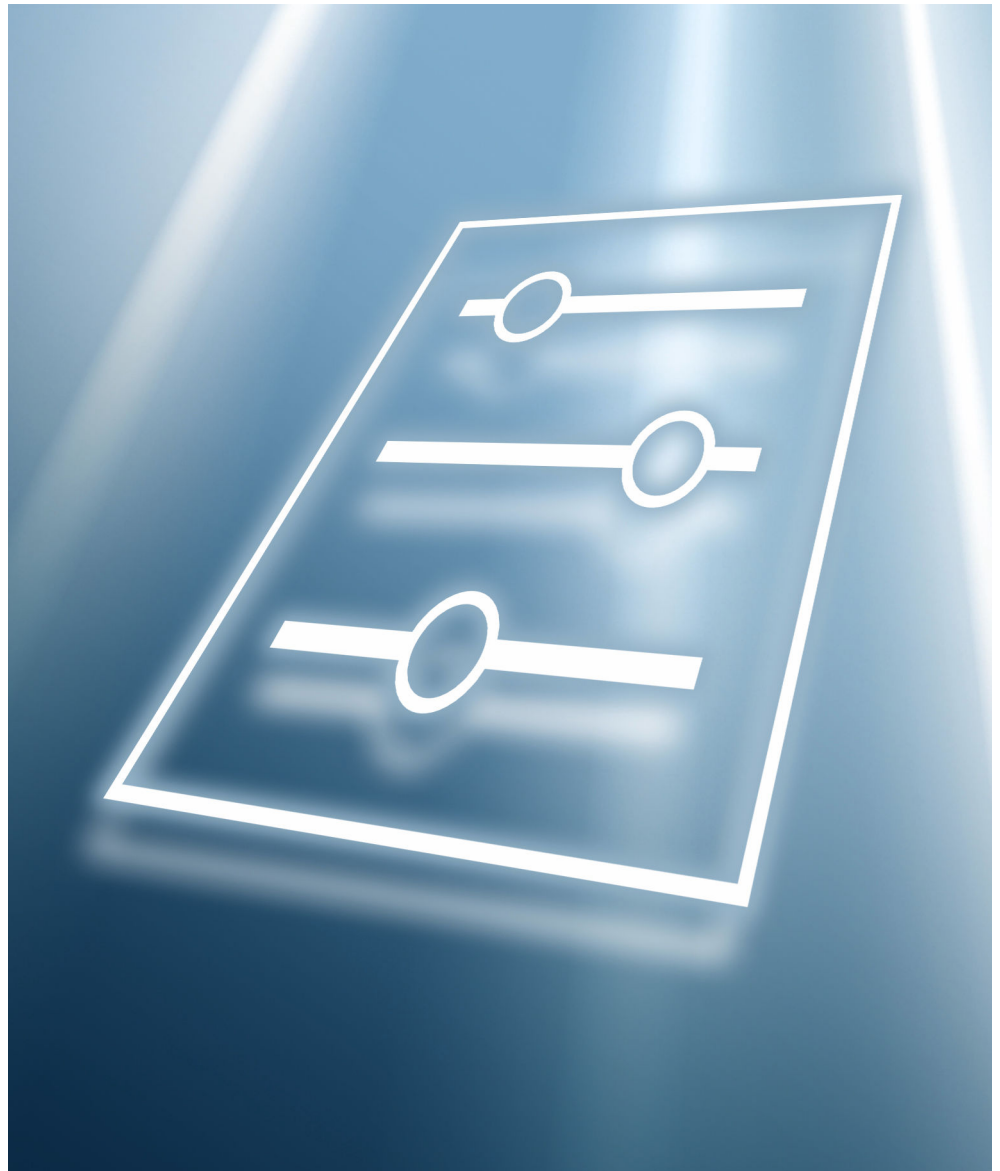


# Description of Device Parameters

## Proline Prosonic Flow I 400

Ultrasonic time-of-flight flowmeter  
HART





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# 1 About this document

## 1.1 Document function

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

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


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

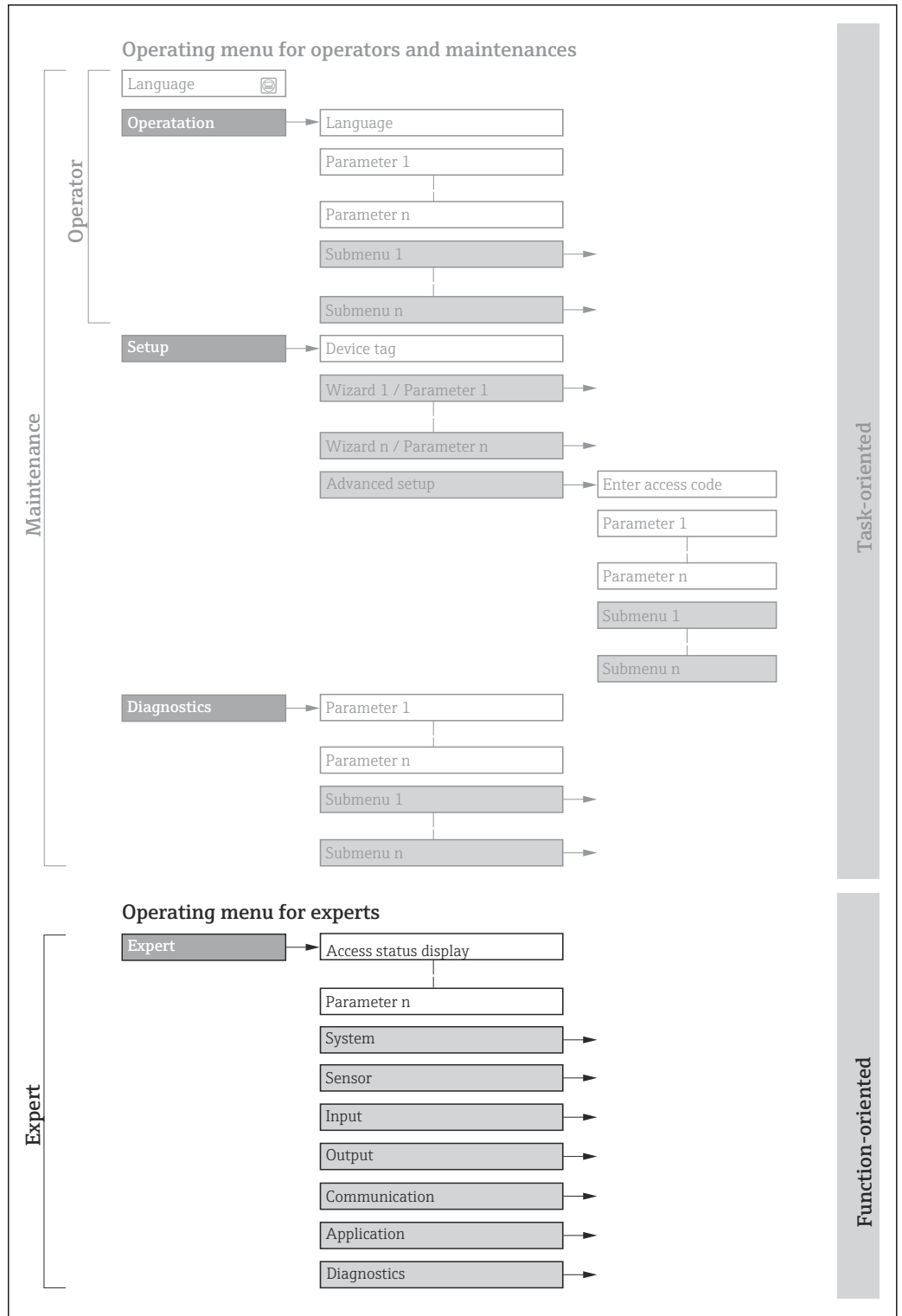
## 1.2 Target group

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

## 1.3 Using this document

### 1.3.1 Information on the document structure

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






1 Sample graphic for the schematic layout of the operating menu

- Additional information regarding:
- The arrangement of the parameters according to the menu structure of the **Operation** menu, **Setup** menu, **Diagnostics** menu with a brief description: Operating Instructions
  - 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 = 
<b>Navigation</b>	 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.
<b>Prerequisite</b>	The parameter is only available under these specific conditions
<b>Description</b>	Description of the parameter function
<b>Selection</b>	List of the individual options for the parameter <ul style="list-style-type: none"> <li>■ Option 1</li> <li>■ Option 2</li> </ul>
<b>User entry</b>	Parameter entry range
<b>Display</b>	Display value/data of the parameter
<b>Factory setting</b>	Default setting ex works
<b>Additional information</b>	Additional explanations (e.g. in examples): <ul style="list-style-type: none"> <li>■ For individual options</li> <li>■ For display value/data</li> <li>■ For the input range</li> <li>■ For the factory setting</li> <li>■ For the parameter function</li> </ul>

## 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
 A0028662	Operation via local display
 A0028663	Operation via operating tool
 A0028665	Write-protected parameter

## 1.4.2 Symbols in graphics

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

## 1.5 Documentation

### 1.5.1 Standard documentation

#### Operating Instructions

Measuring device	Documentation code
Prosonic Flow I 400	BA02085D

### 1.5.2 Supplementary device-dependent documentation

#### Special Documentation

Content	Documentation code
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
Heartbeat Technology	SD02712D

## 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.

<b>Expert</b>		
Direct access (0106)		→ 11
Locking status (0004)		→ 12
User role (0005)		→ 13
Enter access code (0003)		→ 13
▶ <b>System</b>		→ 13
▶ <b>Display</b>		→ 14
▶ <b>Diagnostic handling</b>		→ 27
▶ <b>Administration</b>		→ 34
▶ <b>Sensor</b>		→ 39
▶ <b>Measured values</b>		→ 39
▶ <b>System units</b>		→ 47
▶ <b>Measuring point 1</b>		→ 54
▶ <b>Installation status</b>		→ 61
▶ <b>Process parameters</b>		→ 63
▶ <b>External compensation</b>		→ 67
▶ <b>Sensor adjustment</b>		→ 71
▶ <b>Calibration</b>		→ 75
▶ <b>Input</b>		→ 77
▶ <b>Status input</b>		→ 77















▶ Output	→ 79
▶ Current output 1	→ 79
▶ Pulse/frequency/switch output 1 to n	→ 92
▶ Communication	→ 110
▶ HART input	→ 110
▶ HART output	→ 116
▶ Web server	→ 132
▶ Diagnostic configuration	→ 135
▶ WLAN settings	→ 142
▶ Application	→ 148
Reset all totalizers (2806)	→ 149
▶ Totalizer 1 to n	→ 149
▶ Diagnostics	→ 154
Actual diagnostics (0691)	→ 158
Previous diagnostics (0690)	→ 158
Operating time from restart (0653)	→ 159
Operating time (0652)	→ 159
▶ Diagnostic list	→ 159
▶ Device information	→ 163
▶ Main electronic module	→ 167
▶ Sensor electronic module (ISEM)	→ 168
▶ Display module	→ 169
▶ Data logging	→ 170


▶ Heartbeat Technology	→ 177
▶ Simulation	→ 187

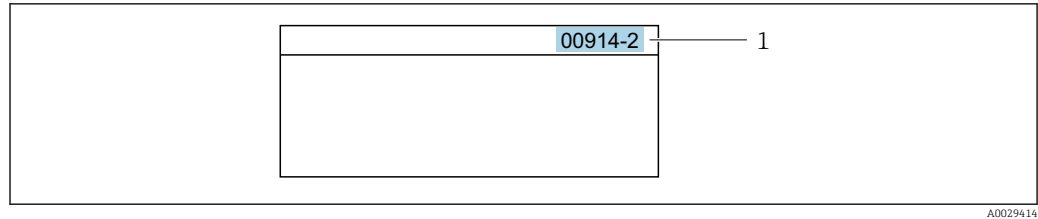
### 3 Description of device parameters

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

 Expert		
Direct access (0106)	→	 11
Locking status (0004)	→	 12
User role (0005)	→	 13
Enter access code (0003)	→	 13
▶ System	→	 13
▶ Sensor	→	 39
▶ Input	→	 77
▶ Output	→	 79
▶ Communication	→	 110
▶ Application	→	 148
▶ Diagnostics	→	 154

#### 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>



1 Direct access code

Note the following when entering the direct access code:

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

## Locking status

### Navigation

Expert → Locking status (0004)

### Description

Displays the active write protection.

### User interface

- Hardware locked
- Temporarily locked

### Additional information

#### Display

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


#### Options

Options	Description
None	The access authorization displayed in the <b>Access status display</b> parameter (→  26) applies. Only appears on local display.
Hardware locked (priority 1)	The DIP switch for hardware locking is activated on the main electronics module. 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.

**User role**

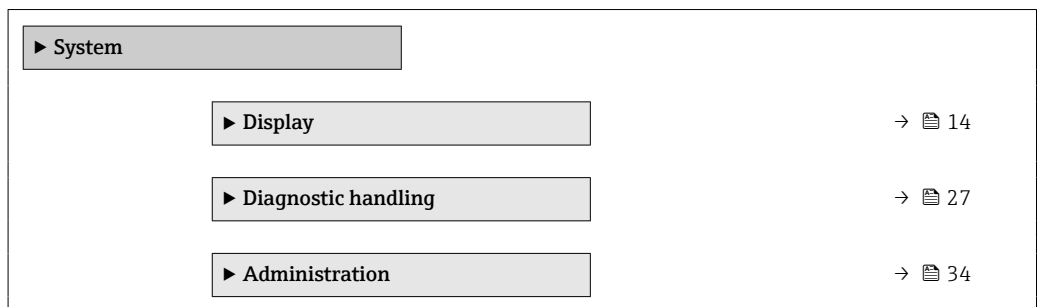
<b>Navigation</b>	 Expert → User role (0005)
<b>Description</b>	Displays the access authorization to the parameters via the operating tool or Web browser.
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Operator</li> <li>▪ Maintenance</li> </ul>
<b>Factory setting</b>	Maintenance
<b>Additional information</b>	<p><i>Description</i></p> <p> Access authorization can be modified via the <b>Enter access code</b> parameter (→  13).</p> <p> If additional write protection is active, this restricts the current access authorization even further.</p> <p><i>User interface</i></p> <p> Detailed information on access authorization is provided in the "User roles and associated access authorization" and "Operating concept" sections of the Operations Instructions for the device</p>

**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










### 3.1 "System" submenu

*Navigation*  Expert → System



### 3.1.1 "Display" submenu



Navigation  Expert → System → Display

► Display	
Display language (0104)	→  15
Format display (0098)	→  15
Value 1 display (0107)	→  18
0% bargraph value 1 (0123)	→  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)	→  21
0% bargraph value 3 (0124)	→  21
100% bargraph value 3 (0126)	→  22
Decimal places 3 (0118)	→  22
Value 4 display (0109)	→  22
Decimal places 4 (0119)	→  23
Display interval (0096)	→  23
Display damping (0094)	→  24
Header (0097)	→  24
Header text (0112)	→  25
Separator (0101)	→  25
Contrast display (0105)	→  26
Backlight (0111)	→  26

---

**Display language**




---

<b>Navigation</b>	  Expert → System → Display → Display language (0104)
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to select the configured language on the local display.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ English</li> <li>■ Deutsch</li> <li>■ Français</li> <li>■ Español</li> <li>■ Italiano</li> <li>■ Nederlands</li> <li>■ Portuguesa</li> <li>■ Polski</li> <li>■ русский язык (Russian)</li> <li>■ Svenska</li> <li>■ Türkçe</li> <li>■ 中文 (Chinese)</li> <li>■ 日本語 (Japanese)</li> <li>■ 한국어 (Korean)</li> <li>■ tiếng Việt (Vietnamese) *</li> <li>■ čeština (Czech)</li> </ul>
<b>Factory setting</b>	English (alternatively, the ordered language is preset in the device)

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**Format display**


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


<b>Navigation</b>	  Expert → System → Display → Format display (0098)
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to select how the measured value is shown on the local display.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ 1 value, max. size</li> <li>■ 1 bargraph + 1 value</li> <li>■ 2 values</li> <li>■ 1 value large + 2 values</li> <li>■ 4 values</li> </ul>
<b>Factory setting</b>	1 value, max. size

---

\* Visibility depends on order options or device settings

**Additional information***Description*

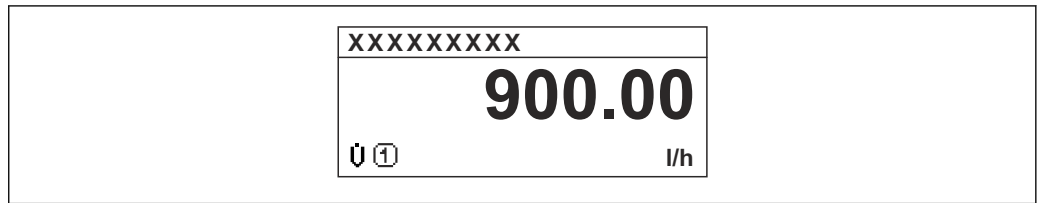
The display format (size, bar graph) and number of simultaneously displayed measured values (1 to 4) can be configured. This setting only applies to normal operation.

-  The **Value 1 display** parameter (→  18)...**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 using the **Display interval** parameter (→  23).

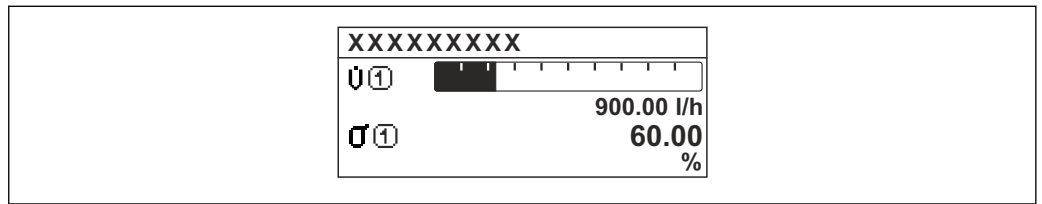


Possible measured values shown on the local display:

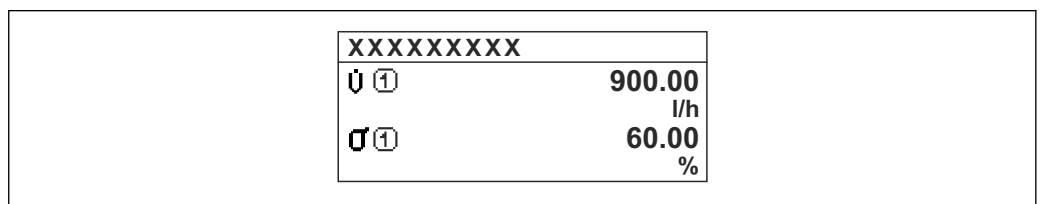
"1 value, max. size" option



"1 bargraph + 1 value" option

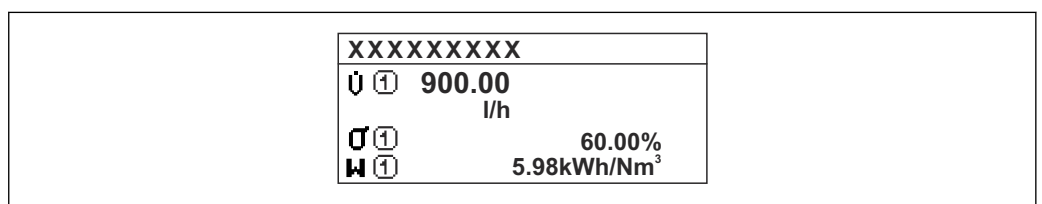


"2 values" option

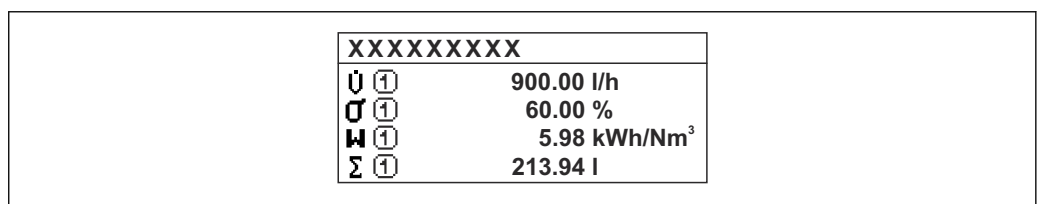








2



"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 a measured value that is shown on the local display.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Volume flow</li> <li>▪ Mass flow</li> <li>▪ Flow velocity</li> <li>▪ Sound velocity</li> <li>▪ Temperature</li> <li>▪ Density</li> <li>▪ Electronics temperature</li> <li>▪ Signal strength<sup>*</sup></li> <li>▪ Signal to noise ratio<sup>*</sup></li> <li>▪ Acceptance rate<sup>*</sup></li> <li>▪ Turbulence<sup>*</sup></li> <li>▪ Totalizer 1</li> <li>▪ Totalizer 2</li> <li>▪ Totalizer 3</li> <li>▪ Current output 1</li> </ul>
<b>Factory setting</b>	Volume flow
<b>Additional information</b>	<p><i>Description</i></p> <p>If several measured values are displayed one below the other, 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 (→  15) 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 (→  47).</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
<b>Factory setting</b>	Country-specific

\* Visibility depends on order options or device settings

**Additional information***Description*

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

*User entry*

 The unit of the displayed measured value is taken from the **System units** submenu (→  47).

**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

**Additional information***Description*

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

*User entry*

 The unit of the displayed measured value is taken from the **System units** submenu (→  47).

**Decimal places 1****Navigation**

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

**Prerequisite**

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

**Description**

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


**Selection**









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





**Factory setting**

x.XX

**Additional information***Description*

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

Value 2 display 	
<b>Navigation</b>	 Expert → System → Display → Value 2 display (0108)
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to select a measured value that is shown on the local display.
<b>Selection</b>	For the picklist, see <b>Value 1 display</b> parameter (→  18)  or  For the picklist, see <b>Value 1 display</b> parameter (→  18)
<b>Factory setting</b>	None
<b>Additional information</b>	<p><i>Description</i></p> <p>If several measured values are displayed one below the other, the measured value selected here will be the second value to be displayed. The value is only displayed during normal operation.</p> <p> The <b>Format display</b> parameter (→  15) 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 (→  47).</p>

Decimal places 2 	
<b>Navigation</b>	 Expert → System → Display → Decimal places 2 (0117)
<b>Prerequisite</b>	A measured value is specified in the <b>Value 2 display</b> parameter (→  20).
<b>Description</b>	Use this function to select the number of decimal places for measured value 2.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ x</li> <li>■ x.x</li> <li>■ x.xx</li> <li>■ x.xxx</li> <li>■ x.xxxx</li> </ul>
<b>Factory setting</b>	x.xx
<b>Additional information</b>	<p><i>Description</i></p> <p> This setting does not affect the accuracy of the device for measuring or calculating the value.</p>

---

**Value 3 display**

---



<b>Navigation</b>	Expert → System → Display → Value 3 display (0110)
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to select a measured value that is shown on the local display.
<b>Selection</b>	For the picklist, see <b>Value 1 display</b> parameter (→  18)
<b>Factory setting</b>	None
<b>Additional information</b>	<p><i>Description</i></p> <p>If several measured values are displayed one below the other, the measured value selected here will be the third value to be displayed. The value is only displayed during normal operation.</p> <p> The <b>Format display</b> parameter (→  15) is used to specify how many measured values are displayed simultaneously and how.</p> <p><i>Options</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  47).</p>

---

**0% bargraph value 3**

---



<b>Navigation</b>	Expert → System → Display → 0% bargraph 3 (0124)
<b>Prerequisite</b>	A selection was made in the <b>Value 3 display</b> parameter (→  21).
<b>Description</b>	Use this function to enter the 0% bar graph value to be shown on the display for the measured value 3.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	Country-specific
<b>Additional information</b>	<p><i>Description</i></p> <p> The <b>Format display</b> parameter (→  15) is used to specify that the measured value is to be displayed as a bar graph.</p> <p><i>User entry</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  47).</p>

---

**100% bargraph value 3**


<b>Navigation</b>	Expert → System → Display → 100% bargraph 3 (0126)
<b>Prerequisite</b>	A selection was made in the <b>Value 3 display</b> parameter (→  21).
<b>Description</b>	Use this function to enter the 100% bar graph value to be shown on the display for the measured value 3.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0
<b>Additional information</b>	<p><i>Description</i></p> <p> The <b>Format display</b> parameter (→  15) is used to specify that the measured value is to be displayed as a bar graph.</p> <p><i>User entry</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  47).</p>

---






**Decimal places 3**


<b>Navigation</b>	Expert → System → Display → Decimal places 3 (0118)
<b>Prerequisite</b>	A measured value is specified in the <b>Value 3 display</b> parameter (→  21).
<b>Description</b>	Use this function to select the number of decimal places for measured value 3.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ x</li> <li>▪ x.x</li> <li>▪ x.xx</li> <li>▪ x.xxx</li> <li>▪ x.xxxx</li> </ul>
<b>Factory setting</b>	x.xx
<b>Additional information</b>	<p><i>Description</i></p> <p> This setting does not affect the accuracy of the device for measuring or calculating the value.</p>

---

**Value 4 display**






<b>Navigation</b>	Expert → System → Display → Value 4 display (0109)
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to select a measured value that is shown on the local display.

<b>Selection</b>	For the picklist, see <b>Value 1 display</b> parameter (→  18)
<b>Factory setting</b>	None
<b>Additional information</b>	<p><i>Description</i></p> <p>If several measured values are displayed one below the other, the measured value selected here will be the fourth value to be displayed. The value is only displayed during normal operation.</p> <p> The <b>Format display</b> parameter (→  15) is used to specify how many measured values are displayed simultaneously and how.</p> <p><i>Options</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  47).</p>

---

## Decimal places 4



---





<b>Navigation</b>	  Expert → System → Display → Decimal places 4 (0119)
<b>Prerequisite</b>	A measured value is specified in the <b>Value 4 display</b> parameter (→  22).
<b>Description</b>	Use this function to select the number of decimal places for measured value 4.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ x</li> <li>▪ x.x</li> <li>▪ x.xx</li> <li>▪ x.xxx</li> <li>▪ x.xxxx</li> </ul>
<b>Factory setting</b>	x.xx
<b>Additional information</b>	<p><i>Description</i></p> <p> This setting does not affect the accuracy of the device for measuring or calculating the value.</p>

---

## Display interval




---

<b>Navigation</b>	  Expert → System → Display → Display interval (0096)
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to enter the length of time the measured values are displayed if the values alternate on the display.
<b>User entry</b>	1 to 10 s
<b>Factory setting</b>	5 s

<b>Additional information</b>	<p><i>Description</i></p> <p>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.</p> <ul style="list-style-type: none"> <li>  <ul style="list-style-type: none"> <li>▪ The <b>Value 1 display</b> parameter (→  18)...<b>Value 4 display</b> parameter (→  22) are used to specify which measured values are shown on the local display.</li> <li>▪ The display format for the measured values displayed is defined in the <b>Format display</b> parameter (→  15).</li> </ul> </li> </ul>
-------------------------------	---



---

## Display damping

<b>Navigation</b>	  Expert → System → Display → Display damping (0094)
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	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.
<b>User entry</b>	0.0 to 999.9 s
<b>Factory setting</b>	0.0 s
<b>Additional information</b>	<p><i>User entry</i></p> <p>Use this function to enter a time constant (PT1 element <sup>1)</sup>) for display damping:</p> <ul style="list-style-type: none"> <li>▪ At a low time constant, the display reacts quickly to fluctuating measured variables.</li> <li>▪ If a high time constant is entered, the display reacts more slowly.</li> </ul> <p> The damping is not active if the value <b>0</b> (factory setting) is entered.</p>

---

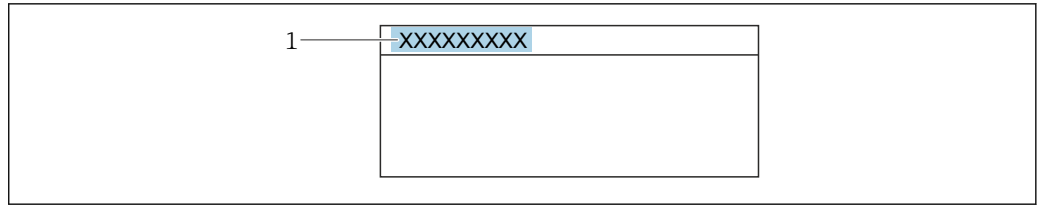
## Header

<b>Navigation</b>	  Expert → System → Display → Header (0097)
<b>Prerequisite</b>	A local display is provided.
<b>Description</b>	Use this function to select the contents of the header of the local display.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Device tag</li> <li>▪ Free text</li> </ul>
<b>Factory setting</b>	Device tag
<b>Additional information</b>	<p><i>Description</i></p> <p>The header text only appears during normal operation.</p>

---

1) proportional transmission behavior with first order delay





A0029422

1 Position of the header text on the display

*Selection*

- Device tag  
Is defined in the **Device tag** parameter (→ 164).
- Free text  
Is defined in the **Header text** parameter (→ 25).

