n)

**Prerequisite** The **Defined value** option is selected in the **Failure mode** parameter (→ 123).

**Description** Use this function to enter a fixed value that the current output adopts in the event of a device alarm.

**User entry** 0 to 22.5 mA

**Factory setting** 22.5 mA

**Output current 1 to n**

**Navigation** Expert → Output → Curr.output 1 to n → Output curr. 1 to n (0361–1 to n)

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

**User interface** 3.59 to 22.5 mA

**Measured current 1 to n**

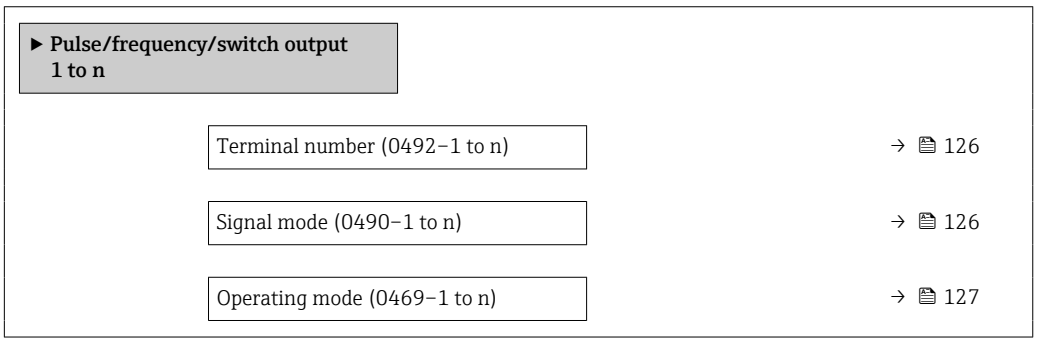
**Navigation** Expert → Output → Curr.output 1 to n → Measur. curr. 1 to n (0366–1 to n)

**Description** Displays the actual measured value of the output current.

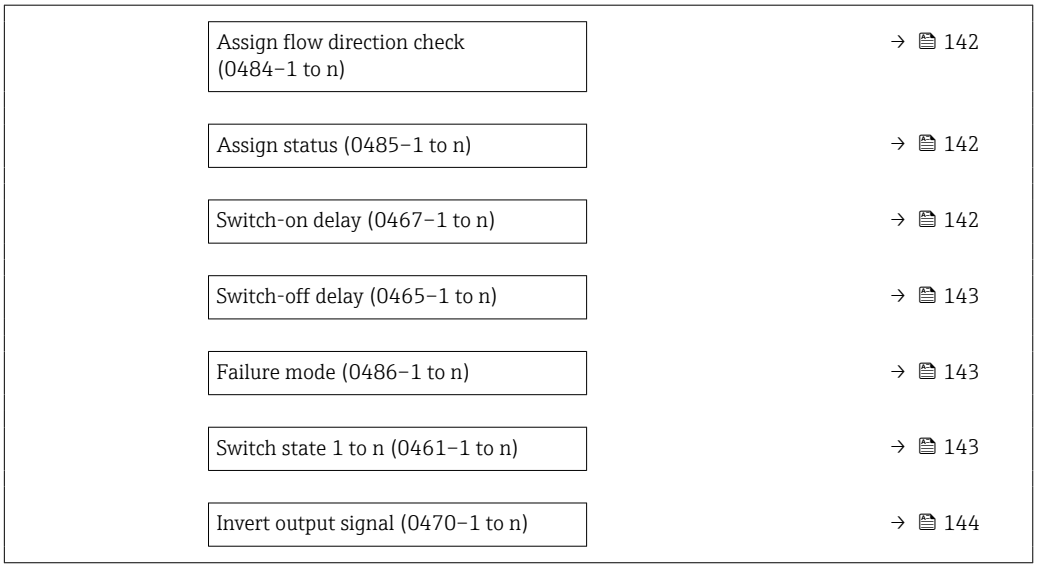
**User interface** 0 to 30 mA

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

*Navigation* Expert → Output → PFS output 1 to n



| | |
|---|---|
| Assign pulse output 1 to n (0460–1 to n) | → 128 |
| Pulse scaling (0455–1 to n) | → 129 |
| Pulse width (0452–1 to n) | → 129 |
| Measuring mode (0457–1 to n) | → 130 |
| Failure mode (0480–1 to n) | → 131 |
| Pulse output 1 to n (0456–1 to n) | → 132 |
| Assign frequency output (0478–1 to n) | → 132 |
| Minimum frequency value (0453–1 to n) | → 133 |
| Maximum frequency value (0454–1 to n) | → 133 |
| Measuring value at minimum frequency (0476–1 to n) | → 133 |
| Measuring value at maximum frequency (0475–1 to n) | → 134 |
| Measuring mode (0479–1 to n) | → 134 |
| Damping output 1 to n (0477–1 to n) | → 135 |
| Response time (0491–1 to n) | → 136 |
| Failure mode (0451–1 to n) | → 136 |
| Failure frequency (0474–1 to n) | → 137 |
| Output frequency 1 to n (0471–1 to n) | → 137 |
| Switch output function (0481–1 to n) | → 137 |
| Assign diagnostic behavior (0482–1 to n) | → 138 |
| Assign limit (0483–1 to n) | → 139 |
| Switch-on value (0466–1 to n) | → 141 |
| Switch-off value (0464–1 to n) | → 141 |




## Terminal number

**Navigation** Expert → Output → PFS output 1 to n → Terminal no. (0492–1 to n)

**Description** Displays the terminal numbers used by the pulse/frequency/switch output module.

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

**Additional information** *"Not used" option*

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

## Signal mode

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

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

**Selection**
- Passive
- Active *
- Passive NE

**Factory setting** Passive

* Visibility depends on order options or device settings

## Operating mode

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

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

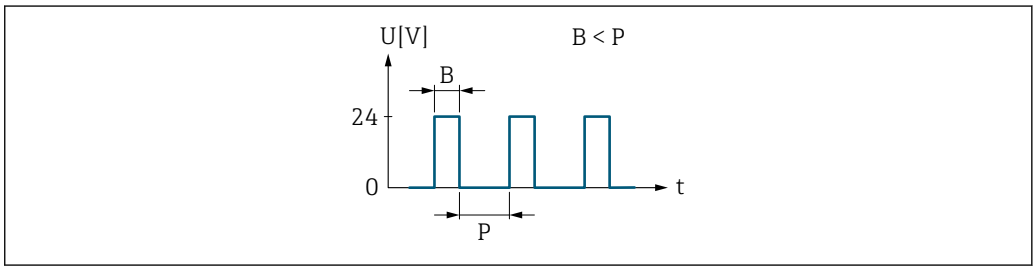
**Selection**
- Pulse
- Frequency
- Switch

**Factory setting** Pulse

**Additional information** *"Pulse" option*

Quantity-dependent pulse with configurable pulse width
- Whenever a specific mass, volume or corrected volume 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



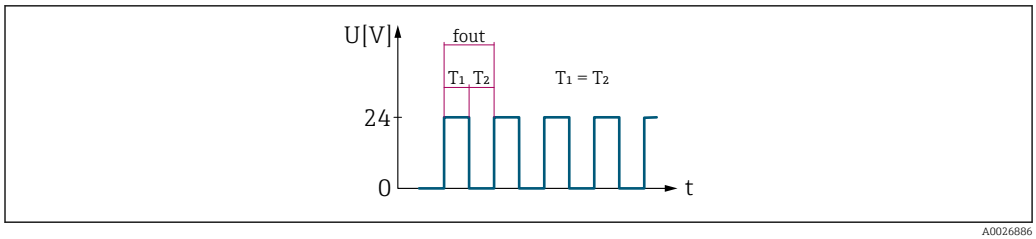

*6 Quantity-proportional pulse (pulse value) with pulse width to be configured*

*B Pulse width entered*
*P Pauses between the individual pulses*

*"Frequency" option*

Flow-proportional frequency output with on/off ratio of 1:1
An output frequency is output that is proportional to the value of a process variable, such as volume flow, mass flow, corrected volume flow, flow velocity, conductivity, corrected conductivity, temperature or electronics temperature.

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

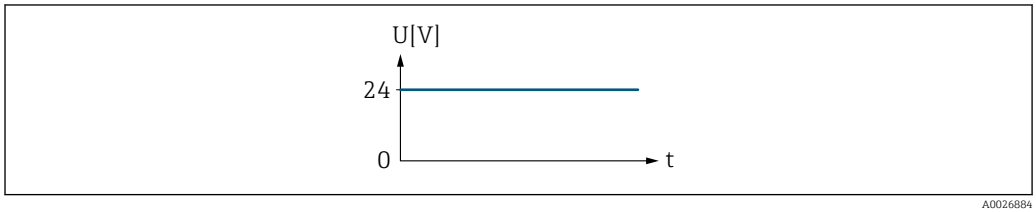



7 *Flow-proportional frequency output*

*"Switch" option*

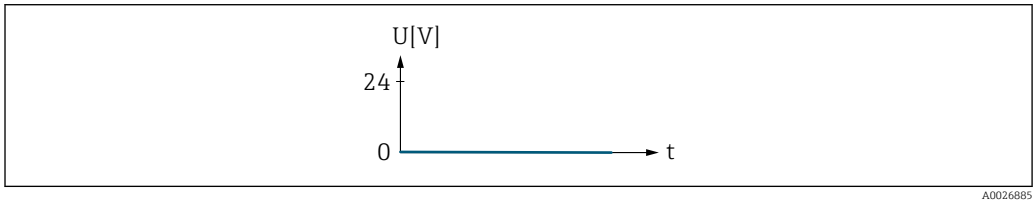
Contact for displaying a condition (e.g. alarm or warning if a limit value is reached)

Example
Alarm response without alarm




8 *No alarm, high level*

Example
Alarm response in case of alarm




9 *Alarm, low level*

## Assign pulse output 1 to n

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

**Prerequisite** The **Pulse** option is selected in the **Operating mode** parameter (→ 127).

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

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

**Factory setting** Off

## Pulse scaling

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

**Prerequisite** The **Pulse** option is selected in the **Operating mode** parameter (→ 127) and a process variable is selected in the **Assign pulse output** parameter (→ 128).

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

**User entry** Positive floating point number

**Factory setting** Depends on country and nominal diameter→ 261

**Additional information** *User entry*

Weighting of the pulse output with a quantity.

The lower the pulse value, the
- better the resolution.
- the higher the frequency of the pulse response.

## Pulse width

**Navigation** Expert → Output → PFS output 1 to n → Pulse width (0452–1 to n)

**Prerequisite** The **Pulse** option is selected in the **Operating mode** parameter (→ 127) and a process variable is selected in the **Assign pulse output** parameter (→ 128).

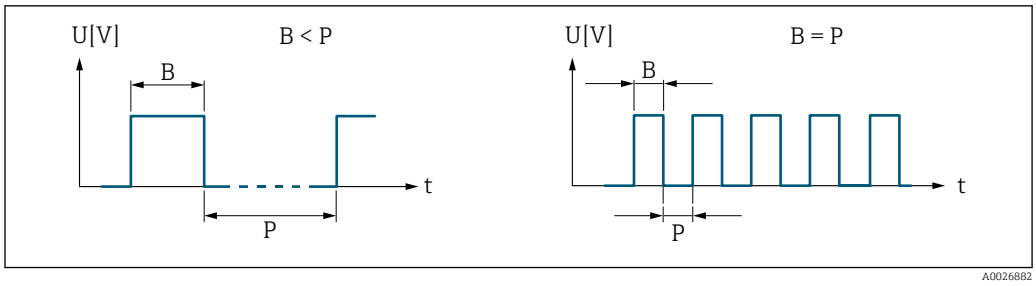
**Description** Use this function to enter the duration of the output pulse.

**User entry** 0.05 to 2 000 ms

**Factory setting** 100 ms

**Additional information** *Description*

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




*B Pulse width entered*
*P Pauses between the individual pulses*

*Example*

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

## Measuring mode

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

**Prerequisite** In the **Operating mode** parameter (→ 127), the **Pulse** option is selected, and one of the following options is selected in the **Assign pulse output** parameter (→ 128):
- Mass flow
- Volume flow
- Corrected volume flow

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

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

**Factory setting** Forward flow

**Additional information**

*Selection*

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

For a detailed description of the options available, see the **Measuring mode** parameter (→ 117)

*Examples*

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 117)

## Failure mode

**Navigation** Expert → Output → PFS output 1 to n → Failure mode (0480–1 to n)

**Prerequisite** The **Pulse** option is selected in the **Operating mode** parameter (→ 127) and a process variable is selected in the **Assign pulse output** parameter (→ 128).

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

**Selection**

- Actual value
- No pulses

**Factory setting** No pulses

**Additional information**

*Description*

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

*Selection*

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

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

## Pulse output 1 to n

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

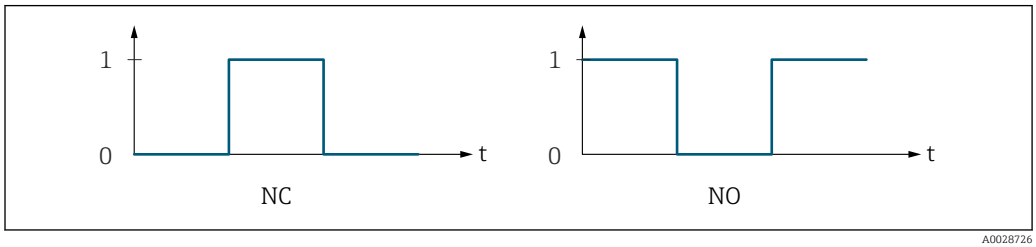
**Prerequisite** The **Pulse** option is selected in the **Operating mode** parameter (→ 127) parameter.

**Description** Displays the pulse frequency currently output.

**User interface** Positive floating-point number

**Additional information** *Description*

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




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

The output behavior can be reversed via the **Invert output signal** parameter (→ 144) 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 (→ 131)) can be configured.

## Assign frequency output

**Navigation** Expert → Output → PFS output 1 to n → Assign freq. (0478–1 to n)

**Prerequisite** In the **Operating mode** parameter (→ 127), the **Frequency** option is selected.

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

**Selection**

- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature

* Visibility depends on order options or device settings

- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- HBSI *
- Build-up index *
- Test point 1
- Test point 2
- Test point 3

**Factory setting** Off

## Minimum frequency value

**Navigation** Expert → Output → PFS output 1 to n → Min. freq. value (0453–1 to n)

**Prerequisite** The **Frequency** option is selected in the **Operating mode** parameter (→ 127) and a process variable is selected in the **Assign frequency output** parameter (→ 132).

**Description** Use this function to enter the minimum frequency.

**User entry** 0.0 to 10 000.0 Hz

**Factory setting** 0.0 Hz

## Maximum frequency value

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

**Prerequisite** The **Frequency** option is selected in the **Operating mode** parameter (→ 127) and a process variable is selected in the **Assign frequency output** parameter (→ 132).

**Description** Use this function to enter the end value frequency.

**User entry** 0.0 to 10 000.0 Hz

**Factory setting** 10 000.0 Hz

## Measuring value at minimum frequency

**Navigation** Expert → Output → PFS output 1 to n → Val. at min.freq (0476–1 to n)

**Prerequisite** The **Frequency** option is selected in the **Operating mode** parameter (→ 127) and a process variable is selected in the **Assign frequency output** parameter (→ 132).

* Visibility depends on order options or device settings

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

**User entry** Signed floating-point number

**Factory setting** Depends on country and nominal diameter

**Additional information** *Dependency*

The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 132).

## Measuring value at maximum frequency

**Navigation** Expert → Output → PFS output 1 to n → Val. at max.freq (0475–1 to n)

**Prerequisite** The **Frequency** option is selected in the **Operating mode** parameter (→ 127) and a process variable is selected in the **Assign frequency output** parameter (→ 132).

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

**User entry** Signed floating-point number

**Factory setting** Depends on country and nominal diameter

**Additional information** *Description*

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

*Dependency*

The entry depends on the process variable selected in the **Assign frequency output** parameter (→ 132).

## Measuring mode

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

**Prerequisite** One of the following options is selected in the **Assign current output** parameter (→ 113):
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature

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

* Visibility depends on order options or device settings

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

**Factory setting**
Forward flow

**Additional information**
*Selection*

For a detailed description of the options available, see the **Measuring mode** parameter (→ 117)

*Examples*

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 117)

## Damping output 1 to n

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

**Prerequisite**
One of the following options is selected in the **Assign current output** parameter (→ 113):
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature

**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 [4]) for frequency output damping:
- If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables.
- On the other hand, the current output reacts more slowly if a high time constant is entered.

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

The frequency output is subject to separate damping that is independent of all preceding time constants.

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

## Response time

**Navigation** Expert → Output → PFS output 1 to n → Response time (0491–1 to n)

**Prerequisite** One of the following options is selected in the **Assign current output** parameter (→ 113):
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature

**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

**Additional information** *Description*

The response time is made up of the time specified for the following dampings:
- Damping of pulse/frequency/switch output → 122
  and
- Depending on the measured variable assigned to the output.
  Flow damping

## Failure mode

**Navigation** Expert → Output → PFS output 1 to n → Failure mode (0451–1 to n)

**Prerequisite** The **Frequency** option is selected in the **Operating mode** parameter (→ 127) and a process variable is selected in the **Assign frequency output** parameter (→ 132).

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

**Selection**
- Actual value
- Defined value
- 0 Hz

**Factory setting** 0 Hz

* Visibility depends on order options or device settings

**Additional information** *Selection*

- Actual value
  In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The device alarm is ignored.
- Defined value
  In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure frequency (→ 137) replaces the current measured value, making it possible to bypass the device alarm. The actual measurement is switched off for the duration of the device alarm.
- 0 Hz
  In the event of a device alarm, the frequency output is "switched off".

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

## Failure frequency

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

**Prerequisite** In the **Operating mode** parameter (→ 127), the **Frequency** option is selected, in the **Assign frequency output** parameter (→ 132) a process variable is selected, and in the **Failure mode** parameter (→ 136), the **Defined value** option is selected.

**Description** Use this function to enter the value for the frequency output in the event of a device alarm in order to bypass the alarm.

**User entry** 0.0 to 12 500.0 Hz

**Factory setting** 0.0 Hz

## Output frequency 1 to n

**Navigation** Expert → Output → PFS output 1 to n → Output freq. 1 to n (0471–1 to n)

**Prerequisite** In the **Operating mode** parameter (→ 127), the **Frequency** option is selected.

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

**User interface** 0.0 to 12 500.0 Hz

## Switch output function

**Navigation** Expert → Output → PFS output 1 to n → Switch out funct (0481–1 to n)

**Prerequisite** The **Switch** option is selected in the **Operating mode** parameter (→ 127).

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

**Selection**
- Off
- On
- Diagnostic behavior
- Limit
- Flow direction check
- Status

**Factory setting** Off

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

## Assign diagnostic behavior

**Navigation** Expert → Output → PFS output 1 to n → Assign diag. beh (0482–1 to n)

**Prerequisite**
- In the **Operating mode** parameter (→ 127), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 137), the **Diagnostic behavior** option is selected.

**Description** Use this function to select the diagnostic event category that is displayed for the switch output.

**Selection**
- Alarm
- Alarm or warning
- Warning

**Factory setting** Alarm

**Additional information** *Description*

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

*Selection*

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

## Assign limit

**Navigation** Expert → Output → PFS output 1 to n → Assign limit (0483–1 to n)

**Prerequisite**
- In the **Operating mode** parameter (→ 127), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 137), the **Limit** option is selected.

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

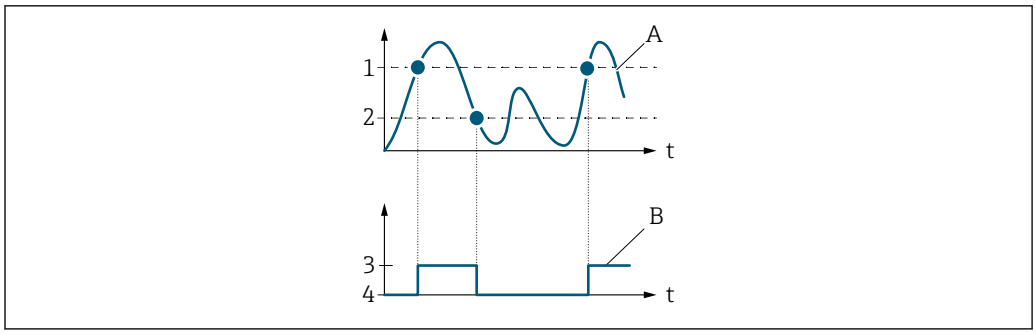
**Selection**
- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Temperature *
- Electronics temperature

**Factory setting** Volume flow

**Additional information** *Description*

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

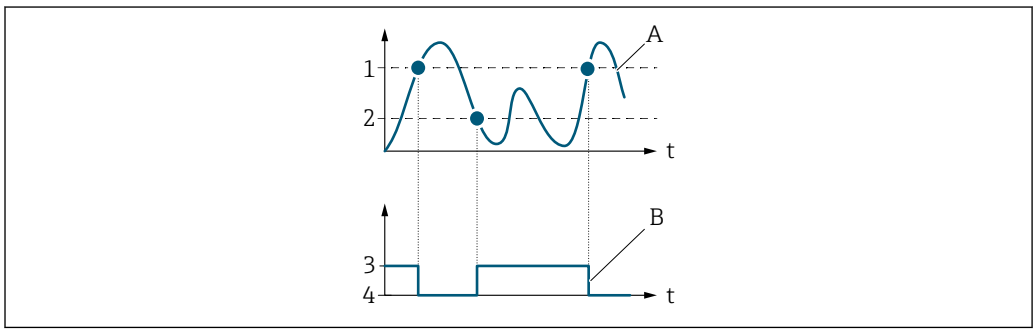
* Visibility depends on order options or device settings




A0026891

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

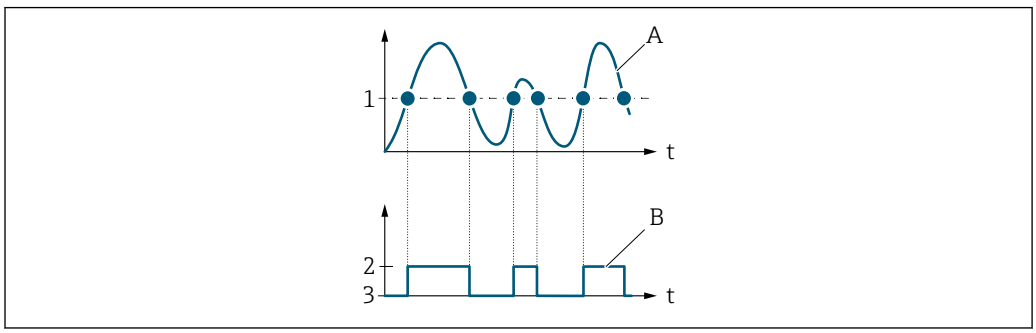
Behavior of status output when Switch-on value < Switch-off value:
- Process variable < Switch-on value: transistor is conductive
- Process variable > Switch-off value: transistor is non-conductive




A0026892

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

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

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

## Switch-on value

**Navigation** Expert → Output → PFS output 1 to n → Switch-on value (0466–1 to n)

**Prerequisite**
- The **Switch** option is selected in the **Operating mode** parameter (→ 127).
- The **Limit** option is selected in the **Switch output function** parameter (→ 137).

**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 l/h
- 0 gal/min (us)

**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 (→ 139).

## Switch-off value

**Navigation** Expert → Output → PFS output 1 to n → Switch-off value (0464–1 to n)

**Prerequisite**
- The **Switch** option is selected in the **Operating mode** parameter (→ 127).
- The **Limit** option is selected in the **Switch output function** parameter (→ 137).

**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 l/h
- 0 gal/min (us)

**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 (→ 139).

### Assign flow direction check

**Navigation** Expert → Output → PFS output 1 to n → Assign dir.check (0484–1 to n)

**Prerequisite**
- The **Switch** option is selected in the **Operating mode** parameter (→ 127).
- The **Flow direction check** option is selected in the **Switch output function** parameter (→ 137).

