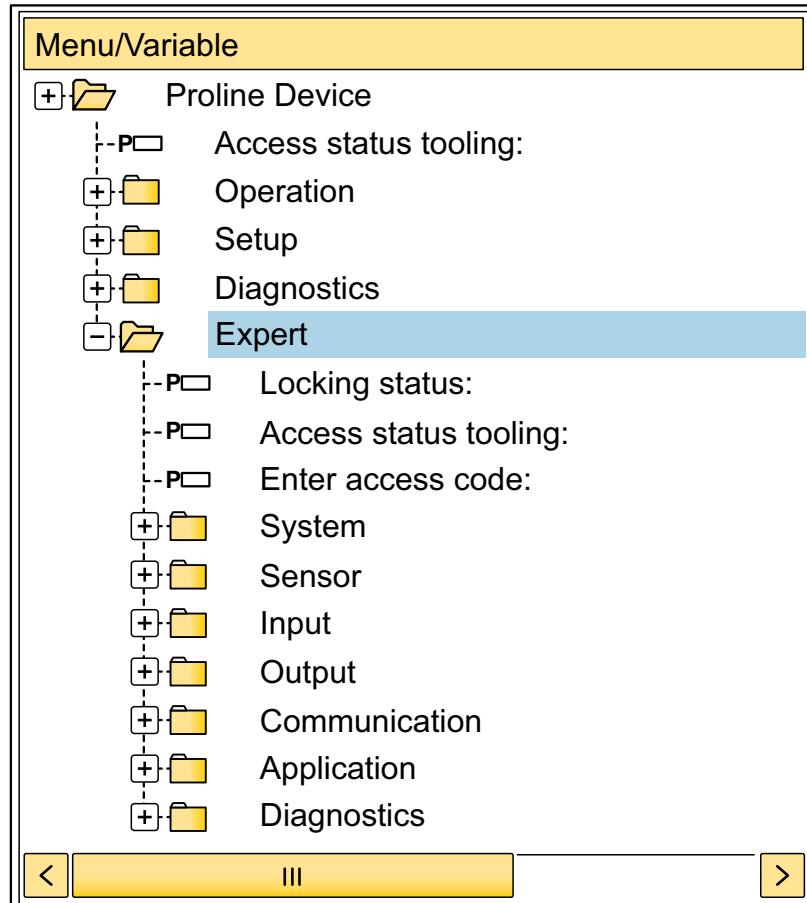


# Description of Device Parameters

## Proline t-mass 500

## HART

Thermal mass flowmeter





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# 1      About this document

## 1.1    Document function

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

It is used to perform tasks that require detailed knowledge of the function of the device:

- Commissioning measurements under difficult conditions
- Optimal adaptation of the measurement to difficult conditions
- Detailed configuration of the communication interface
- Error diagnostics in difficult cases

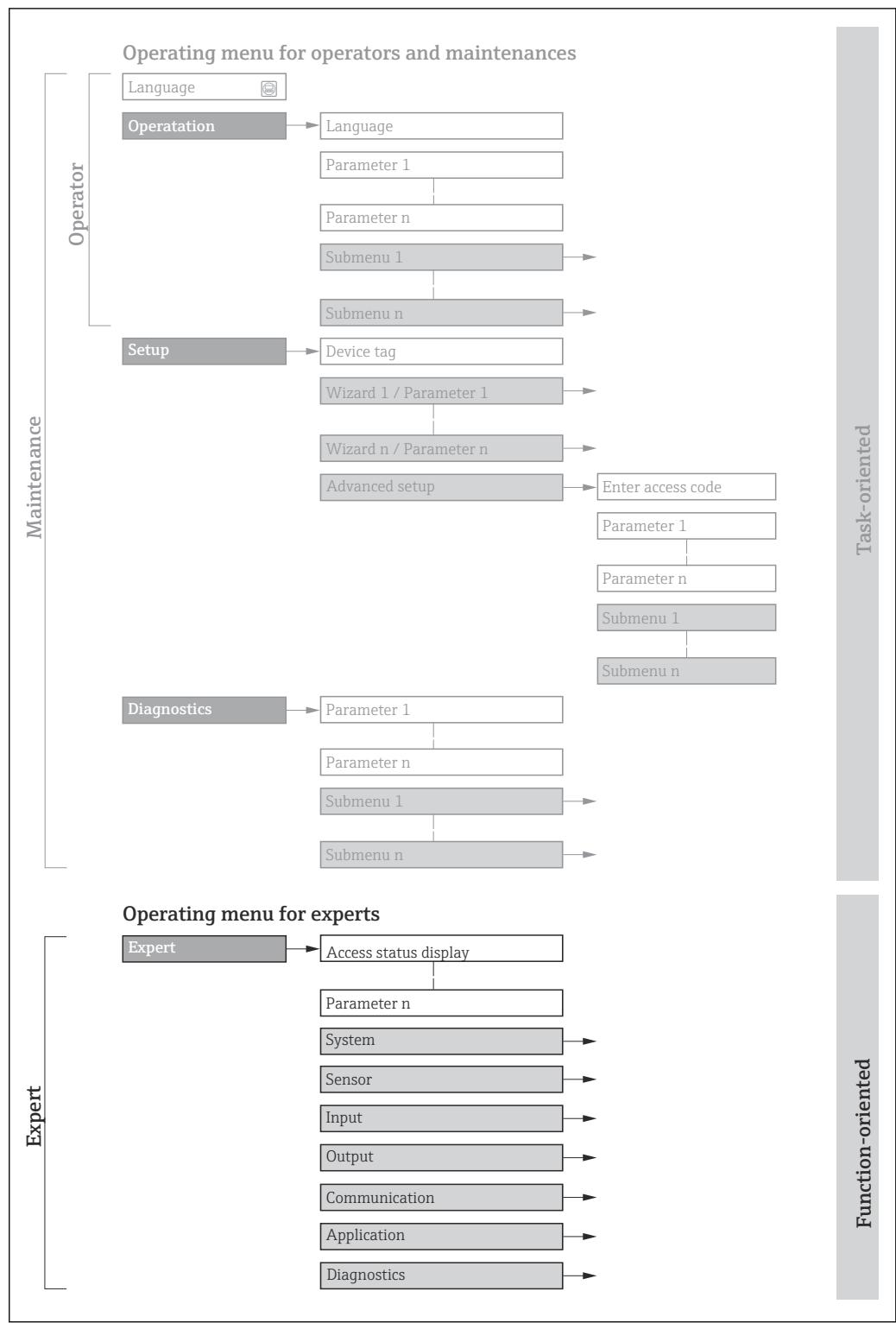
## 1.2    Target group

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

## 1.3    Using this document

### 1.3.1    Information on the document structure

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



1 Sample graphic for the schematic layout of the operating menu



Additional information regarding:

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

### 1.3.2 Structure of a parameter description

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

Complete parameter name

Write-protected parameter = 

**Navigation**



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

**Prerequisite**

The parameter is only available under these specific conditions

**Description**

Description of the parameter function

**Selection**

List of the individual options for the parameter

- Option 1
- Option 2

**User entry**

Input range for the parameter

**User interface**

Display value/data for the parameter

**Factory setting**

Default setting ex works

**Additional information**

Additional explanations (e.g. in examples):

- On individual options
- On display values/data
- On the input range
- On the factory setting
- On the parameter function

## 1.4 Symbols used

### 1.4.1 Symbols for certain types of information

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

### 1.4.2 Symbols in graphics

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

## 1.5 Documentation

### 1.5.1 Standard documentation

#### Operating Instructions

Measuring device	Documentation code
t-mass F 500	BA01996D
t-mass I 500	BA01997D

### 1.5.2 Supplementary device-dependent documentation

#### Special Documentation

Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Functional Safety Manual	SD02484D
Remote display and operating module DKX001	SD01763D
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
Web server	SD02487D
Heartbeat Technology	SD02479D

## 2 Overview of the Expert operating menu

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

⚡ Expert	
Direct access (0106)	→ ↗ 13
Locking status (0004)	→ ↗ 11
Access status (0005)	→ ↗ 12
Enter access code (0003)	→ ↗ 13
▶ System	→ ↗ 14
▶ Display	→ ↗ 14
▶ Configuration backup	→ ↗ 26
▶ Diagnostic handling	→ ↗ 29
▶ Administration	→ ↗ 36
▶ Sensor	→ ↗ 41
▶ Measured values	→ ↗ 42
▶ System units	→ ↗ 54
▶ Process parameters	→ ↗ 64
▶ Measurement mode	→ ↗ 68
▶ Sensor adjustment	→ ↗ 87
▶ Zero point adjustment	
▶ External compensation	→ ↗ 90
▶ In-situ adjustment	→ ↗ 94
▶ Calibration	→ ↗ 104
▶ I/O configuration	→ ↗ 218
I/O module 1 to n terminal numbers (3902-1 to n)	→ ↗ 218

I/O module 1 to n information (3906-1 to n)	→ 218
I/O module 1 to n type (3901-1 to n)	→ 219
Apply I/O configuration (3907)	→ 219
I/O alteration code (2762)	→ 220
▶ Input	→ 104
▶ Current input 1 to n	→ 104
▶ Status input 1 to n	→ 107
▶ Output	→ 110
▶ Current output 1 to n	→ 110
▶ Pulse/frequency/switch output 1 to n	→ 117
▶ Relay output 1 to n	→ 134
▶ Communication	→ 139
▶ HART input	→ 139
▶ HART output	→ 144
▶ Web server	→ 159
▶ WLAN settings	
▶ Diagnostic configuration	→ 162
▶ Application	→ 174
Reset all totalizers (2806)	→ 174
▶ Totalizer 1 to n	→ 175
▶ Diagnostics	→ 180
Actual diagnostics (0691)	→ 180
Previous diagnostics (0690)	→ 181
Operating time from restart (0653)	→ 182

Operating time (0652)	→  182
► Diagnostic list	→  183
► Event logbook	→  187
► Device information	→  188
► Main electronic module + I/O module 1	→  192
► Sensor electronic module (ISEM)	→  193
► I/O module 2	→  194
► I/O module 3	→  195
► I/O module 4	→  197
► Display module	→  198
► Minimum/maximum values	→  199
► Data logging	→  201
► Heartbeat Technology	
► Simulation	→  209

### 3 Description of Device Parameters

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

Expert	
Direct access (0106)	→ 13
Locking status (0004)	→ 11
Access status (0005)	→ 12
Enter access code (0003)	→ 13
▶ System	→ 14
▶ Sensor	→ 41
▶ I/O configuration	→ 218
▶ Input	→ 104
▶ Output	→ 110
▶ Communication	→ 139
▶ Application	→ 174
▶ Diagnostics	→ 180

---

#### Locking status

---

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

**Description** Displays the active write protection.

**User interface**

- Hardware locked
- SIL locked
- Temporarily locked

**Additional information***User interface*

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

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

*Selection*

Options	Description
None	The access status displayed in the <b>Access status</b> parameter (→ 12) applies . Only appears on local display.
Hardware locked (priority 1)	The DIP switch for hardware locking is activated on the PCB board. This locks write access to the parameters (e.g. via local display or operating tool) .
SIL locked (priority 2)	The SIL mode is enabled. This locks write access to the parameters (e.g. via local display or operating tool).
Temporarily locked	Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset etc.). Once the internal processing has been completed, the parameters can be changed once again.

---

**Access status**

---

**Navigation**

  Expert → Access status (0005)

**Description**

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

**User interface**

- Operator
- 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.

*Display*

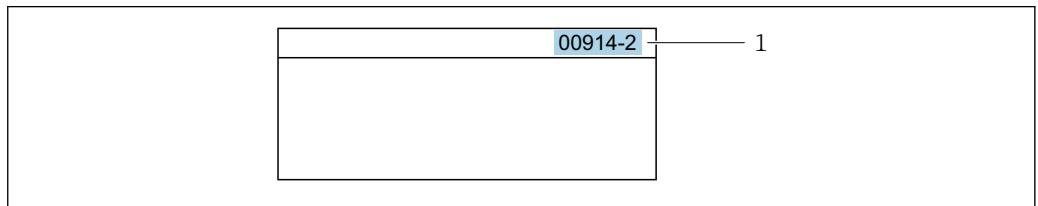
 Detailed information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device

**Enter access code**

<b>Navigation</b>	 Expert → Ent. access code (0003)
<b>Description</b>	Use this function to enter the user-specific release code to remove parameter write protection.
<b>User entry</b>	Max. 16-digit character string comprising numbers, letters and special characters

**Direct access**

<b>Navigation</b>	 Expert → Direct access (0106)
<b>Description</b>	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.
<b>User entry</b>	0 to 65 535
<b>Additional information</b>	<p><i>User entry</i></p> <p>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.</p>



A0029414

1 Direct access code

Note the following when entering the direct access code:

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

### 3.1 "System" submenu

Navigation

Expert → System

▶ System	
▶ Display	→ 14
▶ Configuration backup	→ 26
▶ Diagnostic handling	→ 29
▶ Administration	→ 36

#### 3.1.1 "Display" submenu

Navigation

Expert → System → Display

▶ Display	
Display language (0104)	→ 15
Format display (0098)	→ 16
Value 1 display (0107)	→ 18
0% bargraph value 1 (0123)	→ 18
100% bargraph value 1 (0125)	→ 19
Decimal places 1 (0095)	→ 19
Value 2 display (0108)	→ 20
Decimal places 2 (0117)	→ 20
Value 3 display (0110)	→ 20
0% bargraph value 3 (0124)	→ 21
100% bargraph value 3 (0126)	→ 21
Decimal places 3 (0118)	→ 22
Value 4 display (0109)	→ 22
Decimal places 4 (0119)	→ 23

Display interval (0096)	→  23
Display damping (0094)	→  23
Header (0097)	→  24
Header text (0112)	→  24
Separator (0101)	→  25
Contrast display (0105)	→  25
Backlight (0111)	→  26

## 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)
- العربية (Arabic) \*
- Bahasa Indonesia
- ភាសាខ្មែរ (Thai) \*
- tiếng Việt (Vietnamese)
- čeština (Czech)

### Factory setting

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

\* Visibility depends on order options or device settings

---

## 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

**Additional information***Description*

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



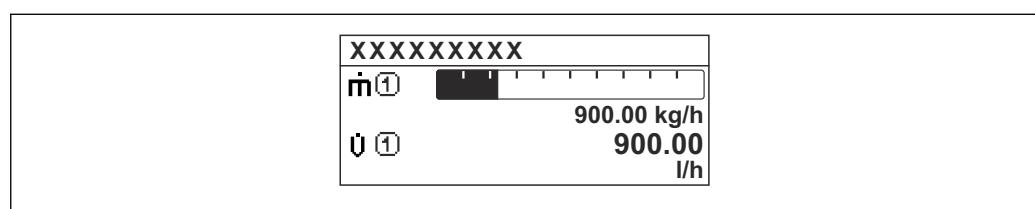
- The **Value 1 display** parameter (→ 18) to **Value 4 display** parameter (→ 22) are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device display. The display time until the next change is configured via the **Display interval** parameter (→ 23).

Possible measured values shown on the local display:

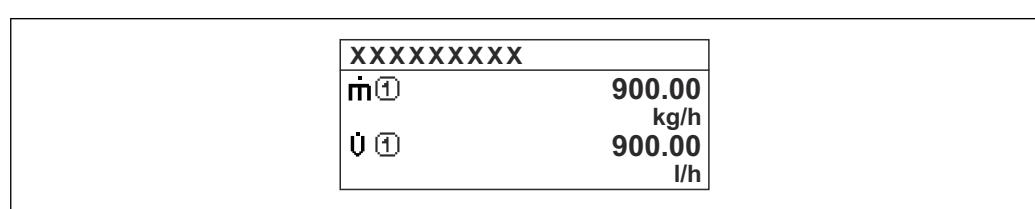
"1 value, max. size" option



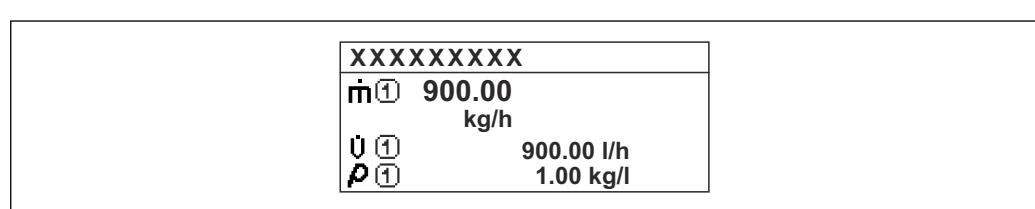
"1 bargraph + 1 value" option



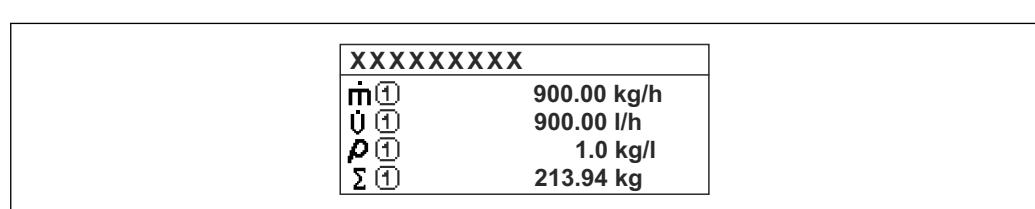
"2 values" option



"1 value large + 2 values" option



"4 values" option



**Value 1 display**

<b>Navigation</b>	Expert → System → Display → Value 1 display (0107)
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to select one of the measured values shown on the local display.
<b>Selection</b>	<ul style="list-style-type: none"><li>▪ Temperature</li><li>▪ Mass flow</li><li>▪ Corrected volume flow</li><li>▪ FAD volume flow *</li><li>▪ Volume flow *</li><li>▪ Energy flow *</li><li>▪ Heat flow *</li><li>▪ Density</li><li>▪ Flow velocity</li><li>▪ Pressure</li><li>▪ 2nd temperature delta heat *</li><li>▪ Electronic temperature</li><li>▪ Totalizer 1</li><li>▪ Totalizer 2</li><li>▪ Totalizer 3</li><li>▪ Current output 1 *</li><li>▪ Current output 2 *</li><li>▪ Current output 3 *</li><li>▪ Current output 4 *</li></ul>
<b>Additional information</b>	<p><i>Description</i></p> <p>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.</p> <p> The <b>Format display</b> parameter (→ 16) is used to specify how many measured values are displayed simultaneously and how.</p> <p><i>Dependency</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→ 54).</p>

**0% bargraph value 1**

<b>Navigation</b>	Expert → System → Display → 0% bargraph 1 (0123)
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 1.
<b>User entry</b>	Signed floating-point number

\* Visibility depends on order options or device settings

**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 (→ 54).

**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 → 221

**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 (→ 54).

**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

**Additional information***Description*

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

## Value 2 display



### Navigation

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

### Prerequisite

A local display is provided.

### Description

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

### Selection

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

### 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 (→ 54).

## 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

### Additional information

#### Description

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

## Value 3 display



### Navigation

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

### Prerequisite

A local display is provided.

### Description

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

**Selection**

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

**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 (→ 54).

**0% bargraph value 3****Navigation**

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

**Prerequisite**

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

**Description**

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

**User entry**

Signed floating-point number

**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 (→ 54).

**100% bargraph value 3****Navigation**

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

**Prerequisite**

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

**Description**

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

**User entry**

Signed floating-point number

**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 (→ 54).

---

**Decimal places 3****Navigation**

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

**Prerequisite**

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

**Description**

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

**Selection**

- X
- X.X
- X.XX
- X.XXX
- X.XXXX

**Additional information***Description*

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

---

**Value 4 display****Navigation**

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

**Prerequisite**

A local display is provided.

**Description**

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

**Selection**

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

**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 (→ 54).

---

**Decimal places 4****Navigation**

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

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

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

**Selection**

- X
- X.X
- X.XX
- X.XXX
- X.XXXX

**Additional information***Description*

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

---

**Display interval****Navigation**

Expert → System → Display → Display interval (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

**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) to **Value 4 display** parameter (→ 22) are used to specify which measured values are shown on the local display.  
■ The display format of the displayed measured values is specified using the **Format display** parameter (→ 16).

---

**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

**Additional information** *User entry*

Use this function to enter a time constant (PT1 element<sup>1)</sup>) 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.

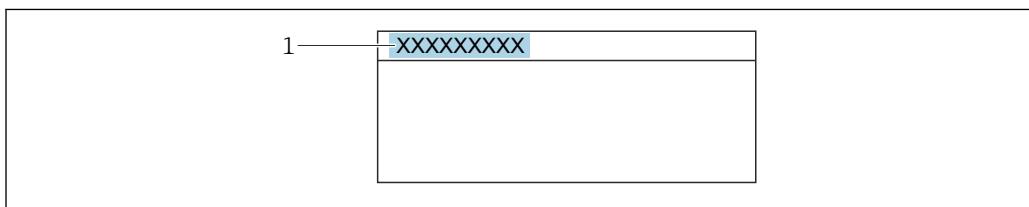
**Selection**

- Device tag
- Free text

**Additional information**

*Description*

The header text only appears during normal operation.



A0029422

1 Position of the header text on the display

*Selection*

- Device tag  
Is defined in the **Device tag** parameter (→  188).
- Free text  
Is defined in the **Header text** parameter (→  24).

## Header text



**Navigation**

 Expert → System → Display → Header text (0112)

**Prerequisite**

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

**Description**

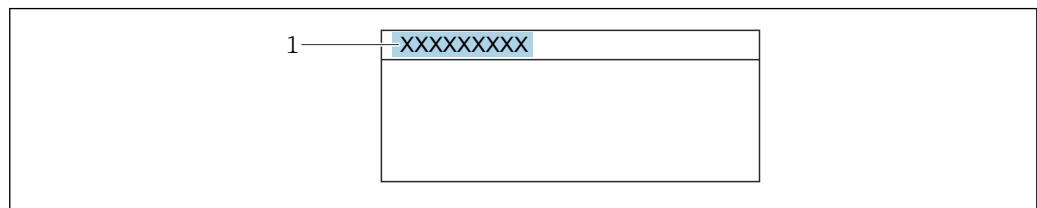
Use this function to enter a customer-specific text for the header of the local display.

1) proportional transmission behavior with first order delay

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

**Additional information** *Description*

The header text only appears during normal operation.



A0029422

1 Position of the header text on the display

*User entry*

The number of characters displayed depends on the characters used.

## Separator



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

**Prerequisite** A local display is provided.

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

**Selection**

- . (point)
- , (comma)

**Factory setting** . (point)

## Contrast display

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

**Prerequisite** A local display is provided.

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

**User entry** 20 to 80 %

**Factory setting** Depends on the display

## Backlight

**Navigation**

Expert → System → Display → Backlight (0111)

**Prerequisite**

One of the following conditions is met:

- Order code for "Display; operation", option **F** "4-line, illum.; touch control"
- Order code for "Display; operation", option **G** "4-line, illum.; touch control +WLAN"

**Description**

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

**Selection**

- Disable
- Enable

### 3.1.2 "Configuration backup" submenu

**Navigation**

Expert → System → Config. backup

► Configuration backup	
Operating time (0652)	→ 26
Last backup (2757)	→ 27
Configuration management (2758)	→ 27
Backup state (2759)	→ 28
Comparison result (2760)	→ 28

## 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**

<b>Navigation</b>	 Expert → System → Config. backup → Last backup (2757)
<b>Description</b>	Displays the time since a backup copy of the data was last saved to the device memory.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)

**Configuration management**

<b>Navigation</b>	 Expert → System → Config. backup → Config. managem. (2758)
<b>Description</b>	Use this function to select an action to save the data to the device memory.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Cancel</li> <li>■ Execute backup</li> <li>■ Restore *</li> <li>■ Compare *</li> <li>■ Clear backup data</li> </ul>
<b>Additional information</b>	<i>Selection</i>

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

*HistoROM*

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

\* 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

## 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

**Additional information**

*Description*

 The comparison is started via the **Compare** option in the **Configuration management** parameter (→  27).

*Selection*

Options	Description
Settings identical	The current device configuration of the HistoROM is identical to the backup copy in the device memory. If the transmitter configuration of another device has been transmitted to the device via HistoROM in the <b>Configuration management</b> 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*

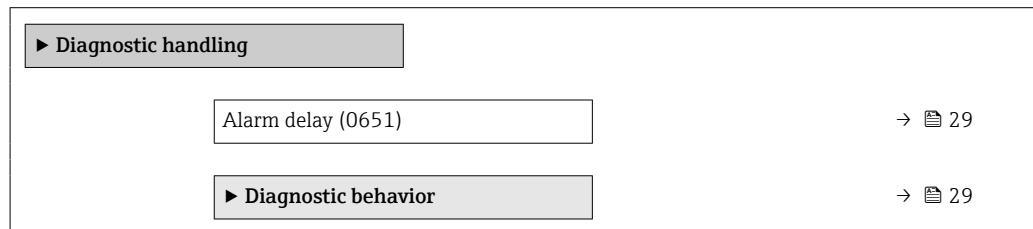
A HistoROM is a "non-volatile" device memory in the form of an EEPROM.

### 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

**Additional information**

*Result*

This setting affects the following diagnostic messages:

- 832 Electronic temperature too high
- 833 Electronic temperature too low
- 834 Process temperature too high
- 835 Process temperature too low

#### "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 (→ 29).

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

Options	Description
Alarm	The device stops measurement. The signal outputs and totalizers assume the defined alarm condition. A diagnostic message is generated. The background lighting changes to red.
Warning	The device continues to measure. The signal outputs and totalizers are not affected. A diagnostic message is generated.
Logbook entry only	The device continues to measure. The diagnostic message is displayed only in the <b>Event logbook</b> submenu (→ 187) ( <b>Event list</b> submenu) 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

*Navigation*

  Expert → System → Diagn. handling → Diagn. behavior

**► Diagnostic behavior**

Assign behavior of diagnostic no. 144 (0631)	→  31
Assign behavior of diagnostic no. 302 (0742)	→  31
Assign behavior of diagnostic no. 441 (0657)	→  31
Assign behavior of diagnostic no. 442 (0658)	→  32
Assign behavior of diagnostic no. 443 (0659)	→  32
Assign behavior of diagnostic no. 444 (0740)	→  33
Assign behavior of diagnostic no. 832 (0675)	→  33
Assign behavior of diagnostic no. 833 (0676)	→  33
Assign behavior of diagnostic no. 834 (0677)	→  34
Assign behavior of diagnostic no. 835 (0678)	→  34
Assign behavior of diagnostic no. 842 (0638)	→  34

Assign behavior of diagnostic no. 976 (0629)	→  35
Assign behavior of diagnostic no. 977 (0627)	→  35
Assign behavior of diagnostic no. 979 (0630)	→  35

## Assign behavior of diagnostic no. 144 (Sensor drift)

<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 144 (0631)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>144 Sensor drift</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"><li>■ Off</li><li>■ Alarm</li><li>■ Warning</li><li>■ Logbook entry only</li></ul>
<b>Additional information</b>	Detailed description of the options available for selection: →  30

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

<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 302 (0742)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>302 Device verification active</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"><li>■ Off</li><li>■ Alarm</li><li>■ Warning</li><li>■ Logbook entry only</li></ul>
<b>Additional information</b>	Detailed description of the options available for selection: →  30

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

<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 441 (0657)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>441 Current output 1 to n</b> diagnostic message.

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Additional information***Selection*

Detailed description of the options available for selection: → 30

---

**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

**Additional information**

Detailed description of the options available for selection: → 30

---

**Assign behavior of diagnostic no. 443 (Pulse output)****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** diagnostic message.

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Additional information***Selection*

Detailed description of the options available for selection: → 30

---

**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

**Additional information**

Detailed description of the options available for selection: → [30](#)

---

**Assign behavior of diagnostic no. 832 (Electronic temperature too high)**

---

**Navigation**

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832 (0675)

**Description**

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

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Additional information**

Detailed description of the options available for selection: → [30](#)

---

**Assign behavior of diagnostic no. 833 (Electronic temperature too low)**

---

**Navigation**

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833 (0676)

**Description**

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

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Additional information**

*Selection*

Detailed description of the options available for selection: → [30](#)

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

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 834 (0677)

**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

**Additional information**

*Selection*

Detailed description of the options available for selection: → 30

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

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 835 (0678)

**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

**Additional information**

*Selection*

Detailed description of the options available for selection: → 30

**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

**Additional information**

Detailed description of the options available for selection: → 30

---

**Assign behavior of diagnostic no. 976 (Mass flow out of calibrated range)**

---

**Navigation**

Diagram: Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 976 (0629)

**Description**

Use this function to change the diagnostic behavior of the **976 Mass flow out of calibrated range** diagnostic message.