---

**Header text**



**Navigation**

Expert → System → Display → Header text (0112)

**Prerequisite**

The **Free text** option is selected in the **Header** parameter (→ 24).

**Description**

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

**User entry**

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

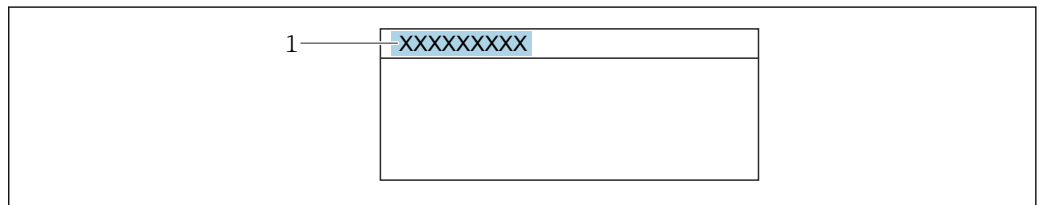
**Factory setting**

-----

**Additional information**

*Description*

The header text only appears during normal operation.



A0029422

1 Position of the header text on the display

*User entry*

The number of characters displayed depends on the characters used.

---

**Separator**



**Navigation**

Expert → System → Display → Separator (0101)

**Prerequisite**

A local display is provided.

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

**Selection**



- . (point)
- , (comma)

**Factory setting** . (point)

---

### Contrast display

---

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

**Prerequisite** A local display is provided.

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

**User entry** 20 to 80 %

**Factory setting** 50 %

---

### Backlight

---

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

**Prerequisite** A local display is provided.

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

**Selection**



- Disable
- Enable

**Factory setting** Enable

---

### Access status display

---

**Navigation**   Expert → System → Display → Access stat.disp (0091)

**Prerequisite** A local display is provided.

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


**User interface**



- Operator
- Maintenance


**Factory setting** Operator


**Additional information**

*Description*


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

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

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

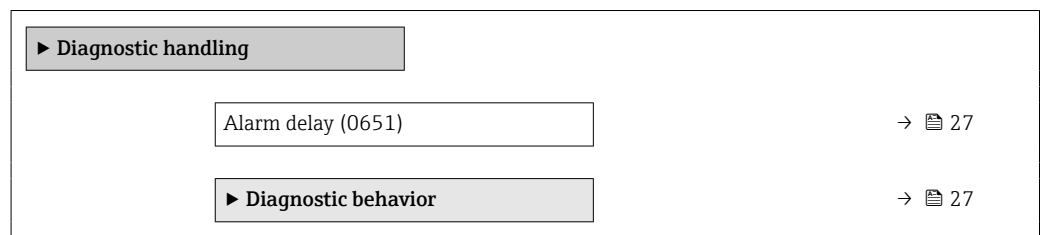
 If additional write protection is active, this restricts the current access authorization even further.

*User interface*

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

**3.1.2 "Diagnostic handling" submenu**



*Navigation*   Expert → System → Diagn. handling



**Alarm delay**




**Navigation**

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

**Description**

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

 The diagnostic message is reset without a time delay.


**User entry**

0 to 60 s

**Factory setting**

0 s

**"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 (→  27).

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 only displayed in the <b>Event logbook</b> submenu ( <b>Event list</b> submenu) and is not displayed in alternating sequence with the operational display.
Off	The diagnostic event is ignored, and no diagnostic message is generated or entered.





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

Navigation

Expert → System → Diagn. handling → Diagn. behavior





► Diagnostic behavior	
Assign behavior of diagnostic no. 019 (0635)	→  29
Assign behavior of diagnostic no. 160 (0776)	→  29
Assign behavior of diagnostic no. 302 (0742)	→  29
Assign behavior of diagnostic no. 441 (0657)	→  30
Assign behavior of diagnostic no. 442 (0658)	→  30
Assign behavior of diagnostic no. 443 (0659)	→  31
Assign behavior of diagnostic no. 832 (0675)	→  31
Assign behavior of diagnostic no. 833 (0676)	→  31
Assign behavior of diagnostic no. 841 (0680)	→  32
Assign behavior of diagnostic no. 842 (0638)	→  32
Assign behavior of diagnostic no. 870 (0726)	→  32

Assign behavior of diagnostic no. 930 (0639)	→  33
Assign behavior of diagnostic no. 931 (0640)	→  33

---

### Assign behavior of diagnostic no. 019 (Device initialization active)





---

<b>Navigation</b>	  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 019 (0635)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>△S019 Device initialization 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>Factory setting</b>	Warning
<b>Additional information</b>	 For a detailed description of the options available: →  28

---

### Assign behavior of diagnostic no. 160 (Signal path switched off)



---

<b>Navigation</b>	  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 160 (0776)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>160 Signal path switched off</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>Factory setting</b>	Warning
<b>Additional information</b>	 For a detailed description of the options available: →  28

---



### 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.

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


**Factory setting** Warning

**Additional information**  For a detailed description of the options available: →  28

---

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


---

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

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

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



**Factory setting** Warning

**Additional information** *Selection*  
 For a detailed description of the options available: →  28

---

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

---

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

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

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

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

**Factory setting** Warning

**Additional information**  For a detailed description of the options available: →  28

---

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


<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 443 (0659)
<b>Prerequisite</b>	The measuring device has a pulse/frequency/switch output.
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>443 Pulse output</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>Factory setting</b>	Warning
<b>Additional information</b>	<i>Selection</i> For a detailed description of the options available: →  28

---

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


<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 832 (0675)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>832 Electronics temperature too high</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>Factory setting</b>	Warning
<b>Additional information</b>	For a detailed description of the options available: →  28



---

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


<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 833 (0676)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>833 Electronics temperature too low</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>

**Factory setting** Warning

**Additional information** *Selection*

 For a detailed description of the options available: →  28

---

### Assign behavior of diagnostic no. 841



**Navigation**  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 841 (0680)

**Description** Use this function to change the diagnostic behavior of the **△S841 Flow velocity too high** diagnostic message.

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Warning

**Additional information**  For a detailed description of the options available: →  28

---

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

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

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

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting** Off

**Additional information**  For a detailed description of the options available: →  28



---

### Assign behavior of diagnostic no. 870 (Measuring inaccuracy increased)

**Navigation**  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 870 (0726)

**Description** Use this function to change the diagnostic behavior of the **870 Measuring inaccuracy increased** 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>Factory setting</b>	Off
<b>Additional information</b>	<i>Selection</i>  For a detailed description of the options available: →  28

---

### Assign behavior of diagnostic no. 930 (Process fluid)





---

<b>Navigation</b>	  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 930 (0639)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>△S930 Process fluid</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>Factory setting</b>	Alarm
<b>Additional information</b>	 For a detailed description of the options available: →  28

---

### Assign behavior of diagnostic no. 931 (Process fluid)

---

<b>Navigation</b>	  Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 931 (0640)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>△S931 Process fluid</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>Factory setting</b>	Alarm
<b>Additional information</b>	 For a detailed description of the options available: →  28

---

**Assign behavior of diagnostic no. 953 (Asymmetry noise signal too high path 1 to n)**


<b>Navigation</b>	Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 953 (0636)
<b>Description</b>	Use this function to change the diagnostic behavior of the <b>△M953 Asymmetry noise signal too high path 1 to n</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>Factory setting</b>	Warning
<b>Additional information</b>	For a detailed description of the options available: →  28

### 3.1.3 "Administration" submenu

*Navigation* Expert → System → Administration

▶ Administration	
▶ Define access code	→  34
▶ Reset access code	→  36
Device reset (0000)	→  37
Activate SW option (0029)	→  37
Software option overview (0015)	→  38


#### "Define access code" wizard


The **Define access code** wizard (→ 34) 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

→  35

→  35

---



### 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 configuration of the device against any inadvertent changes via the local display or Web browser.

**User entry** 0 to 9999

**Factory setting** 0

**Additional information** *Description*  
 The write protection affects all parameters in the document marked with the  symbol. On the local display, the  symbol in front of a parameter indicates that the parameter is write-protected.

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

 Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the **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

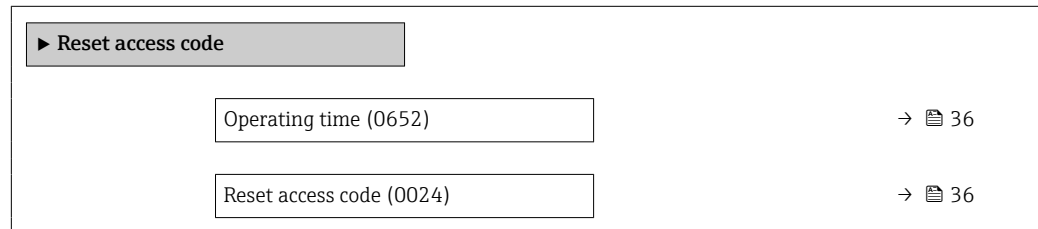
**Description** Enter the defined release code a second time to confirm the release code.

**User entry** 0 to 9999

**Factory setting** 0

### "Reset access code" submenu

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




---

## Operating time

---

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

**Description** Displays the length of time the device has been in operation.


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

**Additional information** *Indication*  
Maximum number of days: 9 999 (corresponds to approx. 27 years and 5 months)

---

## Reset access code

---

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


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

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

**Factory setting** 0x00

**Additional information**

*Description*



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



*User entry*

The reset code can only be entered via:

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

**Additional parameters in the "Administration" submenu**

<b>Device reset</b>										
<b>Navigation</b>	 Expert → System → Administration → Device reset (0000)									
<b>Description</b>	Reset the device configuration - either entirely or in part - to a defined state.									
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Cancel</li> <li>▪ To delivery settings</li> <li>▪ Restart device</li> <li>▪ Restore S-DAT backup *</li> </ul>									
<b>Factory setting</b>	Cancel									
<b>Additional information</b>	<i>Selection</i>									
	<table border="1"> <thead> <tr> <th style="text-align: left;">Options</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr> <td>Cancel</td> <td>No action is executed and the user exits the parameter.</td> </tr> <tr> <td>To delivery settings</td> <td>Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting.</td> </tr> <tr> <td>Restart device</td> <td>The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.</td> </tr> </tbody> </table>	Options	Description	Cancel	No action is executed and the user exits the parameter.	To delivery settings	Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting.	Restart device	The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.	
Options	Description									
Cancel	No action is executed and the user exits the parameter.									
To delivery settings	Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting.									
Restart device	The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.									

<b>Activate SW option</b>		
<b>Navigation</b>	 Expert → System → Administration → Activate SW opt. (0029)	
<b>Description</b>	Use this function to enter an activation code to enable an additional, ordered software option.	
<b>User entry</b>	Max. 10-digit string of numbers.	

\* Visibility depends on order options or device settings

**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.

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

*Entering the activation code*



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

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


- ▶ Before you enter a new activation code, make a note of the current activation code .
- ▶ Enter the new activation code provided by Endress+Hauser when the new software option was ordered.
- ▶ Once the activation code has been entered, check if the new software option is displayed in the **Software option overview** parameter (→  38).
- ↳ The new software option is active if it is displayed.
- ↳ If the new software option is not displayed or all software options have been deleted, the code entered was either incorrect or invalid.
- ▶ If the code entered is incorrect or invalid, enter the old activation code .
- ▶ Have your Endress+Hauser sales organization check the new activation code remembering to specify the serial number or ask for the code again.

*Example for a software option*

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

 The software options currently enabled are displayed in the **Software option overview** parameter (→  38).

*Web browser*

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

---

**Software option overview**

---

**Navigation**

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

**Description**

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

**User interface**

or

- Extended HistoROM
- Heartbeat Verification
- Heartbeat Monitoring
- PFS output 2 + status input

**Additional information**

*Description*

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

*"Extended HistoROM" option*

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

*"PFS output 2 + status input" option*









Order code for "Output; input", option I "4-20mA HART, 2x pul./freq./switch output; status input"

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

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



### 3.2 "Sensor" submenu

*Navigation*  Expert → Sensor

▶ Sensor	
▶ Measured values	→  39
▶ System units	→  47
▶ Measuring point 1	→  54
▶ Installation status	→  61
▶ Process parameters	→  63
▶ External compensation	→  67
▶ Sensor adjustment	→  71
▶ Calibration	→  75

#### 3.2.1 "Measured values" submenu

*Navigation*  Expert → Sensor → Measured val.

▶ Measured values	
▶ Process variables	→  40
▶ System values	→  42

▶ Totalizer	→ 44
▶ Input values	→ 44
▶ Output values	→ 45

### "Process variables" submenu




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

▶ Process variables	
Volume flow (1838)	→ 40
Mass flow (1847)	→ 40
Flow velocity (1852)	→ 41
Sound velocity (1850)	→ 41
Density (1851)	→ 42
Temperature (1853)	→ 41

---

## Volume flow



---

<b>Navigation</b>	  Expert → Sensor → Measured val. → Process variab. → Volume flow (1838)
<b>Description</b>	Displays the volume flow that is currently measured.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Dependency</i></p> <p> The unit is taken from the <b>Volume flow unit</b> parameter (→ 48)</p>

---

## Mass flow

---

<b>Navigation</b>	  Expert → Sensor → Measured val. → Process variab. → Mass flow (1847)
<b>Description</b>	Displays the mass flow that is currently calculated.
<b>User interface</b>	Signed floating-point number



**Additional information***Dependency*The unit is taken from the **Mass flow unit** parameter (→ 50)

---

**Flow velocity**

---

**Navigation**

Expert → Sensor → Measured val. → Process variab. → Flow velocity (1852)

**Description**

Displays the average flow velocity that is currently calculated.

**User interface**

Signed floating-point number

**Additional information***Dependency*The unit is taken from the **Velocity unit** parameter (→ 51)

---

**Sound velocity**

---

**Navigation**

Expert → Sensor → Measured val. → Process variab. → Sound velocity (1850)

**Description**

Displays the sound velocity that is currently measured.

**User interface**

Signed floating-point number

**Additional information***Dependency*The unit is taken from the **Velocity unit** parameter (→ 51)

---

**Temperature**

---

**Navigation**

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

**Prerequisite**

Temperature is not entered as a fixed value.

**Description**

Displays the medium temperature that is currently measured.

**User interface**




Signed floating-point number

**Additional information***Dependency*The unit is taken from the **Temperature unit** parameter (→ 52)

---





**Density**


---

<b>Navigation</b>	 Expert → Sensor → Measured val. → Process variab. → Density (1851)
<b>Prerequisite</b>	A fixed density is not entered.
<b>Description</b>	Displays the density that is 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 (→  52)

**"System values" submenu**


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

▶ System values	
Signal strength (2914)	→  42
Signal to noise ratio (2917)	→  43
Acceptance rate (2912)	→  43
Turbulence (2907)	→  43

---

**Signal strength**




---

<b>Navigation</b>	 Expert → Sensor → Measured val. → System values → Signal strength (2914)
<b>Description</b>	Displays the current signal strength.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<i>Description</i> A drop in the signal strength over time can be an indicator of process changes, such as the development of deposits in the measuring pipe at the measuring point. , e.g. buildup of deposits in the measuring pipe at the measuring point. This can only be quantified by performing a direct process comparison with different deposit layer thicknesses and associated signal strengths.

---

**Signal to noise ratio**




---

<b>Navigation</b>	  Expert → Sensor → Measured val. → System values → SNR (2917)
<b>Description</b>	Displays the current signal to noise ratio.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Description</i></p> <p>A low value or a drop in the signal to noise ratio over time is an indicator of poor signal quality.</p>

---

**Acceptance rate**




---

<b>Navigation</b>	  Expert → Sensor → Measured val. → System values → Acceptance rate (2912)
<b>Description</b>	<p>Displays the ratio of the number of ultrasonic signals accepted for flow calculation and the total number of ultrasonic signals emitted.</p> <p>Multipath measuring devices only: Displays the minimum of all acceptance rates measured.</p>
<b>User interface</b>	0 to 100 %


---

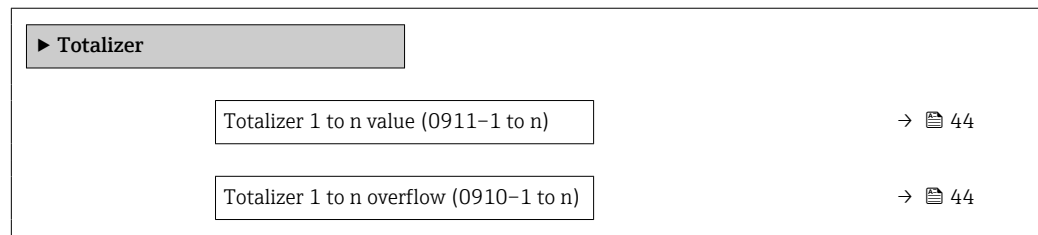
**Turbulence**



---

<b>Navigation</b>	  Expert → Sensor → Measured val. → System values → Turbulence (2907)
<b>Description</b>	Displays the current turbulence.
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Description</i></p> <p>A high turbulence value indicates a disturbance in the flow profile.</p>


**"Totalizer" submenu**

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

**Totalizer 1 to n value**

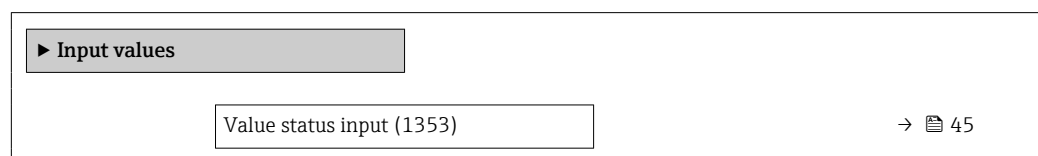
<b>Navigation</b>	 Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n value (0911-1 to n)
<b>Description</b>	Displays the current totalizer counter value.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	01

**Totalizer 1 to n overflow**


<b>Navigation</b>	 Expert → Sensor → Measured val. → Totalizer → Tot. 1 to n overflow (0910-1 to n)
<b>Description</b>	Displays the current totalizer overflow.
<b>User interface</b>	-32 000.0 to 32 000.0
<b>Factory setting</b>	0

**"Input values" submenu**

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



**Value status input**

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

**Prerequisite** For the following order code:  
"Output; input", option I "4-20mA HART, 2x pul./freq./switch output; status input"

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









**User interface**

- High
- Low


**"Output values" submenu**

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

▶ **Output values**

Output current (0361)	→  45
Measured current (0366)	→  46
Pulse output (0456)	→  46
Output frequency (0471)	→  47
Switch state (0461)	→  47
Output frequency (0471)	→  47
Pulse output (0456)	→  46
Switch state (0461)	→  47

**Output current**

**Navigation**  Expert → Sensor → Measured val. → Output values → Output curr. (0361)

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

**User interface** 0 to 22.5 mA

---

**Measured current**


---

<b>Navigation</b>	📄📄 Expert → Sensor → Measured val. → Output values → Measur. curr. (0366)
<b>Description</b>	Displays the actual measured value of the output current.
<b>User interface</b>	0 to 30 mA

---

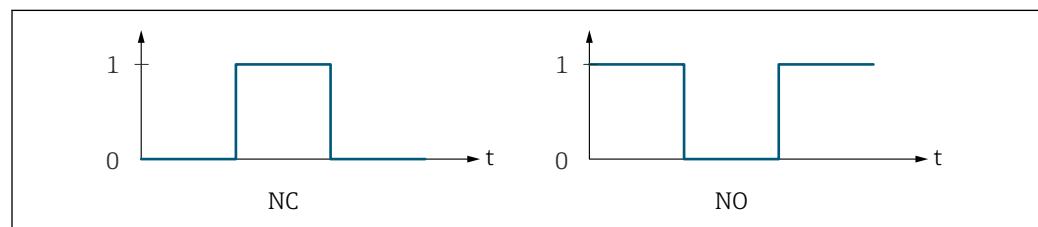
**Pulse output 1 to n**


---

<b>Navigation</b>	📄📄 Expert → Sensor → Measured val. → Output values → Pulse output (0456) 📄📄 Expert → Sensor → Measured val. → Output values → Pulse output (0456)
<b>Prerequisite</b>	The <b>Pulse</b> option is selected in the <b>Operating mode</b> parameter (→ 📄 93) parameter.
<b>Description</b>	Displays the pulse frequency currently output.
<b>User interface</b>	Positive floating-point number

**Additional information***Description*

- The pulse output is an open collector output.
- This is configured at the factory in such a way that the transistor is conductive for the duration of the pulse (NO contact) and is safety-oriented.
- The **Value per pulse** parameter (→ 📄 95) and **Pulse width** parameter (→ 📄 96) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.



A0028726

0 Non-conductive  
 1 Conductive  
 NC Normally closed  
 NO Normally opened






The output behavior can be reversed via the **Invert output signal** parameter (→ 📄 109) 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 (→ 📄 97)) can be configured.

---

**Output frequency 1 to n**







---

<b>Navigation</b>	  Expert → Sensor → Measured val. → Output values → Output freq. (0471)   Expert → Sensor → Measured val. → Output values → Output freq. (0471)
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→  93), 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 state 1 to n**







---

<b>Navigation</b>	  Expert → Sensor → Measured val. → Output values → Switch state (0461)   Expert → Sensor → Measured val. → Output values → Switch state (0461)
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→  93), the <b>Switch</b> option is selected.
<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>	<i>Selection</i> <ul style="list-style-type: none"> <li>▪ Open The switch output is not conductive.</li> <li>▪ Closed The switch output is conductive.</li> </ul>

### 3.2.2 "System units" submenu



*Navigation*   Expert → Sensor → System units

▶ System units	
Volume flow unit (0553)	→  48
Volume unit (0563)	→  50
Mass flow unit (0554)	→  50
Mass unit (0574)	→  51
Velocity unit (0566)	→  51

Temperature unit (0557)	→  52
Density unit (0555)	→  52
Kinematic viscosity unit (0578)	→  53
Length unit (0551)	→  53
Date/time format (2812)	→  54

## Volume flow unit

### Navigation

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

### Description

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

### Selection

- cm<sup>3</sup>/s
- cm<sup>3</sup>/min
- cm<sup>3</sup>/h
- cm<sup>3</sup>/d
- dm<sup>3</sup>/s
- dm<sup>3</sup>/min
- dm<sup>3</sup>/h
- dm<sup>3</sup>/d
- m<sup>3</sup>/s
- m<sup>3</sup>/min
- m<sup>3</sup>/h
- m<sup>3</sup>/d
- ml/s
- ml/min
- ml/h
- ml/d
- l/s
- l/min
- l/h
- l/d
- hl/s
- hl/min
- hl/h
- hl/d
- Ml/s
- Ml/min
- Ml/h
- Ml/d
- af/s
- af/min
- af/h
- af/d
- ft<sup>3</sup>/s
- ft<sup>3</sup>/min
- ft<sup>3</sup>/h
- ft<sup>3</sup>/d




- Mft<sup>3</sup>/s
- Mft<sup>3</sup>/min
- Mft<sup>3</sup>/h
- Mft<sup>3</sup>/d
- fl oz/s (us)
- fl oz/min (us)
- fl oz/h (us)
- fl oz/d (us)
- gal/s (us)
- gal/min (us)
- gal/h (us)
- gal/d (us)
- Mgal/s (us)
- Mgal/min (us)
- Mgal/h (us)
- Mgal/d (us)
- bbl/s (us;liq.)
- bbl/min (us;liq.)
- bbl/h (us;liq.)
- bbl/d (us;liq.)
- bbl/s (us;beer)
- bbl/min (us;beer)
- bbl/h (us;beer)
- bbl/d (us;beer)
- bbl/s (us;oil)
- bbl/min (us;oil)
- bbl/h (us;oil)
- bbl/d (us;oil)
- bbl/s (us;tank)
- bbl/min (us;tank)
- bbl/h (us;tank)
- bbl/d (us;tank)
- gal/s (imp)
- gal/min (imp)
- gal/h (imp)
- gal/d (imp)
- Mgal/s (imp)
- Mgal/min (imp)
- Mgal/h (imp)
- Mgal/d (imp)
- bbl/s (imp;beer)
- bbl/min (imp;beer)
- bbl/h (imp;beer)
- bbl/d (imp;beer)
- bbl/s (imp;oil)
- bbl/min (imp;oil)
- bbl/h (imp;oil)
- bbl/d (imp;oil)
- kgal/s (us)
- kgal/min (us)
- kgal/h (us)
- kgal/d (us)

**Factory setting**

Country-specific:

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

**Additional information***Result*

The selected unit applies to:  
**Volume flow** parameter (→  40)

*Selection*

 For an explanation of the abbreviated units: →  196

**Volume unit****Navigation**

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

**Description**

Use this function to select the unit for the volume.

