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.
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:

<table>
<thead>
<tr>
<th>Complete parameter name</th>
<th>Write-protected parameter</th>
</tr>
</thead>
</table>

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

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

**Description**
- Description of the parameter function

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

**User entry**
- Input range for the parameter

**Display**
- Display value/data for the parameter

**Factory setting**
- Default setting ex works

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

1.4  Symbols used

1.4.1 Symbols for certain types of information

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| ![Tip](A0028662) | Tip  
Indicates additional information. |
| ![Reference to documentation](A0028663) | Reference to documentation |
| ![Reference to page](A0028665) | Reference to page |
| ![Reference to graphic](A0028665) | Reference to graphic |
| ![Operation via local display](A0028665) | Operation via local display |
| ![Operation via operating tool](A0028665) | Operation via operating tool |
| ![Write-protected parameter](A0028665) | Write-protected parameter |
1.4.2  Symbols in graphics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3 ...</td>
<td>Item numbers</td>
</tr>
<tr>
<td>A, B, C ...</td>
<td>Views</td>
</tr>
<tr>
<td>A-A, B-B, C-C, ...</td>
<td>Sections</td>
</tr>
</tbody>
</table>

1.5  Documentation

1.5.1  Standard documentation

Operating Instructions

<table>
<thead>
<tr>
<th>Measuring device</th>
<th>Documentation code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prosonic Flow I 400</td>
<td>BA02085D</td>
</tr>
</tbody>
</table>

1.5.2  Supplementary device-dependent documentation

Special Documentation

<table>
<thead>
<tr>
<th>Contents</th>
<th>Documentation code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio approvals for WLAN interface for A309/A310 display module</td>
<td>SD01793D</td>
</tr>
<tr>
<td>Heartbeat Technology</td>
<td>SD02712D</td>
</tr>
<tr>
<td>Web server</td>
<td>SD02713D</td>
</tr>
</tbody>
</table>
# 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.

<table>
<thead>
<tr>
<th>Expert</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct access (0106)</td>
<td>→ p. 10</td>
<td></td>
</tr>
<tr>
<td>Locking status (0004)</td>
<td>→ p. 11</td>
<td></td>
</tr>
<tr>
<td>User role (0005)</td>
<td>→ p. 12</td>
<td></td>
</tr>
<tr>
<td>Enter access code (0003)</td>
<td>→ p. 12</td>
<td></td>
</tr>
<tr>
<td>System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td></td>
<td>→ p. 13</td>
</tr>
<tr>
<td>Diagnostic handling</td>
<td></td>
<td>→ p. 32</td>
</tr>
<tr>
<td>Administration</td>
<td></td>
<td>→ p. 39</td>
</tr>
<tr>
<td>Sensor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured values</td>
<td>→ p. 44</td>
<td></td>
</tr>
<tr>
<td>System units</td>
<td>→ p. 53</td>
<td></td>
</tr>
<tr>
<td>Measuring point 1</td>
<td>→ p. 59</td>
<td></td>
</tr>
<tr>
<td>Process parameters</td>
<td>→ p. 65</td>
<td></td>
</tr>
<tr>
<td>External compensation</td>
<td>→ p. 69</td>
<td></td>
</tr>
<tr>
<td>Sensor adjustment</td>
<td>→ p. 73</td>
<td></td>
</tr>
<tr>
<td>Calibration</td>
<td>→ p. 77</td>
<td></td>
</tr>
<tr>
<td>Input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status input</td>
<td>→ p. 79</td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current output 1</td>
<td>→ p. 81</td>
<td></td>
</tr>
<tr>
<td>Pulse/frequency/switch output 1 to n</td>
<td>→ p. 93</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td>HART input</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td>HART output</td>
<td>117</td>
<td></td>
</tr>
<tr>
<td>Web server</td>
<td>133</td>
<td></td>
</tr>
<tr>
<td>Diagnostic configuration</td>
<td>137</td>
<td></td>
</tr>
<tr>
<td>WLAN settings</td>
<td>143</td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td>149</td>
<td></td>
</tr>
<tr>
<td>Reset all totalizers (2806)</td>
<td>149</td>
<td></td>
</tr>
<tr>
<td>Totalizer 1 to n</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Diagnostics</td>
<td>154</td>
<td></td>
</tr>
<tr>
<td>Actual diagnostics (0691)</td>
<td>155</td>
<td></td>
</tr>
<tr>
<td>Previous diagnostics (0690)</td>
<td>155</td>
<td></td>
</tr>
<tr>
<td>Operating time from restart (0653)</td>
<td>156</td>
<td></td>
</tr>
<tr>
<td>Operating time (0652)</td>
<td>156</td>
<td></td>
</tr>
<tr>
<td>Diagnostic list</td>
<td>157</td>
<td></td>
</tr>
<tr>
<td>Event logbook</td>
<td>161</td>
<td></td>
</tr>
<tr>
<td>Device information</td>
<td>163</td>
<td></td>
</tr>
<tr>
<td>Main electronic module</td>
<td>167</td>
<td></td>
</tr>
<tr>
<td>Sensor electronic module (ISEM)</td>
<td>168</td>
<td></td>
</tr>
<tr>
<td>Display module</td>
<td>169</td>
<td></td>
</tr>
<tr>
<td>Heartbeat Technology</td>
<td>177</td>
<td></td>
</tr>
<tr>
<td>Simulation</td>
<td>178</td>
<td></td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Expert</th>
<th>Direct access (0106)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Locking status (0004)</td>
</tr>
<tr>
<td></td>
<td>User role (0005)</td>
</tr>
<tr>
<td></td>
<td>Enter access code (0003)</td>
</tr>
<tr>
<td><strong>System</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Sensor</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Input</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Diagnostics</strong></td>
<td></td>
</tr>
</tbody>
</table>

Direct access

Navigation

Expert → Direct access (0106)

Description

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

User entry

0 to 65535

Additional information

User entry

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

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

Locking status

Navigation ▶ Expert → Locking status (0004)

Description Displays the active write protection.

User interface
- Hardware locked
- Temporarily locked

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

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

Selection

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>The access status displayed in the Access status display parameter (→ 31) applies. Only appears on local display.</td>
</tr>
<tr>
<td>Hardware locked (priority 1)</td>
<td>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).</td>
</tr>
<tr>
<td>Temporarily locked</td>
<td>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.</td>
</tr>
</tbody>
</table>
User role

Navigation

Expert → User role (0005)

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

User interface
- Operator
- Maintenance

Factory setting
Maintenance

Additional information

Description
Access authorization can be modified via the Enter access code parameter (→ 12).
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

Enter access code

Navigation

Expert → Ent. access code (0003)

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

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

3.1 "System" submenu

Navigation
Expert → System

- System
  - Display → 13
  - Diagnostic handling → 32
  - Administration → 39
3.1.1 "Display" submenu

Navigation  
expert → system → display

- Display language (0106)  → 14
- Format display (0098)  → 14
- Value 1 display (0107)  → 17
- 0% bargraph value 1 (0123)  → 17
- 100% bargraph value 1 (0125)  → 18
- Decimal places 1 (0095)  → 18
- Value 2 display (0108)  → 19
- Decimal places 2 (0117)  → 19
- Value 3 display (0110)  → 20
- 0% bargraph value 3 (0124)  → 20
- 100% bargraph value 3 (0126)  → 21
- Decimal places 3 (0118)  → 21
- Value 4 display (0109)  → 21
- Decimal places 4 (0119)  → 22
- Display interval (0096)  → 28
- Display damping (0094)  → 29
- Header (0097)  → 29
- Header text (0112)  → 30
- Separator (0101)  → 30
- Contrast display (0105)  → 31
- Backlight (0111)  → 31
### Display language

**Navigation**

Expert → System → Display → Display language (0104)

**Prerequisite**

A local display is provided.

**Description**

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

**Selection**

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

**Factory setting**

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

### Format display

**Navigation**

Expert → System → Display → Format display (0098)

**Prerequisite**

A local display is provided.

**Description**

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

**Selection**

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

**Factory setting**

1 value, max. size
Additional information

Description

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

- The Value 1 display parameter (→ 17) to Value 4 display parameter (→ 21) are used to specify which measured values are shown on the local display and in what order.
- If more measured values are specified than the display mode selected permits, then the values alternate on the device display. The display time until the next change is configured via the Display interval parameter (→ 28).
Possible measured values shown on the local display:

**"1 value, max. size" option**

<table>
<thead>
<tr>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>900.00 l/h</td>
<td></td>
</tr>
</tbody>
</table>

**"1 bargraph + 1 value" option**

<table>
<thead>
<tr>
<th>Value</th>
<th>Unit</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>900.00 l/h</td>
<td></td>
<td>60.00 %</td>
</tr>
</tbody>
</table>

**"2 values" option**

<table>
<thead>
<tr>
<th>Value</th>
<th>Unit</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>900.00 l/h</td>
<td></td>
<td>60.00 %</td>
</tr>
</tbody>
</table>

**"1 value large + 2 values" option**

<table>
<thead>
<tr>
<th>Value</th>
<th>Unit</th>
<th>Percentage</th>
<th>Energy Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>900.00 l/h</td>
<td></td>
<td>60.00 %</td>
<td>5.98 kWh/Nm³</td>
</tr>
</tbody>
</table>

**"4 values" option**

<table>
<thead>
<tr>
<th>Value</th>
<th>Unit</th>
<th>Percentage</th>
<th>Energy Consumption</th>
<th>Total Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>900.00 l/h</td>
<td></td>
<td>60.00 %</td>
<td>5.98 kWh/Nm³</td>
<td>213.94 l</td>
</tr>
</tbody>
</table>
**Value 1 display**

**Navigation**

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

**Prerequisite**

A local display is provided.

**Description**

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

**Selection**

- Volume flow
- Mass flow
- Sound velocity
- Flow velocity
- Signal strength *
- Signal to noise ratio *
- Turbulence *
- Acceptance rate *
- Temperature *
- Density *
- Electronics temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Current output 1

**Factory setting**

Volume flow

**Additional information**

*Description*

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

The **Format display** parameter (→ 14) is used to specify how many measured values are displayed simultaneously and how.

*Dependency*

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

---

**0% bargraph value 1**

**Navigation**

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

**Prerequisite**

A local display is provided.

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

Country-specific

*Visibility depends on order options or device settings*
Additional information

The Format display parameter 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.

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

The Format display parameter 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.

Decimal places 1

Navigation

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

Prerequisite

A measured value is defined in the Value 1 display parameter.

Description

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

Selection

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

Factory setting

x.xx
Additional information

Description

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

Value 2 display

Navigation

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

Prerequisite

A local display is provided.

Description

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

Selection

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

Factory setting

None

Additional information

Description

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

The Format display parameter (→ 14) is used to specify how many measured values are displayed simultaneously and how.

Dependency

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

Decimal places 2

Navigation

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

Prerequisite

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

Description

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

Selection

• x
• x.x
• x.xx
• x.xxx
• x.xxxx

Factory setting

x.xx

Additional information

Description

This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.
**Value 3 display**

**Navigation**

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

**Prerequisite**

A local display is provided.

**Description**

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

**Selection**

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

**Factory setting**

None

**Additional information**

*Description*

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

The Format display parameter (→ 14) is used to specify how many measured values are displayed simultaneously and how.

*Selection*

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

---

**0% bargraph value 3**

**Navigation**

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

**Prerequisite**

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

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

Country-specific

**Additional information**

*Description*

The Format display parameter (→ 14) is used to specify that the measured value is to be displayed as a bar graph.

*User entry*

The unit of the displayed measured value is taken from the System units submenu (→ 53).
### 100% bargraph value 3

**Navigation**

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

**Prerequisite**

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

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

0

**Additional information**

The **Format display** parameter (→ 14) is used to specify that the measured value is to be displayed as a bar graph.

**User entry**

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

### Decimal places 3

**Navigation**

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

**Prerequisite**

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

**Description**

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

**Selection**

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

**Factory setting**

x.xx

**Additional information**

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

### Value 4 display

**Navigation**

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

**Prerequisite**

A local display is provided.
**Description**

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

**Selection**

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

**Factory setting**

None

**Additional information**

*Description*

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

*Selection*

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

---

**Decimal places 4**

**Navigation**

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

**Prerequisite**

A measured value is specified in the **Value 4 display** parameter (→ 21).

**Description**

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

**Selection**

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

**Factory setting**

x.xx

**Additional information**

*Description*

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

---

**Value 5 display**

**Navigation**

Expert → System → Display → Value 5 display (0145)

**Prerequisite**

A local display is provided.

**Description**

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

**Selection**

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

**Factory setting**

None
**Additional information**

*Description*

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

The [Format display parameter](#14) is used to specify how many measured values are displayed simultaneously and how.

*Selection*

The unit of the displayed measured value is taken from the [System units](#53) submenu.

---

### 0% bargraph value 5

**Navigation**

[Expert → System → Display → 0% bargraph 5](#0153)

**Prerequisite**

An option was selected in the [Value 5 display](#22) parameter.

**Description**

Use this function to enter the 0% bar graph value to be shown on the display for the measured value 5.

**User entry**

Signed floating-point number

**Factory setting**

Depends on country

*Additional information*  

*Description*

The [Format display parameter](#14) 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](#53) submenu.

---

### 100% bargraph value 5

**Navigation**

[Expert → System → Display → 100% bargraph 5](#0155)

**Prerequisite**

An option was selected in the [Value 5 display](#22) parameter.

**Description**

Use this function to enter the 100% bar graph value to be shown on the display for the measured value 5.

**User entry**

Signed floating-point number

**Factory setting**

0
Additional information  

**Description**

The **Format display** parameter (→ 14) is used to specify that the measured value is to be displayed as a bar graph.

**User entry**

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

---

**Decimal places 5**

**Navigation**

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

**Prerequisite**

A measured value is specified in the **Value 5 display** parameter (→ 22).

**Description**

Use this function to select the number of decimal places for measured value 5.

**Selection**

- x
- x.x
- x.xx
- x.xxx
- x.xxxx
- x.xxxxx
- x.xxxxxx

**Factory setting**

x.xx

**Additional information**

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

---

**Value 6 display**

**Navigation**

Expert → System → Display → Value 6 display (0146)

**Prerequisite**

A local display is provided.

**Description**

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

**Selection**

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

**Factory setting**

None
Additional information

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

The Format display parameter (→ 14) is used to specify how many measured values are displayed simultaneously and how.

Selection

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

Decimal places 6

Navigation

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

Prerequisite

A measured value is specified in the Value 6 display parameter (→ 24).

Description

Use this function to select the number of decimal places for measured value 6.

Selection

• x
• x.x
• x.xx
• x.xxx
• x.xxxx
• x.xxxxx
• x.xxxxxx

Factory setting

x.xx

Additional information

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

Value 7 display

Navigation

Expert → System → Display → Value 7 display (0147)

Prerequisite

A local display is provided.

Description

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

Selection

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

Factory setting

None
Additional information

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

The Format display parameter (→ 14) is used to specify how many measured values are displayed simultaneously and how.

Selection

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

Decimal places 7

Navigation

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

Prerequisite

A measured value is specified in the Value 7 display parameter (→ 25).

Description

Use this function to select the number of decimal places for measured value 7.

Selection

• x
• x.x
• x.xx
• x.xxx
• x.xxxx
• x.xxxxx
• x.xxxxxx

Factory setting

x.xx

Additional information

Description

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

0% bargraph value 7

Navigation

Expert → System → Display → 0% bargraph 7 (0154)

Prerequisite

An option was selected in the Value 7 display parameter (→ 25).

Description

Use this function to enter the 0% bar graph value to be shown on the display for the measured value 7.

User entry

Signed floating-point number

Factory setting

Depends on country
Additional information

Description

Information

The **Format display** parameter (→ 14) is used to specify that the measured value is to be displayed as a bar graph.

User entry

Information

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

100% bargraph value 7

Navigation

Expert → System → Display → 100% bargraph 7 (0156)

Prerequisite

An option was selected in the **Value 7 display** parameter (→ 25).

Description

Use this function to enter the 100% bar graph value to be shown on the display for the measured value 7.

User entry

Signed floating-point number

Factory setting

0

Additional information

Description

Information

The **Format display** parameter (→ 14) is used to specify that the measured value is to be displayed as a bar graph.

User entry

Information

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

Value 8 display

Navigation

Expert → System → Display → Value 8 display (0148)

Prerequisite

A local display is provided.

Description

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

Selection

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

Factory setting

None
Additional information  

Description

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

The `Format display` parameter (→ 14) is used to specify how many measured values are displayed simultaneously and how.

Selection

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

Decimal places 8

Navigation  

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

Prerequisite

A measured value is specified in the `Value 8 display` parameter (→ 27).

Description

Use this function to select the number of decimal places for measured value 8.