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Additional information**

Detailed description of the options available for selection: → [30](#)

---

**Assign behavior of diagnostic no. 977 (Reverse flow detected)**

---

**Navigation**

Diagram: Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 977 (0627)

**Description**

Use this function to change the diagnostic behavior of the **977 Reverse flow detected** diagnostic message.

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Additional information**

Detailed description of the options available for selection: → [30](#)

---

**Assign behavior of diagnostic no. 979 (Unstable process conditions)**

---

**Navigation**

Diagram: Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 979 (0630)

**Description**

Use this function to change the diagnostic behavior of the **979 Unstable process conditions** diagnostic message.

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

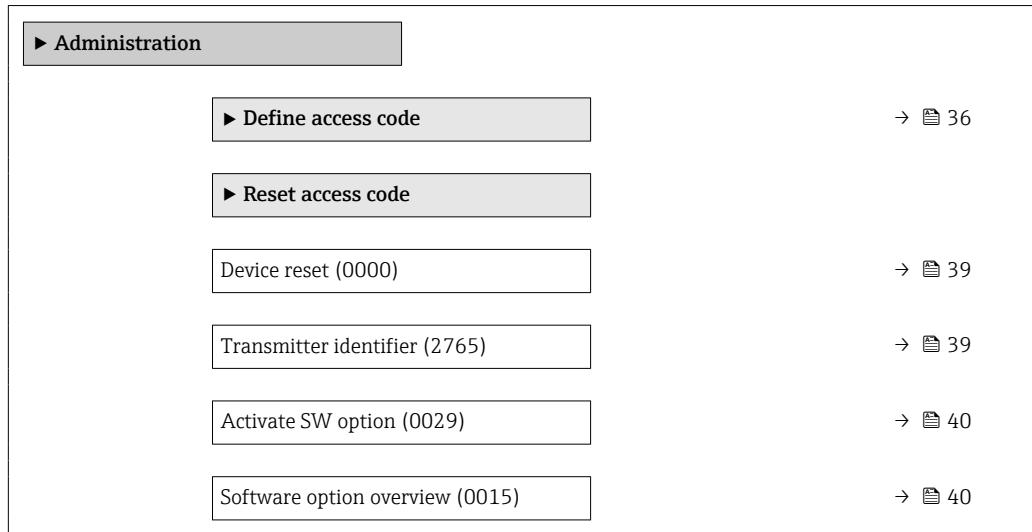
**Additional information**

Detailed description of the options available for selection: → [30](#)

### 3.1.4 "Administration" submenu

Navigation

Expert → System → Administration



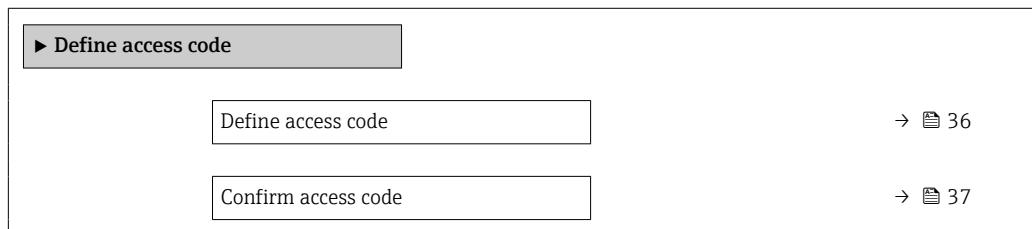
#### "Define access code" wizard

**i** The **Define access code** wizard (→ 36) is only available when operating via the local display or Web browser.

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

Navigation

Expert → System → Administration → Def. access code



#### Define access code



##### Navigation

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

##### Description

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

##### User entry

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

##### Additional information

##### Description

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

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

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

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

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

#### *User entry*

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

#### *Factory setting*

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

## Confirm access code



### Navigation

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

### Description

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

### User entry

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

## "Reset access code" submenu

### *Navigation*

  Expert → System → Administration → Reset acc. code

 **Reset access code**

Operating time (0652)

→  38

Reset access code (0024)

→  38

---

## Operating time

---

**Navigation**

- █ █ Diagnostics → Operating time (0652)
- █ █ Expert → Diagnostics → Operating time (0652)
- █ █ Expert → System → Config. backup → Operating time (0652)
- █ █ Expert → System → Administration → Reset acc. code → Operating time (0652)
- █ █ Setup → Advanced setup → Administration → Reset acc. code → Operating time (0652)
- █ █ Setup → Advanced setup → 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.

---

## Reset access code

---

**Navigation**

- █ █ Expert → System → Administration → Reset acc. code → Reset acc. code (0024)
- █ █ Setup → Advanced setup → Administration → Reset acc. code → Reset acc. code (0024)

**Description**

Use this function to enter a reset code to reset the user-specific release code to the factory setting.

**User entry**

Character string comprising numbers, letters and special characters

**Additional information**

*Description*

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

*User entry*

The reset code can only be entered via:

- Web browser
- DeviceCare, FieldCare (via interface CDI RJ45)
- Fieldbus

### Additional parameters in the "Administration" submenu

**Device reset****Navigation**

Expert → System → Administration → Device reset (0000)

**Description**

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

**Selection**

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

**Additional information***Selection*

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 this customer-specific value. All other parameters are reset to the factory setting.
Restart device	The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.
Restore S-DAT backup	Restore the data that are saved on the S-DAT. The data record is restored from the electronics memory to the S-DAT.  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

\* Visibility depends on order options or device settings

**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.
- ▶ 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"

*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**

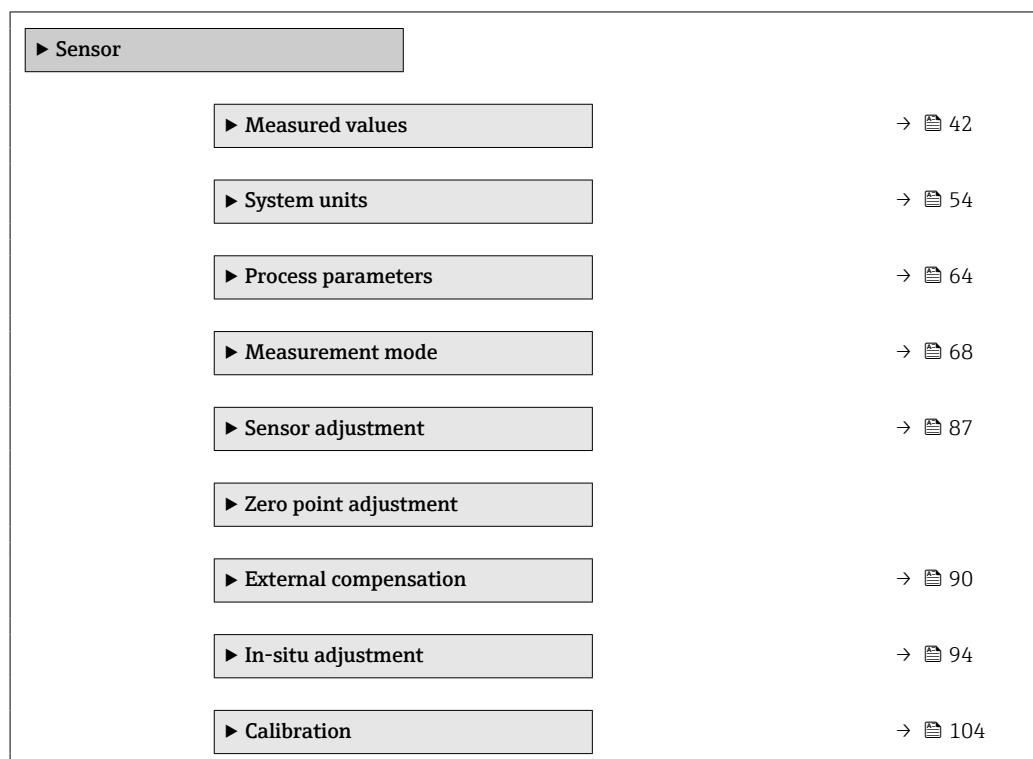
Displays all the software options that are enabled in the device.

<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Extended HistoROM *</li> <li>■ SIL *</li> <li>■ Second gas</li> <li>■ Heartbeat Monitoring *</li> <li>■ Heartbeat Verification *</li> </ul>
<b>Additional information</b>	<i>Description</i>
	Displays all the options that are available if ordered by the customer.
	<i>"Extended HistoROM" option</i>
	Order code for "Application package", option EA "Extended HistoROM"
	<i>"SIL" option</i>
	Order code for "Additional approval", option LA "SIL"
	<i>"Heartbeat Verification" option and "Heartbeat Monitoring" option</i>
	Order code for "Application package", option EB "Heartbeat Verification + Monitoring"
	<i>"Second gas" option</i>
	Order code for "Application package", option EV "Second gas group"

## 3.2 "Sensor" submenu

Navigation

Diagram Expert → Sensor



\* Visibility depends on order options or device settings

### 3.2.1 "Measured values" submenu

Navigation

Expert → Sensor → Measured val.

► Measured values	
► Process variables	→ 42
► System values	→ 47
► Totalizer	→ 47
► Input values	→ 49
► Output values	→ 50

#### "Process variables" submenu

Navigation

Expert → Sensor → Measured val. → Process variab.

► Process variables	
Mass flow (1838)	→ 43
Corrected volume flow (1847)	→ 43
Volume flow (1850)	→ 43
FAD volume flow (1851)	→ 44
Energy flow (1852)	→ 44
Heat flow (1872)	→ 44
Temperature (1853)	→ 45
Density (1854)	→ 45
Process pressure (17343)	→ 45
2nd temperature heat flow (17344)	→ 45
Flow velocity (1857)	→ 46
Mach number (17302)	→ 46

Power coefficient fluctuation (12112)

→ 46

Level of flow fluctuation (12113)

→ 47

## Mass flow

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

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

**User interface** Signed floating-point number

**Additional information** *Dependency*

The unit is taken from the **Mass flow unit** parameter (→ 55)

## Corrected volume flow

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

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

**User interface** Signed floating-point number

**Additional information** *Description*

The corrected volume flow is derived from the measured volume flow corrected to the selected reference conditions.

*Dependency*

The unit is taken from the **Corrected volume flow unit** parameter (→ 56)

## Volume flow

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

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

**User interface** Signed floating-point number

**Additional information** *Dependency*

The unit is taken from the **Volume flow unit** parameter (→ 57)

## FAD volume flow

---

**Navigation**   Expert → Sensor → Measured val. → Process variab. → FAD volume flow (1851)

**Prerequisite** The **Air or compressed air** option is selected in the **Measurement application** parameter (→ [68](#)) parameter.

**Description** Displays the FAD<sup>2)</sup> volume flow that is currently measured.

**User interface** Signed floating-point number

**Additional information** *Dependency*

 The unit is taken from the **FAD volume flow unit** parameter (→ [58](#)).

---

## Energy flow

---

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

**Prerequisite** The **Energy** option is selected in the **Measurement application** parameter (→ [68](#)) parameter.

**Description** Shows the energy flow currently calculated.

**User interface** Signed floating-point number

**Additional information** *Dependency*

 The unit is taken from the **Energy flow unit** parameter (→ [59](#))

---

## Heat flow

---

**Navigation**   Expert → Sensor → Measured val. → Process variab. → Heat flow (1872)

**Prerequisite** The **Energy** option is selected in the **Measurement application** parameter (→ [68](#)) parameter.

**Description** Shows the heat flow currently calculated.

**User interface** Signed floating-point number

**Additional information** *Dependency*

 The unit is taken from the **Energy flow unit** parameter (→ [59](#))

---

## Temperature

---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Temperature (1853)
<b>Description</b>	Displays the temperature that is currently measured.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Temperature unit</b> parameter (→  62)

---

## Density

---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Density (1854)
<b>Description</b>	Shows the density currently calculated.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Density unit</b> parameter (→  61)

---

## Process pressure

---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Process pressure (17343)
<b>Description</b>	Shows depending on the setting the entered or external process pressure.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<i>Dependency</i>  The unit is taken from the <b>Pressure unit</b> parameter (→  62)

---

## 2nd temperature heat flow

---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → 2nd temp.heat fl (17344)
<b>Prerequisite</b>	The <b>Energy</b> option is selected in the <b>Measurement application</b> parameter (→  68) parameter.
<b>Description</b>	Displays the 2nd temperature for heat flow calculation. The temperature can be an external value or a fixed, entered value.

**User interface** Signed floating-point number

**Additional information** *Dependency*

 The unit is taken from the **Temperature unit** parameter (→ [62](#))

---

## Flow velocity

---

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

**Description** Shows the flow velocity currently calculated.

**User interface** Signed floating-point number

**Additional information** *Dependency*

 The unit is taken from the **Velocity unit** parameter (→ [63](#))

---

## Mach number

---

**Navigation**  Expert → Sensor → Measured val. → Process variab. → Mach number (17302)

**Description** Shows the Mach number currently calculated. For the calculation the density and the pressure are required.

**User interface** Signed floating-point number

---

## Power coefficient fluctuation

---

**Navigation**  Expert → Sensor → Measured val. → Process variab. → Powercoeff.fluct (12112)

**Description** Indicates the standard deviation of the unprocessed sensor signal.

**User interface** Signed floating-point number

**Factory setting** 0 to 1

**Additional information** Unit: normalized value.

---

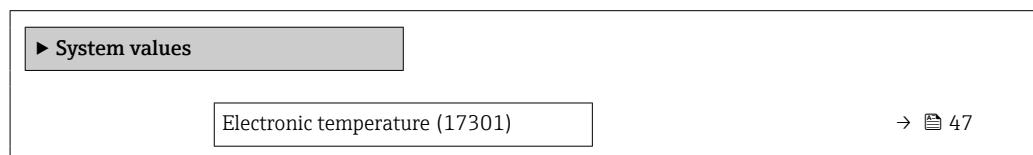
**Level of flow fluctuation**


---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Fluctuat. level (12113)
<b>Description</b>	Indicates the process stability via peak value determination.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	0 to 1
<b>Additional information</b>	U: normalized value.

**"System values" submenu**

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




---

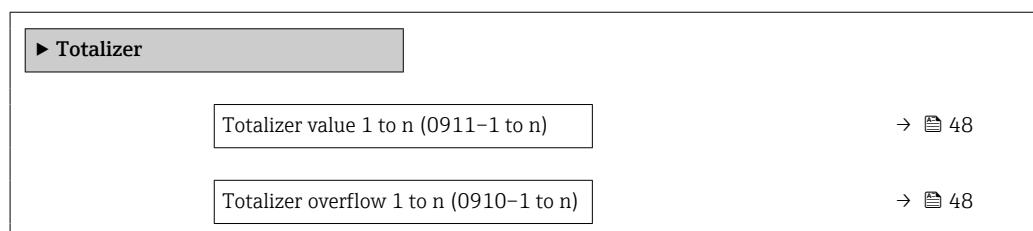
**Electronic temperature**


---

<b>Navigation</b>	 Expert → Sensor → Measured val. → System values → Electronic temp. (17301)
<b>Description</b>	Indication of the current temperature of the electronics.
<b>User interface</b>	Signed floating-point number

**"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)

**Description** Displays the current totalizer reading.

**User interface** Signed floating-point number

**Additional information** *Description*

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

In the event of an error, the totalizer adopts the mode defined in the **Failure mode** parameter (→ 179).

*User interface*

The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ 176).

*Example*

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

- Value in the **Totalizer value 1** parameter: 1968457 kg
- Value in **Totalizer overflow 1** parameter:  $1 \cdot 10^7$  (1 overflow) = 10 000 000 [kg]
- Current totalizer reading: 11 968 457 kg

---

**Totalizer overflow 1 to n**

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

**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 (→ [176](#)).

#### Example

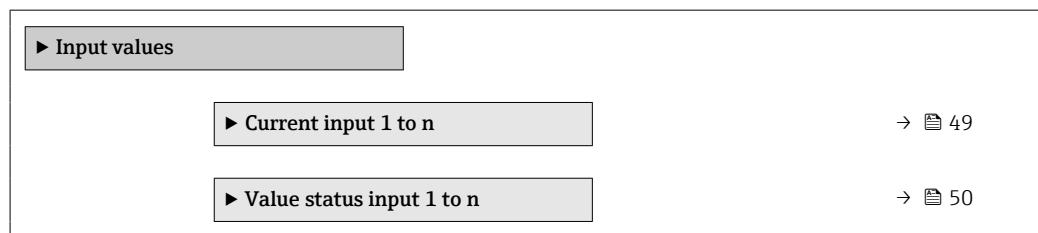
Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:

- Value in the **Totalizer value 1** parameter: 1968457 kg
- Value in **Totalizer overflow 1** parameter:  $2 \cdot 10^7$  (2 overflows) = 20000000 [kg]
- Current totalizer reading: 21968457 kg

### "Input values" submenu

#### Navigation

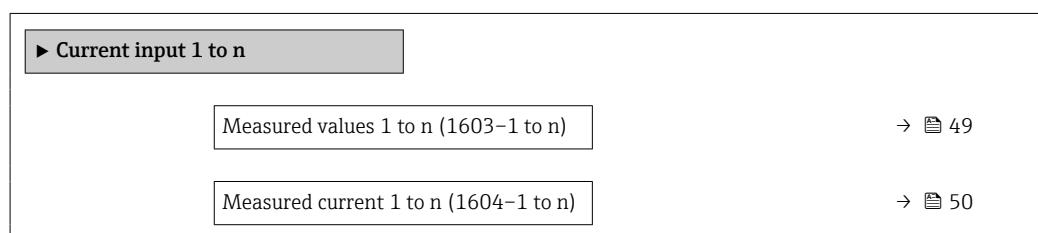
 Expert → Sensor → Measured val. → Input values



### "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**

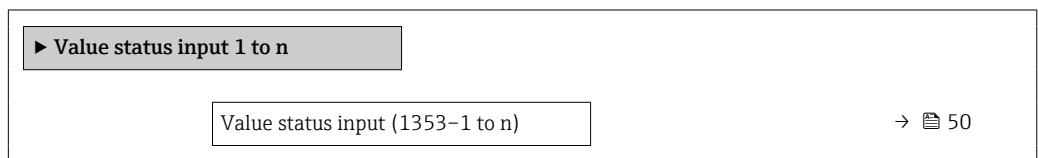
Displays the current value of the current input.

**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**

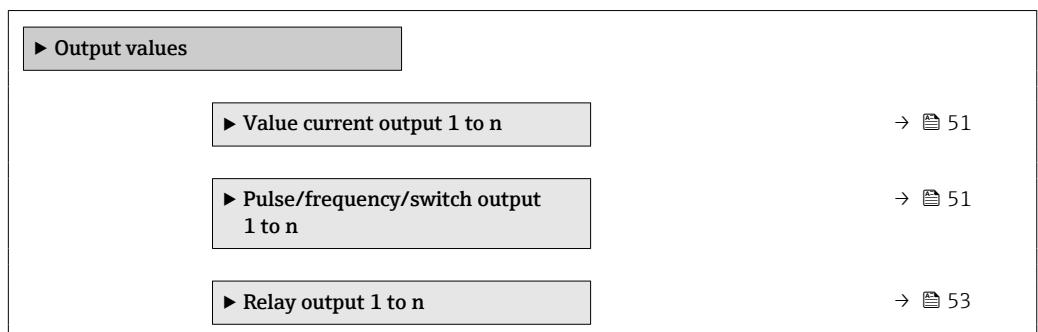
Displays the current input signal level.

**User interface**

- High
- Low

*"Output values" submenu*

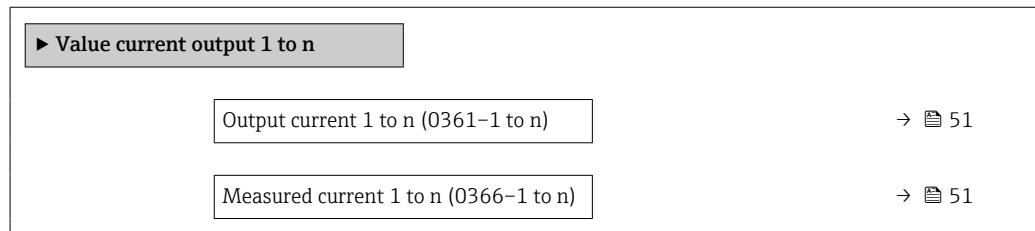
*Navigation*      Expert → Sensor → Measured val. → Output values



*"Value current output 1 to n" submenu*

*Navigation*

Expert → Sensor → Measured val. → Output values → Value curr.out 1 to n




---

### Output current 1 to n

---

**Navigation**

Expert → Sensor → Measured val. → Output values → Value curr.out 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 → Value curr.out 1 to n → Measur. curr. 1 to n (0366-1 to n)

**Description**

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

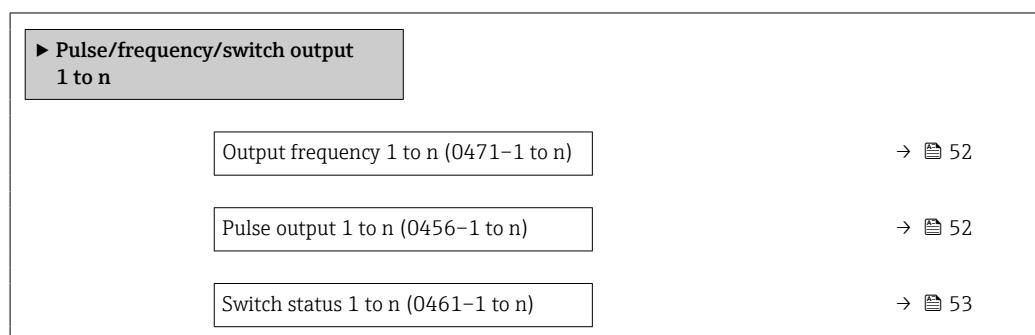
**User interface**

0 to 30 mA

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

*Navigation*

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

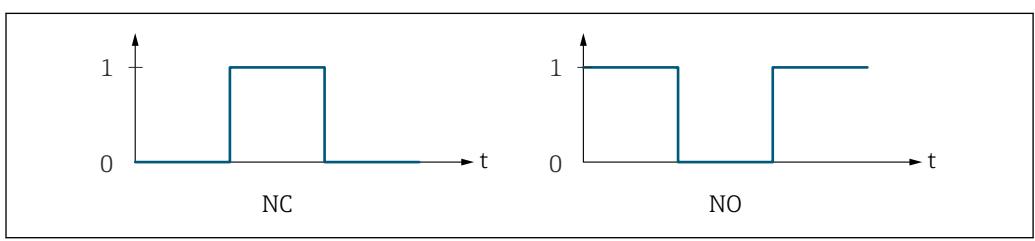


## Output frequency 1 to n

<b>Navigation</b>	 Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Output freq. 1 to n (0471–1 to n)
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→ 119), the <b>Frequency</b> option is selected.
<b>Description</b>	Displays the actual value of the output frequency which is currently measured.
<b>User interface</b>	0.0 to 12 500.0 Hz

## Pulse output 1 to n

<b>Navigation</b>	 Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Pulse output 1 to n (0456–1 to n)
<b>Prerequisite</b>	The <b>Pulse</b> option is selected in the <b>Operating mode</b> parameter (→ 119) parameter.
<b>Description</b>	Displays the pulse frequency currently output.
<b>User interface</b>	Positive floating-point number
<b>Additional information</b>	<p><i>Description</i></p> <ul style="list-style-type: none"> <li>■ The pulse output is an open collector output.</li> <li>■ 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.</li> </ul>



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 (→ 133) 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 (→ 122)) can be configured.

---

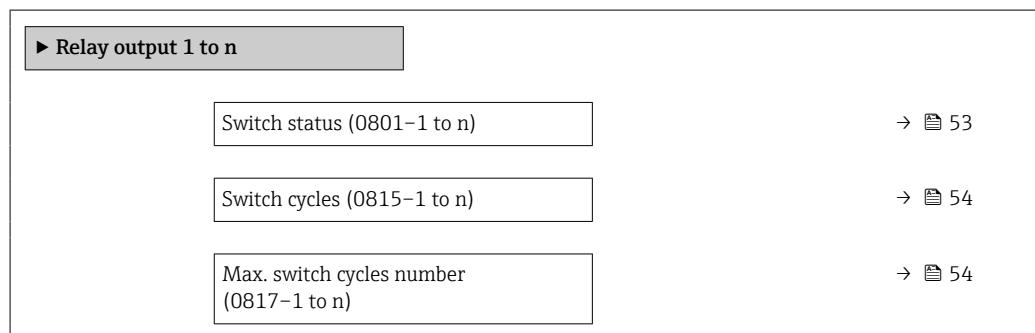
## Switch status 1 to n

---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Output values → PFS output 1 to n → Switch status 1 to n (0461-1 to n)
<b>Prerequisite</b>	The <b>Switch</b> option is selected in the <b>Operating mode</b> parameter (→ <a href="#">119</a> ).
<b>Description</b>	Displays the current switch status of the status output.
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Open</li> <li>▪ Closed</li> </ul>
<b>Additional information</b>	<p><i>User interface</i></p> <ul style="list-style-type: none"> <li>▪ Open The switch output is not conductive.</li> <li>▪ Closed The switch output is conductive.</li> </ul>

"Relay output 1 to n" submenu

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




---

## Switch status

---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Output values → Relay output 1 to n → Switch status (0801-1 to n)
<b>Description</b>	Displays the current status of the relay output.
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Open</li> <li>▪ Closed</li> </ul>

**Additional information***User interface*

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

**Switch cycles****Navigation**

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

**Description**

Displays all the switch cycles performed.

**User interface**

Positive integer

**Max. switch cycles number****Navigation**

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

**Description**

Displays the maximum number of guaranteed switch cycles.

**User interface**

Positive integer

### 3.2.2 "System units" submenu

*Navigation*

  Expert → Sensor → System units

 <b>System units</b>	
Mass flow unit (0554)	→  55
Mass unit (0574)	→  56
Corrected volume flow unit (0558)	→  56
Corrected volume unit (0575)	→  57
Volume flow unit (0553)	→  57
Volume unit (0563)	→  58
FAD volume flow unit (0601)	→  58

FAD volume unit (0591)	→  59
Energy flow unit (0565)	→  59
Energy unit (0559)	→  60
Calorific value unit (0552)	→  61
Density unit (0555)	→  61
Temperature unit (0557)	→  62
Pressure unit (0564)	→  62
Velocity unit (0566)	→  63
Length unit (0551)	→  63
Date/time format (2812)	→  64

**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*

- lb/s
- lb/min
- lb/h
- lb/d
- STon/s
- STon/min
- STon/h
- STon/d

**Factory setting**

Country-specific:

- kg/h
- lb/h

**Additional information***Result*

The selected unit applies for:  
**Mass flow** parameter (→  43)

*Selection*

 For an explanation of the abbreviated units: →  223

---

**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*

- lb
- STon

**Factory setting**

Country-specific:

- kg
- lb

**Additional information***Selection*

 For an explanation of the abbreviated units: →  223

---

**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*

- NI/s
- NI/min
- NI/h
- NI/d
- Nm<sup>3</sup>/s
- Nm<sup>3</sup>/min
- Nm<sup>3</sup>/h
- Nm<sup>3</sup>/d
- Sl/s
- Sl/min
- Sl/h
- Sl/d
- Sm<sup>3</sup>/s
- Sm<sup>3</sup>/min
- Sm<sup>3</sup>/h
- Sm<sup>3</sup>/d

*US units*

- Sft<sup>3</sup>/s
- Sft<sup>3</sup>/min
- Sft<sup>3</sup>/h
- Sft<sup>3</sup>/d

<b>Factory setting</b>	Country-specific: ■ Nm <sup>3</sup> /h ■ Sft <sup>3</sup> /h
------------------------	--

<b>Additional information</b>	<i>Selection</i>
	 For an explanation of the abbreviated units: → <a href="#">223</a>

---

**Corrected volume unit**

<b>Navigation</b>	 Expert → Sensor → System units → Corr. vol. unit (0575)
-------------------	---

<b>Description</b>	Use this function to select the unit for the corrected volume.
--------------------	--

<b>Selection</b>	<i>SI units</i>	<i>US units</i>
■ NL		Sft <sup>3</sup>
■ Nm <sup>3</sup>		
■ SI		
■ Sm <sup>3</sup>		

<b>Factory setting</b>	Country-specific: ■ Nm <sup>3</sup> ■ Sft <sup>3</sup>
------------------------	--

<b>Additional information</b>	<i>Selection</i>
	 For an explanation of the abbreviated units: → <a href="#">223</a>

---

**Volume flow unit**

<b>Navigation</b>	 Expert → Sensor → System units → Volume flow unit (0553)
-------------------	--

<b>Description</b>	Use this function to select the unit for the volume flow.
--------------------	---

<b>Selection</b>	<i>SI units</i>	<i>US units</i>
■ m <sup>3</sup> /s		■ ft <sup>3</sup> /s
■ m <sup>3</sup> /min		■ ft <sup>3</sup> /min
■ m <sup>3</sup> /h		■ ft <sup>3</sup> /h
■ m <sup>3</sup> /d		■ ft <sup>3</sup> /d
■ l/s		
■ l/min		
■ l/h		
■ l/d		

<b>Factory setting</b>	Country-specific: ■ l/h ■ ft <sup>3</sup> /h
------------------------	--

**Volume unit****Navigation**

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

**Description**

Use this function to select the unit for the volume.