**Selection**

- cm<sup>3</sup>
- dm<sup>3</sup>
- m<sup>3</sup>
- ml
- l
- hl
- Ml
- af
- ft<sup>3</sup>
- Mft<sup>3</sup>
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)
- bbl (us;oil)
- bbl (us;liq.)
- bbl (us;beer)
- bbl (us;tank)
- gal (imp)
- Mgal (imp)
- bbl (imp;beer)
- bbl (imp;oil)

**Factory setting**

Country-specific:

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

**Additional information***Selection*

 For an explanation of the abbreviated units: →  196

**Mass flow unit****Navigation**

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

**Description**

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

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

<b>Factory setting</b>	Country-specific:
	▪ kg/h
	▪ lb/min

<b>Additional information</b>	<i>Result</i>
	The selected unit applies to: <b>Mass flow</b> parameter

*Selection*

For an explanation of the abbreviated units: → 196

**Mass unit**

<b>Navigation</b>	Expert → Sensor → System units → Mass unit (0574)
-------------------	---

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

<b>Selection</b>	<i>SI units</i>	<i>US units</i>
	▪ g	▪ oz
	▪ kg	▪ lb
	▪ t	▪ STon





<b>Factory setting</b>	Country-specific:
	▪ kg
	▪ lb

<b>Additional information</b>	<i>Selection</i>
	For an explanation of the abbreviated units: →  196

**Velocity unit**






<b>Navigation</b>	Expert → Sensor → System units → Velocity unit (0566)
-------------------	---

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

<b>Selection</b>	<i>SI units</i> m/s	<i>US units</i> ft/s
<b>Factory setting</b>	Depends on country: <ul style="list-style-type: none"> <li>■ m/s</li> <li>■ ft/s</li> </ul>	
<b>Additional information</b>	<i>Effect</i> The selected unit applies to: <ul style="list-style-type: none"> <li>■ Flow velocity (→  41)</li> <li>■ Sound velocity (→  41)</li> </ul> <i>Options</i>  For an explanation of the abbreviated units: →  196	



---



**Temperature unit**


<b>Navigation</b>	  Expert → Sensor → System units → Temperature unit (0557)	
<b>Description</b>	Use this function to select the unit for the temperature.	
<b>Selection</b>	<i>SI units</i> <ul style="list-style-type: none"> <li>■ °C</li> <li>■ K</li> </ul>	<i>US units</i> <ul style="list-style-type: none"> <li>■ °F</li> <li>■ °R</li> </ul>
<b>Factory setting</b>	Country-specific: <ul style="list-style-type: none"> <li>■ °C</li> <li>■ °F</li> </ul>	
<b>Additional information</b>	<i>Result</i> The selected unit applies to: <ul style="list-style-type: none"> <li>■ Temperature (→  41)</li> <li>■ Electronic temperature</li> <li>■ External temperature</li> <li>■ Reference temperature</li> </ul> <i>Selection</i>  For an explanation of the abbreviated units: →  196	

---



**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> <ul style="list-style-type: none"> <li>■ g/cm<sup>3</sup></li> <li>■ g/m<sup>3</sup></li> <li>■ kg/l</li> <li>■ kg/dm<sup>3</sup></li> <li>■ kg/m<sup>3</sup></li> <li>■ SD4°C</li> <li>■ SD15°C</li> <li>■ SD20°C</li> <li>■ SG4°C</li> <li>■ SG15°C</li> <li>■ SG20°C</li> </ul>	<i>US units</i> <ul style="list-style-type: none"> <li>■ lb/ft<sup>3</sup></li> <li>■ lb/gal (us)</li> <li>■ lb/bbl (us;liq.)</li> <li>■ lb/bbl (us;beer)</li> <li>■ lb/bbl (us;oil)</li> <li>■ lb/bbl (us;tank)</li> </ul>	<i>Imperial units</i> <ul style="list-style-type: none"> <li>■ lb/gal (imp)</li> <li>■ lb/bbl (imp;beer)</li> <li>■ lb/bbl (imp;oil)</li> </ul>
<b>Factory setting</b>	Country-specific: <ul style="list-style-type: none"> <li>■ kg/dm<sup>3</sup></li> <li>■ lb/ft<sup>3</sup></li> </ul>		
<b>Additional information</b>	<i>Selection</i>  For an explanation of the abbreviated units: →  196		



---

**Kinematic viscosity unit**




<b>Navigation</b>	  Expert → Sensor → System units → Kin. visc. unit (0578)
<b>Description</b>	Use this function to select the unit for the kinematic viscosity.
<b>Selection</b>	<i>SI units</i> <ul style="list-style-type: none"> <li>■ cSt</li> <li>■ St</li> <li>■ mm<sup>2</sup>/s</li> <li>■ m<sup>2</sup>/s</li> </ul>
<b>Factory setting</b>	Country-specific: <ul style="list-style-type: none"> <li>■ m<sup>2</sup>/s</li> <li>■ cSt</li> </ul>

---



**Length unit**


<b>Navigation</b>	  Expert → Sensor → System units → Length unit (0551)		
<b>Description</b>	Use this function to select the unit of length of.		
<b>Selection</b>	<table border="0"> <tr> <td> <i>SI units</i> <ul style="list-style-type: none"> <li>■ m</li> <li>■ mm</li> </ul> </td> <td> <i>US units</i> <ul style="list-style-type: none"> <li>■ ft</li> <li>■ in</li> </ul> </td> </tr> </table>	<i>SI units</i> <ul style="list-style-type: none"> <li>■ m</li> <li>■ mm</li> </ul>	<i>US units</i> <ul style="list-style-type: none"> <li>■ ft</li> <li>■ in</li> </ul>
<i>SI units</i> <ul style="list-style-type: none"> <li>■ m</li> <li>■ mm</li> </ul>	<i>US units</i> <ul style="list-style-type: none"> <li>■ ft</li> <li>■ in</li> </ul>		
<b>Factory setting</b>	Country-specific: <ul style="list-style-type: none"> <li>■ mm</li> <li>■ in</li> </ul>		

**Additional information***Selection*

 For an explanation of the abbreviated units: →  196

**Date/time format****Navigation**

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

**Description**

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


**Selection**

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

**Factory setting**










dd.mm.yy hh:mm

**Additional information***Options*

 For an explanation of the abbreviated units: →  196


**3.2.3 "Measuring point " submenu***Navigation*

  Expert → Sensor → Meas. point


▶ Measuring point 1	
Measuring point configuration (5675-1)	→  55
Medium (2926-1)	→  55
Medium temperature (3053-1)	→  56
Sound velocity (2929-1)	→  56
Viscosity (2932-1)	→  56
Pipe dimensions (2943-1)	→  57
Pipe circumference (2934-1)	→  57
Pipe outer diameter (2910-1)	→  57
Pipe wall thickness (2916-1)	→  57

Liner thickness (2935-1)	→ 58
Signal filter (3011-1)	→ 58
Cable length (2939-1)	→ 58
Intermediate pipe length (2945-1)	→ 58
Result sensor type / sensor distance (3066-1)	→ 59
Result path length / arc length (3067-1)	→ 59
► Mounting deviations signal path 1 to n	→ 59

### Measuring point configuration

<b>Navigation</b>	 Expert → Sensor → Meas. point 1 → Meas. pt config. (5675-1)
<b>Description</b>	Use this function to enter the measuring point configuration.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ 1 measuring point - signal path 1</li> <li>■ 1 measuring point - signal path 2 *</li> <li>■ 1 measuring point - 2 signal paths *</li> </ul>
<b>Factory setting</b>	Depending on the sensor version

### Medium

<b>Navigation</b>	 Expert → Sensor → Meas. point 1 → Medium (2926-1)
<b>Description</b>	Select the medium.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Water</li> <li>■ Sea water</li> <li>■ Distilled water</li> <li>■ Ammonia NH3</li> <li>■ Benzene</li> <li>■ Ethanol</li> <li>■ Glycol</li> <li>■ Milk</li> <li>■ Methanol</li> <li>■ User-specific liquid</li> </ul>

\* Visibility depends on order options or device settings

**Factory setting** Water

---

### Medium temperature

**Navigation**   Expert → Sensor → Meas. point 1 → Medium temp. (3053-1)

**Description** Enter the medium temperature for the installation.


**User entry** -200 to 550 °C

**Factory setting** 20 °C


---

### Sound velocity

**Navigation**   Expert → Sensor → Meas. point 1 → Sound velocity (2929-1)

**Prerequisite** The **User-specific liquid** option is selected in **Medium** parameter (→  55).

**Description** Enter the sound velocity of the medium.



-  If the sound velocity is not known, it can be determined with the following tools:
- Endress+Hauser sound velocity sensor sets
  - Prosonic Flow 93T with sound velocity sensors
  - Iterative measurement of sound velocity and distance adjustment of sensor distance using flow sensors


**User entry** 200 to 3 000 m/s

**Factory setting** 1 482.4 m/s

---

### Viscosity

**Navigation**   Expert → Sensor → Meas. point 1 → Viscosity (2932-1)

**Prerequisite** The **User-specific liquid** option is selected in **Medium** parameter (→  55).

**Description** Enter medium viscosity at installation temperature.

**User entry** 0.01 to 10 000 mm<sup>2</sup>/s

**Factory setting** 1 mm<sup>2</sup>/s



---

**Pipe dimensions**


<b>Navigation</b>	Expert → Sensor → Meas. point 1 → Pipe dimensions (2943-1)
<b>Description</b>	Select if pipe dimensions are defined by diameter or circumference.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Diameter</li> <li>■ Pipe circumference</li> </ul>
<b>Factory setting</b>	Diameter

---

**Pipe circumference**


<b>Navigation</b>	Expert → Sensor → Meas. point 1 → Pipe circumfer. (2934-1)
<b>Prerequisite</b>	The <b>Pipe circumference</b> option is selected in the <b>Pipe dimensions</b> parameter (→  57).
<b>Description</b>	Define the pipe circumference.
<b>User entry</b>	30 to 62 800 mm
<b>Factory setting</b>	314.159 mm

---














**Pipe outer diameter**


<b>Navigation</b>	Expert → Sensor → Meas. point 1 → Pipe outer diam. (2910-1)
<b>Prerequisite</b>	The <b>Diameter</b> option is selected in <b>Pipe dimensions</b> parameter (→  57).
<b>Description</b>	Define the outer diameter of the pipe.
<b>User entry</b>	0 to 20 000 mm
<b>Factory setting</b>	100 mm



---

**Pipe wall thickness**




<b>Navigation</b>	Expert → Sensor → Meas. point 1 → Wall thickness (2916-1)
<b>Description</b>	Enter the pipe wall thickness.
<b>User entry</b>	Positive floating point number
<b>Factory setting</b>	3 mm

Liner thickness 	
<b>Navigation</b>	  Expert → Sensor → Meas. point 1 → Liner thickness (2935-1)
<b>Description</b>	Define the thickness of liner.
<b>User entry</b>	0 to 100 mm
<b>Factory setting</b>	0 mm
Signal filter 	
<b>Navigation</b>	  Expert → Sensor → Meas. point 1 → Signal filter (3011-1)
<b>Description</b>	Switch the signal filter on or off. The signal filter is an adaptive filter that is applied to the raw flow signal.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ On</li> </ul>
<b>Factory setting</b>	On
Cable length 	
<b>Navigation</b>	  Expert → Sensor → Meas. point 1 → Cable length (2939-1)
<b>Description</b>	Enter length of sensor cables.
<b>User entry</b>	0 to 200 000 mm
<b>Factory setting</b>	As per order
Intermediate pipe length 	
<b>Navigation</b>	  Expert → Sensor → Meas. point 1 → Interm. pipe l. (2945-1)
<b>Prerequisite</b>	The <b>1 measuring point - 2 signal paths</b> option is selected in <b>Measuring point configuration</b> parameter (→  55).
<b>Description</b>	Enter the length of the intermediate pipe between the two bends.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	0 mm

**Result sensor type / sensor distance**

<b>Navigation</b>	  Expert → Sensor → Meas. point 1 → Sens. type/dist. (3066-1)
<b>Description</b>	Shows the sensor type and sensor distance calculated for installation.
<b>User interface</b>	e.g. I-100-A / 500 mm
<b>Factory setting</b>	-




**Result path length / arc length**

<b>Navigation</b>	  Expert → Sensor → Meas. point 1 → Path/arc length (3067-1)
<b>Description</b>	Shows the path length calculated and (if applicable) the calculated arc length.
<b>User interface</b>	e.g. 1085 mm / 257.56 mm
<b>Factory setting</b>	-

**"Mounting deviations signal path 1 to n" submenu**



*Navigation*   Expert → Sensor → Meas. point 1 → Deviat. path 1 to n

▶ **Mounting deviations signal path 1 to n**

Sensor distance deviation (5822-1 to n)	→  59
Arc length deviation (5876-1 to n)	→  60
Signal path length deviation (5821-1 to n)	→  60

**Sensor distance deviation**



<b>Navigation</b>	  Expert → Sensor → Meas. point 1 → Deviat. path 1 to n → Sens. dist. dev. (5822-1 to n)
<b>Description</b>	Enter the deviation between the nominal sensor distance and the welded position.
<b>User entry</b>	Signed floating-point number

**Factory setting** 0 mm



**Additional information** *Description*

If the welded position is greater than the nominal sensor distance, enter a positive deviation (e.g. 5 mm (0.20 in)). If the welded position is smaller than the nominal sensor distance, enter a negative deviation (e.g. -5 mm (-0.20 in)).

---

### Arc length deviation

---

**Navigation**   Expert → Sensor → Meas. point 1 → Deviat. path 1 to n → Arc length dev. (5876-1 to n)

**Description** Enter the radial deviation between given radial distance and the real mounting position of the sensor.

**User entry** Signed floating-point number

**Factory setting** 0 mm



**Additional information** *Description*

If the actual radial distance is greater than the nominal value, enter a positive deviation (e.g. 5 mm (0.20 in)). If the actual radial distance is smaller than the nominal value, enter a negative deviation (e.g. -5 mm (-0.20 in)).

---

### Signal path length deviation

---

**Navigation**   Expert → Sensor → Meas. point 1 → Deviat. path 1 to n → Path length dev. (5821-1 to n)

**Description** Enter the deviation between the nominal signal path length and the welded position.


**User entry** Signed floating-point number

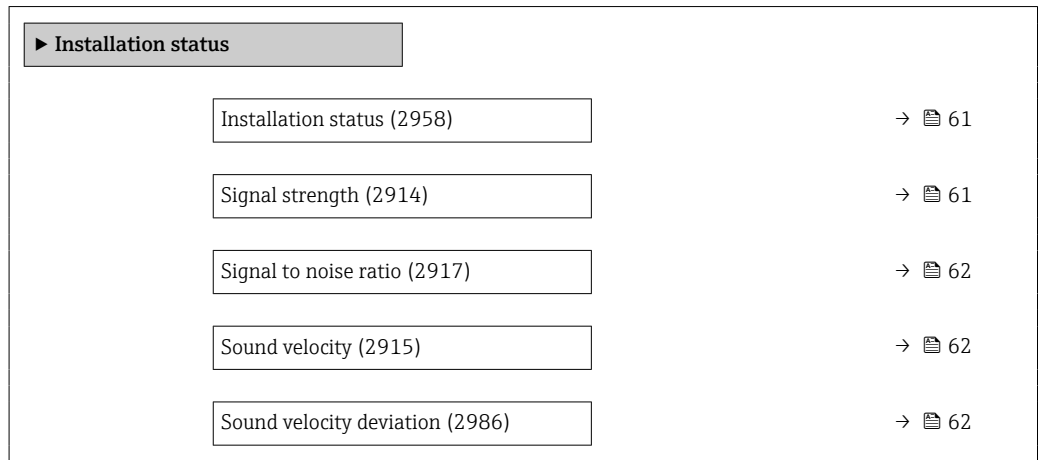
**Factory setting** 0 mm

**Additional information** *Description*

If the actual signal path length is greater than the nominal value, enter a positive deviation (e.g. 5 mm (0.20 in)). If the actual signal path length is smaller than the nominal value, enter a negative deviation (e.g. -5 mm (-0.20 in)).

### 3.2.4 "Installation status" submenu

Navigation  Expert → Sensor → Install. status





---

#### Installation status

---


**Navigation**

 Expert → Sensor → Install. status → Install. status (2958)

**Description**

Displays the device status after installation according to the displayed measured values.

- **Good** option: No further optimization required  
Signal strength > 40 dB, SNR > 35, sound velocity deviation (measured to expected) < 2%
- **Acceptable** option: Measuring performance ok, optimize if possible. You should always aim for the status **Good** option.  
Signal strength > 25 dB, SNR > 35, sound velocity deviation (measured to expected) < 3%
- **Bad** option: Optimization is required. Poor and unstable measuring performance.

-  Check the following points to optimize the sensor installation:
  - Number of traverses, change if necessary (e.g. from 2 traverses to 1 traverse)
  - Sensor distance
  - Alignment of sensors
  - Sufficient coupling medium available (coupling pad or coupling gel)
  - Check the measuring point parameters in the configuration

**User interface**

- Good
- Acceptable
- Bad

**Factory setting**


Good

---

#### Signal strength

---

**Navigation**

 Expert → Sensor → Install. status → Signal strength (2914)

**Description**

Displays the current signal strength.

**User interface** Signed floating-point number

**Additional information** *Description*

A drop in the signal strength over time can be an indicator of process changes, such as the development of deposits in the measuring pipe at the measuring point, e.g. buildup of deposits in the measuring pipe at the measuring point. This can only be quantified by performing a direct process comparison with different deposit layer thicknesses and associated signal strengths.

---

### Signal to noise ratio

---

**Navigation**   Expert → Sensor → Install. status → SNR (2917)

**Description** Displays the current signal to noise ratio.

**User interface** Signed floating-point number



**Additional information** *Description*

A low value or a drop in the signal to noise ratio over time is an indicator of poor signal quality.

---

### Sound velocity

---

**Navigation**   Expert → Sensor → Install. status → Sound velocity (2915)

**Description** Displays the sound velocity that is currently measured.

The difference between the configured sound velocity and the measured sound velocity should not be > 2%.

**User interface** Signed floating-point number

---

### Sound velocity deviation

---

**Navigation**   Expert → Sensor → Install. status → SoundVelocDeviat (2986)







**Description** Shows the deviation of the installation sound velocity from the measured sound velocity.

**User interface** Signed floating-point number

**Factory setting** 0 %


### 3.2.5 "Process parameters" submenu

*Navigation*  Expert → Sensor → Process param.

▶ Process parameters		
Flow override (1839)		→  63
Flow damping (1802)		→  64
Sound velocity damping (1888)		→  64
Density damping (1889)		→  65
Temperature damping (1886)		→  65
▶ Low flow cut off		→  65

#### Flow override

##### Navigation

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

##### Description

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

##### Selection

- Off
- On

##### Factory setting

Off

##### Additional information

*Effect*

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

*Description*

##### Flow override is active

- The **453 Flow override** diagnostic message is output.
- Output values
  - Output: value at zero flow
  - Temperature: continues to be output
  - Sound velocity: continues to be output
  - Totalizer 1...3: stop being totalized

 The **Flow override** option can also be activated in the **Status input** submenu: **Assign status input** parameter (→  77).

---

**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

**Factory setting**

1 s

**Additional information***Description*

The damping is performed by a PT1 element <sup>2)</sup>.

*User entry*

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



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

*Effect*

The damping affects the following variables of the device:

- Outputs → 79
- Low flow cut off → 65
- Totalizers → 149

---

**Sound velocity damping**
**Navigation**

Expert → Sensor → Process param. → Sound vel. damp. (1888)

**Description**

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

**User entry**

0 to 999.9 s

**Factory setting**

1 s

---

2) Proportional behavior with first-order lag



**Density damping**



<b>Navigation</b>	Expert → Sensor → Process param. → Density damping (1889)
<b>Description</b>	Use this function to enter the time constant for density damping.
<b>User entry</b>	0 to 999.9 s
<b>Factory setting</b>	0 s

**Temperature damping**



<b>Navigation</b>	Expert → Sensor → Process param. → Temp. damping (1886)
<b>Description</b>	Use this function to enter the time constant for temperature damping.
<b>User entry</b>	0 to 999.9 s
<b>Factory setting</b>	10 s

**"Low flow cut off" submenu**

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

▶ **Low flow cut off**

Assign process variable (1837)	→  65
On value low flow cutoff (1805)	→  66
Off value low flow cutoff (1804)	→  66

**Assign process variable**





<b>Navigation</b>	Expert → Sensor → Process param. → Low flow cut off → Assign variable (1837)
<b>Description</b>	Use this function to select the process variable for low flow cutoff detection.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Flow velocity</li> </ul>

**Factory setting**                      Flow velocity


---

### 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 (→  65).

**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 →  66.

**User entry**                             Positive floating-point number

**Factory setting**                        0.3 m/s



**Additional information**              *Dependency*

 The unit depends on the process variable selected in the **Assign process variable** parameter (→  65).


---

### 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 (→  65).

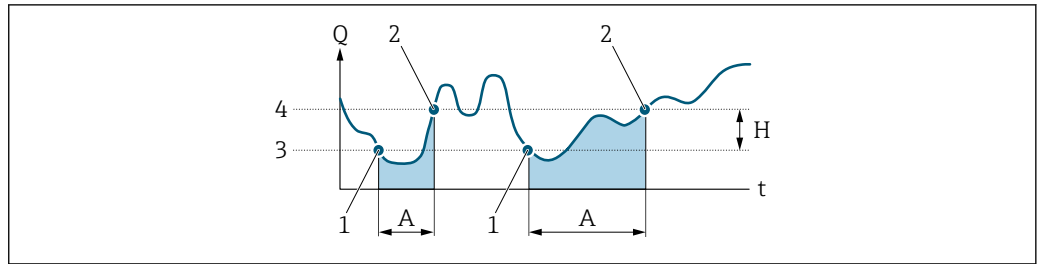
**Description**                            Use this function to enter a switch-off value for low flow cut off. The switch-off value is entered as a positive hysteresis from the switch-on value →  66.

**User entry**                             0 to 100.0 %

**Factory setting**                        50 %

**Additional information**

*Example*













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- 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

**3.2.6 "External compensation" submenu**

Navigation  Expert → Sensor → External comp.

▶ External compensation

Temperature compensation (3025)	→  68
External value (3058)	→  68
Fixed value (2925)	→  68
Density source (3048)	→  68
External value (3060)	→  69
Fixed density (3171)	→  69
Linear expansion coefficient (3153)	→  69
Square expansion coefficient (3172)	→  70
Fixed reference density (3178)	→  70
Reference temperature (3147)	→  70

---

**Temperature compensation**


<b>Navigation</b>	Expert → Sensor → External comp. → Temp. compensat. (3025)
<b>Prerequisite</b>	The <b>Calculated value</b> option is selected in the <b>Density source</b> parameter (→  68).
<b>Description</b>	Select temperature mode for temperature compensation.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Fixed value</li> <li>■ External value</li> </ul>
<b>Factory setting</b>	Fixed value

---

**Fixed value**


<b>Navigation</b>	Expert → Sensor → External comp. → Fixed value (2925)
<b>Prerequisite</b>	The <b>Fixed value</b> option is selected in <b>Temperature compensation</b> parameter (→  68).
<b>Description</b>	Enter a fixed value for the process temperature.
<b>User entry</b>	-50 to 550 °C
<b>Factory setting</b>	20 °C

---

**External value**

<b>Navigation</b>	Expert → Sensor → External comp. → External value (3058)
<b>Description</b>	Shows the process temperature read from the external device.
<b>User interface</b>	-273.15 to 99 999 °C
<b>Factory setting</b>	-

---

**Density source**


<b>Navigation</b>	Expert → Sensor → External comp. → Density source (3048)
<b>Description</b>	Select the density source for the mass calculation.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Fixed value</li> <li>■ External density</li> <li>■ Calculated value</li> </ul>


**Factory setting** Fixed value

---

### External value

---

**Navigation**  Expert → Sensor → External comp. → External value (3060)

**Prerequisite** The **External density** option is selected in the **Density source** parameter (→  68).

**Description** Shows the density read from the external device.


**User interface** Positive floating-point number


**Factory setting** 0 kg/m<sup>3</sup>

---

### Fixed density

---

**Navigation**  Expert → Sensor → External comp. → Fixed density (3171)

**Prerequisite** The **Fixed density** option is selected in the **Density source** parameter (→  68).

**Description** Enter fixed value for medium density.

**User entry** 0.01 to 15 000 kg/m<sup>3</sup>


**Factory setting** 1 000 kg/m<sup>3</sup>

---

### Linear expansion coefficient

---

**Navigation**  Expert → Sensor → External comp. → Linear exp coeff (3153)

**Prerequisite** The **Calculated value** option is selected in the **Density source** parameter (→  68).

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

**User entry**  $1.0 \cdot 10^{-6}$  to  $2.0 \cdot 10^{-3}$

**Factory setting**  $2.06 \cdot 10^{-4}$

---

**Square expansion coefficient**


<b>Navigation</b>	Expert → Sensor → External comp. → Square exp coeff (3172)
<b>Prerequisite</b>	The <b>Calculated value</b> option is selected in the <b>Density source</b> parameter (→  68).
<b>Description</b>	For media with a non-linear expansion pattern: use this function to enter a quadratic, medium-specific expansion coefficient for calculating the density.
<b>User entry</b>	$1.0 \cdot 10^{-6}$ to $2.0 \cdot 10^{-3}$
<b>Factory setting</b>	$2.06 \cdot 10^{-4}$

---

**Fixed reference density**


<b>Navigation</b>	Expert → Sensor → External comp. → Fix ref.density (3178)
<b>Prerequisite</b>	The <b>Calculated value</b> option is selected in the <b>Density source</b> parameter (→  68).
<b>Description</b>	Use this function to enter a fixed value for the reference density.
<b>User entry</b>	0.01 to 15 000 kg/m <sup>3</sup>
<b>Factory setting</b>	1 000 kg/m <sup>3</sup>
<b>Additional information</b>	<i>Reference density calculation</i>

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

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- $\rho$ : currently used density for mass flow calculation
- $\rho_N$ : reference density
- $t$ : currently read-in or fixed temperature according to the setting in the **Temperature compensation** parameter (→ 68)
- $t_N$ : reference temperature at which the reference density applies (e.g. 20 °C)
- $\Delta t$ :  $t - t_N$
- $\alpha$ : linear expansion coefficient of the medium, unit = [1/K]; K = Kelvin
- $\beta$ : square expansion coefficient of the medium, unit = [1/K<sup>2</sup>]

---



**Reference temperature**


<b>Navigation</b>	Expert → Sensor → External comp. → Ref. temperature (3147)
<b>Prerequisite</b>	The <b>Calculated value</b> option is selected in the <b>Density source</b> parameter (→  68).
<b>Description</b>	Enter the reference temperature at which the reference density applies.
<b>User entry</b>	-200 to 450 °C

**Factory setting** 20 °C

### 3.2.7 "Sensor adjustment" submenu

*Navigation*   Expert → Sensor → Sensor adjustm.

<b>► Sensor adjustment</b>	
Installation direction (1809)	→  71
<b>► Process variable adjustment</b>	→  71

---

#### Installation direction

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



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







**Selection**





- Forward flow
- Reverse flow

**Factory setting** Forward flow

### "Process variable adjustment" submenu

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

<b>► Process variable adjustment</b>	
Volume flow offset (1831)	→  72
Volume flow factor (1832)	→  72
Mass flow offset (1841)	→  73
Mass flow factor (1846)	→  73
Sound velocity offset (1848)	→  73
Sound velocity factor (1849)	→  74

Density offset (1866)	→  74
Density factor (1867)	→  74
Temperature offset (1870)	→  75
Temperature factor (1871)	→  75

---

**Volume flow offset**


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

**Description** Use this function to enter the zero point shift for the volume flow trim. The volume flow unit on which the shift is based is m<sup>3</sup>/s. The value is entered in the selected volume flow unit.