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

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

**Factory setting** Volume flow

### Assign status

**Navigation** Expert → Output → PFS output 1 to n → Assign status (0485–1 to n)

**Prerequisite**
- The **Switch** option is selected in the **Operating mode** parameter (→ 127).
- The **Status** option is selected in the **Switch output function** parameter (→ 137).

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

**Selection**
- Empty pipe detection
- Low flow cut off
- Build-up index *
- HBSI limit exceeded *

**Factory setting** Empty pipe detection

**Additional information** *Selection*

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

### Switch-on delay

**Navigation** Expert → Output → PFS output 1 to n → Switch-on delay (0467–1 to n)

**Prerequisite**
- The **Switch** option is selected in the **Operating mode** parameter (→ 127).
- The **Limit** option is selected in the **Switch output function** parameter (→ 137).

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

* Visibility depends on order options or device settings

**User entry** 0.0 to 100.0 s

**Factory setting** 0.0 s

## Switch-off delay

**Navigation** Expert → Output → PFS output 1 to n → Switch-off delay (0465–1 to n)

**Prerequisite**
- The **Switch** option is selected in the **Operating mode** parameter (→ 127).
- The **Limit** option is selected in the **Switch output function** parameter (→ 137).

**Description** Use this function to enter a delay time for switching off the switch output.

**User entry** 0.0 to 100.0 s

**Factory setting** 0.0 s

## Failure mode

**Navigation** Expert → Output → PFS output 1 to n → Failure mode (0486–1 to n)

**Description** Use this function to select a failsafe mode for the switch output in the event of a device alarm.

**Selection**
- Actual status
- Open
- Closed

**Factory setting** Open

**Additional information** *Options*
- Actual status
  In the event of a device alarm, faults are ignored and the current behavior of the input value is output by the switch output. The **Actual status** option behaves in the same way as the current input value.
- Open
  In the event of a device alarm, the switch output's transistor is set to **non-conductive**.
- Closed
  In the event of a device alarm, the switch output's transistor is set to **conductive**.

## Switch state 1 to n

**Navigation** Expert → Output → PFS output 1 to n → Switch state 1 to n (0461–1 to n)

**Prerequisite** The **Switch** option is selected in the **Operating mode** parameter (→ 127).

**Description** Displays the current switch status of the status output.

**User interface**
- Open
- Closed

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

**Invert output signal**

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

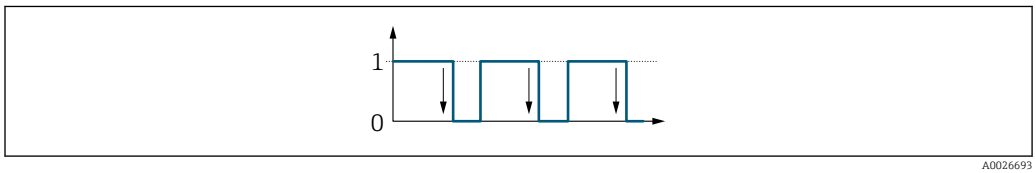
**Description** Use this function to select whether to invert the output signal.

**Selection**
- No
- Yes

**Factory setting** No

**Additional information** *Selection*

**No** option (passive - negative)



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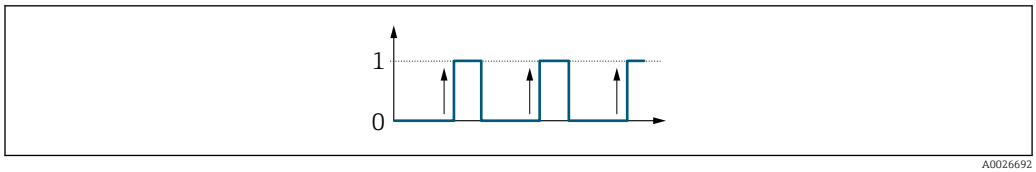
**Yes** option (passive - positive)



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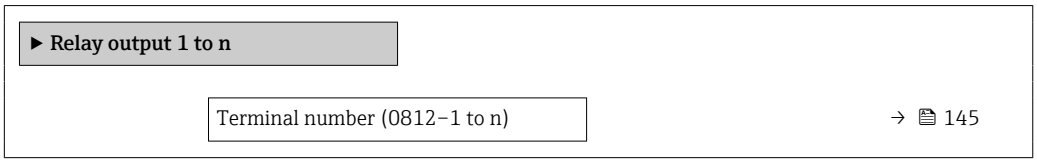
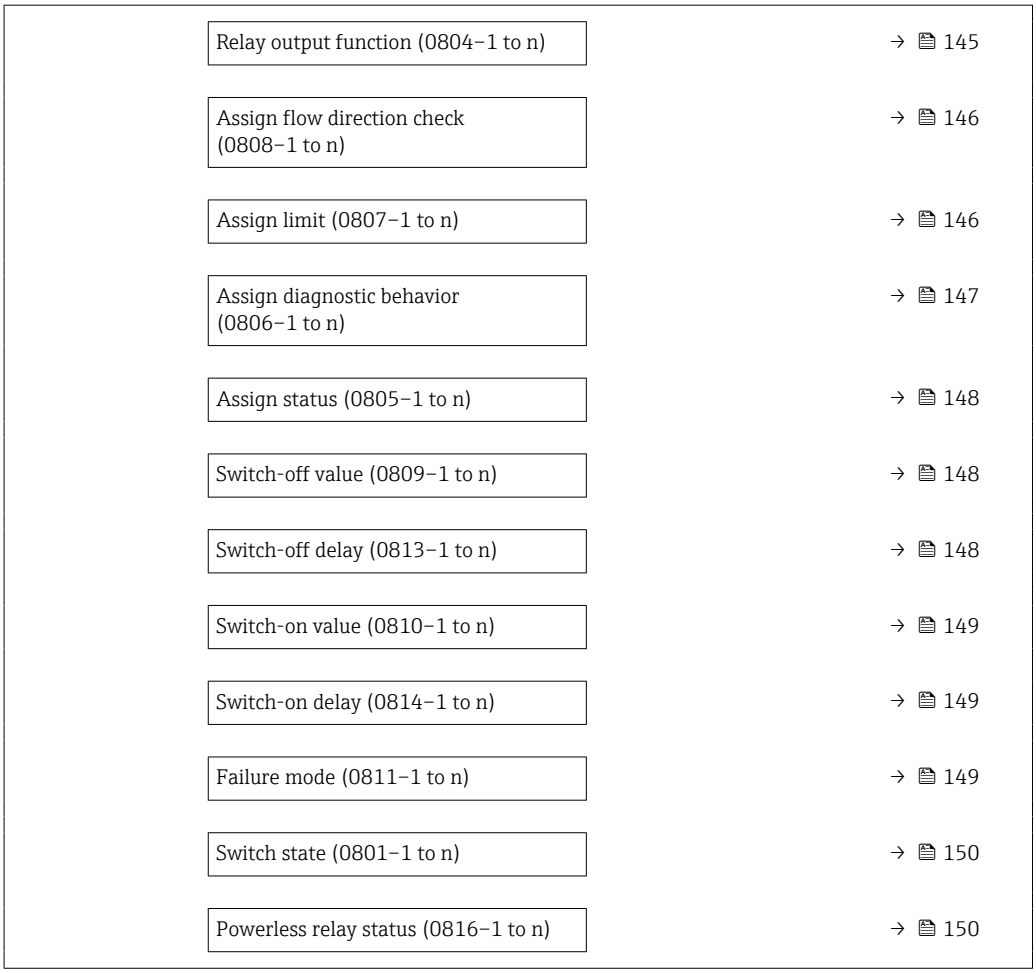
## 3.5.3 "Relay output 1 to n" submenu

*Navigation* Expert → Output → Relay output 1 to n






## Terminal number

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

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

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

**Additional information** *"Not used" option*

The relay output module does not use any terminal numbers.

## Relay output function

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

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

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

**Factory setting** Closed

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

## Assign flow direction check

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

**Prerequisite** The **Flow direction check** option is selected in the **Relay output function** parameter (→ 145).

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

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

**Factory setting** Volume flow

## Assign limit

**Navigation** Expert → Output → Relay output 1 to n → Assign limit (0807–1 to n)

**Prerequisite** The **Limit** option is selected in the **Relay output function** parameter (→ 145).

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

**Selection**
- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Temperature *
- Electronics temperature

**Factory setting** Volume flow

## Assign diagnostic behavior

**Navigation** Expert → Output → Relay output 1 to n → Assign diag. beh (0806–1 to n)

**Prerequisite** In the **Relay output function** parameter (→ 145), the **Diagnostic behavior** option is selected.

**Description** Use this function to select the category of the diagnostic events that are displayed for the relay output.

**Selection**
- Alarm
- Alarm or warning
- Warning

**Factory setting** Alarm

**Additional information**

*Description*

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

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

* Visibility depends on order options or device settings

## Assign status

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

**Prerequisite** In the **Relay output function** parameter (→ 145), the **Digital Output** option is selected.

**Description** Use this function to select the device status for the relay output.

**Selection**
- Partially filled pipe detection
- Low flow cut off
- HBSI limit exceeded *

**Factory setting** Partially filled pipe detection

## Switch-off value

**Navigation** Expert → Output → Relay output 1 to n → Switch-off value (0809–1 to n)

**Prerequisite** In the **Relay output function** parameter (→ 145), 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 l/h
- 0 gal(us)/min

**Additional information**

*Description*

Use this function to enter the limit value for the switch-off value (process variable < switch-off value = open, non-conductive).

When using a hysteresis: Switch-on value > Switch-off value.

*Dependency*

The unit is dependent on the process variable selected in the **Assign limit** parameter (→ 146).

## Switch-off delay

**Navigation** Expert → Output → Relay output 1 to n → Switch-off delay (0813–1 to n)

**Prerequisite** In the **Relay output function** parameter (→ 145), the **Limit** option is selected.

**Description** Use this function to enter a delay time for switching off the switch output.

* Visibility depends on order options or device settings

**User entry** 0.0 to 100.0 s

**Factory setting** 0.0 s

## Switch-on value

**Navigation** Expert → Output → Relay output 1 to n → Switch-on value (0810–1 to n)

**Prerequisite** The **Limit** option is selected in the **Relay output function** parameter (→ 145).

**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 l/h
- 0 gal(us)/min

**Additional information**

*Description*

Use this function to enter the limit value for the switch-on value (process variable > switch-on value = closed, conductive).

When using a hysteresis: Switch-on value > Switch-off value.

*Dependency*

The unit is dependent on the process variable selected in the **Assign limit** parameter (→ 146).

## Switch-on delay

**Navigation** Expert → Output → Relay output 1 to n → Switch-on delay (0814–1 to n)

**Prerequisite** In the **Relay output function** parameter (→ 145), the **Limit** option is selected.

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

**User entry** 0.0 to 100.0 s

**Factory setting** 0.0 s

## Failure mode

**Navigation** Expert → Output → Relay output 1 to n → Failure mode (0811–1 to n)

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

**Selection**
- Actual status
- Open
- Closed

**Factory setting** Open

**Additional information** *Selection*
- Actual status
  In the event of a device alarm, faults are ignored and the current behavior of the input value is output by the relay output. The **Actual status** option behaves in the same way as the current input value.
- Open
  In the event of a device alarm, the relay output's transistor is set to **non-conductive**.
- Closed
  In the event of a device alarm, the relay output's transistor is set to **conductive**.

## Switch state

**Navigation** Expert → Output → Relay output 1 to n → Switch state (0801–1 to n)

**Description** Displays the current status of the relay output.

**User interface**
- Open
- Closed

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

## Powerless relay status

**Navigation** Expert → Output → Relay output 1 to n → Powerless relay (0816–1 to n)

**Description** Use this function to select the quiescent state for the relay output.

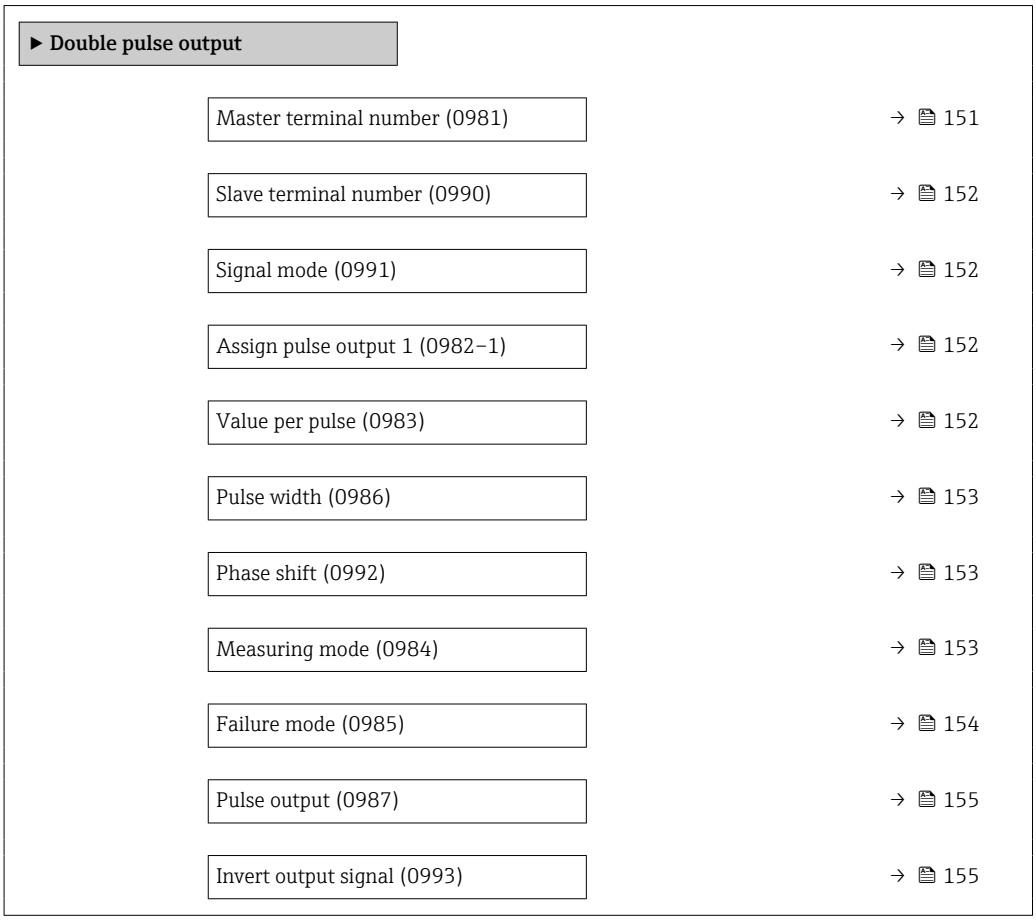
**Selection**
- Open
- Closed

**Factory setting** Open

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

### 3.5.4 "Double pulse output" submenu

*Navigation* Expert → Output → Double pulse out




#### Master terminal number

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

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

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

**Additional information** *"Not used" option*

The double pulse output does not use any terminal numbers.

### Slave terminal number

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

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

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

**Additional information** *"Not used" option*

The double pulse output does not use any terminal numbers.

### Signal mode

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

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

**Selection**
- Passive
- Active *
- Passive NE

**Factory setting** Passive

### Assign pulse output 1

**Navigation** Expert → Output → Double pulse out → Assign pulse 1 (0982–1)

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

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

**Factory setting** Off

### Value per pulse

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

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

* Visibility depends on order options or device settings

**User entry** Signed floating-point number

**Factory setting** Depends on country and nominal diameter → 261

**Additional information** *User entry*

Weighting of the pulse output with a quantity.

The lower the pulse value, the
- better the resolution.
- the higher the frequency of the pulse response.

## Pulse width

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

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

**User entry** 0.5 to 2 000 ms

**Factory setting** 0.5 ms

**Additional information** For a detailed description and example: **Pulse width** parameter (→ 129)

## Phase shift

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

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

**Selection**
- 90°
- 180°

**Factory setting** 90°

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

## Measuring mode

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

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

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

**Factory setting**
Forward flow

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

For a detailed description of the options available, see the **Measuring mode** parameter (→ 117)

*Examples*

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 117)

## Failure mode

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

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

**Selection**
- Actual value
- No pulses

**Factory setting**
No pulses

**Additional information**
*Description*

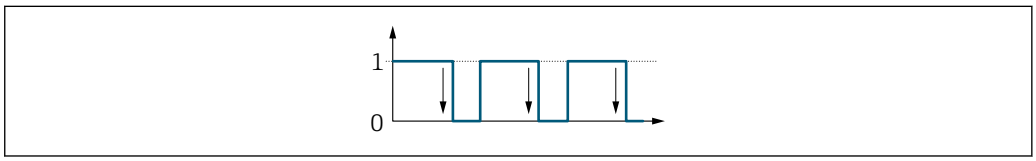
The dictates of safety render it advisable to ensure that the double pulse output shows a predefined behavior in the event of a device alarm.

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

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

| Pulse output | |
|---|---|
| **Navigation** | Expert → Output → Double pulse out → Pulse output (0987) |
| **Description** | Displays the pulse frequency of the double pulse output which is currently output. |
| **User interface** | Positive floating-point number |
| **Additional information** | For a detailed description and example: **Pulse output** parameter (→ 54) |

| Invert output signal | |
|---|---|
| **Navigation** | Expert → Output → Double pulse out → Invert outp.sig. (0993) |
| **Description** | Use this function to select whether to invert the output signal. |
| **Selection** | ▪ No<br>▪ Yes |
| **Factory setting** | No |
| **Additional information** | *Selection*<br>**No** option (passive - negative) |



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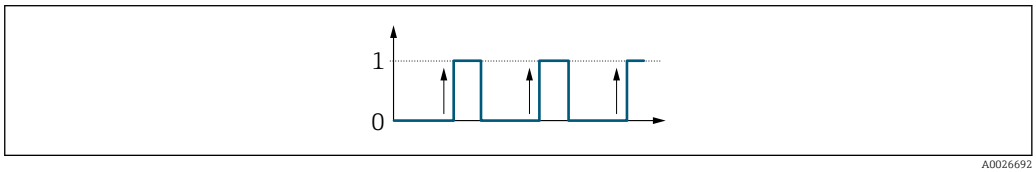
**Yes** option (passive - positive)



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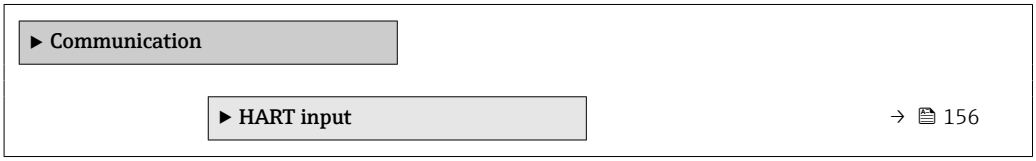
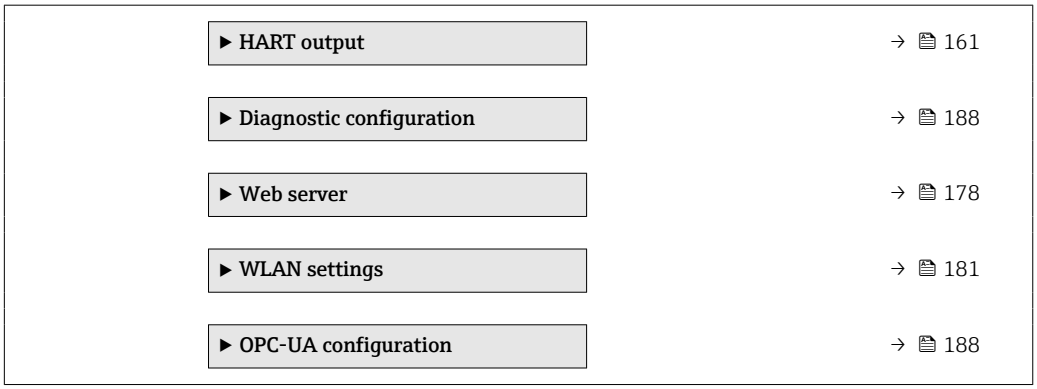
## 3.6 "Communication" submenu

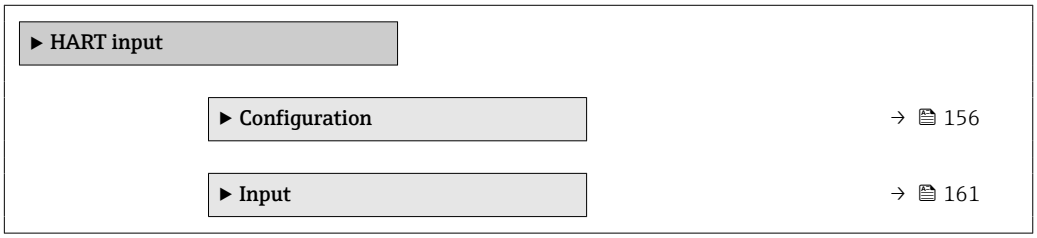
*Navigation* Expert → Communication





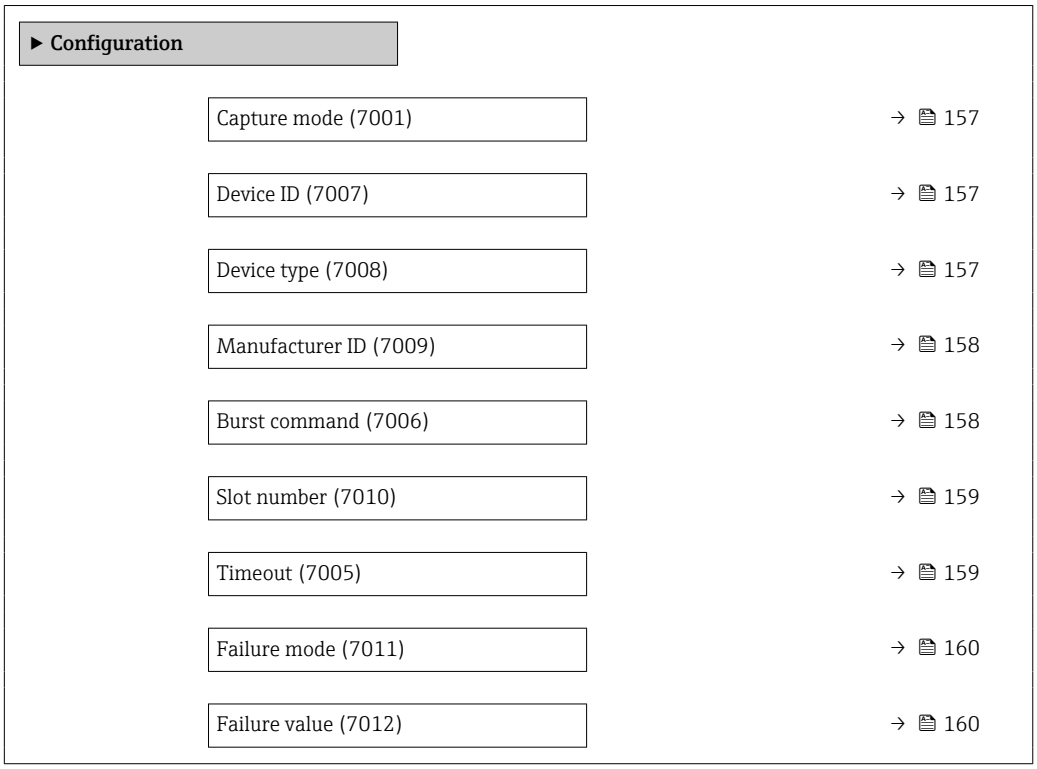

### 3.6.1 "HART input" submenu

*Navigation* Expert → Communication → HART input




#### "Configuration" submenu

*Navigation* Expert → Communication → HART input → Configuration



## Capture mode

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

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

**Selection**
- Off
- Burst network
- Master network

**Factory setting** Off

**Additional information**

*"Burst network" option*

The device records data transmitted via burst in the network.