Selection

- x
- x.x
- x.xx
- x.xxx
- xxxxx
- x.xxxxx
- x.xxxxxx
- x.xxxxxx

Factory setting

x.xx

Additional information  

Description

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

Display interval

Navigation  

Expert → System → Display → Display interval (0096)

Prerequisite

A local display is provided.

Description

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

User entry

1 to 10 s

Factory setting

5 s
Additional information

Description

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

- The Value 1 display parameter (→ 17) to Value 4 display parameter (→ 21) are used to specify which measured values are shown on the local display.
- The display format of the displayed measured values is specified using the Format display parameter (→ 14).

Display damping

Navigation

Expert → System → Display → Display damping (0094)

Prerequisite

A local display is provided.

Description

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

User entry

0.0 to 999.9 s

Factory setting

0.0 s

Additional information

User entry

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

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

Header

Navigation

Expert → System → Display → Header (0097)

Prerequisite

A local display is provided.

Description

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

Selection

- Device tag
- Free text

Factory setting

Device tag

Additional information

Description

The header text only appears during normal operation.

---

1) proportional transmission behavior with first order delay
Description of device parameters

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 (→ 30).

Header text

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

Prerequisite
The Free text option is selected in the Header parameter (→ 29).

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.

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**  
 hann  
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**  
 hann  
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**  
 hann  
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 (→ 12).

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 (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 (→ 32).
The following options are available in the **Assign behavior of diagnostic no. xxx** parameters:

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm</td>
<td>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.</td>
</tr>
<tr>
<td>Warning</td>
<td>The device continues to measure. The signal outputs and totalizers are not affected. A diagnostic message is generated.</td>
</tr>
<tr>
<td>Logbook entry only</td>
<td>The device continues to measure. The diagnostic message is displayed only in the Event logbook submenu (→ 161) (Event list submenu (→ 162)) and is not displayed in alternation with the operational display.</td>
</tr>
<tr>
<td>Off</td>
<td>The diagnostic event is ignored, and no diagnostic message is generated or entered.</td>
</tr>
</tbody>
</table>

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

**Navigation**  
Diagram: Expert → System → Diagn. handling → Diagn. behavior
Description of device parameters

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

Navigation

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 019 (0635)

Description

Use this function to change the diagnostic behavior of the Device initialization active diagnostic message.

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Factory setting

Warning

Additional information

For a detailed description of the options available: → 33

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

Navigation

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 160 (0776)

Description

Use this function to change the diagnostic behavior of the Signal path switched off diagnostic message.

Selection

- Off
- Alarm
- Warning
- Logbook entry only

Factory setting

Warning

Additional information

For a detailed description of the options available: → 33

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

Navigation

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 302 (0742)

Description

Use this function to change the diagnostic behavior of the Device verification active diagnostic message.
Selection
- Off
- Warning
- Logbook entry only

Factory setting
Warning

Additional information
For a detailed description of the options available: →  33

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: →  33

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: →  33
Description of device parameters

Proline Prosonic Flow I 400

Assign behavior of diagnostic no. 443 (Pulse output)

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

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

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

Selection  
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting  
Warning

Additional information  
Selection  
For a detailed description of the options available: →  33

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

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

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

Selection  
- Off
- Alarm
- Warning
- Logbook entry only

Factory setting  
Warning

Additional information  
Selection  
For a detailed description of the options available: →  33

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

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

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

Selection  
- Off
- Alarm
- Warning
- Logbook entry only
Assign behavior of diagnostic no. 840 (Sensor range)

| Navigation | Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 840 (0680) |
| Description | Use this function to change the diagnostic behavior of the **840 Sensor range** diagnostic message. |
| Selection | • Off  
| | • Alarm  
| | • Warning  
| | • Logbook entry only |
| Factory setting | Warning |
| Additional information | For a detailed description of the options available: → 33 |

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: → 33 |

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

**Navigation**

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 930 (0639)

**Description**

Use this function to change the diagnostic behavior of the **S930 Process fluid** diagnostic message.

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting**

Alarm

**Additional information**

For a detailed description of the options available: → 33

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

**Navigation**

Expert → System → Diagn. handling → Diagn. behavior → Diagnostic no. 931 (0640)

**Description**

Use this function to change the diagnostic behavior of the **S931 Process fluid** diagnostic message.

**Selection**

- Off
- Alarm
- Warning
- Logbook entry only

**Factory setting**

Alarm

**Additional information**

For a detailed description of the options available: → 33
3.1.3 "Administration" submenu

Navigation  

Expert → System → Administration

"Define access code" wizard

The Define access code wizard (→ 39) is only available when operating via the local display or Web browser. If operating via the operating tool, the Define access code parameter (→ 41) 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

Definition

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  

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 (→ 12).

⚠️ 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

<table>
<thead>
<tr>
<th>Navigation</th>
<th>➕ Expert → System → Administration → Def. access code → Confirm code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Enter the defined release code a second time to confirm the release code.</td>
</tr>
<tr>
<td>User entry</td>
<td>0 to 9 999</td>
</tr>
<tr>
<td>Factory setting</td>
<td>0</td>
</tr>
</tbody>
</table>

**"Reset access code" submenu**

<table>
<thead>
<tr>
<th>Navigation</th>
<th>➕ ➕ Expert → System → Administration → Reset acc. code</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>❍ Reset access code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating time (0652)</td>
</tr>
<tr>
<td>Reset access code (0024)</td>
</tr>
</tbody>
</table>

### Operating time

<table>
<thead>
<tr>
<th>Navigation</th>
<th>➕ ➕ Expert → System → Administration → Reset acc. code → Operating time (0652)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Use this function to display the length of time the device has been in operation.</td>
</tr>
<tr>
<td>User interface</td>
<td>Days (d), hours (h), minutes (m) and seconds (s)</td>
</tr>
</tbody>
</table>
Additional information

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

Reset access code

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

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

User entry
Character string comprising numbers, letters and special characters

Factory setting
0x00

Additional information

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

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

Additional parameters in the "Administration" submenu

Define access code

Navigation
Expert → System → Administration → Def. access code

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

User entry
0 to 9999

Factory setting
0
**Additional information**

*Description*

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

⚠️ Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the **Enter access code** parameter (→ 12).

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

*User entry*

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

*Factory setting*

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

---

**Device reset**

*Navigation*

Expert → System → Administration → Device reset (0000)

*Description*

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

*Selection*

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

*Factory setting*

Cancel

---

**Activate SW option**

*Navigation*

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

*Description*

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

*User entry*

Max. 10-digit string consisting of numbers.

*Factory setting*

Depends on the software option ordered

* Visibility depends on order options or device settings
Additional information

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

User entry

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

NOTE!

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

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

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

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

▶ Once the activation code has been entered, check if the new software option is displayed in the Software option overview parameter (→ 43).

❖ 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 (→ 43).

Web browser

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

Software option overview

<table>
<thead>
<tr>
<th>Navigation</th>
<th>▶ Expert → System → Administration → SW option overv. (0015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Displays all the software options that are enabled in the device.</td>
</tr>
</tbody>
</table>
| User interface     | ▸ Extended HistoROM  
                    | ▸ PFS output 2 + status input  
                    | ▸ Heartbeat Verification  
                    | ▸ Heartbeat Monitoring |
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

![Diagram of Sensor submenu]

#### 3.2.1  "Measured values" submenu

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

![Diagram of Measured values submenu]
"Process variables" submenu

**Navigation**


**Input values**

Output values

<table>
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<th>Process variables</th>
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<td>Flow velocity (1852) → 46</td>
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<tr>
<td>Density (1851) → 46</td>
</tr>
<tr>
<td>Temperature (1853) → 46</td>
</tr>
</tbody>
</table>

**Volume flow**

**Navigation**


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

**User interface**
Signed floating-point number

**Additional information**

*Dependency*

1 The unit is taken from the Volume flow unit parameter (→ 53)

**Mass flow**

**Navigation**


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

**User interface**
Signed floating-point number

**Additional information**

*Dependency*

1 The unit is taken from the Mass flow unit parameter (→ 55)
Flow velocity

Navigation  

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 (→ 56)

Sound velocity

Navigation  

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 (→ 56)

Density

Navigation  

Prerequisite  
A fixed density is not entered.

Description  
Displays the density that is currently calculated.

User interface  
Signed floating-point number

Additional information  
*Dependency*

- The unit is taken from the **Density unit** parameter (→ 57)

Temperature

Navigation  

Prerequisite  
A fixed temperature is not entered.

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 (→ 57)

---

"System values" submenu

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

| **Signal strength** (2914) | → 47 |
| **Signal to noise ratio** (2917) | → 47 |
| **Acceptance rate** (2912) | → 48 |
| **Turbulence** (2907) | → 48 |

---

**Signal strength**

**Navigation**
Expert → Sensor → Measured val. → System values → Signal strength (2914)

**Description**
Displays the current signal strength.

**User interface**
Signed floating-point number

**Additional information**

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. 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 → Measured val. → System values → 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.

Acceptance rate

Navigation  
Expert → Sensor → Measured val. → System values → Acceptance rate (2912)

Description
Displays the ratio of the number of ultrasonic signals accepted for flow calculation and the total number of ultrasonic signals emitted.
Multipath measuring devices only: Displays the minimum of all acceptance rates measured.

User interface
0 to 100 %

Turbulence

Navigation  
Expert → Sensor → Measured val. → System values → Turbulence (2907)

Description
Displays the current turbulence.

User interface
Signed floating-point number

Additional information
Description
A high turbulence value indicates a disturbance in the flow profile.

"Totalizer" submenu

Navigation  
Expert → Sensor → Measured val. → Totalizer

| Totalizer value 1 to n (0911–1 to n) |  
| Totalizer overflow 1 to n (0910–1 to n) |  

→ 49
Totalizer value 1 to n

**Navigation**

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

**Prerequisite**

One of the following options is selected in the Assign process variable parameter (→ 150) of the Totalizer 1 to n submenu:
- Volume flow
- Mass flow

**Description**

Displays the current totalizer counter reading.

**User interface**

Signed floating-point number

**Additional information**

*Description*

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

*User interface*

The value of the process variable totalized since measuring began can be positive or negative. This depends on the settings in the Totalizer operation mode parameter (→ 152).

*Example*

Calculation of the current totalizer reading when the value exceeds the 7-digit display range of the operating tool:
- Value in the Totalizer value 1 parameter: 1968457 m³
- Value in the Totalizer overflow 1 parameter: 1 ⋅ 10⁷ (1 overflow) = 10000000 m³

*Totalizer overflow 1 to n*

**Navigation**

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

**Prerequisite**

One of the following options is selected in the Assign process variable parameter (→ 150) of the Totalizer 1 to n submenu:
- Volume flow
- Mass flow

**Description**

Displays the current totalizer overflow.

**User interface**

Integer with sign

**Additional information**

*Description*

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

User interface

- The unit of the selected process variable is specified for the totalizer in the Unit totalizer parameter (→ 151).

Example

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

- Value in the Totalizer value 1 parameter: 1968457 m³
- Value in the Totalizer overflow 1 parameter: 2 \cdot 10^7 (2 overflows) = 20000000 [m³]
- Current totalizer reading: 21968457 m³

"Input values" submenu

Navigation

Expert → Sensor → Measured val. → Input values

Value status input

- Prerequisite
  - For the following order code: "Output; input", option 1 "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 current 1

Navigation

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

Navigation

Expert → Sensor → Measured val. → Output values → Measur. curr. 1 (0366–1)

Description
Displays the actual measured value of the output current.

User interface
0 to 30 mA

Pulse output 1 to n

Navigation

Expert → Sensor → Measured val. → Output values → Pulse output 1 (0456–1)
Expert → Sensor → Measured val. → Output values → Pulse output 2 (0456–2)

Prerequisite
The Pulse option is selected in the Operating mode parameter (→ 94) parameter.

Description
Displays the pulse frequency currently output.

User interface
Positive floating-point number
Addition information

- 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 (→ 96) and **Pulse width** parameter (→ 97) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.

The output behavior can be reversed via the **Invert output signal** parameter (→ 110) 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 (→ 98)) can be configured.

**Output frequency 1 to n**

**Navigation**

- Expert → Sensor → Measured val. → Output values → Output freq. 1 (0471–1)
- Expert → Sensor → Measured val. → Output values → Output freq. 2 (0471–2)

**Prerequisite**

In the **Operating mode** parameter (→ 94), the **Frequency** option is selected.

**Description**

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

**User interface**

0.0 to 12500.0 Hz

**Switch state 1 to n**

**Navigation**

- Expert → Sensor → Measured val. → Output values → Switch state 1 (0461–1)
- Expert → Sensor → Measured val. → Output values → Switch state 2 (0461–2)

**Prerequisite**

In the **Operating mode** parameter (→ 94), the **Switch** option is selected.

**Description**

Displays the current switch status of the status output.

**User interface**

- Open
- Closed
### Additional information

**Selection**

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

### 3.2.2 "System units" submenu

**Navigation**

Expert → Sensor → System units

<table>
<thead>
<tr>
<th>System units</th>
</tr>
</thead>
<tbody>
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<td>Volume flow unit (0553)</td>
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<tr>
<td>Volume unit (0563)</td>
</tr>
<tr>
<td>Mass flow unit (0554)</td>
</tr>
<tr>
<td>Mass unit (0574)</td>
</tr>
<tr>
<td>Velocity unit (0566)</td>
</tr>
<tr>
<td>Temperature unit (0557)</td>
</tr>
<tr>
<td>Density unit (0555)</td>
</tr>
<tr>
<td>Kinematic viscosity unit (0578)</td>
</tr>
<tr>
<td>Length unit (0551)</td>
</tr>
<tr>
<td>Date/time format (2812)</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>SI units</th>
<th>US units</th>
<th>Imperial units</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm³/s</td>
<td>af/s</td>
<td>gal/s (imp)</td>
</tr>
<tr>
<td>cm³/min</td>
<td>af/min</td>
<td>gal/min (imp)</td>
</tr>
<tr>
<td>cm³/h</td>
<td>af/h</td>
<td>gal/h (imp)</td>
</tr>
<tr>
<td>cm³/d</td>
<td>af/d</td>
<td>gal/d (imp)</td>
</tr>
<tr>
<td>dm³/s</td>
<td>ft³/s</td>
<td>Mgal/s (imp)</td>
</tr>
<tr>
<td>dm³/min</td>
<td>ft³/min</td>
<td>Mgal/min (imp)</td>
</tr>
<tr>
<td>dm³/h</td>
<td>ft³/h</td>
<td>Mgal/h (imp)</td>
</tr>
<tr>
<td>dm³/d</td>
<td>ft³/d</td>
<td>Mgal/d (imp)</td>
</tr>
<tr>
<td>m³/s</td>
<td>ft³/s</td>
<td>bbl/s (imp;beer)</td>
</tr>
<tr>
<td>m³/min</td>
<td>ft³/min</td>
<td>bbl/min (imp;beer)</td>
</tr>
<tr>
<td>m³/h</td>
<td>ft³/h</td>
<td>bbl/h (imp;beer)</td>
</tr>
<tr>
<td>m³/d</td>
<td>ft³/d</td>
<td>bbl/d (imp;beer)</td>
</tr>
<tr>
<td>l/s</td>
<td>gal/s (us)</td>
<td>bbl/s (imp;oil)</td>
</tr>
<tr>
<td>l/min</td>
<td>gal/min (us)</td>
<td>bbl/min (imp;oil)</td>
</tr>
<tr>
<td>l/h</td>
<td>gal/h (us)</td>
<td>bbl/h (imp;oil)</td>
</tr>
<tr>
<td>l/d</td>
<td>gal/d (us)</td>
<td>bbl/d (imp;oil)</td>
</tr>
<tr>
<td>hl/s</td>
<td>Mgal/s (us)</td>
<td>bbl/s (imp;beer)</td>
</tr>
<tr>
<td>hl/min</td>
<td>Mgal/min (us)</td>
<td>bbl/min (imp;beer)</td>
</tr>
<tr>
<td>hl/h</td>
<td>Mgal/h (us)</td>
<td>bbl/h (imp;beer)</td>
</tr>
<tr>
<td>hl/d</td>
<td>Mgal/d (us)</td>
<td>bbl/d (imp;beer)</td>
</tr>
<tr>
<td>Ml/s</td>
<td>bbl/s (us;liq.)</td>
<td>bbl/s (us;beer)</td>
</tr>
<tr>
<td>Ml/min</td>
<td>bbl/min (us;liq.)</td>
<td>bbl/min (us;beer)</td>
</tr>
<tr>
<td>Ml/h</td>
<td>bbl/h (us;liq.)</td>
<td>bbl/h (us;beer)</td>
</tr>
<tr>
<td>Ml/d</td>
<td>bbl/d (us;liq.)</td>
<td>bbl/d (us;beer)</td>
</tr>
<tr>
<td>M³/s</td>
<td>bbl/s (us;oil)</td>
<td>bbl/s (us;oil)</td>
</tr>
<tr>
<td>M³/min</td>
<td>bbl/min (us;oil)</td>
<td>bbl/min (us;oil)</td>
</tr>
<tr>
<td>M³/h</td>
<td>bbl/h (us;oil)</td>
<td>bbl/h (us;oil)</td>
</tr>
<tr>
<td>M³/d</td>
<td>bbl/d (us;oil)</td>
<td>bbl/d (us;oil)</td>
</tr>
</tbody>
</table>

### Factory setting

Depends on country:
- m³/h
- ft³/min

### Additional information

**Effect**

The selected unit applies for:
Volume flow parameter (→ 45)

**Selection**

For an explanation of the abbreviated units: → 186
Volume unit

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

Selection
- **SI units**
  - cm³
  - dm³
  - m³
  - ml
  - l
  - hl
  - Ml Mega
- **US units**
  - af
  - ft³
  - Mft³
  - fl oz (us)
  - gal (us)
  - kgal (us)
  - bbl (us;oil)
  - bbl (us;liq.)
  - bbl (us;beer)
  - bbl (us;tank)
- **Imperial units**
  - gal (imp)
  - Mgal (imp)
  - bbl (imp;beer)
  - bbl (imp;oil)

Factory setting
- Country-specific:
  - m³
  - ft³

Additional information
Selection
For an explanation of the abbreviated units: → 186

Mass flow unit

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

Selection
- **SI units**
  - g/s
  - g/min
  - g/h
  - g/d
  - kg/s
  - kg/min
  - kg/h
  - kg/d
  - t/s
  - t/min
  - t/h
  - t/d
- **US units**
  - oz/s
  - oz/min
  - oz/h
  - oz/d
  - lb/s
  - lb/min
  - lb/h
  - lb/d
  - STon/s
  - STon/min
  - STon/h
  - STon/d

Factory setting
- Country-specific:
  - kg/h
  - lb/min
Additional information

Effect

The selected unit applies for:

**Mass flow** parameter

Selection

ℹ️ For an explanation of the abbreviated units: → ▶️ 186

---

**Mass unit**

Navigation

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

Description

Use this function to select the unit for the mass.