**Selection***SI units*

- m<sup>3</sup>
- l

*US units*

ft<sup>3</sup>

**Factory setting**

Country-specific:

- ft<sup>3</sup>
- m<sup>3</sup>

**Additional information**

*Selection*

For an explanation of the abbreviated units: → 223

**FAD volume flow unit****Navigation**

Expert → Sensor → System units → FAD vol.fl. unit (0601)

**Description**

Use this function to select the unit for the FAD<sup>3)</sup> volume flow.

**Selection***SI units*

- 1 FAD/s
- 1 FAD/min
- 1 FAD/h
- 1 FAD/d
- m<sup>3</sup> FAD/s
- m<sup>3</sup> FAD/min
- m<sup>3</sup> FAD/h
- m<sup>3</sup> FAD/d

*US units*

- cf FAD/s
- cf FAD/min
- cf FAD/h
- cf FAD/d

**Factory setting**

Country-specific:

- m<sup>3</sup> FAD/h
- cf FAD/min

**Additional information**

*Result*

The selected unit applies for:  
**FAD volume flow** parameter (→ 44)

*Selection*

For an explanation of the abbreviated units: → 223

3) Free air delivery

---

**FAD volume unit**

**Navigation** Expert → Sensor → System units → FAD volume unit (0591)

**Description** Use this function to select the unit for the FAD<sup>4)</sup> volume.

**Selection**

<i>SI units</i>	<i>US units</i>
■ 1 FAD	cf FAD
■ m <sup>3</sup> FAD	

**Factory setting** Country-specific:  
■ m<sup>3</sup> FAD  
■ cf FAD

**Additional information** *Selection*



For an explanation of the abbreviated units: → 223

---

**Energy flow unit**

**Navigation** Expert → Sensor → System units → Energy flow unit (0565)

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

---

4) Free air delivery

**Selection**

*SI units*

- kW
- MW
- GW
- kJ/s
- kJ/min
- kJ/h
- kJ/d
- MJ/s
- MJ/min
- MJ/h
- MJ/d
- GJ/s
- GJ/min
- GJ/h
- GJ/d
- kcal/s
- kcal/min
- kcal/h
- kcal/d
- Mcal/s
- Mcal/min
- Mcal/h
- Mcal/d
- Gcal/s
- Gcal/min
- Gcal/h
- Gcal/d

*Imperial units*

- Btu/s
- Btu/min
- Btu/h
- Btu/day
- MBtu/s
- MBtu/min
- MBtu/h
- MBtu/d
- MMBtu/s
- MMBtu/min
- MMBtu/h
- MMBtu/d

**Factory setting**

Country-specific:

- kW
- Btu/h

**Additional information**

*Selection*

 For an explanation of the abbreviated units: → [223](#)

---

**Energy unit****Navigation**

 Expert → Sensor → System units → Energy unit (0559)

**Description**

Use this function to select the unit for energy.

**Selection**

*SI units*

- kWh
- MWh
- GWh
- kJ
- MJ
- GJ
- kcal
- Mcal
- Gcal

*Imperial units*

- Btu
- MBtu
- MMBtu

<b>Factory setting</b>	Country-specific: ■ kWh ■ Btu
------------------------	-------------------------------------

<b>Additional information</b>	<i>Selection</i>
	 For an explanation of the abbreviated units: → <a href="#">223</a>

**Calorific value unit**

<b>Navigation</b>	 Expert → Sensor → System units → Cal. value unit (0552)
-------------------	---

<b>Description</b>	Use this function to select the unit for the calorific value.
--------------------	---

<b>Selection</b>	<i>SI units</i>	<i>Imperial units</i>
	■ kJ/Nm <sup>3</sup>	■ Btu/Sm <sup>3</sup>
	■ kWh/Nm <sup>3</sup>	■ MBtu/Sm <sup>3</sup>
	■ kWh/Sm <sup>3</sup>	■ Btu/Sft <sup>3</sup>
	■ kJ/Sm <sup>3</sup>	■ MBtu/Sft <sup>3</sup>

<b>Factory setting</b>	Country-specific: ■ kWh/Nm <sup>3</sup> ■ Btu/Sft <sup>3</sup>
------------------------	--

**Additional information****Density unit**

<b>Navigation</b>	 Expert → Sensor → System units → Density unit (0555)
-------------------	--

<b>Description</b>	Use this function to select the unit for the density.
--------------------	---

<b>Selection</b>	<i>SI units</i>	<i>US units</i>
	■ g/cm <sup>3</sup>	lb/ft <sup>3</sup>
	■ kg/dm <sup>3</sup>	
	■ kg/l	
	■ kg/m <sup>3</sup>	

<b>Factory setting</b>	Country-specific: ■ kg/m <sup>3</sup> ■ lb/ft <sup>3</sup>
------------------------	--

<b>Additional information</b>	<i>Selection</i>
	 For an explanation of the abbreviated units: → <a href="#">223</a>

**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***Result*

The selected unit applies for:

- **Temperature** parameter (→ 45)
- **FAD temperature** parameter
- **Reference combustion temperature** parameter
- **Reference temperature** parameter
- **Maximum value** parameter
- **Minimum value** parameter
- **Maximum value** parameter
- **Minimum value** parameter

*Selection*

For an explanation of the abbreviated units: → 223

**Pressure unit****Navigation**

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

**Description**

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

**Selection***SI units*

- MPa a
- kPa a
- bar a
- mbar a

*US units*

psi a

**Factory setting**

Country-specific:

- bar a
- psi a

**Additional information***Result*

The unit is taken from:

- **FAD pressure** parameter
- **Reference pressure** parameter

*Selection*

For an explanation of the abbreviated units: → [223](#)

**Velocity unit****Navigation**

Expert → Sensor → System units → Velocity unit (0566)

**Description**

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

**Selection***SI units*

m/s

*US units*

ft/s

**Factory setting**

Country-specific:

- m/s
- ft/s

**Length unit****Navigation**

Expert → Sensor → System units → Length unit (0551)

**Description**

Use this function to select the unit of length.

**Selection***SI units*

- m
- mm

*US units*

- ft
- in

**Factory setting**

Country-specific:

- mm
- in

**Additional information***Result*

The selected unit applies for:

- **Duct internal height** parameter
- **Insertion depth** parameter
- **Pipe inner diameter** parameter
- **Mounting set height** parameter
- **Pipe wall thickness** parameter
- **Duct internal width** parameter

*Selection*

For an explanation of the abbreviated units: → [223](#)

**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

**Additional information***Selection*

For an explanation of the abbreviated units: → 223

### 3.2.3 "Process parameters" submenu

**Navigation**

Expert → Sensor → Process param.

► Process parameters	
Flow override (1839)	→  64
Flow damping (1802)	→  65
Temperature damping (1822)	→  65
Sensitivity (17032)	→  66
► Low flow cut off	

**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

**Additional information***Description***Flow override is active**

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

 The **Flow override** option can also be activated in the **Status input** submenu: **Assign status input** parameter (→ [108](#)).

**Flow damping****Navigation**

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

**Description**

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

**User entry**

0 to 999.9 s

**Additional information***Description*

 The damping is performed by a PT1 element<sup>5)</sup>.

*User entry*

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

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

*Result*

 The damping affects the following variables of the device:

- Outputs → [110](#)
- Low flow cut off → [66](#)
- Totalizers → [175](#)

**Temperature damping****Navigation**

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

**Description**

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

**User entry**

0 to 999.9 s

5) Proportional behavior with first-order lag

**Additional information***Description*

The damping is performed by a PT1 element<sup>6)</sup>.

*User entry*

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



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

**Sensitivity****Navigation**

Diagram: Expert → Sensor → Process param. → Sensitivity (17032)

**Description**

Enter the threshold value for process stability. The higher the value, the better disturbances are detected.

**User entry**

1 to 9

**"Low flow cut off" submenu***Navigation*

Diagram: Expert → Sensor → Process param. → Low flow cut off

► **Low flow cut off**

Assign process variable (1837) → 66

On value low flow cutoff (1805) → 67

Off value low flow cutoff (1804) → 67

**Assign process variable****Navigation**

Diagram: 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.

6) Proportional behavior with first-order lag

**Selection**

- Off
- Mass flow
- Volume flow
- Corrected volume flow
- FAD volume flow <sup>\*</sup>

**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 (→ [66](#)).

**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 → [67](#).

**User entry**

Positive floating-point number

**Factory setting**

Depends on country and nominal diameter → [221](#)

**Additional information**

*Dependency*

The unit depends on the process variable selected in the **Assign process variable** parameter (→ [66](#)).

**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 (→ [66](#)).

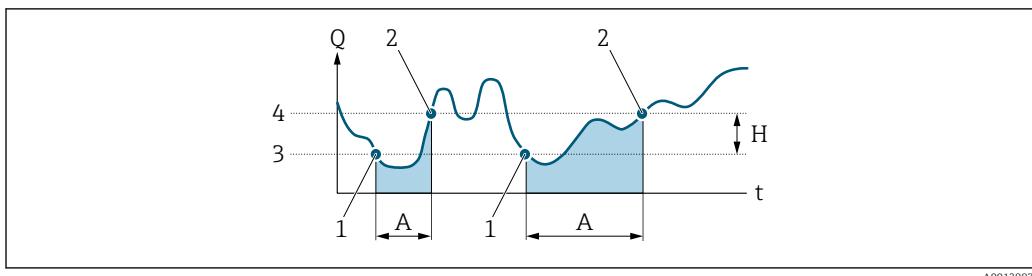
**Description**

Use this function to enter a switch-off value for low flow cut off. The off value is entered as a positive hysteresis from the on value → [67](#).

**User entry**

0 to 100.0 %

\* Visibility depends on order options or device settings

**Additional information***Example*

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

**3.2.4 "Measurement mode" submenu**

Navigation

Expert → Sensor → Measurement mode

<b>► Measurement mode</b>	
Measurement application (17350)	→  68
Calorific value type (3101)	→  69
Active gas (17001)	→  69
<b>► Gas</b>	→  69
<b>► Second gas</b>	→  77
<b>► Reference conditions</b>	→  84

**Measurement application**

Navigation

Expert → Sensor → Measurement mode → Measurem. appl. (17350)

Description

Select measurement application.

Selection

- Air or compressed air
- Gas or gas mixture
- Energy

**Calorific value type**

**Navigation** Expert → Sensor → Measurement mode → Calorif.val.type (3101)

**Prerequisite** The **Energy** option is selected in the **Measurement application** parameter (→ [68](#)) parameter.

**Description** Select calculation based on gross calorific value or net calorific value.

**Selection**

- Gross calorific value mass
- Net calorific value mass

**Active gas**

**Navigation** Expert → Sensor → Measurement mode → Active gas (17001)

**Prerequisite** **Second gas** option application package is available.

**Description** Select the gas that the device is currently using for the measurement.

**Selection**

- Gas
- Second gas

**"Gas" submenu**

*Navigation* Expert → Sensor → Measurement mode → Gas

► Gas	
Select gas type	→ <a href="#">70</a>
Gas	→ <a href="#">71</a>
Special gas name	→ <a href="#">71</a>
Gas composition	→ <a href="#">71</a>
Mol% Air	→ <a href="#">72</a>
Mol% Ar	→ <a href="#">72</a>
Mol% C2H4	→ <a href="#">72</a>
Mol% C2H6	→ <a href="#">73</a>

Mol% C3H8	→  73
Mol% CH4	→  73
Mol% Cl2	→  73
Mol% CO	→  73
Mol% CO2	→  74
Mol% H2	→  74
Mol% H2O	→  74
Mol% H2S	→  74
Mol% HCl	→  74
Mol% He	→  75
Mol% i-C4H10	→  75
Mol% Kr	→  75
Mol% N2	→  75
Mol% Ne	→  75
Mol% NH3	→  76
Mol% O2	→  76
Mol% O3	→  76
Mol% Xe	→  76

---

Select gas type 

## Navigation Expert → Sensor → Measurement mode → Gas → Select gas type (3109)

Description Select measured gas type.

## Selection

- Single gas
- Gas mixture \*
- Special gas

---

\* Visibility depends on order options or device settings

---

**Gas****Navigation**

Expert → Sensor → Measurement mode → Gas → Gas (3151)

**Prerequisite**The **Single gas** option is selected in the **Select gas type** parameter parameter.**Description**

Select measured gas.

**Selection**

- Air
- Ammonia NH<sub>3</sub>
- Argon Ar
- Butane C<sub>4</sub>H<sub>10</sub>
- Carbon dioxide CO<sub>2</sub>
- Carbon monoxide CO
- Chlorine Cl<sub>2</sub>
- Ethane C<sub>2</sub>H<sub>6</sub>
- Ethylene C<sub>2</sub>H<sub>4</sub>
- Helium He
- Hydrogen H<sub>2</sub>
- Hydrogen chloride HCl
- Hydrogen sulfide H<sub>2</sub>S
- Krypton Kr
- Methane CH<sub>4</sub>
- Neon Ne
- Nitrogen N<sub>2</sub>
- Oxygen O<sub>2</sub>
- Ozone O<sub>3</sub>
- Propane C<sub>3</sub>H<sub>8</sub>
- Xenon Xe

---

**Special gas name****Navigation**

Expert → Sensor → Measurement mode → Gas → Special gas name (3177)

**Prerequisite****Special gas** option application package is available.**Description**

Shows the description of the gas ordered by the customer, e.g. gas name or gas composition.

**User interface**

-

**Factory setting**

-

---

**Gas composition****Navigation**

Expert → Sensor → Measurement mode → Gas → Gas composition (3110)

**Prerequisite**The **Gas mixture** option is selected in the **Select gas type** parameter parameter.

**Description** Select measured gas mixture.

**Selection**

- Air
- Hydrogen H<sub>2</sub>
- Helium He
- Neon Ne
- Argon Ar
- Krypton Kr
- Xenon Xe
- Nitrogen N<sub>2</sub>
- Oxygen O<sub>2</sub>
- Chlorine Cl<sub>2</sub>
- Ammonia NH<sub>3</sub>
- Carbon monoxide CO
- Carbon dioxide CO<sub>2</sub>
- Hydrogen sulfide H<sub>2</sub>S
- Hydrogen chloride HCl
- Methane CH<sub>4</sub>
- Propane C<sub>3</sub>H<sub>8</sub>
- Ethane C<sub>2</sub>H<sub>6</sub>
- Butane C<sub>4</sub>H<sub>10</sub>
- Ethylene C<sub>2</sub>H<sub>4</sub>
- Water
- Ozone O<sub>3</sub>

---

**Mol% Air**



**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% Air (3170)

**Description** Air

**User entry** 0 to 100 %

---

**Mol% Ar**



**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% Ar (3112)

**Description** Ar = Argon

**User entry** 0 to 100 %

---

**Mol% C<sub>2</sub>H<sub>4</sub>**



**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% C<sub>2</sub>H<sub>4</sub> (3114)

**Description** C<sub>2</sub>H<sub>4</sub> = ethylene

**User entry** 0 to 100 %

---

**Mol% C2H6**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% C2H6 (3115)

**Description**  $C_2H_6$  = ethane

**User entry** 0 to 100 %

---

**Mol% C3H8**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% C3H8 (3116)

**Description**  $C_3H_8$  = propane

**User entry** 0 to 100 %

---

**Mol% CH4**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% CH4 (3117)

**Description**  $CH_4$  = methane

**User entry** 0 to 100 %

---

**Mol% Cl2**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% Cl2 (3118)

**Description**  $Cl_2$  = chlorine

**User entry** 0 to 100 %

---

**Mol% CO**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% CO (3119)

**Description** CO = carbon monoxide

**User entry** 0 to 100 %

---

**Mol% CO<sub>2</sub>**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% CO<sub>2</sub> (3120)

**Description** CO<sub>2</sub> = carbon dioxide

**User entry** 0 to 100 %

---

**Mol% H<sub>2</sub>**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% H<sub>2</sub> (3121)

**Description** H<sub>2</sub> = hydrogen

**User entry** 0 to 100 %

---

**Mol% H<sub>2</sub>O**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% H<sub>2</sub>O (3122)

**Description** H<sub>2</sub>O = water

**User entry** 0 to 20 %

---

**Mol% H<sub>2</sub>S**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% H<sub>2</sub>S (3123)

**Description** H<sub>2</sub>S = hydrogen sulfide

**User entry** 0 to 100 %

---

**Mol% HCl**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% HCl (3124)

**Description** HCl = hydrogen chloride

**User entry** 0 to 100 %

---

**Mol% He**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% He (3125)

**Description** He = helium

**User entry** 0 to 100 %

---

**Mol% i-C4H10**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% i-C4H10 (3126)

**Description** i-C<sub>4</sub>H<sub>10</sub> = isobutane

**User entry** 0 to 100 %

---

**Mol% Kr**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% Kr (3128)

**Description** Kr = krypton

**User entry** 0 to 100 %

---

**Mol% N2**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% N2 (3129)

**Description** N<sub>2</sub> = nitrogen

**User entry** 0 to 100 %

---

**Mol% Ne**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% Ne (3137)

**Description** Ne = neon

**User entry** 0 to 100 %

---

**Mol% NH<sub>3</sub>**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% NH<sub>3</sub> (3138)

**Description** NH<sub>3</sub> = ammonia

**User entry** 0 to 100 %

---

**Mol% O<sub>2</sub>**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% O<sub>2</sub> (3139)

**Description** O<sub>2</sub> = oxygen

**User entry** 0 to 100 %

---

**Mol% O<sub>3</sub>**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% O<sub>3</sub> (3174)

**Prerequisite** Mixture only possible with O<sub>2</sub>.

- O<sub>3</sub>: 65 to 100 %
- O<sub>2</sub>: 0 to 35 %

**Description** Enter amount of substance for the gas mixture.

**User entry** 65 to 100 %

---

**Mol% Xe**

**Navigation** Expert → Sensor → Measurement mode → Gas → Mol% Xe (3142)

**Description** Xe = xenon

**User entry** 0 to 100 %

**"Second gas" submenu***Navigation*

Expert → Sensor → Measurement mode → Second gas → Special gas name (3177)

► Second gas	
Select gas type	→ <a href="#">78</a>
Gas	→ <a href="#">78</a>
Special gas name	→ <a href="#">79</a>
Gas composition	→ <a href="#">79</a>
Mol% Air	→ <a href="#">80</a>
Mol% Ar	→ <a href="#">80</a>
Mol% C2H4	→ <a href="#">80</a>
Mol% C2H6	→ <a href="#">80</a>
Mol% C3H8	→ <a href="#">80</a>
Mol% CH4	→ <a href="#">81</a>
Mol% Cl2	→ <a href="#">81</a>
Mol% CO	→ <a href="#">81</a>
Mol% CO2	→ <a href="#">81</a>
Mol% H2	→ <a href="#">81</a>
Mol% H2O	→ <a href="#">82</a>
Mol% H2S	→ <a href="#">82</a>
Mol% HCl	→ <a href="#">82</a>
Mol% He	→ <a href="#">82</a>
Mol% i-C4H10	→ <a href="#">82</a>
Mol% Kr	→ <a href="#">83</a>
Mol% N2	→ <a href="#">83</a>
Mol% Ne	→ <a href="#">83</a>

Mol% NH3	→  83
Mol% O2	→  83
Mol% O3	→  84
Mol% Xe	→  84

## Select gas type



### Navigation

Expert → Sensor → Measurement mode → Second gas → Select gas type (3109)

### Description

Select measured gas type.

### Selection

- Single gas
- Gas mixture
- Special gas \*

## Gas



### Navigation

Expert → Sensor → Measurement mode → Second gas → Gas (3151)

### Prerequisite

The **Single gas** option is selected in the **Select gas type** parameter parameter.

### Description

Select measured gas.

### Selection

- Air
- Ammonia NH3
- Argon Ar
- Butane C4H10
- Carbon dioxide CO2
- Carbon monoxide CO
- Chlorine Cl2
- Ethane C2H6
- Ethylene C2H4
- Helium He
- Hydrogen H2
- Hydrogen chloride HCl
- Hydrogen sulfide H2S
- Krypton Kr
- Methane CH4
- Neon Ne
- Nitrogen N2
- Oxygen O2

\* Visibility depends on order options or device settings

- Ozone O3
- Propane C3H8
- Xenon Xe

---

### Special gas name

---

<b>Navigation</b>	 Expert → Sensor → Measurement mode → Second gas → Special gas name (3177)
<b>Prerequisite</b>	<b>Special gas</b> option application package is available.
<b>Description</b>	Shows the description of the gas ordered by the customer, e.g. gas name or gas composition.
<b>User interface</b>	-
<b>Factory setting</b>	-

---

### Gas composition

---



<b>Navigation</b>	 Expert → Sensor → Measurement mode → Second gas → Gas composition (3110)
<b>Prerequisite</b>	The <b>Gas mixture</b> option is selected in the <b>Select gas type</b> parameter parameter.
<b>Description</b>	Select measured gas mixture.
<b>Selection</b>	<ul style="list-style-type: none"><li>■ Air</li><li>■ Hydrogen H2</li><li>■ Helium He</li><li>■ Neon Ne</li><li>■ Argon Ar</li><li>■ Krypton Kr</li><li>■ Xenon Xe</li><li>■ Nitrogen N2</li><li>■ Oxygen O2</li><li>■ Chlorine Cl2</li><li>■ Ammonia NH3</li><li>■ Carbon monoxide CO</li><li>■ Carbon dioxide CO2</li><li>■ Hydrogen sulfide H2S</li><li>■ Hydrogen chloride HCl</li><li>■ Methane CH4</li><li>■ Propane C3H8</li><li>■ Ethane C2H6</li><li>■ Butane C4H10</li><li>■ Ethylene C2H4</li><li>■ Water</li><li>■ Ozone O3</li></ul>

---

**Mol% Air****Navigation**     Expert → Sensor → Measurement mode → Second gas → Mol% Air (3170)**Description**     Air**User entry**     0 to 100 %

---

**Mol% Ar****Navigation**     Expert → Sensor → Measurement mode → Second gas → Mol% Ar (3112)**Description**     Ar = Argon**User entry**     0 to 100 %

---

**Mol% C2H4****Navigation**     Expert → Sensor → Measurement mode → Second gas → Mol% C2H4 (3114)**Description**     C<sub>2</sub>H<sub>4</sub> = ethylene**User entry**     0 to 100 %

---

**Mol% C2H6****Navigation**     Expert → Sensor → Measurement mode → Second gas → Mol% C2H6 (3115)**Description**     C<sub>2</sub>H<sub>6</sub> = ethane**User entry**     0 to 100 %

---

**Mol% C3H8****Navigation**     Expert → Sensor → Measurement mode → Second gas → Mol% C3H8 (3116)**Description**     C<sub>3</sub>H<sub>8</sub> = propane**User entry**     0 to 100 %

---

**Mol% CH<sub>4</sub>**

---

<b>Navigation</b>	Expert → Sensor → Measurement mode → Second gas → Mol% CH <sub>4</sub> (3117)
<b>Description</b>	CH <sub>4</sub> = methane
<b>User entry</b>	0 to 100 %

---

**Mol% Cl<sub>2</sub>**

---

<b>Navigation</b>	Expert → Sensor → Measurement mode → Second gas → Mol% Cl <sub>2</sub> (3118)
<b>Description</b>	Cl <sub>2</sub> = chlorine
<b>User entry</b>	0 to 100 %

---

**Mol% CO**

---

<b>Navigation</b>	Expert → Sensor → Measurement mode → Second gas → Mol% CO (3119)
<b>Description</b>	CO = carbon monoxide
<b>User entry</b>	0 to 100 %

---

**Mol% CO<sub>2</sub>**

---

<b>Navigation</b>	Expert → Sensor → Measurement mode → Second gas → Mol% CO <sub>2</sub> (3120)
<b>Description</b>	CO <sub>2</sub> = carbon dioxide
<b>User entry</b>	0 to 100 %

---

**Mol% H<sub>2</sub>**

---

<b>Navigation</b>	Expert → Sensor → Measurement mode → Second gas → Mol% H <sub>2</sub> (3121)
<b>Description</b>	H <sub>2</sub> = hydrogen
<b>User entry</b>	0 to 100 %

---

**Mol% H<sub>2</sub>O****Navigation**    Expert → Sensor → Measurement mode → Second gas → Mol% H<sub>2</sub>O (3122)**Description**    H<sub>2</sub>O = water**User entry**    0 to 20 %

---

**Mol% H<sub>2</sub>S****Navigation**    Expert → Sensor → Measurement mode → Second gas → Mol% H<sub>2</sub>S (3123)**Description**    H<sub>2</sub>S = hydrogen sulfide**User entry**    0 to 100 %

---

**Mol% HCl****Navigation**    Expert → Sensor → Measurement mode → Second gas → Mol% HCl (3124)**Description**    HCl = hydrogen chloride**User entry**    0 to 100 %

---

**Mol% He****Navigation**    Expert → Sensor → Measurement mode → Second gas → Mol% He (3125)**Description**    He = helium**User entry**    0 to 100 %

---

**Mol% i-C<sub>4</sub>H<sub>10</sub>****Navigation**    Expert → Sensor → Measurement mode → Second gas → Mol% i-C<sub>4</sub>H<sub>10</sub> (3126)**Description**    i-C<sub>4</sub>H<sub>10</sub> = isobutane**User entry**    0 to 100 %

---

**Mol% Kr**

<b>Navigation</b>	Expert → Sensor → Measurement mode → Second gas → Mol% Kr (3128)
<b>Description</b>	Kr = krypton
<b>User entry</b>	0 to 100 %

---

**Mol% N2**

<b>Navigation</b>	Expert → Sensor → Measurement mode → Second gas → Mol% N2 (3129)
<b>Description</b>	N <sub>2</sub> = nitrogen
<b>User entry</b>	0 to 100 %

---

**Mol% Ne**

<b>Navigation</b>	Expert → Sensor → Measurement mode → Second gas → Mol% Ne (3137)
<b>Description</b>	Ne = neon
<b>User entry</b>	0 to 100 %

---

**Mol% NH3**

<b>Navigation</b>	Expert → Sensor → Measurement mode → Second gas → Mol% NH3 (3138)
<b>Description</b>	NH <sub>3</sub> = ammonia
<b>User entry</b>	0 to 100 %

---

**Mol% O2**

<b>Navigation</b>	Expert → Sensor → Measurement mode → Second gas → Mol% O2 (3139)
<b>Description</b>	O <sub>2</sub> = oxygen
<b>User entry</b>	0 to 100 %

**Mol% O<sub>3</sub>****Navigation**

Expert → Sensor → Measurement mode → Second gas → Mol% O<sub>3</sub> (3174)

**Prerequisite**

Mixture only possible with O<sub>2</sub>.

- O<sub>3</sub>: 65 to 100 %
- O<sub>2</sub>: 0 to 35 %

**Description**

Enter amount of substance for the gas mixture.