**User entry** Signed floating-point number

**Factory setting** 0 m<sup>3</sup>/h

**Additional information** *Description*



Corrected value = (factor × value) + offset

---

**Volume flow factor**


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

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

**User entry** Positive floating-point number

**Factory setting** 1

**Additional information** *Description*



Corrected value = (factor × value) + offset



**Mass flow offset**

<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow offset (1841)
<b>Description</b>	Use this function to enter the zero point shift for the mass flow trim. The mass flow unit on which the shift is based is kg/h. The value is entered in the selected mass flow unit.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 kg/h
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

**Mass flow factor**

<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Variable adjust → Mass flow factor (1846)
<b>Description</b>	Use this function to enter a quantity factor (without time) for the mass flow. This multiplication factor is applied over the mass flow range.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	1
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

**Sound velocity offset**

<b>Navigation</b>	Expert → Sensor → Sensor adjustm. → Variable adjust → S. veloc. offset (1848)
<b>Description</b>	Use this function to enter the zero point shift for the sound velocity trim. The sound velocity unit on which the shift is based is m/s. The value is entered in the selected velocity unit.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0 m/s
<b>Additional information</b>	<i>Description</i> Corrected value = (factor × value) + offset

---

**Sound velocity factor** 


---


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

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

**User entry** Positive floating-point number

**Factory setting** 1

**Additional information** *Description*

 Corrected value = (factor × value) + offset

---

**Density offset** 


---


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

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

**User entry** Signed floating-point number

**Factory setting** 0 kg/m<sup>3</sup>

**Additional information** *Description*

 Corrected value = (factor × value) + offset

---

**Density factor** 


---


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






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






**User entry** Positive floating-point number

**Factory setting** 1

**Additional information** *Description*

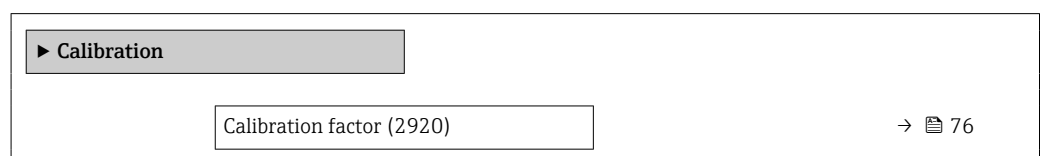
 Corrected value = (factor × value) + offset



Temperature offset	
<b>Navigation</b>	  Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. offset (1870)
<b>Prerequisite</b>	The <b>Calculated value</b> option is selected in the <b>Density source</b> parameter (→  68) and the <b>External value</b> option is selected in the <b>Temperature compensation</b> parameter (→  68).
<b>Description</b>	Use this function to enter the zero point shift for the temperature trim. The temperature unit on which the shift is based is K.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0
<b>Additional information</b>	<p><i>Description</i></p> <p> Corrected value = (factor × value) + offset</p>
Temperature factor	

<b>Navigation</b>	  Expert → Sensor → Sensor adjustm. → Variable adjust → Temp. factor (1871)
<b>Prerequisite</b>	The <b>Calculated value</b> option is selected in the <b>Density source</b> parameter (→  68) and the <b>External value</b> option is selected in the <b>Temperature compensation</b> parameter (→  68).
<b>Description</b>	Use this function to enter a quantity factor for the temperature. In each case, this factor refers to the temperature in K.
<b>User entry</b>	Positive floating-point number
<b>Factory setting</b>	1
<b>Additional information</b>	<p><i>Description</i></p> <p> Corrected value = (factor × value) + offset</p>

### 3.2.8 "Calibration" submenu

*Navigation*   Expert → Sensor → Calibration





Zero point (2921)	→  76
Nominal diameter (2807)	→  76

---

### Calibration factor



---

<b>Navigation</b>	  Expert → Sensor → Calibration → Cal. factor (2920)
<b>Description</b>	Displays the current calibration factor for the sensor.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	1

---

### Zero point



---

<b>Navigation</b>	  Expert → Sensor → Calibration → Zero point (2921)
<b>Description</b>	Displays the current zero point correction value for the sensor.
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	0

---

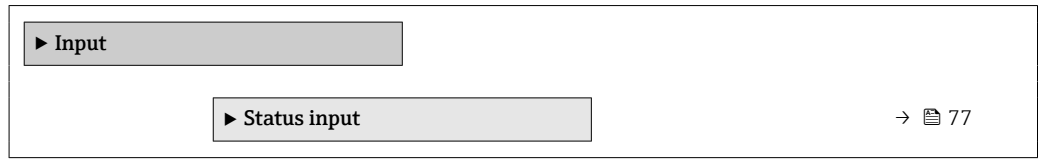
### Nominal diameter

---

<b>Navigation</b>	  Expert → Sensor → Calibration → Nominal diameter (2807)
<b>Description</b>	Displays the nominal diameter of the sensor.
<b>User interface</b>	-----
<b>Factory setting</b>	-----

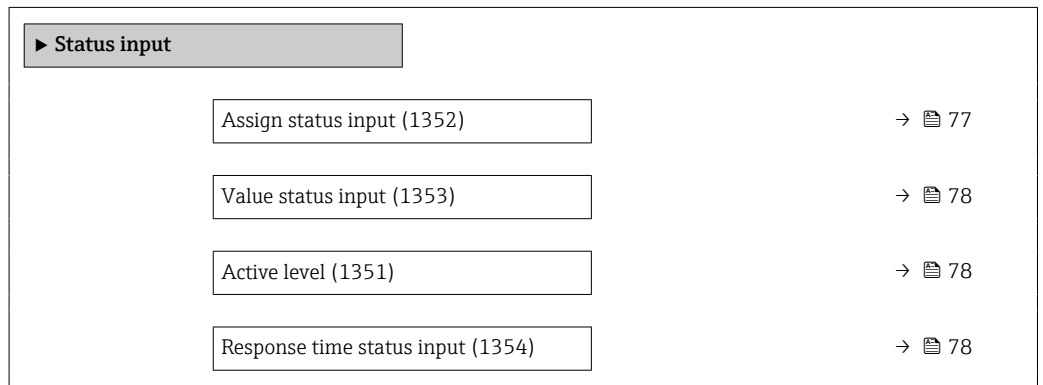
### 3.3 "Input" submenu

Navigation  Expert → Input




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

Navigation  Expert → Input → Status input 1 to n







#### Assign status input

**Navigation**  Expert → Input → Status input → Assign stat.inp. (1352)

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

- Selection**
- Off
  - Reset totalizer 1
  - Reset totalizer 2
  - Reset totalizer 3
  - Reset all totalizers
  - Flow override



**Factory setting** Off

<b>Additional information</b>	<p><i>Options</i></p> <ul style="list-style-type: none"> <li>▪ Off The status input is switched off.</li> <li>▪ Reset totalizer 1...3 The individual totalizers are reset.</li> <li>▪ Reset all totalizers All totalizers are reset.</li> <li>▪ Flow override The Flow override (→  63) is activated.</li> </ul> <p> Note on the Flow override (→  63):</p> <ul style="list-style-type: none"> <li>▪ The Flow override (→  63) is enabled as long as the level is at the status input (continuous signal).</li> <li>▪ All other assignments react to a change in level (pulse) at the status input.</li> </ul>
-------------------------------	--

---

## Value status input



---

<b>Navigation</b>	  Expert → Input → Status input → Val.stat.inp. (1353)
<b>Prerequisite</b>	For the following order code: "Output; input", option I "4-20mA HART, 2x pul./freq./switch output; status input"
<b>Description</b>	Displays the current input signal level.
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ High</li> <li>▪ Low</li> </ul>

---

## Active level



---

<b>Navigation</b>	  Expert → Input → Status input → Active level (1351)
<b>Description</b>	Use this function to determine the input signal level at which the assigned function is activated.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ High</li> <li>▪ Low</li> </ul>
<b>Factory setting</b>	High

---

## Response time status input

---



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

Factory setting


50 ms












### 3.4 "Output" submenu

Navigation   Expert → Output

▶ Output		
▶ Current output 1		→  79
▶ Pulse/frequency/switch output 1 to n		→  92

#### 3.4.1 "Current output 1" submenu

Navigation   Expert → Output → Curr.output 1

▶ Current output 1		
Process variable current output (0359-1)		→  80
Current range output (0353-1)		→  80
Fixed current (0365-1)		→  81
Lower range value output (0367-1)		→  82
Upper range value output (0372-1)		→  83
Measuring mode current output (0351-1)		→  84
Damping current output (0363-1)		→  88
Failure behavior current output (0364-1)		→  89
Failure current (0352-1)		→  90
Output current (0361-1)		→  90
Measured current (0366-1)		→  91

---

**Process variable current output**


**Navigation** Expert → Output → Curr.output 1 → Proc.var. outp (0359-1)

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

**Selection**

- Off \*
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature
- Density
- Signal strength \*
- Signal to noise ratio \*
- Acceptance rate \*
- Turbulence \*
- Electronics temperature

**Factory setting** Volume flow

---

**Current range output**


**Navigation** Expert → Output → Curr.output 1 → Curr.range out (0353-1)

**Description** Select current range for process value output and upper/lower level for alarm signal.

**Selection**

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

**Factory setting** Depends on country:

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




---

\* Visibility depends on order options or device settings




**Additional information**

*Description*

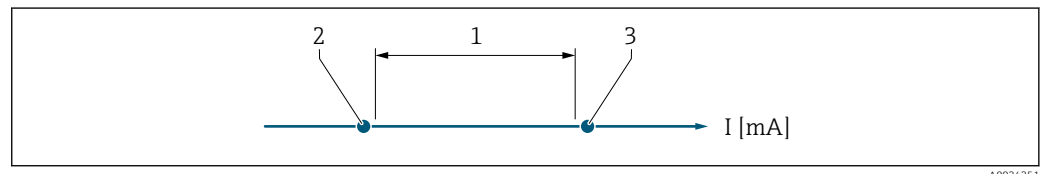
- i
  - In the event of a device alarm, the current output adopts the value specified in the **Failure mode** parameter (→  89).
  - If the measured value is outside the measuring range, the **△S441 Current output 1** diagnostic message is displayed.
  - The measuring range is specified via the **0/4 mA value** parameter (→  82) and **20 mA value** parameter (→  83).

*"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 (→  81).

*Example*

Shows the relationship between the current range for the output of the process value and the two signal on alarm levels:



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

*Selection*

Selection	1	2	3
4...20 mA NE (3.8...20.5 mA)	3.8 to 20.5 mA	< 3.6 mA	> 21.95 mA
4...20 mA US (3.9...20.8 mA)	3.9 to 20.8 mA US	< 3.6 mA	> 21.95 mA
4...20 mA (4...20.5 mA)	4 to 20.5 mA	< 3.6 mA	> 21.95 mA
0...20 mA (0...20.5 mA)	0 to 20.5 mA	0 mA	> 21.95 mA

- i
  - If the flow exceeds or falls below the upper or lower signal on alarm level, the **△S441 Current output 1** diagnostic message is displayed.


**Fixed current**



**Navigation**

  Expert → Output → Curr.output 1 → Fixed current (0365-1)

**Prerequisite**

The **Fixed current** option is selected in the **Current span** parameter (→  80).

**Description**

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

**User entry**

0 to 22.5 mA

**Factory setting**

22.5 mA

## Lower range value output



### Navigation

Expert → Output → Curr.output 1 → Low.range outp (0367-1)

### Prerequisite

In **Current span** parameter (→ 80), one of the following options is selected:

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

### Description

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

### User entry

Signed floating-point number

### Factory setting

Depends on country:

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

### Additional information

#### Description

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→ 80). 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 (→ 83).

#### Dependency

The unit depends on the process variable selected in the **Assign current output** parameter (→ 80).

#### Current output behavior

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

- Current span (→ 80)
- Measuring mode (→ 84)
- Failure mode (→ 89)

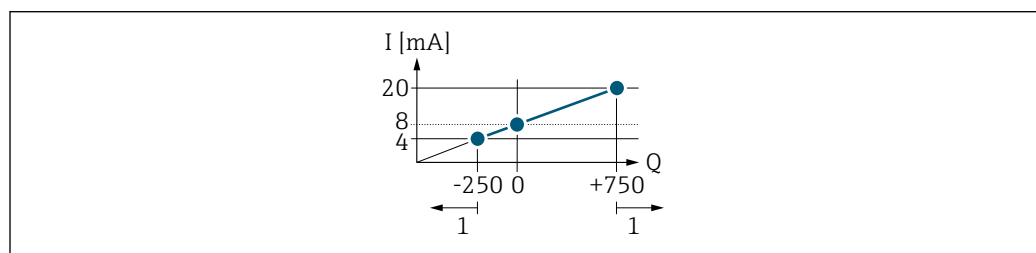
#### Configuration examples

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

#### Configuration example A



Measurement mode with **Forward flow** option

- **0/4 mA value** parameter (→ 82) = not equal to zero flow (e.g. -250 m<sup>3</sup>/h)
- **20 mA value** parameter (→ 83) = not equal to zero flow (e.g. +750 m<sup>3</sup>/h)
- Calculated current value = 8 mA at zero flow



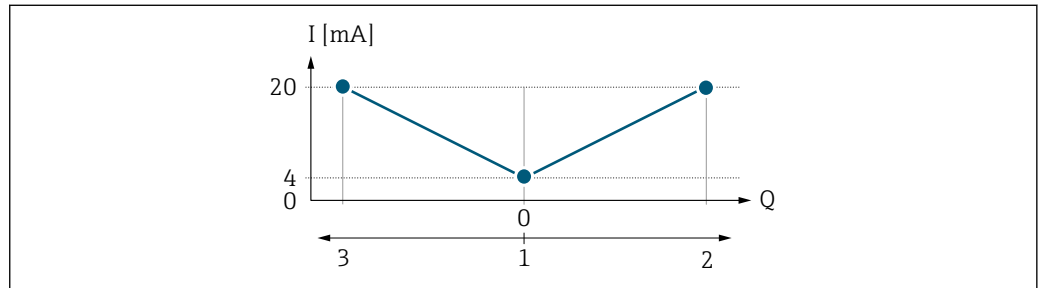
A0013757

Q Flow  
I Current  
1 Measuring range is exceeded or undershot





The operational range of the measuring device is defined by the values entered for the **0/4 mA value** parameter (→  82) and **20 mA value** parameter (→  83). If the effective flow exceeds or falls below this operational range, the **△S441 Current output 1** diagnostic message is output.

### Configuration example B

Measurement mode with **Forward/Reverse flow** option




- I* Current  
*Q* Flow  
 1 Value assigned to 0/4 mA current  
 2 Forward flow  
 3 Reverse flow

The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **0/4 mA value** parameter (→  82) and **20 mA value** parameter (→  83) must have the same algebraic sign. The value for the **20 mA value** parameter (→  83) (e.g. reverse flow) corresponds to the mirrored value for the **20 mA value** parameter (→  83) (e.g. flow).

### Configuration example C



Measurement mode with **Reverse flow compensation** option

If flow is characterized by severe fluctuations (e.g. when using reciprocating pumps), flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s →  84.


## Upper range value output



### Navigation

  Expert → Output → Curr.output 1 → Upp.range outp (0372-1)

### Prerequisite

In **Current span** parameter (→  80), one of the following options is selected:

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

### Description

Use this function to enter a value for the 20 mA current..

### User entry


Signed floating-point number


### Factory setting

Depends on country and nominal diameter



### Additional information

*Description*

Positive and negative values are permitted depending on the process variable assigned in the **Assign current output** parameter (→  80). 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 (→  82).

#### Dependency



 The unit depends on the process variable selected in the **Assign current output** parameter (→  80).

#### Example

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

If the **Forward/Reverse flow** option is selected in the **Measuring mode** parameter (→  84), different algebraic signs cannot be entered for the values for the **0/4 mA value** parameter (→  82) and **Upper range value output** parameter (→  83). The **△S441 Current output 1** diagnostic message is displayed.

#### Configuration examples


 Observe the configuration examples for the **0/4 mA value** parameter (→  82).

---


## Measuring mode current output

---

### Navigation

  Expert → Output → Curr.output 1 → Output mode (0351-1)

### Prerequisite

One of the following options is selected in the **Current span** parameter (→  80):

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

### Description

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

### Selection



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

### Factory setting

Forward flow

### Additional information

#### Description

 The process variable that is assigned to the current output via the **Assign current output** parameter (→  80) is displayed below the parameter.

#### "Forward flow" option

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

---

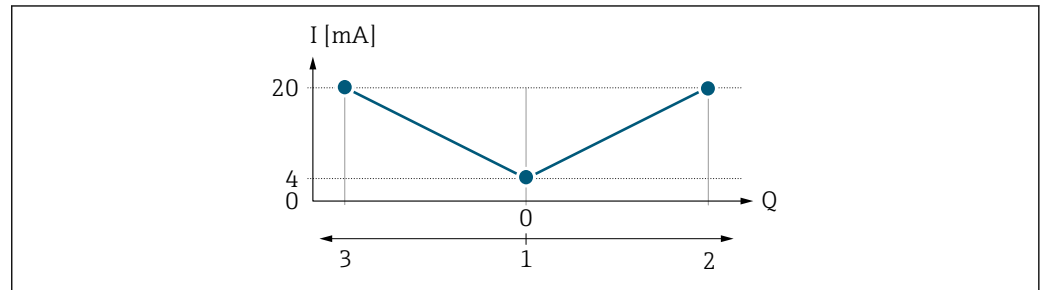
\* Visibility depends on order options or device settings

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

Both values are defined such that they are not equal to zero flow e.g.:

- 0/4 mA current value =  $-5 \text{ m}^3/\text{h}$
- 20 mA current value =  $10 \text{ m}^3/\text{h}$

"Forward/Reverse flow" option



A0013758

- I Current
- Q Flow
- 1 Value assigned to 0/4 mA current
- 2 Forward flow
- 3 Reverse flow

- The current output signal is independent of the direction of flow (absolute amount of the measured variable). The values for the **0/4 mA value** parameter (→ 82) and **20 mA value** parameter (→ 83) must have the same sign.
- The value for the **20 mA value** parameter (→ 83) (e.g. reverse flow) corresponds to the mirrored value for the **20 mA value** parameter (→ 83) (e.g. forward flow).

"Reverse flow compensation" option

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

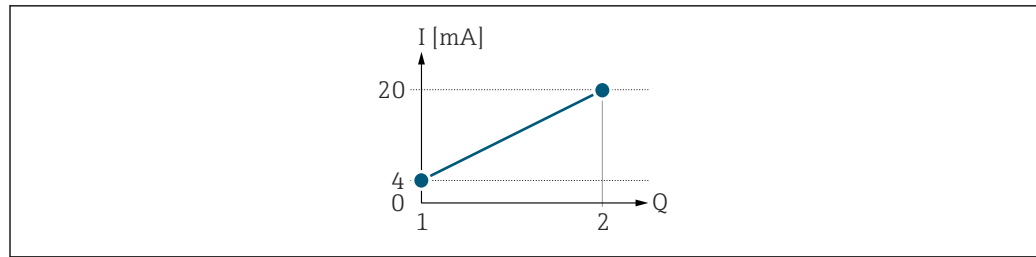
In the event of prolonged and undesired reverse flow, flow values can accumulate in the buffer memory. Due to the configuration of the current output, these values are not factored in, however, i.e. there is no compensation for the reverse flow.

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

Examples of how the current output behaves

#### Example 1

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

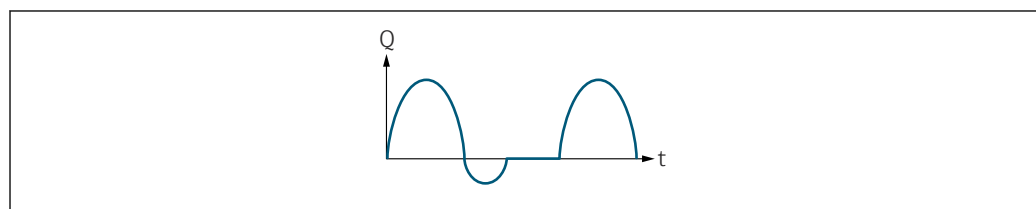


A0028084

3 Measuring range

- $I$  Current  
 $Q$  Flow  
 1 Lower range value (Value assigned to 0/4 mA current)  
 2 Upper range value (end of measuring range output)

With the following flow response:



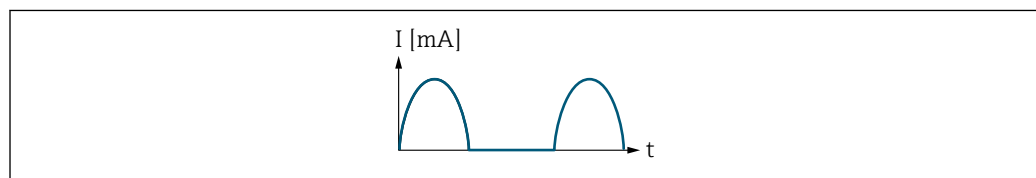
A0028091

4 Flow response

- $Q$  Flow  
 $t$  Time

With **Forward flow** option

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

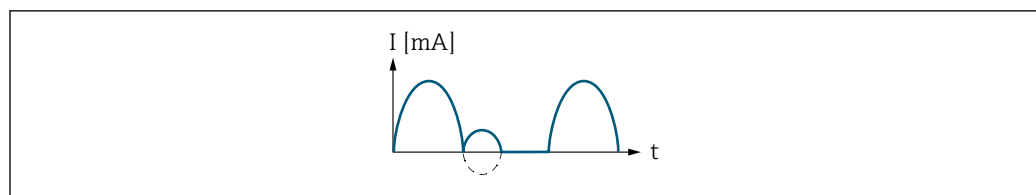


A0028092

- $I$  Current  
 $t$  Time

With **Forward/Reverse flow** option

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

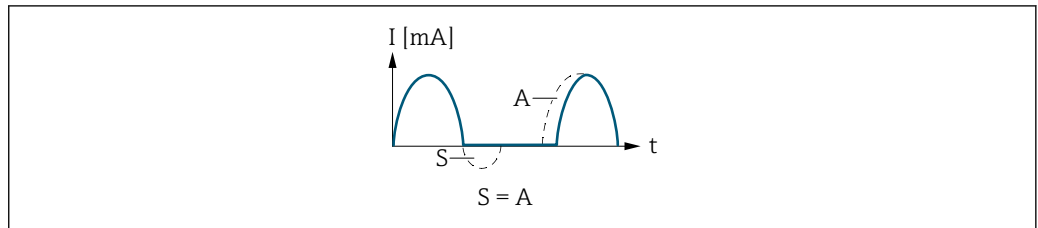


A0028093

- $I$  Current  
 $t$  Time

With **Reverse flow compensation** option

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

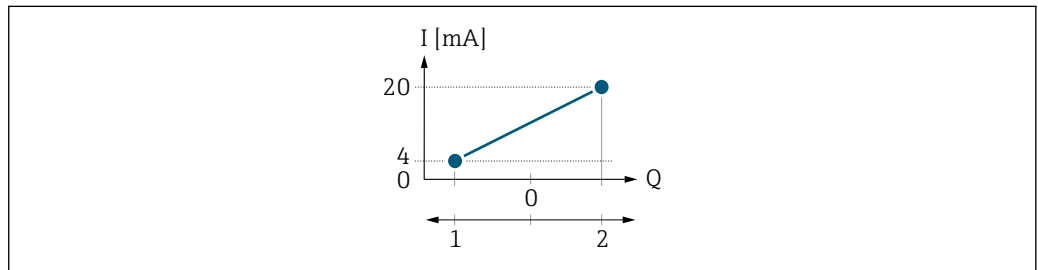


A0028094

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

**Example 2**

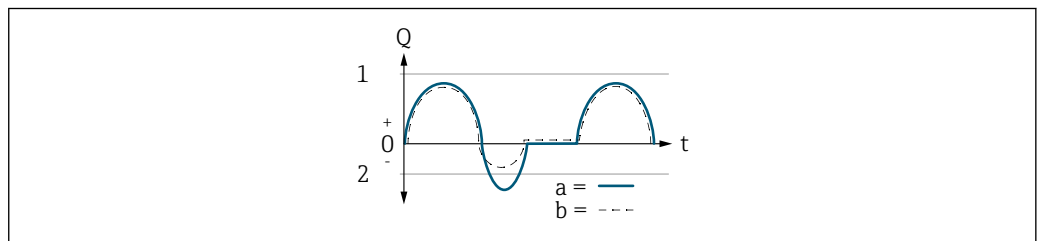
Defined measuring range: lower range value and upper range value with **different** signs



A0028095

- 5 Measuring range
- I* Current
- Q* Flow
- 1 Lower range value (Value assigned to 0/4 mA current)
- 2 Upper range value (end of measuring range output)

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

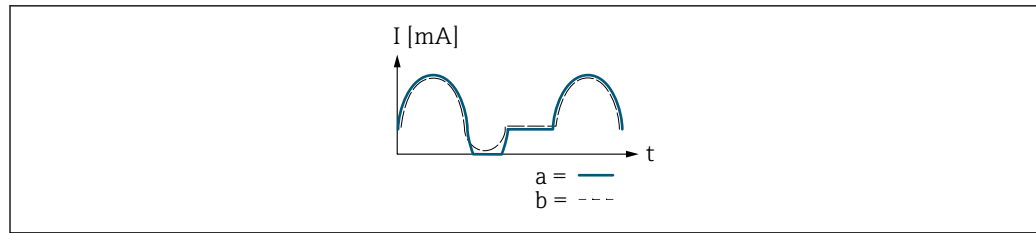


A0028098

- Q* Flow
- t* Time
- 1 Lower range value (Value assigned to 0/4 mA current)
- 2 Upper range value (end of measuring range output)

With **Forward flow** option

- a (–): The flow components outside the scaled measuring range cannot be taken into account for signal output.
- b (– –): The current output signal is proportional to the process variable assigned.



A0028100

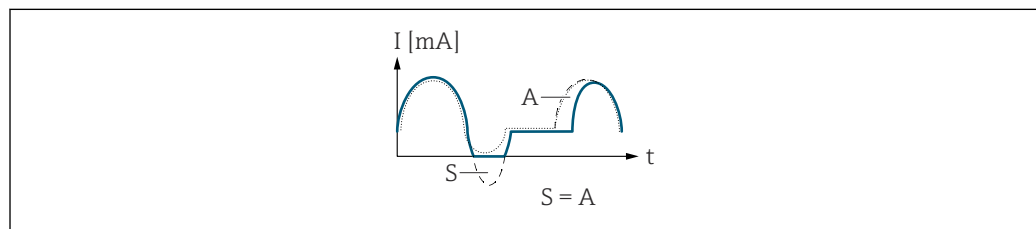
$I$  Current  
 $t$  Time

With **Forward/Reverse flow** option

This option cannot be selected here since the values for the **0/4 mA value** parameter (→ ☰ 82) and **20 mA value** parameter (→ ☰ 83) have different signs.

With **Reverse flow compensation** option

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



A0028101

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

## Damping current output



### Navigation

☰☰ Expert → Output → Curr.output 1 → Damp.curr.outp (0363-1)

### Prerequisite

A process variable is selected in the **Assign current output** parameter (→ ☰ 80) and one of the following options is selected in the **Current span** parameter (→ ☰ 80):

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

### Description

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


### User entry

0.0 to 999.9 s

### Factory setting

1.0 s







<b>Additional information</b>	<p><i>User entry</i></p> <p>Use this function to enter a time constant (PT1 element<sup>3)</sup>) for current output damping:</p> <ul style="list-style-type: none"> <li>▪ If a low time constant is entered, the current output reacts quickly to fluctuating measured variables.</li> <li>▪ If a high time constant is entered, the current output reacts more slowly.</li> </ul> <p> Damping is switched off if <b>0</b> is entered (factory setting).</p>
-------------------------------	--

---

## Failure behavior current output

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<b>Navigation</b>	  Expert → Output → Curr.output 1 → Failure behav. (0364-1)
<b>Prerequisite</b>	<p>A process variable is selected in the <b>Assign current output</b> parameter (→  80) and one of the following options is selected in the <b>Current span</b> parameter (→  80):</p> <ul style="list-style-type: none"> <li>▪ 4...20 mA NE (3.8...20.5 mA)</li> <li>▪ 4...20 mA US (3.9...20.8 mA)</li> <li>▪ 4...20 mA (4...20.5 mA)</li> <li>▪ 0...20 mA (0...20.5 mA)</li> </ul>
<b>Description</b>	Use this function to select the value of the current output in the event of a device alarm.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Min.</li> <li>▪ Max.</li> <li>▪ Last valid value</li> <li>▪ Actual value</li> <li>▪ Fixed value</li> </ul>
<b>Factory setting</b>	Max.

---



3) 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 (→  80).

*"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 (→  80).

*"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 (→  90).

**Failure current****Navigation**

 Expert → Output → Curr.output 1 → Fail. current (0352-1)

**Prerequisite**

The **Defined value** option is selected in the **Failure mode** parameter (→  89).

**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****Navigation**

 Expert → Output → Curr.output 1 → Output curr. 1 (0361-1)

**Description**

Displays the current value currently calculated for the current output.


**User interface**

0 to 22.5 mA

---

**Measured current**


---


<b>Navigation</b>	 Expert → Output → Curr.output 1 → Measur. curr. (0366-1)
<b>Description</b>	Displays the actual measured value of the output current.
<b>User interface</b>	0 to 30 mA

---

**Trim**


---




<b>Navigation</b>	 Expert → Output → Curr.output 1 → Trim (0362-1)
<b>Description</b>	Select adjustment mode for trim.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ 4 mA</li> <li>■ 20 mA</li> <li>■ Calculate</li> <li>■ Reset</li> </ul>
<b>Factory setting</b>	Off

---

**20mA trim value**


---




<b>Navigation</b>	 Expert → Output → Curr.output 1 → 20mA trim value (0356-1)
<b>Description</b>	Enter upper measured value for trim (around 20 mA).
<b>User entry</b>	18 to 22 mA
<b>Factory setting</b>	20 mA

---

**4mA trim value**


---





<b>Navigation</b>	 Expert → Output → Curr.output 1 → 4mA trim value (0357-1)
<b>Description</b>	Enter lower measured value for the trim (around 4 mA).
<b>User entry</b>	3 to 5 mA
<b>Factory setting</b>	4 mA

---

**Status**



---

<b>Navigation</b>	  Expert → Output → Curr.output 1 → Status (0360-1)
<b>Description</b>	Shows the status of the last output current (OutValue).
<b>User interface</b>	0 to 255
<b>Factory setting</b>	0

### 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	
Operating mode (0469-1 to n)	→  93
Assign pulse output (0460-1 to n)	→  95
Pulse scaling (0455-1 to n)	→  95
Pulse width (0452-1 to n)	→  96
Measuring mode (0457-1 to n)	→  96
Failure mode (0480-1 to n)	→  97
Pulse output (0456-1 to n)	→  98
Assign frequency output (0478-1 to n)	→  98
Minimum frequency value (0453-1 to n)	→  99
Maximum frequency value (0454-1 to n)	→  99
Measuring value at minimum frequency (0476-1 to n)	→  99
Measuring value at maximum frequency (0475-1 to n)	→  100
Measuring mode (0479-1 to n)	→  100
Damping output (0477-1 to n)	→  101

Response time (0491-1 to n)	→  101
Failure mode (0451-1 to n)	→  102
Failure frequency (0474-1 to n)	→  102
Output frequency (0471-1 to n)	→  103
Switch output function (0481-1 to n)	→  103
Assign diagnostic behavior (0482-1 to n)	→  103
Assign limit (0483-1 to n)	→  104
Switch-on value (0466-1 to n)	→  106
Switch-off value (0464-1 to n)	→  106
Assign flow direction check (0484-1 to n)	→  107
Assign status (0485-1 to n)	→  107
Switch-on delay (0467-1 to n)	→  108
Switch-off delay (0465-1 to n)	→  108
Failure mode (0486-1 to n)	→  108
Switch state (0461-1 to n)	→  109
Invert output signal (0470-1 to n)	→  109

**Operating mode**



**Navigation**

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

**Description**

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

**Selection**

- Pulse \*
- Frequency \*
- Switch \*

**Factory setting**

Pulse

\* Visibility depends on order options or device settings

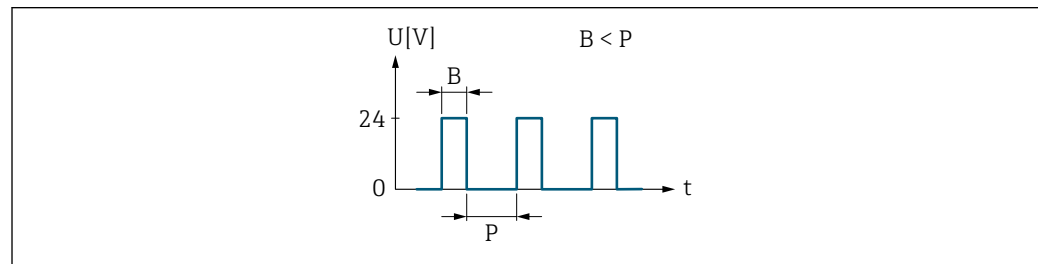
**Additional information***"Pulse" option*

Quantity-dependent pulse with configurable pulse width

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

Example

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



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

B Pulse width entered

P Pauses between the individual pulses

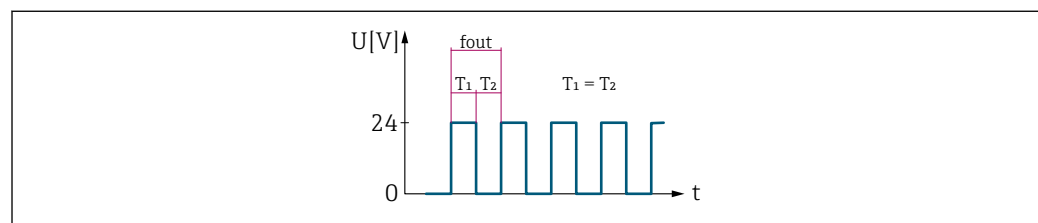
*"Frequency" option*

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

An output frequency is output that is proportional to the value of a process variable, such as volume flow, mass flow, temperature, sound velocity, flow velocity, acceptance rate, turbulence, signal strength or signal to noise ratio.