Selection

**SI units**

- g

- kg

- t

**US units**

- oz

- lb

- STon

Factory setting

Country-specific:

- kg

- lb

Additional information

Selection

ℹ️ For an explanation of the abbreviated units: → ▶️ 186

---

**Velocity unit**

Navigation

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

Description

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

Selection

**SI units**

- m/s

**US units**

- ft/s

Factory setting

Country-specific:

- m/s

- ft/s

Additional information

**Effect**

The selected unit applies for:

- Flow velocity (→ ▶️ 46)
- Sound velocity (→ ▶️ 46)

Selection

ℹ️ For an explanation of the abbreviated units: → ▶️ 186
Temperature unit

**Navigation**

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

**Description**

Use this function to select the unit for the temperature.

**Selection**

**SI units**
- °C
- K

**US units**
- °F
- °R

**Factory setting**

Country-specific:
- °C
- °F

**Additional information**

The selected unit applies for:
- Temperature (→ 46)
- Electronic temperature
- External temperature
- Reference temperature

For an explanation of the abbreviated units: → 186

Density unit

**Navigation**

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

**Description**

Use this function to select the unit for the density.

**Selection**

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

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

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

**Factory setting**

Country-specific:
- kg/dm³
- lb/ft³

**Additional information**

Selection

For an explanation of the abbreviated units: → 186
### Kinematic viscosity unit

**Navigation**
Expert → Sensor → System units → Kin. visc. unit (0578)

**Description**
Use this function to select the unit for the kinematic viscosity.

**Selection**
- **SI units**
  - cSt
  - m²/s
  - St

**Factory setting**
Country-specific:
- m²/s
- cSt

### Length unit

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

**Description**
Use this function to select the unit of length for the.

**Selection**
- **SI units**
  - m
  - mm
- **US units**
  - ft
  - in

**Factory setting**
Country-specific:
- mm
- in

**Additional information**
Selection
For an explanation of the abbreviated units: → 186

### 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
3.2.3 "Measuring point " submenu

**Navigation** 专家 → 传感器 → 测点

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</table>
Description of device parameters

**Measuring point configuration**

**Navigation**

Expert → Sensor → Meas. point 1 → Meas. pt config. (5675–1)

**Description**

Use this function to enter the measuring point configuration.

**Selection**

- 1 measuring point - signal path 1
- 1 measuring point - signal path 2 *
- 1 measuring point - 2 signal paths *

**Factory setting**

Depending on the sensor version

**Process fluid**

**Navigation**

Expert → Sensor → Meas. point 1 → Process fluid (2926–1)

**Description**

Select process fluid.

**Selection**

- Water
- Sea water
- Distilled water
- Ammonia NH3
- Benzene
- Ethanol
- Glycol
- Milk
- Methanol
- User-specific liquid

**Factory setting**

Water

**Medium temperature**

**Navigation**

Expert → Sensor → Meas. point 1 → Medium temp. (3053–1)

**Description**

Enter a fixed value for process temperature.

**User entry**

−200 to 550 °C

**Factory setting**

20 °C

* Visibility depends on order options or device settings
### Sound velocity

**Navigation**

![Expert → Sensor → Meas. point 1 → Sound velocity (2929–1)]

**Prerequisite**

The User-specific liquid option is selected in the Process fluid parameter (→ 60).

**Description**

Enter sound velocity of fluid.

**User entry**

200 to 3000 m/s

**Factory setting**

1482.4 m/s

### Viscosity

**Navigation**

![Expert → Sensor → Meas. point 1 → Viscosity (2932–1)]

**Prerequisite**

The User-specific liquid option is selected in the Process fluid parameter (→ 60).

**Description**

Enter medium viscosity at installation temperature.

**User entry**

1E-10 to 0.01 m²/s

**Factory setting**

1E-6 m²/s

### Pipe dimensions

**Navigation**

![Expert → Sensor → Meas. point 1 → Pipe dimensions (2943–1)]

**Description**

Select if pipe dimensions are defined by diameter or circumference.

**Selection**

- Diameter
- Pipe circumference

**Factory setting**

Diameter

### Pipe circumference

**Navigation**

![Expert → Sensor → Meas. point 1 → Pipe circumfer. (2934–1)]

**Prerequisite**

The Pipe circumference option is selected in the Pipe dimensions parameter (→ 61).

**Description**

Define the pipe circumference.

**User entry**

30 to 62800 mm
**Factory setting**

314.159 mm

---

**Pipe outer diameter**

**Navigation**

Expert → Sensor → Meas. point 1 → Pipe outer diam. (2910–1)

**Prerequisite**

The **Diameter** option is selected in the **Pipe dimensions** parameter (→ 61).

**Description**

Define the outer diameter of the pipe.

**User entry**

10 to 5000 mm

**Factory setting**

100 mm

---

**Pipe wall thickness**

**Navigation**

Expert → Sensor → Meas. point 1 → Wall thickness (2916–1)

**Description**

Enter the pipe wall thickness.

**User entry**

Positive floating point number

**Factory setting**

3 mm

---

**Liner thickness**

**Navigation**

Expert → Sensor → Meas. point 1 → Liner thickness (2935–1)

**Description**

Define the thickness of liner.

**User entry**

0 to 100 mm

**Factory setting**

0 mm

---

**Cable length**

**Navigation**

Expert → Sensor → Meas. point 1 → Cable length (2939–1)

**Description**

Enter length of sensor cables.

**User entry**

0 to 200 000 mm

**Factory setting**

As per order
Result sensor type / sensor distance

**Navigation**  
Expert → Sensor → Meas. point 1 → Sens. type/dist. (3066–1)

**Description**  
Shows the sensor type and sensor distance calculated for installation.

**User interface**  
e.g. I-100-A / 500 mm

**Factory setting**  
-

Result path length / arc length

**Navigation**  
Expert → Sensor → Meas. point 1 → Path/arc length (3067–1)

**Description**  
Shows the path length calculated and (if applicable) the calculated arc length.

**User interface**  
e.g. 1085 mm / 257.56 mm

**Factory setting**  
-

"Mounting deviations signal path 1 to n" submenu

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

- **Sensor distance deviation**
  Sensor distance deviation
  (5822–1 to n) →  63

- **Arc length deviation**
  Arc length deviation (5876–1 to n) →  64

- **Signal path length deviation**
  Signal path length deviation
  (5821–1 to n) →  64

Sensor distance deviation

**Navigation**  
Expert → Sensor → Meas. point 1 → Deviat. path 1 to n → Sens. dist. dev. (5822–1 to n)

**Description**  
Enter the deviation between the nominal sensor distance and the welded position.

**User entry**  
Signed floating-point number
### 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**  
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**  
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 "Process parameters" submenu

**Navigation**


---

**Flow override**

**Navigation**


**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

**Additional information**

- The Flow override option can also be activated in the Status input submenu: Assign status input parameter (→ 79).
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 2).

User entry

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

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

Effect

The damping affects the following variables of the device:

- Outputs → 81
- Low flow cut off → 67
- Totalizers → 150

Sound velocity damping

Navigation


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

Navigation  

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

User entry  
0 to 999.9 s

Factory setting  
0 s

Temperature damping

Navigation  

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

User entry  
0 to 999.9 s

Factory setting  
10 s

"Low flow cut off" submenu

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

Assign process variable (1837) → 67

On value low flow cutoff (1805) → 68

Off value low flow cutoff (1804) → 68

Assign process variable

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

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

Selection  
- Off
- Volume flow
- Mass flow
- Flow velocity
<table>
<thead>
<tr>
<th>Factory setting</th>
<th>Flow velocity</th>
</tr>
</thead>
</table>

**On value low flow cutoff**

- **Navigation**: Expert → Sensor → Process param. → Low flow cut off → On (1805)
- **Prerequisite**: A process variable is selected in the Assign process variable parameter (→ 67).
- **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 → 68.
- **User entry**: Positive floating-point number
- **Factory setting**: 0.3 m/s
- **Additional information**: The unit depends on the process variable selected in the Assign process variable parameter (→ 67).

**Off value low flow cutoff**

- **Navigation**: Expert → Sensor → Process param. → Low flow cut off → Off (1804)
- **Prerequisite**: A process variable is selected in the Assign process variable parameter (→ 67).
- **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 → 68.
- **User entry**: 0 to 100.0 %
- **Factory setting**: 50 %
Additional information  

Example

![Diagram]

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

3.2.5  "External compensation" submenu

Navigation  


<table>
<thead>
<tr>
<th>External compensation</th>
<th></th>
</tr>
</thead>
<tbody>
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<td>Temperature compensation (3025)</td>
<td>70</td>
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<tr>
<td>External temperature (3058)</td>
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<tr>
<td>Medium temperature (2925)</td>
<td>70</td>
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<td>Density source (3048)</td>
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<td>Linear expansion coefficient (3153)</td>
<td>71</td>
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<td>72</td>
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<tr>
<td>Fixed reference density (3178)</td>
<td>72</td>
</tr>
<tr>
<td>Reference temperature (3147)</td>
<td>72</td>
</tr>
</tbody>
</table>
Temperature compensation

Navigation

Endress+Hauser

Prerequisite
The Calculated value option is selected in the Density source parameter (→ 70).

Description
Select temperature mode for temperature compensation.

Selection
- Fixed value
- External value

Factory setting
Fixed value

External temperature

Navigation

Endress+Hauser

Prerequisite
The Calculated value option is selected in the Density source parameter (→ 70) and the External value option is selected in the Temperature compensation parameter (→ 70).

Description
Shows the external process temperature read in from the external device.

User interface
-273.15 to 99999 °C

Factory setting
-

Medium temperature

Navigation

Endress+Hauser

Description
Enter a fixed value for process temperature.

User entry
-50 to 550 °C

Factory setting
20 °C

Density source

Navigation

Endress+Hauser

Description
Select the density source for the calculation of the mass.
Selection
- Fixed density
- External density
- Calculated value

Factory setting
Fixed density

External density

Navigation
Expert → Sensor → External comp. → External density (3060)

Prerequisite
The External density option is selected in the Density source parameter (→ 70).

Description
Shows the density read in from the external device.

User interface
Positive floating-point number

Factory setting
0 kg/l

Fixed density

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

Prerequisite
The Fixed density option is selected in the Density source parameter (→ 70).

Description
Enter fixed value for medium density.

User entry
1E-05 to 15 kg/l

Factory setting
1 kg/l

Linear expansion coefficient

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

Prerequisite
The Calculated value option is selected in the Density source parameter (→ 70).

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

User entry
1.0 · 10^-6 to 2.0 · 10^-3

Factory setting
2.06 · 10^-4
Square expansion coefficient

Navigation

Expert → Sensor → External comp. → Square exp coeff (3172)

Prerequisite

The Calculated value option is selected in the Density source parameter (→ 70).

Description

For media with a non-linear expansion pattern: use this function to enter a quadratic, 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}

Fixed reference density

Navigation

Expert → Sensor → External comp. → Fix ref. density (3178)

Prerequisite

The Calculated value option is selected in the Density source parameter (→ 70).

Description

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

User entry

1E-05 to 15 kg/l

Factory setting

1 kg/l

Additional information

Reference density calculation

\[
\rho = \rho_N \cdot (1 + a \cdot \Delta t + \beta \cdot \Delta t^2)
\]

- \(\rho\): 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 (→ 70)
- \(t_N\): reference temperature at which the reference density applies (e.g. 20 °C)
- \(\Delta t\): \(t - t_N\)
- \(a\): linear expansion coefficient of the medium, unit = \([1/K]\); \(K = \text{Kelvin}\)
- \(\beta\): square expansion coefficient of the medium, unit = \([1/K^2]\)

Reference temperature

Navigation

Expert → Sensor → External comp. → Ref. temperature (3147)

Prerequisite

The Calculated value option is selected in the Density source parameter (→ 70).

Description

Enter the reference temperature at which the reference density parameter applies.

User entry

-200 to 450 °C
### Factory setting

20 °C

### 3.2.6 "Sensor adjustment" submenu

**Navigation**


**Installation direction**

**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

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<thead>
<tr>
<th>Process variable adjustment</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Volume flow factor (1832) → 74</td>
</tr>
<tr>
<td>Mass flow offset (1841) → 74</td>
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<tr>
<td>Mass flow factor (1846) → 75</td>
</tr>
<tr>
<td>Sound velocity offset (1848) → 75</td>
</tr>
<tr>
<td>Sound velocity factor (1849) → 75</td>
</tr>
</tbody>
</table>
Volume flow offset

Navigation


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 m³/s. The value is entered in the selected volume flow unit.

User entry

Signed floating-point number

Factory setting

0 m³/h

Additional information

Description

Corrected value = (factor × value) + offset

Volume flow factor

Navigation


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

Navigation


Description

Use this function to enter the zero point shift for the mass flow trim. The mass flow unit on which the shift is based is kg/h. The value is entered in the selected mass flow unit.

User entry

Signed floating-point number

Factory setting

0 kg/h
### Additional information

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected value = (factor \times value) + offset</td>
</tr>
</tbody>
</table>

### Mass flow factor

**Navigation**


**Description**

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

**User entry**

- Positive floating-point number

**Factory setting**

- 1

**Additional information**

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected value = (factor \times value) + offset</td>
</tr>
</tbody>
</table>

### Sound velocity offset

**Navigation**

- Expert → Sensor → Sensor adjustm. → Variable adjust → S. veloc. offset (1848)

**Description**

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.

**User entry**

- Signed floating-point number

**Factory setting**

- 0 m/s

**Additional information**

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected value = (factor \times value) + offset</td>
</tr>
</tbody>
</table>

### Sound velocity factor

**Navigation**


**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
Description of device parameters

Proline Prosonic Flow I 400

Additional information

Description

Corrected value = (factor × value) + offset

Temperature offset

Navigation


Prerequisite

The Calculated value option is selected in the Density source parameter (→ 70) and the External value option is selected in the Temperature compensation parameter (→ 70).

Description

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

User entry

Signed floating-point number

Factory setting

0

Additional information

Description

Corrected value = (factor × value) + offset

Temperature factor

Navigation


Prerequisite

The Calculated value option is selected in the Density source parameter (→ 70) and the External value option is selected in the Temperature compensation parameter (→ 70).

Description

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

User entry

Positive floating-point number

Factory setting

1

Additional information

Description

Corrected value = (factor × value) + offset
### Density offset

**Navigation**

> Expert → Sensor → Sensor adjustm. → Variable adjust → Density offset (1877)

**Prerequisite**

The **External density** option or **Calculated value** option is selected in the **Density source** parameter (→ 70).

**Description**

Use this function to enter the zero point shift for the density trim. The value is entered in the selected density unit.

**User entry**

Signed floating-point number

**Factory setting**

0 kg/m³

---

### Density factor

**Navigation**

> Expert → Sensor → Sensor adjustm. → Variable adjust → Density factor (1878)

**Prerequisite**

The **External density** option or **Calculated value** option is selected in the **Density source** parameter (→ 70).