**User entry**

65 to 100 %

**Mol% Xe****Navigation**

Expert → Sensor → Measurement mode → Second gas → Mol% Xe (3142)

**Description**

Xe = xenon

**User entry**

0 to 100 %

**"Reference conditions" submenu****Navigation**

Expert → Sensor → Measurement mode → Ref. conditions

► Reference conditions	
Reference conditions (3155)	→ 85
Reference pressure (3146)	→ 85
Reference temperature (3147)	→ 85
FAD conditions (3173)	→ 85
FAD pressure (3175)	→ 86
FAD temperature (3176)	→ 86
Reference combustion temperature (3165)	
Reference combustion temperature (3143)	→ 86

---

**Reference conditions**

<b>Navigation</b>	Expert → Sensor → Measurement mode → Ref. conditions → Ref. conditions (3155)
<b>Description</b>	Select reference conditions for calculation of the corrected volume flow.
<b>Selection</b>	<ul style="list-style-type: none"><li>■ 1013.25 mbara, 0 °C</li><li>■ 1013.25 mbara, 15 °C</li><li>■ 1013.25 mbara, 20 °C</li><li>■ 1013.25 mbara, 25 °C</li><li>■ 1000 mbara, 0 °C</li><li>■ 1000 mbara, 15 °C</li><li>■ 1000 mbara, 20 °C</li><li>■ 1000 mbara, 25 °C</li><li>■ 14.696 psia, 59 °F</li><li>■ 14.696 psia, 60 °F</li><li>■ User-defined</li></ul>

---

**Reference pressure**

<b>Navigation</b>	Expert → Sensor → Measurement mode → Ref. conditions → Ref. pressure (3146)
<b>Prerequisite</b>	The <b>Others</b> option is selected in the <b>Reference conditions</b> parameter (→  85).
<b>Description</b>	Select reference conditions for the corrected volume flow.
<b>User entry</b>	0 to 250 bar a

---

**Reference temperature**

<b>Navigation</b>	Expert → Sensor → Measurement mode → Ref. conditions → Ref. temperature (3147)
<b>Prerequisite</b>	The <b>Others</b> option is selected in the <b>Reference conditions</b> parameter (→  85).
<b>Description</b>	Select reference conditions for the corrected volume flow.
<b>User entry</b>	-200 to 450 °C

---

**FAD conditions**

<b>Navigation</b>	Expert → Sensor → Measurement mode → Ref. conditions → FAD conditions (3173)
<b>Prerequisite</b>	The <b>Air or compressed air</b> option is selected in the <b>Measurement application</b> parameter (→  68) parameter.

Description	Select reference conditions for the calculation of the FAD density (FAD = free air delivery).
Selection	<ul style="list-style-type: none"><li>■ 1000 mbara, 20 °C</li><li>■ 14.504 psia, 68 °F</li><li>■ User-defined</li></ul>

## FAD pressure



Navigation	Expert → Sensor → Measurement mode → Ref. conditions → FAD pressure (3175)
Prerequisite	<ul style="list-style-type: none"><li>■ The <b>Air or compressed air</b> option is selected in the <b>Measurement application</b> parameter (→  68) parameter.</li><li>■ The <b>User-defined</b> option is selected in the <b>FAD conditions</b> parameter parameter.</li></ul>
Description	Enter reference pressure for the calculation of the FAD density (FAD = free air delivery).
User entry	0 to 250 bar a

## FAD temperature



Navigation	Expert → Sensor → Measurement mode → Ref. conditions → FAD temperature (3176)
Prerequisite	<ul style="list-style-type: none"><li>■ The <b>Air or compressed air</b> option is selected in the <b>Measurement application</b> parameter (→  68) parameter.</li><li>■ The <b>User-defined</b> option is selected in the <b>FAD conditions</b> parameter parameter.</li></ul>
Description	Enter reference temperature for the calculation of the FAD density (FAD = free air delivery).
User entry	-200 to 450 °C

## Reference combustion temperature



Navigation	Expert → Sensor → Measurement mode → Ref. conditions → Ref. comb. temp. (3143)
Prerequisite	The <b>Energy</b> option is selected in the <b>Measurement application</b> parameter (→  68) parameter.
Description	Enter reference combustion temperature to calculate the natural gas energy value.
User entry	-200 to 450 °C

### 3.2.5 "Sensor adjustment" submenu

*Navigation*

Expert → Sensor → Sensor adjustm.

► Sensor adjustment	
Installation direction (1809)	→ 87
Installation factor (17333)	→ 87
Pipe shape (17339)	→ 88
Pipe inner diameter (17009)	→ 88
Duct height (17010)	→ 88
Duct width (17011)	→ 88
Pipe wall thickness (17340)	→ 89
Mounting set height (17336)	→ 89
Insertion depth (17335)	→ 89

---

#### Installation direction



**Navigation**

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

**Description**

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

**Selection**

- Flow in arrow direction
- Flow against arrow direction

**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 device.

---

#### Installation factor



**Navigation**

Expert → Sensor → Sensor adjustm. → Install. factor (17333)

**Description**

Enter factor to compensate the mounting-related measurement error.

**User entry**

0.01 to 100.0

---

**Pipe shape**

**Navigation** Expert → Sensor → Sensor adjustm. → Pipe shape (17339)

**Prerequisite** Only available with t-mass I.

**Description** Select the shape of the pipe.

- Selection**
- Circular
  - Rectangular

---

**Pipe inner diameter**

**Navigation** Expert → Sensor → Sensor adjustm. → Pipe inner diam. (17009)

**Prerequisite** Only available with t-mass I.

**Description** Enter the internal diameter of a circular pipe.

**User entry** 0.050 to 5 m

---

**Duct height**

**Navigation** Expert → Sensor → Sensor adjustm. → Duct height (17010)

**Prerequisite** Only available with t-mass I.

**Description** Enter inner duct height. Duct height and sensor shaft are parallel.

**User entry** 0.050 to 5 m

---

**Duct width**

**Navigation** Expert → Sensor → Sensor adjustm. → Duct width (17011)

**Prerequisite** Only available with t-mass I.

**Description** Enter inner duct width. The duct width is vertical to the sensor shaft.

**User entry** 0.050 to 5 m

---

**Pipe wall thickness**

**Navigation**      Expert → Sensor → Sensor adjustm. → Wall thickness (17340)

**Description**      Enter the pipe wall thickness.

**User entry**      0 to 1 m

---

**Mounting set height**

**Navigation**      Expert → Sensor → Sensor adjustm. → Mounting set ht. (17336)

**Description**      Enter mounting set height.

**User entry**      0 to 1 m

---

**Insertion depth**

**Navigation**      Expert → Sensor → Sensor adjustm. → Insertion depth (17335)

**Description**      Shows calculated insertion depth of the sensor.

**User interface**      Positive floating-point number

### 3.2.6 "Zero point adjustment" submenu

*Navigation*



Expert → Sensor → Zero point adj.

**► Zero point adjustment**

Zero point (17012)	
Zero point adjustment control (17013)	→  90
Zeropoint adjust state (17014)	→  90
Progress (2808)	→  90

**Zero point adjustment control**

**Navigation**      Expert → Sensor → Zero point adj. → Zero point adj. (17013)

**Description**      Start zero point adjustment.

**Selection**

- Cancel
- Start

---

**Zeropoint adjust state**

---

**Navigation**      Expert → Sensor → Zero point adj. → Zero adj. state (17014)

**User interface**

- Busy
- Zero point adjust failure
- Ok

---

**Progress**

---

**Navigation**      Diagnostics → HBT → Perform.verific. → Progress (2808)

Expert → Diagnostics → HBT → Perform.verific. → Progress (2808)

Expert → Sensor → Sensor adjustm. → Zero point adj. → Progress (2808)

Expert → Sensor → Zero point adj. → Progress (2808)

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

**User interface**      0 to 100 %

### 3.2.7 "External compensation" submenu

*Navigation*      Expert → Sensor → External comp.

External compensation	
Pressure compensation (17326)	→  91
Pressure (17325)	→  91
External pressure (17341)	→  91
Input type 2nd temperature heat flow (17327)	→  92

Delta heat calculation (17006)	→  92
2nd temperature heat flow (17328)	→  92
External 2nd temperature heat flow (17342)	→  93
Gas compensation (17003)	→  93
Gas component (17005)	→  93
Mol% (17007)	→  94

## Pressure compensation



**Navigation** Expert → Sensor → External comp. → Pressure compen. (17326)

**Description** Select pressure compensation type.

**Selection**

- Fixed value
- External value \*
- Current input 1 \*
- Current input 2 \*
- Current input 3 \*

## Pressure



**Navigation** Expert → Sensor → External comp. → Pressure (17325)

**Description** Enter fixed value for the process pressure.

**User entry** 0.1 to 40 bar a

## External pressure

**Navigation** Expert → Sensor → External comp. → External press. (17341)

**Description** Shows the external process pressure value.

**User interface** 0.1 to 40 bar a

\* Visibility depends on order options or device settings

**Input type 2nd temperature heat flow****Navigation**

Expert → Sensor → External comp. → Input 2nd temp. (17327)

**Prerequisite**

The **Energy** option is selected in the **Measurement application** parameter (→ 68) parameter.

**Description**

Select input type for the 2nd temperature for the heat flow calculation.

**Selection**

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

**Delta heat calculation****Navigation**

Expert → Sensor → External comp. → Delta heat calc. (17006)

**Prerequisite**

The **Energy** option is selected in the **Measurement application** parameter (→ 68) parameter.

**Description**

Select the position of the measuring device in relation to the external temperature sensor.

**Selection**

- Off
- Upstream
- Downstream

**2nd temperature heat flow****Navigation**

Expert → Sensor → External comp. → 2nd temp.heat fl (17328)

**Prerequisite**

The **Energy** option is selected in the **Measurement application** parameter (→ 68) parameter.

**Description**

Enter fixed value for the 2nd temperature for the heat flow calculation.

**User entry**

233.15 to 453.15 °C

**Factory setting**

293.15 °C

\* Visibility depends on order options or device settings

---

**External 2nd temperature heat flow**

---

**Navigation**
  Expert → Sensor → External comp. → Ext. 2nd temp. (17342)
**Prerequisite**

The **Energy** option is selected in the **Measurement application** parameter (→  68) parameter.

**Description**

Shows the value for the external 2nd temperature for heat flow calculation.

**User interface**

Signed floating-point number

---

**Gas compensation**

---

**Navigation**
  Expert → Sensor → External comp. → Gas compensation (17003)
**Description**

Select the input type for gas compensation. The selected gas component is measured by an external gas analyzer.

**Selection**

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

---

**Gas component**

---

**Navigation**
  Expert → Sensor → External comp. → Gas component (17005)
**Description**

Select the gas component that is measured by an external gas analyzer.

**Selection**

- Air
- Oxygen O<sub>2</sub>
- Ozone O<sub>3</sub>
- Nitrogen N<sub>2</sub>
- Methane CH<sub>4</sub>
- Hydrogen H<sub>2</sub>
- Helium He
- Hydrogen chloride HCl
- Hydrogen sulfide H<sub>2</sub>S
- Ethylene C<sub>2</sub>H<sub>4</sub>
- Carbon dioxide CO<sub>2</sub>
- Carbon monoxide CO
- Chlorine Cl<sub>2</sub>
- Butane C<sub>4</sub>H<sub>10</sub>
- Propane C<sub>3</sub>H<sub>8</sub>
- Ethane C<sub>2</sub>H<sub>6</sub>

---

\* Visibility depends on order options or device settings

- Argon Ar
- Ammonia NH<sub>3</sub>
- Water

---

**Mol%**

---

**Navigation**      Expert → Sensor → External comp. → Mol% (17007)

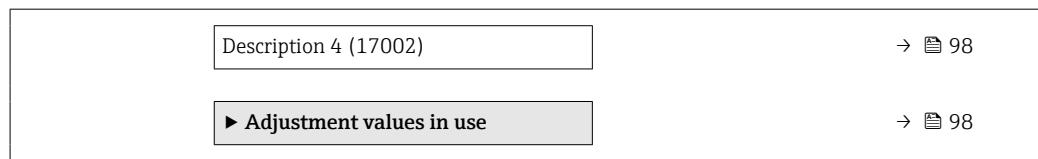
**Description**      Enter amount of substance for the gas mixture.

**User interface**      0 to 100 %

### 3.2.8 "In-situ adjustment" submenu

*Navigation*      Expert → Sensor → In-situ adjust.

In-situ adjustment	
Activate in-situ adjustment (17360)	→  95
Input type reference value (17351)	→  95
Delete values (17355)	→  95
Confirm (17356)	→  96
Select flow reference (17354)	→  96
Stability check (17366)	→  96
Actual flow value (17365)	→  96
External reference value (17352)	→  97
Reference value (17353)	→  97
Apply value (17364)	→  97
Status (17367)	→  97
Description 1 (17359)	→  97
Description 2 (17358)	→  98
Description 3 (17357)	→  98



## Activate in-situ adjustment

**Navigation**

Expert → Sensor → In-situ adjust. → In-situ adjustm. (17360)

**Description**

Activate the in-situ adjustment. The points stored by the user are used for the in-situ adjustment.

**Selection**

- No
- Yes

## Input type reference value

**Navigation**

Expert → Sensor → In-situ adjust. → Input ref. value (17351)

**Description**

Select input type for the reference value.

**Selection**

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

## Delete values

**Navigation**

Expert → Sensor → In-situ adjust. → Delete values (17355)

**Description**

Delete previous adjustment values and descriptions.

**Selection**

- No
- Yes

\* Visibility depends on order options or device settings

---

**Confirm**

---

**Navigation**  Expert → Sensor → In-situ adjust. → Confirm (17356)

**Description** Confirm deletion.

**Selection**  
■ No  
■ Yes

---

**Select flow reference**

---

**Navigation**  Expert → Sensor → In-situ adjust. → Select flow ref. (17354)

**Description** Select process variable. This process variable is used as reference value for the in situ adjustment.

**Selection**  
■ Mass flow  
■ Corrected volume flow  
■ FAD volume flow \*  
■ Volume flow

---

**Stability check**

---

**Navigation**  Expert → Sensor → In-situ adjust. → Stability check (17366)

**Description** Activate stability check. New adjustment value is only accepted when the measurement is stable.

**Selection**  
■ No  
■ Yes

---

**Actual flow value**

---

**Navigation**  Expert → Sensor → In-situ adjust. → Act. flow value (17365)

**Description** Shows the actual flow in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

**User interface** -2 000 to 2 000 %

---

\* Visibility depends on order options or device settings

---

**External reference value**

---

**Navigation**   Expert → Sensor → In-situ adjust. → Ext. ref. value (17352)

**Description** Shows the external reference value for the in situ adjustment.

**User interface** Signed floating-point number

---

**Reference value**

---

**Navigation**   Expert → Sensor → In-situ adjust. → Reference value (17353)

**Description** Enter fixed value as reference value used for the in situ adjustment.

**User entry** Signed floating-point number

---

**Apply value**

---

**Navigation**   Expert → Sensor → In-situ adjust. → Apply value (17364)

**Description** Apply the actual value.

**Selection**  
■ No  
■ Yes

---

**Status**

---

**Navigation**   Expert → Sensor → In-situ adjust. → Status (17367)

**Description** Shows the validity of the actual reference value.

**User interface**  
■ Passed  
■ Replaced  
■ Unstable  
■ Invalid

---

**Description 1**

---

**Navigation**   Expert → Sensor → In-situ adjust. → Description 1 (17359)

**Description** Description for in-situ adjustment: e.g. facility, operator, date.

**User entry**

-

**Factory setting**

-

---

**Description 2**

---

**Navigation**        Expert → Sensor → In-situ adjust. → Description 2 (17358)**Description**      Description for in-situ adjustment: e.g. facility, operator, date.**User entry**

-

**Factory setting**

-

---

**Description 3**

---

**Navigation**        Expert → Sensor → In-situ adjust. → Description 3 (17357)**Description**      Description for in-situ adjustment: e.g. facility, operator, date.**User entry**

-

**Factory setting**

-

---

**Description 4**

---

**Navigation**        Expert → Sensor → In-situ adjust. → Description 4 (17002)**Description**      Description for in-situ adjustment: e.g. facility, operator, date.**User entry**

-

**Factory setting**

-

**"Adjustment values in use" submenu****Navigation**        Expert → Sensor → In-situ adjust. → Values in use

 <b>Adjustment values in use</b>
Gas description 1/2 (17361)
→  99

Gas description 2/2 (17362)	→  100
Flow value 1 (17368)	→  100
Flow value 2 (17369)	→  100
Flow value 3 (17370)	→  100
Flow value 4 (17371)	→  101
Flow value 5 (17372)	→  101
Flow value 6 (17373)	→  101
Flow value 7 (17374)	→  101
Flow value 8 (17375)	→  101
Flow value 9 (17376)	→  102
Flow value 10 (17377)	→  102
Flow value 11 (17378)	→  102
Flow value 12 (17379)	→  102
Flow value 13 (17380)	→  103
Flow value 14 (17381)	→  103
Flow value 15 (17382)	→  103
Flow value 16 (17383)	→  103

---

## Gas description 1/2

---

**Navigation**

Expert → Sensor → In-situ adjust. → Values in use → Gas descrip. 1/2 (17361)

**Description**

Shows the 1st part of the description of the set gas used in the in-situ adjustment.

**User interface**

-

**Factory setting**

-

---

**Gas description 2/2**

---

<b>Navigation</b>	  Expert → Sensor → In-situ adjust. → Values in use → Gas descrip. 2/2 (17362)
<b>Description</b>	Shows the 2nd part of the description of the set gas used in the in-situ adjustment.
<b>User interface</b>	-
<b>Factory setting</b>	-

---

**Flow value 1**

---

<b>Navigation</b>	  Expert → Sensor → In-situ adjust. → Values in use → Flow value 1 (17368)
<b>Description</b>	Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.
<b>User interface</b>	-2 000 to 2 000 %

---

**Flow value 2**

---

<b>Navigation</b>	  Expert → Sensor → In-situ adjust. → Values in use → Flow value 2 (17369)
<b>Description</b>	Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.
<b>User interface</b>	-2 000 to 2 000 %

---

**Flow value 3**

---

<b>Navigation</b>	  Expert → Sensor → In-situ adjust. → Values in use → Flow value 3 (17370)
<b>Description</b>	Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.
<b>User interface</b>	-2 000 to 2 000 %

---

**Flow value 4**

---

<b>Navigation</b>	  Expert → Sensor → In-situ adjust. → Values in use → Flow value 4 (17371)
<b>Description</b>	Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.
<b>User interface</b>	-2 000 to 2 000 %

---

**Flow value 5**

---

<b>Navigation</b>	  Expert → Sensor → In-situ adjust. → Values in use → Flow value 5 (17372)
<b>Description</b>	Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.
<b>User interface</b>	-2 000 to 2 000 %

---

**Flow value 6**

---

<b>Navigation</b>	  Expert → Sensor → In-situ adjust. → Values in use → Flow value 6 (17373)
<b>Description</b>	Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.
<b>User interface</b>	-2 000 to 2 000 %

---

**Flow value 7**

---

<b>Navigation</b>	  Expert → Sensor → In-situ adjust. → Values in use → Flow value 7 (17374)
<b>Description</b>	Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.
<b>User interface</b>	-2 000 to 2 000 %

---

**Flow value 8**

---

<b>Navigation</b>	  Expert → Sensor → In-situ adjust. → Values in use → Flow value 8 (17375)
<b>Description</b>	Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

**User interface** -2 000 to 2 000 %

---

### Flow value 9

---

**Navigation**  Expert → Sensor → In-situ adjust. → Values in use → Flow value 9 (17376)

**Description** Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

**User interface** -2 000 to 2 000 %

---

### Flow value 10

---

**Navigation**  Expert → Sensor → In-situ adjust. → Values in use → Flow value 10 (17377)

**Description** Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

**User interface** -2 000 to 2 000 %

---

### Flow value 11

---

**Navigation**  Expert → Sensor → In-situ adjust. → Values in use → Flow value 11 (17378)

**Description** Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

**User interface** -2 000 to 2 000 %

---

### Flow value 12

---

**Navigation**  Expert → Sensor → In-situ adjust. → Values in use → Flow value 12 (17379)

**Description** Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.

**User interface** -2 000 to 2 000 %

---

**Flow value 13**

---

<b>Navigation</b>	 Expert → Sensor → In-situ adjust. → Values in use → Flow value 13 (17380)
<b>Description</b>	Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.
<b>User interface</b>	-2 000 to 2 000 %

---

**Flow value 14**

---

<b>Navigation</b>	 Expert → Sensor → In-situ adjust. → Values in use → Flow value 14 (17381)
<b>Description</b>	Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.
<b>User interface</b>	-2 000 to 2 000 %

---

**Flow value 15**

---

<b>Navigation</b>	 Expert → Sensor → In-situ adjust. → Values in use → Flow value 15 (17382)
<b>Description</b>	Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.
<b>User interface</b>	-2 000 to 2 000 %

---

**Flow value 16**

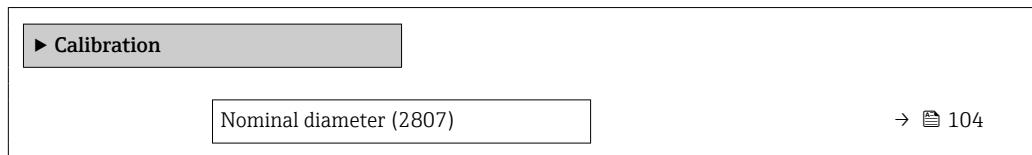
---

<b>Navigation</b>	 Expert → Sensor → In-situ adjust. → Values in use → Flow value 16 (17383)
<b>Description</b>	Shows the stored flow value in relation to the maximum, factory-measured value that is adapted to the actual process conditions.
<b>User interface</b>	-2 000 to 2 000 %

### 3.2.9 "Calibration" submenu

Navigation

Expert → Sensor → Calibration



#### Nominal diameter

Navigation

Expert → Sensor → Calibration → Nominal diameter (2807)

Prerequisite

Only available with t-mass F.

Description

Displays the nominal diameter of the sensor.

User interface

DNxx / x"

Factory setting

Depends on the size of the sensor

Additional information

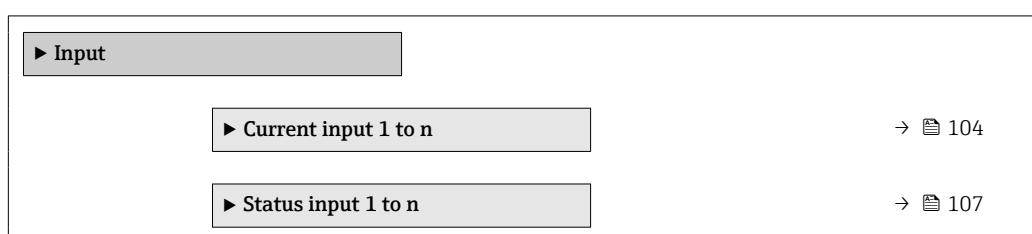
Description

The value is also specified on the sensor nameplate.

### 3.3 "Input" submenu

Navigation

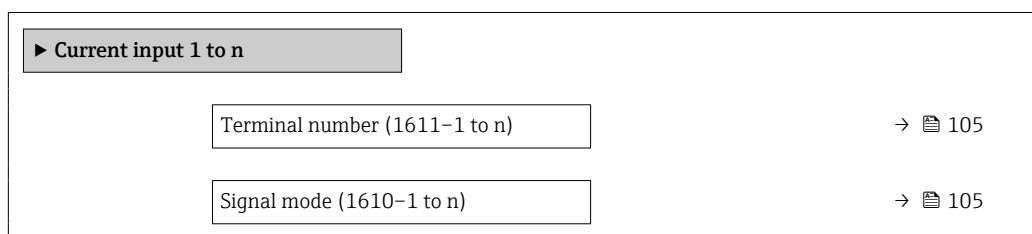
Expert → Input



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

Navigation

Expert → Input → Current input 1 to n



Current span (1605-1 to n)	→  106
0/4 mA value (1606-1 to n)	→  106
20 mA value (1607-1 to n)	→  106
Failure mode (1601-1 to n)	→  107
Failure value (1602-1 to n)	→  107

## 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

\* Visibility depends on order options or device settings

**Current span****Navigation**

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

**Description**

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

**Selection**

- 4...20 mA (4... 20.5 mA)
- 4...20 mA NAMUR (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 NAMUR (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 (→ 112)

**0/4 mA value****Navigation**

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

**Description**

Enter 4 mA value.

**User entry**

Signed floating-point number

**Additional information***Current input behavior*

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

- Current span (→ 106)
- Failure mode (→ 107)

*Configuration examples*

Pay attention to the configuration examples for **4 mA value** parameter (→ 113).

**20 mA value****Navigation**

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

**Description**

Enter 20 mA value.

**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 (→ [113](#)).

**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 (→ [106](#)).

**Selection**

- Alarm
- Last valid value
- Defined value

**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 (→ [107](#))).

**Failure value****Navigation**

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

**Prerequisite**

In the **Failure mode** parameter (→ [107](#)), 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

### 3.3.2 "Status input 1 to n" submenu

*Navigation*

Expert → Input → Status input 1 to n

▶ Status input 1 to n	
Terminal number (1358–1 to n)	→ <a href="#">108</a>
Assign status input (1352–1 to n)	→ <a href="#">108</a>

Value status input (1353-1 to n)	→  109
Active level (1351-1 to n)	→  109
Response time status input (1354-1 to n)	→  109

## 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
- Gas group \*
- Zero point adjustment

\* Visibility depends on order options or device settings

**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 (→ 64) is activated.



Note on the Flow override (→ 64):

- The Flow override (→ 64) is enabled as long as the level is at the status input (continuous signal).
- All other assignments react to a change in level (pulse) at the status input.

**Value status input****Navigation**

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

**Description**

Displays the current input signal level.