*"Master network" option*

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

## Device ID

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

**Prerequisite** The **Master network** option is selected in the **Capture mode** parameter (→ 157).

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

**User entry**

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

**Factory setting** 0

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

## Device type

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

**Prerequisite** In the **Capture mode** parameter (→ 157), the **Master network** option is selected.

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

**User entry** 2-digit hexadecimal number

**Factory setting** 0x00

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

## Manufacturer ID

**Navigation** Expert → Communication → HART input → Configuration → Manufacturer ID (7009)

**Prerequisite** The **Master network** option is selected in the **Capture mode** parameter (→ 157).

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

**User entry** 2-digit value:
- Via local operation: enter as hexadecimal or decimal number
- Via operating tool: enter as decimal number

**Factory setting** 0

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

## Burst command

**Navigation** Expert → Communication → HART input → Configuration → Burst command (7006)

**Prerequisite** The **Burst network** option or the **Master network** option are selected in the **Capture mode** parameter (→ 157).

**Description** Use this function to select the burst command to be recorded.

**Selection**
- Command 1
- Command 3
- Command 9
- Command 33

**Factory setting** Command 1

**Additional information** *Selection*

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

## Slot number

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

**Prerequisite** The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 157).

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

**User entry** 1 to 8

**Factory setting** 1

**Additional information** *User entry*

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

## Timeout

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

**Prerequisite** The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 157).

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

**User entry** 1 to 120 s

**Factory setting** 5 s

**Additional information** *Description*

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

## Failure mode

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

**Prerequisite** In the **Capture mode** parameter (→ 157), 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 (→ 160)).

## Failure value

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

**Prerequisite** The following conditions are met:
- In the **Capture mode** parameter (→ 157), the **Burst network** option or **Master network** option is selected.
- In the **Failure mode** parameter (→ 160), the **Defined value** option is selected.

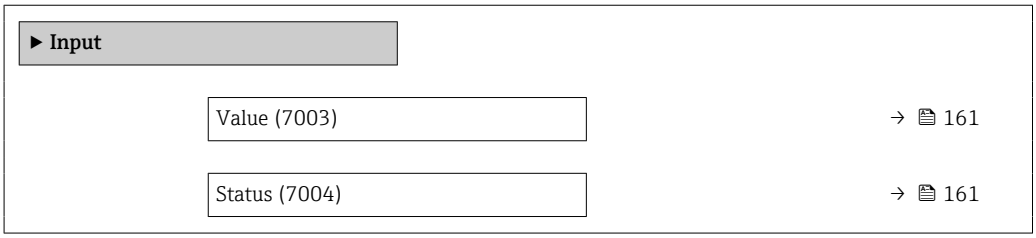
**Description** Use this function to enter the measured value to be used if no data are recorded within the maximum permitted interval.

**User entry** Signed floating-point number

**Factory setting** 0

**"Input" submenu**

*Navigation* Expert → Communication → HART input → Input




**Value**

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

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

**User interface** Signed floating-point number

**Status**

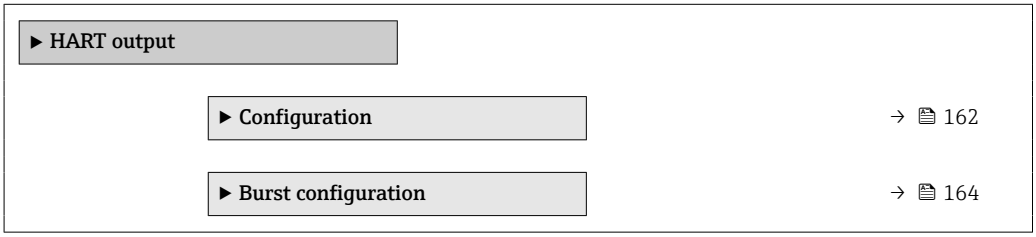
**Navigation** Expert → Communication → HART input → Input → Status (7004)

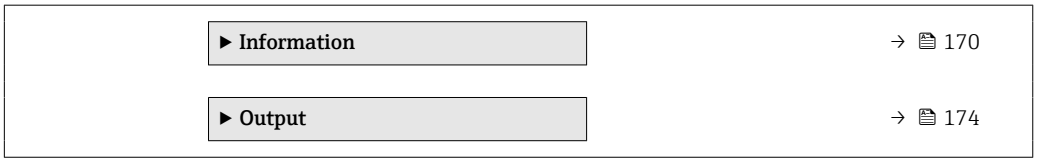
**Description** Displays the value of the device variable recorded by the HART input in accordance with the HART specification.

**User interface**
- Manual/Fixed
- Good
- Poor accuracy
- Bad

## 3.6.2 "HART output" submenu

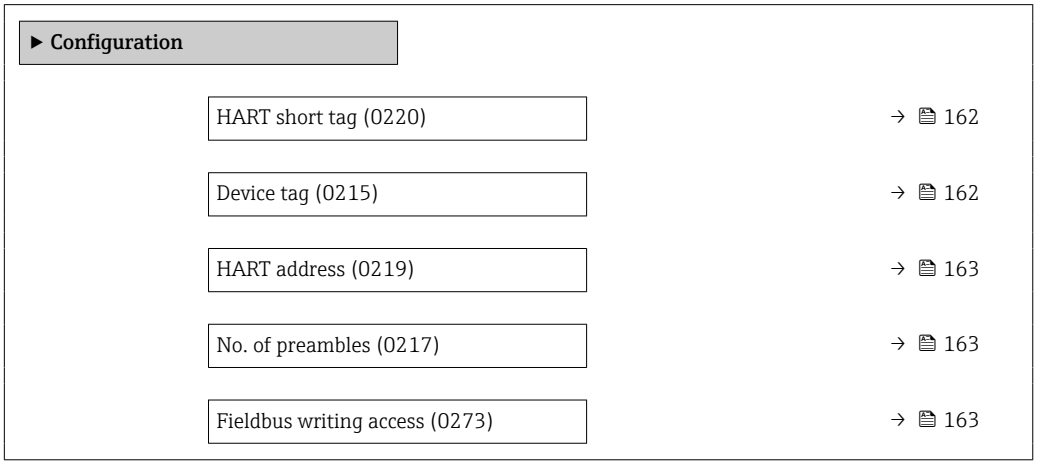
*Navigation* Expert → Communication → HART output






### "Configuration" submenu

*Navigation* Expert → Communication → HART output → Configuration




## HART short tag

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

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

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

**Factory setting** PROMAG

## Device tag

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

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

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

**Factory setting** Promag

### HART address

**Navigation** Expert → Communication → HART output → Configuration → HART address (0219)

**Description** Use this function to enter the address via which the data exchange takes place via HART protocol.

**User entry** 0 to 63

**Factory setting** 0

**Additional information** *Description*

For addressing in a HART Multidrop network, the **Fixed current** option must be set in the **Current span** parameter (→ 114) (current output 1).

### No. of preambles

**Navigation** Expert → Communication → HART output → Configuration → No. of preambles (0217)

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

**User entry** 2 to 20

**Factory setting** 5

**Additional information** *User entry*

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

### Fieldbus writing access

**Navigation** Expert → Communication → HART output → Configuration → Fieldb.writ.acc. (0273)

**Description** Use this function to restrict access to the measuring device via fieldbus (HART interface).

**Selection**
- Read + write
- Read only

**Factory setting** Read + write

**Additional information**

*Description*

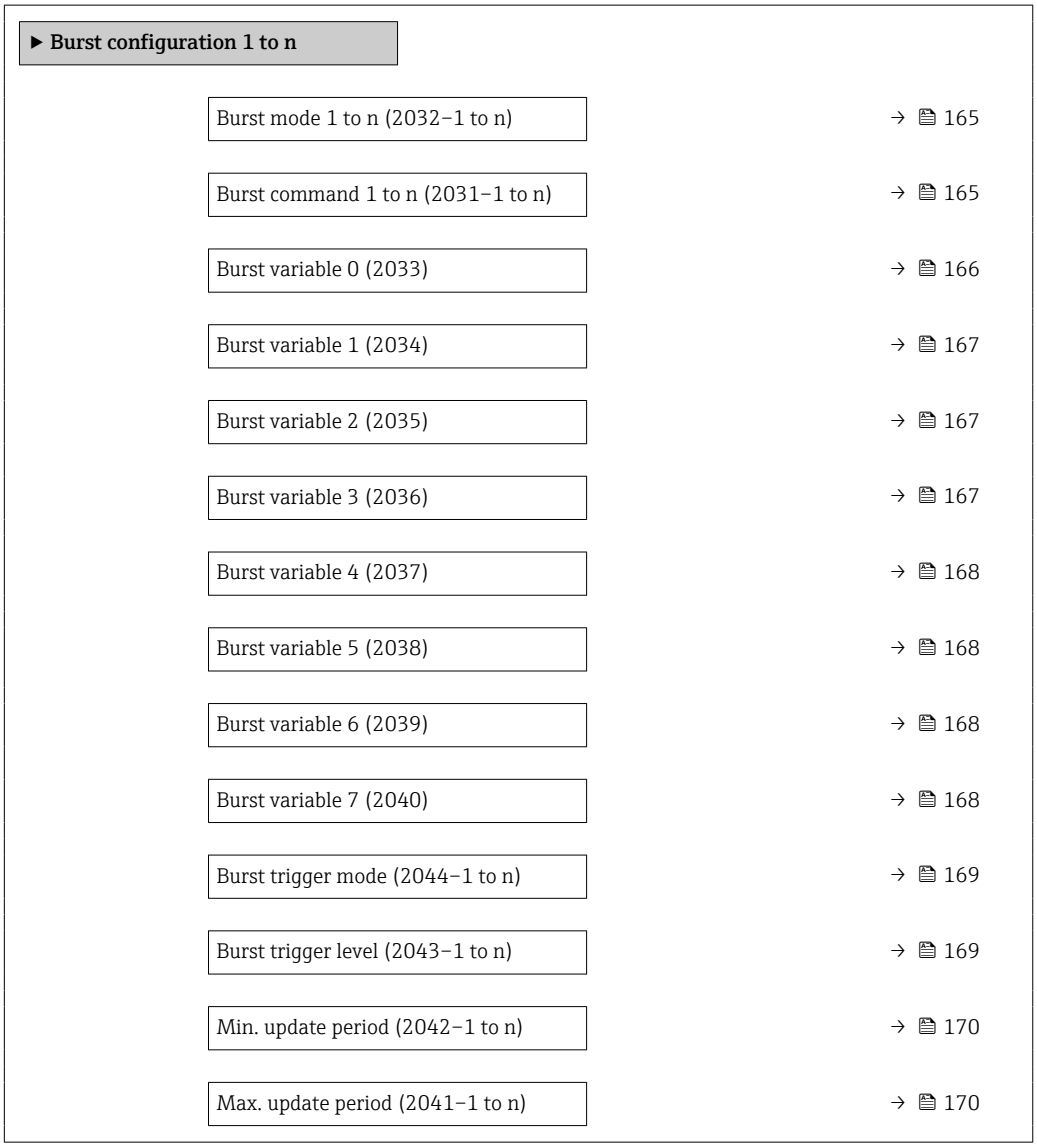
If read and/or write protection is enabled, the parameter can only be controlled and reset via local operation. Access is no longer possible via operating tools.

*Selection*

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

### "Burst configuration 1 to n" submenu

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



### Burst mode 1 to n

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

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

**Selection**
- Off
- On

**Factory setting** Off

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

### Burst command 1 to n

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

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

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

**Factory setting** Command 2

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

*"Command 33" option*

The HART device variables are defined via Command 107.

The following measured variables (HART device variables) can be read out:
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Electronics temperature
- Temperature *
- HART input
- Totalizer 1…3
- Percent of range
- Measured current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)

*Commands*

- Information about the defined details of the command: HART specifications
- The measured variables (HART device variables) are assigned to the dynamic variables in the **Output** submenu (→ 111).

## Burst variable 0

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

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

**Selection**
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Electronics temperature
- HBSI *
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Density
- Temperature *
- HART input
- Percent of range
- Measured current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- Not used

* Visibility depends on order options or device settings

**Factory setting** Volume flow

**Additional information** *Selection*

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

### Burst variable 1

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

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

**Selection** See the **Burst variable 0** parameter (→ 166).

**Factory setting** Not used

### Burst variable 2

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

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

**Selection** See the **Burst variable 0** parameter (→ 166).

**Factory setting** Not used

### Burst variable 3

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

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

**Selection** See the **Burst variable 0** parameter (→ 166).

**Factory setting** Not used

### Burst variable 4

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

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

**Selection** See the **Burst variable 0** parameter (→ 166).

**Factory setting** Not used

### Burst variable 5

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

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

**Selection** See the **Burst variable 0** parameter (→ 166).

**Factory setting** Not used

### Burst variable 6

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

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

**Selection** See the **Burst variable 0** parameter (→ 166).

**Factory setting** Not used

### Burst variable 7

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

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

**Selection** See the **Burst variable 0** parameter (→ 166).

**Factory setting** Not used

## Burst trigger mode

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

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

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

**Factory setting** Continuous

**Additional information** *Selection*
- Continuous
  The message is sent continuously, at least at intervals corresponding to the time frame specified in the **Burst min period** parameter (→ 170).
- Window
  The message is sent if the specified measured value has changed by the value in the **Burst trigger level** parameter (→ 169).
- Rising
  The message is sent if the specified measured value exceeds the value in the **Burst trigger level** parameter (→ 169).
- Falling
  The message is sent if the specified measured value drops below the value in the **Burst trigger level** parameter (→ 169).
- On change
  The message is sent if a measured value changes in the burst message.

## Burst trigger level

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

**Description** For entering the burst trigger value.

**User entry** Signed floating-point number

**Additional information** *Description*

Together with the option selected in the **Burst trigger mode** parameter (→ 169) the burst trigger value determines the time of burst message X.

* Visibility depends on order options or device settings

### Min. update period

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

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

**User entry** Positive integer

**Factory setting** 1 000 ms

### Max. update period

**Navigation** Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Max. upd. per. (2041–1 to n)

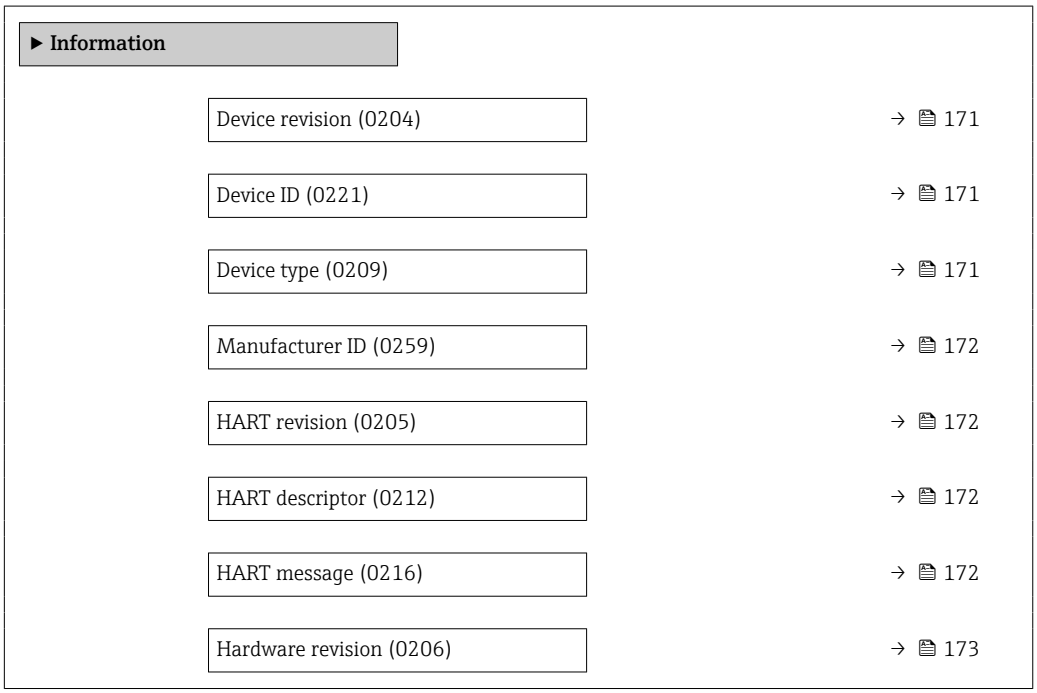
**Description** Use this function to enter the maximum time span between two burst commands of burst message X.

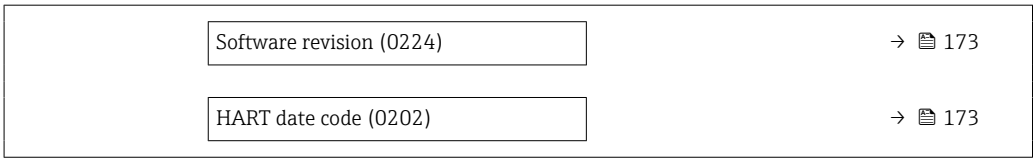
**User entry** Positive integer

**Factory setting** 2 000 ms

### "Information" submenu

*Navigation* Expert → Communication → HART output → Information






## Device revision

**Navigation** Expert → Communication → HART output → Information → Device revision (0204)

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

**User interface** 2-digit hexadecimal number

**Factory setting** 7

**Additional information** *Description*

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

## Device ID

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

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

**User interface** 6-digit hexadecimal number

**Additional information** *Description*

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

## Device type

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

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

**User interface** 2-digit hexadecimal number

**Factory setting** 0x3A (for Promag 500)

**Additional information** *Description*

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

### Manufacturer ID

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

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

**User interface** 2-digit hexadecimal number

**Factory setting** 0x11 (for Endress+Hauser)

### HART revision

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

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

**User interface** 5 to 7

**Factory setting** 7

### HART descriptor

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

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

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

**Factory setting** Promag300/500

### HART message

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

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

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

**Factory setting** Promag300/500

### Hardware revision

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

**Description** Displays the hardware revision of the measuring device.

**User interface** 0 to 255

**Factory setting** 2

### Software revision

**Navigation** Expert → Communication → HART output → Information → Software rev. (0224)

**Description** Displays the software revision of the measuring device.

**User interface** 0 to 255

**Factory setting** 7

### HART date code

**Navigation** Expert → Communication → HART output → Information → HART date code (0202)

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

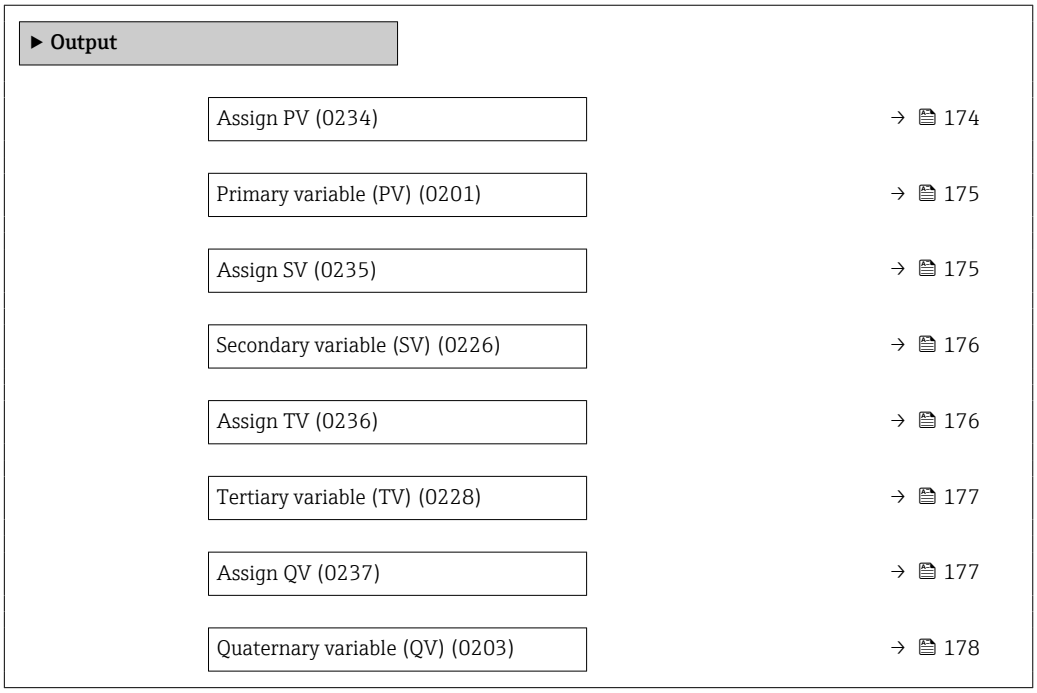
**User entry** Date entry format: yyyy-mm-dd

**Factory setting** 2009-07-20

**Additional information** *Example*
Device installation date

### "Output" submenu

*Navigation* Expert → Communication → HART output → Output




## Assign PV

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

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

**Selection**
- Off *
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature
- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- HBSI *
- Build-up index *
- Test point 1
- Test point 2
- Test point 3

**Factory setting** Volume flow

* Visibility depends on order options or device settings

## Primary variable (PV)

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

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

**User interface** Signed floating-point number

**Additional information**

*User interface*

The measured value displayed depends on the process variable selected in the **Assign PV** parameter (→ 174).

*Dependency*

The unit of the displayed measured value is taken from the **System units** submenu (→ 57).

## Assign SV

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

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

**Selection**

- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature
- Density
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current input 1 *
- Current input 2 *
- Current input 3 *
- HART input
- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- Build-up index *
- Test point 1
- Test point 2
- Test point 3
- HBSI *

**Factory setting** Totalizer 1

* Visibility depends on order options or device settings

## Secondary variable (SV)

**Navigation** Expert → Communication → HART output → Output → Second.var(SV) (0226)

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

**User interface** Signed floating-point number

**Additional information**

*User interface*

The measured value displayed depends on the process variable selected in the **Assign SV** parameter (→ 175).

*Dependency*

The unit of the displayed measured value is taken from the **System units** submenu (→ 57).

## Assign TV

**Navigation** Expert → Communication → HART output → Output → Assign TV (0236)

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

**Selection**

- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature
- Density
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current input 1 *
- Current input 2 *
- Current input 3 *
- HART input
- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- Build-up index *
- Test point 1
- Test point 2
- Test point 3
- HBSI *

**Factory setting** Totalizer 2

* Visibility depends on order options or device settings

## Tertiary variable (TV)

**Navigation** Expert → Communication → HART output → Output → Tertiary var(TV) (0228)

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

**User interface** Signed floating-point number

**Additional information**

*User interface*

The measured value displayed depends on the process variable selected in the **Assign TV** parameter (→ 176).

*Dependency*

The unit of the displayed measured value is taken from the **System units** submenu (→ 57).