**Description**

Use this function to enter a quantity factor for the density.

**User entry**

Positive floating-point number

**Factory setting**

1

---

### 3.2.7 "Calibration" submenu

**Navigation**

> Expert → Sensor → Calibration

<table>
<thead>
<tr>
<th>Calibration factor (2920)</th>
<th>→ 78</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero point (2921)</td>
<td>→ 78</td>
</tr>
<tr>
<td>Nominal diameter (2807)</td>
<td>→ 78</td>
</tr>
</tbody>
</table>
### Calibration factor

**Navigation**  
Expert → Sensor → Calibration → Cal. factor (2920)

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

**User interface**  
Signed floating-point number

**Factory setting**  
1

### Zero point

**Navigation**  
Expert → Sensor → Calibration → Zero point (2921)

**Description**  
Displays the current zero point correction value for the sensor.

**User interface**  
Signed floating-point number

**Factory setting**  
0

### Nominal diameter

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

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

**User interface**  
--------------

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

### 3.3 "Input" submenu

**Navigation**  
Expert → Input

```
[Input]
[Status input]  
```

→ 79
3.3.1 "Status input 1 to n" submenu

**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

**Additional information**

- **Selection**
  - Off
    The status input is switched off.
  - Reset totalizer 1...
    The individual totalizers are reset.
  - Reset all totalizers
    All totalizers are reset.
  - Flow override
    The Flow override (→ 65) is activated.

Note on the Flow override (→ 65):

- The Flow override (→ 65) is enabled as long as the level is at the status input (continuous signal).
- All other assignments react to a change in level (pulse) at the status input.
Value status input

**Navigation**

Expert → Input → Status input → 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

Active level

**Navigation**

Expert → Input → Status input → Active level (1351)

**Description**

Use this function to determine the input signal level at which the assigned function is activated.

**Selection**

- High
- Low

**Factory setting**

High

Response time status input

**Navigation**

Expert → Input → Status input → Response time (1354)

**Description**

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

**User entry**

5 to 200 ms

**Factory setting**

50 ms
3.4 "Output" submenu

*Navigation*  
Expert → Output

- Current output 1
- Pulse/frequency/switch output 1 to n

3.4.1 "Current output 1" submenu

*Navigation*  
Expert → Output → Curr.output 1

- Process variable current output (0359–1)
- Current range output (0353–1)
- Fixed current (0365–1)
- Lower range value output (0367–1)
- Upper range value output (0372–1)
- Measuring mode current output (0351–1)
- Damping current output (0363–1)
- Failure behavior current output (0364–1)
- Failure current (0352–1)
- Output current 1 (0361–1)
- Measured current 1 (0366–1)

**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
- Sound velocity
- Flow velocity
- Signal strength *
- Signal to noise ratio *
- Turbulence *
- Acceptance rate *
- Temperature *
- Density *
- Electronics temperature

Factory setting Volume flow

Current range output

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

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

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

Factory setting
Depends on country:
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)

Additional information
Description
- In the event of a device alarm, the current output adopts the value specified in the Failure mode parameter (→ 91).
- 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 (→ 83) and 20 mA value parameter (→ 85).

"Fixed current" option
- This option is used for a HART Multidrop network.
- It can only be used for the 4 to 20 mA HART current output (current output 1).
- The current value is set via the Fixed current parameter (→ 83).

Example
Shows the relationship between the current range for outputting the process value and the two sign on alarm levels:

* Visibility depends on order options or device settings
Description of device parameters

Selection

<table>
<thead>
<tr>
<th>Selection</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>4...20 mA NE (3.8...20.5 mA)</td>
<td>3.8 to 20.5 mA</td>
<td>&lt; 3.6 mA</td>
<td>&gt; 21.95 mA</td>
</tr>
<tr>
<td>4...20 mA US (3.9...20.8 mA)</td>
<td>3.9 to 20.8 mA US</td>
<td>&lt; 3.6 mA</td>
<td>&gt; 21.95 mA</td>
</tr>
<tr>
<td>4...20 mA (4... 20.5 mA)</td>
<td>4 to 20.5 mA</td>
<td>&lt; 3.6 mA</td>
<td>&gt; 21.95 mA</td>
</tr>
<tr>
<td>0...20 mA (0... 20.5 mA)</td>
<td>0 to 20.5 mA</td>
<td>&lt; 0 mA</td>
<td>&gt; 21.95 mA</td>
</tr>
</tbody>
</table>

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 (→ 82).

**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**

One of the following options is selected in the **Current span** parameter (→ 82):

- 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
Description of device parameters

Factory setting
Country-specific:
- m³/h
- ft³/h

Additional information

Description
Positive and negative values are permitted depending on the process variable assigned in the Assign current output parameter (→ 81). 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 (→ 85).

Dependency

The unit depends on the process variable selected in the Assign current output parameter (→ 81).

Current output behavior

The current output behaves differently depending on the settings configured in the following parameters:
- Current span (→ 82)
- Measuring mode (→ 86)
- Failure mode (→ 91)

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 (→ 83) = not equal to zero flow (e.g. –250 m³/h)
- 20 mA value parameter (→ 85) = not equal to zero flow (e.g. +750 m³/h)
- Calculated current value = 8 mA at zero flow

The operational range of the measuring device is defined by the values entered for the 0/4 mA value parameter (→ 83) and 20 mA value parameter (→ 85). If the effective flow exceeds or falls below this operational range, the S441 Current output 1 diagnostic message is displayed.

Configuration example B
Measurement mode with Forward/Reverse flow option
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 (→ 83) and 20 mA value parameter (→ 85) must have the same algebraic sign. The value for the 20 mA value parameter (→ 85) (e.g. reverse flow) corresponds to the mirrored value for the 20 mA value parameter (→ 85) (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 → 86.

---

### Upper range value output

**Navigation**

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

**Prerequisite**

In the Current span parameter (→ 82), 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**

Positive and negative values are permitted depending on the process variable assigned in the Assign current output parameter (→ 81). 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 (→ 83).

**Dependency**

The unit depends on the process variable selected in the Assign current output parameter (→ 81).

**Example**

- Value assigned to 0/4 mA = –250 m³/h
- Value assigned to 20 mA = +750 m³/h
- Calculated current value = 8 mA (at zero flow)

If the Forward/Reverse flow option is selected in the Measuring mode parameter (→ 86), different signs cannot be entered for the values of the 0/4 mA value parameter (→ 83) and 20 mA value parameter (→ 85). The “S441 Current output 1 diagnostic message is displayed.

**Configuration examples**

Observe the configuration examples for the 0/4 mA value parameter (→ 83).

---

**Measuring mode current output**

**Navigation**

Expert → Output → Curr.output 1 → Meas.mode outp (0351–1)

**Prerequisite**

One of the following options is selected in the Current span parameter (→ 82):

- 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**

The process variable that is assigned to the current output via the Assign current output parameter (→ 81) 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

- 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 (→ 83) and 20 mA value parameter (→ 85) must have the same sign.
- The value for the 20 mA value parameter (→ 85) (e.g. reverse flow) corresponds to the mirrored value for the 20 mA value parameter (→ 85) (e.g. forward flow).

"Reverse flow compensation" option

The Reverse flow compensation option is primarily used to compensate for abrupt reverse flow that can occur with positive displacement pumps as a result of wear or high viscosity. 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
3 Measuring range

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

With the following flow response:

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.

With Forward/Reverse flow option

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

With Reverse flow compensation option
Flow components outside of the measuring range are buffered, balanced and output after a maximum delay of 60 s.

![Diagram](image)

* 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

![Diagram](image)

5 Measuring range

* I Current
* Q Flow

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

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

![Diagram](image)

* Q Flow
* t Time

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

With **Forward flow** option

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

This option cannot be selected here since the values for the **0/4 mA value** parameter (→ 83) and **20 mA value** parameter (→ 85) have different algebraic signs.

With **Reverse flow compensation** option

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

---

**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 (→ 81) and one of the following options is selected in the **Current span** parameter (→ 82):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4...20.5 mA)
- 0...20 mA (0...20.5 mA)

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

**User entry**  
0.0 to 999.9 s

**Factory setting**  
1.0 s
Additional information

User entry

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

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

Failure behavior current output

Navigation

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

Prerequisite

A process variable is selected in the Assign current output parameter (→ 81) and one of the following options is selected in the Current span parameter (→ 82):
- 4...20 mA NE (3.8...20.5 mA)
- 4...20 mA US (3.9...20.8 mA)
- 4...20 mA (4... 20.5 mA)
- 0...20 mA (0... 20.5 mA)

Description

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

Selection

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

Factory setting

Max.

---

3) proportional transmission behavior with first order delay
**Description of device parameters**

Proline Prosonic Flow I 400

---

**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 (→ 82).

*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 (→ 82).

*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 (→ 92).

---

**Failure current**

**Navigation**

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

**Prerequisite**

The **Defined value** option is selected in the **Failure mode** parameter (→ 91).

**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 1

Navigation

Expert → Output → Curr.output 1 → Measur. curr. 1 (0366–1)

Description
Displays the actual measured value of the output current.

User interface
0 to 30 mA

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

Navigation

Expert → Output → PFS output 1 to n
Description of device parameters

Proline Prosonic Flow I 400

Response time (0491–1 to n)  →  102
Failure mode (0451–1 to n)  →  103
Failure frequency (0474–1 to n)  →  103
Output frequency 1 to n (0471–1 to n)  →  104
Switch output function (0481–1 to n)  →  104
Assign diagnostic behavior (0482–1 to n)  →  104
Assign limit (0483–1 to n)  →  105
Switch-on value (0466–1 to n)  →  107
Switch-off value (0464–1 to n)  →  107
Assign flow direction check (0484–1 to n)  →  108
Assign status (0485–1 to n)  →  108
Switch-on delay (0467–1 to n)  →  109
Switch-off delay (0465–1 to n)  →  109
Failure mode (0486–1 to n)  →  109
Switch state 1 to n (0461–1 to n)  →  110
Invert output signal (0470–1 to n)  →  110

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

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

“Frequency” option
Flow-proportional frequency output with on/off ratio of 1:1
An output frequency is output that is proportional to the value of a process variable, such as volume flow, mass flow, 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

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

Example
Alarm response without alarm
Assign pulse output 1 to n

**Navigation**

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

**Prerequisite**

The Pulse option is selected in the Operating mode parameter (→ 94).

**Description**

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

**Selection**

- Off
- Volume flow
- Mass flow

**Factory setting**

Off

**Pulse scaling**

**Navigation**

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

**Prerequisite**

The Pulse option is selected in the Operating mode parameter (→ 94) and a process variable is selected in the Assign pulse output parameter (→ 96).

**Description**

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

**User entry**

Positive floating point number

**Factory setting**

Depends on country and nominal diameter

**Additional information**

User entry
Weighting of the pulse output with a quantity.
The lower the pulse value, the
- better the resolution.
- the higher the frequency of the pulse response.

### Pulse width

**Navigation**

- Expert → Output → PFS output 1 to n → Pulse width (0452–1 to n)

**Prerequisite**

The Pulse option is selected in the Operating mode parameter (→ 94) and a process variable is selected in the Assign pulse output parameter (→ 96).

**Description**

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

**User entry**

0.05 to 2000 ms

**Factory setting**

100 ms

**Additional information**

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

![Diagram of Pulse Width](image)

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

### 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.
Selection

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

Factory setting

Forward flow

Additional information

Selection

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

For a detailed description of the options available, see the **Measuring mode** parameter (→ 86)

Examples

For a detailed description of the configuration examples, see the **Measuring mode** parameter (→ 86)

---

Failure mode

### Navigation

Expert → Output → PFS output 1 to n → Failure mode (0480–1 to n)

### Prerequisite

The **Pulse** option is selected in the **Operating mode** parameter (→ 94) and a process variable is selected in the **Assign pulse output** parameter (→ 96).

### Description

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

### Selection

- Actual value
- No pulses

### Factory setting

No pulses

### Additional information

**Description**

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

**Selection**

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

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

### Pulse output 1 to n

**Navigation**

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

**Prerequisite**

The Pulse option is selected in the Operating mode parameter (→ 94) parameter.

**Description**

Displays the pulse frequency currently output.

**User interface**

Positive floating-point number

**Additional information**

- 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 (→ 96) and Pulse width parameter (→ 97) can be used to define the value (i.e. the measured value amount that corresponds to a pulse) and the duration of the pulse.

![Graph](image)

| 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 (→ 110) 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 (→ 98)) can be configured.

### Assign frequency output

**Navigation**

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

**Prerequisite**

The Frequency option is selected in the Operating mode parameter (→ 94).

**Description**

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

**Selection**

- Off
- Volume flow
- Mass flow
Description of device parameters

- Sound velocity
- Flow velocity
- Signal strength *
- Signal to noise ratio *
- Turbulence *
- Acceptance rate *
- Temperature *
- Density *
- Electronics temperature

Factory setting

**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 (→  94) and a process variable is selected in the Assign frequency output parameter (→  99).

**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 (→  94) and a process variable is selected in the Assign frequency output parameter (→  99).

**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 (→  94) and a process variable is selected in the Assign frequency output parameter (→  99).

* Visibility depends on order options or device settings
Description
Use this function to enter the measured value for the start value frequency.

User entry
Signed floating-point number

Factory setting
Depends on country and nominal diameter

Additional information

Dependency
The entry depends on the process variable selected in the Assign frequency output parameter (→ 99).

Measuring value at maximum frequency

Navigation
Expert → Output → PFS output 1 to n → Val. at max.freq (0475–1 to n)

Prerequisite
The Frequency option is selected in the Operating mode parameter (→ 94) and a process variable is selected in the Assign frequency output parameter (→ 99).

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

User entry
Signed floating-point number

Factory setting
Depends on country and nominal diameter

Additional information

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

Dependency
The entry depends on the process variable selected in the Assign frequency output parameter (→ 99).

Measuring mode

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

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

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

Factory setting
Forward flow
**Damping output 1 to n**

**Navigation**

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

**Description**

Use this function to enter a time constant for the reaction time of the output signal to fluctuations in the measured value.

**User entry**

0 to 999.9 s

**Factory setting**

0.0 s

**Additional information**

User entry

Use this function to enter a time constant (PT1 element 4) for frequency output damping:

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

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

The frequency output is subject to separate damping that is independent of all preceding time constants.

---

**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 the measured value change of 63 % of 100 % of the measured value change.

**User interface**

Positive floating-point number

**Additional information**

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

- Damping of pulse/frequency/switch output → 90
- Depending on the measured variable assigned to the output.

Flow damping

---

4) proportional transmission behavior with first order delay
Failure mode

Navigation

Expert → Output → PFS output 1 to n → Failure mode (0451–1 to n)

Prerequisite

The Frequency option is selected in the Operating mode parameter (→ 94) and a process variable is selected in the Assign frequency output parameter (→ 99).

Description

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

Selection

- Actual value
- Defined value
- 0 Hz

Factory setting

0 Hz

Additional information

Selection

- Actual value
  In the event of a device alarm, the frequency output continues on the basis of the current flow measurement. The device alarm is ignored.
- Defined value
  In the event of a device alarm, the frequency output continues on the basis of a predefined value. The Failure frequency (→ 103) replaces the current measured value, making it possible to bypass the device alarm. The actual measurement is switched off for the duration of the device alarm.
- 0 Hz
  In the event of a device alarm, the frequency output is “switched off”.

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

Failure frequency

Navigation

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

Prerequisite

The Frequency option is selected in the Operating mode parameter (→ 94) and a process variable is selected in the Assign frequency output parameter (→ 99).

Description

Use this function to enter the value for the frequency output in the event of a device alarm in order to bypass the alarm.

User entry

0.0 to 12 500.0 Hz

Factory setting

0.0 Hz
### Output frequency 1 to n

**Navigation**

Expert → Output → PFS output 1 to n → Output freq. 1 to n (0471–1 to n)

**Prerequisite**

In the **Operating mode** parameter (→ 94), the **Frequency** option is selected.

**Description**

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

**User interface**

0.0 to 12 500.0 Hz

### Switch output function

**Navigation**

Expert → Output → PFS output 1 to n → Switch out funct (0481–1 to n)

**Prerequisite**

The **Switch** option is selected in the **Operating mode** parameter (→ 94).

**Description**

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

**Selection**

- Off
- On
- Diagnostic behavior
- Limit
- Flow direction check
- Status

**Factory setting**

Off

**Additional information**

*Selection*

- Off
  The switch output is permanently switched off (open, non-conductive).
- On
  The switch output is permanently switched on (closed, conductive).
- Diagnostic behavior
  Indicates if the diagnostic event is present or not. Is used to output diagnostic information and to react to it appropriately at the system level.
- Limit
  Indicates if a specified limit value has been reached for the process variable. Is used to output diagnostic information relating to the process and to react to it appropriately at the system level.
- Status
  Displays the device status low flow cut off is selected.