**User interface**

- High
- Low

**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

**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.

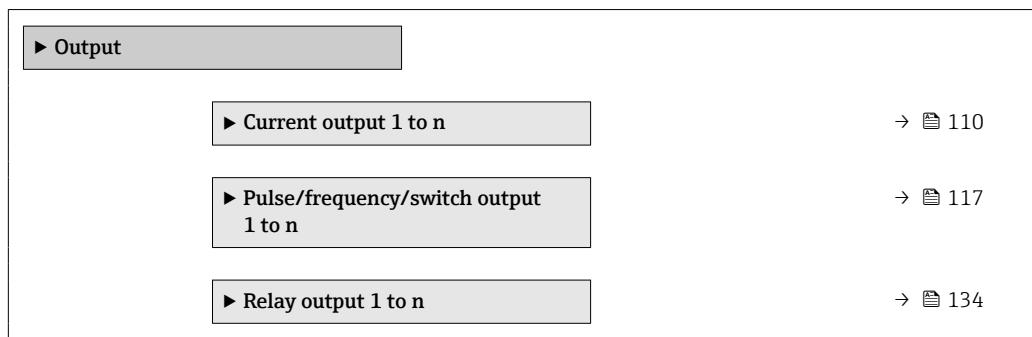
**User entry**

5 to 200 ms

### 3.4 "Output" submenu

Navigation

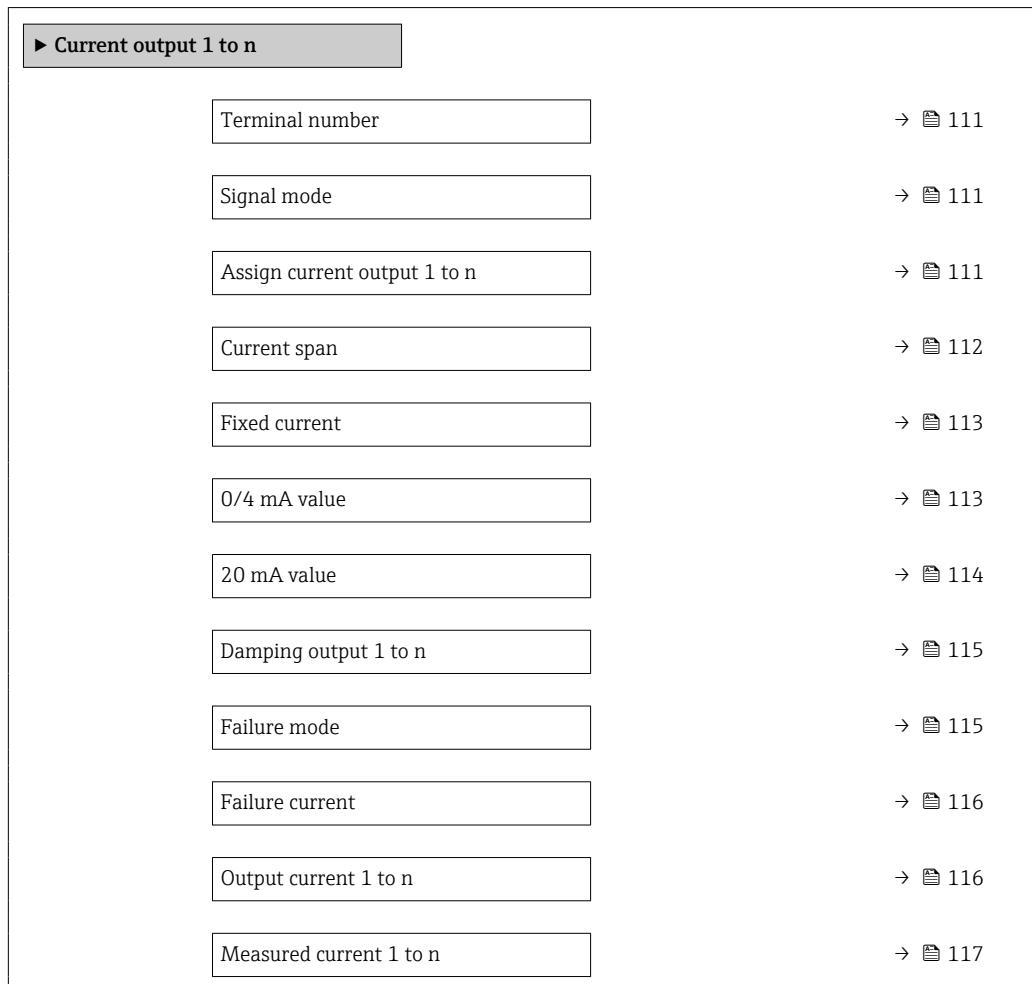
Expert → Output



#### 3.4.1 "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

---

**Assign current output 1 to n**

---



**Navigation**  Expert → Output → Curr.output 1 to n → Assign curr. 1 to n (0359–1 to n)

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

**Selection**

- Off \*
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow \*
- Volume flow
- Energy flow \*
- Heat flow \*
- Density
- Flow velocity
- Pressure
- 2nd temperature delta heat \*
- Electronic temperature

---

\* Visibility depends on order options or device settings

**Current span****Navigation**

Expert → Output → Curr.output 1 to n → Current span (0353-1 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 NAMUR (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 current

**Factory setting**

Country-specific:

- 4...20 mA NAMUR (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)

**Additional information***Description*

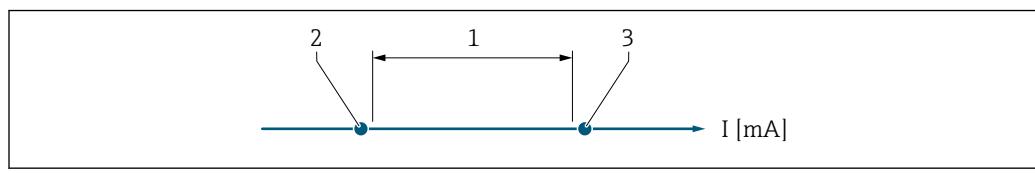
- In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→ 115).
- The measuring range is specified via the **0/4 mA value** parameter (→ 113) and **20 mA value** parameter (→ 114).

*"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 (→ 113).

*Example*

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



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

*Selection*

Selection	1	2	3
4...20 mA NAMUR (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

**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 (→ 112).

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

**User entry** 0 to 22.5 mA

**Factory setting** 22.5 mA

**0/4 mA value**

**Navigation** Expert → Output → Curr.output 1 to n → 0/4 mA value (0367–1 to n)

**Prerequisite** In the **Current span** parameter (→ 112), one of the following options is selected:

- 4...20 mA NAMUR (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 0/4 mA current.

**User entry** Signed floating-point number

**Additional information***Description*

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 111). In addition, the value can be greater than or smaller than the value assigned for the 20 mA current in the **20 mA value** parameter (→ 114).

*Dependency*

The unit depends on the process variable selected in the **Assign current output** parameter (→ 111).

*Current output behavior*

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

- Current span (→ 112)
- Failure mode (→ 115)

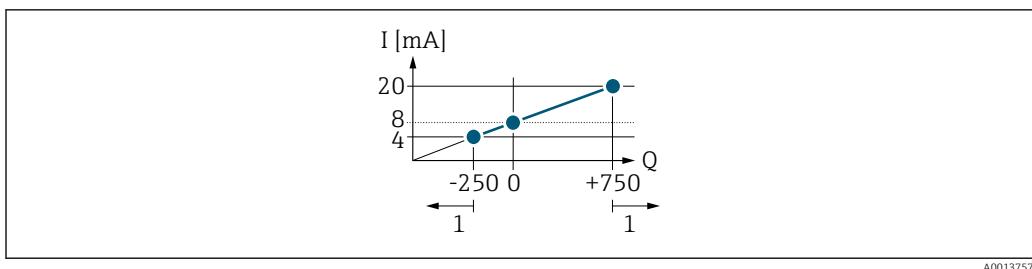
*Configuration examples*

A configuration example and its effect on the current output is explained in the following section.

**Configuration example**

In the forward flow

- **0/4 mA value** parameter (→ 113) = not equal to zero flow (e.g. -250 kg/h)
- **20 mA value** parameter (→ 114) = not equal to zero flow (e.g. +750 kg/h)
- Calculated current value = 8 mA at zero flow



$Q$  Flow  
 $I$  Current  
 1 Measuring range is exceeded or undershot

## 20 mA value



Expert → Output → Curr.output 1 to n → 20 mA value (0372–1 to n)

### Prerequisite

In the **Current span** parameter (→ 112), one of the following options is selected:

- 4...20 mA NAMUR (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 20 mA current.

### User entry

Signed floating-point number

### Factory setting

Depends on country and nominal diameter → 221

### Additional information

#### Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 111). In addition, the value can be greater than or smaller than the value assigned for the 0/4 mA current in the **0/4 mA value** parameter (→ 113).

#### Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 111).

#### Example

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

#### Configuration examples

Observe the configuration examples for the **0/4 mA value** parameter (→ 113).

**Damping output 1 to n****Navigation**

Expert → Output → Curr.output 1 to n → Damping out. 1 to n (0363–1 to n)

**Prerequisite**

A process variable is selected in the **Assign current output** parameter (→ 111) and one of the following options is selected in the **Current span** parameter (→ 112):

- 4...20 mA NAMUR (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

**Additional information**

*User entry*

Use this function to enter a time constant (PT1 element<sup>7)</sup>) for current output damping:

- If a low time constant is entered, the current output reacts particularly quickly to fluctuating measured variables.
- On the other hand, the current output reacts more slowly if a high time constant is entered.

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

**Failure mode****Navigation**

Expert → Output → Curr.output 1 to n → Failure mode (0364–1 to n)

**Prerequisite**

A process variable is selected in the **Assign current output** parameter (→ 111) and one of the following options is selected in the **Current span** parameter (→ 112):

- 4...20 mA NAMUR (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
- Defined value

7) proportional transmission behavior with first order delay

**Additional information****Description**

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

*"Min." option*

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

 The signal on alarm level is defined via the **Current span** parameter (→ 112).

*"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 (→ 112).

*"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 (→ 116).

---

**Failure current****Navigation**

 Expert → Output → Curr.output 1 to n → Failure current (0352-1 to n)

**Prerequisite**

The **Defined value** option is selected in the **Failure mode** parameter (→ 115).

**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**

<b>Navigation</b>	 Expert → Output → Curr.output 1 to n → Measur. curr. 1 to n (0366–1 to n)
<b>Description</b>	Use this function to display the actual measured value of the output current.
<b>User interface</b>	0 to 30 mA

**3.4.2 "Pulse/frequency/switch output 1 to n" submenu***Navigation* Expert → Output → PFS output 1 to n

 Pulse/frequency/switch output 1 to n	
Terminal number	→  118
Signal mode	→  119
Operating mode	→  119
Assign pulse output 1 to n	→  120
Pulse scaling	→  121
Pulse width	→  121
Failure mode	→  122
Pulse output 1 to n	→  123
Assign frequency output	→  123
Minimum frequency value	→  124
Maximum frequency value	→  124
Measuring value at minimum frequency	→  124
Measuring value at maximum frequency	→  125
Damping output 1 to n	→  125
Response time	→  126

Failure mode	→  126
Failure frequency	→  127
Output frequency 1 to n	→  127
Switch output function	→  127
Assign diagnostic behavior	→  128
Assign limit	→  128
Switch-on value	→  130
Switch-off value	→  131
Assign status	→  131
Switch-on delay	→  132
Switch-off delay	→  132
Failure mode	→  132
Switch status 1 to n	→  133
Invert output signal	→  133

---

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.

\* Visibility depends on order options or device settings

**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 NAMUR

**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**

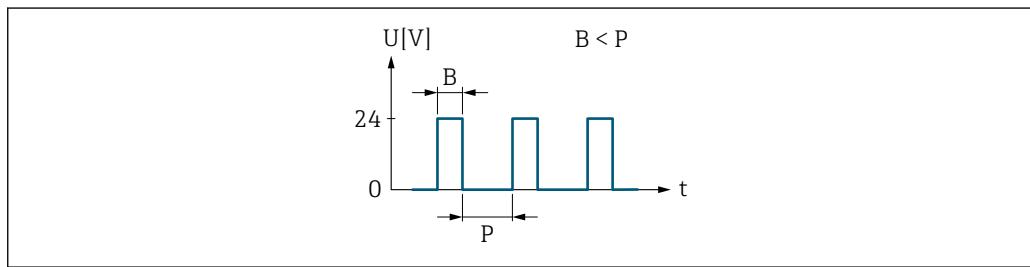
- Pulse
- Frequency
- Switch

**Additional information***"Pulse" option*

Quantity-dependent pulse with configurable 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



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

B Pulse width entered

P Pauses between the individual pulses

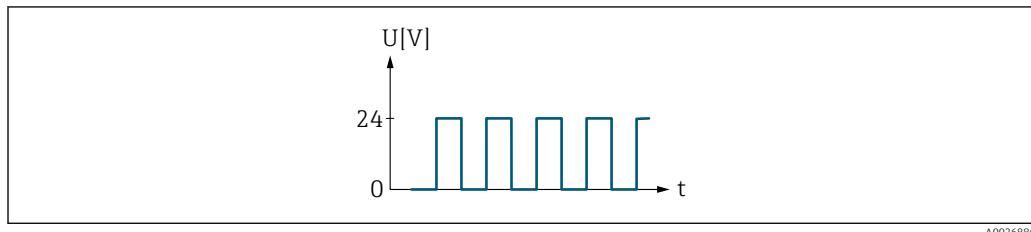
*"Frequency" option*

Flow-proportional frequency output with 1:1 on/off ratio

\* Visibility depends on order options or device settings

**Example**

- Flow rate approx. 100 g/s
- Max. frequency 10 kHz
- Flow rate at max. frequency 1000 g/s
- Output frequency approx. 1000 Hz



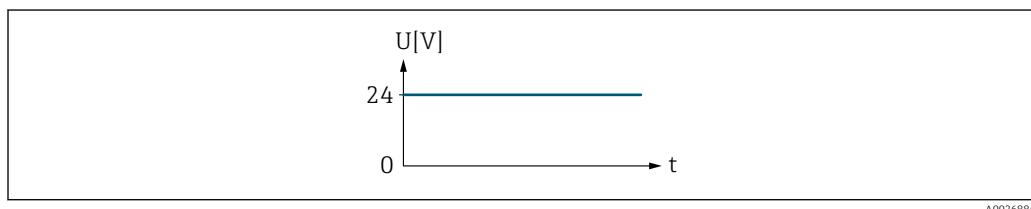
3 *Flow-proportional frequency output*

**"Switch" option**

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

**Example**

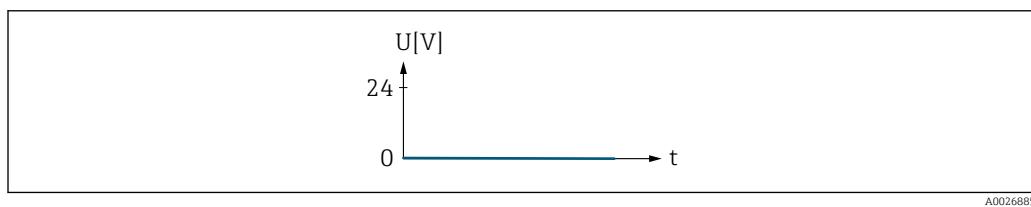
Alarm response without alarm



4 *No alarm, high level*

**Example**

Alarm response in case of alarm



5 *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 (→ 119) parameter.

**Description**

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

**Selection**

- Off
- Mass flow
- Corrected volume flow

- FAD volume flow \*
- Volume flow
- Energy flow \*
- Heat flow \*

---

## 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 (→ 119) and a process variable is selected in the **Assign pulse output** parameter (→ 120).

**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

**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 (→ 119) and a process variable is selected in the **Assign pulse output** parameter (→ 120).

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

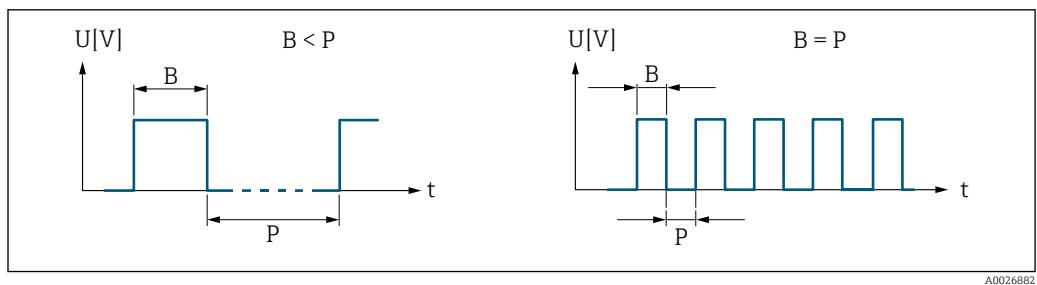
**User entry** 0.05 to 2 000 ms

**Additional information** *Description*

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

---

\* Visibility depends on order options or device settings



*B* Pulse width entered  
*P* Pauses between the individual pulses

### Example

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

## 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 (→ 119) and a process variable is selected in the **Assign pulse output** parameter (→ 120).

### 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

### 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 (→ [119](#)) parameter.

### Description

Displays the pulse frequency currently output.

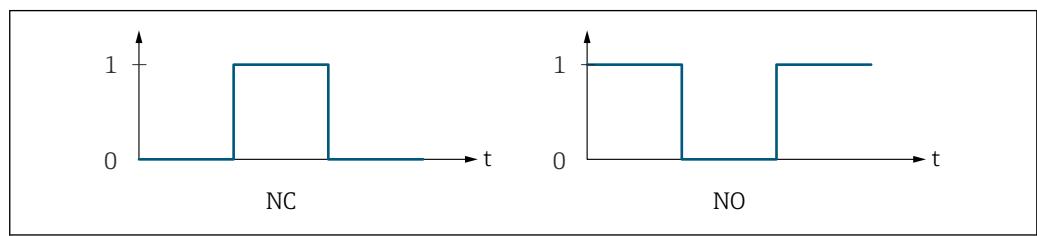
### User interface

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 (→ [133](#)) 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 (→ [122](#))) can be configured.

## Assign frequency output

### Navigation

Expert → Output → PFS output 1 to n → Assign freq. (0478–1 to n)

### Prerequisite

The **Frequency** option is selected in the **Operating mode** parameter (→ [119](#)).

### Description

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

### Selection

- Off
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow <sup>\*</sup>
- Volume flow <sup>\*</sup>
- Energy flow <sup>\*</sup>
- Heat flow <sup>\*</sup>
- Density

\* Visibility depends on order options or device settings

- Flow velocity
- Pressure
- 2nd temperature delta heat \*
- Electronic temperature

---

**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 (→ 119) and a process variable is selected in the **Assign frequency output** parameter (→ 123).

**Description** Use this function to enter the minimum frequency.

**User entry** 0.0 to 10 000.0 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 (→ 119) and a process variable is selected in the **Assign frequency output** parameter (→ 123).

**Description** Use this function to enter the end value frequency.

**User entry** 0.0 to 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 (→ 119) and a process variable is selected in the **Assign frequency output** parameter (→ 123).

**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 (→ 123).

---

\* Visibility depends on order options or device settings

**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 (→ 119) and a process variable is selected in the **Assign frequency output** parameter (→ 123).

**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 (→ 123).

**Damping output 1 to n**

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

**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

**Additional information** *User entry*

Use this function to enter a time constant (PT1 element<sup>8)</sup>) 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.

8) proportional transmission behavior with first order delay

## Response time

<b>Navigation</b>	  Expert → Output → PFS output 1 to n → Response time (0491–1 to n)
<b>Description</b>	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.
<b>User interface</b>	Positive floating-point number
<b>Additional information</b>	<i>Description</i>  The response time is made up of the time specified for the following dampings: <ul style="list-style-type: none"><li>▪ Damping of pulse/frequency/switch output → <a href="#">115</a> and</li><li>▪ Depending on the measured variable assigned to the output. Flow damping</li></ul>

## Failure mode



<b>Navigation</b>	  Expert → Output → PFS output 1 to n → Failure mode (0451–1 to n)
<b>Prerequisite</b>	The <b>Frequency</b> option is selected in the <b>Operating mode</b> parameter (→ <a href="#">119</a> ) and a process variable is selected in the <b>Assign frequency output</b> parameter (→ <a href="#">123</a> ).
<b>Description</b>	Use this function to select the failure mode of the frequency output in the event of a device alarm.
<b>Selection</b>	<ul style="list-style-type: none"><li>▪ Actual value</li><li>▪ Defined value</li><li>▪ 0 Hz</li></ul>
<b>Additional information</b>	<i>Selection</i> <ul style="list-style-type: none"><li>▪ 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.</li><li>▪ Defined value In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure frequency (→ <a href="#">127</a>) 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.</li><li>▪ 0 Hz In the event of a device alarm, the frequency output is "switched off".</li></ul> <p><b>NOTICE!</b> 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 <b>Actual value</b> option is only recommended if it can be guaranteed that all possible alarm conditions will not affect the measurement quality.</p>

---

**Failure frequency**

<b>Navigation</b>	Expert → Output → PFS output 1 to n → Failure freq. (0474–1 to n)
<b>Prerequisite</b>	The <b>Frequency</b> option is selected in the <b>Operating mode</b> parameter (→ 119) and a process variable is selected in the <b>Assign frequency output</b> parameter (→ 123).
<b>Description</b>	Use this function to enter the value for the frequency output in the event of a device alarm in order to bypass the alarm.
<b>User entry</b>	0.0 to 12 500.0 Hz

---

**Output frequency 1 to n**

<b>Navigation</b>	Expert → Output → PFS output 1 to n → Output freq. 1 to n (0471–1 to n)
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→ 119), the <b>Frequency</b> option is selected.
<b>Description</b>	Displays the actual value of the output frequency which is currently measured.
<b>User interface</b>	0.0 to 12 500.0 Hz

---

**Switch output function**

<b>Navigation</b>	Expert → Output → PFS output 1 to n → Switch out funct (0481–1 to n)
<b>Prerequisite</b>	The <b>Switch</b> option is selected in the <b>Operating mode</b> parameter (→ 119) parameter.
<b>Description</b>	Use this function to select a function for the switch output.
<b>Selection</b>	<ul style="list-style-type: none"><li>■ Off</li><li>■ On</li><li>■ Diagnostic behavior</li><li>■ Limit</li><li>■ Flow direction check *</li><li>■ Status</li></ul>

---

\* Visibility depends on order options or device settings

**Additional information***Selection*

- Off  
The switch output is permanently switched off (open, non-conductive).
- On  
The switch output is permanently switched on (closed, conductive).
- 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.
- Status  
Indicates 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 (→ 119), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 127), 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

**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**

- The **Switch** option is selected in the **Operating mode** parameter (→ 119).
- The **Limit** option is selected in the **Switch output function** parameter (→ 127).

**Description**

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

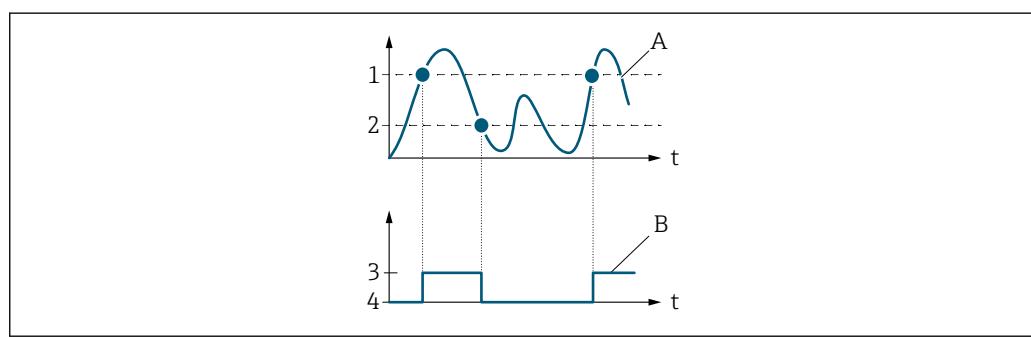
**Selection**

- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow \*
- Volume flow
- Energy flow \*
- Heat flow \*
- Density
- Flow velocity
- 2nd temperature delta heat \*
- Electronic temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3

**Additional information***Description*

Behavior of status output when Switch-on value > Switch-off value:

- Process variable > Switch-on value: transistor is conductive
- Process variable < Switch-off value: transistor is non-conductive

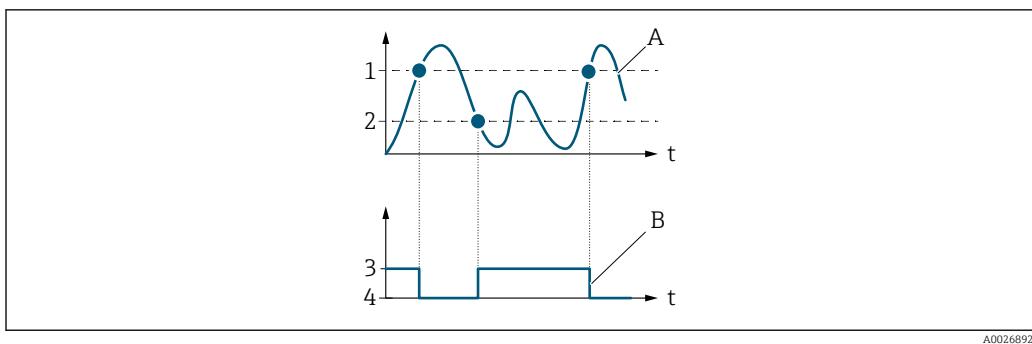


A0026891

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

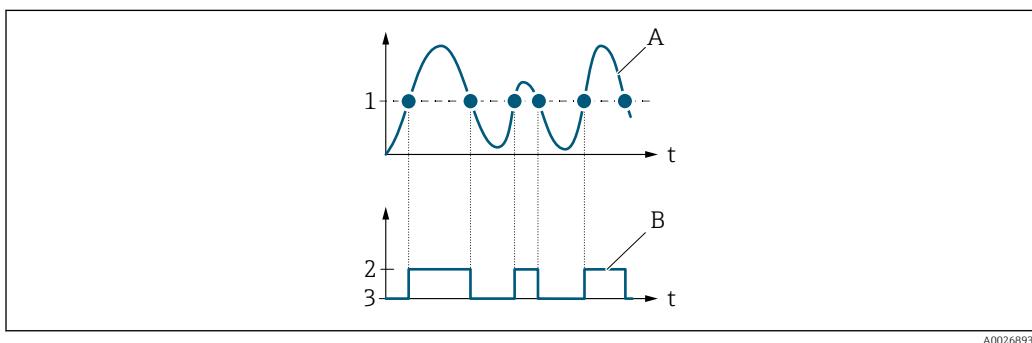


- 1 Switch-off value  
 2 Switch-on value  
 3 Conductive  
 4 Non-conductive  
 A Process variable  
 B Status output

A0026892

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



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

A0026893

## 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 (→ 119)
- The **Limit** option is selected in the **Switch output function** parameter (→ 127)

### Description

Use this function to enter the measured value for the switch-on point.

### User entry

Signed floating-point number

### Factory setting

Depends on country and nominal diameter

**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 (→ [128](#)).

**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 (→ [119](#)).
- The **Limit** option is selected in the **Switch output function** parameter (→ [127](#)).

**Description**

Use this function to enter the measured value for the switch-off point.

**User entry**

Signed floating-point number

**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 (→ [128](#)).

**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 (→ [119](#)).
- The **Status** option is selected in the **Switch output function** parameter (→ [127](#)).

**Description**

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

**Selection**

- Off
- Low flow cut off

**Additional information***Options*

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

## Switch-on delay



**Navigation** Expert → Output → PFS output 1 to n → Switch-on delay (0467-1 to n)

**Prerequisite**

- The **Switch** option is selected in the **Operating mode** parameter (→ [119](#)).
- The **Limit** option is selected in the **Switch output function** parameter (→ [127](#)).

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

**User entry** 0.0 to 100.0 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 (→ [119](#)).
- The **Limit** option is selected in the **Switch output function** parameter (→ [127](#)).

**Description** Use this function to enter a delay time for switching off the switch output.

**User entry** 0.0 to 100.0 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

**Additional information** *Options*

- Actual status  
In the event of a device alarm, faults are ignored and the current behavior of the input value is output by the switch output. The **Actual status** option behaves in the same way as the current input value.
- Open  
In the event of a device alarm, the switch output's transistor is set to **non-conductive**.
- Closed  
In the event of a device alarm, the switch output's transistor is set to **conductive**.

## Switch status 1 to n

**Navigation**

Expert → Output → PFS output 1 to n → Switch status 1 to n (0461–1 to n)

**Prerequisite**

The **Switch** option is selected in the **Operating mode** parameter (→ [119](#)).

**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.

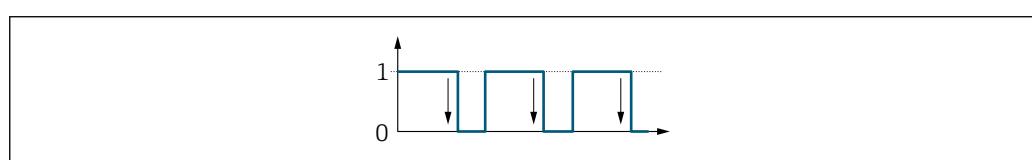
**Selection**

- No
- Yes

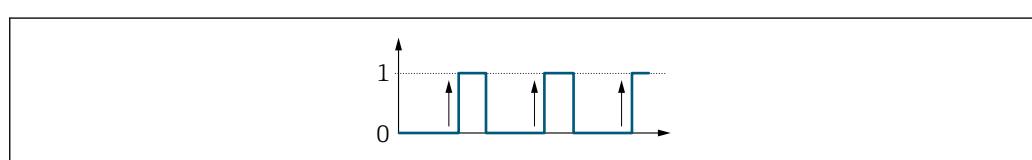
**Additional information**

*Selection*

**No** option (passive - negative)



**Yes** option (passive - positive)



### 3.4.3 "Relay output 1 to n" submenu

Navigation

 Expert → Output → Relay output 1 to n

► Relay output 1 to n	
Terminal number (0812-1 to n)	→  134
Relay output function (0804-1 to n)	→  135
Assign limit (0807-1 to n)	→  135
Assign diagnostic behavior (0806-1 to n)	→  136
Assign status (0805-1 to n)	→  136
Switch-off value (0809-1 to n)	→  136
Switch-off delay (0813-1 to n)	→  137
Switch-on value (0810-1 to n)	→  137
Switch-on delay (0814-1 to n)	→  138
Failure mode (0811-1 to n)	→  138
Switch status (0801-1 to n)	→  138
Powerless relay status (0816-1 to n)	→  139

---

#### 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

**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 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 (→ 135).

**Description**

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

**Selection**

- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow \*
- Volume flow
- Energy flow \*
- Heat flow \*
- Density
- Flow velocity
- 2nd temperature delta heat \*
- Electronic temperature

\* Visibility depends on order options or device settings

- Totalizer 1
- Totalizer 2
- Totalizer 3

## 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 (→ 135), 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

### Additional information

#### Description

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

#### Selection

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

## Assign status



### Navigation

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

### Prerequisite

In the **Relay output function** parameter (→ 135), the **Digital Output** option is selected.