## Assign QV

**Navigation** Expert → Communication → HART output → Output → Assign QV (0237)

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

**Selection**

- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature
- Density
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current input 1 *
- Current input 2 *
- Current input 3 *
- HART input
- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- Build-up index *
- Test point 1
- Test point 2
- Test point 3
- HBSI *

**Factory setting** Totalizer 3

* Visibility depends on order options or device settings

### Quaternary variable (QV)

**Navigation** Expert → Communication → HART output → Output → Quaterna.var(QV) (0203)

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

**User interface** Signed floating-point number

**Additional information** *User interface*

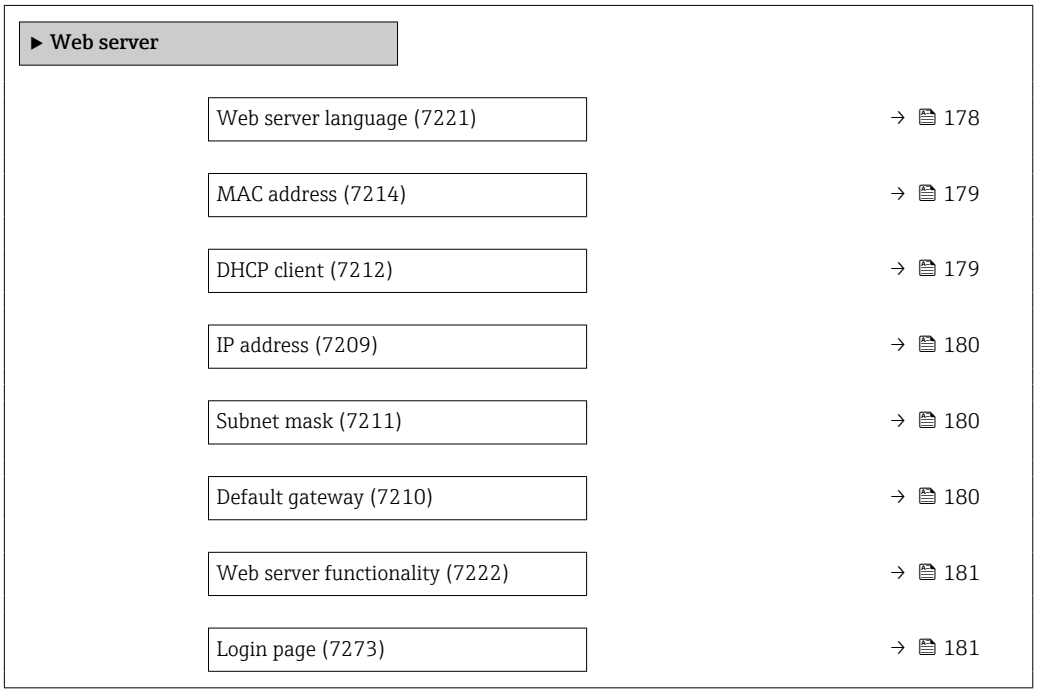
The measured value displayed depends on the process variable selected in the **Assign QV** parameter (→ 177).

*Dependency*

The unit of the displayed measured value is taken from the **System units** submenu (→ 57).

## 3.6.3 "Web server" submenu

*Navigation* Expert → Communication → Web server




### Web server language

**Navigation** Expert → Communication → Web server → Webserv.language (7221)

**Description** Use this function to select the language configured for the Web server.

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

**Factory setting** English

## MAC address

**Navigation** Expert → Communication → Web server → MAC Address (7214)

**Description** Displays the MAC [5] 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 → Web server → DHCP client (7212)

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

**Selection**
- Off
- On

**Factory setting** On

5) Media Access Control

**Additional information** *Effect*

If the DHCP client functionality of the web server is selected, the IP address (→ 180), Subnet mask (→ 180) and Default gateway (→ 180) are set automatically.

- Identification is via the MAC address of the measuring device.
- The IP address (→ 180) in the **IP address** parameter (→ 180) is ignored as long as the **DHCP client** parameter (→ 179) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (→ 180) in the parameter of the same name is only used if the **DHCP client** parameter (→ 179) is inactive.

### IP address

**Navigation** Expert → Communication → Web server → IP address (7209)

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

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

**Factory setting** 192.168.1.212

### Subnet mask

**Navigation** Expert → Communication → Web server → Subnet mask (7211)

**Description** Display or enter the subnet mask.

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

**Factory setting** 255.255.255.0

### Default gateway

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

**Description** Display or enter the Default gateway (→ 180).

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

**Factory setting** 0.0.0.0

### Web server functionality

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

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

**Selection**
- Off
- HTML Off
- On

**Factory setting** On

**Additional information** *Description*

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

*Selection*

| Option | Description |
|---|---|
| Off | ▪ The Web server is completely disabled.<br>▪ Port 80 is locked. |
| HTML Off | The HTML version of the Web server is not available. |
| On | ▪ The complete Web server functionality is available.<br>▪ JavaScript is used.<br>▪ The password is transferred in an encrypted state.<br>▪ Any change to the password is also transferred in an encrypted state. |

### Login page

**Navigation** Expert → Communication → Web server → Login page (7273)

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

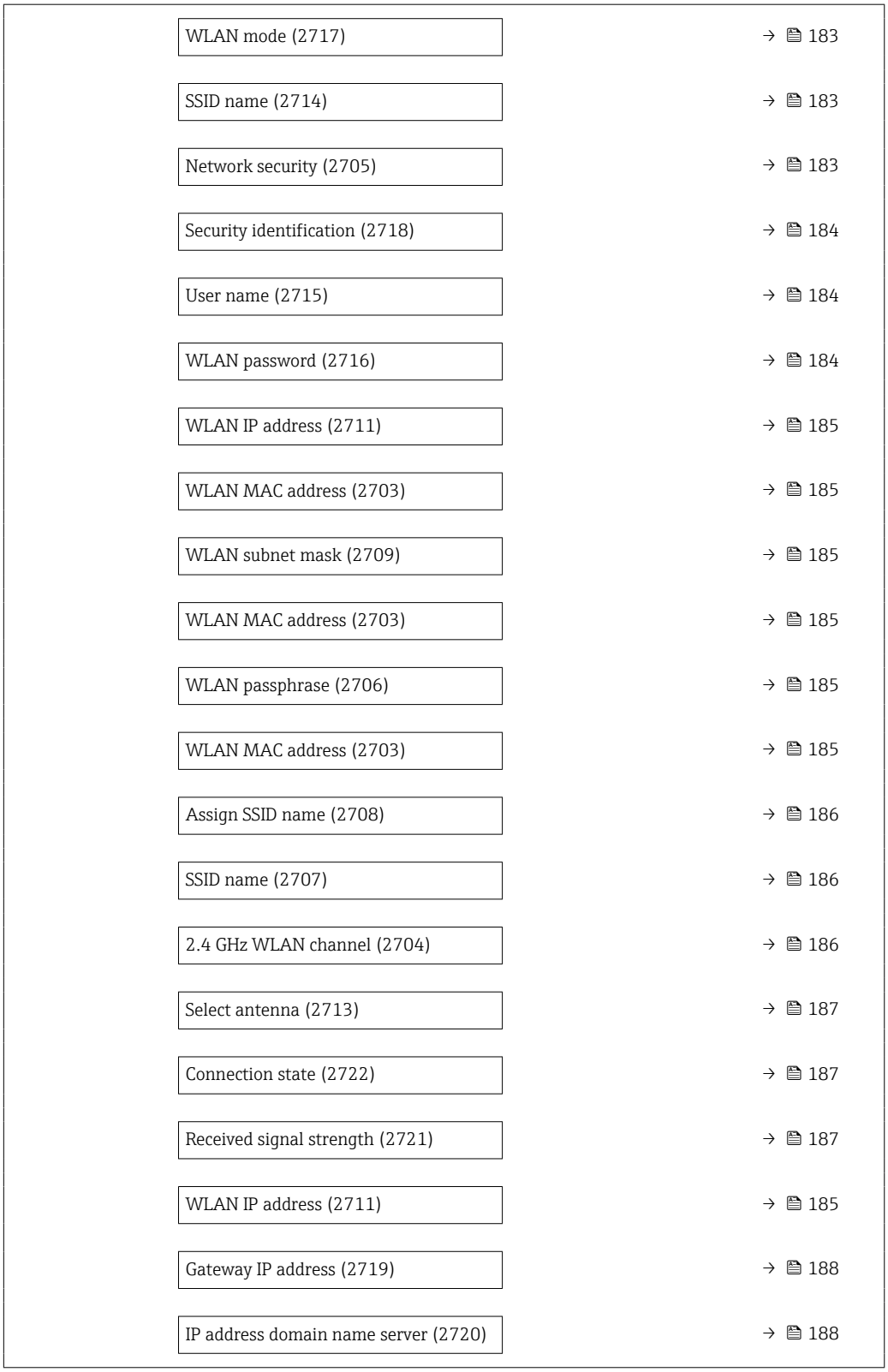
**Selection**
- Without header
- With header

**Factory setting** With header

## 3.6.4 "WLAN settings" wizard

*Navigation* Expert → Communication → WLAN settings

| ▶ WLAN settings | | |
|---|---|---|
| | WLAN (2702) | → 182 |




## WLAN

**Navigation** Expert → Communication → WLAN settings → WLAN (2702)

**Description** Use this function to enable and disable the WLAN connection.

**Selection**
- Disable
- Enable

**Factory setting** Enable

## WLAN mode

**Navigation** Expert → Communication → WLAN settings → WLAN mode (2717)

**Description** Use this function to select the WLAN mode.

**Selection**
- WLAN access point
- WLAN Client

**Factory setting** WLAN access point

## SSID name

**Navigation** Expert → Communication → WLAN settings → SSID name (2714)

**Prerequisite** The client is activated.

**Description** Use this function to enter the user-defined SSID name (max. 32 characters) of the WLAN network.

**User entry** –

**Factory setting** –

## Network security

**Navigation** Expert → Communication → WLAN settings → Network security (2705)

**Description** Use this function to select the type of security for the WLAN interface.

**Selection**
- Unsecured
- WPA2-PSK
- EAP-PEAP with MSCHAPv2 *
- EAP-PEAP MSCHAPv2 no server authentic. *
- EAP-TLS *

**Factory setting** WPA2-PSK

* Visibility depends on order options or device settings

**Additional information** *Selection*

- Unsecured
  Access the WLAN connection without identification.
- WPA2-PSK
  Access the WLAN connection with a network key.
- EAP-PEAP with MSCHAPv2
  Access the WLAN connection with a password-based authentication protocol.
- EAP-PEAP MSCHAPv2 no server authentic.
  Access the WLAN connection with a password-based protocol without server authentication.
- EAP-TLS
  Access the WLAN connection with a certificate-based, two-way authentication of the client and network.

### Security identification

**Navigation** Expert → Communication → WLAN settings → Sec. identific. (2718)

**Description** Use this function to select the security settings (download via the menu: Data Management > Security > Download WLAN).

**User interface**

- Trusted issuer certificate
- Device certificate
- Device private key

### User name

**Navigation** Expert → Communication → WLAN settings → User name (2715)

**Description** Use this function to enter the username of the WLAN network.

**User entry** –

**Factory setting** –

### WLAN password

**Navigation** Expert → Communication → WLAN settings → WLAN password (2716)

**Description** Use this function to enter the WLAN password for the WLAN network.

**User entry** –

**Factory setting** –

### WLAN IP address

**Navigation** Expert → Communication → WLAN settings → WLAN IP address (2711)

**Description** Use this function to enter the IP address of the measuring device's WLAN connection.

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

**Factory setting** 192.168.1.212

### WLAN MAC address

**Navigation** Expert → Communication → WLAN settings → WLAN MAC address (2703)

**Description** Displays the MAC [6] address of the measuring device.

**User interface** Unique 12-digit character string comprising letters and numbers

**Factory setting** Each measuring device is given an individual address.

**Additional information** *Example*
For the display format
00:07:05:10:01:5F

### WLAN subnet mask

**Navigation** Expert → Communication → WLAN settings → WLAN subnet mask (2709)

**Description** Use this function to enter the subnet mask.

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

**Factory setting** 255.255.255.0

### WLAN passphrase

**Navigation** Expert → Communication → WLAN settings → WLAN passphrase (2706)

**Prerequisite** The **WPA2-PSK** option is selected in the **Security type** parameter (→ 183).

**Description** Use this function to enter the network key.

6) Media Access Control

**User entry** 8 to 32-digit character string comprising numbers, letters and special characters (without spaces)

**Factory setting** Serial number of the measuring device (e.g. L100A802000)

## Assign SSID name

**Navigation** Expert → Communication → WLAN settings → Assign SSID name (2708)

**Description** Use this function to select which name is used for the SSID [7].

**Selection**
- Device tag
- User-defined

**Factory setting** User-defined

**Additional information** *Selection*
- Device tag
  The device tag name is used as the SSID.
- User-defined
  A user-defined name is used as the SSID.

## SSID name

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

**Prerequisite**
- The **User-defined** option is selected in the **Assign SSID name** parameter (→ 186).
- The **WLAN access point** option is selected in the **WLAN mode** parameter (→ 183).

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

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

**Factory setting** EH_device designation_last 7 digits of the serial number (e.g. EH_Promag_500_A802000)

## 2.4 GHz WLAN channel

**Navigation** Expert → Communication → WLAN settings → WLAN channel (2704)

**Description** Use this function to enter the 2.4 GHz WLAN channel.

**User entry** 1 to 11

7) Service Set Identifier

**Factory setting** 6

**Additional information** *Description*

- It is only necessary to enter a 2.4 GHz WLAN channel if multiple WLAN devices are in use.
- If just one measuring device is in use, it is recommended to keep the factory setting.

## Select antenna

**Navigation** Expert → Communication → WLAN settings → Select antenna (2713)

**Description** Use this function to select whether the external or internal antenna is used for reception.

**Selection**
- External antenna
- Internal antenna

**Factory setting** Internal antenna

## Connection state

**Navigation** Expert → Communication → WLAN settings → Connection state (2722)

**Description** The connection status is displayed.

**User interface**
- Connected
- Not connected

**Factory setting** Not connected

## Received signal strength

**Navigation** Expert → Communication → WLAN settings → Rec.sig.strength (2721)

**Description** Displays the signal strength received.

**User interface**
- Low
- Medium
- High

**Factory setting** High

**Gateway IP address**

**Navigation** Expert → Communication → WLAN settings → Gateway IP addr. (2719)

**Description** Use this function to enter the IP address of the gateway.

**User interface** Character string comprising numbers, letters and special characters

**Factory setting** 192.168.1.212

**IP address domain name server**

**Navigation** Expert → Communication → WLAN settings → IP address DNS (2720)

**Description** Use this function to enter the IP address of the domain name server.

**User interface** Character string comprising numbers, letters and special characters

**Factory setting** 192.168.1.212

### 3.6.5 "OPC-UA configuration" submenu

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

*Navigation* Expert → Communication → OPC-UA config.

▶ **OPC-UA configuration**

### 3.6.6 "Diagnostic configuration" submenu

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

*Assign a category to the particular diagnostic event:*

| Category | Meaning |
|---|---|
| Failure (F) | A device error is present. The measured value is no longer valid. |
| Function check (C) | The device is in service mode (e.g. during a simulation). |
| Out of specification (S) | The device is being operated:<br>▪ Outside its technical specification limits (e.g. outside the process temperature range)<br>▪ Outside of the configuration carried out by the user (e.g. maximum flow in parameter 20 mA value) |

| Category | Meaning |
|---|---|
| Maintenance required (M) | Maintenance is required. The measured value is still valid. |
| No effect (N) | Has no effect on the condensed status [1]. |

1) Condensed status according to NAMUR recommendation NE107

*Navigation* Expert → Communication → Diag. config.

► **Diagnostic configuration**

| | |
|---|---|
| Event category 043 (0285) | → 190 |
| Event category 376 (0286) | → 190 |
| Event category 377 (0287) | → 190 |
| Event category 441 (0210) | → 191 |
| Event category 442 (0230) | → 191 |
| Event category 443 (0231) | → 191 |
| Event category 444 (0211) | → 192 |
| Event category 531 (0262) | → 192 |
| Event category 543 (0276) | → 193 |
| Event category 599 (0279) | → 193 |
| Event category 832 (0218) | → 193 |
| Event category 833 (0225) | → 194 |
| Event category 834 (0227) | → 194 |
| Event category 835 (0229) | → 195 |
| Event category 842 (0295) | → 195 |
| Event category 961 (0261) | → 195 |
| Event category 962 (0214) | → 196 |
| Event category 937 (0260) | → 196 |
| Event category 938 (0284) | → 196 |

### Event category 043 (Sensor short circuit)

**Navigation** Expert → Communication → Diag. config. → Event category 043 (0285)

**Description** Use this option to select a category for the **043 Sensor short circuit** diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information** For a detailed description of the event categories available for selection: → 188

### Event category 376 (Sensor electronics (ISEM) faulty)

**Navigation** Expert → Communication → Diag. config. → Event category 376 (0286)

**Description** Use this option to select a category for the **376 Sensor electronics (ISEM) faulty** diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information** For a detailed description of the event categories available for selection: → 188

### Event category 377 (Sensor electronics (ISEM) faulty)

**Navigation** Expert → Communication → Diag. config. → Event category 377 (0287)

**Description** Use this option to select a category for the **377 Sensor electronics (ISEM) faulty** diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information** For a detailed description of the event categories available for selection: → 188

## Event category 441 (Current output 1 to n)

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

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

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

**Factory setting** Out of specification (S)

**Additional information** For a detailed description of the event categories available for selection: → 188

## Event category 442 (Frequency output 1 to n)

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

**Prerequisite** The pulse/frequency/switch output is available.

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

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

**Factory setting** Out of specification (S)

**Additional information** For a detailed description of the event categories available for selection: → 188

## Event category 443 (Pulse output 1 to n)

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

**Prerequisite** The pulse/frequency/switch output is available.

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

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

**Factory setting** Out of specification (S)

**Additional information** For a detailed description of the event categories available for selection: → 188

## Event category 444 (Current input 1 to n)

**Navigation** Expert → Communication → Diag. config. → Event category 444 (0211)

**Prerequisite** The current input is available.

**Description** Use this function to select a category for the **444 Current input 1 to n** diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information** *Selection*

For a detailed description of the event categories available for selection: → 188

## Event category 531 (Empty pipe detection)

**Navigation** Expert → Communication → Diag. config. → Event category 531 (0262)

**Description** Use this option to select a category for the **531 Empty pipe detection** diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information** For a detailed description of the event categories available for selection: → 188

## Event category 543 (Double pulse output)

**Navigation** Expert → Communication → Diag. config. → Event category 543 (0276)

**Description** Use this option to select a category for the **543 Double pulse output** diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information** For a detailed description of the event categories available for selection: → 188

## Event category 599 (Custody transfer logbook full)

**Navigation** Expert → Communication → Diag. config. → Event category 599 (0279)

**Description** Select category for diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information** *Selection*

For a detailed description of the event categories available for selection: → 188

## Event category 832 (Electronics temperature too high)

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

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

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

**Factory setting** Out of specification (S)

**Additional information** *Selection*

For a detailed description of the event categories available for selection: → 188

## Event category 833 (Electronics temperature too low)

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

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

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

**Factory setting** Out of specification (S)

**Additional information** *Selection*

For a detailed description of the event categories available for selection: → 188

## Event category 834 (Process temperature too high)

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

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

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

**Factory setting** Out of specification (S)

**Additional information** *Selection*

For a detailed description of the event categories available for selection: → 188

### Event category 835 (Process temperature too low)

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

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

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

**Factory setting** Out of specification (S)

**Additional information** *Selection*

For a detailed description of the event categories available for selection: → 188

### Event category 861 (Process fluid)

**Navigation** Expert → Communication → Diag. config. → Event category 961 (0261)

**Description** Use this option to select a category for the **861 Process fluid** diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information** For a detailed description of the event categories available for selection: → 188

### Event category 842 (Process limit)

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

**Description** Use this function to assign a category to the **842 Process limit** diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information** *Selection*

For a detailed description of the event categories available for selection: → 188

## Event category 862 (Pipe empty)

**Navigation** Expert → Communication → Diag. config. → Event category 962 (0214)

**Description** Use this option to select a category for the **862 Pipe empty** diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information** For a detailed description of the event categories available for selection: → 188

## Event category 937 (EMC interference)

**Navigation** Expert → Communication → Diag. config. → Event category 937 (0260)

**Description** Use this option to select a category for the **937 EMC interference** diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information** For a detailed description of the event categories available for selection: → 188

## Event category 938 (EMC interference)

**Navigation** Expert → Communication → Diag. config. → Event category 938 (0284)

**Description** Use this option to select a category for the **938 EMC interference** diagnostic message.

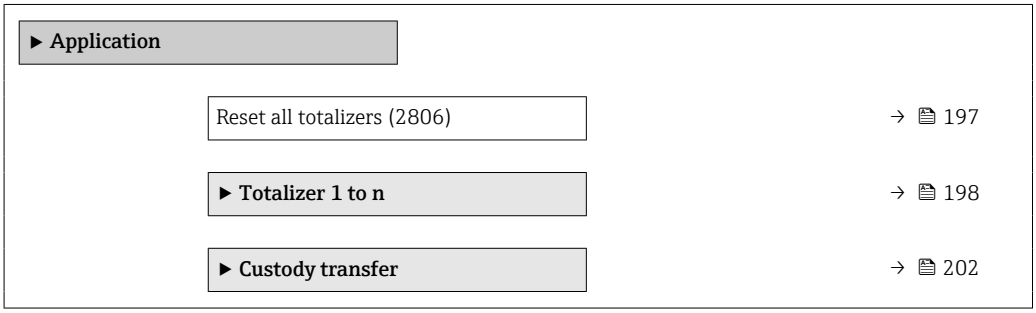
**Selection**
- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- No effect (N)

**Factory setting** Failure (F)

**Additional information** For a detailed description of the event categories available for selection: → 188

## 3.7 "Application" submenu

*Navigation* Expert → Application




### Reset all totalizers

**Navigation** Expert → Application → Reset all tot. (2806)

**Description** Use this function to reset all totalizers to the value **0** and restart the totaling process. This deletes all the flow values previously totalized.

**Selection**
- Cancel
- Reset + totalize

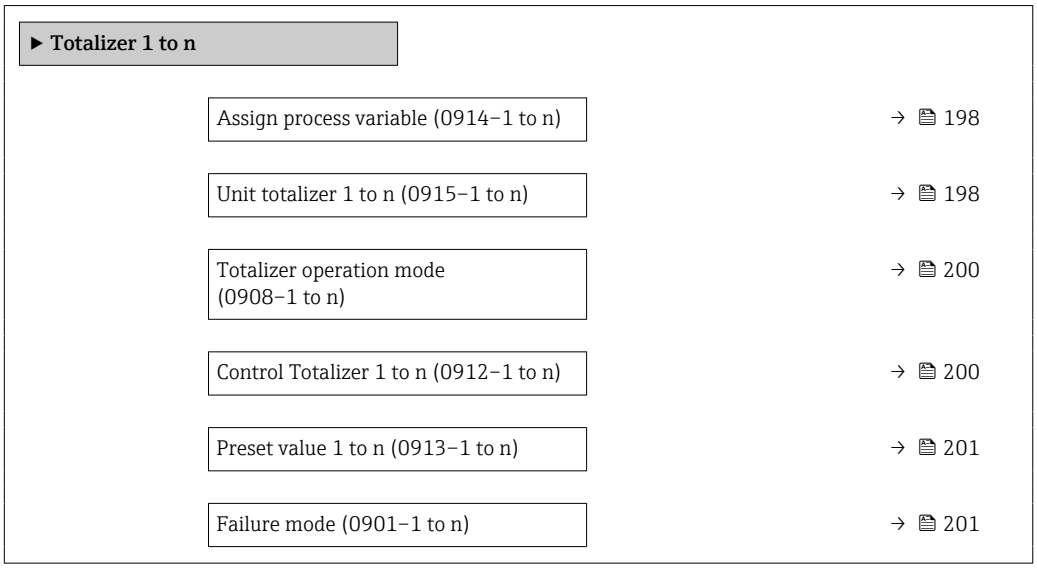
**Factory setting** Cancel

**Additional information** *Selection*

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

### 3.7.1 "Totalizer 1 to n" submenu

*Navigation* Expert → Application → Totalizer 1 to n




**Assign process variable**

**Navigation** Expert → Application → Totalizer 1 to n → Assign variable (0914–1 to n)

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

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

**Factory setting** Volume flow

**Additional information** *Description*

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

*Selection*

If the **Off** option is selected, only the **Assign process variable** parameter (→ 198) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

**Unit totalizer 1 to n**

**Navigation** Expert → Application → Totalizer 1 to n → Unit totalizer 1 to n (0915–1 to n)

**Prerequisite** A process variable is selected in the **Assign process variable** parameter (→ 198) of the **Totalizer 1 to n** submenu.

**Description**

Use this function to select the process variable unit for the Totalizer 1 to n (→ 198).

**Selection**

*SI units*
- g *
- kg *
- t *

*US units*
- oz *
- lb *
- STon *

* Visibility depends on order options or device settings

or

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

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

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

* Visibility depends on order options or device settings

or

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

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

*Imperial units*
Sgal (imp) *

* Visibility depends on order options or device settings

or

*Other units*
None *

* Visibility depends on order options or device settings

**Factory setting**

Depends on country:
- l
- gal (us)

**Additional information** *Description*

The unit is selected separately for each totalizer. It is independent of the selection made in the **System units** submenu (→ 57).