### Assign diagnostic behavior

**Navigation**

Expert → Output → PFS output 1 to n → Assign diag. beh (0482–1 to n)

**Prerequisite**

- In the **Operating mode** parameter (→ 94), the **Switch** option is selected.
- In the **Switch output function** parameter (→ 104), the **Diagnostic behavior** option is selected.
Proline Prosonic Flow I 400

Description
Use this function to select the diagnostic event category that is displayed for the switch output.

Selection
- Alarm
- Alarm or warning
- Warning

Factory setting
Alarm

Additional information

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

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

Assign limit

Navigation
Expert → Output → PFS output 1 to n → Assign limit (0483–1 to n)

Prerequisite
- The Switch option is selected in the Operating mode parameter (→ 94).
- The Limit option is selected in the Switch output function parameter (→ 104).

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

Selection
- Off
- Volume flow
- Mass flow
- Sound velocity
- Flow velocity
- Signal strength *
- Signal to noise ratio *
- Turbulence *
- Acceptance rate *
- Temperature *
- Density *
- Electronics temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3

Factory setting
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

![Diagram showing behavior of status output when Switch-on value > Switch-off value]

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

![Diagram showing behavior of status output when Switch-on value < Switch-off value]

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

![Diagram showing behavior of status output when Switch-on value = Switch-off value]
Switch-on value

Navigation

Expert → Output → PFS output 1 to n → Switch-on value (0466–1 to n)

Prerequisite

- The Switch option is selected in the Operating mode parameter (→ 94).
- The Limit option is selected in the Switch output function parameter (→ 104).

Description

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

User entry

Signed floating-point number

Factory setting

Country-specific

Additional information

Description

Use this function to enter the limit value for the switch-on value (process variable > switch-on value = closed, conductive).

When using a hysteresis: Switch-on value > Switch-off value.

Dependency

The unit depends on the process variable selected in the Assign limit parameter (→ 105).

Switch-off value

Navigation

Expert → Output → PFS output 1 to n → Switch-off value (0464–1 to n)

Prerequisite

- The Switch option is selected in the Operating mode parameter (→ 94).
- The Limit option is selected in the Switch output function parameter (→ 104).

Description

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

User entry

Signed floating-point number
**Description of device parameters**

**Proline Prosonic Flow I 400**

**Factory setting**  
Country-specific

**Additional information**

*Description*
Use this function to enter the limit value for the switch-off value (process variable < switch-off value = open, non-conductive).

*Dependency*
- The unit depends on the process variable selected in the **Assign limit** parameter (→ 105).

---

**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 (→ 94).
- The **Flow direction check** option is selected in the **Switch output function** parameter (→ 104).

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

**Selection**
- Off
- Volume flow
- Mass flow
- Flow velocity

**Factory setting**  
Volume flow

---

**Assign status**

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

**Prerequisite**
- The **Switch** option is selected in the **Operating mode** parameter (→ 94).
- The **Status** option is selected in the **Switch output function** parameter (→ 104).

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

**Selection**
- Off
- Low flow cut off

**Factory setting**  
Low flow cut off

**Additional information**

*Selection*
If low flow cut off are active, the output is conductive. Otherwise, the switch output is non-conductive.
Switch-on delay

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

**Prerequisite**
- The **Switch** option is selected in the **Operating mode** parameter (→ 94).
- The **Limit** option is selected in the **Switch output function** parameter (→ 104).

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

**User entry**
0.0 to 100.0 s

**Factory setting**
0.0 s

Switch-off delay

**Navigation**
Expert → Output → PFS output 1 to n → Switch-off delay (0465–1 to n)

**Prerequisite**
- The **Switch** option is selected in the **Operating mode** parameter (→ 94).
- The **Limit** option is selected in the **Switch output function** parameter (→ 104).

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

**User entry**
0.0 to 100.0 s

**Factory setting**
0.0 s

Failure mode

**Navigation**
Expert → Output → PFS output 1 to n → Failure mode (0486–1 to n)

**Description**
Use this function to select a failsafe mode for the switch output in the event of a device alarm.

**Selection**
- Actual status
- Open
- Closed

**Factory setting**
Open

**Additional information**
*Options*
- **Actual status**
  In the event of a device alarm, faults are ignored and the current behavior of the input value is output by the switch output. The **Actual status** option behaves in the same way as the current input value.
- **Open**
  In the event of a device alarm, the switch output's transistor is set to **non-conductive**.
- **Closed**
  In the event of a device alarm, the switch output's transistor is set to **conductive**.
Switch state 1 to n

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

Prerequisite
The Switch option is selected in the Operating mode parameter (→ 94).

Description
Displays the current switch status of the status output.

User interface
- Open
- Closed

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

Invert output signal

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

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

Selection
- No
- Yes

Factory setting
No

Additional information
Selection
No option (passive - negative)

Yes option (passive - positive)
3.5 "Communication" submenu

Navigation  

**Expert → Communication**

- **HART input**
  - Configuration  → 111
  - Input  → 116

3.5.1 "HART input" submenu

Navigation  

**Expert → Communication → HART input**

- **Configuration**  → 111

"Configuration" submenu

Navigation  

**Expert → Communication → HART input → Configuration**

- Capture mode (7001)  → 112
- Device ID (7007)  → 112
- Device type (7008)  → 113
- Manufacturer ID (7009)  → 113
- Burst command (7006)  → 113
- Slot number (7010)  → 114
- Timeout (7005)  → 114
Capture mode

Navigation

Expert → Communication → HART input → Configuration → Capture mode (7001)

Description

Use this function to select the capture mode via burst or master communication.

Selection

- Off
- Burst network
- Master network

Factory setting

Off

Additional information

"Burst network" option

The device records data transmitted via burst in the network.

An external pressure sensor must be in the burst mode.

"Master network" option

In this case, the device must be located in a HART network in which a HART master (control) queries the measured values of the up to 64 network participants. The device reacts only to the responses of a specific device in the network. Device ID, device type, manufacturer ID and the HART commands used by the master must be defined.

Device ID

Navigation

Expert → Communication → HART input → Configuration → Device ID (7007)

Prerequisite

The Master network option is selected in the Capture mode parameter (→ 112).

Description

Use this function to enter the device ID of the HART slave device whose data are to be recorded.

User entry

6-digit value:

- Via local operation: enter as hexadecimal or decimal number
- Via operating tool: enter as decimal number

Factory setting

0

Additional information

In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.
Device type

Navigation  
Expert → Communication → HART input → Configuration → Device type (7008)

Prerequisite  
In the Capture mode parameter (→ 112), the Master network option is selected.

Description  
Use this function to enter the device type of the HART slave device whose data are to be recorded.

User entry  
2-digit hexadecimal number

Factory setting  
0x00

Additional information  
In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Manufacturer ID

Navigation  
Expert → Communication → HART input → Configuration → Manufacturer ID (7009)

Prerequisite  
The Master network option is selected in the Capture mode parameter (→ 112).

Description  
Use this function to enter the manufacturer ID of the HART slave device whose data are to be recorded.

User entry  
2-digit value:  
- Via local operation: enter as hexadecimal or decimal number  
- Via operating tool: enter as decimal number

Factory setting  
0

Additional information  
In addition to the device ID and manufacturer ID, the device type is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

Burst command

Navigation  
Expert → Communication → HART input → Configuration → Burst command (7006)

Prerequisite  
The Burst network option or the Master network option are selected in the Capture mode parameter (→ 112).

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

Selection  
- Command 1  
- Command 3  
- Command 9  
- Command 33
**Factory setting**  
Command 1

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

### Slot number

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

**Prerequisite**  
The **Burst network** option or the **Master network** option is selected in the **Capture mode** parameter (→ 112).

**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*

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<tr>
<th>Slot</th>
<th>Command</th>
<th>Command</th>
<th>Command</th>
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</thead>
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<td>PV</td>
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<tr>
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<td>-</td>
<td>TV</td>
<td>HART variable (slot 3)</td>
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<tr>
<td>4</td>
<td>-</td>
<td>QV</td>
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<td>-</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>8</td>
<td>-</td>
<td>-</td>
<td>HART variable (slot 8)</td>
</tr>
</tbody>
</table>

**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 (→ 112).

**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:

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 (→ 112), 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 (→ 115)).

### Failure value

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

**Prerequisite**: The following conditions are met:
- In the Capture mode parameter (→ 112), the Burst network option or Master network option is selected.
- In the Failure mode parameter (→ 115), 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
Description of device parameters

Additional information

Dependency

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

"Input" submenu

**Navigation**

Expert → Communication → HART input → Input

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</tbody>
</table>

**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

![Diagram](image)

"Configuration" submenu

**Navigation**

Expert → Communication → HART output → Configuration

![Diagram](image)

**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**

PROSONIC
### Device tag

**Navigation**
Endress+Hauser

**Description**
Use this function to enter the name for the measuring point.

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

**Factory setting**
Prosonic Flow

### HART address

**Navigation**
Endress+Hauser

**Description**
Use this function to enter the address via which the data exchange takes place via HART protocol.

**User entry**
0 to 63

**Factory setting**
0

**Additional information**
*Description*
For addressing in a HART Multidrop network, the **Fixed current** option must be set in the **Current span** parameter (→ 82) (current output 1).

### No. of preambles

**Navigation**
Endress+Hauser

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

**User entry**
2 to 20

**Factory setting**
5

**Additional information**
*User entry*
As every modem component can 'swallow' a byte, 2-byte preambles at least must be defined.
**Fieldbus writing access**

**Navigation**

Expert → Communication → HART output → Configuration → Fieldbus.writ.acc. (0273)

**Description**

Use this function to restrict access to the measuring device via fieldbus (HART interface).

**Selection**

- Read + write
- Read only

**Factory setting**

Read + write

**Additional information**

*Description*

If read and/or write protection is enabled, the parameter can only be controlled and reset via local operation. Access is no longer possible via operating tools.

*Selection*

- Read + write
  - The parameters are readable and writable.
- Read only
  - The parameters are only readable.

"Burst configuration 1 to n" submenu

**Navigation**

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

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<td>Burst command 1 to n (2031–1 to n)</td>
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<tr>
<td>Burst variable 3 (2036)</td>
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<tr>
<td>Burst variable 4 (2037)</td>
<td>123</td>
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<tr>
<td>Burst variable 5 (2038)</td>
<td>123</td>
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<tr>
<td>Burst variable 6 (2039)</td>
<td>123</td>
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<tr>
<td>Burst variable 7 (2040)</td>
<td>124</td>
</tr>
</tbody>
</table>
**Burst mode 1 to n**

**Navigation**

[Expert] → Communication → HART output → Burst config. → Burst config. 1 to n → Burst mode 1 to n (2032–1 to n)

**Description**

Use this function to select whether to activate the HART burst mode for burst message X.

**Selection**

- Off
- On

**Factory setting**

Off

**Additional information**

*Options*

- Off
  - The measuring device transmits data only when requested by the HART master.
- On
  - The measuring device transmits data regularly without being requested.

---

**Burst command 1 to n**

**Navigation**

[Expert] → Communication → HART output → Burst config. → Burst config. 1 to n → Burst command 1 to n (2031–1 to n)

**Description**

Use this function to select the HART command that is sent to the HART master.

**Selection**

- Command 1
- Command 2
- Command 3
- Command 9
- Command 33
- Command 48

**Factory setting**

Command 2
Additional information

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

"Command 33" option
The HART device variables are defined via Command 107.
The following measured variables (HART device variables) can be read out:
- Volume flow
- Mass flow
- 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 (→ 81).

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
- Sound velocity
- Flow velocity

* Visibility depends on order options or device settings
Description of device parameters

Proline Prosonic Flow I 400

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

Factory setting
Volume flow

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

Burst variable 1

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

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

Selection
See the Burst variable 0 parameter (→ 121).

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 (→ 121).

Factory setting
Not used

* Visibility depends on order options or device settings
### Burst variable 3

**Navigation**

[Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 3 (2036)]

**Description**

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

**Selection**

See the **Burst variable 0** parameter (→ 121).

**Factory setting**

Not used

---

### Burst variable 4

**Navigation**

[Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 4 (2037)]

**Description**

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

**Selection**

See the **Burst variable 0** parameter (→ 121).

**Factory setting**

Not used

---

### Burst variable 5

**Navigation**

[Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 5 (2038)]

**Description**

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

**Selection**

See the **Burst variable 0** parameter (→ 121).

**Factory setting**

Not used

---

### Burst variable 6

**Navigation**

[Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 6 (2039)]

**Description**

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

**Selection**

See the **Burst variable 0** parameter (→ 121).

**Factory setting**

Not used
Burst variable 7

**Navigation**
Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Burst variable 7 (2040)

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

**Selection**
See the Burst variable 0 parameter (→ 121).

**Factory setting**
Not used

Burst trigger mode

**Navigation**
Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger mode (2044–1 to n)

**Description**
Use this function to select the event that triggers burst message X.

**Selection**
- Continuous
- Window
- Rising
- Falling
- On change

**Factory setting**
Continuous

**Additional information**

- Continuous
  The message is sent continuously, at least at intervals corresponding to the time frame specified in the Burst min period parameter (→ 125).
- Window
  The message is sent if the specified measured value has changed by the value in the Burst trigger level parameter (→ 125).
- Rising
  The message is sent if the specified measured value exceeds the value in the Burst trigger level parameter (→ 125).
- Falling
  The message is sent if the specified measured value drops below the value in the Burst trigger level parameter (→ 125).
- On change
  The message is sent if a measured value changes in the burst message.

* Visibility depends on order options or device settings
### Burst trigger level

**Navigation**

Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Trigger level (2043–1 to n)

**Description**

For entering the burst trigger value.

**User entry**

Signed floating-point number

**Additional information**

*Description*

Together with the option selected in the **Burst trigger mode** parameter (→ 124) the burst trigger value determines the time of burst message X.

### Min. update period

**Navigation**

Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Min. upd. per. (2042–1 to n)

**Description**

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

**User entry**

Positive integer

**Factory setting**

1 000 ms

### Max. update period

**Navigation**

Expert → Communication → HART output → Burst config. → Burst config. 1 to n → Max. upd. per. (2041–1 to n)

**Description**

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

**User entry**

Positive integer

**Factory setting**

2 000 ms
"Information" submenu

**Navigation**

Expert → Communication → HART output → Information

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</table>

**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**

1

**Additional information**

*Description*

The device revision is needed to assign the appropriate device description file (DD) to the device.
### Device ID

**Navigation**

![Expert ➔ Communication ➔ HART output ➔ Information ➔ Device ID (0221)]

**Description**

Use this function to view the device ID for identifying the measuring device in a HART network.

**User interface**

6-digit hexadecimal number

**Additional information**

*Description*

In addition to the device type and manufacturer ID, the device ID is part of the unique ID. Each HART device is uniquely identified by the unique device ID.

### Device type

**Navigation**

![Expert ➔ Communication ➔ HART output ➔ Information ➔ Device type (0209)]

**Description**

Displays the device type with which the measuring device is registered with the HART Communication Foundation.

**User interface**

2-digit hexadecimal number

**Factory setting**

0x69 (for Prosonic Flow I 400)

**Additional information**

*Description*

The device type is specified by the manufacturer. It is needed to assign the appropriate device description file (DD) to the device.

### Manufacturer ID

**Navigation**

![Expert ➔ Communication ➔ HART output ➔ Information ➔ Manufacturer ID (0259)]

**Description**

Use this function to view the manufacturer ID with which the measuring device is registered with the HART Communication Foundation.

**User interface**

2-digit hexadecimal number

**Factory setting**

0x11 (for Endress+Hauser)

### HART revision

**Navigation**

![Expert ➔ Communication ➔ HART output ➔ Information ➔ HART revision (0205)]

**Description**

Use this function to display the HART protocol revision of the measuring device.
### Description of device parameters

**Proline Prosonic Flow I 400**

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<th>Description</th>
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</tbody>
</table>

#### 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

<table>
<thead>
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<th>Description of device parameters</th>
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</thead>
<tbody>
<tr>
<td><strong>HART date code</strong></td>
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</table>

**Navigation**

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

**Description**

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

**User entry**

Date entry format: yyyy-mm-dd

**Factory setting**

2009-07-20

**Additional information**

Example

Device installation date

"Output" submenu

**Navigation**

Expert → Communication → HART output → Output

- Assign PV (0234) → 130
- Primary variable (PV) (0201) → 130
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- Assign TV (0236) → 131
- Tertiary variable (TV) (0228) → 132
- Assign QV (0237) → 132
- Quaternary variable (QV) (0203) → 133
Assign PV

Navigation

Expert → Communication → HART output → Output → Assign PV (0234)

Description

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

Selection

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

Factory setting

Volume flow

Primary variable (PV)

Navigation

Expert → Communication → HART output → Output → Primary var (PV) (0201)

Description

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

User interface

Signed floating-point number

Additional information

User interface

The measured value displayed depends on the process variable selected in the Assign PV parameter (→ 130).