### Description

Use this function to select the device status for the relay output.

### Selection

- Off
- Low flow cut off

## 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 (→ 135), the **Limit** option is selected.

<b>Description</b>	Use this function to enter the measured value for the switch-off point.
<b>User entry</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Description</i></p> <p>Use this function to enter the limit value for the switch-off value (process variable &lt; switch-off value = open, non-conductive).</p> <p> When using a hysteresis: Switch-on value &gt; Switch-off value.</p>
	<p><i>Dependency</i></p> <p> The unit is dependent on the process variable selected in the <b>Assign limit</b> parameter (→ 135).</p>

---

## Switch-off delay

<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Switch-off delay (0813-1 to n)
<b>Prerequisite</b>	In the <b>Relay output function</b> parameter (→ 135), the <b>Limit</b> option is selected.
<b>Description</b>	Use this function to enter a delay time for switching off the switch output.
<b>User entry</b>	0.0 to 100.0 s

---

## Switch-on value

<b>Navigation</b>	  Expert → Output → Relay output 1 to n → Switch-on value (0810-1 to n)
<b>Prerequisite</b>	The <b>Limit</b> option is selected in the <b>Relay output function</b> parameter (→ 135) parameter.
<b>Description</b>	Use this function to enter the measured value for the switch-on point.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	Depends on country and nominal diameter
<b>Additional information</b>	<p><i>Description</i></p> <p>Use this function to enter the limit value for the switch-on value (process variable &gt; switch-on value = closed, conductive).</p> <p> When using a hysteresis: Switch-on value &gt; Switch-off value.</p>
	<p><i>Dependency</i></p> <p> The unit is dependent on the process variable selected in the <b>Assign limit</b> parameter (→ 135).</p>

## 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 (→ 135), 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

## 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

**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 status

**Navigation** Expert → Output → Relay output 1 to n → Switch status (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**

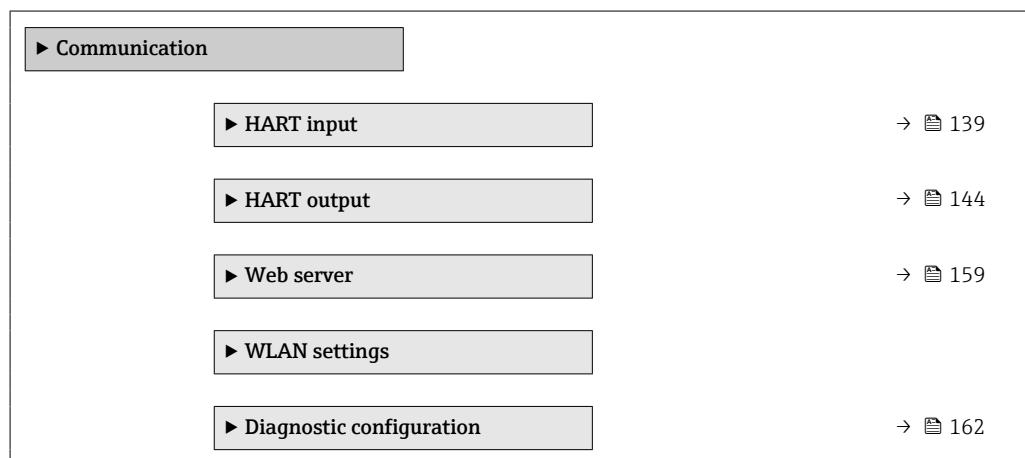
- Open
- Closed

**Additional information** *Selection*

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

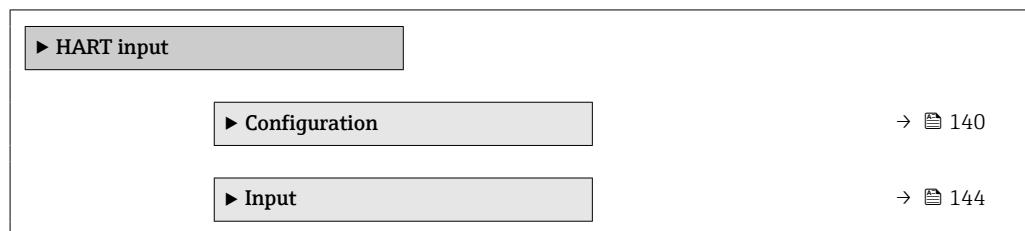
## 3.5 "Communication" submenu

*Navigation* Expert → Communication



### 3.5.1 "HART input" submenu

*Navigation* Expert → Communication → HART input



**"Configuration" submenu****Navigation**
 Expert → Communication → HART input → Configuration

 Configuration	
Capture mode (7001)	→  140
Device ID (7007)	→  141
Device type (7008)	→  141
Manufacturer ID (7009)	→  141
Burst command (7006)	→  142
Slot number (7010)	→  142
Timeout (7005)	→  143
Failure mode (7011)	→  143
Failure value (7012)	→  143

**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

**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**

<b>Navigation</b>	Expert → Communication → HART input → Configuration → Device ID (7007)
<b>Prerequisite</b>	The <b>Master network</b> option is selected in the <b>Capture mode</b> parameter (→ 140).
<b>Description</b>	Use this function to enter the device ID of the HART slave device whose data are to be recorded.
<b>User entry</b>	6-digit value: <ul style="list-style-type: none"><li>▪ Via local operation: enter as hexadecimal or decimal number</li><li>▪ Via operating tool: enter as decimal number</li></ul>
<b>Additional information</b>	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**

<b>Navigation</b>	Expert → Communication → HART input → Configuration → Device type (7008)
<b>Prerequisite</b>	In the <b>Capture mode</b> parameter (→ 140), the <b>Master network</b> option is selected.
<b>Description</b>	Use this function to enter the device type of the HART slave device whose data are to be recorded.
<b>User entry</b>	2-digit hexadecimal number
<b>Factory setting</b>	0x00
<b>Additional information</b>	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**

<b>Navigation</b>	Expert → Communication → HART input → Configuration → Manufacturer ID (7009)
<b>Prerequisite</b>	The <b>Master network</b> option is selected in the <b>Capture mode</b> parameter (→ 140).
<b>Description</b>	Use this function to enter the manufacturer ID of the HART slave device whose data are to be recorded.
<b>User entry</b>	2-digit value: <ul style="list-style-type: none"><li>▪ Via local operation: enter as hexadecimal or decimal number</li><li>▪ Via operating tool: enter as decimal number</li></ul>
<b>Additional information</b>	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 (→ [140](#)).

**Description**

Use this function to select the burst command to be recorded.

**Selection**

- Command 1
- Command 3
- Command 9
- Command 33

**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 (→ [140](#)).

**Description**

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

**User entry**

1 to 8

**Additional information***User entry*

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

---

**Timeout****Navigation**

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

**Prerequisite**

The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 140).

**Description**

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

**User entry**

1 to 120 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 (→ 140), 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

**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 (→ 143)).

---

**Failure value****Navigation**

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

**Prerequisite**

The following conditions are met:

- In the **Capture mode** parameter (→ 140), the **Burst network** option or **Master network** option is selected.
- In the **Failure mode** parameter (→ 143), the **Defined value** option is selected.

**Description**

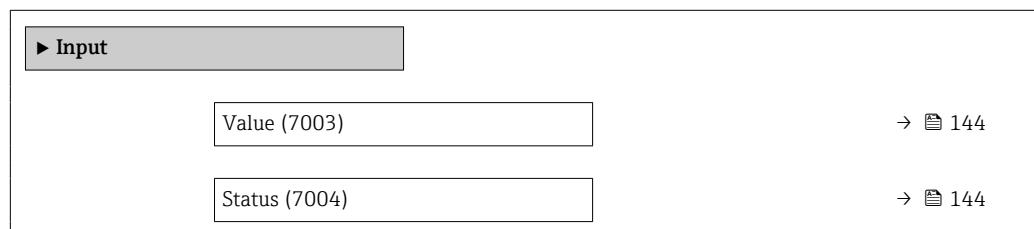
Use this function to enter the measured value to be used if no data are recorded within the maximum permitted interval.

**User entry**

Signed floating-point number

**"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.

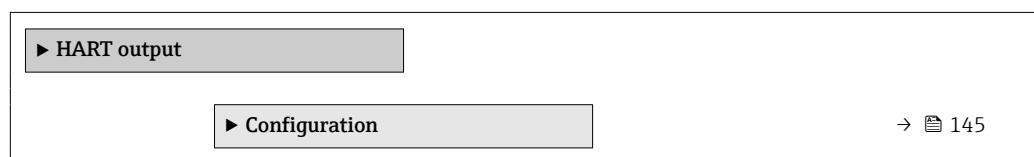
**User interface**

- Manual/Fixed
- Good
- Poor accuracy
- Bad

---

**3.5.2 "HART output" submenu***Navigation*

Expert → Communication → HART output



▶ Burst configuration	→  147
▶ Information	→  152
▶ Output	→  155

### "Configuration" submenu

#### *Navigation*

Expert → Communication → HART output → Configuration

▶ Configuration	
HART short tag (0220)	→  145
Device tag (0215)	→  145
HART address (0219)	→  146
No. of preambles (0217)	→  146
Fieldbus writing access (0273)	→  146

---

## 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, @, %).

---

## 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. @, %, /).

---

**HART address**

<b>Navigation</b>	Expert → Communication → HART output → Configuration → HART address (0219)
<b>Description</b>	Use this function to enter the address via which the data exchange takes place via HART protocol.
<b>User entry</b>	0 to 63
<b>Additional information</b>	<i>Description</i> For addressing in a HART Multidrop network, the <b>Fixed current</b> option must be set in the <b>Current span</b> parameter (→  112) (current output 1).

---

**No. of preambles**

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

---

**Fieldbus writing access**

<b>Navigation</b>	Expert → Communication → HART output → Configuration → Fieldb.writ.acc. (0273)
<b>Description</b>	Use this function to restrict access to the measuring device via fieldbus (HART interface).
<b>Selection</b>	<ul style="list-style-type: none"><li>■ Read + write</li><li>■ Read only</li></ul>
<b>Additional information</b>	<i>Description</i> 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.  <i>Selection</i> <ul style="list-style-type: none"><li>■ Read + write The parameters are readable and writable.</li><li>■ Read only The parameters are only readable.</li></ul>

**"Burst configuration 1 to n" submenu***Navigation*

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

<b>► Burst configuration</b>	
<b>► Burst configuration 1 to n</b>	
Burst mode 1 to n (2032–1 to n)	→ <a href="#">147</a>
Burst command 1 to n (2031–1 to n)	→ <a href="#">148</a>
Burst variable 0 (2033)	→ <a href="#">148</a>
Burst variable 1 (2034)	→ <a href="#">149</a>
Burst variable 2 (2035)	→ <a href="#">149</a>
Burst variable 3 (2036)	→ <a href="#">150</a>
Burst variable 4 (2037)	→ <a href="#">150</a>
Burst variable 5 (2038)	→ <a href="#">150</a>
Burst variable 6 (2039)	→ <a href="#">150</a>
Burst variable 7 (2040)	→ <a href="#">150</a>
Burst trigger mode (2044–1 to n)	→ <a href="#">151</a>
Burst trigger level (2043–1 to n)	→ <a href="#">151</a>
Min. update period (2042–1 to n)	→ <a href="#">152</a>
Max. update period (2041–1 to n)	→ <a href="#">152</a>

**Burst mode 1 to n****Navigation**

Diagram: 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

**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

**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.

*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 (→ 110).

**Burst variable 0****Navigation**

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

**Description**

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

**Selection**

- Mass flow
- Corrected volume flow
- FAD volume flow \*
- Volume flow
- Temperature
- Density
- Flow velocity
- Pressure
- Energy flow \*
- Heat flow \*
- 2nd temperature delta heat \*
- Electronic temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Percent of range
- Measured current
- Current input 1 \*
- Current input 2 \*
- Current input 3 \*
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)
- HART input
- Not used

**Additional information***Selection*

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

**Burst variable 1****Navigation**

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

**Description**

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

**Selection**

See the **Burst variable 0** parameter (→ 148).

**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 (→ 148).

\* Visibility depends on order options or device settings

**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 (→ 148).

**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 (→ 148).

**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 (→ 148).

**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 (→ 148).

**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 (→ 148).

**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

**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 (→ 152).
- Window  
The message is sent if the specified measured value has changed by the value in the **Burst trigger level** parameter (→ 151).
- Rising  
The message is sent if the specified measured value exceeds the value in the **Burst trigger level** parameter (→ 151).
- Falling  
The message is sent if the specified measured value drops below the value in the **Burst trigger level** parameter (→ 151).
- 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 (→ 151) 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

**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

**"Information" submenu***Navigation*

Expert → Communication → HART output → Information

<b>Information</b>	
Device revision (0204)	→  153
Device ID (0221)	→  153
Device type (0209)	→  153
Manufacturer ID (0259)	→  154
HART revision (0205)	→  154
HART descriptor (0212)	→  154
HART message (0216)	→  154
Hardware revision (0206)	→  154
Software revision (0224)	→  155
HART date code (0202)	→  155

---

## Device revision

---

<b>Navigation</b>	  Expert → Communication → HART output → Information → Device revision (0204)
<b>Description</b>	Displays the device revision with which the device is registered with the HART Communication Foundation.
<b>User interface</b>	2-digit hexadecimal number
<b>Factory setting</b>	0x1
<b>Additional information</b>	<i>Description</i>  The device revision is needed to assign the appropriate device description file (DD) to the device.

---

## Device ID

---

<b>Navigation</b>	  Expert → Communication → HART output → Information → Device ID (0221)
<b>Description</b>	Use this function to view the device ID for identifying the measuring device in a HART network.
<b>User interface</b>	6-digit hexadecimal number
<b>Additional information</b>	<i>Description</i>  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

---

<b>Navigation</b>	  Expert → Communication → HART output → Information → Device type (0209)
<b>Description</b>	Displays the device type with which the measuring device is registered with the HART Communication Foundation.
<b>User interface</b>	2-digit hexadecimal number
<b>Factory setting</b>	0x1160 (for t-mass 300/500)
<b>Additional information</b>	<i>Description</i>  The device type is specified by the manufacturer. It is needed to assign the appropriate device description file (DD) to the device.

**Manufacturer ID**

---

<b>Navigation</b>	  Expert → Communication → HART output → Information → Manufacturer ID (0259)
<b>Description</b>	Use this function to view the manufacturer ID with which the measuring device is registered with the HART Communication Foundation.
<b>User interface</b>	2-digit hexadecimal number
<b>Factory setting</b>	0x11 (for Endress+Hauser)

---

**HART revision**

---

<b>Navigation</b>	  Expert → Communication → HART output → Information → HART revision (0205)
<b>Description</b>	Use this function to display the HART protocol revision of the measuring device.
<b>User interface</b>	5 to 7

---

**HART descriptor**

---



<b>Navigation</b>	  Expert → Communication → HART output → Information → HART descriptor (0212)
<b>Description</b>	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.
<b>User entry</b>	Max. 16 characters such as letters, numbers or special characters (e.g. @, %, /)

---

**HART message**

---



<b>Navigation</b>	  Expert → Communication → HART output → Information → HART message (0216)
<b>Description</b>	Use this function to enter a HART message which is sent via the HART protocol when requested by the master.
<b>User entry</b>	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)

---

**Hardware revision**

---

<b>Navigation</b>	  Expert → Communication → HART output → Information → Hardware rev. (0206)
<b>Description</b>	Displays the hardware revision of the measuring device.

---

User interface	0 to 255
----------------	----------

---

## 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

---

## 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
Additional information	<i>Example</i> Device installation date

## "Output" submenu

*Navigation*        Expert → Communication → HART output → Output

 <b>Output</b>	
Assign PV (0234)	→  156
Primary variable (PV) (0201)	→  156
Assign SV (0235)	→  156
Secondary variable (SV) (0226)	→  157
Assign TV (0236)	→  157
Tertiary variable (TV) (0228)	→  158
Assign QV (0237)	→  158
Quaternary variable (QV) (0203)	→  159

**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 \*
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow \*
- Volume flow
- Energy flow \*
- Heat flow \*
- Density
- Flow velocity
- Pressure
- 2nd temperature delta heat \*
- Electronic temperature

---

**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 (→ 156).

*Dependency*

The unit of the displayed measured value is taken from the **System units** submenu (→ 54).

---

**Assign SV****Navigation**

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

**Description**

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

---

\* Visibility depends on order options or device settings

**Selection**

- Mass flow
- Corrected volume flow \*
- FAD volume flow \*
- Volume flow
- Temperature
- Density
- Flow velocity
- Pressure
- Energy flow \*
- Heat flow \*
- 2nd temperature delta heat \*
- Electronic temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current input 1 \*
- Current input 2 \*
- Current input 3 \*
- HART input

---

**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 (→  156).

*Dependency*

 The unit of the displayed measured value is taken from the **System units** submenu (→  54).

---

**Assign TV**

---

**Navigation**

 Expert → Communication → HART output → Output → Assign TV (0236)

**Description**

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

**Selection**

- Mass flow
- Corrected volume flow \*
- FAD volume flow \*
- Volume flow
- Temperature

\* Visibility depends on order options or device settings

- Density
- Flow velocity
- Pressure
- Energy flow \*
- Heat flow
- 2nd temperature delta heat \*
- Electronic temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current input 1 \*
- Current input 2 \*
- Current input 3 \*
- HART input

---

### 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 (→  157).

*Dependency*

 The unit of the displayed measured value is taken from the **System units** submenu (→  54).

---

### Assign QV

**Navigation**

 Expert → Communication → HART output → Output → Assign QV (0237)

**Description**

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

**Selection**

- Mass flow
- Corrected volume flow
- FAD volume flow \*
- Volume flow
- Temperature
- Density
- Flow velocity
- Pressure
- Energy flow \*
- Heat flow \*

---

\* Visibility depends on order options or device settings

- 2nd temperature delta heat \*
- Electronic temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current input 1 \*
- Current input 2 \*
- Current input 3 \*
- HART input

## Quaternary variable (QV)

<b>Navigation</b>	Diagram: Expert → Communication → HART output → Output → Quaternary.var(QV) (0203)
<b>Description</b>	Displays the current measured value of the quaternary dynamic variable (QV).
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>User interface</i></p> <p>The measured value displayed depends on the process variable selected in the <b>Assign QV</b> parameter (→ <a href="#">158</a>).</p> <p><i>Dependency</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→ <a href="#">54</a>).</p>

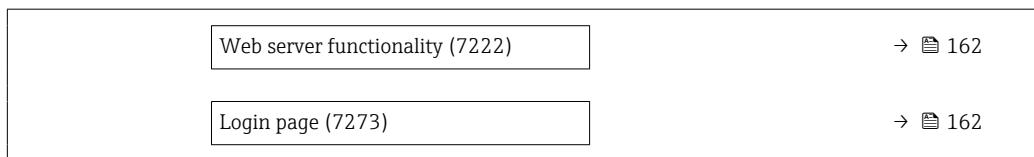
### 3.5.3 "Web server" submenu

#### Navigation

Diagram: Expert → Communication → Web server

 Web server	
Web server language (7221)	→ <a href="#">160</a>
MAC address (7214)	→ <a href="#">160</a>
DHCP client (7212)	→ <a href="#">161</a>
IP address (7209)	→ <a href="#">161</a>
Subnet mask (7211)	→ <a href="#">161</a>
Default gateway (7210)	→ <a href="#">161</a>

\* Visibility depends on order options or device settings



## Web server language

### Navigation

Expert → Communication → Web server → Webserv.language (7221)

### Description

Use this function to select the Web server language setting.

### Selection

- English
- Deutsch
- Français
- Español
- Italiano
- Nederlands
- Portuguesa
- Polski
- русский язык (Russian)
- Svenska
- Türkçe
- 中文 (Chinese)
- 日本語 (Japanese)
- 한국어 (Korean)
- العربية (Arabic) \*
- Bahasa Indonesia
- ภาษาไทย (Thai) \*
- tiếng Việt (Vietnamese)
- čeština (Czech)

## MAC address

### Navigation

Expert → Communication → Web server → MAC Address (7214)

### Description

Displays the MAC<sup>9)</sup> 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

\* Visibility depends on order options or device settings

9) Media Access Control

---

**DHCP client****Navigation**

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

**Description**

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

**Selection**

- Off
- On

**Additional information***Result*

If the DHCP client functionality of the Web server is activated, the IP address (→ 161), Subnet mask (→ 161) and Default gateway (→ 161) are set automatically.



- Identification is via the MAC address of the measuring device.
- The IP address (→ 161) in the **IP address** parameter (→ 161) is ignored as long as the **DHCP client** parameter (→ 161) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (→ 161) in the parameter of the same name is only used if the **DHCP client** parameter (→ 161) 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)

---

**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)

---

**Default gateway****Navigation**

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

**Description**

Display or enter the Default gateway (→ 161).

**User entry**

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

**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

**Additional information***Description*

Once disabled, the Web server functionality can only be re-enabled via or the operating tool FieldCare.

*Selection*

Option	Description
Off	<ul style="list-style-type: none"> <li>▪ The web server is completely disabled.</li> <li>▪ Port 80 is locked.</li> </ul>
On	<ul style="list-style-type: none"> <li>▪ The complete functionality of the web server is available.</li> <li>▪ JavaScript is used.</li> <li>▪ The password is transferred in an encrypted state.</li> <li>▪ Any change to the password is also transferred in an encrypted state.</li> </ul>

**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

**3.5.4 "Diagnostic configuration" submenu**

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

*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)	<p>The device is being operated:</p> <ul style="list-style-type: none"> <li>▪ Outside its technical specification limits (e.g. outside the process temperature range)</li> <li>▪ Outside of the configuration carried out by the user (e.g. maximum flow in parameter 20 mA value)</li> </ul>

Category	Meaning
Maintenance required (M)	Maintenance is required. The measured value is still valid.
No effect (N)	Has no effect on the condensed status <sup>1)</sup> .

1) Condensed status according to NAMUR recommendation NE107

#### Navigation

Expert → Communication → Diag. config.

► Diagnostic configuration

Event category 144 (0300)	→ 163
Event category 441 (0210)	→ 164
Event category 442 (0230)	→ 164
Event category 443 (0231)	→ 164
Event category 832 (0218)	→ 165
Event category 833 (0225)	→ 165
Event category 834 (0227)	→ 165
Event category 835 (0229)	→ 166
Event category 842 (0295)	→ 166
Event category 979 (0299)	→ 166
Event category 976 (0298)	→ 167

#### Event category 144 (Sensor drift)



##### Navigation

Expert → Communication → Diag. config. → Event category 144 (0300)

##### Description

Use this function to select a category for the **Sensor drift** diagnostic message.

##### Selection

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

##### Additional information

For a detailed description of the event categories available for selection: → 162

**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)

**Additional information**

For a detailed description of the event categories available for selection: → [162](#)

**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)

**Additional information**

For a detailed description of the event categories available for selection: → [162](#)

**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)

**Additional information**

For a detailed description of the event categories available for selection: → [162](#)

---

**Event category 832 (Electronic temperature too high)**

---

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

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

**Selection**

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

**Additional information** *Selection*

 For a detailed description of the event categories available for selection: → [162](#)

---

**Event category 833 (Electronic temperature too low)**

---

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

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

**Selection**

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

**Additional information** *Selection*

 For a detailed description of the event categories available for selection: → [162](#)

---

**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)

**Additional information***Selection*

For a detailed description of the event categories available for selection: → [162](#)

---

**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)

**Additional information***Selection*

For a detailed description of the event categories available for selection: → [162](#)

---

**Event category 842 (Process limit)**

---

**Navigation**

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

**Description**

Use this function to select a category for the **842 Process limit** diagnostic message.

**Selection**

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

**Additional information***Selection*

For a detailed description of the event categories available for selection: → [162](#)

---

**Event category 979 (Unstable process conditions)**

---

**Navigation**

Expert → Communication → Diag. config. → Event category 979 (0299)

**Description**

Use this function to select a category for the **Unstable process conditions** diagnostic message.

**Selection**

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

**Additional information***Selection*

 For a detailed description of the event categories available for selection: → [162](#)

**Event category 976 (Mass flow out of calibrated range)****Navigation**

 Expert → Communication → Diag. config. → Event category 976 (0298)

**Description**

Use this function to select a category for the **Mass flow out of calibrated range** diagnostic message.

**Selection**

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

**Additional information***Selection*

 For a detailed description of the event categories available for selection: → [162](#)

**3.5.5 "WLAN settings" submenu***Navigation*

  Expert → Communication → WLAN settings

► WLAN settings	
WLAN (2702)	→ <a href="#">168</a>
WLAN mode (2717)	→ <a href="#">169</a>
SSID name (2714)	→ <a href="#">169</a>
Network security (2705)	→ <a href="#">169</a>
Security identification (2718)	→ <a href="#">170</a>
User name (2715)	→ <a href="#">170</a>
WLAN password (2716)	→ <a href="#">170</a>

WLAN IP address (2711)	→  171
WLAN MAC address (2703)	→  171
WLAN subnet mask (2709)	→  171
WLAN MAC address (2703)	→  171
WLAN passphrase (2706)	→  171
WLAN MAC address (2703)	→  171
Assign SSID name (2708)	→  172
SSID name (2707)	→  172
2.4 GHz WLAN channel (2704)	→  172
Select antenna (2713)	→  173
Connection state (2722)	→  173
Received signal strength (2721)	→  173
WLAN IP address (2711)	→  171
Gateway IP address (2719)	→  173
IP address domain name server (2720)	→  174

---

## WLAN

**Navigation**

Expert → Communication → WLAN settings → WLAN (2702)

**Description**

Use this function to enable and disable the WLAN connection.