*Selection*

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ 198).

## Totalizer operation mode

**Navigation** Expert → Application → Totalizer 1 to n → Operation mode (0908–1 to n)

**Prerequisite** A process variable is selected in the **Assign process variable** parameter (→ 198) of the **Totalizer 1 to n** submenu.

**Description** Use this function to select how the totalizer summates the flow.

**Selection**
- Net
- Forward
- Reverse

**Factory setting** Net

**Additional information** *Selection*
- Net flow total
  Flow values in the forward and reverse flow direction are totalized and balanced against one another. Net flow is registered in the flow direction.
- Forward flow total
  Only the flow in the forward flow direction is totalized.
- Reverse flow total
  Only the flow in the reverse flow direction is totalized (= reverse flow quantity).

## Control Totalizer 1 to n

**Navigation** Expert → Application → Totalizer 1 to n → Control Tot. 1 to n (0912–1 to n)

**Prerequisite** A process variable is selected in the **Assign process variable** parameter (→ 198) of the **Totalizer 1 to n** submenu.

**Description** Use this function to select the control of totalizer value 1-3.

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

* Visibility depends on order options or device settings

**Factory setting** Totalize

**Additional information** *Selection*

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

1) Visible depending on the order options or device settings

## Preset value 1 to n

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

**Prerequisite** A process variable is selected in the **Assign process variable** parameter (→ 198) of the **Totalizer 1 to n** submenu.

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

**User entry** Signed floating-point number

**Factory setting** 0 l

**Additional information** *User entry*

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 198).

*Example*

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

## Failure mode

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

**Prerequisite** A process variable is selected in the **Assign process variable** parameter (→ 198) of the **Totalizer 1 to n** submenu.

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

**Selection**
- Hold
- Continue
- Last valid value + continue

**Factory setting**
Hold

**Additional information**
*Description*

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

*Selection*
- Stop
  The totalizer is stopped in the event of a device alarm.
- Actual value
  The totalizer continues to count based on the actual (current) measured value; the device alarm is ignored.
- Last valid value
  The totalizer continues to count based on the last valid measured value before the device alarm occurred.

### 3.7.2 "Custody transfer" submenu

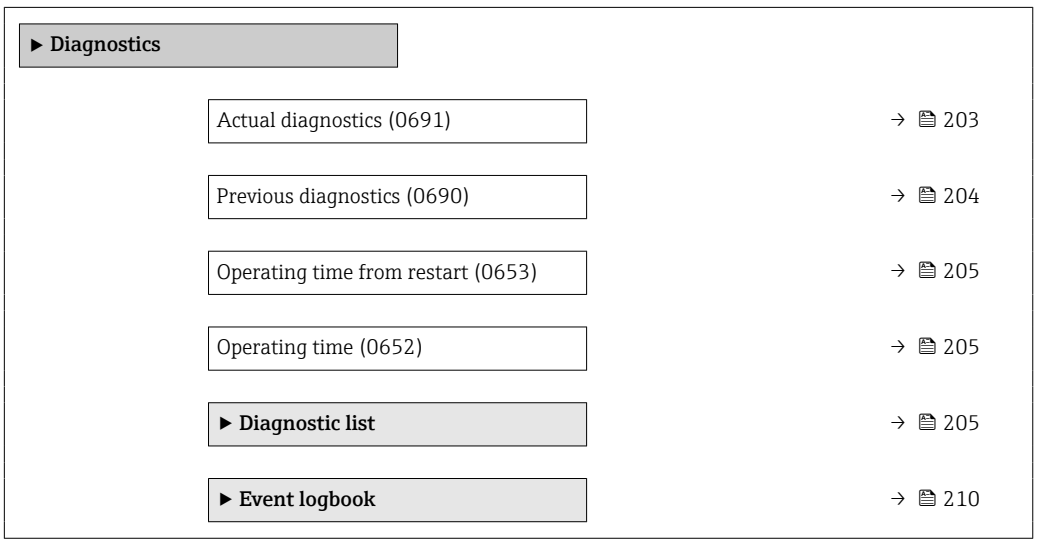
Only available for Promag H.

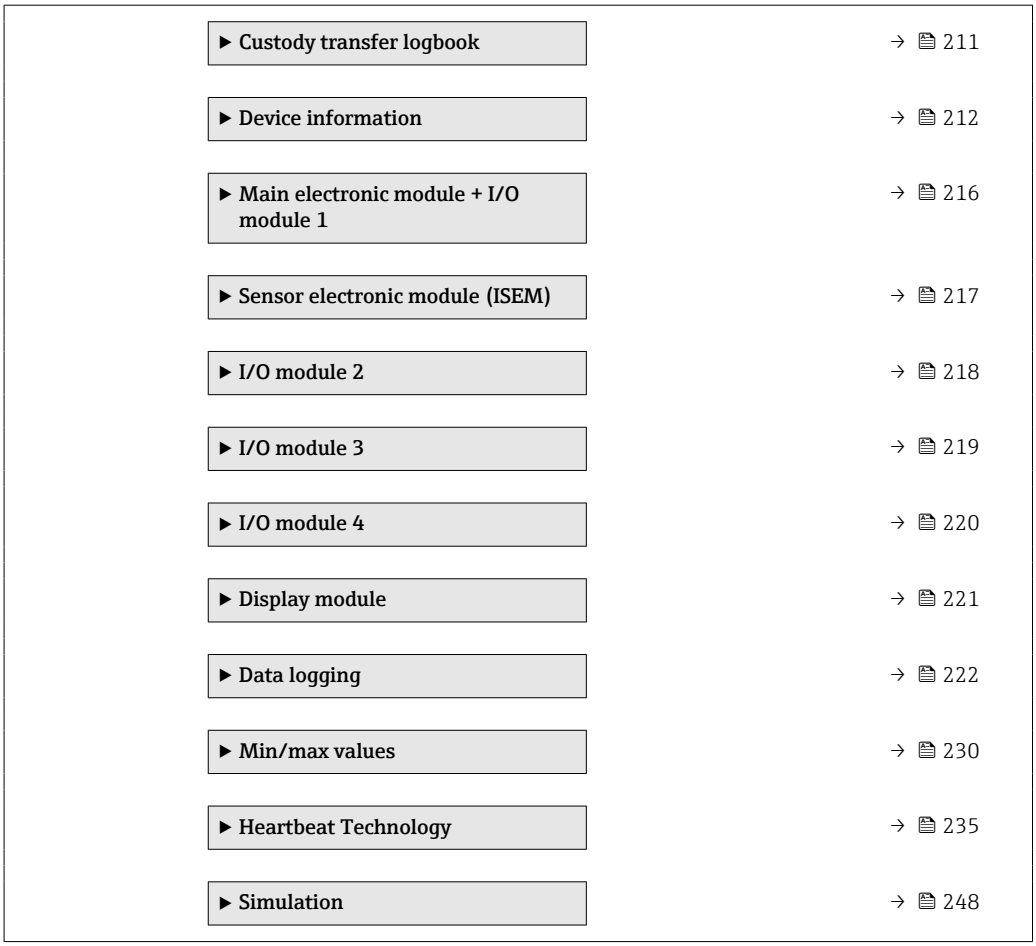
For detailed information on the parameter descriptions for custody transfer measurement, see the Special Documentation for the device → 7

*Navigation* Expert → Application → Custody transfer


## 3.8 "Diagnostics" submenu

*Navigation* Expert → Diagnostics






## Actual diagnostics

**Navigation** Expert → Diagnostics → Actual diagnos. (0691)

**Prerequisite** A diagnostic event has occurred.

**Description** Displays the current diagnostic message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.

**User interface** Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information** *Display*

Additional pending diagnostic messages can be viewed in the **Diagnostic list** submenu (→ 205).

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

*Example*

For the display format:
⊗F271 Main electronics failure

## Timestamp

**Navigation** Expert → Diagnostics → Timestamp

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

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

**Additional information** *Display*

The diagnostic message can be viewed via the **Actual diagnostics** parameter (→ 203).

*Example*

For the display format:
24d12h13m00s

## Previous diagnostics

**Navigation** Expert → Diagnostics → Prev.diagnostics (0690)

**Prerequisite** Two diagnostic events have already occurred.

**Description** Displays the diagnostic message that occurred before the current message.

**User interface** Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information** *Display*

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

*Example*

For the display format:
⊗F271 Main electronics failure

## Timestamp

**Navigation** Expert → Diagnostics → Timestamp

**Description** Displays the operating time when the last diagnostic message before the current message occurred.

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

**Additional information** *Display*

The diagnostic message can be viewed via the **Previous diagnostics** parameter (→ 204).

*Example*

For the display format:
24d12h13m00s

**Operating time from restart**

**Navigation** Expert → Diagnostics → Time fr. restart (0653)

**Description** Use this function to display the time the device has been in operation since the last device restart.

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

**Operating time**

**Navigation** Expert → Diagnostics → Operating time (0652)

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

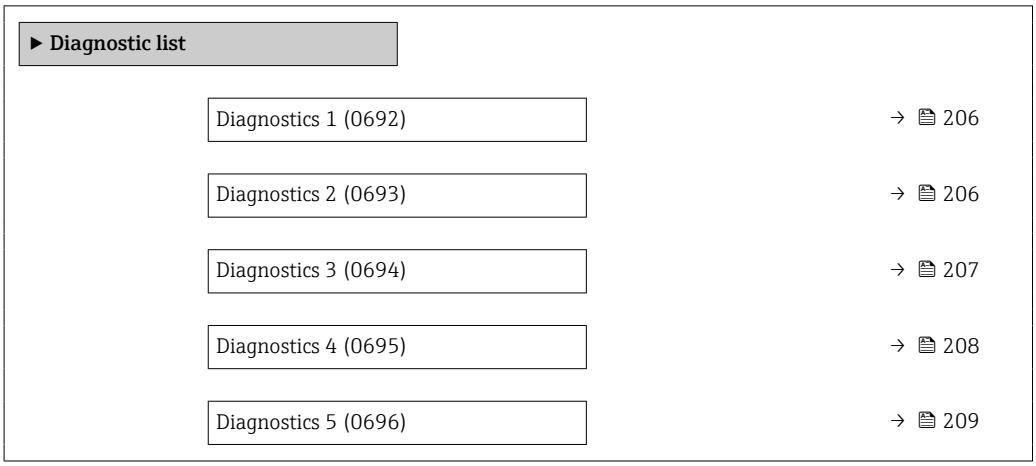
**User interface** Days (d), hours (h), minutes (m) and seconds (s)

**Additional information** *User interface*

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

## 3.8.1 "Diagnostic list" submenu

*Navigation* Expert → Diagnostics → Diagnostic list



## Diagnostics 1

**Navigation** Expert → Diagnostics → Diagnostic list → Diagnostics 1 (0692)

**Description** Displays the current diagnostics message with the highest priority.

**User interface** Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information**

*Display*

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

*Examples*

For the display format:
- ⊗F271 Main electronics failure
- ⊗F276 I/O module failure

## Timestamp 1

**Navigation** Expert → Diagnostics → Diagnostic list → Timestamp

**Description** Displays the operating time when the diagnostic message with the highest priority occurred.

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

**Additional information**

*Display*

The diagnostic message can be viewed via the **Diagnostics 1** parameter (→ 206).

*Example*

For the display format:
24d12h13m00s

## Diagnostics 2

**Navigation** Expert → Diagnostics → Diagnostic list → Diagnostics 2 (0693)

**Description** Displays the current diagnostics message with the second-highest priority.

**User interface** Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information** *Display*

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

*Examples*

For the display format:
- ⊗F271 Main electronics failure
- ⊗F276 I/O module failure

## Timestamp 2

**Navigation** Expert → Diagnostics → Diagnostic list → Timestamp

**Description** Displays the operating time when the diagnostic message with the second-highest priority occurred.

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

**Additional information** *Display*

The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 206).

*Example*

For the display format:
24d12h13m00s

## Diagnostics 3

**Navigation** Expert → Diagnostics → Diagnostic list → Diagnostics 3 (0694)

**Description** Displays the current diagnostics message with the third-highest priority.

**User interface** Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information** *Display*

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

*Examples*

For the display format:
- ⊗F271 Main electronics failure
- ⊗F276 I/O module failure

### Timestamp 3

**Navigation** Expert → Diagnostics → Diagnostic list → Timestamp

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

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

**Additional information**

*Display*

The diagnostic message can be viewed via the **Diagnostics 3** parameter (→ 207).

*Example*

For the display format:
24d12h13m00s

### Diagnostics 4

**Navigation** Expert → Diagnostics → Diagnostic list → Diagnostics 4 (0695)

**Description** Displays the current diagnostics message with the fourth-highest priority.

**User interface** Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information**

*Display*

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

*Examples*

For the display format:
- ⊗F271 Main electronics failure
- ⊗F276 I/O module failure

### Timestamp 4

**Navigation** Expert → Diagnostics → Diagnostic list → Timestamp

**Description** Displays the operating time when the diagnostic message with the fourth-highest priority occurred.

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

**Additional information** *Display*

The diagnostic message can be viewed via the **Diagnostics 4** parameter (→ 208).

*Example*

For the display format:
24d12h13m00s

## Diagnostics 5

**Navigation** Expert → Diagnostics → Diagnostic list → Diagnostics 5 (0696)

**Description** Displays the current diagnostics message with the fifth-highest priority.

**User interface** Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information** *Display*

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

*Examples*

For the display format:
- ⊗F271 Main electronics failure
- ⊗F276 I/O module failure

## Timestamp 5

**Navigation** Expert → Diagnostics → Diagnostic list → Timestamp

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

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

**Additional information** *Display*

The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ 209).

*Example*

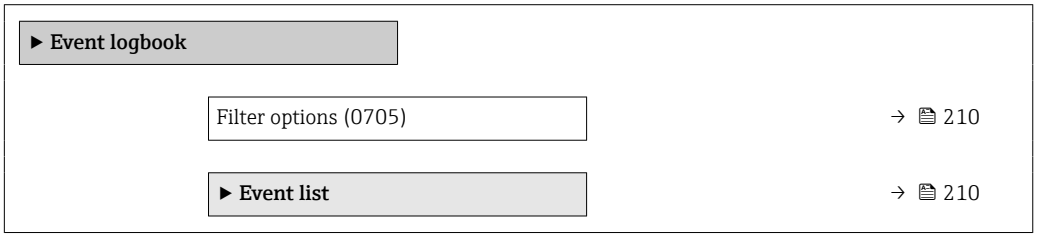
For the display format:
24d12h13m00s

### 3.8.2 "Event logbook" submenu

Viewing event messages

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

*Navigation* Expert → Diagnostics → Event logbook




**Filter options**

**Navigation** Expert → Diagnostics → Event logbook → Filter options (0705)

**Description** Use this function to select the category whose event messages are displayed in the event list of the local display.

**Selection**
- All
- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- Information (I)

**Factory setting** All

**Additional information** *Description*

The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107:
- F = Failure
- C = Function Check
- S = Out of Specification
- M = Maintenance Required

**"Event list" submenu**

The **Event list** submenu is only displayed if operating via the local display.

If operating via the FieldCare operating tool, the event list can be read out with a separate FieldCare module.

If operating via the Web browser, the event messages can be found directly in the **Event logbook** submenu.

*Navigation* Expert → Diagnostics → Event logbook → Event list


**Event list**

**Navigation** Expert → Diagnostics → Event logbook → Event list

**Description** Displays the history of event messages of the category selected in the **Filter options** parameter (→ 210).

**User interface**
- For a "Category I" event message
  Information event, short message, symbol for event recording and operating time when error occurred
- For a "Category F, C, S, M" event message (status signal)
  Diagnostics code, short message, symbol for event recording and operating time when error occurred

**Additional information**

*Description*

A maximum of 20 event messages are displayed in chronological order.

If the **Extended HistoROM** application package (order option) is enabled in the device, the event list can contain up to 100 entries .

The following symbols indicate whether an event has occurred or has ended:
- : Occurrence of the event
- : End of the event

*Examples*

For the display format:
- I1091 Configuration modified
  24d12h13m00s
- F271 Main electronics failure
  01d04h12min30s

*HistoROM*

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

## 3.8.3 "Custody transfer logbook" submenu

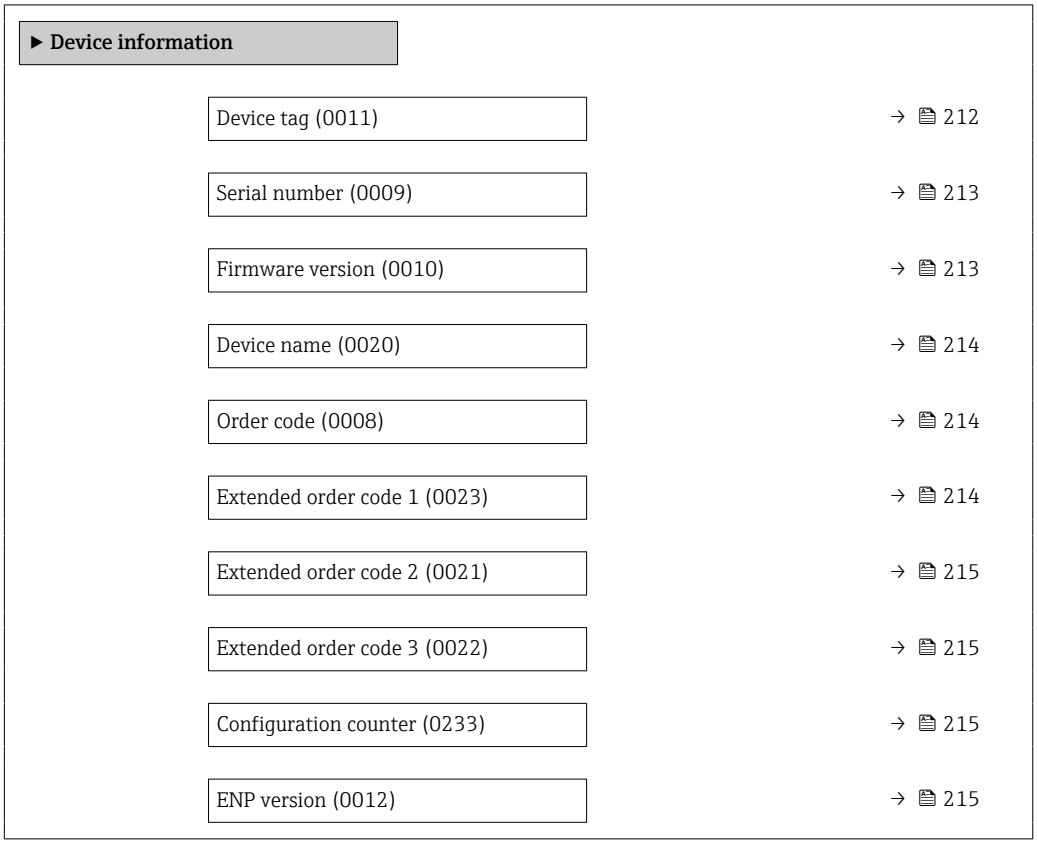
Only available for Promag H.

For detailed information on the parameter descriptions for custody transfer measurement, see the Special Documentation for the device → 7

*Navigation* Expert → Diagnostics → Cust.transf.log.


### 3.8.4 "Device information" submenu

*Navigation* Expert → Diagnostics → Device info




**Device tag**

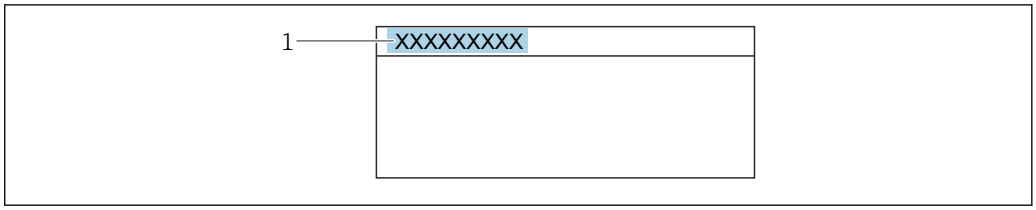
**Navigation** Expert → Diagnostics → Device info → Device tag (0011)

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

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

**Factory setting** Promag

**Additional information** *User interface*




*1 Position of the header text on the display*

The number of characters displayed depends on the characters used.

## Serial number

**Navigation** Expert → Diagnostics → Device info → Serial number (0009)

**Description** Displays the serial number of the measuring device.

The number can be found on the nameplate of the sensor and transmitter.

**User interface** Max. 11-digit character string comprising letters and numbers.

**Additional information** *Description*

**Uses of the serial number**
- To identify the measuring device quickly, e.g. when contacting Endress+Hauser.
- To obtain specific information on the measuring device using the Device Viewer: www.endress.com/deviceviewer

## Firmware version

**Navigation** Expert → Diagnostics → Device info → Firmware version (0010)

**Description** Displays the device firmware version installed.

**User interface** Character string in the format xx.yy.zz

**Additional information** *Display*

The Firmware version is also located:
- On the title page of the Operating instructions
- On the transmitter nameplate

## Device name

**Navigation** Expert → Diagnostics → Device info → Device name (0020)

**Description** Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.

**User interface** Promag 300/500

## Order code

**Navigation** Expert → Diagnostics → Device info → Order code (0008)

**Description** Displays the device order code.

**User interface** Character string composed of letters, numbers and certain punctuation marks (e.g. /).

**Additional information** *Description*

The order code can be found on the nameplate of the sensor and transmitter in the "Order code" field.

The order code is generated from the extended order code through a process of reversible transformation. The extended order code indicates the attributes for all the device features in the product structure. The device features are not directly readable from the order code.

**Uses of the order code**
- To order an identical spare device.
- To identify the device quickly and easily, e.g. when contacting Endress+Hauser.

## Extended order code 1

**Navigation** Expert → Diagnostics → Device info → Ext. order cd. 1 (0023)

**Description** Displays the first part of the extended order code.

On account of length restrictions, the extended order code is split into a maximum of 3 parameters.

**User interface** Character string

**Additional information** *Description*

The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device.

The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field.

### Extended order code 2

**Navigation** Expert → Diagnostics → Device info → Ext. order cd. 2 (0021)

**Description** Displays the second part of the extended order code.

**User interface** Character string

**Additional information** For additional information, see **Extended order code 1** parameter (→ 214)

### Extended order code 3

**Navigation** Expert → Diagnostics → Device info → Ext. order cd. 3 (0022)

**Description** Displays the third part of the extended order code.

**User interface** Character string

**Additional information** For additional information, see **Extended order code 1** parameter (→ 214)

### Configuration counter

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

**Description** Displays the number of parameter modifications for the device. When the user changes a parameter setting, this counter is incremented.

**User interface** 0 to 65 535

### ENP version

**Navigation** Expert → Diagnostics → Device info → ENP version (0012)

**Description** Displays the version of the electronic nameplate.

**User interface** Character string

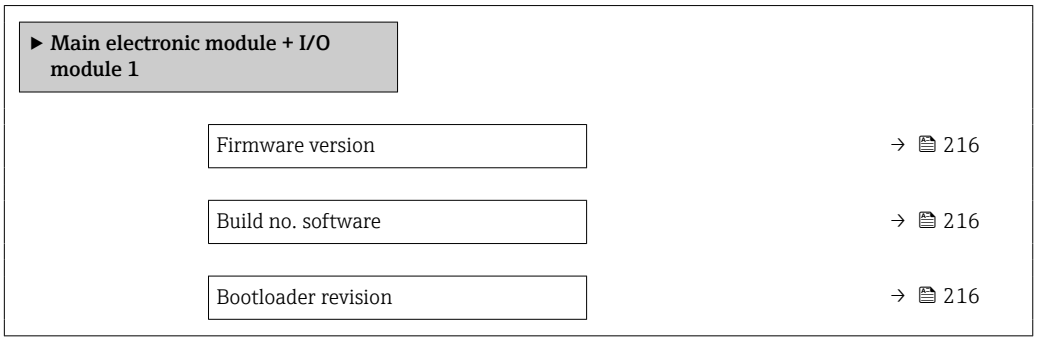
**Factory setting** 2.02.00

**Additional information** *Description*

This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device.