Dependency

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

Assign SV

Navigation

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

Description

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

* Visibility depends on order options or device settings
Selection

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

User interface

The measured value displayed depends on the process variable selected in the Assign SV parameter (→ 130).

Dependency

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

Assign TV

Navigation

Expert → Communication → HART output → Output → Assign TV (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
- Sound velocity
- Flow velocity
- Signal strength *
- Signal to noise ratio *
- Turbulence *

* Visibility depends on order options or device settings
Description of device parameters

Proline Prosonic Flow I 400

- Acceptance rate *
- Temperature *
- Density *
- Electronics temperature
- Totalizer 1
- Totalizer 2
- Totalizer 3
- HART input

Factory setting

Totalizer 2

Tertiary variable (TV)

**Navigation**

Expert → Communication → HART output → Output → Tertiary var(TV) (0228)

**Description**

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

**User interface**

Signed floating-point number

**Additional information**

*User interface*

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

**Dependency**

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

Assign QV

**Navigation**

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

**Description**

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

**Selection**

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

* 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**

*User interface*
The measured value displayed depends on the process variable selected in the Assign QV parameter (→ 132).

*Dependency*

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

---

### 3.5.3 "Web server" submenu

**Navigation**

Expert → Communication → Web server

<table>
<thead>
<tr>
<th>Web server</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Web server language (7221)</td>
<td></td>
<td>→ 134</td>
</tr>
<tr>
<td>MAC address (7214)</td>
<td></td>
<td>→ 134</td>
</tr>
<tr>
<td>DHCP client (7212)</td>
<td></td>
<td>→ 135</td>
</tr>
<tr>
<td>IP address (7209)</td>
<td></td>
<td>→ 135</td>
</tr>
<tr>
<td>Subnet mask (7211)</td>
<td></td>
<td>→ 135</td>
</tr>
<tr>
<td>Default gateway (7210)</td>
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<td>→ 136</td>
</tr>
<tr>
<td>Web server functionality (7222)</td>
<td></td>
<td>→ 136</td>
</tr>
<tr>
<td>Login page (7273)</td>
<td></td>
<td>→ 136</td>
</tr>
</tbody>
</table>
Web server language

Navigation  

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

Description  

Use this function to select the Web server language setting.

Selection  

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

Factory setting  

English

MAC address

Navigation  

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

Description  

Displays the MAC address of the measuring device.

User interface  

Unique 12-digit character string comprising letters and numbers

Factory setting  

Each measuring device is given an individual address.

Additional information  

Example

For the display format

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

* Visibility depends on order options or device settings

5) Media Access Control
DHCP client

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

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

Selection
- Off
- On

Factory setting
On

Additional information
Effect
If the DHCP client functionality of the web server is selected, the IP address (135), Subnet mask (135) and Default gateway (136) are set automatically.

- Identification is via the MAC address of the measuring device.
- The IP address (135) in the IP address parameter (135) is ignored as long as the DHCP client parameter (135) is active. This is also the case, in particular, if the DHCP server cannot be reached. The IP address (135) in the parameter of the same name is only used if the DHCP client parameter (135) is inactive.

IP address

Navigation
Expert → Communication → Web server → IP address (7209)

Description
Display or enter the IP address of the Web server integrated in the measuring device.

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

Factory setting
192.168.1.212

Subnet mask

Navigation
Expert → Communication → Web server → Subnet mask (7211)

Description
Display or enter the subnet mask.

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

Factory setting
255.255.255.0
Default gateway

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

**Description**
Display or enter the Default gateway (→ 136).

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

**Factory setting**
0.0.0.0

Web server functionality

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

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

**Selection**
- Off
- On

**Factory setting**
On

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

**Selection**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
</table>
| Off    | - The web server is completely disabled.  
         | - Port 80 is locked. |
| On     | - The complete functionality of the web server is available.  
         | - JavaScript is used.  
         | - The password is transferred in an encrypted state.  
         | - Any change to the password is also transferred in an encrypted state. |

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:

<table>
<thead>
<tr>
<th>Category</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure (F)</td>
<td>A device error is present. The measured value is no longer valid.</td>
</tr>
<tr>
<td>Function check (C)</td>
<td>The device is in service mode (e.g. during a simulation).</td>
</tr>
<tr>
<td>Out of specification (S)</td>
<td>Outside its technical specification limits (e.g. outside the process temperature range)</td>
</tr>
<tr>
<td></td>
<td>Outside of the configuration carried out by the user (e.g. maximum flow in parameter 20 mA value)</td>
</tr>
<tr>
<td>Maintenance required (M)</td>
<td>Maintenance is required. The measured value is still valid.</td>
</tr>
<tr>
<td>No effect (N)</td>
<td>Has no effect on the condensed status 1).</td>
</tr>
</tbody>
</table>

1) Condensed status according to NAMUR recommendation NE107

**Navigation** ☑️ Expert → Communication → Diag. config.

<table>
<thead>
<tr>
<th>Event category</th>
<th>→</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event category 019 (0277)</td>
<td>138</td>
</tr>
<tr>
<td>Event category 160 (0272)</td>
<td>138</td>
</tr>
<tr>
<td>Event category 441 (0210)</td>
<td>138</td>
</tr>
<tr>
<td>Event category 442 (0230)</td>
<td>139</td>
</tr>
<tr>
<td>Event category 443 (0231)</td>
<td>139</td>
</tr>
<tr>
<td>Event category 832 (0218)</td>
<td>139</td>
</tr>
<tr>
<td>Event category 833 (0225)</td>
<td>140</td>
</tr>
<tr>
<td>Event category 840 (0267)</td>
<td>140</td>
</tr>
<tr>
<td>Event category 842 (0295)</td>
<td>141</td>
</tr>
<tr>
<td>Event category 870 (0250)</td>
<td>141</td>
</tr>
<tr>
<td>Event category 930 (0296)</td>
<td>142</td>
</tr>
<tr>
<td>Event category 931 (0297)</td>
<td>142</td>
</tr>
</tbody>
</table>
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 Device initialization active 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: →  137

Event category 160 (Signal path switched off)

Navigation

Expert → Communication → Diag. config. → Event category 160 (0272)

Description

Use this function to select a category for the Signal path switched off diagnostic message.

Selection

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

Factory setting

Maintenance required (M)

Additional information

For a detailed description of the event categories available for selection: →  137

Event category 441 (Current output 1 to n)

Navigation

Expert → Communication → Diag. config. → Event category 441 (0210)

Description

Use this function to select a category for the Current output 1 to n diagnostic message.

Selection

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

Factory setting

Out of specification (S)
### Event category 442 (Frequency output 1 to n)

**Navigation**
- Expert → Communication → Diag. config. → Event category 442 (0230)

**Prerequisite**
The pulse/frequency/switch output is available.

**Description**
Use this function to select a category for the 442 Frequency output 1 to n diagnostic message.

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

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

**Additional information**
For a detailed description of the event categories available for selection: → 137

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

**Navigation**
- Expert → Communication → Diag. config. → Event category 443 (0231)

**Prerequisite**
The pulse/frequency/switch output is available.

**Description**
Use this function to select a category for the 443 Pulse output 1 to n diagnostic message.

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

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

**Additional information**
For a detailed description of the event categories available for selection: → 137

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

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

**Description**
Use this function to select a category for the 832 Electronics temperature too high diagnostic message.
Selection  
- Failure (F)  
- Function check (C)  
- Out of specification (S)  
- Maintenance required (M)  
- No effect (N)  

Factory setting  
Out of specification (S)  

Additional information  
Selection  
For a detailed description of the event categories available for selection: → 137

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: → 137

Event category 841 (Sensor range)  

Navigation  
Expert → Communication → Diag. config. → Event category 840 (0267)  

Description  
Use this function to select a category for the **841 Sensor range** 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: → 137
### Event category 842 (Process limit)

**Navigation**

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

**Description**

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

**Selection**

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

**Factory setting**

Out of specification (S)

**Additional information**

For a detailed description of the event categories available for selection: → 137

---

### Event category 870 (Measuring inaccuracy increased)

**Navigation**

Expert → Communication → Diag. config. → Event category 870 (0250)

**Description**

Use this function to select a category for the **870 Measuring inaccuracy increased** 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: → 137

---

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

**Navigation**

Expert → Communication → Diag. config. → Event category 881 (0268)

**Description**

Use this function to select a category for the **881 Sensor signal path 1 to n** diagnostic message.

**Selection**

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

Maintenance required (M)

Additional information

For a detailed description of the event categories available for selection: →  137

Event category 930 (Process fluid)

Navigation

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

Description

Use this function to select a category for the 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: →  137

Event category 931 (Process fluid)

Navigation

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

Description

Use this function to select a category for the 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: →  137
3.5.5 "WLAN settings" wizard

Navigation  
Expert → Communication → WLAN settings

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<th>▶ WLAN settings</th>
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</thead>
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<td>WLAN mode (2717)</td>
</tr>
<tr>
<td>SSID name (2714)</td>
</tr>
<tr>
<td>Network security (2705)</td>
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<tr>
<td>Security identification (2718)</td>
</tr>
<tr>
<td>User name (2715)</td>
</tr>
<tr>
<td>WLAN password (2716)</td>
</tr>
<tr>
<td>WLAN IP address (2711)</td>
</tr>
<tr>
<td>WLAN MAC address (2703)</td>
</tr>
<tr>
<td>WLAN subnet mask (2709)</td>
</tr>
<tr>
<td>WLAN MAC address (2703)</td>
</tr>
<tr>
<td>WLAN passphrase (2706)</td>
</tr>
<tr>
<td>WLAN MAC address (2703)</td>
</tr>
<tr>
<td>Assign SSID name (2708)</td>
</tr>
<tr>
<td>SSID name (2707)</td>
</tr>
<tr>
<td>2.4 GHz WLAN channel (2704)</td>
</tr>
<tr>
<td>Select antenna (2713)</td>
</tr>
<tr>
<td>Connection state (2722)</td>
</tr>
<tr>
<td>Received signal strength (2721)</td>
</tr>
<tr>
<td>WLAN IP address (2711)</td>
</tr>
<tr>
<td>Gateway IP address (2719)</td>
</tr>
<tr>
<td>IP address domain name server (2720)</td>
</tr>
</tbody>
</table>
**WLAN**

**Navigation**
Expert → Communication → WLAN settings → WLAN (2702)

**Description**
Use this function to enable and disable the WLAN connection.

**Selection**
- Disable
- Enable

**Factory setting**
Enable

---

**WLAN mode**

**Navigation**
Expert → Communication → WLAN settings → WLAN mode (2717)

**Description**
Use this function to select the WLAN mode.

**Selection**
WLAN access point

**Factory setting**
WLAN access point

---

**SSID name**

**Navigation**
Expert → Communication → WLAN settings → SSID name (2714)

**Prerequisite**
The client is activated.

**Description**
Use this function to enter the user-defined SSID name (max. 32 characters) of the WLAN network.

**User entry**
–

**Factory setting**
–

---

**Network security**

**Navigation**
Expert → Communication → WLAN settings → Network security (2705)

**Description**
Use this function to select the type of security for the WLAN interface.
Selection
- Unsecured
- WPA2-PSK
- EAP-PEAP with MSCHAPv2
- EAP-PEAP MSCHAPv2 no server authentic.
- EAP-TLS

Factory setting
WPA2-PSK

Additional information
Selection
- Unsecured
  Access the WLAN connection without identification.
- WPA2-PSK
  Access the WLAN connection with a network key.

Security identification

Navigation
Expert → Communication → WLAN settings → Sec. identific. (2718)

Description
Use this function to select the security settings (download via the menu: Data Management > Security > Download WLAN).

User interface
- Trusted issuer certificate
- Device certificate
- Device private key

User name

Navigation
Expert → Communication → WLAN settings → User name (2715)

Description
Use this function to enter the username of the WLAN network.

User entry
-

Factory setting
-

WLAN password

Navigation
Expert → Communication → WLAN settings → WLAN password (2716)

Description
Use this function to enter the WLAN password for the WLAN network.

User entry
-

Factory setting
-
### WLAN IP address

**Navigation**  
Expert → Communication → WLAN settings → WLAN IP address (2711)

**Description**  
Use this function to enter the IP address of the measuring device's WLAN connection.

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

**Factory setting**  
192.168.1.212

---

### WLAN MAC address

**Navigation**  
Expert → Communication → WLAN settings → WLAN MAC address (2703)

**Description**  
Displays the MAC address of the measuring device.

**User interface**  
Unique 12-digit character string comprising letters and numbers

**Factory setting**  
Each measuring device is given an individual address.

**Additional information**  
*Example*  
For the display format  
00:07:05:10:01:5F

---

### WLAN subnet mask

**Navigation**  
Expert → Communication → WLAN settings → WLAN subnet mask (2709)

**Description**  
Use this function to enter the subnet mask.

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

**Factory setting**  
255.255.255.0

---

### WLAN passphrase

**Navigation**  
Expert → Communication → WLAN settings → WLAN passphrase (2706)

**Prerequisite**  
The WPA2-PSK option is selected in the Security type parameter (→ 144).

**Description**  
Use this function to enter the network key.

---

6) Media Access Control
User entry  8 to 32-digit character string comprising numbers, letters and special characters (without spaces)

Factory setting  Serial number of the measuring device (e.g. L100A802000)

### Assign SSID name

**Navigation**  
Expert → Communication → WLAN settings → Assign SSID name (2708)

**Description**  
Use this function to select which name is used for the SSID.

**Selection**  
- Device tag
- User-defined

**Factory setting**  
User-defined

**Additional information**  

Selection  
- Device tag  
The device tag name is used as the SSID.
- User-defined  
A user-defined name is used as the SSID.

### SSID name

**Navigation**  
Expert → Communication → WLAN settings → SSID name (2707)

**Prerequisite**  
- The User-defined option is selected in the Assign SSID name parameter (→  147).
- The WLAN access point option is selected in the WLAN mode parameter (→  144).

**Description**  
Use this function to enter a user-defined SSID name.

**User entry**  
Max. 32-digit character string comprising numbers, letters and special characters

**Factory setting**  
EH_device designation_last 7 digits of the serial number (e.g. EH_Prosonic_Flow_400_A802000)

### 2.4 GHz WLAN channel

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

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

**User entry**  
1 to 11

---

7) Service Set Identifier
Description of device parameters

<table>
<thead>
<tr>
<th>Factory setting</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional information</td>
<td>Description</td>
</tr>
</tbody>
</table>
| | • It is only necessary to enter a 2.4 GHz WLAN channel if multiple WLAN devices are in use.  
  • If just one measuring device is in use, it is recommended to keep the factory setting. |

Select antenna

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Communication → WLAN settings → Select antenna (2713)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Use this function to select whether the external or internal antenna is used for reception.</td>
</tr>
</tbody>
</table>
| Selection | • External antenna  
  • Internal antenna |
| Factory setting | Internal antenna |

Connection state

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Communication → WLAN settings → Connection state (2722)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The connection status is displayed.</td>
</tr>
</tbody>
</table>
| User interface | • Connected  
  • Not connected |
| Factory setting | Not connected |

Received signal strength

<table>
<thead>
<tr>
<th>Navigation</th>
<th>Expert → Communication → WLAN settings → Rec.sig.strength (2721)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Displays the signal strength received.</td>
</tr>
</tbody>
</table>
| User interface | • Low  
  • Medium  
  • High |
| Factory setting | High |
Gateway IP address

**Navigation**

Expert → Communication → WLAN settings → Gateway IP addr. (2719)

**Description**

Use this function to enter the IP address of the gateway.

**User interface**

Character string comprising numbers, letters and special characters

**Factory setting**

192.168.1.212

IP address domain name server

**Navigation**

Expert → Communication → WLAN settings → IP address DNS (2720)

**Description**

Use this function to enter the IP address of the domain name server.

**User interface**

Character string comprising numbers, letters and special characters

**Factory setting**

192.168.1.212

3.6 "Application" submenu

**Navigation**

Expert → Application

- Reset all totalizers (2806) → 149
- Totalizer 1 to n → 150

Reset all totalizers

**Navigation**

Expert → Application → Reset all tot. (2806)

**Description**

Use this function to reset all totalizers to the value 0 and restart the totaling process. This deletes all the flow values previously totalized.

**Selection**

- Cancel
- Reset + totalize

**Factory setting**

Cancel
Additional information

### Selection

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancel</td>
<td>No action is executed and the user exits the parameter.</td>
</tr>
<tr>
<td>Reset + totalize</td>
<td>Resets all totalizers to 0 and restarts the totaling process. This deletes all the flow values previously totalized.</td>
</tr>
</tbody>
</table>

3.6.1 "Totalizer 1 to n" submenu

**Navigation**

Expert → Application → Totalizer 1 to n

**Assign process variable**

**Navigation**

Expert → Application → Totalizer 1 to n → Assign variable (0914–1 to n)

**Description**

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

**Selection**

- Off
- Volume flow
- Mass flow

**Factory setting**

Volume flow

**Additional information**

If the option selected is changed, the device resets the totalizer to 0.