**Selection**

- Disable
- Enable

**WLAN mode**

<b>Navigation</b>	Expert → Communication → WLAN settings → WLAN mode (2717) Setup → Advanced setup → WLAN settings → WLAN mode (2717) Setup → Advanced setup → WLAN settings → WLAN mode (2717)
<b>Description</b>	Use this function to select the WLAN mode.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ WLAN access point</li> <li>▪ WLAN Client</li> </ul>

**SSID name**

<b>Navigation</b>	Expert → Communication → WLAN settings → SSID name (2714) Setup → Advanced setup → WLAN settings → SSID name (2714) Setup → Advanced setup → WLAN settings → SSID name (2714)
<b>Prerequisite</b>	The client is activated.
<b>Description</b>	Use this function to enter the user-defined SSID name (max. 32 characters) of the WLAN network.
<b>User entry</b>	-
<b>Factory setting</b>	-

**Network security**

<b>Navigation</b>	Expert → Communication → WLAN settings → Network security (2705)
<b>Description</b>	Use this function to select the type of security for the WLAN interface.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Unsecured</li> <li>▪ WPA2-PSK</li> <li>▪ EAP-PEAP with MSCHAPv2 *</li> <li>▪ EAP-PEAP MSCHAPv2 no server authentic. *</li> <li>▪ EAP-TLS *</li> </ul>
<b>Additional information</b>	<p><b>Selection</b></p> <ul style="list-style-type: none"> <li>▪ Unsecured Access the WLAN connection without identification.</li> <li>▪ WPA2-PSK Access the WLAN connection with a network key.</li> </ul>

\* Visibility depends on order options or device settings

---

## Security identification

---

<b>Navigation</b>	  Expert → Communication → WLAN settings → Sec. identific. (2718)
<b>Description</b>	Use this function to select the security settings (download via the menu: Data Management > Security > Download WLAN).
<b>User interface</b>	<ul style="list-style-type: none"><li>▪ Trusted issuer certificate</li><li>▪ Device certificate</li><li>▪ Device private key</li></ul>

---

## User name

---

<b>Navigation</b>	  Expert → Communication → WLAN settings → User name (2715)
<b>Description</b>	Use this function to enter the username of the WLAN network.
<b>User entry</b>	–
<b>Factory setting</b>	–

---

## WLAN password

---

<b>Navigation</b>	  Expert → Communication → WLAN settings → WLAN password (2716)
<b>Description</b>	Use this function to enter the WLAN password for the WLAN network.
<b>User entry</b>	–
<b>Factory setting</b>	–

---

**WLAN IP address**

- Navigation**
- █ █ Expert → Communication → WLAN settings → WLAN IP address (2711)
  - █ Setup → Advanced setup → WLAN settings → WLAN IP address (2711)
  - █ Setup → Advanced setup → 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)

---

**WLAN MAC address**

- Navigation**
- █ █ Expert → Communication → WLAN settings → WLAN MAC address (2703)
  - █ █ Setup → Advanced setup → WLAN settings → WLAN MAC address (2703)

**Description** Displays the MAC<sup>10)</sup> 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)

---

**WLAN passphrase**

- Navigation**
- █ █ Expert → Communication → WLAN settings → WLAN passphrase (2706)
  - █ Setup → Advanced setup → WLAN settings → WLAN passphrase (2706)
  - █ Setup → Advanced setup → WLAN settings → WLAN passphrase (2706)

**Prerequisite** The **WPA2-PSK** option is selected in the **Security type** parameter (→ 169).

---

10) Media Access Control

---

<b>Description</b>	Use this function to enter the network key.
<b>User entry</b>	8 to 32-digit character string comprising numbers, letters and special characters (without spaces)
<b>Factory setting</b>	Serial number of the measuring device (e.g. L100A802000)

---

## Assign SSID name



<b>Navigation</b>	Expert → Communication → WLAN settings → Assign SSID name (2708) Setup → Advanced setup → WLAN settings → Assign SSID name (2708) Setup → Advanced setup → WLAN settings → Assign SSID name (2708)
<b>Description</b>	Use this function to select which name is used for the SSID <sup>11)</sup> .
<b>Selection</b>	<ul style="list-style-type: none"><li>■ Device tag</li><li>■ User-defined</li></ul>
<b>Additional information</b>	<i>Selection</i> <ul style="list-style-type: none"><li>■ Device tag The device tag name is used as the SSID.</li><li>■ User-defined A user-defined name is used as the SSID.</li></ul>

---

## SSID name



<b>Navigation</b>	Expert → Communication → WLAN settings → SSID name (2707)
<b>Prerequisite</b>	<ul style="list-style-type: none"><li>■ The <b>User-defined</b> option is selected in the <b>Assign SSID name</b> parameter (→ 172).</li><li>■ The <b>WLAN access point</b> option is selected in the <b>WLAN mode</b> parameter (→ 169).</li></ul>
<b>Description</b>	Use this function to enter a user-defined SSID name.
<b>User entry</b>	Max. 32-digit character string comprising numbers, letters and special characters

---

## 2.4 GHz WLAN channel



<b>Navigation</b>	Expert → Communication → WLAN settings → WLAN channel (2704)
<b>Description</b>	Use this function to enter the 2.4 GHz WLAN channel.
<b>User entry</b>	1 to 11

---

11) Service Set Identifier

**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**

④② 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

**Connection state****Navigation**

④ Expert → Communication → WLAN settings → Connection state (2722)  
④ Setup → Advanced setup → WLAN settings → Connection state (2722)  
④ Setup → Advanced setup → WLAN settings → Connection state (2722)

**Description**

The connection status is displayed.

**User interface**

- Connected
- Not connected

**Received signal strength****Navigation**

④② Expert → Communication → WLAN settings → Rec.sig.strength (2721)  
④ Setup → Advanced setup → WLAN settings → Rec.sig.strength (2721)  
④ Setup → Advanced setup → WLAN settings → Rec.sig.strength (2721)

**Description**

Displays the signal strength received.

**User interface**

- Low
- Medium
- High

**Gateway IP address****Navigation**

④② 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 (#15)

---

#### IP address domain name server

---

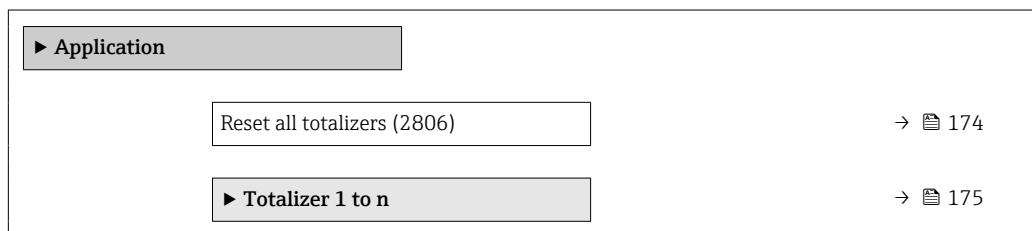
**Navigation** ☐ Expert → Communication → WLAN settings → IP address DNS (2720)

**Description** Use this function to enter the IP address of the domain name server.

**User interface** Character string comprising numbers, letters and special characters (#15)

## 3.6 "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 totaled.

**Selection**

- Cancel
- Reset + totalize

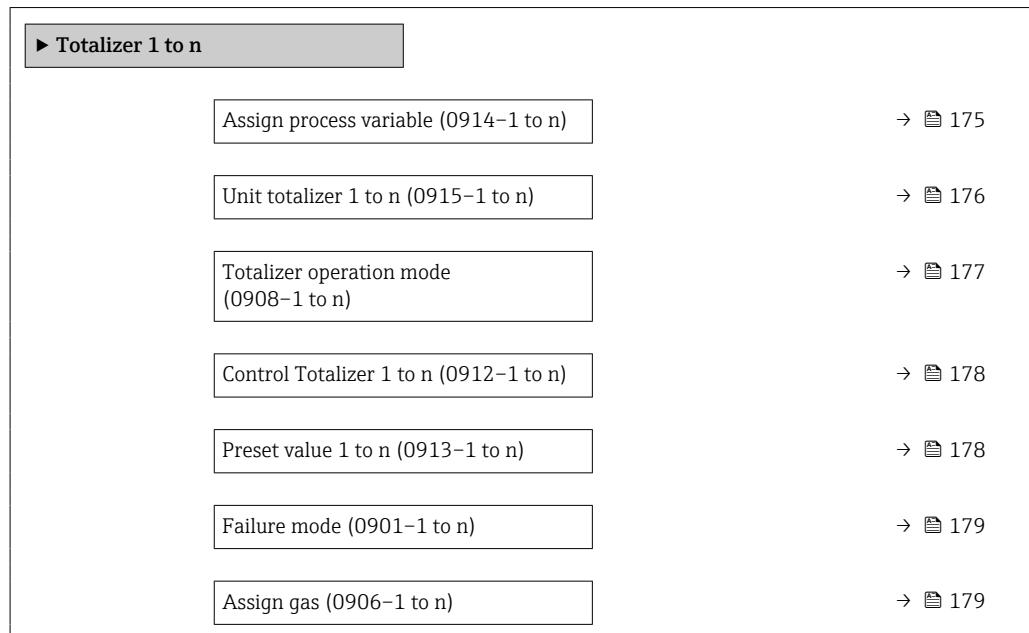
**Additional information** Selection

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 totaled.

### 3.6.1 "Totalizer 1 to n" submenu

#### Navigation

 Expert → Application → Totalizer 1 to n



#### Assign process variable



#### Navigation

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

#### Description

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

#### Selection

- Off
- Mass flow
- Corrected volume flow
- FAD volume flow \*
- Volume flow \*
- Energy flow \*
- Heat 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 **Assign process variable** parameter (→ 175) is still displayed in the **Totalizer 1 to n** submenu. All other parameters in the submenu are hidden.

\* Visibility depends on order options or device settings

**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 (→ 175) of the **Totalizer 1 to n** submenu.

**Description**

Use this function to select the process variable unit for the Totalizer 1 to n (→ 175).

**Selection***SI units*

- g \*
- kg \*
- t

*US units*

- oz \*
- lb \*
- STon \*

\* Visibility depends on order options or device settings

or

*SI units*

- m<sup>3</sup> \*
- l \*

*US units*

- ft<sup>3</sup> \*
- Mft<sup>3</sup> \*

\* Visibility depends on order options or device settings

or

*SI units*

- NI \*
- Nm<sup>3</sup> \*
- Sl \*
- Sm<sup>3</sup> \*

*US units*

- Sft<sup>3</sup> \*

\* Visibility depends on order options or device settings

or

*SI units*

- m<sup>3</sup> FAD \*
- l FAD \*

*US units*

- cf FAD \*

\* Visibility depends on order options or device settings

or

<i>SI units</i>	<i>Imperial units</i>
■ kWh*	■ Btu*
■ MWh*	■ MBtu*
■ GWh*	■ MMBtu*
■ kJ*	
■ MJ*	
■ GJ*	
■ kcal*	
■ Mcal*	
■ Gcal*	

\* Visibility depends on order options or device settings

or

#### *Other units*

None\*

\* Visibility depends on order options or device settings

### Additional information

#### *Description*

 The unit is selected separately for each totalizer. It is independent of the selection made in the **System units** submenu (→ 54).

#### *Selection*

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ 175).

### 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 (→ 175) of the **Totalizer 1 to n** submenu.

#### Description

Use this function to select how the totalizer summates the flow.

#### Selection

- Net flow total
- Forward flow total
- Reverse flow total

#### Additional information

#### *Selection*

- Net flow total

Flow values in the forward and reverse flow direction are totalized and balanced against one another. Net flow is registered in the flow direction.

- Forward 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 (→ [175](#)) 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

### Additional information

#### Selection

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

## 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 (→ [175](#)) 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

### Additional information

#### User entry

 The unit of the selected process variable is specified for the totalizer in the **Unit totalizer** parameter (→ [176](#)).

#### 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 (→ 175) 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**
- Stop
  - Actual value
  - Last valid value

**Additional information** *Description*

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

*Selection*

- Stop  
The totalizer is stopped in the event of a device alarm.
- Actual value  
The totalizer continues to count based on the actual measured value; the device alarm is ignored.
- Last valid value  
The totalizer continues to count based on the last valid measured value before the device alarm occurred.

---

**Assign gas (Only with order code for "Application package", option EV "Second gas group")**

**Navigation** Expert → Application → Totalizer 1 to n → Assign gas (0906–1 to n)

**Description** Select the gas that the totalizer uses. This gas is only totalized when it is currently active ('Active gas' parameter).

- Selection**
- Both gases
  - Gas
  - Second gas

**Factory setting**

- **Both gases** option (only with order code for "Application package", option EV "Second gas group")
- Gas

### 3.7 "Diagnostics" submenu

Navigation

Expert → Diagnostics

▶ Diagnostics	
Actual diagnostics (0691)	→ 180
Previous diagnostics (0690)	→ 181
Operating time from restart (0653)	→ 182
Operating time (0652)	→ 182
▶ Diagnostic list	→ 183
▶ Event logbook	→ 187
▶ Device information	→ 188
▶ Main electronic module + I/O module 1	→ 192
▶ Sensor electronic module (ISEM)	→ 193
▶ I/O module 2	→ 194
▶ I/O module 3	→ 195
▶ I/O module 4	→ 197
▶ Display module	→ 198
▶ Minimum/maximum values	→ 199
▶ Data logging	→ 201
▶ Heartbeat Technology	
▶ Simulation	→ 209

#### Actual diagnostics

Navigation

Expert → Diagnostics → Actual diagnos. (0691)

Prerequisite

A diagnostic event has occurred.

<b>Description</b>	Displays the current diagnostic message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.
<b>User interface</b>	Symbol for diagnostic behavior, diagnostic code and short message.
<b>Additional information</b>	<p><i>Display</i></p> <p> Additional pending diagnostic messages can be viewed in the <b>Diagnostic list</b> submenu (→ 183).</p> <p> Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.</p>
	<p><i>Example</i></p> <p>For the display format: ☒F271 Main electronic failure</p>

---

## Timestamp

---

<b>Navigation</b>	 Expert → Diagnostics → Timestamp
<b>Description</b>	Displays the operating time when the current diagnostic message occurred.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)
<b>Additional information</b>	<p><i>Display</i></p> <p> The diagnostic message can be viewed via the <b>Actual diagnostics</b> parameter (→ 180).</p>

*Example*

For the display format:  
24d12h13m00s

---

## Previous diagnostics

---

<b>Navigation</b>	  Expert → Diagnostics → Prev.diagnostics (0690)
<b>Prerequisite</b>	Two diagnostic events have already occurred.
<b>Description</b>	Displays the diagnostic message that occurred before the current message.
<b>User interface</b>	Symbol for diagnostic behavior, diagnostic code and short message.
<b>Additional information</b>	<p><i>Display</i></p> <p> Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.</p>
	<p><i>Example</i></p> <p>For the display format: ☒F271 Main electronic failure</p>

---

**Timestamp**

---

<b>Navigation</b>	 Expert → Diagnostics → Timestamp
<b>Description</b>	Displays the operating time when the last diagnostic message before the current message occurred.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)
<b>Additional information</b>	<i>Display</i>  The diagnostic message can be viewed via the <b>Previous diagnostics</b> parameter (→  181).
	<i>Example</i> For the display format: 24d12h13m00s

---

**Operating time from restart**

---

<b>Navigation</b>	  Expert → Diagnostics → Time fr. restart (0653)
<b>Description</b>	Use this function to display the time the device has been in operation since the last device restart.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)

---

**Operating time**

---

<b>Navigation</b>	  Expert → Diagnostics → Operating time (0652)
<b>Description</b>	Use this function to display the length of time the device has been in operation.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)
<b>Additional information</b>	<i>User interface</i> The maximum number of days is 9999, which is equivalent to 27 years.

### 3.7.1 "Diagnostic list" submenu

*Navigation*

Expert → Diagnostics → Diagnostic list

► Diagnostic list	
Diagnostics 1 (0692)	→ 183
Diagnostics 2 (0693)	→ 184
Diagnostics 3 (0694)	→ 185
Diagnostics 4 (0695)	→ 185
Diagnostics 5 (0696)	→ 186

---

#### Diagnostics 1

---

**Navigation**

Expert → Diagnostics → Diagnostic list → Diagnostics 1 (0692)

**Description**

Displays the current diagnostics message with the highest priority.

**User interface**

Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information**

*Display*

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

*Examples*

For the display format:

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

---

#### Timestamp

---

**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 (→ 183).

*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 key.

*Examples*

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

---

**Timestamp**

---

**Navigation**

Expert → Diagnostics → Diagnostic list → Timestamp

**Description**

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

**User interface**

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

**Additional information***Display*

The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 184).

*Example*

For the display format:  
24d12h13m00s

---

## Diagnostics 3

---

<b>Navigation</b>	  Expert → Diagnostics → Diagnostic list → Diagnostics 3 (0694)
<b>Description</b>	Displays the current diagnostics message with the third-highest priority.
<b>User interface</b>	Symbol for diagnostic behavior, diagnostic code and short message.
<b>Additional information</b>	<i>Display</i>  Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the  key.
	<i>Examples</i> For the display format: <ul style="list-style-type: none"><li>▪  F271 Main electronic failure</li><li>▪  F276 I/O module failure</li></ul>

---

## Timestamp

---

<b>Navigation</b>	 Expert → Diagnostics → Diagnostic list → Timestamp
<b>Description</b>	Displays the operating time when the diagnostic message with the third-highest priority occurred.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)
<b>Additional information</b>	<i>Display</i>  The diagnostic message can be viewed via the <b>Diagnostics 3</b> parameter (→  185).
	<i>Example</i> For the display format: 24d12h13m00s

---

## Diagnostics 4

---

<b>Navigation</b>	  Expert → Diagnostics → Diagnostic list → Diagnostics 4 (0695)
<b>Description</b>	Displays the current diagnostics message with the fourth-highest priority.
<b>User interface</b>	Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information***Display*

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

*Examples*

For the display format:

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

---

**Timestamp**

---

**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 (→  185).

*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  key.

*Examples*

For the display format:

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

**Timestamp****Navigation**

 Expert → Diagnostics → Diagnostic list → Timestamp

**Description**

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

**User interface**

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

**Additional information***Display*

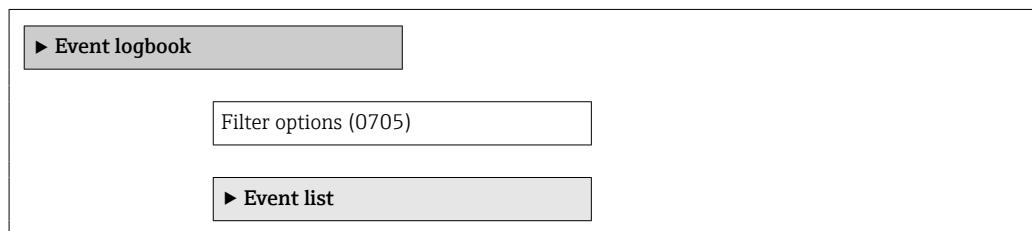
 The diagnostic message can be viewed via the **Diagnostics 5** parameter (→  186).

*Example*

For the display format:  
24d12h13m00s

**3.7.2 "Event logbook" submenu****Navigation**

 Expert → Diagnostics → Event logbook

**Filter options****Navigation**

 Expert → Diagnostics → Event logbook → Filter options

**Description**

Use this function to select the category whose event messages are displayed in the event list of the operating tool.

**Selection**

- All
- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- Information (I)

**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

### 3.7.3 "Device information" submenu

*Navigation*

Expert → Diagnostics → Device info

► Device information	
Device tag (0011)	→  188
Serial number (0009)	→  189
Firmware version (0010)	→  189
Device name (0020)	→  190
Order code (0008)	→  190
Extended order code 1 (0023)	→  190
Extended order code 2 (0021)	→  190
Extended order code 3 (0022)	→  191
Configuration counter (0233)	→  191
ENP version (0012)	→  191

---

**Device tag**


---

*Navigation*

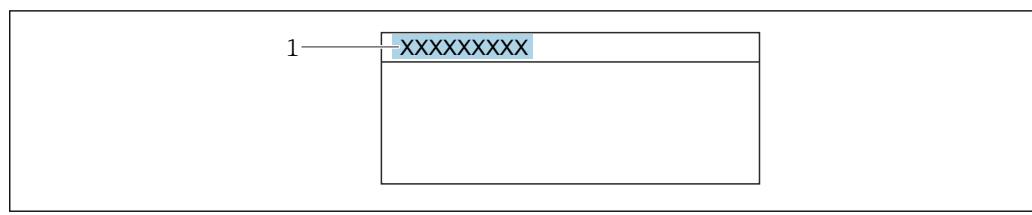
Expert → Diagnostics → Device info → Device tag (0011)

**Description**

Displays a unique name for the measuring point so it can be identified quickly within the plant. The name is displayed in the header.

**User interface**

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

**Additional information***User interface*

A0029422

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](http://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** Character string comprising numbers, letters and special characters (#16)

---

**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 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.

---

**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 (→ 190)

---

### 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 (→ 190)

---

### 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

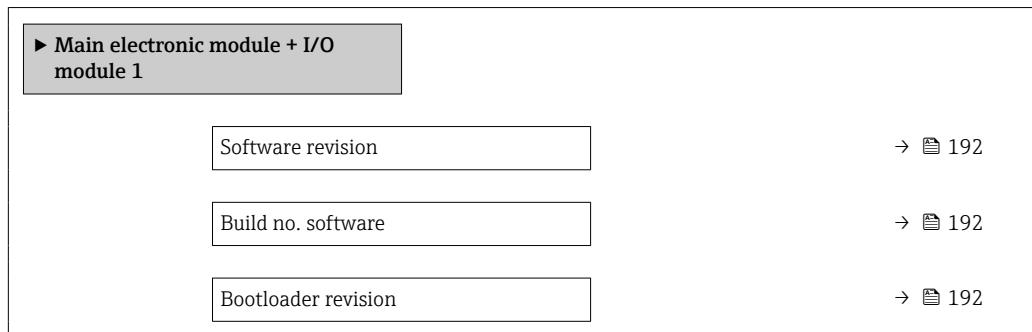
**Additional information** *Description*

This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device.

### 3.7.4 "Main electronic module + I/O module 1" submenu

Navigation

Expert → Diagnostics → Mainboard I/O1



---

#### Software revision

---

Navigation

Expert → Diagnostics → Mainboard I/O1 → Software rev. (0072)

Description

Use this function to display the software revision of the module.

User interface

Positive integer

---

#### Build no. software

---

Navigation

Expert → Diagnostics → Mainboard 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 → Mainboard I/O1 → Bootloader rev. (0073)

Description

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

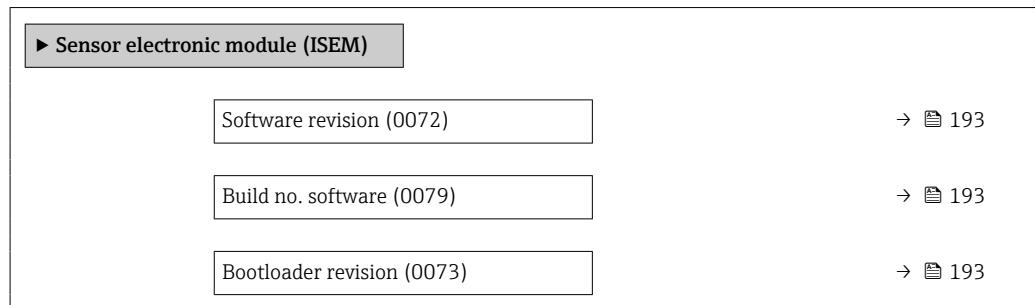
User interface

Positive integer

### 3.7.5 "Sensor electronic module (ISEM)" submenu

*Navigation*

Expert → Diagnostics → Sens. electronic



---

#### Software revision

---

**Navigation**

Expert → Diagnostics → Sens. electronic → Software rev. (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.

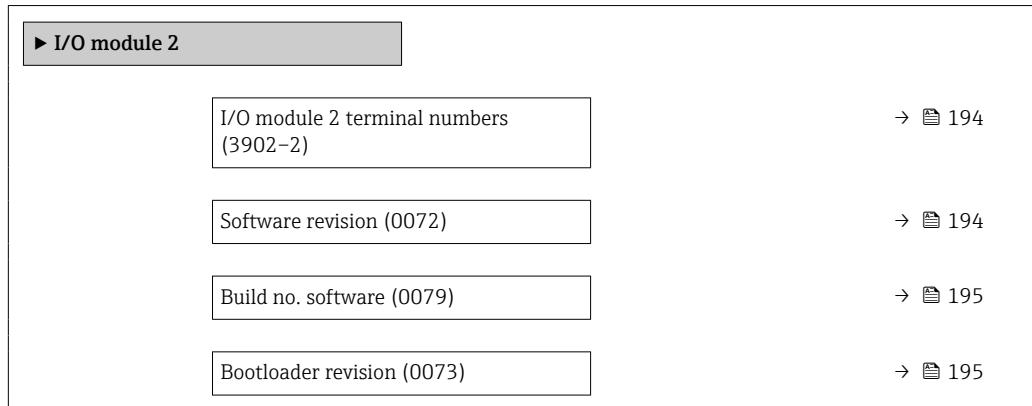
**User interface**

Positive integer

### 3.7.6 "I/O module 2" submenu

**Navigation**

Expert → Diagnostics → I/O module 2



#### I/O module 2 terminal numbers

**Navigation**

Expert → Diagnostics → I/O module 2 → I/O 2 terminals (3902-2)

**Description**

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

**User interface**

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

#### Software revision

**Navigation**

Expert → Diagnostics → Display module → Software rev. (0072)

Expert → Diagnostics → I/O module → Software rev. (0072)

Expert → Diagnostics → Sens. electronic → Software rev. (0072)

Expert → Diagnostics → Main elec.+I/O1 → Software rev. (0072)

Expert → Diagnostics → Mainboard I/O1 → Software rev. (0072)

**Description**

Use this function to display the software revision of the module.

**User interface**

Positive integer

\* Visibility depends on order options or device settings

---

**Build no. software**

---

**Navigation**   Expert → Diagnostics → I/O module → Build no. softw. (0079)

**Description** Use this function to display the software build number of the module.

**User interface** Positive integer

---

**Bootloader revision**

---

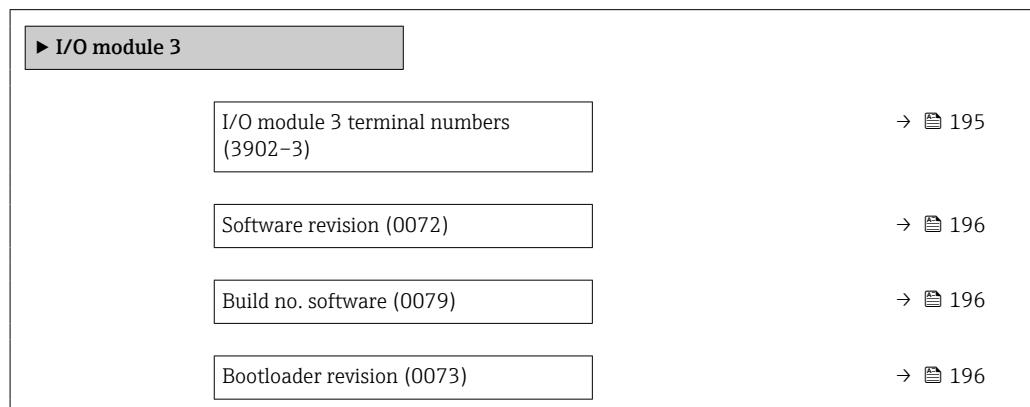
**Navigation**   Expert → Diagnostics → I/O module → Bootloader rev. (0073)

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

**User interface** Positive integer

### 3.7.7 "I/O module 3" submenu

*Navigation*   Expert → Diagnostics → I/O module 3



---

**I/O module 3 terminal numbers**

---

**Navigation**   Expert → Diagnostics → I/O module 3 → I/O 3 terminals (3902-3)

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

**User interface**

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

**Software revision****Navigation**

- ■ Expert → Diagnostics → Display module → Software rev. (0072)
- ■ Expert → Diagnostics → I/O module → Software rev. (0072)
- ■ Expert → Diagnostics → Sens. electronic → Software rev. (0072)
- ■ Expert → Diagnostics → Main elec.+I/O1 → Software rev. (0072)
- ■ Expert → Diagnostics → Mainboard I/O1 → Software rev. (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)
- ■ Expert → Diagnostics → I/O module → Build no. softw. (0079)
- ■ Expert → Diagnostics → Sens. electronic → Build no. softw. (0079)
- ■ Expert → Diagnostics → Main elec.+I/O1 → Build no. softw. (0079)
- ■ Expert → Diagnostics → Mainboard 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 → Display module → Bootloader rev. (0073)
- ■ Expert → Diagnostics → I/O module → Bootloader rev. (0073)
- ■ Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)
- ■ Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)
- ■ Expert → Diagnostics → Mainboard I/O1 → Bootloader rev. (0073)

**Description**

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

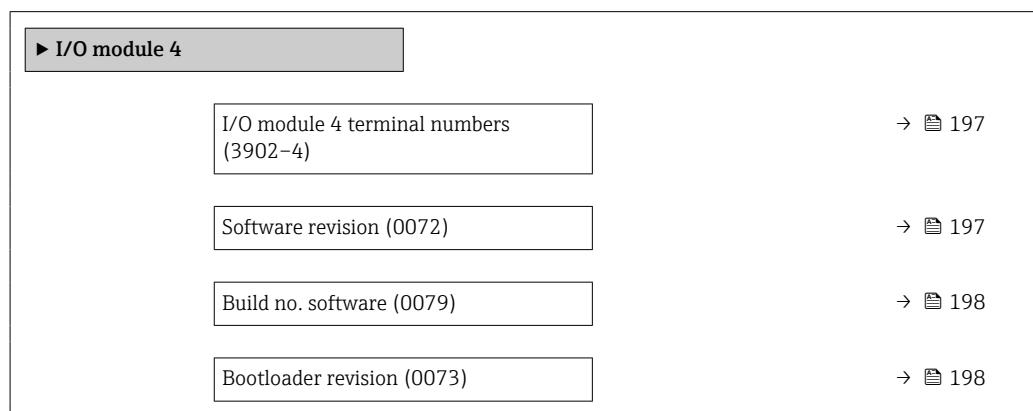
\* Visibility depends on order options or device settings

User interface	Positive integer
----------------	------------------

### 3.7.8 "I/O module 4" submenu

Navigation

Expert → Diagnostics → I/O module 4




---

#### I/O module 4 terminal numbers

---

Navigation

Expert → Diagnostics → I/O module 4 → I/O 4 terminals (3902-4)

Description

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

User interface

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

---

#### Software revision

---

Navigation

Expert → Diagnostics → I/O module → Software rev. (0072)

Description

Use this function to display the software revision of the module.