### 3.8.5 "Main electronic module + I/O module 1" submenu

*Navigation* Expert → Diagnostics → Main elec.+I/O1




#### Firmware version

**Navigation** Expert → Diagnostics → Main elec.+I/O1 → Firmware version (0072)

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

**User interface** Positive integer

#### Build no. software

**Navigation** Expert → Diagnostics → Main elec.+I/O1 → Build no. softw. (0079)

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

**User interface** Positive integer

#### Bootloader revision

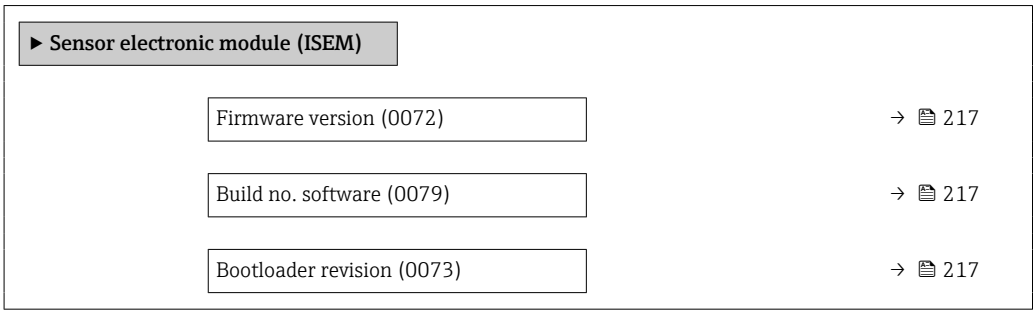
**Navigation** Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)

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

**User interface** Positive integer

### 3.8.6 "Sensor electronic module (ISEM)" submenu

*Navigation* Expert → Diagnostics → Sens. electronic




#### Firmware version

**Navigation** Expert → Diagnostics → Sens. electronic → Firmware version (0072)

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

**User interface** Positive integer

#### Build no. software

**Navigation** Expert → Diagnostics → Sens. electronic → Build no. softw. (0079)

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

**User interface** Positive integer

#### Bootloader revision

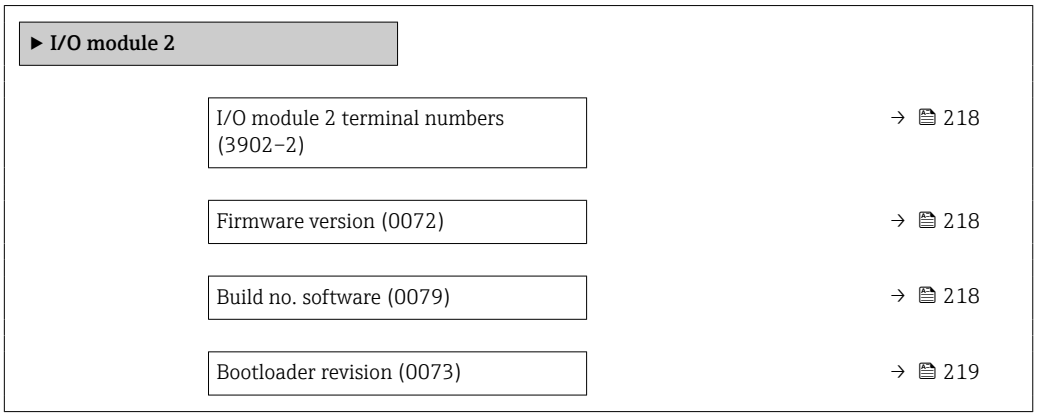
**Navigation** Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)

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

**User interface** Positive integer

### 3.8.7 "I/O module 2" submenu

*Navigation* Expert → Diagnostics → I/O module 2




#### I/O module 2 terminal numbers

**Navigation** Expert → Diagnostics → I/O module 2 → I/O 2 terminals (3902–2)

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

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

#### Firmware version

**Navigation** Expert → Diagnostics → I/O module 2 → Firmware version (0072)

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

**User interface** Positive integer

#### Build no. software

**Navigation** Expert → Diagnostics → I/O module 2 → Build no. softw. (0079)

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

**User interface** Positive integer

* Visibility depends on order options or device settings

**Bootloader revision**

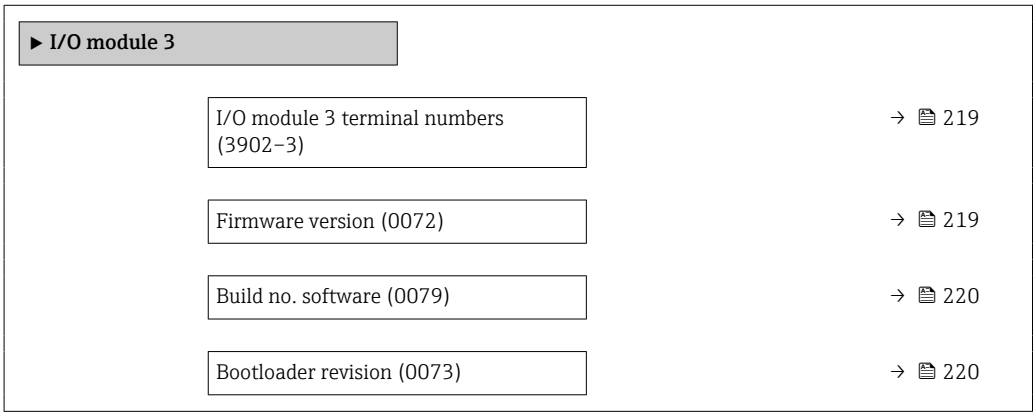
**Navigation** Expert → Diagnostics → I/O module 2 → Bootloader rev. (0073)

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

**User interface** Positive integer

## 3.8.8 "I/O module 3" submenu

*Navigation* Expert → Diagnostics → I/O module 3




**I/O module 3 terminal numbers**

**Navigation** Expert → Diagnostics → I/O module 3 → I/O 3 terminals (3902–3)

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

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

**Firmware version**

**Navigation** Expert → Diagnostics → I/O module 3 → Firmware version (0072)

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

* Visibility depends on order options or device settings

**User interface** Positive integer

**Build no. software**

**Navigation** Expert → Diagnostics → I/O module 3 → Build no. softw. (0079)

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

**User interface** Positive integer

**Bootloader revision**

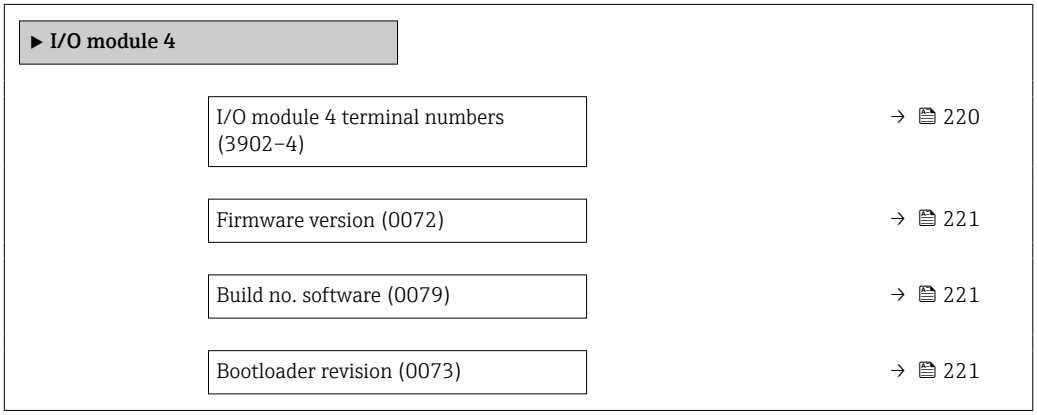
**Navigation** Expert → Diagnostics → I/O module 3 → Bootloader rev. (0073)

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

**User interface** Positive integer

## 3.8.9 "I/O module 4" submenu

*Navigation* Expert → Diagnostics → I/O module 4




**I/O module 4 terminal numbers**

**Navigation** Expert → Diagnostics → I/O module 4 → I/O 4 terminals (3902–4)

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

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

**Firmware version**

**Navigation** Expert → Diagnostics → I/O module 4 → Firmware version (0072)

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

**User interface** Positive integer

**Build no. software**

**Navigation** Expert → Diagnostics → I/O module 4 → Build no. softw. (0079)

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

**User interface** Positive integer

**Bootloader revision**

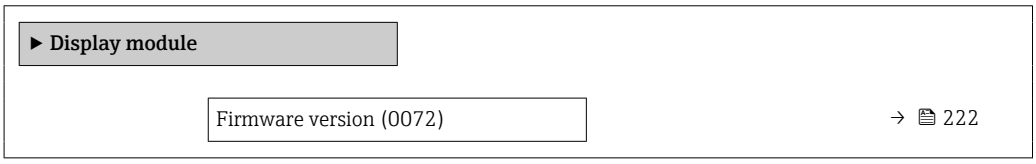
**Navigation** Expert → Diagnostics → I/O module 4 → Bootloader rev. (0073)

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

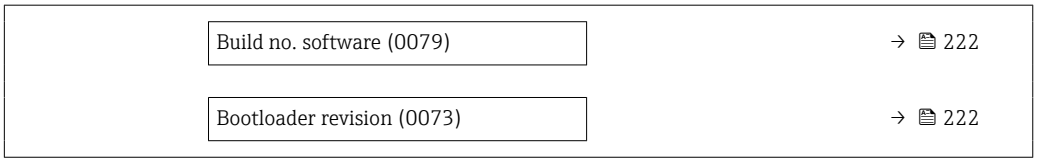
**User interface** Positive integer

## 3.8.10 "Display module" submenu

*Navigation* Expert → Diagnostics → Display module




* Visibility depends on order options or device settings




**Firmware version**

**Navigation** Expert → Diagnostics → Display module → Firmware version (0072)

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

**User interface** Positive integer

**Build no. software**

**Navigation** Expert → Diagnostics → Display module → Build no. softw. (0079)

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

**User interface** Positive integer

**Bootloader revision**

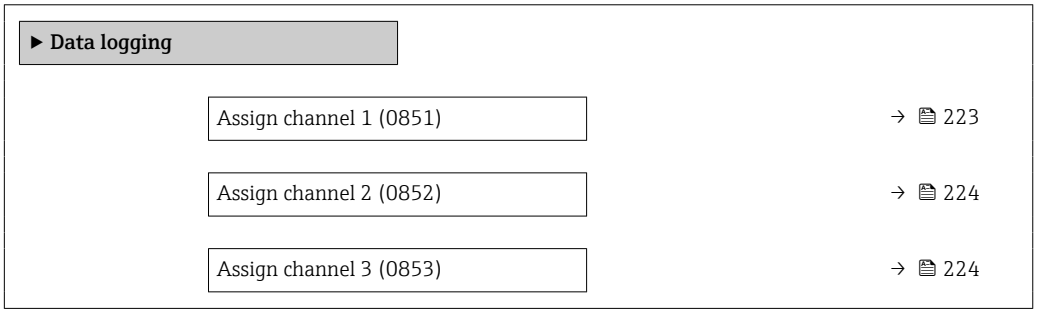
**Navigation** Expert → Diagnostics → Display module → Bootloader rev. (0073)

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

**User interface** Positive integer

## 3.8.11 "Data logging" submenu

*Navigation* Expert → Diagnostics → Data logging




## Assign channel 1

**Navigation** Expert → Diagnostics → Data logging → Assign chan. 1 (0851)

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

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

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

**Selection**
- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *
- Electronics temperature
- Current output 1
- Current output 2 *
- Current output 3 *
- Current output 4 *

* Visibility depends on order options or device settings

- Noise *
- Coil current shot time *
- Reference electrode potential against PE *
- HBSI *
- Build-up index *
- Test point 1
- Test point 2
- Test point 3

**Factory setting** Off

**Additional information** *Description*

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

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

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

## Assign channel 2

**Navigation** Expert → Diagnostics → Data logging → Assign chan. 2 (0852)

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

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

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

**Selection** For the picklist, see the **Assign channel 1** parameter (→ 223)

**Factory setting** Off

## Assign channel 3

**Navigation** Expert → Diagnostics → Data logging → Assign chan. 3 (0853)

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

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

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

* Visibility depends on order options or device settings

**Selection** For the picklist, see the **Assign channel 1** parameter (→ 223)

**Factory setting** Off

## Assign channel 4

**Navigation** Expert → Diagnostics → Data logging → Assign chan. 4 (0854)

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

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

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

**Selection** For the picklist, see the **Assign channel 1** parameter (→ 223)

**Factory setting** Off

## Logging interval

**Navigation** Expert → Diagnostics → Data logging → Logging interval (0856)

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

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

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

**User entry** 0.1 to 3 600.0 s

**Factory setting** 1.0 s

**Additional information** *Description*

This defines the interval between the individual data points in the data log, and thus the maximum loggable process time $T_{log}$:

- If 1 logging channel is used: $T_{log} = 1000 \times t_{log}$
- If 2 logging channels are used: $T_{log} = 500 \times t_{log}$
- If 3 logging channels are used: $T_{log} = 333 \times t_{log}$
- If 4 logging channels are used: $T_{log} = 250 \times t_{log}$

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

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

*Example*

If 1 logging channel is used:
- $T_{log}$ = 1000 × 1 s = 1 000 s ≈15 min
- $T_{log}$ = 1000 × 10 s = 10 000 s ≈ 3 h
- $T_{log}$ = 1000 × 80 s = 80 000 s ≈ 1 d
- $T_{log}$ = 1000 × 3 600 s = 3 600 000 s ≈ 41 d

## Clear logging data

**Navigation** Expert → Diagnostics → Data logging → Clear logging (0855)

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

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

**Description** Use this function to clear the entire logging data.

**Selection**
- Cancel
- Clear data

**Factory setting** Cancel

**Additional information** *Selection*
- Cancel
  The data is not cleared. All the data is retained.
- Clear data
  The logging data is cleared. The logging process starts from the beginning.

## Data logging

**Navigation** Expert → Diagnostics → Data logging → Data logging (0860)

**Description** Use this function to select the data logging method.

**Selection**
- Overwriting
- Not overwriting

**Factory setting** Overwriting

**Additional information** *Selection*
- Overwriting
  The device memory applies the FIFO principle.
- Not overwriting
  Data logging is canceled if the measured value memory is full (single shot).

### Logging delay

**Navigation** Expert → Diagnostics → Data logging → Logging delay (0859)

**Prerequisite** In the **Data logging** parameter (→ 226), the **Not overwriting** option is selected.

**Description** Use this function to enter the time delay for measured value logging.

**User entry** 0 to 999 h

**Factory setting** 0 h

**Additional information** *Description*

Once data logging has been started with the **Data logging control** parameter (→ 227), the device does not save any data for the duration of the delay time entered.

### Data logging control

**Navigation** Expert → Diagnostics → Data logging → Data log.control (0857)

**Prerequisite** In the **Data logging** parameter (→ 226), the **Not overwriting** option is selected.

**Description** Use this function to start and stop measured value logging.

**Selection**
- None
- Delete + start
- Stop

**Factory setting** None

**Additional information** *Selection*
- None
  Initial measured value logging status.
- Delete + start
  All the measured values recorded for all the channels are deleted and measured value logging starts again.
- Stop
  Measured value logging is stopped.

### Data logging status

**Navigation** Expert → Diagnostics → Data logging → Data log. status (0858)

**Prerequisite** In the **Data logging** parameter (→ 226), the **Not overwriting** option is selected.

**Description** Displays the measured value logging status.

**User interface**
- Done
- Delay active
- Active
- Stopped

**Factory setting** Done

**Additional information** *Selection*
- Done
  Measured value logging has been performed and completed successfully.
- Delay active
  Measured value logging has been started but the logging interval has not yet elapsed.
- Active
  The logging interval has elapsed and measured value logging is active.
- Stopped
  Measured value logging is stopped.

### Entire logging duration

**Navigation** Expert → Diagnostics → Data logging → Logging duration (0861)

**Prerequisite** In the **Data logging** parameter (→ 226), the **Not overwriting** option is selected.

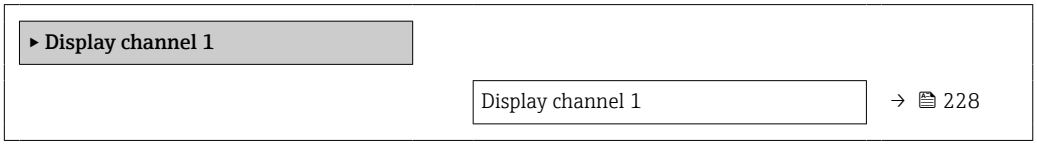
**Description** Displays the total logging duration.

**User interface** Positive floating-point number

**Factory setting** 0 s

#### "Display channel 1" submenu

*Navigation* Expert → Diagnostics → Data logging → Displ.channel 1




### Display channel 1

**Navigation** Expert → Diagnostics → Data logging → Displ.channel 1

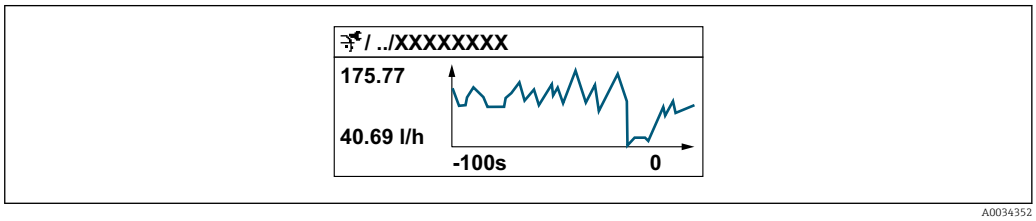
**Prerequisite** The **Extended HistoROM** application package is available.

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

One of the following options is selected in the **Assign channel 1** parameter (→ 223):
- Conductivity *
- Corrected conductivity *
- Temperature *

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

**Additional information** *Description*

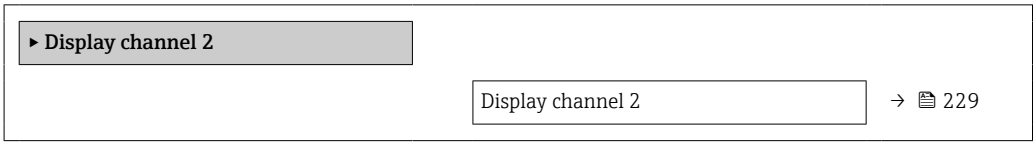



10 *Chart of a measured value trend*

- x-axis: depending on the number of channels selected displays 250 to 1000 measured values of a process variable.
- y-axis: displays the approximate measured value span and constantly adapts this to the ongoing measurement.

### "Display channel 2" submenu

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




## Display channel 2

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

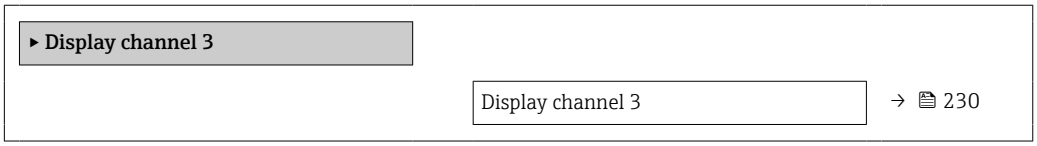
**Prerequisite** A process variable is specified in the **Assign channel 2** parameter.

**Description** See the **Display channel 1** parameter → 228

* Visibility depends on order options or device settings

### "Display channel 3" submenu

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




**Display channel 3**

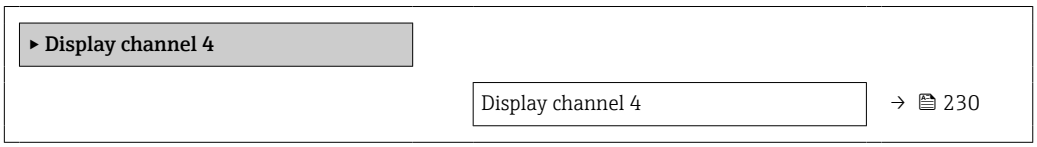
**Navigation** Expert → Diagnostics → Data logging → Displ.channel 3

**Prerequisite** A process variable is specified in the **Assign channel 3** parameter.

**Description** See the **Display channel 1** parameter → 228

### "Display channel 4" submenu

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




**Display channel 4**

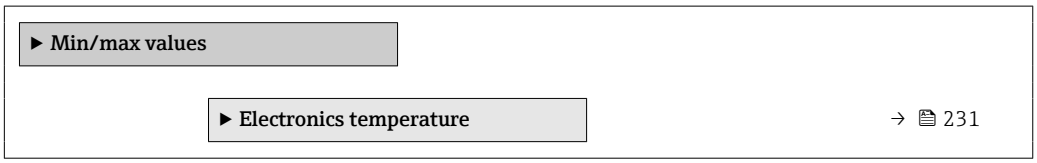
**Navigation** Expert → Diagnostics → Data logging → Displ.channel 4

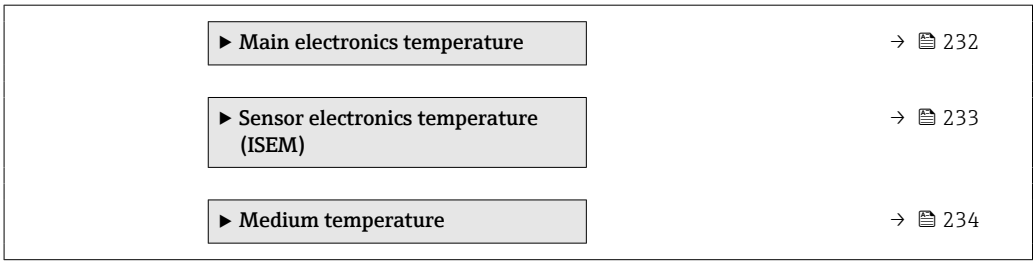
**Prerequisite** A process variable is specified in the **Assign channel 4** parameter.

**Description** See the **Display channel 1** parameter → 228

## 3.8.12 "Min/max values" submenu

*Navigation* Expert → Diagnostics → Min/max val.






## Reset min/max values

**Navigation** Expert → Diagnostics → Min/max val. → Reset min/max (6541)

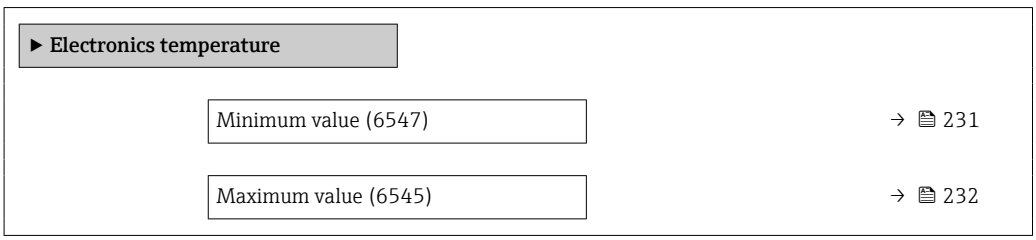
**Description** Use this function to select measured variables whose minimum, maximum and average measured values are to be reset.

**Selection**
- Cancel
- Terminal voltage
- IO module temperature

**Factory setting** Cancel

### "Main electronics temperature" submenu

*Navigation* Expert → Diagnostics → Min/max val. → Main elect.temp.