Example

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



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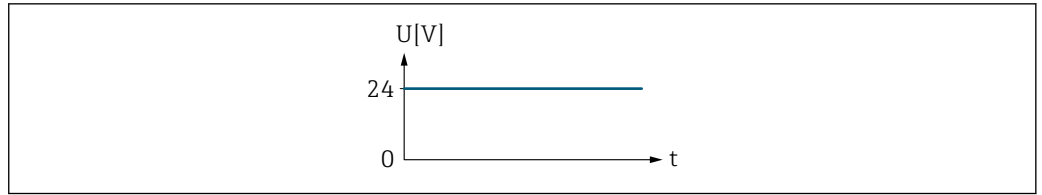
7 Flow-proportional frequency output

*"Switch" option*

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

Example

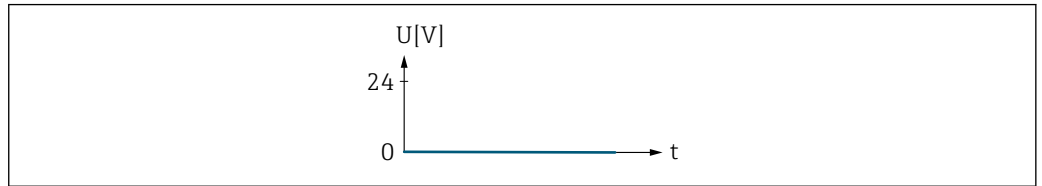
Alarm response without alarm



A0026884

8 No alarm, high level

Example  
Alarm response in case of alarm



A0026885

9 Alarm, low level

**Assign pulse output**



<b>Navigation</b>	Expert → Output → PFS output 1 to n → Assign pulse (0460–1 to n)
<b>Prerequisite</b>	The <b>Pulse</b> option is selected in <b>Operating mode</b> parameter (→ 93).
<b>Description</b>	Use this function to select the process variable for the pulse output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Volume flow</li> <li>■ Mass flow</li> </ul>
<b>Factory setting</b>	Off

**Pulse scaling**



<b>Navigation</b>	Expert → Output → PFS output 1 to n → Pulse scaling (0455–1 to n)
<b>Prerequisite</b>	The <b>Pulse</b> option is selected in the <b>Operating mode</b> parameter (→ 93) and a process variable is selected in the <b>Assign pulse output</b> parameter (→ 95).
<b>Description</b>	Use this function to enter the value for the measured value that a pulse is equivalent to.
<b>User entry</b>	Positive floating point number
<b>Factory setting</b>	Depends on country and nominal diameter
<b>Additional information</b>	<p>User entry</p> <p>Weighting of the pulse output with a quantity.</p>

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 (→ 93) and a process variable is selected in the **Assign pulse output** parameter (→ 95).

### Description

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

### User entry

0.05 to 2 000 ms

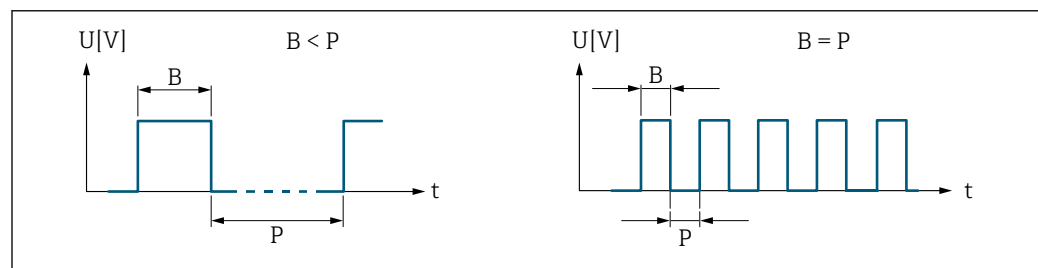
### Factory setting

100 ms

### Additional information

*Description*

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



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

*Example*

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

## Measuring mode







### Navigation

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

### Description

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







<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Forward flow</li> <li>■ Forward/Reverse flow</li> <li>■ Reverse flow</li> <li>■ Reverse flow compensation</li> </ul>
<b>Factory setting</b>	Forward flow
<b>Additional information</b>	<p><i>Options</i></p> <ul style="list-style-type: none"> <li>■ Forward flow Positive flow is output, negative flow is not output.</li> <li>■ Forward/Reverse flow Positive and negative flow are output (absolute value), but a distinction is not made between positive and negative flow.</li> <li>■ Reverse flow Negative flow is output, positive flow is not output.</li> <li>■ Reverse flow compensation The flow components outside the measuring range are buffered, balanced and output after a maximum delay of 60 s.</li> </ul> <p> For a detailed description of the options available, see the <b>Measuring mode</b> parameter (→  84)</p> <p><i>Examples</i></p> <p> For a detailed description of the configuration examples, see the <b>Measuring mode</b> parameter (→  84)</p>

---

## Failure mode

---

<b>Navigation</b>	  Expert → Output → PFS output 1 to n → Failure mode (0480-1 to n)
<b>Prerequisite</b>	The <b>Pulse</b> option is selected in the <b>Operating mode</b> parameter (→  93) and a process variable is selected in the <b>Assign pulse output</b> parameter (→  95).
<b>Description</b>	Use this function to select the failure mode of the pulse output in the event of a device alarm.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Actual value</li> <li>■ No pulses</li> </ul>
<b>Factory setting</b>	No pulses
<b>Additional information</b>	<p><i>Description</i></p> <p>The dictates of safety render it advisable to ensure that the pulse output shows a predefined behavior in the event of a device alarm.</p> <p><i>Options</i></p> <ul style="list-style-type: none"> <li>■ 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.</li> <li>■ No pulses In the event of a device alarm, the pulse output is "switched off".</li> </ul> <p><b>NOTICE!</b> A device alarm indicates a serious fault with the measuring device. The measurement quality may possibly be influenced and may no longer be guaranteed. The</p>

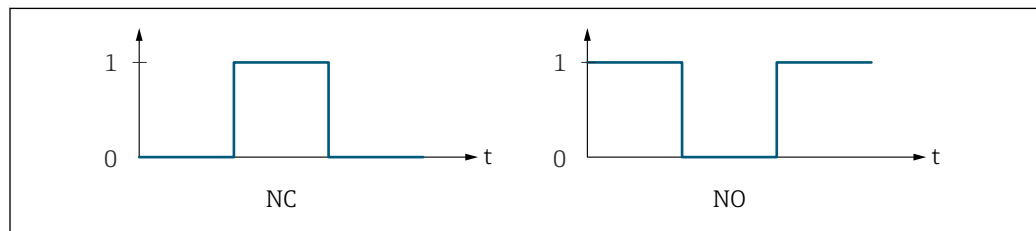
**Actual value** option is only recommended if it is ensured that all possible alarm conditions do not influence the measurement quality.

---

## Pulse output

---

<b>Navigation</b>	🔍📄 Expert → Output → PFS output 1 to n → Pulse output (0456-1 to n)
<b>Prerequisite</b>	The <b>Pulse</b> option is selected in the <b>Operating mode</b> parameter (→ 📄 93) 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> <li>■ The <b>Value per pulse</b> parameter (→ 📄 95) and <b>Pulse width</b> parameter (→ 📄 96) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.</li> </ul>



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

The output behavior can be reversed via the **Invert output signal** parameter (→ 📄 109) 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 (→ 📄 97)) can be configured.

---

## Assign frequency output

---



<b>Navigation</b>	🔍📄 Expert → Output → PFS output 1 to n → Assign freq. (0478-1 to n)
<b>Prerequisite</b>	The <b>Frequency</b> option is selected in <b>Operating mode</b> parameter (→ 📄 93).
<b>Description</b>	Use this function to select the process variable for the frequency output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Volume flow</li> <li>■ Mass flow</li> </ul>



- Flow velocity
- Sound velocity
- Temperature
- Density
- Electronics temperature<sup>\*</sup>
- Signal strength
- Signal to noise ratio<sup>\*</sup>
- Acceptance rate<sup>\*</sup>
- Turbulence<sup>\*</sup>



**Factory setting** Off

---

### Minimum frequency value

---

**Navigation**   Expert → Output → PFS output 1 to n → Min. freq. value (0453-1 to n)

**Prerequisite** The **Frequency** option is selected in the **Operating mode** parameter (→  93) and a process variable is selected in the **Assign frequency output** parameter (→  98).

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



**User entry** 0.0 to 10 000 Hz



**Factory setting** 0.0 Hz

---

### Maximum frequency value

---

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

**Prerequisite** The **Frequency** option is selected in the **Operating mode** parameter (→  93) and a process variable is selected in the **Assign frequency output** parameter (→  98).

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



**User entry** 0.0 to 10 000 Hz



**Factory setting** 10 000 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 (→  93) and a process variable is selected in the **Assign frequency output** parameter (→  98).

---







\* Visibility depends on order options or device settings

<b>Description</b>	Use this function to enter the measured value for the start value frequency.
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	Depends on country and nominal diameter
<b>Additional information</b>	<p><i>Dependency</i></p> <p> The entry depends on the process variable selected in the <b>Assign frequency output</b> parameter (→  98).</p>

---

### Measuring value at maximum frequency



---

<b>Navigation</b>	  Expert → Output → PFS output 1 to n → Val. at max.freq (0475-1 to n)
<b>Prerequisite</b>	The <b>Frequency</b> option is selected in the <b>Operating mode</b> parameter (→  93) and a process variable is selected in the <b>Assign frequency output</b> parameter (→  98).
<b>Description</b>	Use this function to enter the measured value for the end value frequency.
<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 maximum measured value at the maximum frequency. The selected process variable is output as a proportional frequency.</p> <p><i>Dependency</i></p> <p> The entry depends on the process variable selected in the <b>Assign frequency output</b> parameter (→  98).</p>

---

### Measuring mode

---

<b>Navigation</b>	  Expert → Output → PFS output 1 to n → Measuring mode (0479-1 to n)
<b>Description</b>	Use this function to select the measuring mode for the frequency output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Forward flow</li> <li>▪ Forward/Reverse flow</li> <li>▪ Reverse flow compensation</li> </ul>
<b>Factory setting</b>	Forward flow

**Additional information***Options*

For a detailed description of the options available, see the **Measuring mode** parameter (→ 84)

*Examples*

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 84)

**Damping output****Navigation**

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

**Factory setting**

0.0 s

**Additional information***User entry*

Use this function to enter a time constant (PT1 element <sup>4)</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.

**Response time****Navigation**

Expert → Output → PFS output 1 to n → Response time (0491-1 to n)

**Description**

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

**User interface**







Positive floating-point number







**Additional information***Description*

The response time is made up of the time specified for the following dampings:

- Damping of pulse/frequency/switch output → 88  
and
- Depending on the measured variable assigned to the output.  
Flow damping

4) proportional transmission behavior with first order delay



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 (→  93) and a process variable is selected in the <b>Assign frequency output</b> parameter (→  98).
<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>Factory setting</b>	0 Hz
<b>Additional information</b>	<p><i>Options</i></p> <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 (→  102) 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 indicates a serious fault with the measuring device. The measurement quality may possibly be influenced and may no longer be guaranteed. The <b>Actual value</b> option is only recommended if it is ensured that all possible alarm conditions do not influence 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>	In the <b>Operating mode</b> parameter (→  93), the <b>Frequency</b> option is selected, in the <b>Assign frequency output</b> parameter (→  98) a process variable is selected, and in the <b>Failure mode</b> parameter (→  102), the <b>Defined value</b> option is selected.
<b>Description</b>	Enter frequency output value in alarm condition.
<b>User entry</b>	0.0 to 12 500.0 Hz
<b>Factory setting</b>	0.0 Hz

---

**Output frequency**


---



<b>Navigation</b>	 Expert → Output → PFS output 1 to n → Output freq. (0471-1 to n)
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→  93), 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 (→  93).
<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>
<b>Factory setting</b>	Off
<b>Additional information</b>	<p><i>Options</i></p> <ul style="list-style-type: none"> <li>▪ Off The switch output is permanently switched off (open, non-conductive).</li> <li>▪ On The switch output is permanently switched on (closed, conductive).</li> <li>▪ 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.</li> <li>▪ 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.</li> <li>▪ Status Displays the device status low flow cut off is selected.</li> </ul>


---

**Assign diagnostic behavior**


---







<b>Navigation</b>	 Expert → Output → PFS output 1 to n → Assign diag. beh (0482-1 to n)
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ In the <b>Operating mode</b> parameter (→  93), the <b>Switch</b> option is selected.</li> <li>▪ In the <b>Switch output function</b> parameter (→  103), the <b>Diagnostic behavior</b> option is selected.</li> </ul>

<b>Description</b>	Use this function to select the diagnostic event category that is displayed for the switch output.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Alarm</li> <li>■ Alarm or warning</li> <li>■ Warning</li> </ul>
<b>Factory setting</b>	Alarm
<b>Additional information</b>	<p><i>Description</i></p> <p> If no diagnostic event is pending, the switch output is closed and conductive.</p> <p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ Alarm The switch output signals only diagnostic events in the alarm category.</li> <li>■ Alarm or warning The switch output signals diagnostic events in the alarm and warning category.</li> <li>■ Warning The switch output signals only diagnostic events in the warning category.</li> </ul>

---

## Assign limit

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<b>Navigation</b>	  Expert → Output → PFS output 1 to n → Assign limit (0483–1 to n)
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>■ The <b>Switch</b> option is selected in <b>Operating mode</b> parameter (→  93).</li> <li>■ The <b>Limit</b> option is selected in <b>Switch output function</b> parameter (→  103).</li> </ul>
<b>Description</b>	Use this function to select a process variable for the limit function.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Flow velocity</li> <li>■ Sound velocity</li> <li>■ Temperature</li> <li>■ Density</li> <li>■ Electronics temperature</li> <li>■ Signal strength<sup>*</sup></li> <li>■ Signal to noise ratio<sup>*</sup></li> <li>■ Acceptance rate<sup>*</sup></li> <li>■ Turbulence<sup>*</sup></li> <li>■ Totalizer 1</li> <li>■ Totalizer 2</li> <li>■ Totalizer 3</li> </ul>
<b>Factory setting</b>	Volume flow

---

\* Visibility depends on order options or device settings

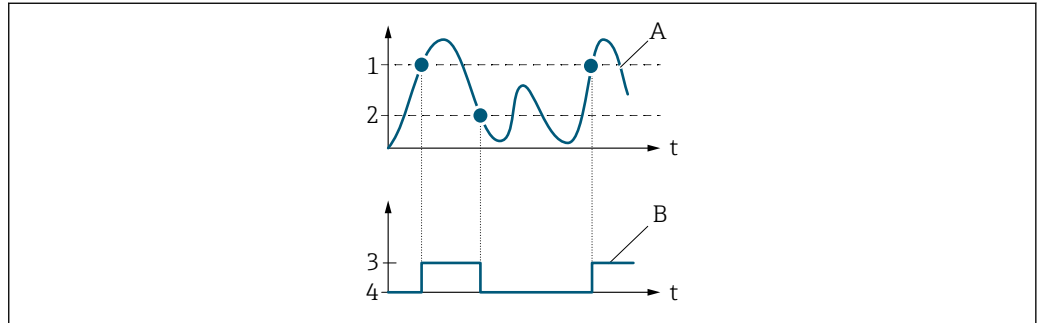


**Additional information**

*Description*

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

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

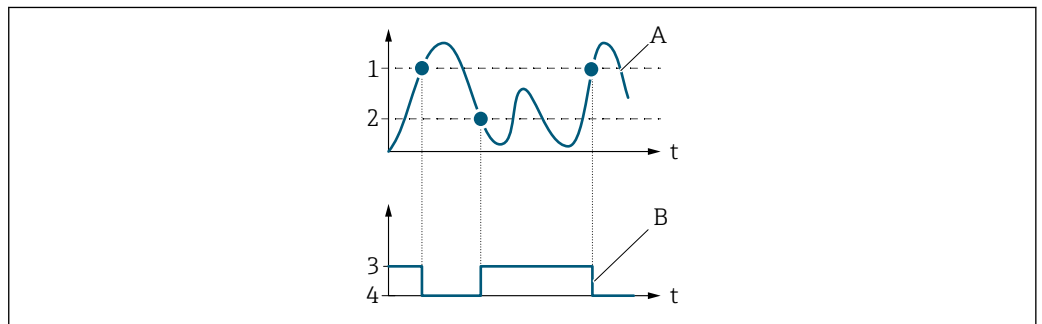


A0026891

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

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

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

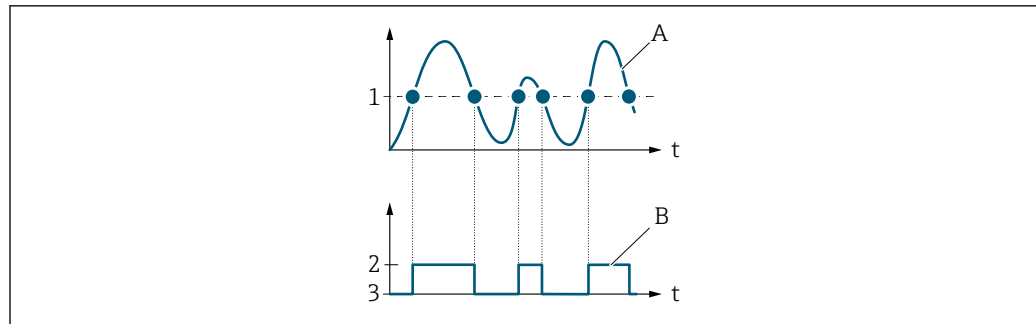


A0026892

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

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







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






A0026893

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

## Switch-on value

<b>Navigation</b>	 Expert → Output → PFS output 1 to n → Switch-on value (0466-1 to n)
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ The <b>Switch</b> option is selected in the <b>Operating mode</b> parameter (→  93).</li> <li>▪ The <b>Limit</b> option is selected in the <b>Switch output function</b> parameter (→  103).</li> </ul>
<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
<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 depends on the process variable selected in the <b>Assign limit</b> parameter (→  104).</p>

## Switch-off value

<b>Navigation</b>	 Expert → Output → PFS output 1 to n → Switch-off value (0464-1 to n)
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ The <b>Switch</b> option is selected in the <b>Operating mode</b> parameter (→  93).</li> <li>▪ The <b>Limit</b> option is selected in the <b>Switch output function</b> parameter (→  103).</li> </ul>
<b>Description</b>	Use this function to enter the measured value for the switch-off point.
<b>User entry</b>	Signed floating-point number



**Factory setting** Depends on country

**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 (→  104).



---

## Assign flow direction check

---

**Navigation**   Expert → Output → PFS output 1 to n → Assign dir.check (0484-1 to n)

**Prerequisite**

- The **Switch** option is selected in the **Operating mode** parameter (→  93).
- The **Flow direction check** option is selected in the **Switch output function** parameter (→  103).

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


**Selection**

**Factory setting** Volume flow



---

## Assign status

---

**Navigation**   Expert → Output → PFS output 1 to n → Assign status (0485-1 to n)

**Prerequisite**

- The **Switch** option is selected in **Operating mode** parameter (→  93).
- The **Status** option is selected in **Switch output function** parameter (→  103).

**Description** Select the device function whose status you want to display.

**Selection**

- Off
- Low flow cut off

**Factory setting** Low flow cut off





**Additional information** *Options*

When the switch-on point for the selected device function is reached, the output is switched on (closed, conductive). Otherwise, the output is non-conductive.

---

**Switch-on delay** 






---

<b>Navigation</b>	  Expert → Output → PFS output 1 to n → Switch-on delay (0467-1 to n)
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ The <b>Switch</b> option is selected in the <b>Operating mode</b> parameter (→  93).</li> <li>▪ The <b>Limit</b> option is selected in the <b>Switch output function</b> parameter (→  103).</li> </ul>
<b>Description</b>	Use this function to enter a delay time for switching on the switch output.
<b>User entry</b>	0.0 to 100.0 s
<b>Factory setting</b>	0.0 s


---

**Switch-off delay** 




---

<b>Navigation</b>	  Expert → Output → PFS output 1 to n → Switch-off delay (0465-1 to n)
<b>Prerequisite</b>	<ul style="list-style-type: none"> <li>▪ The <b>Switch</b> option is selected in the <b>Operating mode</b> parameter (→  93).</li> <li>▪ The <b>Limit</b> option is selected in the <b>Switch output function</b> parameter (→  103).</li> </ul>
<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
<b>Factory setting</b>	0.0 s

---

**Failure mode** 


---

<b>Navigation</b>	  Expert → Output → PFS output 1 to n → Failure mode (0486-1 to n)
<b>Description</b>	Use this function to select a failsafe mode for the switch output in the event of a device alarm.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Actual status</li> <li>▪ Open</li> <li>▪ Closed</li> </ul>
<b>Factory setting</b>	Open
<b>Additional information</b>	<p><i>Options</i></p> <ul style="list-style-type: none"> <li>▪ 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 <b>Actual status</b> option behaves in the same way as the current input value.</li> <li>▪ Open In the event of a device alarm, the switch output's transistor is set to <b>non-conductive</b>.</li> <li>▪ Closed In the event of a device alarm, the switch output's transistor is set to <b>conductive</b>.</li> </ul>

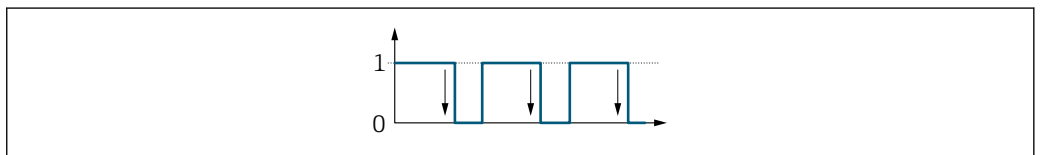
**Switch state**

<b>Navigation</b>	🏠🏠 Expert → Output → PFS output 1 to n → Switch state (0461-1 to n)
<b>Prerequisite</b>	The <b>Switch</b> option is selected in the <b>Operating mode</b> parameter (→ 📄 93).
<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>

**Invert output signal**

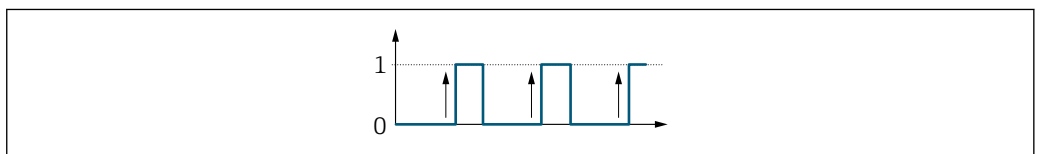


<b>Navigation</b>	🏠🏠 Expert → Output → PFS output 1 to n → Invert outp.sig. (0470-1 to n)
<b>Description</b>	Use this function to select whether to invert the output signal.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ No</li> <li>■ Yes</li> </ul>
<b>Factory setting</b>	No
<b>Additional information</b>	<p><i>Selection</i></p> <p><b>No</b> option (passive - negative)</p>



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

**Yes** option (passive - positive)




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## 3.5 "Communication" submenu

Navigation  Expert → Communication


▶ Communication		
▶ HART input		→  110
▶ HART output		→  116
▶ Web server		→  132
▶ Diagnostic configuration		→  135
▶ WLAN settings		→  142








### 3.5.1 "HART input" submenu

Navigation  Expert → Communication → HART input

▶ HART input		
▶ Configuration		→  110
▶ Input		→  115

### "Configuration" submenu



Navigation  Expert → Communication → HART input → Configuration

▶ Configuration		
Capture mode (7001)		→  111
Device ID (7007)		→  111
Device type (7008)		→  112
Manufacturer ID (7009)		→  112
Burst command (7006)		→  112
Slot number (7010)		→  113
Timeout (7005)		→  113

Failure mode (7011)	→ ⓘ 114
Failure value (7012)	→ ⓘ 114



---

## Capture mode 🔒

<b>Navigation</b>	 Expert → Communication → HART input → Configuration → Capture mode (7001)
<b>Description</b>	Use this function to select the capture mode via burst or master communication.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Burst network</li> <li>▪ Master network</li> </ul>
<b>Factory setting</b>	Off
<b>Additional information</b>	<p><i>"Burst network" option</i></p> <p>The device records data transmitted via burst in the network.</p> <p> An external pressure sensor must be in the burst mode.</p> <p><i>"Master network" option</i></p> <p>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.</p>

---




## 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 (→ ⓘ 111).
<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>	<p>6-digit value:</p> <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>Factory setting</b>	0
<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 (→  111), 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 (→  111).
<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>Factory setting</b>	0
<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** 


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<b>Navigation</b>	 Expert → Communication → HART input → Configuration → Burst command (7006)
<b>Prerequisite</b>	The <b>Burst network</b> option or the <b>Master network</b> option are selected in the <b>Capture mode</b> parameter (→  111).
<b>Description</b>	Use this function to select the burst command to be recorded.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Command 1</li> <li>■ Command 3</li> <li>■ Command 9</li> <li>■ Command 33</li> </ul>



**Factory setting** Command 1

**Additional information** *Selection*

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

**Slot number**



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

**Prerequisite** The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 111).

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

**User entry** 1 to 8

**Factory setting** 1

**Additional information** *User entry*

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

**Timeout**



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

**Prerequisite** The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 111).

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

**User entry** 1 to 120 s

**Factory setting** 5 s


**Additional information** *Description*

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

---

## Failure mode

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

**Prerequisite** In the **Capture mode** parameter (→  111), the **Burst network** option or **Master network** option is selected.


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

**Selection**

- Alarm
- Last valid value
- Defined value

**Factory setting** Alarm

**Additional information** *Options*



- Alarm  
An error message is set.
- Last valid value  
The last valid measured value is used.
- Defined value  
A user-defined measured value is used: (**Failure value** parameter (→  114)).

---

## Failure value

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

**Prerequisite** The following conditions are met:

- In the **Capture mode** parameter (→  111), the **Burst network** option or **Master network** option is selected.
- In the **Failure mode** parameter (→  114), the **Defined value** option is selected.