User interface

Positive integer

\* Visibility depends on order options or device settings

---

**Build no. software**

---

**Navigation**

- ④ ② Expert → Diagnostics → Display module → Build no. softw. (0079)
- ④ ② Expert → Diagnostics → I/O module → Build no. softw. (0079)
- ④ ② Expert → Diagnostics → Sens. electronic → Build no. softw. (0079)
- ④ ② Expert → Diagnostics → Main elec.+I/O1 → Build no. softw. (0079)
- ④ ② Expert → Diagnostics → Mainboard 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**

- ④ ② Expert → Diagnostics → Display module → Bootloader rev. (0073)
- ④ ② Expert → Diagnostics → I/O module → Bootloader rev. (0073)
- ④ ② Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)
- ④ ② Expert → Diagnostics → Main elec.+I/O1 → Bootloader rev. (0073)
- ④ ② Expert → Diagnostics → Mainboard I/O1 → Bootloader rev. (0073)

**Description**

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

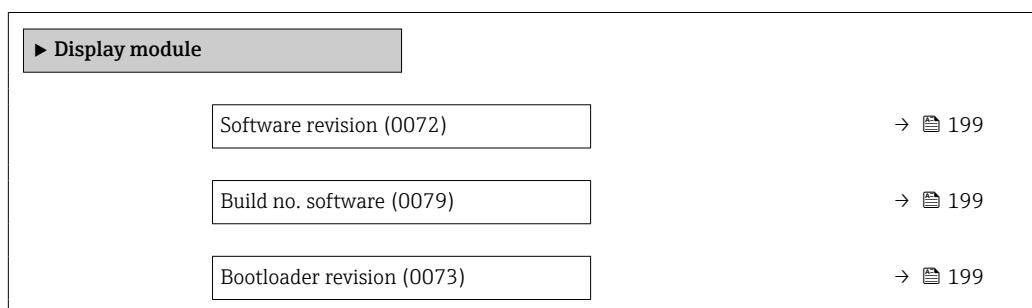
**User interface**

Positive integer

### 3.7.9 "Display module" submenu

*Navigation*

④ ② Expert → Diagnostics → Display module



---

**Software revision**

---

**Navigation**       Expert → Diagnostics → Display module → Software rev. (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

### 3.7.10 "Minimum/maximum values" submenu

*Navigation*

 Expert → Diagnostics → Min/max val.

**► Minimum/maximum values**

Reset min/max values      →  200

**► Main electronic temperature**      →  200

**► Medium temperature**      →  201

**Reset min/max values****Navigation**

Expert → Diagnostics → Min/max val. → Reset min/max (17015)

**Description**

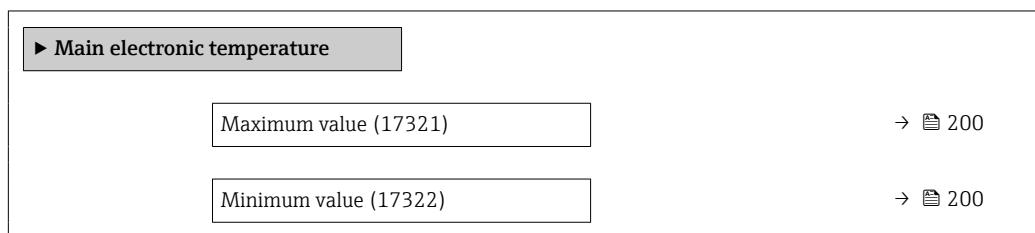
Select measured variable whose minimum value and maximum value are to be reset.

**Selection**

- Main electronic temperature (→ 200)
- Medium temperature (→ 201)

**"Main electronic temperature" submenu***Navigation*

Expert → Diagnostics → Min/max val. → Main elect.temp.

**Maximum value****Navigation**

Expert → Diagnostics → Min/max val. → Main elect.temp. → Maximum value (17321)

**Description**

Shows the highest previously measured temperature for the main electronic module in the transmitter.

**User interface**

Signed floating-point number

**Minimum value****Navigation**

Expert → Diagnostics → Min/max val. → Main elect.temp. → Minimum value (17322)

**Description**

Shows the lowest previously measured temperature for the main electronic module in the transmitter.

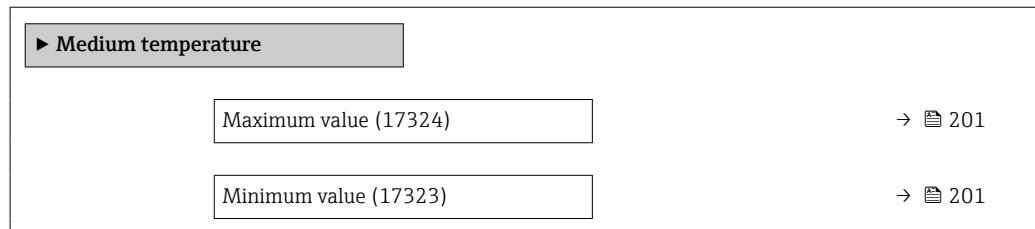
**User interface**

Signed floating-point number

### "Medium temperature" submenu

**Navigation**

Expert → Diagnostics → Min/max val. → Medium temp.



---

#### Maximum value

---

**Navigation**

Expert → Diagnostics → Min/max val. → Medium temp. → Maximum value (17324)

**Description**

Shows the highest previously measured medium temperature.

**User interface**

Signed floating-point number

---

#### Minimum value

---

**Navigation**

Expert → Diagnostics → Min/max val. → Medium temp. → Minimum value (17323)

**Description**

Shows the lowest previously measured medium temperature.

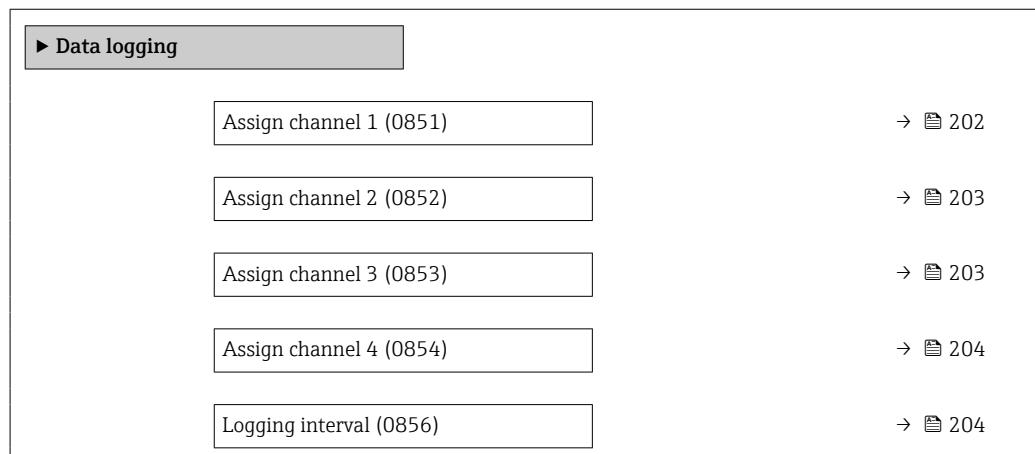
**User interface**

Signed floating-point number

### 3.7.11 "Data logging" submenu

**Navigation**

Expert → Diagnostics → Data logging



Clear logging data (0855)	→  205
Data logging (0860)	→  205
Logging delay (0859)	→  205
Data logging control (0857)	→  206
Data logging status (0858)	→  206
Entire logging duration (0861)	→  207
▶ Display channel 1	→  207
▶ Display channel 2	→  207
▶ Display channel 3	→  208
▶ Display channel 4	→  208

## 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 (→ 40).

### Description

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

### Selection

- Off
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow \*
- Volume flow
- Energy flow \*
- Heat flow
- Density
- Flow velocity
- Pressure
- 2nd temperature delta heat \*
- Electronic temperature
- Current output 1 \*
- Current output 2 \*
- Current output 3 \*
- Current output 4 \*

\* Visibility depends on order options or device settings

**Additional information***Description*

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

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

Once the maximum number of data points is reached, the oldest data points in the data log are cyclically overwritten in such a way that the last 1000, 500, 333 or 250 measured values are always in the log (ring memory principle).

 The log contents are cleared if the option selected is changed.

**Assign channel 2****Navigation**

  Expert → Diagnostics → Data logging → Assign chan. 2 (0852)

**Prerequisite**

The **Extended HistoROM** application package is available.

 The software options currently enabled are displayed in the **Software option overview** parameter (→  40).

**Description**

Options for the assignment of a process variable to the data logging channel.

**Selection**

Picklist, see **Assign channel 1** parameter (→  202)

**Assign channel 3****Navigation**

  Diagnostics → Data logging → Assign chan. 3 (0853)

  Diagnostics → Data logging → Assign chan. 3 (0853)

  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 (→  40).

**Description**

Options for the assignment of a process variable to the data logging channel.

**Selection**

Picklist, see **Assign channel 1** parameter (→  202)

## Assign channel 4



### Navigation

- █ Diagnostics → Data logging → Assign chan. 4 (0854)
- █ Diagnostics → Data logging → Assign chan. 4 (0854)
- █ █ Expert → Diagnostics → Data logging → Assign chan. 4 (0854)

### Prerequisite

The **Extended HistoROM** application package is available.

- i** The software options currently enabled are displayed in the **Software option overview** parameter (→ 40).

### Description

Options for the assignment of a process variable to the data logging channel.

### Selection

Picklist, see **Assign channel 1** parameter (→ 202)

## Logging interval



### Navigation

- █ █ Expert → Diagnostics → Data logging → Logging interval (0856)

### Prerequisite

The **Extended HistoROM** application package is available.

- i** The software options currently enabled are displayed in the **Software option overview** parameter (→ 40).

### Description

Use this function to enter the logging interval  $T_{log}$  for data logging.

### User entry

0.1 to 3 600.0 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).

- i** The log contents are cleared if the length of the logging interval is changed.

#### Example

If 1 logging channel is used:

- $T_{log} = 1000 \times 1 \text{ s} = 1000 \text{ s} \approx 15 \text{ min}$
- $T_{log} = 1000 \times 10 \text{ s} = 10000 \text{ s} \approx 3 \text{ h}$
- $T_{log} = 1000 \times 80 \text{ s} = 80000 \text{ s} \approx 1 \text{ d}$
- $T_{log} = 1000 \times 3600 \text{ s} = 3600000 \text{ s} \approx 41 \text{ d}$

---

## Clear logging data

---

**Navigation**

Expert → Diagnostics → Data logging → Clear logging (0855)

**Prerequisite**

The **Extended HistoROM** application package is available.

 The software options currently enabled are displayed in the **Software option overview** parameter (→ 40).

**Description**

Use this function to clear the entire logging data.

**Selection**

- Cancel
- Clear data

**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

**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 (→ 205), 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

**Additional information***Description*

Once measured value logging has been started with the **Data logging control** parameter (→ 206), the device does not save any data for the duration of the time delay entered.

## Data logging control



### Navigation

Expert → Diagnostics → Data logging → Data log.control (0857)

### Prerequisite

In the **Data logging** parameter (→ 205), the **Not overwriting** option is selected.

### Description

Use this function to start and stop measured value logging.

### Selection

- None
- Delete + start
- Stop

### 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 (→ 205), the **Not overwriting** option is selected.

### Description

Displays the measured value logging status.

### User interface

- Done
- Delay active
- Active
- Stopped

### 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 (→ 205), the **Not overwriting** option is selected.

**Description**

Displays the total logging duration.

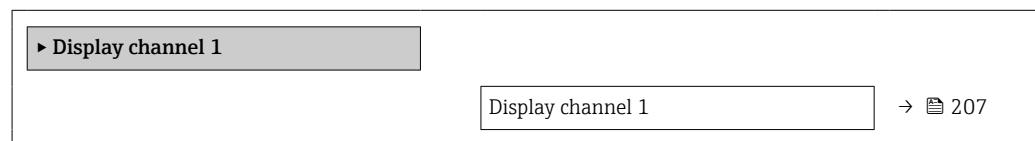
**User interface**

Positive floating-point number

---

**"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.

**i** The software options currently enabled are displayed in the **Software option overview** parameter (→ 40).

**Description**

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

**Additional information***Description*

- 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*

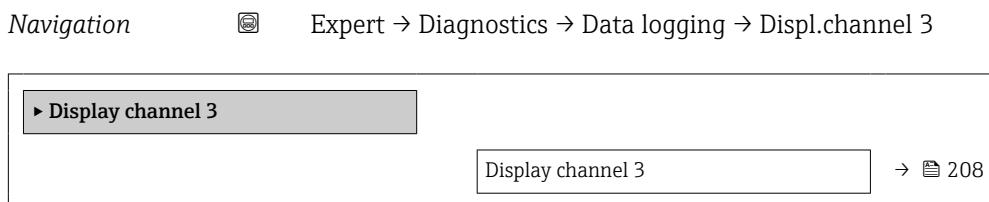
Expert → Diagnostics → Data logging → Displ.channel 2



## Display channel 2

Navigation	④ Expert → Diagnostics → Data logging → Displ.channel 2
Prerequisite	A process variable is defined in the <b>Assign channel 2</b> parameter.
Description	See the <b>Display channel 1</b> parameter → ④ 207

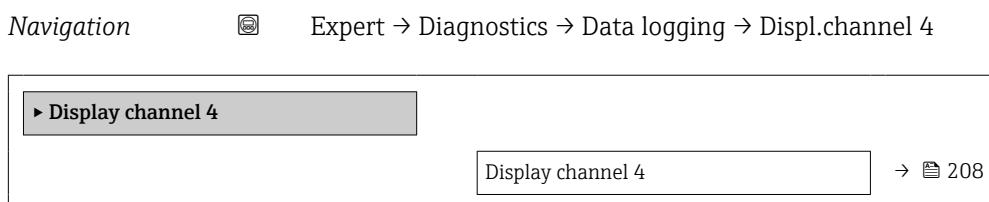
### "Display channel 3" submenu



## Display channel 3

Navigation	④ Expert → Diagnostics → Data logging → Displ.channel 3
Prerequisite	A process variable is defined in the <b>Assign channel 3</b> parameter.
Description	See the <b>Display channel 1</b> parameter → ④ 207

### "Display channel 4" submenu



## Display channel 4

Navigation	④ Expert → Diagnostics → Data logging → Displ.channel 4
Prerequisite	A process variable is defined in the <b>Assign channel 4</b> parameter.

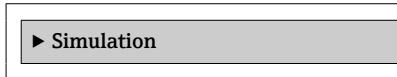
**Description**See the **Display channel 1** parameter → [207](#)

### 3.7.12 "Heartbeat" submenu

 For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring** refer to the Special Documentation for the device → [7](#)

*Navigation*  Expert → Diagnostics → Heartbeat**▶ Heartbeat Technology**

### 3.7.13 "Simulation" submenu

*Navigation*  Expert → Diagnostics → Simulation**▶ Simulation**

Assign simulation process variable  
(1810) → [210](#)

Process variable value (1811) → [210](#)

Current input 1 to n simulation  
(1608-1 to n) → [211](#)

Value current input 1 to n  
(1609-1 to n) → [211](#)

Status input simulation 1 to n  
(1355-1 to n) → [212](#)

Input signal level 1 to n (1356-1 to n) → [212](#)

Current output 1 to n simulation  
(0354-1 to n) → [212](#)

Value current output 1 to n  
(0355-1 to n) → [213](#)

Frequency output simulation 1 to n  
(0472-1 to n) → [213](#)

Frequency value 1 to n (0473-1 to n) → [214](#)

Pulse output simulation 1 to n  
(0458-1 to n) → [214](#)

Pulse value 1 to n (0459-1 to n) → [215](#)

Switch output simulation 1 to n (0462-1 to n)	→  215
Switch status 1 to n (0463-1 to n)	→  215
Relay output 1 to n simulation (0802-1 to n)	→  216
Switch status 1 to n (0803-1 to n)	→  216
Device alarm simulation (0654)	→  217
Diagnostic event category (0738)	→  217
Diagnostic event simulation (0737)	→  217

## 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
- Temperature
- Mass flow
- Corrected volume flow
- FAD volume flow \*
- Volume flow
- Energy flow \*
- Heat flow \*
- Density
- Flow velocity

### Additional information

#### Description

The simulation value of the process variable selected is defined in the **Process variable value** parameter (→ 210).

## Process variable value



### Navigation

Expert → Diagnostics → Simulation → Proc. var. value (1811)

### Prerequisite

A process variable is selected in the **Assign simulation process variable** parameter (→ 210).

\* Visibility depends on order options or device settings

<b>Description</b>	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.
<b>User entry</b>	Depends on the process variable selected
<b>Additional information</b>	<p><i>User entry</i></p>  The unit of the displayed measured value is taken from the <b>System units</b> submenu (→ 54).

## Current input 1 to n simulation



<b>Navigation</b>	 Expert → Diagnostics → Simulation → Curr.inp 1 to n sim. (1608-1 to n)
<b>Description</b>	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 <b>Value current input 1 to n</b> parameter.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ On</li> </ul>
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ Off Current simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.</li> <li>▪ On Current simulation is active.</li> </ul>

## Value current input 1 to n



<b>Navigation</b>	 Expert → Diagnostics → Simulation → Value curr.inp 1 to n (1609-1 to n)
<b>Prerequisite</b>	In the <b>Current input 1 to n simulation</b> parameter, the <b>On</b> option is selected.
<b>Description</b>	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.
<b>User entry</b>	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

**Additional information***Description*

The desired simulation value is defined in the **Input signal level** parameter (→ 212).

*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 (→ 212), the **On** option is selected.

**Description**

Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct function of upstream feed-in units.

**Selection**

- High
- Low

**Current output 1 to n simulation****Navigation**

Expert → Diagnostics → Simulation → Curr.out. 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

**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.

---

**Value current output 1 to n****Navigation**

Diagram 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 (→ [112](#)).

---

**Frequency output simulation 1 to n****Navigation**

Diagram Expert → Diagnostics → Simulation → FreqOutputSim 1 to n (0472-1 to n)

**Prerequisite**

In the **Operating mode** parameter (→ [119](#)), 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

**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 value 1 to n****Navigation**

Expert → Diagnostics → Simulation → Freq value 1 to n (0473–1 to n)

**Prerequisite**

In the **Frequency output 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 (→ 119), 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

**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 (→ 121).

- Down-counting value

The pulses specified in the **Pulse value** parameter (→ 215) 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 (→ 119), 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

**Additional information***Description*

The desired simulation value is defined in the **Switch status 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 status 1 to n****Navigation**

Expert → Diagnostics → Simulation → Switch status 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

**Additional information***Description*

The desired simulation value is defined in the **Switch status 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 status 1 to n****Navigation**

Expert → Diagnostics → Simulation → Switch status 1 to n (0803–1 to n)

**Prerequisite**

The **On** option is selected in the **Switch output simulation 1 to n** parameter parameter.

**Description**

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

**Selection**

- Open
- Closed

**Additional information***Selection*

- Open  
Relay simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed  
Relay simulation is active.

---

**Device alarm simulation****Navigation**

Expert → Diagnostics → Simulation → Dev. alarm sim. (0654)

**Description**

Use this function to switch the device alarm on and off.

**Selection**

- Off
- On

**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 (→ 217).

**Selection**

- Sensor
- Electronics
- Configuration
- 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)

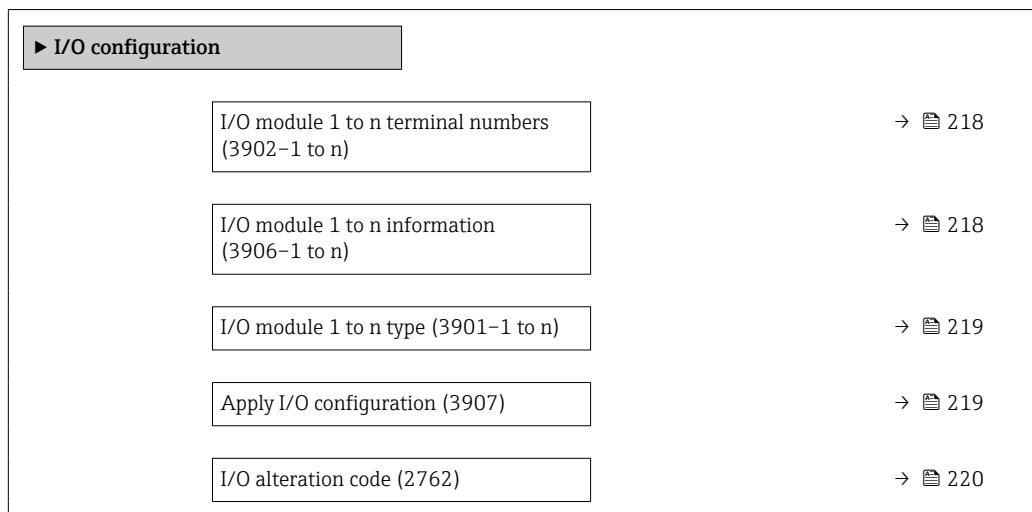
**Additional information***Description*

For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event category** parameter (→ 217).

### 3.8 "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

\* Visibility depends on order options or device settings

<b>Additional information</b>	<p><i>"Not plugged"</i> option The I/O module is not plugged in.</p> <p><i>"Invalid"</i> option The I/O module is not plugged correctly.</p> <p><i>"Not configurable"</i> option The I/O module is not configurable.</p> <p><i>"Configurable"</i> option The I/O module is configurable.</p> <p><i>"Fieldbus"</i> option The I/O module is configured for HART.</p>
-------------------------------	---

---

## I/O module 1 to n type



<b>Navigation</b>	Expert → I/O config. → I/O 1 to n type (3901-1 to n)
<b>Prerequisite</b>	For the following order code: <ul style="list-style-type: none"><li>■ "Output; input 2", option D "Configurable I/O initial setting off"</li><li>■ "Output; input 3", option D "Configurable I/O initial setting off"</li><li>■ "Output; input 4", option D "Configurable I/O initial setting off"</li></ul>
<b>Description</b>	Use this function to select the I/O module type for the configuration of the I/O module.
<b>Selection</b>	<ul style="list-style-type: none"><li>■ Off</li><li>■ Current output *</li><li>■ Current input *</li><li>■ Status input *</li><li>■ Pulse/frequency/switch output *</li><li>■ Relay output</li></ul>

---

## Apply I/O configuration



<b>Navigation</b>	Expert → I/O config. → Apply I/O config (3907)
<b>Description</b>	Use this function to activate the newly configured I/O module type.
<b>Selection</b>	<ul style="list-style-type: none"><li>■ No</li><li>■ Yes</li></ul>

---

\* Visibility depends on order options or device settings

**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

**Additional information** *Description*

The I/O configuration is changed in the **I/O module type** parameter (→ 219).

## 4 Country-specific factory settings

### 4.1 SI units

 Not valid for USA and Canada.

#### 4.1.1 System units

Volume flow	$\text{m}^3/\text{h}$ option
Volume	$\text{m}^3$ option
Mass flow	$\text{kg}/\text{h}$ option
Mass	$\text{kg}$ option
Corrected volume flow	$\text{Nm}^3/\text{h}$ option
Corrected volume	$\text{Nm}^3$ option
FAD volume flow	$\text{m}^3 \text{ FAD}/\text{h}$ option
FAD volume	$\text{m}^3 \text{ FAD}$ option
Density	$\text{kg}/\text{m}^3$ option
Reference density	$\text{kg}/\text{Nm}^3$
Temperature	$^\circ\text{C}$ option
Length	$\text{mm}$ option
Pressure	<b>bar a</b> option

#### 4.1.2 Full scale values

The full scale values depend on the medium type, nominal diameter and rectifier.

 The factory settings apply to the following parameters:

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

#### 4.1.3 Output current span

Current output 1 to n	4 to 20 mA NAMUR
-----------------------	------------------

#### 4.1.4 On value low flow cut off

 The switch-on point depends on the type of medium and the nominal diameter.

## 4.2 US units

 Only valid for USA and Canada.

#### 4.2.1 System units

Volume flow	$\text{ft}^3/\text{h}$ option
Volume	$\text{ft}^3$ option
Mass flow	$\text{lb}/\text{h}$ option

<b>Mass</b>	lb option
<b>Corrected volume flow</b>	Sft <sup>3</sup> /min option
<b>Corrected volume</b>	Sft <sup>3</sup> option
<b>FAD volume flow</b>	ft <sup>3</sup> FAD/h
<b>FAD volume</b>	ft <sup>3</sup> FAD
<b>Density</b>	lb/ft <sup>3</sup> option
<b>Reference density</b>	lb/Sft <sup>3</sup>
<b>Temperature</b>	°F option
<b>Length</b>	in option
<b>Pressure</b>	psi a option

#### 4.2.2 Full scale values

The full scale values depend on the medium type, nominal diameter and rectifier.

 The factory settings apply to the following parameters:

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

#### 4.2.3 Output current span

Current output 1 to n	4 to 20 mA US
-----------------------	---------------

#### 4.2.4 On value low flow cut off

 The switch-on point depends on the type of medium and the nominal diameter.

## 5 Explanation of abbreviated units

### 5.1 SI units

Process variable	Units	Explanation
Density	g/cm <sup>3</sup>	Gram/volume unit
	kg/l, kg/dm <sup>3</sup> , kg/m <sup>3</sup>	Kilogram/volume unit
Pressure	kPa a, MPa a	Kilopascal, megapascal (absolute)
	bar	Bar
	mbar a	Millibar (absolute)
FAD volume	l FAD, m <sup>3</sup> FAD	FAD liter, FAD cubic meter
FAD volume flow	l FAD/s, l FAD/min, l FAD/h, l FAD/d	FAD liter/time unit
	m <sup>3</sup> FAD/s, m <sup>3</sup> FAD/min, m <sup>3</sup> FAD/h, m <sup>3</sup> FAD/d	FAD cubic meter/time unit
Length	mm, m	Millimeter, meter
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
Corrected volume	NI, Nm <sup>3</sup> , SI, Sm <sup>3</sup>	Normal liter, normal cubic meter, standard liter, standard cubic meter
Corrected volume flow	NI/s, NI/min, NI/h, NI/d	Normal liter/time unit
	Nm <sup>3</sup> /s, Nm <sup>3</sup> /min, Nm <sup>3</sup> /h, Nm <sup>3</sup> /d	Normal cubic meter/time unit
	SI/s, SI/min, SI/h, SI/d	Standard liter/time unit
	Sm <sup>3</sup> /s, Sm <sup>3</sup> /min, Sm <sup>3</sup> /h, Sm <sup>3</sup> /d	Standard cubic meter/time unit
Temperature	°C, K	Celsius, Kelvin
Volume	m <sup>3</sup>	Cubic meters
Volume flow	m <sup>3</sup> /s, m <sup>3</sup> /min, m <sup>3</sup> /h, m <sup>3</sup> /d	Cubic meter/time unit
	l/s, l/min, l/h, l/d	Liter/time unit
Time	s, m, h, d, y	Second, minute, hour, day, year

### 5.2 US units

Process variable	Units	Explanation
Density	lb/ft <sup>3</sup>	Pound/cubic foot
FAD volume	ft <sup>3</sup> FAD	FAD cubic foot
FAD volume flow	cf FAD/s, cf FAD/min, cf FAD/h, cf FAD/d	FAD cubic foot/time unit
FAD volume flow	ft <sup>3</sup> FAD/s, ft <sup>3</sup> FAD/min, ft <sup>3</sup> FAD/h, ft <sup>3</sup> FAD/d,	FAD cubic foot/time unit
Length	in, ft	Inch, foot
Mass	lb, ton	Pound, standard ton
lb/s, lb/min, lb/h, lb/d	Pound/time unit	

Process variable	Units	Explanation
STon/s, STon/min, STon/h, STon/d	Standard ton/time unit	
Mass flow	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	ton/s, ton/min, ton/h, ton/d	Standard ton/time unit
Corrected volume	Sft <sup>3</sup>	Standard cubic foot
Corrected volume flow	Sft <sup>3</sup> /s, Sft <sup>3</sup> /min, Sft <sup>3</sup> /h, Sft <sup>3</sup> /d	Standard cubic foot/time unit
Temperature	°F, °R	Fahrenheit, Rankine
Volume	ft <sup>3</sup>	Cubic foot
Volume flow	ft <sup>3</sup> /s, ft <sup>3</sup> /min, ft <sup>3</sup> /h, ft <sup>3</sup> /d	Cubic foot/time unit
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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