## Minimum value

**Navigation** Expert → Diagnostics → Min/max val. → Electronics temp → Minimum value (6547)

**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)

## Maximum value

**Navigation** Expert → Diagnostics → Min/max val. → Electronics temp → Maximum value (6545)

**Description** Displays the highest previously measured temperature value of the main electronics module.

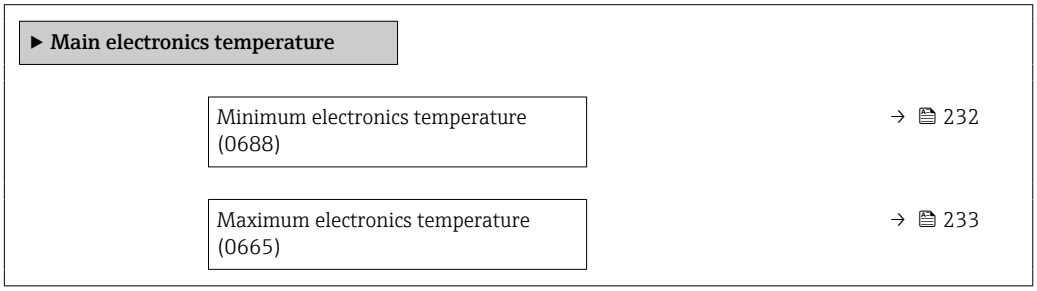
**User interface** Signed floating-point number

**Additional information** *Dependency*

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

### "Main electronics temperature" submenu

*Navigation* Expert → Diagnostics → Min/max val. → Main elect.temp.




## Minimum electronics temperature

**Navigation** Expert → Diagnostics → Min/max val. → Main elect.temp. → Min.electr.temp. (0688)

**Description** Displays the lowest previously measured temperature value of the electronics module in the transmitter.

**User interface** Signed floating-point number

**Additional information** *Dependency*

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

### Maximum electronics temperature

**Navigation** Expert → Diagnostics → Min/max val. → Main elect.temp. → Max.electr.temp. (0665)

**Description** Displays the highest previously measured temperature value of the electronics module in the transmitter.

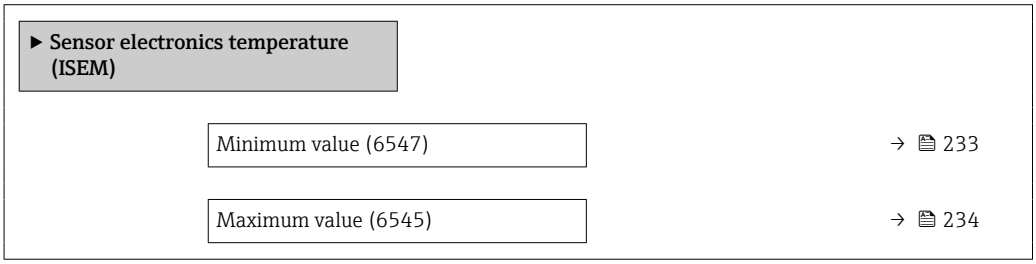
**User interface** Signed floating-point number

**Additional information** *Dependency*

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

#### "Sensor electronics temperature (ISEM)" submenu

*Navigation* Expert → Diagnostics → Min/max val. → Sensor elec.temp




### Minimum value

**Navigation** Expert → Diagnostics → Min/max val. → Sensor elec.temp → Minimum value (6547)

**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)

## Maximum value

**Navigation** Expert → Diagnostics → Min/max val. → Sensor elec.temp → Maximum value (6545)

**Description** Displays the highest previously measured temperature value of the main electronics module.

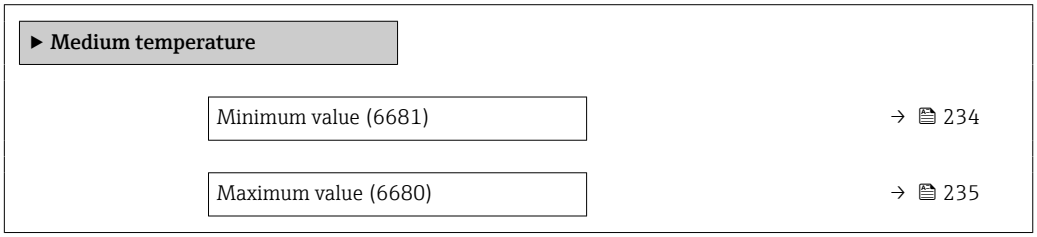
**User interface** Signed floating-point number

**Additional information** *Dependency*

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

### "Temperature" submenu

*Navigation* Expert → Diagnostics → Min/max val. → Temperature




## Minimum value

**Navigation** Expert → Diagnostics → Min/max val. → Medium temp. → Minimum value (6681)

**Prerequisite** One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

**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 (6680)

**Prerequisite** One of the following conditions is met:
- Order code for "Sensor option", option **CI** "Medium temperature measurement"
  or
- The temperature is read into the flowmeter from an external device.

**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)

## 3.8.13 "Heartbeat Technology" submenu

For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring**: Special Documentation for the device → 7

*Navigation* Expert → Diagnostics → Heartbeat Techn.

| | |
|---|---|
| ▶ Heartbeat Technology | |
| ▶ Heartbeat base settings | → 235 |
| ▶ Performing verification | → 236 |
| ▶ Verification results | → 243 |
| ▶ Monitoring results | → 246 |

### "Heartbeat base settings" submenu

*Navigation* Expert → Diagnostics → Heartbeat Techn. → Base settings

| | |
|---|---|
| ▶ Heartbeat base settings | |
| Plant operator (2754) | → 236 |
| Location (2755) | → 236 |
| Partially filled pipe (6465) | → 236 |

### Plant operator

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Base settings → Plant operator (2754)

**Description** Use this function to enter the plant operator.

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

### Location

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Base settings → Location (2755)

**Description** Use this function to enter the location.

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

### Partially filled pipe

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Base settings → Part.filled pipe (6465)

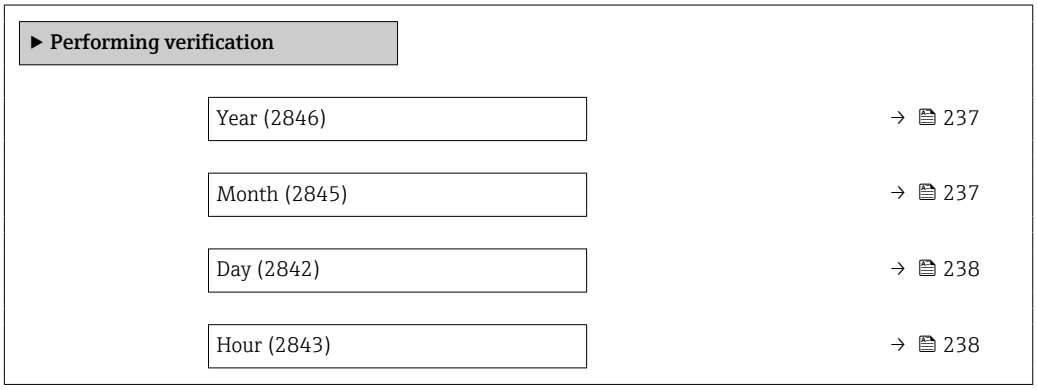
**Description** Indicate, if the measuring tube is partially filled during the verification process in order to avoid evaluating the EPD electrode cable.

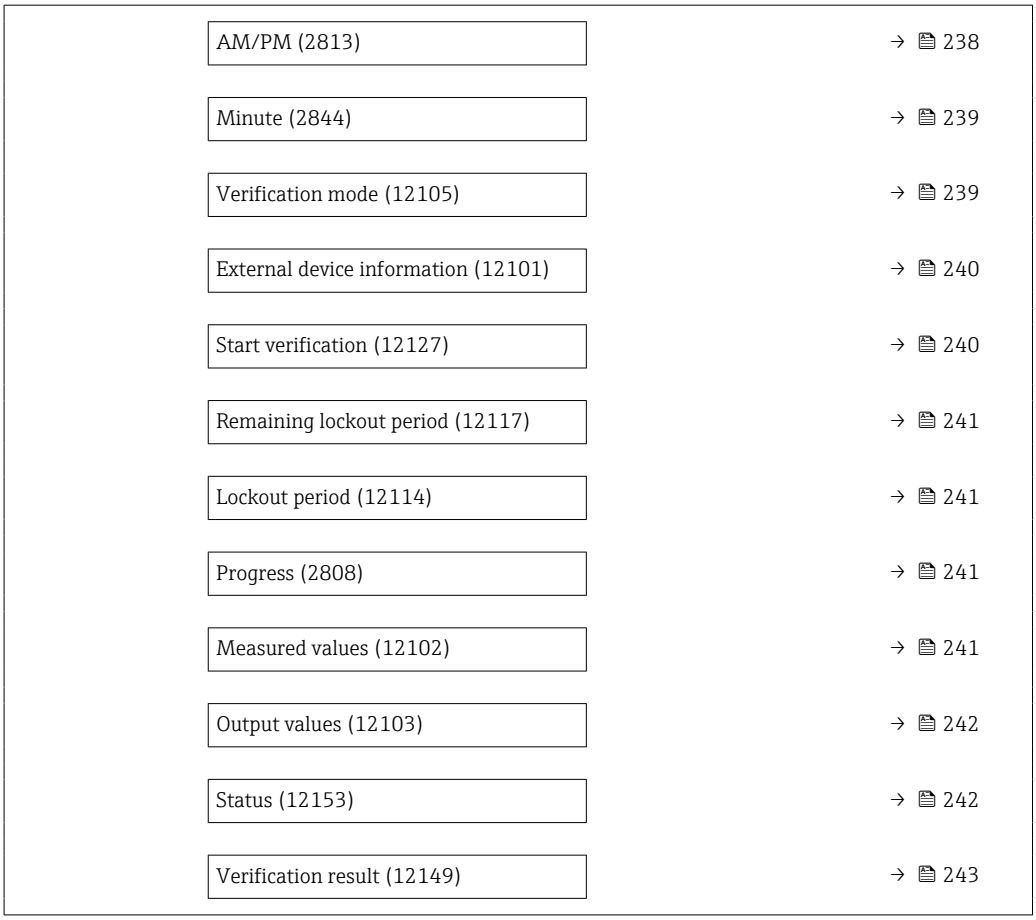
**Selection**
- No
- Yes

**Factory setting** No

### "Performing verification" wizard

*Navigation* Expert → Diagnostics → Heartbeat Techn. → Perform.verific.






## Year

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Year (2846)

**Prerequisite** Can be edited if Heartbeat Verification is not active.

**Description** Use this function to enter the year of recalibration.

**User entry** 9 to 99

**Factory setting** 10

## Month

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Month (2845)

**Prerequisite** Can be edited if Heartbeat Verification is not active.

**Description** Use this function to select the month of recalibration.

**Selection**
- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

**Factory setting** January

## Day

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Day (2842)

**Prerequisite** Can be edited if Heartbeat Verification is not active.

**Description** Use this function to enter the day of the month of recalibration.

**User entry** 1 to 31 d

**Factory setting** 1 d

## Hour

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Hour (2843)

**Prerequisite** Can be edited if Heartbeat Verification is not active.

**Description** Use this function to enter the hour of recalibration.

**User entry** 0 to 23 h

**Factory setting** 12 h

## AM/PM

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → AM/PM (2813)

**Prerequisite** Can be edited if Heartbeat Verification is not active.

The **dd.mm.yy hh:mm am/pm** option or the **mm/dd/yy hh:mm am/pm** option is selected in the **Date/time format** parameter (2812) (→ 64).

**Description** Use this function to select the time entry in the morning (**AM** option) or afternoon (**PM** option) in the case of 12-hour notation.

**Selection**
- AM
- PM

**Factory setting** AM

## Minute

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Minute (2844)

**Prerequisite** Can be edited if Heartbeat Verification is not active.

**Description** Use this function to enter the minutes of recalibration.

**User entry** 0 to 59 min

**Factory setting** 0 min

## Verification mode

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verificat. mode (12105)

**Prerequisite** Can be edited if verification status is not active.

**Description** Select verification mode.

Standard verification: Verification is performed automatically by the device and without manual checking of external measured variables.

Extended verification: Similar to internal verification but with the entry of external measured variables (see also "Measured values" parameter).

**Selection**
- Standard verification
- Extended verification

**Factory setting** Standard verification

## External device information

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Ext. device info (12101)

**Prerequisite**
With the following conditions:
- The **Extended verification** option is selected in the **Verification mode** parameter (→ 239).
- Can be edited if the verification status is not active.

**Description** Record measuring equipment for extended verification.

**User entry** Free text entry

**Factory setting** –

## Start verification

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Start verificat. (12127)

**Description**
Start the verification.

To carry out a complete verification, select the selection parameters individually. Once the external measured values have been recorded, verification is started using the **Start** option.

**Selection**
- Cancel
- Output 1 low value *
- Output 1 high value *
- Output 2 low value *
- Output 2 high value *
- Output 3 low value *
- Output 3 high value *
- Output 4 low value *
- Output 4 high value *
- Frequency output 1 *
- Pulse output 1 *
- Frequency output 2 *
- Pulse output 2 *
- Frequency output 3 *
- Double pulse output *
- Start

**Factory setting** Cancel

* Visibility depends on order options or device settings

### Remaining lockout period

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → RemainLockoutPer (12117)

**Description** Shows the remaining number of hours until the lockout period has elapsed.

**User interface** 0 to 99 h

**Factory setting** 0 h

### Lockout period

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Lockout period (12114)

**Description** Enter the lockout period in hours. When the device is in custody transfer mode, it is not possible to perform a verification during this time.

**User entry** 0 to 99 h

**Factory setting** 48 h

### Progress

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Progress (2808)

**Description** The progress of the process is indicated.

**User interface** 0 to 100 %

### Measured values

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Measured val. (12102)

**Prerequisite** One of the following options is selected in the **Start verification** parameter (→ 240):
- Output 1 low value
- Output 1 high value
- Output 2 low value
- Output 2 high value
- Output 3 low value
- Output 3 high value
- Output 4 low value
- Output 4 high value
- Frequency output 1

- Pulse output 1
- Frequency output 2
- Pulse output 2
- Frequency output 3
- Double pulse output

**Description**

Use this function to enter the measured values (actual values) for the external measured variables:.

- Current output: Output current in [mA]
- Pulse/frequency output: Output frequency in [Hz]
- Double pulse output: Output frequency in [Hz]

**User entry**

Signed floating-point number

**Factory setting**

0

## Output values

**Navigation**

Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Output values (12103)

**Description**

Displays the simulated output values (target values) for the external measured variables:.

- Current output: Output current in [mA].
- Pulse/frequency output: Output frequency in [Hz].

**User interface**

Signed floating-point number

**Factory setting**

-

## Status

**Navigation**

Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Status (12153)

**Description**

Displays the current status of the verification.

**User interface**

- Done
- Busy
- Failed
- Not done

## Verification result

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verific. result (12149)

**Description** Displays the overall result of the verification.

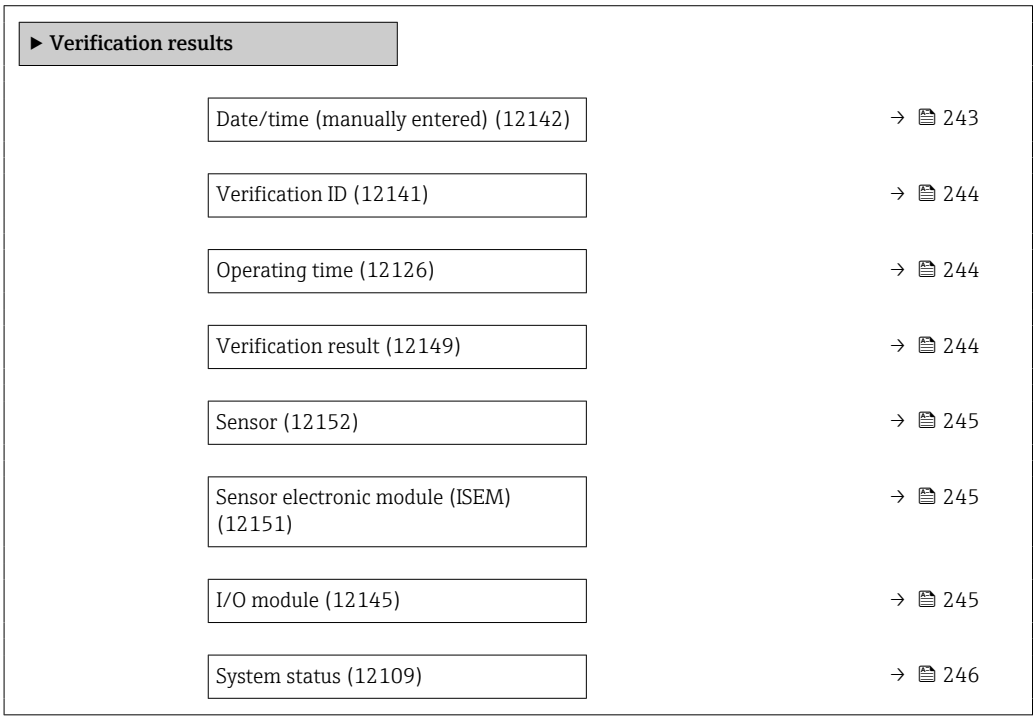
Detailed description of results classification:

**User interface**
- Not supported
- Passed
- Not done
- Failed

**Factory setting** Not done

### "Verification results" submenu

*Navigation* Expert → Diagnostics → Heartbeat Techn. → Verific. results




## Date/time (manually entered)

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Verific. results → Date/time (12142)

**Prerequisite** The verification has been performed.

**Description** Date and time.

**User interface** dd.mmmm.yyyy; hh:mm

**Factory setting** 1 January 2010; 12:00

## Verification ID

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verification ID (12141)

**Prerequisite** The verification has been performed.

**Description** Displays consecutive numbering of the verification results in the measuring device.

**User interface** 0 to 65 535

**Factory setting** 0

## Operating time

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Verific. results → Operating time (12126)

**Prerequisite** The verification has been performed.

**Description** Indicates how long the device has been in operation up to the verification.

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

**Factory setting** –

## Verification result

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verific. result (12149)

**Description** Displays the overall result of the verification.

Detailed description of results classification:

**User interface**
- Not supported
- Passed
- Not done
- Failed

**Factory setting** Not done

## Sensor

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

**Prerequisite** The **Failed** option result is shown in the **Overall result** parameter (→ 243).

**Description** Displays the result for the sensor.

Detailed description of results classification:

**User interface**
- Not supported
- Passed
- Not done
- Failed

**Factory setting** Not done

## Sensor electronic module (ISEM)

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sens. electronic (12151)

**Prerequisite** The **Failed** option result is shown in the **Overall result** parameter (→ 243).

**Description** Displays the result for the sensor electronics module (ISEM).

Detailed description of results classification:

**User interface**
- Not supported
- Passed
- Not done
- Failed

**Factory setting** Not done

## I/O module

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Verific. results → I/O module (12145)

**Prerequisite** In the **Overall result** parameter (→ 243), the **Failed** option was displayed.

**Description** Displays the result for I/O module monitoring of the I/O module.
- For current output: Accuracy of the current
- For pulse output: Accuracy of the pulses
- For frequency output: Accuracy of the frequency

- Current input: Accuracy of the current
- Double pulse output: Accuracy of the pulses
- Relay output: Number of switching cycles

Detailed description of results classification:

**User interface**

- Not supported
- Passed
- Not done
- Not plugged
- Failed

**Factory setting**

Not done

## System status

**Navigation**

Expert → Diagnostics → Heartbeat Techn. → Verific. results → System status (12109)

**Prerequisite**

The **Failed** option result is shown in the **Overall result** parameter (→ 243).

**Description**

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

Detailed description of results classification:

**User interface**

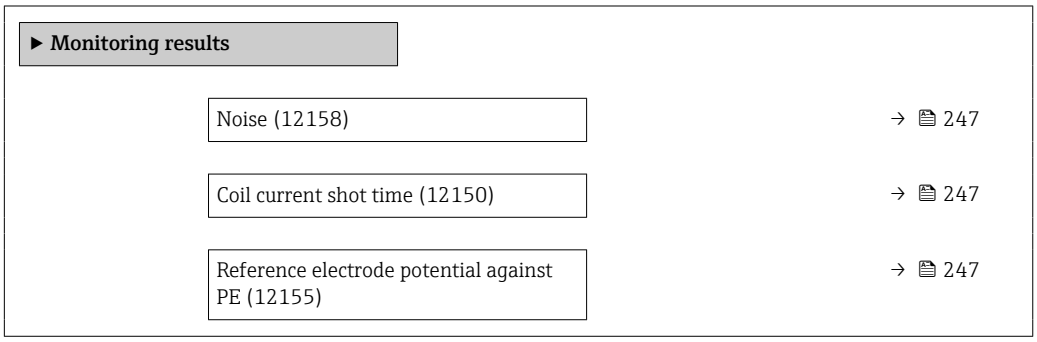
- Not supported
- Passed
- Not done
- Failed

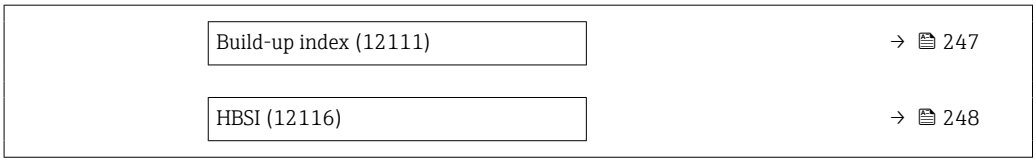
**Factory setting**

Not done

### "Monitoring results" submenu

*Navigation* Expert → Diagnostics → Heartbeat Techn. → Monitor. results






### Noise

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Monitor. results → Noise (12158)

**Description** Indicates the degree to which the differential signal from both measuring electrodes is dispersed.

**User interface** 0 to 3.0 · $10^{+38}$ µV

### Coil current shot time

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Monitor. results → CoilCurrShotTime (12150)

**Description** Indicates the rise time of the coil current for the buildup of the magnetic field.

**User interface** 2 to 500 ms

### Reference electrode potential against PE

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Monitor. results → RefElectrPotPE (12155)

**Description** Displays the voltage of the reference electrode in relation to the potential of the measuring tube.

**User interface** −30 to +30 V

### Build-up index

**Navigation** Expert → Diagnostics → Heartbeat Techn. → Monitor. results → Build-up index (12111)

**Description** Shows current build-up index value.

**User interface** 0.0 to 100.0 %

**Factory setting** 0.0 %

**Additional information**

The formation of build-up is output as a percentage in the Build-up index value (→ 86) parameter. The higher the percentage, the thicker the build-up.

Build-up index value (→ 86) = 0%
- No build-up present
- Measuring tube as-delivered state (initial value)
- Measuring tube was cleaned thoroughly after formation of build-up

Build-up index value (→ 86) = 100%
- Value for the maximum measurable build-up thickness
- The thickness of the build-up at 100% varies depending on the process
- A value of 100% should not be equated with a blocked measuring tube

The percentage indicated in the Build-up index value (→ 86) parameter does not provide direct information about the absolute thickness or the composition of the build-up. Therefore, to make optimum use of the build-up detection function, it is necessary to first compare the formation of build-up in the process, as known from experience, with the associated Build-up index value (→ 86). The aim is to determine the Build-up index value (→ 86) at the time the cleaning is usually performed.

On the basis of the Build-up index value (→ 86) during cleaning, it is possible to make a valid assessment of the condition inside the measuring tube and to plan the cleaning using the build-up limit and build-up detection hysteresis parameters.

In addition, conclusions about possible effects on neighboring processes can be drawn from the Build-up index value (→ 86).