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

**User entry** Signed floating-point number

**Factory setting** 0

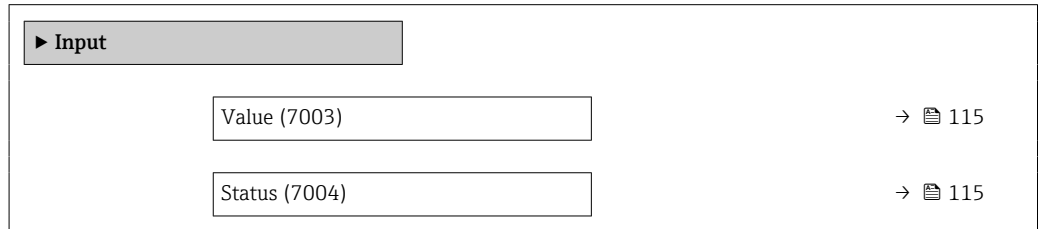
**Additional information**

*Dependency*

 The unit is taken from the **Pressure unit** parameter

**"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





**Additional information**

*Description*


If the measuring device reads in an invalid pressure measured value, the  **F882 Input signal** diagnostic message is output






### 3.5.2 "HART output" submenu

Navigation  Expert → Communication → HART output

▶ HART output	
▶ Configuration	→  116
▶ Burst configuration	→  118
▶ Information	→  125
▶ Output	→  128


#### "Configuration" submenu

Navigation  Expert → Communication → HART output → Configuration

▶ Configuration	
HART short tag (0220)	→  116
Device tag (0215)	→  117
HART address (0219)	→  117
No. of preambles (0217)	→  117
Fieldbus writing access (0273)	→  118

#### HART short tag

##### Navigation

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

##### Description









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

##### User entry

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

##### Factory setting

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Device tag		
<b>Navigation</b>	  Expert → Communication → HART output → Configuration → Device tag (0215)	
<b>Description</b>	Use this function to enter the name for the measuring point.	
<b>User entry</b>	Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).	
<b>Factory setting</b>	Prosonic Flow	
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>Factory setting</b>	0	
<b>Additional information</b>	<p><i>Description</i></p> <p>For addressing in a HART Multidrop network, the <b>Fixed current</b> option must be set in the <b>Current span</b> parameter (→  80) (current output 1).</p>	
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>Factory setting</b>	5	
<b>Additional information</b>	<p><i>User entry</i></p> <p>As every modem component can "swallow" a byte, 2-byte preambles at least must be defined.</p>	

---

**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>Factory setting</b>	Read + write
<b>Additional information</b>	<p><i>Description</i></p> <p>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.</p> <p><i>Selection</i></p> <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* Expert → Communication → HART output → Burst config.  
→ Burst config. 1 to n

▶ Burst configuration 1 to n	
Burst mode 1 to n (2032-1 to n)	→  119
Burst command 1 to n (2031-1 to n)	→  119
Burst variable 0 (2033)	→  120
Burst variable 1 (2034)	→  121
Burst variable 2 (2035)	→  121
Burst variable 3 (2036)	→  122
Burst variable 4 (2037)	→  122
Burst variable 5 (2038)	→  122
Burst variable 6 (2039)	→  122
Burst variable 7 (2040)	→  123

Burst trigger mode (2044-1 to n)	→  123
Burst trigger level (2043-1 to n)	→  124
Min. update period (2042-1 to n)	→  124
Max. update period (2041-1 to n)	→  124

**Burst mode 1 to n**



<b>Navigation</b>	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst mode 1 to n (2032-1 to n)
<b>Description</b>	Use this function to select whether to activate the HART burst mode for burst message X.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ On</li> </ul>
<b>Factory setting</b>	Off
<b>Additional information</b>	<p><i>Options</i></p> <ul style="list-style-type: none"> <li>■ Off The measuring device transmits data only when requested by the HART master.</li> <li>■ On The measuring device transmits data regularly without being requested.</li> </ul>

**Burst command 1 to n**



<b>Navigation</b>	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst command 1 to n (2031-1 to n)
<b>Description</b>	Use this function to select the HART command that is sent to the HART master.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Command 1</li> <li>■ Command 2</li> <li>■ Command 3</li> <li>■ Command 9</li> <li>■ Command 33</li> <li>■ Command 48</li> </ul>
<b>Factory setting</b>	Command 2

**Additional information***Selection*

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



*"Command 33" option*

The HART device variables are defined via Command 107.


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

- Volume flow
- Mass flow
- Temperature \*
- Totalizer 1...3
- Sound velocity
- Flow velocity
- Acceptance rate \*
- Turbulence \*
- Signal strength \*
- Signal to noise ratio \*
- Percent of range
- Measured current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)

*Commands*

-  ■ Information about the defined details of the command: HART specifications
- The measured variables (HART device variables) are assigned to the dynamic variables in the **Output** submenu (→  79).

**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**

- Not used
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity

\* Visibility depends on order options or device settings



- Temperature
- Density
- Signal strength \*
- Signal to noise ratio \*
- Acceptance rate \*
- Turbulence \*
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Percent of range
- Measured current
- Primary variable (PV)
- Secondary variable (SV)
- Tertiary variable (TV)
- Quaternary variable (QV)

**Factory setting**

Volume flow

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

---

**Burst variable 1**

---

**Navigation**

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

**Description**

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

**Selection**See the **Burst variable 0** parameter (→ 120).**Factory setting**

Not used

---

**Burst variable 2**

---

**Navigation**

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

**Description**

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





**Selection**See the **Burst variable 0** parameter (→ 120).**Factory setting**

Not used





---

\* Visibility depends on order options or device settings





---

<b>Burst variable 3</b>		
<b>Navigation</b>	  Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 3 (2036)	
<b>Description</b>	For HART command 9 and 33: select the HART device variable or the process variable.	
<b>Selection</b>	See the <b>Burst variable 0</b> parameter (→  120).	
<b>Factory setting</b>	Not used	





---

<b>Burst variable 4</b>		
<b>Navigation</b>	  Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 4 (2037)	
<b>Description</b>	For HART command 9: select the HART device variable or the process variable.	
<b>Selection</b>	See the <b>Burst variable 0</b> parameter (→  120).	
<b>Factory setting</b>	Not used	

---

<b>Burst variable 5</b>		
<b>Navigation</b>	  Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 5 (2038)	
<b>Description</b>	For HART command 9: select the HART device variable or the process variable.	
<b>Selection</b>	See the <b>Burst variable 0</b> parameter (→  120).	
<b>Factory setting</b>	Not used	

---

<b>Burst variable 6</b>		
<b>Navigation</b>	  Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 6 (2039)	
<b>Description</b>	For HART command 9: select the HART device variable or the process variable.	
<b>Selection</b>	See the <b>Burst variable 0</b> parameter (→  120).	
<b>Factory setting</b>	Not used	




**Burst variable 7**

<b>Navigation</b>	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 7 (2040)
<b>Description</b>	For HART command 9: select the HART device variable or the process variable.
<b>Selection</b>	See the <b>Burst variable 0</b> parameter (→  120).
<b>Factory setting</b>	Not used


**Burst trigger mode**

<b>Navigation</b>	Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger mode (2044-1 to n)
<b>Description</b>	Use this function to select the event that triggers burst message X.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Continuous</li> <li>■ Window*</li> <li>■ Rising*</li> <li>■ Falling*</li> <li>■ On change</li> </ul>
<b>Factory setting</b>	Continuous
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ Continuous The message is sent continuously, at least at intervals corresponding to the time frame specified in the <b>Burst min period</b> parameter (→  124).</li> <li>■ Window The message is sent if the specified measured value has changed by the value in the <b>Burst trigger level</b> parameter (→  124).</li> <li>■ Rising The message is sent if the specified measured value exceeds the value in the <b>Burst trigger level</b> parameter (→  124).</li> <li>■ Falling The message is sent if the specified measured value drops below the value in the <b>Burst trigger level</b> parameter (→  124).</li> <li>■ On change The message is sent if a measured value changes in the burst message.</li> </ul>











\* Visibility depends on order options or device settings

<b>Burst trigger level</b>		
<b>Navigation</b>	  Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger level (2043-1 to n)	
<b>Description</b>	For entering the burst trigger value.	
<b>User entry</b>	Signed floating-point number	
<b>Additional information</b>	<p><i>Description</i></p> <p>Together with the option selected in the <b>Burst trigger mode</b> parameter (→  123) the burst trigger value determines the time of burst message X.</p>	
<b>Min. update period</b>		
<b>Navigation</b>	  Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Min. upd. per. (2042-1 to n)	
<b>Description</b>	Use this function to enter the minimum time span between two burst commands of burst message X.	
<b>User entry</b>	Positive integer	
<b>Factory setting</b>	1 000 ms	
<b>Max. update period</b>		
<b>Navigation</b>	  Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Max. upd. per. (2041-1 to n)	
<b>Description</b>	Use this function to enter the maximum time span between two burst commands of burst message X.	
<b>User entry</b>	Positive integer	
<b>Factory setting</b>	2 000 ms	

**"Information" submenu**

Navigation  Expert → Communication → HART output → Information

**▶ Information**

Device revision (0204)	→  125
Device ID (0221)	→  126
Device type (0209)	→  126
Manufacturer ID (0259)	→  126
HART revision (0205)	→  126
HART descriptor (0212)	→  127
HART message (0216)	→  127
Hardware revision (0206)	→  127
Software revision (0224)	→  127
HART date code (0202)	→  128

---

**Device revision**

---

**Navigation**  Expert → Communication → HART output → Information → Device revision (0204)

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

**User interface** 2-digit hexadecimal number

**Factory setting** 2



**Additional information** *Description*

 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>	<p><i>Description</i></p> <p> 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.</p>

---

**Device type**



---

<b>Navigation</b>	 Expert → Communication → HART output → Information → Device type (0209)
<b>Description</b>	Displays the device type used to register the measuring device with the HART Communication Foundation
<b>User interface</b>	Hexadecimal number
<b>Factory setting</b>	0x69 (for Prosonic Flow I 400)
<b>Additional information</b>	<p><i>Description</i></p> <p> The device type is specified by the manufacturer. It is needed to assign the appropriate device description file (DD) to the device.</p>

---

**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.

**User interface** 5 to 7

**Factory setting** 7

---

### HART descriptor



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

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

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

**Factory setting** Pros. Flow 400

---

### HART message



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

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

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

**Factory setting** Pros. Flow 400

---

### Hardware revision

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

**Description** Displays the hardware revision of the measuring device.

**User interface** 0 to 255

**Factory setting** 1

---

### Software revision

**Navigation** Expert → Communication → HART output → Information → Software rev. (0224)

**Description** Displays the software revision of the measuring device.

**User interface** 0 to 255

**Factory setting** 2

---

## HART date code

---

**Navigation**   Expert → Communication → HART output → Information → HART date code (0202)

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









**User entry** Date entry format: yyyy-mm-dd

**Factory setting** 2009-07-20




**Additional information** *Example*  
Device installation date






### "Output" submenu




*Navigation*   Expert → Communication → HART output → Output

▶ Output	
Assign PV (0234)	→  129
Primary variable (PV) (0201)	→  129
Assign SV (0235)	→  129
Secondary variable (SV) (0226)	→  130
Assign TV (0236)	→  130
Tertiary variable (TV) (0228)	→  131
Assign QV (0237)	→  131
Quaternary variable (QV) (0203)	→  132



Assign PV 	
<b>Navigation</b>	  Expert → Communication → HART output → Output → Assign PV (0234)
<b>Description</b>	Use this function to select a measured variable (HART device variable) for the primary dynamic variable (PV).
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off *</li> <li>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Flow velocity</li> <li>■ Sound velocity</li> <li>■ Temperature</li> <li>■ Density</li> <li>■ Signal strength *</li> <li>■ Signal to noise ratio *</li> <li>■ Acceptance rate *</li> <li>■ Turbulence *</li> <li>■ Electronics temperature</li> </ul>
<b>Factory setting</b>	Volume flow

Primary variable (PV)	
<b>Navigation</b>	  Expert → Communication → HART output → Output → Primary var (PV) (0201)
<b>Description</b>	Displays the current measured value of the primary dynamic variable (PV).
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Display</i></p> <p>The measured value displayed depends on the process variable selected in the <b>Assign PV</b> parameter (→  129).</p> <p><i>Dependency</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  47).</p>

Assign SV 	
<b>Navigation</b>	  Expert → Communication → HART output → Output → Assign SV (0235)
<b>Description</b>	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**
- Volume flow
  - Mass flow
  - Flow velocity
  - Sound velocity
  - Temperature
  - Density
  - Electronics temperature
  - Signal strength<sup>\*</sup>
  - Signal to noise ratio<sup>\*</sup>
  - Acceptance rate<sup>\*</sup>
  - Turbulence<sup>\*</sup>
  - Totalizer 1
  - Totalizer 2
  - Totalizer 3
  - HART input

**Factory setting** Totalizer 1

---

## Secondary variable (SV)

---


**Navigation**  Expert → Communication → HART output → Output → Second.var(SV) (0226)

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

**User interface** Signed floating-point number

**Additional information** *Display*  
The measured value displayed depends on the process variable selected in the **Assign SV** parameter (→  129).


*Dependency*

 The unit of the displayed measured value is taken from the **System units** submenu (→  47).

---

## Assign TV

---

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

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

- Selection**
- Volume flow
  - Mass flow
  - Flow velocity
  - Sound velocity
  - Temperature
  - Density
  - Electronics temperature

---

\* Visibility depends on order options or device settings





- Signal strength \*
- Signal to noise ratio \*
- Acceptance rate \*
- Turbulence \*
- Totalizer 1
- Totalizer 2
- Totalizer 3
- HART input

**Factory setting** Totalizer 2

---

### Tertiary variable (TV)


---

<b>Navigation</b>	 Expert → Communication → HART output → Output → Tertiary var(TV) (0228)
<b>Description</b>	Displays the current measured value of the tertiary dynamic variable (TV).
<b>User interface</b>	Signed floating-point number
<b>Additional information</b>	<p><i>Display</i></p> <p>The measured value displayed depends on the process variable selected in the <b>Assign TV</b> parameter (→  130).</p> <p><i>Dependency</i></p> <p> The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  47).</p>

---

### Assign QV

---

<b>Navigation</b>	 Expert → Communication → HART output → Output → Assign QV (0237)
<b>Description</b>	Use this function to select a measured variable (HART device variable) for the quaternary (fourth) dynamic variable (QV).
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Flow velocity</li> <li>■ Sound velocity</li> <li>■ Temperature</li> <li>■ Density</li> <li>■ Electronics temperature</li> <li>■ Signal strength *</li> <li>■ Signal to noise ratio *</li> <li>■ Acceptance rate *</li> <li>■ Turbulence *</li> <li>■ Totalizer 1</li> </ul>


---

\* Visibility depends on order options or device settings

- Totalizer 2
- Totalizer 3
- HART input

**Factory setting**

Totalizer 3


**Quaternary variable (QV)****Navigation**
 Expert → Communication → HART output → Output → Quaterna.var(QV) (0203)
**Description**

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



**User interface**


Signed floating-point number









**Additional information***Display*

The measured value displayed depends on the process variable selected in the **Assign QV** parameter (→  131).

*Dependency*

 The unit of the displayed measured value is taken from the **System units** submenu (→  47).



**3.5.3 "Web server" submenu***Navigation*
 Expert → Communication → Web server

► Web server	
Web server language (7221)	→  133
MAC address (7214)	→  133
DHCP client (7212)	→  133
IP address (7209)	→  134
Subnet mask (7211)	→  134
Default gateway (7210)	→  134
Web server functionality (7222)	→  135
Login page (7273)	→  135

---

**Web server language**




---

<b>Navigation</b>	  Expert → Communication → Web server → Webserv.language (7221)
<b>Description</b>	Use this function to select the language configured for the Web server.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ English</li> <li>■ Deutsch</li> <li>■ Français</li> <li>■ Español</li> <li>■ Italiano</li> <li>■ Nederlands</li> <li>■ Portuguesa</li> <li>■ Polski</li> <li>■ русский язык (Russian)</li> <li>■ Svenska</li> <li>■ Türkçe</li> <li>■ 中文 (Chinese)</li> <li>■ 日本語 (Japanese)</li> <li>■ 한국어 (Korean)</li> <li>■ tiếng Việt (Vietnamese) *</li> <li>■ čeština (Czech)</li> </ul>
<b>Factory setting</b>	English

---

**MAC address**




---

<b>Navigation</b>	  Expert → Communication → Web server → MAC Address (7214)
<b>Description</b>	Displays the MAC <sup>5)</sup> address of the measuring device.
<b>User interface</b>	Unique 12-digit character string comprising letters and numbers
<b>Factory setting</b>	Each measuring device is given an individual address.
<b>Additional information</b>	<p><i>Example</i></p> <p>For the display format 00:07:05:10:01:5F</p>

---

**DHCP client**











---

<b>Navigation</b>	  Expert → Communication → Web server → DHCP client (7212)
<b>Description</b>	Use this function to activate and deactivate the DHCP client functionality.

---

\* Visibility depends on order options or device settings



5) Media Access Control

<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ On</li> </ul>
<b>Factory setting</b>	On
<b>Additional information</b>	<p><i>Effect</i></p> <p>If the DHCP client functionality of the web server is selected, the IP address (→  134), Subnet mask (→  134) and Default gateway (→  134) are set automatically.</p> <ul style="list-style-type: none"> <li> Identification is via the MAC address of the measuring device.</li> <li>■ The IP address (→  134) in the <b>IP address</b> parameter (→  134) is ignored as long as the <b>DHCP client</b> parameter (→  133) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (→  134) in the parameter of the same name is only used if the <b>DHCP client</b> parameter (→  133) is inactive.</li> </ul>

---

### IP address



---

<b>Navigation</b>	  Expert → Communication → Web server → IP address (7209)
<b>Description</b>	Display or enter the IP address of the Web server integrated in the measuring device.
<b>User entry</b>	4 octet: 0 to 255 (in the particular octet)
<b>Factory setting</b>	192.168.1.212

---

### Subnet mask




---

<b>Navigation</b>	  Expert → Communication → Web server → Subnet mask (7211)
<b>Description</b>	Display or enter the subnet mask.
<b>User entry</b>	4 octet: 0 to 255 (in the particular octet)
<b>Factory setting</b>	255.255.255.0

---

### Default gateway

---

<b>Navigation</b>	  Expert → Communication → Web server → Default gateway (7210)
<b>Description</b>	Display or enter the Default gateway (→  134).
<b>User entry</b>	4 octet: 0 to 255 (in the particular octet)
<b>Factory setting</b>	0.0.0.0

**Web server functionality**



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

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

**Selection**

- Off
- On

**Factory setting** On

**Additional information** *Description*

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

*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 Web server functionality 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

**Factory setting** With header

### 3.5.4 "Diagnostic configuration" submenu

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


*Assign a category to the particular diagnostic event:*













Category	Meaning
Failure (F)	A device error has occurred. The measured value is no longer valid.
Function check (C)	The device is in the service mode (e.g. during a simulation).

Category	Meaning
Out of specification (S)	The device is being operated: <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>
Maintenance required (M)	Maintenance is required. The measured value remains valid.
No effect (N)	Has no effect on the condensed status <sup>1)</sup> .

1) Condensed status according to NAMUR recommendation NE 107

Navigation


 Expert → Communication → Diag. config.

► Diagnostic configuration	
Event category 019 (0277)	→  136
Event category 160 (0272)	→  137
Event category 441 (0210)	→  137
Event category 442 (0230)	→  138
Event category 443 (0231)	→  138
Event category 832 (0218)	→  138
Event category 833 (0225)	→  139
Event category 841 (0267)	→  139
Event category 842 (0295)	→  140
Event category 870 (0250)	→  140
Event category 930 (0296)	→  141
Event category 931 (0297)	→  141

### Event category 019 (Device initialization active)





#### Navigation

 Expert → Communication → Diag. config. → Event category 019 (0277)

#### Description

Use this function to assign a category to the **△S019 Device initialization active** diagnostic message.






<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Failure (F)</li> <li>■ Function check (C)</li> <li>■ Out of specification (S)</li> <li>■ Maintenance required (M)</li> <li>■ No effect (N)</li> </ul>
<b>Factory setting</b>	Out of specification (S)
<b>Additional information</b>	 For a detailed description of the event categories available for selection: →  135

---

### Event category 160 (Signal path switched off)




---

<b>Navigation</b>	 Expert → Communication → Diag. config. → Event category 160 (0272)
<b>Description</b>	Use this function to select a category for the <b>160 Signal path switched off</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Failure (F)</li> <li>■ Function check (C)</li> <li>■ Out of specification (S)</li> <li>■ Maintenance required (M)</li> <li>■ No effect (N)</li> </ul>
<b>Factory setting</b>	Maintenance required (M)
<b>Additional information</b>	 For a detailed description of the event categories available for selection: →  135

---

### Event category 441 (Current output 1 to n)

---

<b>Navigation</b>	 Expert → Communication → Diag. config. → Event category 441 (0210)
<b>Description</b>	Use this function to select a category for the <b>441 Current output 1 to n</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Failure (F)</li> <li>■ Function check (C)</li> <li>■ Out of specification (S)</li> <li>■ Maintenance required (M)</li> <li>■ No effect (N)</li> </ul>
<b>Factory setting</b>	Out of specification (S)
<b>Additional information</b>	 For a detailed description of the event categories available for selection: →  135

---

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

---



<b>Navigation</b>	Expert → Communication → Diag. config. → Event category 442 (0230)
<b>Prerequisite</b>	The pulse/frequency/switch output is available.
<b>Description</b>	Use this function to select a category for the <b>442 Frequency output 1 to n</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"><li>▪ Failure (F)</li><li>▪ Function check (C)</li><li>▪ Out of specification (S)</li><li>▪ Maintenance required (M)</li><li>▪ No effect (N)</li></ul>
<b>Factory setting</b>	Out of specification (S)
<b>Additional information</b>	For a detailed description of the event categories available for selection: →  135

---

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

---



<b>Navigation</b>	Expert → Communication → Diag. config. → Event category 443 (0231)
<b>Prerequisite</b>	The pulse/frequency/switch output is available.
<b>Description</b>	Use this function to select a category for the <b>443 Pulse output 1 to n</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"><li>▪ Failure (F)</li><li>▪ Function check (C)</li><li>▪ Out of specification (S)</li><li>▪ Maintenance required (M)</li><li>▪ No effect (N)</li></ul>
<b>Factory setting</b>	Out of specification (S)
<b>Additional information</b>	For a detailed description of the event categories available for selection: →  135

---

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

---



<b>Navigation</b>	Expert → Communication → Diag. config. → Event category 832 (0218)
<b>Description</b>	Use this function to select a category for the <b>832 Electronics temperature too high</b> diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information** *Selection*



For a detailed description of the event categories available for selection: → 135

---

### Event category 833 (Electronics temperature too low)

---

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

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

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

**Factory setting** Out of specification (S)

**Additional information** *Selection*



For a detailed description of the event categories available for selection: → 135

---

### Event category 841 (Flow velocity too high)

---

**Navigation** Expert → Communication → Diag. config. → Event category 841 (0267)

**Description** Use this function to assign a category to the **△S841 Flow velocity too high** diagnostic message.

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

**Factory setting** Out of specification (S)

**Additional information**



For a detailed description of the event categories available for selection: → 135

---

**Event category 842 (Process limit)**

---



<b>Navigation</b>	Expert → Communication → Diag. config. → Event category 842 (0295)
<b>Description</b>	Use this function to assign a category to the <b>842 Process limit</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"><li>■ Failure (F)</li><li>■ Function check (C)</li><li>■ Out of specification (S)</li><li>■ Maintenance required (M)</li><li>■ No effect (N)</li></ul>
<b>Factory setting</b>	Out of specification (S)
<b>Additional information</b>	<i>Selection</i> For a detailed description of the event categories available for selection: →  135

---

**Event category 870 (Measuring inaccuracy increased)**

---



<b>Navigation</b>	Expert → Communication → Diag. config. → Event category 870 (0250)
<b>Description</b>	Use this function to select a category for the <b>870 Measuring inaccuracy increased</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"><li>■ Failure (F)</li><li>■ Function check (C)</li><li>■ Out of specification (S)</li><li>■ Maintenance required (M)</li><li>■ No effect (N)</li></ul>
<b>Factory setting</b>	No effect (N)
<b>Additional information</b>	<i>Selection</i> For a detailed description of the event categories available for selection: →  135

---

**Event category 881 (Sensor signal path 1 to n)**

---



<b>Navigation</b>	Expert → Communication → Diag. config. → Event category 881 (0268)
<b>Description</b>	Use this function to select a category for the <b>881 Sensor signal path 1 to n</b> diagnostic message.
<b>Selection</b>	<ul style="list-style-type: none"><li>■ Failure (F)</li><li>■ Function check (C)</li><li>■ Out of specification (S)</li><li>■ Maintenance required (M)</li><li>■ No effect (N)</li></ul>


**Factory setting** Maintenance required (M)

**Additional information**  For a detailed description of the event categories available for selection: →  135

---

### Event category 930 (Process fluid)

---



**Navigation**  Expert → Communication → Diag. config. → Event category 930 (0296)

**Description** Use this function to select a category for the  $\Delta$ **S930 Process fluid** diagnostic message.

**Selection**

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


**Factory setting** Out of specification (S)

**Additional information** *Selection*  
 For a detailed description of the event categories available for selection: →  135

---

### Event category 931 (Process fluid)

---



**Navigation**  Expert → Communication → Diag. config. → Event category 931 (0297)

**Description** Use this function to select a category for the  $\Delta$ **S931 Process fluid** diagnostic message.


**Selection**























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

**Factory setting** Out of specification (S)

**Additional information** *Selection*  
 For a detailed description of the event categories available for selection: →  135

### 3.5.5 "WLAN settings" wizard

Navigation  Expert → Communication → WLAN settings

▶ WLAN settings	
WLAN (2702)	→  143
WLAN mode (2717)	→  143
SSID name (2714)	→  143
Network security (2705)	→  143
Security identification (2718)	→  144
User name (2715)	→  144
WLAN password (2716)	→  145
WLAN IP address (2711)	→  145
WLAN MAC address (2703)	→  146
WLAN subnet mask (2709)	→  146
WLAN MAC address (2703)	→  146
WLAN passphrase (2706)	→  147
WLAN MAC address (2703)	→  146
Assign SSID name (2708)	→  147
SSID name (2707)	→  147
2.4 GHz WLAN channel (2704)	→  148
Select antenna (2713)	→  148
Connection state (2722)	→  145
Received signal strength (2721)	→  145
WLAN IP address (2711)	→  145
Gateway IP address (2719)	→  146
IP address domain name server (2720)	→  146

---

**WLAN**

---



<b>Navigation</b>	Expert → Communication → WLAN settings → WLAN (2702)
<b>Description</b>	Use this function to enable and disable the WLAN connection.
<b>Selection</b>	<ul style="list-style-type: none"><li>▪ Disable</li><li>▪ Enable</li></ul>
<b>Factory setting</b>	Enable

---

**WLAN mode**

---



<b>Navigation</b>	Expert → Communication → WLAN settings → WLAN mode (2717)
<b>Description</b>	Use this function to select the WLAN mode.
<b>Selection</b>	WLAN access point
<b>Factory setting</b>	WLAN access point

---

**SSID name**

---



<b>Navigation</b>	Expert → Communication → 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>Factory setting</b>	WPA2-PSK
<b>Additional information</b>	<p><i>Selection</i></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> <li>■ EAP-PEAP with MSCHAPv2 Access the WLAN connection with a password-based authentication protocol.</li> <li>■ EAP-PEAP MSCHAPv2 no server authentic. Access the WLAN connection with a password-based protocol without server authentication.</li> <li>■ EAP-TLS Access the WLAN connection with a certificate-based, two-way authentication of the client and network.</li> </ul>

---

## 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>	–

---

\* Visibility depends on order options or device settings



---

**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>	–

---

**Connection state**

---

<b>Navigation</b>	Expert → Communication → WLAN settings → Connection state (2722)
<b>Description</b>	The connection status is displayed.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Connected</li> <li>■ Not connected</li> </ul>
<b>Factory setting</b>	Not connected

---

**Received signal strength**

---

<b>Navigation</b>	Expert → Communication → WLAN settings → Rec.sig.strength (2721)
<b>Description</b>	Displays the signal strength received.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Low</li> <li>■ Medium</li> <li>■ High</li> </ul>
<b>Factory setting</b>	High

---

**WLAN IP address**

---





<b>Navigation</b>	Expert → Communication → WLAN settings → WLAN IP address (2711)
<b>Description</b>	Use this function to enter the IP address of the measuring device's WLAN connection.
<b>User entry</b>	4 octet: 0 to 255 (in the particular octet)
<b>Factory setting</b>	192.168.1.212

---

**Gateway IP address**




---

<b>Navigation</b>	  Expert → Communication → WLAN settings → Gateway IP addr. (2719)
<b>Description</b>	Use this function to enter the IP address of the gateway.
<b>User interface</b>	Character string comprising numbers, letters and special characters
<b>Factory setting</b>	192.168.1.212

---

**IP address domain name server**


---



<b>Navigation</b>	  Expert → Communication → WLAN settings → IP address DNS (2720)
<b>Description</b>	Use this function to enter the IP address of the domain name server.
<b>User interface</b>	Character string comprising numbers, letters and special characters
<b>Factory setting</b>	192.168.1.212

---

**WLAN subnet mask**


---





<b>Navigation</b>	  Expert → Communication → WLAN settings → WLAN subnet mask (2709)
<b>Description</b>	Use this function to enter the subnet mask.
<b>User entry</b>	4 octet: 0 to 255 (in the particular octet)
<b>Factory setting</b>	255.255.255.0

---

**WLAN MAC address**


---

<b>Navigation</b>	  Expert → Communication → WLAN settings → WLAN MAC address (2703)
<b>Description</b>	Displays the MAC <sup>6)</sup> address of the measuring device.
<b>User interface</b>	Unique 12-digit character string comprising letters and numbers
<b>Factory setting</b>	Each measuring device is given an individual address.
<b>Additional information</b>	<i>Example</i> For the display format

---

6) Media Access Control

00:07:05:10:01:5F

---

**WLAN passphrase**

---



<b>Navigation</b>	Expert → Communication → WLAN settings → WLAN passphrase (2706)
<b>Prerequisite</b>	The <b>WPA2-PSK</b> option is selected in the <b>Security type</b> parameter (→  143).
<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)
<b>Description</b>	Use this function to select which name is used for the SSID <sup>7)</sup> .
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Device tag</li> <li>▪ User-defined</li> </ul>
<b>Factory setting</b>	User-defined
<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 (→  147).</li> <li>▪ The <b>WLAN access point</b> option is selected in the <b>WLAN mode</b> parameter (→  143).</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

---



7) Service Set Identifier

**Factory setting** EH\_device designation\_last 7 digits of the serial number (e.g. EH\_Prosonic\_Flow\_400\_A802000)

---

### Select antenna

---

**Navigation**   Expert → Communication → WLAN settings → Select antenna (2713)

**Description** Use this function to select whether the external or internal antenna is used for reception.

**Selection**



- External antenna
- Internal antenna

**Factory setting** Internal antenna

---

### 2.4 GHz WLAN channel

---


**Navigation**   Expert → Communication → WLAN settings → WLAN channel (2704)

**Description** Use this function to enter the 2.4 GHz WLAN channel.

**User entry** 1 to 11

**Factory setting** 6


**Additional information** *Description*


-  It is only necessary to enter a 2.4 GHz WLAN channel if multiple WLAN devices are in use.
- If just one measuring device is in use, it is recommended to keep the factory setting.