**Selection**

If the Off option is selected, only the Assign process variable parameter (→ 150) is still displayed in the Totalizer 1 to n submenu. All other parameters in the submenu are hidden.
**Navigation**

Expert → Application → Totalizer 1 to n → Unit totalizer 1 to n (0915–1 to n)

**Prerequisite**

A process variable is selected in the **Assign process variable** parameter (→ 150) of the Totalizer 1 to n submenu.

**Description**

Use this function to select the process variable unit for the Totalizer 1 to n (→ 150).

**Selection**

- g
- kg
- t
- oz
- lb
- STon
- cm³
- dm³
- m³
- ml
- l
- hl
- Ml
- af
- ft³
- Mft³
- fl oz (us)
- gal (us)
- kgal (us)
- Mgal (us)
- bbl (us;liq.)
- bbl (us;beer)
- bbl (us;oill)
- bbl (us;tank)
- gal (imp)
- Mgal (imp)
- bbl (imp;beer)
- bbl (imp;oill)
- None

**Factory setting**

Country-specific:

- m³
- ft³

**Additional information**

* The unit is selected separately for each totalizer. It is independent of the selection made in the System units submenu (→ 53).

**Selection**

The selection is dependent on the process variable selected in the **Assign process variable** parameter (→ 150).

* Visibility depends on order options or device settings
**Totalizer operation mode**

**Navigation**

Navigate to Expert → Application → Totalizer 1 to n → Operation mode (0908–1 to n)

**Prerequisite**

A process variable is selected in the **Assign process variable** parameter (→ 150) of the **Totalizer 1 to n** submenu.

**Description**

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

**Selection**

- Net flow total
- Forward flow total
- Reverse flow total

**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).

---

**Control Totalizer 1 to n**

**Navigation**

Navigate to Expert → Application → Totalizer 1 to n → Control Tot. 1 to n (0912–1 to n)

**Prerequisite**

A process variable is selected in the **Assign process variable** parameter (→ 150) of the **Totalizer 1 to n** submenu.

**Description**

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

**Selection**

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

**Factory setting**

Totalize

**Additional information**

**Options** | **Description**
---|---
Totalize | The totalizer is started or continues running.
Reset + hold | The totalizing process is stopped and the totalizer is reset to 0.
Preset + hold | The totalizing process is stopped and the totalizer is set to its defined start value from the **Preset value** parameter.
### Options

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reset + totalize</td>
<td>The totalizer is reset to 0 and the totaling process is restarted.</td>
</tr>
<tr>
<td>Preset + totalize</td>
<td>The totalizer is set to the defined start value from the Preset value parameter and the totaling process is restarted.</td>
</tr>
</tbody>
</table>

### 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 (→ 150) of the Totalizer 1 to n submenu.

**Description**

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

**User entry**

Signed floating-point number

**Factory setting**

Country-specific:
- 0 m³
- 0 ft³

**Additional information**

*User entry*

The unit of the selected process variable is specified for the totalizer in the Unit totalizer parameter (→ 151).

*Example*

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

### Failure mode

**Navigation**

Expert → Application → Totalizer 1 to n → Failure mode (0901–1 to n)

**Prerequisite**

A process variable is selected in the Assign process variable parameter (→ 150) of the Totalizer 1 to n submenu.

**Description**

Use this function to select how a totalizer behaves in the event of a device alarm.

**Selection**

- Stop
- Actual value
- Last valid value

**Factory setting**

Stop
Additional information

Description

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

Selection

- Stop
  The totalizer is stopped in the event of a device alarm.

- Actual value
  The totalizer continues to count based on the actual (current) measured value; the device alarm is ignored.

- Last valid value
  The totalizer continues to count based on the last valid measured value before the device alarm occurred.

3.7 "Diagnostics" submenu

Navigation  

Expert → Diagnostics

- Actual diagnostics (0691)  →  155
- Previous diagnostics (0690)  →  155
- Operating time from restart (0653)  →  156
- Operating time (0652)  →  156
- Diagnostic list  →  157
- Event logbook  →  161
- Device information  →  163
- Main electronic module  →  167
- Sensor electronic module (ISEM)  →  168
- Display module  →  169
- Heartbeat Technology  →  177
- Simulation  →  178
Actual diagnostics

Navigation

Expert → Diagnostics → Actual diagnos. (0691)

Prerequisite

A diagnostic event has occurred.

Description

Displays the current diagnostic message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.

User interface

Symbol for diagnostic behavior, diagnostic code and short message.

Additional information

Display

Additional pending diagnostic messages can be viewed in the Diagnostic list submenu (→ 157).

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

Example

For the display format:

F271 Main electronics failure

Timestamp

Navigation

Expert → Diagnostics → Timestamp

Description

Displays the operating time when the current diagnostic message occurred.

User interface

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

Additional information

Display

The diagnostic message can be viewed via the Actual diagnostics parameter (→ 155).

Example

For the display format:

24d12h13m00s

Previous diagnostics

Navigation

Expert → Diagnostics → Prev.diagnostics (0690)

Prerequisite

Two diagnostic events have already occurred.

Description

Displays the diagnostic message that occurred before the current message.

User interface

Symbol for diagnostic behavior, diagnostic code and short message.
### Additional information

**Display**

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

**Example**

For the display format:

F271 Main electronics failure

---

### Timestamp

**Navigation**

Expert → Diagnostics → Timestamp

**Description**

Displays the operating time when the last diagnostic message before the current message occurred.

**User interface**

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

**Additional information**

**Display**

The diagnostic message can be viewed via the Previous diagnostics parameter (→  155).

**Example**

For the display format:

24d12h13m00s

---

### Operating time from restart

**Navigation**

Expert → Diagnostics → Time fr. restart (0653)

**Description**

Use this function to display the time the device has been in operation since the last device restart.

**User interface**

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

---

### Operating time

**Navigation**

Expert → Diagnostics → Operating time (0652)

**Description**

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

**User interface**

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

User interface

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

3.7.1 "Diagnostic list" submenu

Navigation

Expert → Diagnostics → Diagnostic list

<table>
<thead>
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<th>Diagnostic list</th>
</tr>
</thead>
<tbody>
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<td>Diagnostics 1 (0692) → 157</td>
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<tr>
<td>Diagnostics 2 (0693) → 158</td>
</tr>
<tr>
<td>Diagnostics 3 (0694) → 159</td>
</tr>
<tr>
<td>Diagnostics 4 (0695) → 159</td>
</tr>
<tr>
<td>Diagnostics 5 (0696) → 160</td>
</tr>
</tbody>
</table>

Diagnostics 1

Navigation

Expert → Diagnostics → Diagnostic list → Diagnostics 1 (0692)

Description

Displays the current diagnostics message with the highest priority.

User interface

Symbol for diagnostic behavior, diagnostic code and short message.

Additional information

Display

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

Examples

For the display format:

- ΔS442 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 (→ 157).

*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:
- ΔS442 Frequency output
- ☢F276 I/O module failure

---

### Timestamp 2

#### Navigation

[ ] Expert → Diagnostics → Diagnostic list → Timestamp

#### Description
Displays the operating time when the diagnostic message with the second-highest priority occurred.

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

#### Additional information
*Display*

> The diagnostic message can be viewed via the **Diagnostics 2** parameter (→ 158).

*Example*
For the display format:
24d12h13m00s
### Diagnostics 3

**Navigation**

Expert → Diagnostics → Diagnostic list → Diagnostics 3 (0694)

**Description**

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

**User interface**

Symbol for diagnostic behavior, diagnostic code and short message.

**Additional information**

*Display*

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

*Examples*

For the display format:
- \( \text{△S442 Frequency output} \)
- \( \text{×F276 I/O module failure} \)

---

### Timestamp 3

**Navigation**

Expert → Diagnostics → Diagnostic list → Timestamp

**Description**

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

**User interface**

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

**Additional information**

*Display*

The diagnostic message can be viewed via the Diagnostics 3 parameter (→ 159).

*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 \( \text{key} \).

Examples

For the display format:
- \( \Delta \text{S442 Frequency output} \)
- \( \times \text{F276 I/O module failure} \)

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 (→ 159).

Example

For the display format:
24d12h13m00s

Diagnostics 5

Navigation

Expert → Diagnostics → Diagnostic list → Diagnostics 5 (0696)

Description

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

User interface

Symbol for diagnostic behavior, diagnostic code and short message.

Additional information

Display

Via the local display: the time stamp and corrective measures referring to the cause of the diagnostic message can be accessed via the \( \text{key} \).

Examples

For the display format:
- \( \Delta \text{S442 Frequency output} \)
- \( \times \text{F276 I/O module failure} \)
Timestamp 5

**Navigation**

\[ Expert \rightarrow Diagnostics \rightarrow Diagnostic list \rightarrow Timestamp \]

**Description**

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

**User interface**

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

**Additional information**

*Display*

The diagnostic message can be viewed via the **Diagnostics 5** parameter (→ \[ 160 \]).

*Example*

For the display format:

\[ 24d12h13m00s \]

---

3.7.2  "Event logbook" submenu

Viewing event messages

Event messages are displayed in chronological order. The event history includes both diagnostic events and information events. The symbol in front of the timestamp indicates whether the event has started or ended.

**Navigation**

\[ Expert \rightarrow Diagnostics \rightarrow Event logbook \]

```
[ Event logbook ]

Filter options (0705)  →  \[ 161 \]

[ Event list ]  →  \[ 162 \]
```

---

**Filter options**

**Navigation**

\[ Expert \rightarrow Diagnostics \rightarrow Event logbook \rightarrow Filter options (0705) \]

**Description**

Use this function to select the category whose event messages are displayed in the event list of the local display.

**Selection**

- All
- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- Information (I)
Factory setting

Additional information

Description of device parameters

Proline Prosonic Flow I 400

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Endress+Hauser

The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107:

- **F** = Failure
- **C** = Function Check
- **S** = Out of Specification
- **M** = Maintenance Required

"Event list" submenu

The **Event list** submenu is only displayed if operating via the local display. If operating via the FieldCare operating tool, the event list can be read out with a separate FieldCare module. If operating via the Web browser, the event messages can be found directly in the **Event logbook** submenu.

**Navigation**

**Event list**

Event list

**Description**

Displays the history of event messages of the category selected in the **Filter options** parameter (→ 161).

**User interface**

- For a 'Category I' event message
  Information event, short message, symbol for event recording and operating time when error occurred
- For a 'Category F, C, S, M' event message (status signal)
  Diagnostics code, short message, symbol for event recording and operating time when error occurred

**Additional information**

A maximum of 20 event messages are displayed in chronological order.
The following symbols indicate whether an event has occurred or has ended:
- • ː Occurrence of the event
- • ⪫: End of the event

Examples
For the display format:
- I1091 Configuration modified
  • ː 24d12h13m00s
- ΔS442 Frequency output
  • ː 01d04h12min30s

Additional information, such as remedial measures, can be retrieved via the ❗ key.

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

To order the Extended HistoROM application package, see the "Application packages" section of the "Technical Information" document

3.7.3 "Device information" submenu

Navigation

Expert → Diagnostics → Device info

<table>
<thead>
<tr>
<th>Device information</th>
</tr>
</thead>
<tbody>
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<td>Device tag (0011)               → 164</td>
</tr>
<tr>
<td>Serial number (0009)            → 164</td>
</tr>
<tr>
<td>Firmware version (0010)         → 164</td>
</tr>
<tr>
<td>Device name (0013)              → 165</td>
</tr>
<tr>
<td>Order code (0008)               → 165</td>
</tr>
<tr>
<td>Extended order code 1 (0023)    → 165</td>
</tr>
<tr>
<td>Extended order code 2 (0021)    → 166</td>
</tr>
<tr>
<td>Extended order code 3 (0022)    → 166</td>
</tr>
<tr>
<td>Configuration counter (0233)    → 166</td>
</tr>
<tr>
<td>ENP version (0012)              → 166</td>
</tr>
</tbody>
</table>
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*

![Device tag example](image.png)

1  Position of the header text on the display

The number of characters displayed depends on the characters used.

Serial number

**Navigation**  
Expert → Diagnostics → Device info → Serial number (0009)

**Description**  
Displays the serial number of the measuring device.

*The number can be found on the nameplate of the sensor and transmitter.*

**User interface**  
Max. 11-digit character string comprising letters and numbers.

**Additional information**  
*Description*

**Uses of the serial number**

- To identify the measuring device quickly, e.g. when contacting Endress+Hauser.
- To obtain specific information on the measuring device using the Device Viewer: www.endress.com/deviceviewer

Firmware version

**Navigation**  
Expert → Diagnostics → Device info → Firmware version (0010)

**Description**  
Displays the device firmware version installed.

**User interface**  
Character string in the format xx.yy.zz
Additional information

Display

The Firmware version is also located:
- On the title page of the Operating instructions
- On the transmitter nameplate

Device name

Navigation

Expert → Diagnostics → Device info → Device name (0013)

Description

Displays the name of the transmitter. It can also be found on the nameplate of the transmitter.

User interface

Max. 32 characters such as letters or numbers.

Factory setting

Pros. Flow 400

Order code

Navigation

Expert → Diagnostics → Device info → Order code (0008)

Description

Displays the device order code.

User interface

Character string composed of letters, numbers and certain punctuation marks (e.g. /).

Additional information

Description

The order code can be found on the nameplate of the sensor and transmitter in the "Order code" field.

The order code is generated from the extended order code through a process of reversible transformation. The extended order code indicates the attributes for all the device features in the product structure. The device features are not directly readable from the order code.

Uses of the order code

- To order an identical spare device.
- To identify the device quickly and easily, e.g. when contacting Endress+Hauser.

Extended order code 1

Navigation

Expert → Diagnostics → Device info → Ext. order cd. 1 (0023)

Description

Displays the first part of the extended order code.

On account of length restrictions, the extended order code is split into a maximum of 3 parameters.

User interface

Character string
### Extended order code 2

**Navigation**

Expert → Diagnostics → Device info → Ext. order cd. 2 (0021)

**Description**

Displays the second part of the extended order code.

**User interface**

Character string

**Additional information**

For additional information, see [Extended order code 1](#) parameter (→ 165)

### Extended order code 3

**Navigation**

Expert → Diagnostics → Device info → Ext. order cd. 3 (0022)

**Description**

Displays the third part of the extended order code.

**User interface**

Character string

**Additional information**

For additional information, see [Extended order code 1](#) parameter (→ 165)

### Configuration counter

**Navigation**

Expert → Diagnostics → Device info → Config. counter (0233)

**Description**

Displays the number of parameter modifications for the device. When the user changes a parameter setting, this counter is incremented.

**User interface**

0 to 65535

### ENP version

**Navigation**

Expert → Diagnostics → Device info → ENP version (0012)

**Description**

Displays the version of the electronic nameplate.

**User interface**

Character string
Factory setting 2.02.00

Additional information Description
This electronic nameplate stores a data record for device identification that includes more data than the nameplates attached to the outside of the device.

3.7.4 "Main electronic module + I/O module 1" submenu

Navigation Expert → Diagnostics → Mainboard module

Firmware version

| Description | Use this function to display the software revision of the module. |
| User interface | Positive integer |

Build no. software

| Description | Use this function to display the software build number of the module. |
| User interface | Positive integer |

Bootloader revision

| Description | Use this function to display the bootloader revision of the software. |
Description of device parameters

User interface Positive integer

3.7.5 "Sensor electronic module (ISEM)" submenu

**Navigation**

Expert → Diagnostics → Sens. electronic

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firmware version (0072)</td>
<td>Use this function to display the software revision of the module.</td>
</tr>
<tr>
<td>Build no. software (0079)</td>
<td>Use this function to display the software build number of the module.</td>
</tr>
<tr>
<td>Bootloader revision (0073)</td>
<td>Use this function to display the bootloader revision of the software.</td>
</tr>
</tbody>
</table>

**User interface** Positive integer
3.7.6 "Display module" submenu

**Navigation**

Expert → Diagnostics → Display module

**Firmware version**

**Navigation**

Expert → Diagnostics → Display module → Firmware version (0072)

**Description**

Use this function to display the software revision of the module.

**User interface**

Positive integer

**Build no. software**

**Navigation**

Expert → Diagnostics → Display module → Build no. softw. (0079)

**Description**

Use this function to display the software build number of the module.

**User interface**

Positive integer

**Bootloader revision**

**Navigation**

Expert → Diagnostics → Display module → Bootloader rev. (0073)

**Description**

Use this function to display the bootloader revision of the software.