**HBSI**

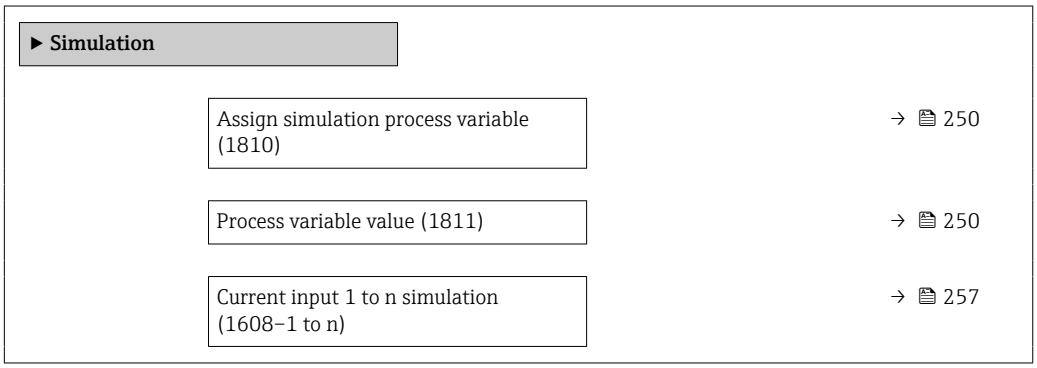
**Navigation** Expert → Diagnostics → Heartbeat Techn. → Monitor. results → HBSI (12116)

**Description** Displays the relative change of the entire sensor, with all its electrical, mechanical and electromechanical components incorporated in the sensor housing (including the measuring tube, electrodynamic pick-ups, excitation system, cables etc.), in % of the reference value.

**User interface** −100.0 to 100.0 %

## 3.8.14 "Simulation" submenu

*Navigation* Expert → Diagnostics → Simulation



| | |
|---|---|
| Value current input 1 to n (1609–1 to n) | → 258 |
| Status input simulation 1 to n (1355–1 to n) | → 258 |
| Input signal level 1 to n (1356–1 to n) | → 259 |
| Current output 1 to n simulation (0354–1 to n) | → 251 |
| Current output value (0355) | → 251 |
| Frequency output 1 to n simulation (0472–1 to n) | → 251 |
| Frequency output 1 to n value (0473–1 to n) | → 252 |
| Pulse output simulation 1 to n (0458–1 to n) | → 252 |
| Pulse value 1 to n (0459–1 to n) | → 253 |
| Switch output simulation 1 to n (0462–1 to n) | → 253 |
| Switch state 1 to n (0463–1 to n) | → 254 |
| Relay output 1 to n simulation (0802–1 to n) | → 254 |
| Switch state 1 to n (0803–1 to n) | → 255 |
| Pulse output simulation (0988) | → 255 |
| Pulse value (0989) | → 256 |
| Device alarm simulation (0654) | → 256 |
| Diagnostic event category (0738) | → 257 |
| Diagnostic event simulation (0737) | → 257 |

## Assign simulation process variable

**Navigation** Expert → Diagnostics → Simulation → Assign proc.var. (1810)

**Description** Use this function to select a process variable for the simulation process that is activated. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

**Selection**
- Off
- Volume flow
- Mass flow
- Corrected volume flow
- Flow velocity
- Conductivity *
- Corrected conductivity *
- Temperature *

**Factory setting** Off

**Additional information** *Description*

The simulation value of the process variable selected is defined in the **Process variable value** parameter (→ 250).

## Process variable value

**Navigation** Expert → Diagnostics → Simulation → Proc. var. value (1811)

**Prerequisite** A process variable is selected in the **Assign simulation process variable** parameter (→ 250).

**Description** Use this function to enter a simulation value for the selected process variable. Subsequent measured value processing and the signal output use this simulation value. In this way, users can verify whether the measuring device has been configured correctly.

**User entry** Depends on the process variable selected

**Factory setting** 0

**Additional information** *User entry*

The unit of the displayed measured value is taken from the **System units** submenu (→ 57).

* Visibility depends on order options or device settings

## Current output 1 to n simulation

**Navigation** Expert → Diagnostics → Simulation → Curr.outp 1 to n sim. (0354–1 to n)

**Description** Use this function to switch simulation of the current output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

**Selection**
- Off
- On

**Factory setting** Off

**Additional information**

*Description*

The desired simulation value is defined in the **Value current output 1 to n** parameter.

*Selection*
- Off
  Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Current simulation is active.

## Current output value

**Navigation** Expert → Diagnostics → Simulation → Curr.outp val. (0355)

Expert → Diagnostics → Simulation → Value curr.out 1 to n (0355–1 to n)

**Prerequisite** In the **Current output 1 to n simulation** parameter, the **On** option is selected.

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

**User entry** 3.59 to 22.5 mA

**Additional information**

*Dependency*

The input range is dependent on the option selected in the **Current span** parameter (→ 114).

## Frequency output 1 to n simulation

**Navigation** Expert → Diagnostics → Simulation → Freq.outp 1 to n sim. (0472–1 to n)

**Prerequisite** In the **Operating mode** parameter (→ 127), the **Frequency** option is selected.

**Description** Use this function to switch simulation of the frequency output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

**Selection**
- Off
- On

**Factory setting** Off

**Additional information**

*Description*

The desired simulation value is defined in the **Frequency value 1 to n** parameter.

*Selection*
- Off
  Frequency simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Frequency simulation is active.

## Frequency output 1 to n value

**Navigation** Expert → Diagnostics → Simulation → Freq.outp 1 to n val. (0473–1 to n)

**Prerequisite** In the **Frequency simulation 1 to n** parameter, the **On** option is selected.

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

**User entry** 0.0 to 12 500.0 Hz

## Pulse output simulation 1 to n

**Navigation** Expert → Diagnostics → Simulation → Puls.outp.sim. 1 to n (0458–1 to n)

**Prerequisite** In the **Operating mode** parameter (→ 127), the **Pulse** option is selected.

**Description** Use this function to switch simulation of the pulse output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

**Selection**
- Off
- Fixed value
- Down-counting value

**Factory setting** Off

**Additional information**

*Description*

The desired simulation value is defined in the **Pulse value 1 to n** parameter.

*Selection*

- Off
  Pulse simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Fixed value
  Pulses are continuously output with the pulse width specified in the **Pulse width** parameter (→ 129).
- Down-counting value
  The pulses specified in the **Pulse value** parameter (→ 253) are output.

## Pulse value 1 to n

**Navigation** Expert → Diagnostics → Simulation → Pulse value 1 to n (0459–1 to n)

**Prerequisite** In the **Pulse output simulation 1 to n** parameter, the **Down-counting value** option is selected.

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

**User entry** 0 to 65 535

## Switch output simulation 1 to n

**Navigation** Expert → Diagnostics → Simulation → Switch sim. 1 to n (0462–1 to n)

**Prerequisite** In the **Operating mode** parameter (→ 127), the **Switch** option is selected.

**Description** Use this function to switch simulation of the switch output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

**Selection**

- Off
- On

**Factory setting** Off

**Additional information** *Description*

The desired simulation value is defined in the **Switch state 1 to n** parameter.

*Selection*

- Off
  Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Switch simulation is active.

## Switch state 1 to n

**Navigation** Expert → Diagnostics → Simulation → Switch state 1 to n (0463–1 to n)

**Description** Use this function to select a switch value for the simulation. In this way, users can verify the correct adjustment of the switch output and the correct function of downstream switching units.

**Selection**
- Open
- Closed

**Additional information** *Selection*

- Open
  Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed
  Switch simulation is active.

## Relay output 1 to n simulation

**Navigation** Expert → Diagnostics → Simulation → Relay out. 1 to n sim (0802–1 to n)

**Description** Use this function to switch simulation of the relay output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

**Selection**
- Off
- On

**Factory setting** Off

**Additional information** *Description*

The desired simulation value is defined in the **Switch state 1 to n** parameter.

*Selection*

- Off
  Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Relay simulation is active.

## Switch state 1 to n

**Navigation** Expert → Diagnostics → Simulation → Switch state 1 to n (0803–1 to n)

**Prerequisite** The **On** option is selected in the **Switch output simulation 1 to n** parameter parameter.

**Description** Use this function to select a relay value for the simulation. In this way, users can verify the correct adjustment of the relay output and the correct function of downstream switching units.

**Selection**

- Open
- Closed

**Additional information** *Selection*

- Open
  Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed
  Relay simulation is active.

## Pulse output simulation

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

**Description** Use this function to switch simulation of the double pulse output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

**Selection**

- Off
- Fixed value
- Down-counting value

**Factory setting** Off

**Additional information** *Description*

The desired simulation value is defined in the **Pulse value** parameter (→ 256).

*Selection*

- Off
  Simulation of the double pulse output is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Fixed value
  Pulses are continuously output with the pulse width specified in the **Pulse width** parameter (→ 153).
- Down-counting value
  The pulses specified in the **Pulse value** parameter (→ 256) are output.

## Pulse value

**Navigation** Expert → Diagnostics → Simulation → Pulse value (0989)

**Prerequisite** In the **Pulse output simulation** parameter (→ 255), the **Down-counting value** option is selected.

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

**User entry** 0 to 65 535

## Device alarm simulation

**Navigation** Expert → Diagnostics → Simulation → Dev. alarm sim. (0654)

**Description** Use this function to switch the device alarm on and off.

**Selection**

- Off
- On

**Factory setting** Off

**Additional information** *Description*

The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

### Diagnostic event category

**Navigation** Expert → Diagnostics → Simulation → Event category (0738)

**Description** Use this function to select the category of the diagnostic events that are displayed for the simulation in the **Diagnostic event simulation** parameter (→ 257).

**Selection**
- Sensor
- Electronics
- Configuration
- Process

**Factory setting** Process

### Diagnostic event simulation

**Navigation** Expert → Diagnostics → Simulation → Diag. event sim. (0737)

**Description** Use this function to select a diagnostic event for the simulation process that is activated.

**Selection**
- Off
- Diagnostic event picklist (depends on the category selected)

**Factory setting** Off

**Additional information** *Description*

For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event category** parameter (→ 257).

### Current input 1 to n simulation

**Navigation** Expert → Diagnostics → Simulation → Curr.inp 1 to n sim. (1608-1 to n)

**Description** Option for switching simulation of the current input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

The desired simulation value is defined in the **Value current input 1 to n** parameter.

**Selection**
- Off
- On

**Factory setting** Off

**Additional information** *Selection*

- Off
  Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Current simulation is active.

## Value current input 1 to n

**Navigation** Expert → Diagnostics → Simulation → Value curr.inp 1 to n (1609–1 to n)

**Prerequisite** In the **Current input 1 to n simulation** parameter, the **On** option is selected.

**Description** Use this function to enter the current value for the simulation. In this way, users can verify the correct configuration of the current input and the correct function of upstream feed-in units.

**User entry** 0 to 22.5 mA

## Status input simulation 1 to n

**Navigation** Expert → Diagnostics → Simulation → Status inp.sim 1 to n (1355–1 to n)

**Description** Use this function to switch simulation of the status input on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

**Selection**

- Off
- On

**Factory setting** Off

**Additional information** *Description*

The desired simulation value is defined in the **Input signal level** parameter (→ 259).

*Selection*

- Off
  Simulation for the status input is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Simulation for the status input is active.

## Input signal level 1 to n

**Navigation** Expert → Diagnostics → Simulation → Signal level 1 to n (1356–1 to n)

**Prerequisite** In the **Status input simulation** parameter (→ 258), the **On** option is selected.

**Description** Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct function of upstream feed-in units.

**Selection**
- High
- Low

# 4 Country-specific factory settings

## 4.1 SI units

Not valid for USA and Canada.

### 4.1.1 System units

| Process variable | Unit |
|---|---|
| Volume flow | l/h |
| Volume | $m^3$ |
| Conductivity | µS/cm |
| Temperature | °C |
| Mass flow | kg/h |
| Mass | kg |
| Density | kg/l |
| Corrected volume flow | Nl/h |
| Corrected volume | $Nm^3$ |

### 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] | (v ~ 2.5 m/s) [$dm^3$/min] |
|---|---|
| 2 | 0.5 |
| 4 | 2 |
| 8 | 8 |
| 15 | 25 |
| 25 | 75 |
| 32 | 125 |
| 40 | 200 |
| 50 | 300 |
| 65 | 500 |
| 80 | 750 |
| 100 | 1200 |
| 125 | 1850 |

| Nominal diameter [mm] | (v ~ 2.5 m/s) [$m^3$/h] |
|---|---|
| 150 | 150 |
| 200 | 300 |
| 250 | 500 |
| 300 | 750 |

| Nominal diameter [mm] | (v ~ 2.5 m/s) [m³/h] |
|---|---|
| 350 | 1000 |
| 400 | 1200 |
| 450 | 1500 |
| 500 | 2000 |
| 600 | 2500 |
| 700 | 3500 |
| 750 | 4000 |
| 800 | 4500 |
| 900 | 6000 |
| 1000 | 7000 |
| 1200 | 10000 |
| 1400 | 14000 |
| 1600 | 18000 |
| 1800 | 23000 |
| 2000 | 28500 |
| 2200 | 34000 |
| 2400 | 40000 |
| 2600 | 48000 |
| 2800 | 55500 |
| 3000 | 63500 |

### 4.1.3 Output current span

| Output | Current range |
|---|---|
| Current output 1…n | 4 to 20 mA NAMUR |

### 4.1.4 Pulse value

| Nominal diameter [mm] | (~ 2 pulse/s at v ~ 2.5 m/s) [dm³] |
|---|---|
| 2 | 0.005 |
| 4 | 0.025 |
| 8 | 0.1 |
| 15 | 0.2 |
| 25 | 0.5 |
| 32 | 1 |
| 40 | 1.5 |
| 50 | 2.5 |
| 65 | 5 |
| 80 | 5 |
| 100 | 10 |
| 125 | 15 |

| Nominal diameter [mm] | (~ 2 pulse/s at v ~ 2.5 m/s) [m³] |
|---|---|
| 150 | 0.03 |
| 200 | 0.05 |
| 250 | 0.05 |
| 300 | 0.1 |
| 350 | 0.1 |
| 400 | 0.15 |
| 450 | 0.25 |
| 500 | 0.25 |
| 600 | 0.3 |
| 700 | 0.5 |
| 750 | 0.5 |
| 800 | 0.75 |
| 900 | 0.75 |
| 1 000 | 1 |
| 1 200 | 1.5 |
| 1 400 | 2 |
| 1 600 | 2.5 |
| 1 800 | 3 |
| 2 000 | 3.5 |
| 2 200 | 4.5 |
| 2 400 | 5.5 |
| 2600 | 7 |
| 2800 | 8 |
| 3000 | 9 |

### 4.1.5 Switch-on point low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

| Nominal diameter [mm] | (v ~ 0.04 m/s) [dm³/min] |
|---|---|
| 2 | 0.01 |
| 4 | 0.05 |
| 8 | 0.1 |
| 15 | 0.5 |
| 25 | 1 |
| 32 | 2 |
| 40 | 3 |
| 50 | 5 |
| 65 | 8 |
| 80 | 12 |
| 100 | 20 |
| 125 | 30 |

| Nominal diameter [mm] | (v ~ 0.04 m/s) [m³/h] |
|---|---|
| 150 | 2.5 |
| 200 | 5 |
| 250 | 7.5 |
| 300 | 10 |
| 350 | 15 |
| 400 | 20 |
| 450 | 25 |
| 500 | 30 |
| 600 | 40 |
| 700 | 50 |
| 750 | 60 |
| 800 | 75 |
| 900 | 100 |
| 1000 | 125 |
| 1200 | 150 |
| 1400 | 225 |
| 1600 | 300 |
| 1800 | 350 |
| 2000 | 450 |
| 2200 | 540 |
| 2400 | 650 |
| 2600 | 775 |
| 2800 | 875 |
| 3000 | 1025 |

## 4.2 US units

Only valid for USA and Canada.

### 4.2.1 System units

| Process variable | Unit |
|---|---|
| Volume flow | gal/min (us) |
| Volume | gal (us) |
| Temperature | °F |
| Mass flow | lb/min |
| Mass | lb |
| Density | lb/ft³ |
| Corrected volume flow | Sft³/h |
| Corrected volume | Sft³ |

### 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] | (v ~ 2.5 m/s) [gal/min] |
|---|---|
| 1/12 | 0.1 |
| 1/8 | 0.5 |
| 3/8 | 2 |
| ½ | 6 |
| 1 | 18 |
| 1½ | 50 |
| 2 | 75 |
| 3 | 200 |
| 4 | 300 |
| 5 | 450 |
| 6 | 600 |
| 8 | 1200 |
| 10 | 1500 |
| 12 | 2400 |
| 14 | 3600 |
| 15 | 4800 |
| 16 | 4800 |
| 18 | 6000 |
| 20 | 7500 |
| 24 | 10500 |
| 28 | 13500 |
| 30 | 16500 |
| 32 | 19500 |
| 36 | 24000 |
| 40 | 30000 |
| 42 | 33000 |
| 48 | 42000 |

| Nominal diameter [in] | (v ~ 2.5 m/s) [Mgal/d] |
|---|---|
| 54 | 75 |
| 60 | 95 |
| 66 | 120 |
| 72 | 140 |
| 78 | 175 |
| 84 | 190 |
| 90 | 220 |
| 96 | 265 |

| Nominal diameter [in] | (v ~ 2.5 m/s) [Mgal/d] |
|---|---|
| 102 | 300 |
| 108 | 340 |
| 114 | 375 |
| 120 | 415 |

### 4.2.3 Output current span

| Output | Current range |
|---|---|
| Current output 1…n | 4 to 20 mA US |

### 4.2.4 Pulse value

| Nominal diameter [in] | (~ 2 pulse/s at v ~ 2.5 m/s) [gal] |
|---|---|
| $^{1}/_{12}$ | 0.001 |
| $^{1}/_{8}$ | 0.005 |
| $^{3}/_{8}$ | 0.02 |
| ½ | 0.1 |
| 1 | 0.2 |
| 1½ | 0.5 |
| 2 | 0.5 |
| 3 | 2 |
| 4 | 2 |
| 5 | 5 |
| 6 | 5 |
| 8 | 10 |
| 10 | 15 |
| 12 | 25 |
| 14 | 30 |
| 15 | 50 |
| 16 | 50 |
| 18 | 50 |
| 20 | 75 |
| 24 | 100 |
| 28 | 125 |
| 30 | 150 |
| 32 | 200 |
| 36 | 225 |
| 40 | 250 |
| 42 | 250 |
| 48 | 400 |

| Nominal diameter [in] | (~ 2 pulse/s at v ~ 2.5 m/s) [Mgal] |
|---|---|
| 54 | 0.0005 |
| 60 | 0.0005 |
| 66 | 0.0008 |
| 72 | 0.0008 |
| 78 | 0.001 |
| 84 | 0.0011 |
| 90 | 0.0013 |
| 96 | 0.0015 |
| 102 | 0.0017 |
| 108 | 0.0020 |
| 114 | 0.0022 |
| 120 | 0.0024 |

### 4.2.5 Switch-on point low flow cut off

The switch-on point depends on the type of medium and the nominal diameter.

| Nominal diameter [in] | (v ~ 0.04 m/s) [gal/min] |
|---|---|
| 1/12 | 0.002 |
| 1/8 | 0.008 |
| 3/8 | 0.025 |
| ½ | 0.15 |
| 1 | 0.25 |
| 1½ | 0.75 |
| 2 | 1.25 |
| 3 | 2.5 |
| 4 | 4 |
| 5 | 7 |
| 6 | 12 |
| 8 | 15 |
| 10 | 30 |
| 12 | 45 |
| 14 | 60 |
| 15 | 60 |
| 16 | 60 |
| 18 | 90 |
| 20 | 120 |
| 24 | 180 |
| 28 | 210 |
| 30 | 270 |
| 32 | 300 |
| 36 | 360 |

| Nominal diameter [in] | (v ~ 0.04 m/s) [gal/min] |
|---|---|
| 40 | 480 |
| 42 | 600 |
| 48 | 600 |

| Nominal diameter [in] | (v ~ 0.04 m/s) [Mgal/d] |
|---|---|
| 54 | 1.3 |
| 60 | 1.3 |
| 66 | 2.2 |
| 72 | 2.6 |
| 78 | 3.0 |
| 84 | 3.2 |
| 90 | 3.6 |
| 96 | 4.0 |
| 102 | 5.0 |
| 108 | 5.0 |
| 114 | 6.0 |
| 120 | 7.0 |

# 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). |
| Conductivity | µS/mm | Microsiemens/length unit |
| | nS/cm, µS/cm, mS/cm, S/cm | Nano-, Micro- , Milli- , Siemens/length unit |
| | µS/m, mS/m, S/m, kS/m, MS/m | Micro- , Milli- , Siemens, Kilo-, Megasiemens/length unit |
| 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 |
| Temperature | °C , K | Celsius, Kelvin |
| Volume | cm³, dm³, m³ | Cubic centimeter, cubic decimeter, cubic meter |
| | ml, l, hl, Ml Mega | Milliliter, liter, hectoliter, megaliter |
| 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 |
| Mass | oz, lb, STon | Ounce, pound, standard ton |
| Mass flow | oz/s, oz/min, oz/h, oz/d | Ounce/time unit |
| | lb/s, lb/min, lb/h, lb/d | Pound/time unit |
| | STon/s, STon/min, STon/h, STon/d | Standard ton/time unit |
| Corrected volume | Sft³, Sgal (us), Sbbl (us;liq.) | Standard cubic foot, standard gallon, standard barrel |
| Corrected volume flow | Sft³/s, Sft³/min, Sft³/h, Sft³/d | Standard cubic foot/time unit |
| | Sgal/s (us), Sgal/min (us), Sgal/h (us), Sgal/d (us) | Standard gallon/time unit |
| | Sbbl/s (us;liq.), Sbbl/min (us;liq.), Sbbl/h (us;liq.), Sbbl/d (us;liq.) | Barrel/time unit (normal liquids) |
| Temperature | °F, °R | Fahrenheit, Rankine |
| Volume | af | Acre foot |
| | ft³ | Cubic foot |

| Process variable | Units | Explanation |
|---|---|---|
| | fl oz (us), gal (us), kgal (us), Mgal (us) | Fluid ounce, gallon, kilogallon, million gallon |
| | bbl (us;liq.), bbl (us;beer), bbl (us;oil), bbl (us;tank) | Barrel (normal liquids), barrel (beer), barrel (petrochemicals), barrel (filling tanks) |
| Volume flow | af/s, af/min, af/h, af/d | Acre foot/time unit |
| | $ft^3$/s, $ft^3$/min, $ft^3$/h, $ft^3$/d | Cubic foot/time unit |
| | fl oz/s (us), fl oz/min (us), fl oz/h (us), fl oz/d (us) | Fluid ounce/time unit |
| | gal/s (us), gal/min (us), gal/h (us), gal/d (us) | Gallon/time unit |
| | kgal/s (us), kgal/min (us), kgal/h (us), kgal/d (us) | Kilogallon/time unit |
| | Mgal/s (us), Mgal/min (us), Mgal/h (us), Mgal/d (us) | Million gallon/time unit |
| | bbl/s (us;liq.), bbl/min (us;liq.), bbl/h (us;liq.), bbl/d (us;liq.) | Barrel/time unit (normal liquids)<br>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)<br>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)<br>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)<br>Filling tanks: 55.0 gal/bbl |
| Time | s, m, h, d, y | Second, minute, hour, day, year |
| | am, pm | Ante meridiem ( before midday), post meridiem (after midday) |

## 5.3 Imperial units

| Process variable | Units | Explanation |
|---|---|---|
| Density | lb/gal (imp), lb/bbl (imp;beer), lb/bbl (imp;oil) | Pound/volume unit |
| Corrected volume | Sgal (imp) | Standard gallon |
| Corrected volume flow | Sgal/s (imp), Sgal/min (imp), Sgal/h (imp), Sgal/d (imp) | Standard gallon/time unit |
| Volume | gal (imp), Mgal (imp) | Gallon, mega gallon |
| | bbl (imp;beer), bbl (imp;oil) | Barrel (beer), barrel (petrochemicals) |
| Volume flow | gal/s (imp), gal/min (imp), gal/h (imp), gal/d (imp) | Gallon/time unit |
| | Mgal/s (imp), Mgal/min (imp), Mgal/h (imp), Mgal/d (imp) | Mega gallon/time unit |
| | bbl/s (imp;beer), bbl/min (imp;beer), bbl/h (imp;beer), bbl/d (imp;beer) | Barrel /time unit (beer)<br>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)<br>Petrochemicals: 34.97 gal/bbl |
| Time | s, m, h, d, y | Second, minute, hour, day, year |
| | am, pm | Ante meridiem ( before midday), post meridiem (after midday) |

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