## 3.6 "Application" submenu


*Navigation*   Expert → Application

▶ Application

Reset all totalizers (2806) →  149

▶ Totalizer 1 to n →  149

**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 previously aggregated flow values.

**Selection**


- Cancel
- Reset + totalize

**Factory setting** Cancel







**Additional information** Selection

Options	Description
Cancel	No action is executed and the user exits the parameter.
Reset + totalize	Resets all totalizers to 0 and restarts the totaling process. This deletes all the previously aggregated flow values.

### 3.6.1 "Totalizer 1 to n" submenu


*Navigation*  Expert → Application → Totalizer 1 to n

▶ **Totalizer 1 to n**



Assign process variable 1 to n (0914-1 to n)	→  149
Process variable unit 1 to n (0915-1 to n)	→  150
Totalizer 1 to n operation mode (0908-1 to n)	→  151
Totalizer 1 to n control (0912-1 to n)	→  151
Preset value 1 to n (0913-1 to n)	→  152
Totalizer 1 to n failure behavior (0901-1 to n)	→  153

**Assign process variable 1 to n**



**Navigation**  Expert → Application → Totalizer 1 to n → AssignVariab. 1 to n (0914-1 to n)


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

<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Volume flow</li> <li>■ Mass flow</li> </ul>
<b>Factory setting</b>	Volume flow
<b>Additional information</b>	<p><i>Description</i></p> <p> If the option selected is changed, the device resets the totalizer to 0.</p> <p><i>Options</i></p> <p>If the <b>Off</b> option is selected, only the <b>Assign process variable</b> parameter (→  149) is still displayed in the <b>Totalizer 1 to n</b> submenu. All other parameters in the submenu are hidden.</p>

---

## Process variable unit 1 to n

---

<b>Navigation</b>	  Expert → Application → Totalizer 1 to n → VariableUnit 1 to n (0915-1 to n)
<b>Prerequisite</b>	A process variable is selected in the <b>Assign process variable</b> parameter (→  149) of the <b>Totalizer 1 to n</b> submenu.
<b>Description</b>	Use this function to select the process variable unit for the Totalizer 1 to n (→  149).
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ g<sup>*</sup></li> <li>■ kg<sup>*</sup></li> <li>■ t<sup>*</sup></li> <li>■ oz<sup>*</sup></li> <li>■ lb<sup>*</sup></li> <li>■ STon<sup>*</sup></li> <li>■ cm<sup>3*</sup></li> <li>■ dm<sup>3*</sup></li> <li>■ m<sup>3*</sup></li> <li>■ ml<sup>*</sup></li> <li>■ l<sup>*</sup></li> <li>■ hl<sup>*</sup></li> <li>■ Ml Mega<sup>*</sup></li> <li>■ af<sup>*</sup></li> <li>■ ft<sup>3*</sup></li> <li>■ Mft<sup>3*</sup></li> <li>■ Mft<sup>3*</sup></li> <li>■ fl oz (us)<sup>*</sup></li> <li>■ gal (us)<sup>*</sup></li> <li>■ kgal (us)<sup>*</sup></li> <li>■ Mgal (us)<sup>*</sup></li> <li>■ bbl (us;liq.)<sup>*</sup></li> <li>■ bbl (us;beer)<sup>*</sup></li> <li>■ bbl (us;oil)<sup>*</sup></li> <li>■ bbl (us;tank)<sup>*</sup></li> <li>■ gal (imp)<sup>*</sup></li> <li>■ Mgal (imp)<sup>*</sup></li> </ul>

---

\* Visibility depends on order options or device settings

- bbl (imp;beer)<sup>\*</sup>
- bbl (imp;oil)<sup>\*</sup>
- None<sup>\*</sup>

**Factory setting**

Depends on country:

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

**Additional information**

*Description*



The unit is selected separately for each totalizer. It is independent of the selection made in the **System units** submenu (→ 47).

*Options*

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ 149).

---

**Totalizer 1 to n operation mode**
**Navigation**

Expert → Application → Totalizer 1 to n → Operat. mode 1 to n (0908-1 to n)

**Prerequisite**

A process variable is selected in the **Assign process variable** parameter (→ 149) of the **Totalizer 1 to n** submenu.

**Description**

Use this function to select how the totalizer summates the flow.

**Selection**

- Net
- Forward
- Reverse

**Factory setting**

Net 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).

---

**Totalizer 1 to n control**
**Navigation**

Expert → Application → Totalizer 1 to n → Tot. 1 to n control (0912-1 to n)

**Prerequisite**

A process variable is selected in the **Assign process variable** parameter (→ 149) of the **Totalizer 1 to n** submenu.

---

\* Visibility depends on order options or device settings

**Description** Use this function to select the control of totalizer value 1-3.

**Selection**

- Totalize
- Reset + hold
- Preset + hold
- Reset + totalize
- Preset + totalize
- Hold

**Factory setting** Totalize

**Additional information** *Selection*


Options	Description
Totalize	The totalizer is started or continues running.
Reset + hold	The totaling process is stopped and the totalizer is reset to 0.
Preset + hold <sup>1)</sup>	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 <sup>1)</sup>	The totalizer is set to the defined start value in the <b>Preset value</b> parameter and the totaling process is restarted.


1) Visible depending on the order options or device settings

---

## Preset value 1 to n

---

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

**Prerequisite** A process variable is selected in the **Assign process variable** parameter (→  149) of the **Totalizer 1 to n** submenu.



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

**User entry** Signed floating-point number

**Factory setting** Depends on country:

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

**Additional information** *User entry*

 The unit of the selected process variable is defined in the **Unit totalizer** parameter (→  150) for the totalizer.

*Example*

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



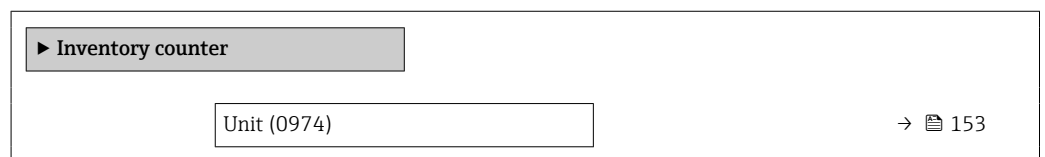
---

**Totalizer 1 to n failure behavior**


<b>Navigation</b>	Expert → Application → Totalizer 1 to n → FailureBehav. 1 to n (0901-1 to n)
<b>Prerequisite</b>	A process variable is selected in the <b>Assign process variable</b> parameter (→  149) of the <b>Totalizer 1 to n</b> submenu.
<b>Description</b>	Use this function to select how a totalizer behaves in the event of a device alarm.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Hold</li> <li>■ Continue</li> <li>■ Last valid value + continue</li> </ul>
<b>Factory setting</b>	Stop
<b>Additional information</b>	<p><i>Description</i></p> <p> This setting does not affect the failsafe mode of other totalizers and the outputs. This is specified in separate parameters.</p> <p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ Stop The totalizer is stopped in the event of a device alarm.</li> <li>■ Actual value The totalizer continues to count based on the actual (current) measured value; the device alarm is ignored.</li> <li>■ Last valid value The totalizer continues to count based on the last valid measured value before the device alarm occurred.</li> </ul>

### 3.6.2 "Inventory counter" submenu

*Navigation* Expert → Application → Inventory count.




---

**Unit**

<b>Navigation</b>	Expert → Application → Inventory count. → Unit (0974)
<b>Description</b>	Displays the unit of the inventory counter.

**User interface***SI units*

- cm<sup>3</sup>
- dm<sup>3</sup>
- m<sup>3</sup>
- ml
- l
- hl
- Ml Mega

*US units*

- ft<sup>3</sup>
- af
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)
- bbl (us;oil)
- bbl (us;liq.)
- bbl (us;beer)
- bbl (us;tank)

*Imperial units*

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

**Additional information***Description*

The parameter cannot be configured or reset.

























### 3.7 "Diagnostics" submenu
























*Navigation*





Expert → Diagnostics

▶ Diagnostics		
Actual diagnostics (0691)		→ ⓘ 158
Previous diagnostics (0690)		→ ⓘ 158
Operating time from restart (0653)		→ ⓘ 159
Operating time (0652)		→ ⓘ 159
▶ Diagnostic list		→ ⓘ 159
Diagnostics 1 (0692)		→ ⓘ 159
Diagnostics 2 (0693)		→ ⓘ 160
Diagnostics 3 (0694)		→ ⓘ 161
Diagnostics 4 (0695)		→ ⓘ 162
Diagnostics 5 (0696)		→ ⓘ 163
▶ Device information		→ ⓘ 163
Device tag (0011)		→ ⓘ 164
Serial number (0009)		→ ⓘ 164

Firmware version (0010)	→ 165
Device name (0013)	→ 165
Order code (0008)	→ 165
Extended order code 1 (0023)	→ 166
Extended order code 2 (0021)	→ 166
Extended order code 3 (0022)	→ 166
Configuration counter (0233)	→ 167
ENP version (0012)	→ 167
<b>► Main electronic module</b>	→ 167
Firmware version (0072)	→ 167
Build no. software (0079)	→ 168
Bootloader revision (0073)	→ 168
<b>► Sensor electronic module (ISEM)</b>	→ 168
Firmware version (0072)	→ 168
Build no. software (0079)	→ 169
Bootloader revision (0073)	→ 169
<b>► Display module</b>	→ 169
Firmware version (0072)	→ 169
Build no. software (0079)	→ 170
Bootloader revision (0073)	→ 170
<b>► Data logging</b>	→ 170
Assign channel 1 (0851)	→ 171
Assign channel 2 (0852)	→ 171
Assign channel 3 (0853)	→ 172
Assign channel 4 (0854)	→ 172

Logging interval (0856)	→  172
Clear logging data (0855)	→  173
Data logging (0860)	→  173
Logging delay (0859)	→  174
Data logging control (0857)	→  174
Data logging status (0858)	→  175
Entire logging duration (0861)	→  175
<b>▶ Heartbeat Technology</b>	→  177
<b>▶ Heartbeat base settings</b>	→  178
Plant operator (2754)	→  178
Location (2755)	→  178
<b>▶ Performing verification</b>	→  178
Year (2846)	→  179
Month (2845)	→  179
Day (2842)	→  180
Hour (2843)	→  180
AM/PM (2813)	→  181
Minute (2844)	→  181
Verification mode (12105)	→  181
External device information (12101)	→  182
Start verification (12127)	→  182
Progress (2808)	→  182
Measured values (12102)	→  183
Output values (12103)	→  183








Status (12153)	→  183
Verification result (12149)	→  184
<b>► Verification results</b>	→  184
Date/time (manually entered) (12142)	→  184
Verification ID (12141)	→  185
Operating time (12126)	→  185
Verification result (12149)	→  185
Sensor (12152)	→  186
Sensor electronic module (ISEM) (12151)	→  186
I/O module (12145)	→  186
System status (12109)	→  187
<b>► Simulation</b>	→  187
Assign simulation process variable (1810)	→  188
Process variable value (1811)	→  188
Status input 1 simulation (1355-1)	→  189
Input signal level 1 (1356-1)	→  189
Current output 1 simulation (0354-1)	→  190
Current output value (0355)	→  190
Frequency output 1 to n simulation (0472-1 to n)	→  191
Frequency output 1 to n value (0473-1 to n)	→  191
Pulse output simulation 1 to n (0458-1 to n)	→  191
Pulse value 1 to n (0459-1 to n)	→  192
Switch output simulation 1 to n (0462-1 to n)	→  192

Switch state 1 to n (0463-1 to n)	→  193
Device alarm simulation (0654)	→  193
Diagnostic event category (0738)	→  194
Diagnostic event simulation (0737)	→  194

---

## Actual diagnostics






---

<b>Navigation</b>	  Expert → Diagnostics → Actual diagnos. (0691)
<b>Prerequisite</b>	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 (→  159).</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>

---

## 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>

**Operating time from restart**

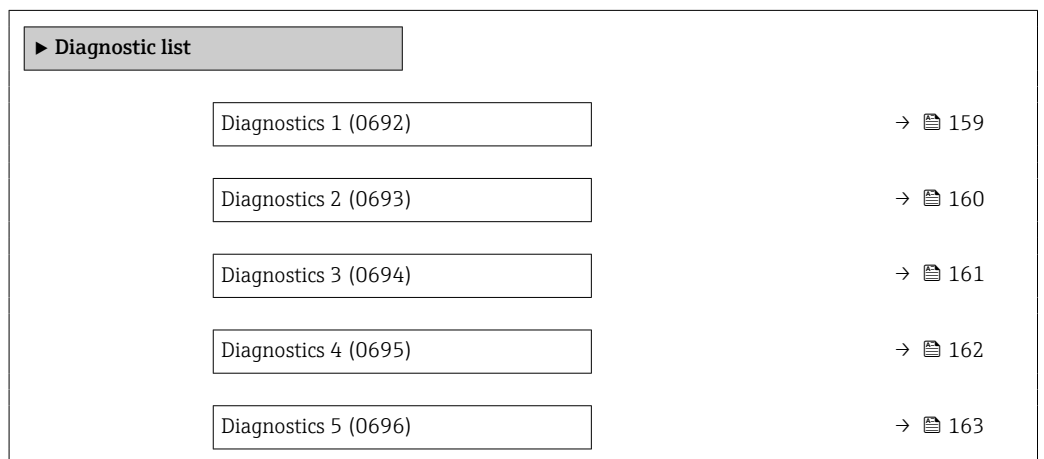
<b>Navigation</b>	📄📄 Expert → Diagnostics → Time fr. restart (0653)
<b>Description</b>	Use this function to display the time the device has been in operation since the last device restart.
<b>User interface</b>	Days (d), hours (h), minutes (m) and seconds (s)

**Operating time**

<b>Navigation</b>	📄📄 Expert → Diagnostics → Operating time (0652)
<b>Description</b>	Displays 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>Indication</i> Maximum number of days: 9 999 (corresponds to approx. 27 years and 5 months)

**3.7.1 "Diagnostic list" submenu**

*Navigation*      📄📄 Expert → Diagnostics → Diagnostic list





**Diagnostics 1**

<b>Navigation</b>	📄📄 Expert → Diagnostics → Diagnostic list → Diagnostics 1 (0692)
<b>Description</b>	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:

-  S442 Frequency output
-  F276 I/O module failure


## Timestamp 1

**Navigation**  Expert → Diagnostics → Diagnostic list → Timestamp

**Description** Displays the operating time when the diagnostic message with the highest priority occurred.

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

**Additional information** *Display*


 The diagnostic message can be viewed via the **Diagnostics 1** parameter (→  159).

*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:




-  S442 Frequency output
-  F276 I/O module failure



---

### Timestamp 2







---

<b>Navigation</b>	 Expert → Diagnostics → Diagnostic list → Timestamp
<b>Description</b>	Displays the operating time when the diagnostic message with the second-highest priority 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>Diagnostics 2</b> parameter (→  160).</p> <p><i>Example</i></p> <p>For the display format: 24d12h13m00s</p>

---

### 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>	<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>Examples</i></p> <p>For the display format:</p> <ul style="list-style-type: none"> <li>▪  S442 Frequency output</li> <li>▪  F276 I/O module failure</li> </ul>


---

### Timestamp 3

---

<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)

**Additional information***Display*

 The diagnostic message can be viewed via the **Diagnostics 3** parameter (→  161).

*Example*

For the display format:  
24d12h13m00s

---

**Diagnostics 4**

---

**Navigation**

 Expert → Diagnostics → Diagnostic list → Diagnostics 4 (0695)



**Description**

Displays the current diagnostics message with the fourth-highest priority.

**User interface**



Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information***Display*

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

*Examples*

For the display format:


-  S442 Frequency output
-  F276 I/O module failure

---

**Timestamp 4**

---

**Navigation**

 Expert → Diagnostics → Diagnostic list → Timestamp


**Description**

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

**User interface**

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

**Additional information***Display*

 The diagnostic message can be viewed via the **Diagnostics 4** parameter (→  162).






*Example*

For the display format:  
24d12h13m00s

---

**Diagnostics 5**





---

<b>Navigation</b>	 Expert → Diagnostics → Diagnostic list → Diagnostics 5 (0696)
<b>Description</b>	Displays the current diagnostics message with the fifth-highest priority.
<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>Examples</i></p> <p>For the display format:</p> <ul style="list-style-type: none"> <li>▪  S442 Frequency output</li> <li>▪  F276 I/O module failure</li> </ul>

---




**Timestamp 5**


---

<b>Navigation</b>	 Expert → Diagnostics → Diagnostic list → Timestamp
<b>Description</b>	Displays the operating time when the diagnostic message with the fifth-highest priority 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>Diagnostics 5</b> parameter (→  163).</p> <p><i>Example</i></p> <p>For the display format: 24d12h13m00s</p>

### 3.7.2 "Device information" submenu

*Navigation*  Expert → Diagnostics → Device info

<b>▶ Device information</b>	
Device tag (0011)	→  164
Serial number (0009)	→  164
Firmware version (0010)	→  165

Device name (0013)	→ ⓘ 165
Order code (0008)	→ ⓘ 165
Extended order code 1 (0023)	→ ⓘ 166
Extended order code 2 (0021)	→ ⓘ 166
Extended order code 3 (0022)	→ ⓘ 166
Configuration counter (0233)	→ ⓘ 167
ENP version (0012)	→ ⓘ 167

---

## Device tag

---

**Navigation**

🔍📄 Expert → Diagnostics → Device info → Device tag (0011)

**Description**

Displays a unique name for the measuring point so it can be identified quickly within the plant. It is displayed in the header.

**User interface**

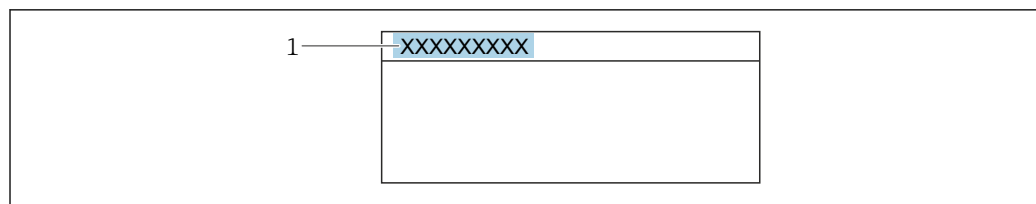
Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).

**Factory setting**

Prosonic Flow

**Additional information**

*User interface*



A00294Z2

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.


**i** 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
	<p data-bbox="499 248 863 282"> <b>Uses of the serial number</b></p> <ul data-bbox="555 282 1485 376" style="list-style-type: none"> <li data-bbox="555 282 1485 315">■ To identify the measuring device quickly, e.g. when contacting Endress+Hauser.</li> <li data-bbox="555 315 1485 376">■ To obtain specific information on the measuring device using the Device Viewer: <a href="http://www.endress.com/deviceviewer">www.endress.com/deviceviewer</a></li> </ul>
<b>Firmware version</b>	
<b>Navigation</b>	 Expert → Diagnostics → Device info → Firmware version (0010)
<b>Description</b>	Displays the device firmware version installed.
<b>User interface</b>	Character string in the format xx.yy.zz
<b>Additional information</b>	<p data-bbox="499 790 584 815"><i>Display</i></p> <p data-bbox="499 837 975 871"> The Firmware version is also located:</p> <ul data-bbox="555 871 1102 931" style="list-style-type: none"> <li data-bbox="555 871 1102 904">■ On the title page of the Operating instructions</li> <li data-bbox="555 904 1102 931">■ On the transmitter nameplate</li> </ul>
<b>Device name</b>	
<b>Navigation</b>	 Expert → Diagnostics → Device info → Device name (0013)
<b>Description</b>	Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.
<b>User interface</b>	Max. 32 characters such as letters or numbers.
<b>Factory setting</b>	Pros. Flow 400
<b>Order code</b>	
<b>Navigation</b>	 Expert → Diagnostics → Device info → Order code (0008)
<b>Description</b>	Displays the device order code
<b>User interface</b>	Character string composed of letters, numbers and certain punctuation marks (e.g. /).
<b>Additional information</b>	<p data-bbox="499 1821 628 1845"><i>Description</i></p> <p data-bbox="499 1868 1497 1930"> The order code can be found on the nameplate of the sensor and transmitter in the "Order code" field.</p>

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** 



---

<b>Navigation</b>	 Expert → Diagnostics → Device info → Ext. order cd. 1 (0023)
<b>Description</b>	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.
<b>User interface</b>	Character string
<b>Additional information</b>	<i>Description</i> The extended order code indicates the version of all the features of the product structure for the measuring device and thus uniquely identifies the measuring device.  The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field.

---

**Extended order code 2** 



---

<b>Navigation</b>	 Expert → Diagnostics → Device info → Ext. order cd. 2 (0021)
<b>Description</b>	Displays the second part of the extended order code.
<b>User interface</b>	Character string
<b>Additional information</b>	For additional information, see <b>Extended order code 1</b> parameter (→  166)

---

**Extended order code 3** 



---

<b>Navigation</b>	 Expert → Diagnostics → Device info → Ext. order cd. 3 (0022)
<b>Description</b>	Displays the third part of the extended order code.
<b>User interface</b>	Character string
<b>Additional information</b>	For additional information, see <b>Extended order code 1</b> parameter (→  166)

---

**Configuration counter**




---

<b>Navigation</b>	  Expert → Diagnostics → Device info → Config. counter (0233)
<b>Description</b>	Displays the number of parameter modifications for the device. When the user changes a parameter setting, this counter is incremented.
<b>User interface</b>	0 to 65 535



---




**ENP version**


---

<b>Navigation</b>	  Expert → Diagnostics → Device info → ENP version (0012)
<b>Description</b>	Displays the version of the electronic nameplate.
<b>User interface</b>	Character string
<b>Factory setting</b>	2.02.00
<b>Additional information</b>	<p><i>Description</i></p> <p>This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device.</p>

### 3.7.3 "Main electronic module + I/O module 1" submenu



*Navigation*   Expert → Diagnostics → Mainboard module

<div style="background-color: #cccccc; padding: 2px; margin-bottom: 5px;">▶ Main electronic module</div>	
Firmware version (0072)	→  167
Build no. software (0079)	→  168
Bootloader revision (0073)	→  168

---

**Firmware version**



---

<b>Navigation</b>	  Expert → Diagnostics → Main elec. mod. → Firmware version (0072)
<b>Description</b>	Use this function to display the software revision of the module.
<b>User interface</b>	Positive integer

---

**Build no. software**


---

<b>Navigation</b>	 Expert → Diagnostics → Main elec. mod. → Build no. softw. (0079)
<b>Description</b>	Use this function to display the software build number of the module.
<b>User interface</b>	Positive integer


---




**Bootloader revision**

---

<b>Navigation</b>	 Expert → Diagnostics → Main elec. mod. → Bootloader rev. (0073)
<b>Description</b>	Use this function to display the bootloader revision of the software.
<b>User interface</b>	Positive integer

### 3.7.4 "Sensor electronic module (ISEM)" submenu


*Navigation*  Expert → Diagnostics → Sens. electronic

<b>▶ Sensor electronic module (ISEM)</b>	
Firmware version (0072)	→  168
Build no. software (0079)	→  169
Bootloader revision (0073)	→  169

---

**Firmware version**

---


<b>Navigation</b>	 Expert → Diagnostics → Sens. electronic → Firmware version (0072)
<b>Description</b>	Use this function to display the software revision of the module.
<b>User interface</b>	Positive integer



---

**Build no. software**



---

<b>Navigation</b>	 Expert → Diagnostics → Sens. electronic → Build no. softw. (0079)
<b>Description</b>	Use this function to display the software build number of the module.
<b>User interface</b>	Positive integer


---




**Bootloader revision**


---

<b>Navigation</b>	 Expert → Diagnostics → Sens. electronic → Bootloader rev. (0073)
<b>Description</b>	Use this function to display the bootloader revision of the software.
<b>User interface</b>	Positive integer

### 3.7.5 "Display module" submenu


*Navigation*  Expert → Diagnostics → Display module

▶ Display module	
Firmware version (0072)	→  169
Build no. software (0079)	→  170
Bootloader revision (0073)	→  170



---

**Firmware version**




---

<b>Navigation</b>	 Expert → Diagnostics → Display module → Firmware version (0072)
<b>Description</b>	Use this function to display the software revision of the module.
<b>User interface</b>	Positive integer

**Build no. software**












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

**Bootloader revision**

<b>Navigation</b>	  Expert → Diagnostics → Display module → Bootloader rev. (0073)
<b>Description</b>	Use this function to display the bootloader revision of the software.
<b>User interface</b>	Positive integer

**3.7.6 "Data logging" submenu**

*Navigation*   Expert → Diagnostics → Data logging

▶ Data logging	
Assign channel 1 (0851)	→  171
Assign channel 2 (0852)	→  171
Assign channel 3 (0853)	→  172
Assign channel 4 (0854)	→  172
Logging interval (0856)	→  172
Clear logging data (0855)	→  173
Data logging (0860)	→  173
Logging delay (0859)	→  174
Data logging control (0857)	→  174
Data logging status (0858)	→  175
Entire logging duration (0861)	→  175



## 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 (→ 38).

### Description

Use this function to assign a process variable to the data logging channel.

### Selection

- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature
- Density
- Signal strength \*
- Signal to noise ratio \*
- Acceptance rate \*
- Turbulence \*
- Electronics temperature
- Current output 1

### Factory setting

Off

### Additional information

*Description*

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

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

Once the maximum number of data points is reached, the oldest data points in the data log are cyclically overwritten in such a way that the last 1000, 500, 333 or 250 measured values are always in the log (ring memory principle).

The log contents are cleared if the option selected is changed.



## Assign channel 2

### Navigation

Expert → Diagnostics → Data logging → Assign chan. 2 (0852)

### Prerequisite

The **Extended HistoROM** application package is available.

The software options currently enabled are displayed in the **Software option overview** parameter (→ 38).

### Description

Use this function to assign a process variable to the logging channel.

### Selection

For the picklist, see **Assign channel 1** parameter (→ 171)



\* Visibility depends on order options or device settings

**Factory setting** Off



---

### Assign channel 3


---

**Navigation**   Expert → Diagnostics → Data logging → Assign chan. 3 (0853)

**Prerequisite** The **Extended HistoROM** application package is available.

 The software options currently enabled are displayed in the **Software option overview** parameter (→  38).