**User interface**

Positive integer
3.7.7 "Data logging" submenu

**Navigation**

Expert → Diagnostics → Data logging

**Assign channel 1 (0851)** → 170

**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

**Display channel 1** → 175

**Display channel 2** → 176

**Display channel 3** → 177

**Display channel 4** → 177

---

**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 (→ 43).

**Description**

Use this function to select a process variable for the data logging channel.
**Selection**

- Off
- Volume flow
- Mass flow
- Sound velocity
- Flow velocity
- Signal strength *
- Signal to noise ratio *
- Turbulence *
- Acceptance rate *
- Temperature *
- Density *
- 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).

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

---

**Assign channel 2**

**Navigation**

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

**Prerequisite**

The [Extended HistOROM](#) application package is available.

ℹ️ The software options currently enabled are displayed in the [Software option overview](#) parameter (→ 43).

**Description**

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

**Selection**

For the picklist, see the [Assign channel 1](#) parameter (→ 170)

**Factory setting**

Off

---

* Visibility depends on order options or device settings
Assign channel 3

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

Prerequisite  
The Extended HistoROM application package is available.

Description  
Use this function to select a process variable for the data logging channel.

Selection  
For the picklist, see the Assign channel 1 parameter (→ 43)

Factory setting  
Off

Assign channel 4

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

Prerequisite  
The Extended HistoROM application package is available.

Description  
Use this function to select a process variable for the data logging channel.

Selection  
For the picklist, see the Assign channel 1 parameter (→ 43)

Factory setting  
Off

Logging interval

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

Prerequisite  
The Extended HistoROM application package is available.

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

User entry  
0.1 to 3 600.0 s

Factory setting  
1.0 s
Additional information

Description

This defines the interval between the individual data points in the data log, and thus the maximum loggable process time $T_{\text{log}}$:

- If 1 logging channel is used: $T_{\text{log}} = 1000 \times t_{\text{log}}$
- If 2 logging channels are used: $T_{\text{log}} = 500 \times t_{\text{log}}$
- If 3 logging channels are used: $T_{\text{log}} = 333 \times t_{\text{log}}$
- If 4 logging channels are used: $T_{\text{log}} = 250 \times t_{\text{log}}$

Once this time elapses, the oldest data points in the data log are cyclically overwritten such that a time of $T_{\text{log}}$ always remains in the memory (ring memory principle).

Example

If 1 logging channel is used:

- $T_{\text{log}} = 1000 \times 1 \text{ s} = 1000 \text{ s} \approx 15 \text{ min}$
- $T_{\text{log}} = 1000 \times 10 \text{ s} = 10000 \text{ s} \approx 3 \text{ h}$
- $T_{\text{log}} = 1000 \times 80 \text{ s} = 80000 \text{ s} \approx 1 \text{ d}$
- $T_{\text{log}} = 1000 \times 3600 \text{ s} = 3600000 \text{ s} \approx 41 \text{ d}$

Clear logging data

Navigation

Expert → Diagnostics → Data logging → Clear logging (0855)

Prerequisite

The Extended HistoROM application package is available.

Description

Use this function to clear the entire logging data.

Selection

- Cancel
- Clear data

Factory setting

Cancel

Additional information

Selection

- Cancel
  The data is not cleared. All the data is retained.
- Clear data
  The logging data is cleared. The logging process starts from the beginning.

Data logging

Navigation

Expert → Diagnostics → Data logging → Data logging (0860)

Description

Use this function to select the data logging method.

Selection

- Overwriting
- Not overwriting
Description of device parameters

Proline Prosonic Flow I 400

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

---

**Data logging control**

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

**Prerequisite**
In the **Data logging** parameter (→ 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

Navigation

Expert → Diagnostics → Data logging → Data log. status (0858)

Prerequisite

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

Description

Displays the measured value logging status.

User interface

- Done
- Delay active
- Active
- Stopped

Factory setting

Done

Additional information

Selection

- Done
  Measured value logging has been performed and completed successfully.
- Delay active
  Measured value logging has been started but the logging interval has not yet elapsed.
- Active
  The logging interval has elapsed and measured value logging is active.
- Stopped
  Measured value logging is stopped.

Entire logging duration

Navigation

Expert → Diagnostics → Data logging → Logging duration (0861)

Prerequisite

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

Description

Displays the total logging duration.

User interface

Positive floating-point number

Factory setting

0 s

"Display channel 1" submenu

Navigation

Expert → Diagnostics → Data logging → Displ.channel 1

Display channel 1

Display channel 1 → 176
**Display channel 1**

**Navigation**

- Expert → Diagnostics → Data logging → Displ. channel 1

**Prerequisite**

- The **Extended HistoROM** application package is available.
- The software options currently enabled are displayed in the Software option overview parameter (→ 43).

**Description**

Displays the measured value trend for the logging channel in the form of a chart.

**Additional information**

- ![Chart of a measured value trend](image)

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

**“Display channel 2” submenu**

**Navigation**

- Expert → Diagnostics → Data logging → Displ. channel 2

**Display channel 2**

**Navigation**

- Expert → Diagnostics → Data logging → Displ. channel 2

**Prerequisite**

- A process variable is specified in the Assign channel 2 parameter.

**Description**

See the Display channel 1 parameter → 176
“Display channel 3” submenu

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

**Display 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**

**Prerequisite**
A process variable is specified in the Assign channel 4 parameter.

**Description**
See the Display channel 1 parameter → 176

3.7.8  “Heartbeat” submenu

For detailed information on the parameter descriptions for the Heartbeat Verification+Monitoring: Special Documentation for the device → 7

**Navigation**
Expert → Diagnostics → HBT
3.7.9 "Simulation" submenu

**Navigation**  
Expert → Diagnostics → Simulation

---

### Assign simulation process variable

**Navigation**  
Expert → Diagnostics → Simulation → Assign proc.var. (1810)

**Description**  
Use this function to select a process variable for the simulation process that is activated. The display alternates between the measured value and a diagnostic message of the 'Function check' category (C) while simulation is in progress.
Selection

- Off
- Volume flow
- Mass flow
- Sound velocity
- Flow 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 (→ 179).

Process variable value

Navigation

Expert → Diagnostics → Simulation → Proc. var. value (1811)

Prerequisite

A process variable is selected in the Assign simulation process variable parameter (→ 178).

Description

Use this function to enter a simulation value for the selected process variable. Subsequent measured value processing and the signal output use this simulation value. In this way, users can verify whether the measuring device has been configured correctly.

User entry

Depends on the process variable selected

Factory setting

0

Additional information

User entry

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

Status input simulation 1

Navigation

Expert → Diagnostics → Simulation → Status inp.sim 1 (1355–1)

Prerequisite

For the following order code:
‘Output; input’, option I‘4–20mA HART, 2x pul./freq./switch output; status input“

Description

Use this function to switch simulation of the status input on and off. The display alternates between the measured value and a diagnostic message of the ‘Function check’ category (C) while simulation is in progress.

Selection

- Off
- On

* Visibility depends on order options or device settings
Factory setting

Off

Additional information

Description

The desired simulation value is defined in the Input signal level parameter (→ 180).

Selection

- Off
  Simulation for the status input is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Simulation for the status input is active.

Input signal level 1

Navigation

Expert → Diagnostics → Simulation → Signal level 1 (1356–1)

Prerequisite

In the Status input simulation parameter (→ 179), the On option is selected.

Description

Use this function to select the signal level for the simulation of the status input. In this way, users can verify the correct configuration of the status input and the correct function of upstream feed-in units.

Selection

- High
- Low

Current output 1 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 (→ 181).

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**

**Navigation**
- Expert → Diagnostics → Simulation → Freq.outp 1 to n sim. (0472–1 to n)

**Prerequisite**
In the **Operating mode** parameter (→  94), the **Frequency** option is selected.

**Description**
Use this function to switch simulation of the frequency output on and off. The display alternates between the measured value and a diagnostic message of the 'Function check' category (C) while simulation is in progress.

**Selection**
- Off
- On

**Factory setting**
Off

**Additional information**
- **Description**
  - The desired simulation value is defined in the **Frequency value 1 to n** parameter.
  - **Selection**
    - Off
      - Frequency simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
    - On
      - Frequency simulation is active.

---

**Frequency output 1 to n value**

**Navigation**
- Expert → Diagnostics → Simulation → Freq.outp 1 to n val. (0473–1 to n)

**Prerequisite**
In the **Frequency simulation 1 to n** parameter, the **On** option is selected.
Description
Use this function to enter a frequency value for the simulation. In this way, users can verify the correct adjustment of the frequency output and the correct function of downstream switching units.

User entry
0.0 to 12 500.0 Hz

Pulse output simulation 1 to n

Navigation
Expert → Diagnostics → Simulation → Puls.outp.sim. 1 to n (0458–1 to n)

Prerequisite
In the Operating mode parameter (→ 94), the Pulse option is selected.

Description
Use this function to switch simulation of the pulse output on and off. The display alternates between the measured value and a diagnostic message of the “Function check” category (C) while simulation is in progress.

Selection
- Off
- Fixed value
- Down-counting value

Factory setting
Off

Additional information
Description
The desired simulation value is defined in the Pulse value 1 to n parameter.

Selection
- Off
  Pulse simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Fixed value
  Pulses are continuously output with the pulse width specified in the Pulse width parameter (→ 97).
- Down-counting value
  The pulses specified in the Pulse value parameter (→ 182) are output.

Pulse value 1 to n

Navigation
Expert → Diagnostics → Simulation → Pulse value 1 to n (0459–1 to n)

Prerequisite
In the Pulse output simulation 1 to n parameter, the Down-counting value option is selected.

Description
Use this function to enter a pulse value for the simulation. In this way, users can verify the correct adjustment of the pulse output and the correct function of downstream switching units.

User entry
0 to 65 535
Switch output simulation 1 to n

Navigation

Expert → Diagnostics → Simulation → Switch sim. 1 to n (0462–1 to n)

Prerequisite

In the Operating mode parameter (→ 94), the Switch option is selected.

Description

Use this function to switch simulation of the switch output on and off. The display alternates between the measured value and a diagnostic message of the "Function check" category (C) while simulation is in progress.

Selection

- Off
- On

Factory setting

Off

Additional information

The desired simulation value is defined in the Switch state 1 to n parameter.

Selection

- Off
  Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- On
  Switch simulation is active.

Switch state 1 to n

Navigation

Expert → Diagnostics → Simulation → Switch state 1 to n (0463–1 to n)

Description

Use this function to select a switch value for the simulation. In this way, users can verify the correct adjustment of the switch output and the correct function of downstream switching units.

Selection

- Open
- Closed

Additional information

Selection

- Open
  Switch simulation is switched off. The device is in normal measuring mode or another process variable is being simulated.
- Closed
  Switch simulation is active.
Device alarm simulation

**Navigation**

Expert → Diagnostics → Simulation → Dev. alarm sim. (0654)

**Description**

Use this function to switch the device alarm on and off.

**Selection**

- Off
- On

**Factory setting**

Off

**Additional information**

Description

The display alternates between the measured value and a diagnostic message of the ‘Function check’ category (C) while simulation is in progress.

Diagnostic event category

**Navigation**

Expert → Diagnostics → Simulation → Event category (0738)

**Description**

Use this function to select the category of the diagnostic events that are displayed for the simulation in the Diagnostic event simulation parameter (→ 184).

**Selection**

- Sensor
- Electronics
- Configuration
- Process

**Factory setting**

Process

Diagnostic event simulation

**Navigation**

Expert → Diagnostics → Simulation → Diag. event sim. (0737)

**Description**

Use this function to select a diagnostic event for the simulation process that is activated.

**Selection**

- Off
- Diagnostic event picklist (depends on the category selected)

**Factory setting**

Off

**Additional information**

Description

For the simulation, you can choose from the diagnostic events of the category selected in the Diagnostic event category parameter (→ 184).
4 Country-specific factory settings

4.1 SI units

Not valid for USA and Canada.

4.1.1 System units

<table>
<thead>
<tr>
<th>System</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>kg</td>
</tr>
<tr>
<td>Mass flow</td>
<td>kg/h</td>
</tr>
<tr>
<td>Volume</td>
<td>m³</td>
</tr>
<tr>
<td>Volume flow</td>
<td>m³/h</td>
</tr>
<tr>
<td>Velocity</td>
<td>m/s</td>
</tr>
<tr>
<td>Temperature</td>
<td>°C</td>
</tr>
</tbody>
</table>

4.1.2 Output current span

| Current output 1 | 4 to 20 mA NAMUR |

4.2 US units

Only valid for USA and Canada.

4.2.1 System units

<table>
<thead>
<tr>
<th>System</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>lb</td>
</tr>
<tr>
<td>Mass flow</td>
<td>lb/min</td>
</tr>
<tr>
<td>Volume</td>
<td>ft³</td>
</tr>
<tr>
<td>Volume flow</td>
<td>ft³/min</td>
</tr>
<tr>
<td>Velocity</td>
<td>ft/s</td>
</tr>
<tr>
<td>Temperature</td>
<td>°F</td>
</tr>
</tbody>
</table>

4.2.2 Output current span

| Current output 1 | 4 to 20 mA US |
# 5 Explanation of abbreviated units

## 5.1 SI units

<table>
<thead>
<tr>
<th>Process variable</th>
<th>Units</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>cm³, dm³, m³</td>
<td>Cubic centimeter, cubic decimeter, cubic meter</td>
</tr>
<tr>
<td></td>
<td>ml, l</td>
<td>Milliliter, liter</td>
</tr>
<tr>
<td>Volume flow</td>
<td>dm³/s, dm³/min, dm³/h, dm³/d</td>
<td>Cubic decimeter/time unit</td>
</tr>
<tr>
<td></td>
<td>m³/s, m³/min, m³/h, m³/d</td>
<td>Cubic meter/time unit</td>
</tr>
<tr>
<td></td>
<td>l/s, l/min, l/h, l/d</td>
<td>Liter/time unit</td>
</tr>
<tr>
<td>Mass</td>
<td>g, kg, t</td>
<td>Gram, kilogram, metric ton</td>
</tr>
<tr>
<td>Mass flow</td>
<td>g/s, g/min</td>
<td>Gram/time unit</td>
</tr>
<tr>
<td></td>
<td>kg/s, kg/min, kg/h, kg/d</td>
<td>Kilogram/time unit</td>
</tr>
<tr>
<td></td>
<td>t/h, t/d</td>
<td>Metric ton/time unit</td>
</tr>
<tr>
<td>Density</td>
<td>kg/l</td>
<td>Kilogram/liter</td>
</tr>
<tr>
<td>Velocity</td>
<td>m/s</td>
<td>Meter/time unit</td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>m²/s</td>
<td>Square meter/second</td>
</tr>
<tr>
<td>Temperature</td>
<td>°C, K</td>
<td>Celsius, Kelvin</td>
</tr>
<tr>
<td>Length</td>
<td>mm</td>
<td>Millimeters</td>
</tr>
<tr>
<td>Time</td>
<td>m, h, d, y</td>
<td>Minute, hour, day, year</td>
</tr>
</tbody>
</table>

## 5.2 US units

<table>
<thead>
<tr>
<th>Process variable</th>
<th>Units</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>ft³</td>
<td>Cubic foot</td>
</tr>
<tr>
<td>Volume flow</td>
<td>ft³/s, ft³/min, ft³/h, ft³/d</td>
<td>Cubic foot/time unit</td>
</tr>
<tr>
<td>Mass</td>
<td>oz, lb, STon</td>
<td>Ounce, pound, standard ton</td>
</tr>
<tr>
<td>Mass flow</td>
<td>oz/s, oz/min</td>
<td>Ounce/time unit</td>
</tr>
<tr>
<td></td>
<td>lb/s, lb/min, lb/h, lb/d</td>
<td>Pound/time unit</td>
</tr>
<tr>
<td></td>
<td>STon/h, STon/d</td>
<td>Standard ton/time unit</td>
</tr>
<tr>
<td>Density</td>
<td>lb/ft³</td>
<td>Pound/cubic foot</td>
</tr>
<tr>
<td>Velocity</td>
<td>ft/s</td>
<td>Foot/time unit</td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>cSt</td>
<td>Centistokes</td>
</tr>
<tr>
<td>Temperature</td>
<td>°F, °R</td>
<td>Fahrenheit, Rankine</td>
</tr>
<tr>
<td>Length</td>
<td>in</td>
<td>Inch</td>
</tr>
<tr>
<td>Time</td>
<td>m, h, d, y</td>
<td>Minute, hour, day, year</td>
</tr>
<tr>
<td></td>
<td>am, pm</td>
<td>Ante meridiem (before midday), post meridiem (after midday)</td>
</tr>
</tbody>
</table>
## 5.3 Imperial units

<table>
<thead>
<tr>
<th>Process variable</th>
<th>Units</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>bbl (imp;beer)</td>
<td>Barrel (beer)</td>
</tr>
</tbody>
</table>
| 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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  0% bargraph value 7 (0154) ......................... 26
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