**Description** Use this function to assign a process variable to the logging channel.


**Selection** For the picklist, see **Assign channel 1** parameter (→  171)

**Factory setting** Off



---

### Assign channel 4


---

**Navigation**   Expert → Diagnostics → Data logging → Assign chan. 4 (0854)

**Prerequisite** The **Extended HistoROM** application package is available.

 The software options currently enabled are displayed in the **Software option overview** parameter (→  38).

**Description** Use this function to assign a process variable to the logging channel.



**Selection** For the picklist, see **Assign channel 1** parameter (→  171)

**Factory setting** Off



---

### Logging interval

---

**Navigation**   Expert → Diagnostics → Data logging → Logging interval (0856)


**Prerequisite** The **Extended HistoROM** application package is available.

 The software options currently enabled are displayed in the **Software option overview** parameter (→  38).

**Description** Use this function to enter the logging interval  $T_{\log}$  for data logging.




**User entry** 0.1 to 3 600.0 s

**Factory setting** 1.0 s

<b>Additional information</b>	<p><i>Description</i></p> <p>This defines the interval between the individual data points in the data log, and thus the maximum loggable process time <math>T_{\log}</math>:</p> <ul style="list-style-type: none"> <li>■ If 1 logging channel is used: <math>T_{\log} = 1000 \times t_{\log}</math></li> <li>■ If 2 logging channels are used: <math>T_{\log} = 500 \times t_{\log}</math></li> <li>■ If 3 logging channels are used: <math>T_{\log} = 333 \times t_{\log}</math></li> <li>■ If 4 logging channels are used: <math>T_{\log} = 250 \times t_{\log}</math></li> </ul> <p>Once this time elapses, the oldest data points in the data log are cyclically overwritten such that a time of <math>T_{\log}</math> always remains in the memory (ring memory principle).</p> <p> The log contents are cleared if the length of the logging interval is changed.</p> <p><i>Example</i></p> <p>If 1 logging channel is used:</p> <ul style="list-style-type: none"> <li>■ <math>T_{\log} = 1000 \times 1 \text{ s} = 1\,000 \text{ s} \approx 15 \text{ min}</math></li> <li>■ <math>T_{\log} = 1000 \times 10 \text{ s} = 10\,000 \text{ s} \approx 3 \text{ h}</math></li> <li>■ <math>T_{\log} = 1000 \times 80 \text{ s} = 80\,000 \text{ s} \approx 1 \text{ d}</math></li> <li>■ <math>T_{\log} = 1000 \times 3\,600 \text{ s} = 3\,600\,000 \text{ s} \approx 41 \text{ d}</math></li> </ul>
-------------------------------	---


---

## Clear logging data

<b>Navigation</b>	 Expert → Diagnostics → Data logging → Clear logging (0855)
<b>Prerequisite</b>	<p>The <b>Extended HistorOM</b> application package is available.</p> <p> The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  38).</p>
<b>Description</b>	Use this function to clear the entire logging data.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Cancel</li> <li>■ Clear data</li> </ul>
<b>Factory setting</b>	Cancel
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ Cancel The data is not cleared. All the data is retained.</li> <li>■ Clear data The logging data is cleared. The logging process starts from the beginning.</li> </ul>

---

## Data logging

<b>Navigation</b>	 Expert → Diagnostics → Data logging → Data logging (0860)
<b>Description</b>	Use this function to select the data logging method.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Overwriting</li> <li>■ Not overwriting</li> </ul>

**Factory setting** Overwriting

**Additional information** *Selection*

- Overwriting  
The device memory applies the FIFO principle.
- Not overwriting  
Data logging is canceled if the measured value memory is full (single shot).

---

## Logging delay

---

**Navigation**   Expert → Diagnostics → Data logging → Logging delay (0859)

**Prerequisite** In the **Data logging** parameter (→  173), the **Not overwriting** option is selected.

**Description** Use this function to enter the time delay for measured value logging.

**User entry** 0 to 999 h

**Factory setting** 0 h



**Additional information** *Description*

Once data logging has been started with the **Data logging control** parameter (→  174), the device does not save any data for the duration of the delay time entered.

---

## Data logging control

---

**Navigation**   Expert → Diagnostics → Data logging → Data log.control (0857)

**Prerequisite** In the **Data logging** parameter (→  173), the **Not overwriting** option is selected.

**Description** Use this function to start and stop measured value logging.

**Selection**

- None
- Delete + start
- Stop

**Factory setting** None




**Additional information** *Selection*

- None  
Initial measured value logging status.
- Delete + start  
All the measured values recorded for all the channels are deleted and measured value logging starts again.
- Stop  
Measured value logging is stopped.

---

**Data logging status**





---

<b>Navigation</b>	  Expert → Diagnostics → Data logging → Data log. status (0858)
<b>Prerequisite</b>	In the <b>Data logging</b> parameter (→  173), the <b>Not overwriting</b> option is selected.
<b>Description</b>	Displays the measured value logging status.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Done</li> <li>■ Delay active</li> <li>■ Active</li> <li>■ Stopped</li> </ul>
<b>Factory setting</b>	Done
<b>Additional information</b>	<i>Selection</i> <ul style="list-style-type: none"> <li>■ Done Measured value logging has been performed and completed successfully.</li> <li>■ Delay active Measured value logging has been started but the logging interval has not yet elapsed.</li> <li>■ Active The logging interval has elapsed and measured value logging is active.</li> <li>■ Stopped Measured value logging is stopped.</li> </ul>

---

**Entire logging duration**


---

<b>Navigation</b>	  Expert → Diagnostics → Data logging → Logging duration (0861)
<b>Prerequisite</b>	In the <b>Data logging</b> parameter (→  173), the <b>Not overwriting</b> option is selected.
<b>Description</b>	Displays the total logging duration.
<b>User interface</b>	Positive floating-point number
<b>Factory setting</b>	0 s

**"Display channel 1" submenu**




*Navigation*  Expert → Diagnostics → Data logging → Displ.channel 1

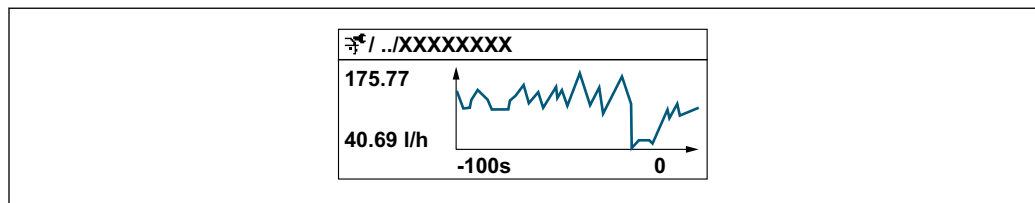



---

**Display channel 1**


---


<b>Navigation</b>	 Expert → Diagnostics → Data logging → Displ.channel 1
<b>Prerequisite</b>	The <b>Extended HistoROM</b> application package is available.  The software options currently enabled are displayed in the <b>Software option overview</b> parameter (→  38).
<b>Description</b>	Displays the measured value trend for the logging channel in the form of a chart.
<b>Additional information</b>	<i>Description</i>



 10 Chart of a measured value trend

- x-axis: depending on the number of channels selected displays 250 to 1000 measured values of a process variable.
- y-axis: displays the approximate measured value span and constantly adapts this to the ongoing measurement.

**"Display channel 2" submenu**



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




---


**Display channel 2**


---


<b>Navigation</b>	 Expert → Diagnostics → Data logging → Displ.channel 2
<b>Prerequisite</b>	A process variable is specified in the <b>Assign channel 2</b> parameter.
<b>Description</b>	See the <b>Display channel 1</b> parameter →  176



**"Display channel 3" submenu**

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


**Display channel 3****Navigation**

 Expert → Diagnostics → Data logging → Displ.channel 3


**Prerequisite**

A process variable is specified in the **Assign channel 3** parameter.


**Description**

See the **Display channel 1** parameter →  176

**"Display channel 4" submenu**

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


**Display channel 4****Navigation**

 Expert → Diagnostics → Data logging → Displ.channel 4

**Prerequisite**


A process variable is specified in the **Assign channel 4** parameter.

**Description**

See the **Display channel 1** parameter →  176

**3.7.7 "Heartbeat Technology" submenu**


 For detailed information on the parameter descriptions for the **Heartbeat Verification+Monitoring**: Special Documentation for the device →  7

*Navigation*  Expert → Diagnostics → Heartbeat Techn.



▶ Heartbeat base settings	→ 178
▶ Performing verification	→ 178
▶ Verification results	→ 184


### "Heartbeat base settings" submenu

*Navigation*  Expert → Diagnostics → Heartbeat Techn. → Base settings

▶ Heartbeat base settings	
Plant operator (2754)	→ 178
Location (2755)	→ 178


---

## Plant operator

<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Base settings → Plant operator (2754)
<b>Description</b>	Use this function to enter the plant operator.
<b>User entry</b>	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)

---

## Location

<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Base settings → Location (2755)
<b>Description</b>	Use this function to enter the location.
<b>User entry</b>	Max. 32 characters such as letters, numbers or special characters (e.g. @, %, /)

### "Performing verification" wizard

*Navigation*  Expert → Diagnostics → Heartbeat Techn. → Perform.verific.

▶ Performing verification	
Year (2846)	→ 179

Month (2845)	→ 179
Day (2842)	→ 180
Hour (2843)	→ 180
AM/PM (2813)	→ 181
Minute (2844)	→ 181
Verification mode (12105)	→ 181
External device information (12101)	→ 182
Start verification (12127)	→ 182
Progress (2808)	→ 182
Measured values (12102)	→ 183
Output values (12103)	→ 183
Status (12153)	→ 183
Verification result (12149)	→ 184

**Year**



<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Year (2846)
<b>Prerequisite</b>	Can be edited if Heartbeat Verification is not active.
<b>Description</b>	Use this function to enter the year of recalibration.
<b>User entry</b>	9 to 99
<b>Factory setting</b>	21

**Month**



<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Month (2845)
<b>Prerequisite</b>	Can be edited if Heartbeat Verification is not active.

**Description** Use this function to select the month of recalibration.

**Selection**



- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December


**Factory setting** January

---

## Day

---

**Navigation**   Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Day (2842)

**Prerequisite**  Can be edited if Heartbeat Verification is not active.

**Description** Use this function to enter the day of the month of recalibration.



**User entry** 1 to 31 d


**Factory setting** 1 d

---

## Hour

---













**Navigation**   Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Hour (2843)

**Prerequisite**  Can be edited if Heartbeat Verification is not active.

**Description** Use this function to enter the hour of recalibration.

**User entry** 0 to 23 h

**Factory setting** 12 h

AM/PM 	
<b>Navigation</b>	  Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → AM/PM (2813)
<b>Prerequisite</b>	 Can be edited if Heartbeat Verification is not active.  The <b>dd.mm.yy hh:mm am/pm</b> option or the <b>mm/dd/yy hh:mm am/pm</b> option is selected in the <b>Date/time format</b> parameter (2812) (→  54).
<b>Description</b>	Use this function to select the time entry in the morning ( <b>AM</b> option) or afternoon ( <b>PM</b> option) in the case of 12-hour notation.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ AM</li> <li>■ PM</li> </ul>
<b>Factory setting</b>	AM
Minute 	
<b>Navigation</b>	  Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Minute (2844)
<b>Prerequisite</b>	 Can be edited if Heartbeat Verification is not active.
<b>Description</b>	Use this function to enter the minutes of recalibration.
<b>User entry</b>	0 to 59 min
<b>Factory setting</b>	0 min
Verification mode 	
<b>Navigation</b>	  Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verificat. mode (12105)
<b>Prerequisite</b>	Can be edited if the verification status is not active.
<b>Description</b>	Select verification mode.  Standard verification: Verification is performed automatically by the device and without manual checking of external measured variables.  Extended verification: Similar to internal verification but with the entry of external measured variables (see also "Measured values" parameter).
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Standard verification</li> <li>■ Extended verification</li> </ul>
<b>Factory setting</b>	Standard verification

---

**External device information**


<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Ext. device info (12101)
<b>Prerequisite</b>	With the following conditions: <ul style="list-style-type: none"> <li>▪ The <b>Extended verification</b> option is selected in the <b>Verification mode</b> parameter (→  181).</li> <li>▪ Can be edited if Heartbeat Verification is not active.</li> </ul>
<b>Description</b>	Record measuring equipment for extended verification.
<b>User entry</b>	Free text entry
<b>Factory setting</b>	–

---

**Start verification**


<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Start verificat. (12127)
<b>Description</b>	Start the verification. To carry out a complete verification, select the selection parameters individually. Once the external measured values have been recorded, verification is started using the <b>Start</b> option.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Cancel</li> <li>▪ Start</li> <li>▪ Start with testkit *</li> <li>▪ Output 1 low value *</li> <li>▪ Output 1 high value *</li> <li>▪ Frequency output 1 *</li> <li>▪ Pulse output 1 *</li> <li>▪ Frequency output 2 *</li> <li>▪ Pulse output 2 *</li> </ul>
<b>Factory setting</b>	Cancel

---

**Progress**

<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Progress (2808)
<b>Description</b>	The progress of the process is indicated.
<b>User interface</b>	0 to 100 %

---

\* Visibility depends on order options or device settings

---

**Measured values**


<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Measured val. (12102)
<b>Prerequisite</b>	One of the following options is selected in the <b>Start verification</b> parameter (→  182): <ul style="list-style-type: none"> <li>■ Output 1 low value</li> <li>■ Output 1 high value</li> <li>■ Output 2 low value</li> <li>■ Output 2 high value</li> <li>■ Frequency output 1</li> <li>■ Pulse output 1</li> <li>■ Frequency output 2</li> <li>■ Pulse output 2</li> </ul>
<b>Description</b>	Use this function to enter the measured values (actual values) for the external measured variables:. <ul style="list-style-type: none"> <li>■ Current output: Output current in [mA]</li> <li>■ Pulse/frequency output: Output frequency in [Hz]</li> </ul>
<b>User entry</b>	Signed floating-point number
<b>Factory setting</b>	0

---

**Output values**

<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Output values (12103)
<b>Description</b>	Displays the simulated output values (target values) for the external measured variables:. Pulse/frequency output: Output frequency in [Hz].
<b>User interface</b>	Signed floating-point number
<b>Factory setting</b>	0

---



**Status**

<b>Navigation</b>	Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Status (12153)
<b>Description</b>	Displays the current status of the verification.
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Done</li> <li>■ Busy</li> <li>■ Failed</li> <li>■ Not done</li> </ul>
<b>Factory setting</b>	Done


---









**Verification result**


---

<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Perform.verific. → Verific. result (12149)
<b>Description</b>	Displays the overall result of the verification.  Detailed description of the classification of the results:
<b>User interface</b>	<ul style="list-style-type: none"> <li>■ Not supported</li> <li>■ Passed</li> <li>■ Not done</li> <li>■ Failed</li> </ul>
<b>Factory setting</b>	Not done

**"Verification results" submenu**


*Navigation*  Expert → Diagnostics → Heartbeat Techn. → Verific. results

▶ Verification results	
Date/time (manually entered) (12142)	→  184
Verification ID (12141)	→  185
Operating time (12126)	→  185
Verification result (12149)	→  185
Sensor (12152)	→  186
Sensor electronic module (ISEM) (12151)	→  186
I/O module (12145)	→  186
System status (12109)	→  187

---

**Date/time (manually entered)**


---

<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Verific. results → Date/time (12142)
<b>Prerequisite</b>	The verification has been performed.




<b>Description</b>	Date and time.
<b>User interface</b>	dd.mmmm.yyyy; hh:mm
<b>Factory setting</b>	1 January 2010; 12:00

---

#### Verification ID


---

<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verification ID (12141)
<b>Prerequisite</b>	The verification has been performed.
<b>Description</b>	Displays consecutive numbering of the verification results in the measuring device.
<b>User interface</b>	0 to 65 535
<b>Factory setting</b>	0

---

#### Operating time



---

<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Verific. results → Operating time (12126)
<b>Prerequisite</b>	The verification has been performed.
<b>Description</b>	Indicates how long the device has been in operation up to the verification.
<b>User interface</b>	Days (d), hours (h), minutes (m), seconds (s)
<b>Factory setting</b>	–

---

#### Verification result




---

<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Verific. results → Verific. result (12149)
<b>Description</b>	Displays the overall result of the verification.  Detailed description of the classification of the results:
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Not supported</li> <li>▪ Passed</li> <li>▪ Not done</li> <li>▪ Failed</li> </ul>
<b>Factory setting</b>	Not done

---

**Sensor**




---

<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sensor (12152)
<b>Prerequisite</b>	The <b>Failed</b> option was shown in the <b>Overall result</b> parameter (→  184).
<b>Description</b>	Displays the result for the sensor.  Detailed description of the classification of the results:
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Not supported</li> <li>▪ Passed</li> <li>▪ Not done</li> <li>▪ Failed</li> </ul>
<b>Factory setting</b>	Not done

---

**Sensor electronic module (ISEM)**





---

<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Verific. results → Sens. electronic (12151)
<b>Prerequisite</b>	In the <b>Overall result</b> parameter (→  184), the <b>Failed</b> option was displayed.
<b>Description</b>	Shows the overall result for the “sensor electronic module” test group.
<b>User interface</b>	<ul style="list-style-type: none"> <li>▪ Not supported</li> <li>▪ Passed</li> <li>▪ Not done</li> <li>▪ Failed</li> </ul>
<b>Factory setting</b>	Not done

---

**I/O module**


---


<b>Navigation</b>	 Expert → Diagnostics → Heartbeat Techn. → Verific. results → I/O module (12145)
<b>Prerequisite</b>	The <b>Failed</b> option was shown in the <b>Overall result</b> parameter (→  184).
<b>Description</b>	Displays the result for I/O module monitoring of the I/O module. <ul style="list-style-type: none"> <li>▪ For pulse output: Accuracy of pulses (for external verification only)</li> <li>▪ For frequency output: Accuracy of frequency (for external verification only)</li> </ul>  Detailed description of the classification of the results:


**User interface**


- Not supported
- Passed
- Not done
- Failed

**Factory setting** Not done

**System status**

**Navigation**  Expert → Diagnostics → Heartbeat Techn. → Verific. results → System status (12109)

**Prerequisite** The **Failed** option was shown in the **Overall result** parameter (→  184).

**Description** Displays the system condition. Tests the measuring device for active errors.  
 Detailed description of the classification of the results:

**User interface**








- Not supported
- Passed
- Not done
- Failed









**Factory setting** Not done

### 3.7.8 "Simulation" submenu

*Navigation*  Expert → Diagnostics → Simulation



▶ **Simulation**

Assign simulation process variable (1810)	→  188
Process variable value (1811)	→  188
Status input 1 simulation (1355-1)	→  189
Input signal level 1 (1356-1)	→  189
Current output 1 simulation (0354-1)	→  190
Current output value (0355)	→  190
Frequency output 1 to n simulation (0472-1 to n)	→  191

Frequency output 1 to n value (0473-1 to n)	→  191
Pulse output simulation 1 to n (0458-1 to n)	→  191
Pulse value 1 to n (0459-1 to n)	→  192
Switch output simulation 1 to n (0462-1 to n)	→  192
Switch state 1 to n (0463-1 to n)	→  193
Device alarm simulation (0654)	→  193
Diagnostic event category (0738)	→  194
Diagnostic event simulation (0737)	→  194

## Assign simulation process variable

### Navigation

  Expert → Diagnostics → Simulation → Assign proc.var. (1810)

### Description

Use this function to select a process variable for the simulation process that is activated. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

### Selection



- Off
- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Temperature
- Density

### Factory setting

Off



### Additional information

*Description*


 The simulation value of the process variable selected is defined in the **Process variable value** parameter (→  188).



## Process variable value

### Navigation

  Expert → Diagnostics → Simulation → Proc. var. value (1811)

### Prerequisite





A process variable is selected in the **Assign simulation process variable** parameter (→  188).

<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>Factory setting</b>	0
<b>Additional information</b>	<i>User entry</i>  The unit of the displayed measured value is taken from the <b>System units</b> submenu (→  47).

---

### Status input 1 simulation




---

<b>Navigation</b>	  Expert → Diagnostics → Simulation → Status inp 1 sim (1355-1)
<b>Prerequisite</b>	For the following order code: "Output; input", option I "4-20mA HART, 2x pul./freq./switch output; status input"
<b>Description</b>	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.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ On</li> </ul>
<b>Factory setting</b>	Off
<b>Additional information</b>	<i>Description</i>  The desired simulation value is defined in the <b>Input signal level</b> parameter (→  189).  <i>Selection</i> <ul style="list-style-type: none"> <li>■ Off Simulation for the status input is switched off. The device is in normal measuring mode or another process variable is being simulated.</li> <li>■ On Simulation for the status input is active.</li> </ul>

---

### Input signal level 1

---

<b>Navigation</b>	  Expert → Diagnostics → Simulation → Signal level 1 (1356-1)
<b>Prerequisite</b>	In the <b>Status input simulation</b> parameter (→  189), the <b>On</b> option is selected.
<b>Description</b>	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 simulation

---



**Navigation**   Expert → Diagnostics → Simulation → Curr.outp 1 sim. (0354-1)

**Description** Use this function to switch simulation of the current output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

- Selection**
- Off
  - On

**Factory setting** Off

**Additional information** *Description*

 The desired simulation value is specified in the **Value current output 1** parameter (→  190).

*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

---

**Navigation**   Expert → Diagnostics → Simulation → Curr.outp val. (0355)


  Expert → Diagnostics → Simulation → Value curr.out 1 (0355-1)

**Prerequisite** In the **Current output 1 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** 0 to 22.5 mA

**Additional information** *User entry*

 The value must be entered with a period (.) as the separator.

---

**Frequency output 1 to n simulation**


<b>Navigation</b>	Expert → Diagnostics → Simulation → Freq.outp 1 to n sim. (0472-1 to n)
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→  93), the <b>Frequency</b> option is selected.
<b>Description</b>	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.
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ On</li> </ul>
<b>Factory setting</b>	Off
<b>Additional information</b>	<p><i>Description</i></p> <p> The desired simulation value is defined in the <b>Frequency value 1 to n</b> parameter.</p> <p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ Off Frequency simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.</li> <li>▪ On Frequency simulation is active.</li> </ul>

---




**Frequency output 1 to n value**


<b>Navigation</b>	Expert → Diagnostics → Simulation → Freq.outp 1 to n val. (0473-1 to n)
<b>Prerequisite</b>	In the <b>Frequency simulation 1 to n</b> parameter, the <b>On</b> option is selected.
<b>Description</b>	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.
<b>User entry</b>	0.0 to 12 500.0 Hz

---



**Pulse output simulation 1 to n**


<b>Navigation</b>	Expert → Diagnostics → Simulation → Puls.outp.sim. 1 to n (0458-1 to n)
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→  93), the <b>Pulse</b> option is selected.
<b>Description</b>	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.

<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Fixed value</li> <li>■ Down-counting value</li> </ul>
<b>Factory setting</b>	Off
<b>Additional information</b>	<p><i>Description</i></p> <p> The desired simulation value is defined in the <b>Pulse value 1 to n</b> parameter.</p> <p><i>Selection</i></p> <ul style="list-style-type: none"> <li>■ Off Pulse simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.</li> <li>■ Fixed value Pulses are continuously output with the pulse width specified in the <b>Pulse width</b> parameter (→  96).</li> <li>■ Down-counting value The pulses specified in the <b>Pulse value</b> parameter (→  192) are output.</li> </ul>




---

**Pulse value 1 to n**



<b>Navigation</b>	  Expert → Diagnostics → Simulation → Pulse value 1 to n (0459-1 to n)
<b>Prerequisite</b>	In the <b>Pulse output simulation 1 to n</b> parameter, the <b>Down-counting value</b> option is selected.
<b>Description</b>	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.
<b>User entry</b>	0 to 65 535

---

**Switch output simulation 1 to n**




<b>Navigation</b>	  Expert → Diagnostics → Simulation → Switch sim. 1 to n (0462-1 to n)
<b>Prerequisite</b>	In the <b>Operating mode</b> parameter (→  93), the <b>Switch</b> option is selected.
<b>Description</b>	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.
<b>Selection</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ On</li> </ul>
<b>Factory setting</b>	Off



<b>Additional information</b>	<p><i>Description</i></p> <p> The desired simulation value is defined in the <b>Switch state 1 to n</b> parameter.</p> <p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ Off Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.</li> <li>▪ On Switch simulation is active.</li> </ul>
-------------------------------	--



---

**Switch state 1 to n**


<b>Navigation</b>	<p>  Expert → Diagnostics → Simulation → Switch state 1 to n (0463–1 to n)</p>
<b>Description</b>	<p>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.</p>
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Open</li> <li>▪ Closed</li> </ul>
<b>Additional information</b>	<p><i>Selection</i></p> <ul style="list-style-type: none"> <li>▪ Open Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.</li> <li>▪ Closed Switch simulation is active.</li> </ul>

---

**Device alarm simulation**


<b>Navigation</b>	<p>  Expert → Diagnostics → Simulation → Dev. alarm sim. (0654)</p>
<b>Description</b>	<p>Use this function to switch the device alarm on and off.</p>
<b>Selection</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ On</li> </ul>
<b>Factory setting</b>	<p>Off</p>
<b>Additional information</b>	<p><i>Description</i></p> <p>The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.</p>

---

**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 (→ 194).

**Selection**

- Sensor
- Electronics
- Configuration
- Process

**Factory setting**

Process

---

**Diagnostic event simulation**
**Navigation**

Expert → Diagnostics → Simulation → Diagnostic event (0737)

**Description**

Use this function to select a diagnostic event for the simulation process that is activated.

**Selection**

- Off
- Diagnostic event picklist (depends on the category selected)

**Factory setting**

Off

**Additional information**

*Description*



For the simulation, you can choose from the diagnostic events of the category selected in the **Diagnostic event category** parameter (→ 194).

## 4 Country-specific factory settings

### 4.1 SI units

 Not valid for USA and Canada.

#### 4.1.1 System units

Mass	kg
Mass flow	kg/h
Volume	m <sup>3</sup>
Volume flow	m <sup>3</sup> /h
Velocity	m/s
Temperature	°C

#### 4.1.2 Output current span

Output	Current range
Current output 1	4 to 20 mA NAMUR

### 4.2 US units

 Only valid for USA and Canada.

#### 4.2.1 System units

Mass	lb
Mass flow	lb/min
Volume	ft <sup>3</sup>
Volume flow	ft <sup>3</sup> /min
Velocity	ft/s
Temperature	°F

#### 4.2.2 Output current span

Output	Current range
Current output 1	4 to 20 mA US

## 5 Explanation of abbreviated units

### 5.1 SI units

Process variable	Units	Explanation
Volume	cm <sup>3</sup> , dm <sup>3</sup> , m <sup>3</sup>	Cubic centimeter, cubic decimeter, cubic meter
	ml, l	Milliliter, liter
Volume flow	dm <sup>3</sup> /s, dm <sup>3</sup> /min, dm <sup>3</sup> /h, dm <sup>3</sup> /d	Cubic decimeter/time unit
	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
Mass	g, kg, t	Gram, kilogram, metric ton
Mass flow	g/s, g/min	Gram/time unit
	kg/s, kg/min, kg/h, kg/d	Kilogram/time unit
	t/h, t/d	Metric ton/time unit
Density	kg/l	Kilogram/liter
Velocity	m/s	Meter/time unit
Kinematic viscosity	m <sup>2</sup> /s	Square meter/second
Temperature	°C, K	Celsius, Kelvin
Length	mm	Millimeters
Time	m, h, d, y	Minute, hour, day, year

### 5.2 US units

Process variable	Units	Explanation
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
Mass	oz, lb, STon	Ounce, pound, standard ton
Mass flow	oz/s, oz/min	Ounce/time unit
	lb/s, lb/min, lb/h, lb/d	Pound/time unit
	STon/h, STon/d	Standard ton/time unit
Density	lb/ft <sup>3</sup>	Pound/cubic foot
Velocity	ft/s	Foot/time unit
Kinematic viscosity	cSt	Centistokes
Temperature	°F, °R	Fahrenheit, Rankine
Length	in	Inch
Time	m, h, d, y	Minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

### 5.3 Imperial units

Process variable	Units	Explanation
Volume	bbl (imp;beer)	Barrel (beer)
Volume flow	bbl/s (imp;beer), bbl/min (imp;beer), bbl/h (imp;beer), bbl/d (imp;beer)	Barrel /time unit (beer) Beer: 36.0 gal/bbl
Time	m, h, d, y	Minute, hour, day, year
	am, pm	Ante meridiem (before midday), post meridiem (after midday)

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